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PAGE 74

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Entered as Second Class Matter Sept. 15, 1903, at the Post Office at Chicago, Illinois, under Act of March 3rd, 1879.

Entered as Second Class Matter at the Post Office Department, Canada.

Published monthly by POPULAR MECHANICS CO.

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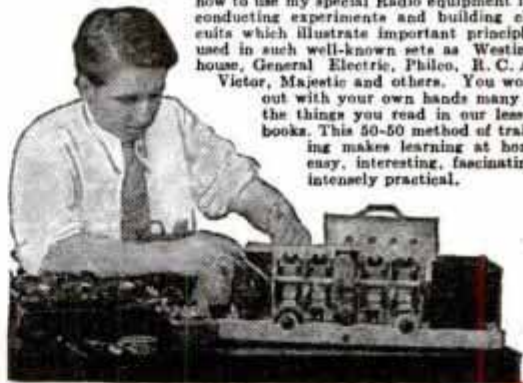


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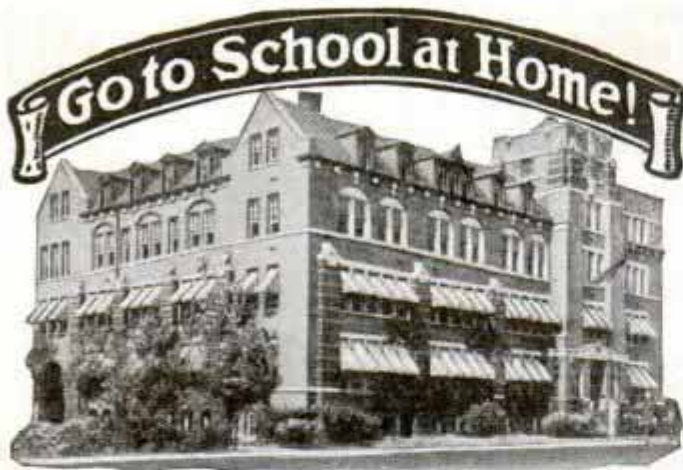
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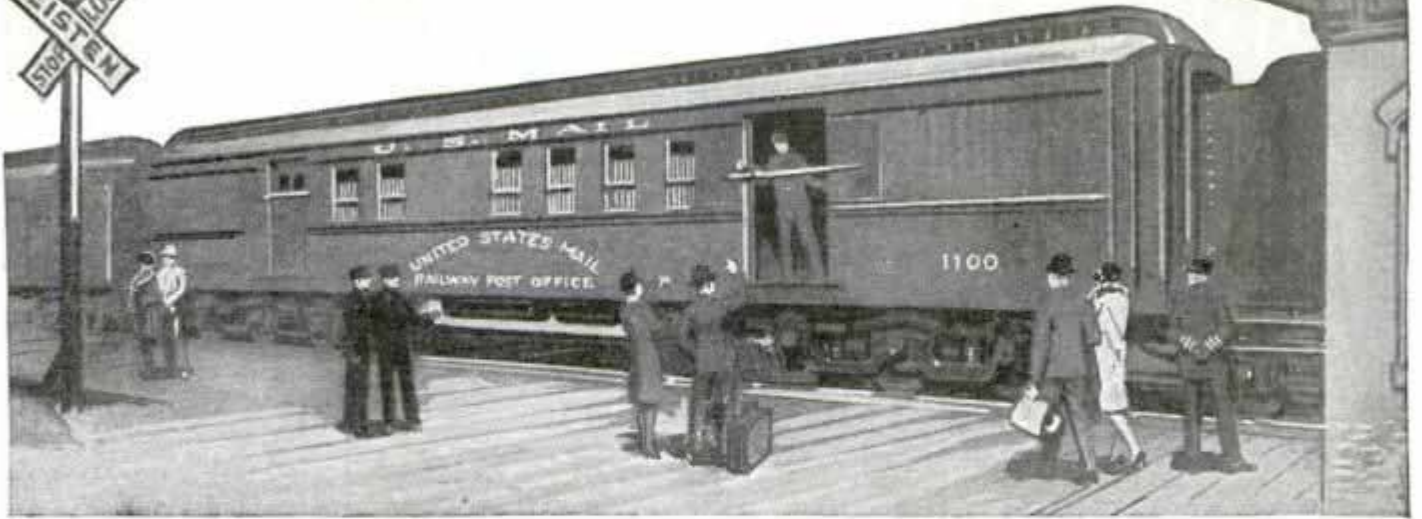
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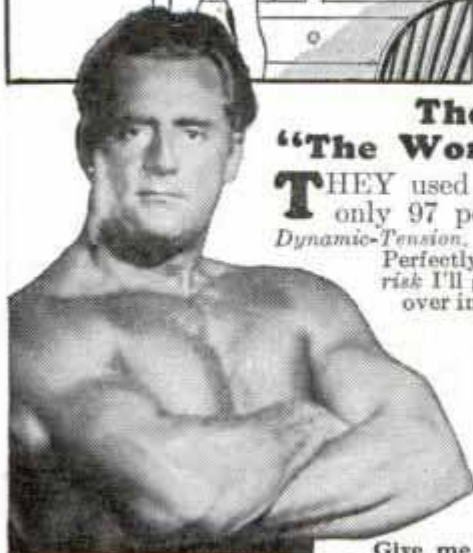
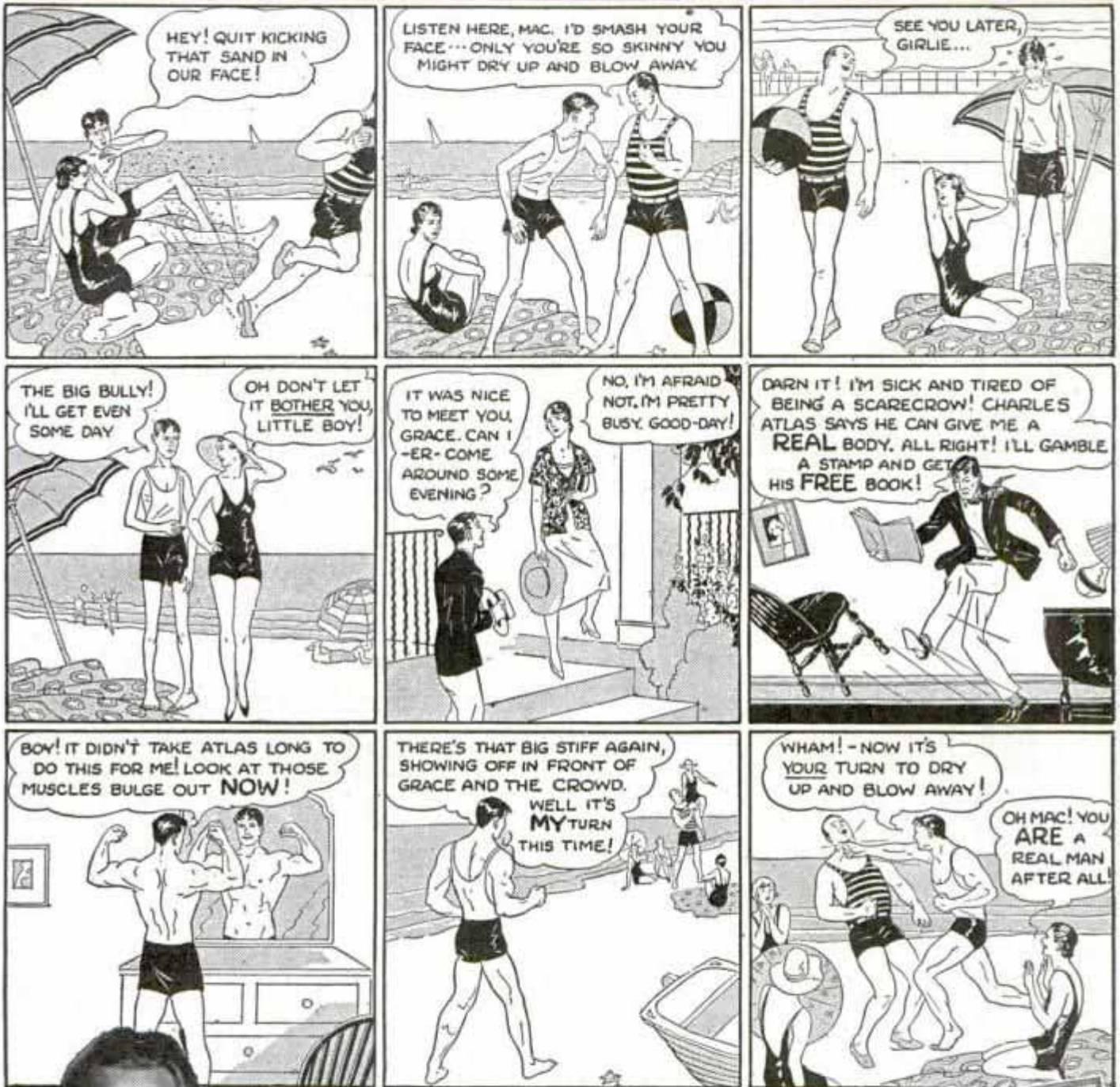
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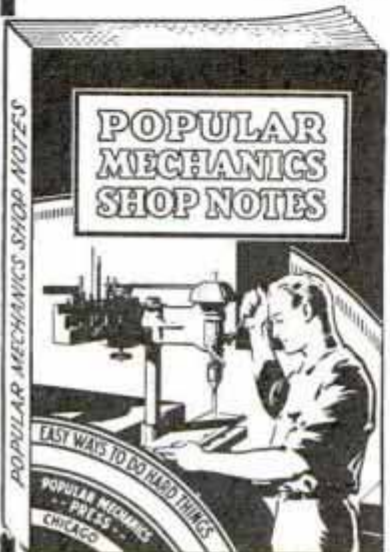
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START Little business anywhere. Everything furnished. No canvassing. Maywood, PM.923 Broadway, New York.

PROFITABLE Manufacturing is easy with Miller's foremost formulas for making latest advertised specialties all lines including plastic rubber tire spread, pyroil grafex, drybrite wax, shine stix, jewelmist, boltzfer mothpak, skeetox, puritor magic dish wash, cheese chips, big deal bottle flavors. No machinery. Investment small. Profits great. Literature free. Miller, Chemist, 1707 PMB, Tampa, Fla.

ARTIFICIAL Marble sanitary flooring, instructions covering wood or cement flooring 1/2 inch thick, fireproof, all colors, low cost. Ornamental casting, concrete plaster papier-mache decorations, garden furniture, statuary, flexible molds, particulars and illustrations free. Chris. Mahler, Elmont, N. Y.

CHEMICAL Expert will furnish formulas and trade secrets. All lines. Lists free. W. L. Cummings, Ph. D., 228 Gordon Ave., Syracuse, N. Y.

CHEMISTRY

FREE! Christmas science catalog and chemistry booklet. P-5049 Bernard, Chicago.

"AMATEUR Scientist," Shamokin, Pennsylvania. Interesting non-technical magazine. 25c. Yearly subscription, \$1.00.

CHEMICALS, Laboratory glassware and apparatus. Catalog CP. Biological Supply Co., 1176 Mt. Hope Ave., Rochester, N. Y.

CHEMICAL Experimenters' Handbook, hundreds of experiments, illustrated, 50c postpaid. Experiment booklet 15c. Chemical catalogue 10c. General Chemical Co., Reading, Penna.

FORMULAS AND TRADE SECRETS

RELIABLE Information any subject—Formulas, \$1.00. American Business, 79 Madison Ave., New York.

CHEMICAL Analysis, any product, low prices. Send for Master Chemists formula list, it's free. Electro-Thermo Works, Peoria, Ill.

SAWDUST Chemicals make marble flooring. Direction \$1. Universal Supply Co., 777 Boulevard, Bayonne, N. J.

"CHEESE Chips" formula, \$1.00. "Corn Chips," \$1.00. "Metallic Liquid" (cold solder) 50c. "Plastic Leather," 50c. "Rug Shampoo," 25c. W. J. Lynch, 119-D, North Fifth, Springfield, Ill.

ANY Formula three dimes or money refunded. Org Laboratories, Tampa, Fla.

TESTED Formulas. Newest—guaranteed. Catalog free. Grinstead Laboratory, Edwardsville, Ill.

SUCCEED With your own products. Learn how. Formulas, process, analytical service. Formula catalog free. B. Thaxly Company, Washington, D. C.

15 FORMULAS For 50c. Donald Greenwood, 965 River, Southbridge, Mass.

NEWEST Guaranteed formulas. Catalogs free. Special prices. Leads. Gibson, Chemist, BD-4702 N. Racine, Chicago.

FORMULAS—32 different solders 50c. G. Pennington, Rt. 1, Robbinsdale, Minn.

FORMULAS, Practical plans. Particulars free. M-Koller, 231 Hamilton, Trenton, New Jersey.

FREE—Formula literature, home manufacturing processes. Thomson, 7309 Pingree, Chicago.

FORMULAS, All kinds. Guaranteed. Catalog free. Kemico, 31, Parkridge, Ill.

FOREMOST Formulas—Authentic, practicable, and inexpensive. Successful manufacturers everywhere using them. All lines including latest advertised specialties. Literature free. Miller, Chemist, 1707 PMB, Tampa, Fla.

3,000 FORMULAS, Facts, processes, trade secrets in Dr. Brown's Book of Formulas—380 pages. Price, postpaid \$1.00. Ogilvie Publishing Co., 57 Rose Street, Dept. 25, New York.

FORMULAS, Business plans. Literature free. Belfort, 4042 N. Keeler, Chicago.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950 W. Broad, Richmond, Va.

AGENTS WANTED

DISTRIBUTORS—Agents: Patented water pump tightening support for Ford model A and AA. Stops leaks, end play and wear. Sample 55c. F. P. Madress Co., 302 E. Vine St., Kalamazoo, Mich.

BEEMAN Co., 46 S. Broadway, Denver, Colo., guarantees savings 20 to 50% automobile, gasoline and oil bills. Agents wanted. Write today.

300% PROFIT Selling new "20-in-1" kitchen utensil. Retail 25c. Costs you \$1.00 a dozen. Sample 10c. New Method Co., Desk PM-1, Bradford, Pa.

MOVALL—Quick polisher. Glass, silver, etc. Distributors wanted. Murval Products, Drexel Building, Philadelphia.

"MYSTIK-LOK," baffling practical key carrier opens new profitable agents' field. Sample and solution 25c coin. Cloral Service, Dept. P.M. 129 East Third Street, Cincinnati, Ohio.

SELLS Like hot cakes. Big profits. Every woman buys. New soapflakes perfumes clothes lastingly, when washing. Sunset Laboratories, Lynbrook, N. Y.

If you want a wonderful opportunity to make \$8.50 a day and get a new Ford Eight Tudor sedan besides, send me your name immediately. No contest or lottery. Particulars free. Albert Mills, 4440 Menmouth, Cincinnati, O.

NOVELTY Lace transparent stenocuffs. 180,000 pairs sold last winter. Season is on. You should average \$20.00 daily. Sample and plan 25c coin. None free. Sameco Corporation, Brockton, Mass.

SUCCEED With your own products. Learn how. Formulas, processes, analytical service. Formula catalog free. B. Thaxly Company, Washington, D. C.

CASH Income daily resilvering mirrors at home. Replating autoparts, tableware, etc. Outfit furnished. Write Sprinkle, Plater, 128, Marion, Ind.

100% PROFIT In the mystery cigar lighter. No flint or friction. What makes it light? No wind can blow it out. Retail 25c. Sample and sales plan 25c. New Method Company, Desk PM-1, New Method Bldg., Bradford, Pa.

STRANGE Ironing cord. Prevents scorching. Saves electricity. Abolishes kinks, snarls. Approved by Good Housekeeping. For telephones also. 166% profit. Samples furnished. Neverknot, Dept. 1-A, 4593 Ravenswood, Chicago.

1000 BARGAINS—Drygoods, notions, toiletries. Agents—undersell stores. Free catalogue. Jobbers, 504-Z S. Crawford, Chicago.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name, address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

SALES Kit free! Collins' 2 new deals. Samples and sales kit free. Write for free offer and catalog of 150 other fast sellers. Collins Chemical Co., Dept. PM-1, Memphis, Tenn.

FIFTEEN-SECOND Demonstration sells device that makes auto parking easy. 100% profit. Box 415, Lancaster, Penna.

MANUFACTURER Desires direct selling representatives, whole or part time. Every city, village, hamlet in United States. Write for particulars on our latest revolutionary patented novelty. Sells on sight. Hub Research Corporation, 279 Newbury Street, Boston.

AMAZING Cleaner. Cleans everything. Sample free. Bestever, 5007P Irving Park, Chicago.

AGENTS, Mechanics—Make most money installing Aero oil burners. Fit any stove. Burn any old oil. They satisfy where others fail. \$9.75 up. Send 6c stamps for illustrated catalog with net prices on parts and outfits. Bates Aero, 214-Sigel, Chicago.

300% PROFITS Demonstrating Latex rubber bandage kits to homes, offices, shops and factories. Small size 90c per dozen. Tie presser free with each order. Manufacturers, 434 St. James Place, Chicago.

\$2.60 WORTH Of daily food necessities for only \$1.00. Retail! This is not a flavor deal. Get details now! M. Kennedy Coffee Co., Kokomo, Ind.

AGENTS: Make 600% profit selling cleaner, polish, shampoo, vanilla, tonic, laxative, spot remover, etc. Your name on labels. Free sample. Standard Chemical, Dept. E-14, Dayton, Ohio.

CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 8A.

\$2.00 HOURLY With new scientific cream that mends all cloth easily, quickly, invisibly, without needle and thread. Stands laundering. Free sample. Sew-No-More Co., Dept. P-744, Cincinnati, O.

SPARE Time at home could earn you money. Interested? Hetzel, 802 Garden, Hartford, Conn.

TURBO-GRINDER—Water power household sharpener. Grinds knives, tools. Big demand. 100% profit. Retail \$2.50. Get details. Hester Products, 1419 So. James-town, Tulsa, Okla.

MAKE Money. Collect \$6, keep \$5. Two quick selling dollar per month "hard times" life policies. Write the Fidelity Mutual Benefit Association, Rockford, Ill.

AGENTS—Sell no glare. Ray-O-Light G. E. Mazda bulb sets to auto owners. Perfect fog-storm light—big profits—fast sales. Sample set \$1.50—Special wholesale price to representatives. Ray-O-Light Mfg. Co., Syracuse, N. Y.

THE "New Deal" Roosevelt phantom reproduction, combining penmanship inaugural speech. Sells fast! Davis, 1308-A Broadway, Cincinnati.

PROFITS on your own goods. Make, sell them. Guaranteed formulas. Special prices, leads. Catalogs free. Gibson, Chemist, BD-4702 N. Racine, Chicago.

FREE Wholesale catalogue. World's lowest prices, needle books, threaders, run-menders, blades, toilet deodorizers, scissors sharpeners, comb cleaners, etc. Paty Needle Co., Somerville, Mass.

"SOBERINE"—Guaranteed to sober an intoxicated person in ten minutes. Agents make big money selling druggists, hotels, etc. Send \$1.00. Soberine, 312 Jefferson, Allentown, Penna.

FREE To mail-order aspirants our new pamphlet: Experiences of An Old-Timer. Send dime for postage. Let's get acquainted. Mercur Co., 225 W. 46th Str., Suite 219, New York City.

AGENTS Wanted—For new style piston and ring nationally advertised. All-Power Piston & Ring Co., 1001 E. First Street, Los Angeles.

AGENTS—Hop on our fast selling specialties. We have them. You sell them. Price list free. Texide Chicago Sales, 538-A S. Dearborn, Chicago.

SUEDE Raincoats, jackets, union made. Low price. Selling fast. Commission advanced. Beautiful outfit free. Goodyear, 8-714 Roosevelt, Chicago.

JUST Out! Women wild about new dainty colored perfume sticks. Replaces liquid perfume. Amazing profits. Sample 10c (coin, stamps). Garden City Laboratory, A-550 W. Roosevelt, Chicago.

OUTSTANDING Money-Making line. Quick profitable repeat sales. Free details. Sample 10c. Mint Co., Baroda, Mich.

BIG Money and fast sales. Every owner buys gold initials for his auto. You charge \$1.50; make \$1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 40, East Orange, N. J.

BEAUTIFUL Gold window sign letters. Penny each, any size! 2500% profit. Easily applied. Samples, complete working equipment free! Atlas Sign Works, 7941 Halsted, Chicago.

MEXICAN Hand made leather pictures. Send 25c (stamps) for \$1.00 worth sample and details. Mexican Art, Apartado 1593, Mexico City.

OUR Wonderful luminous crucifix shines brilliantly in the dark. Sells on first demonstration. Handsome profits. Hannan Co., 2539 S. State St., Chicago.

A BUSINESS Of your own making sparkling glass name plates, numbers, checkerboards, medallions, signs. Booklet and sample mailed free. E. Palmer, 512, Wooster, Ohio.

SOMETHING New, electric bulb attachment perfumes home. Purifies air. Destroys cooking odors. Attractive package. Quick seller. Sample 25c. Werner Mfg. Co., 172 Court St., Brooklyn, N. Y.

FREE Booklet describes 87 plans for making \$20-\$100 weekly, in home or office, business of your own. Elite Co., 214 Grand St., New York.

SURE Fire Xmas sellers. California perfumed beads. Knockout. No competition. Mission, 2328 W. Pico, Los Angeles, Calif.

BIG Money applying gold initials on automobiles. Easiest thing today. No experience needed. Free samples. "Raico," 1084 Washington, Boston, Mass.

AGENTS—Opportunity to make money; book containing 87 successful business plans; home or office; send for free introductory booklet. Elite Co., 214 Grand St., New York.

FREE Literature describing many money-making plans. Belfort, 4042 N. Keeler, Chicago.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

PROFITABLE Home business. Legitimate. No canvassing. Maywood Publishers, P-923 Broadway, New York.

GENUINE Gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

AGENTS. Smash go prices. Santos coffee 12c lb. 4 oz. vanilla 8½¢; \$1.00 size tonic 14¢; razor blades 5 for 8½¢; 100 sticks chewing gum 12¢; Christmas cards, 21 in box, 14c. 150 other bargains. Experience unnecessary. Write Carnation Co., P.O. St. Louis, Missouri.

NAME Plates, number plates, signs, etc., hand engraved, easily sold with large profit. Brett Bros., Winthrop, Mass.

MAN In each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H. Decatur, Ill.

HIGH-GRADE SALESMEN WANTED

BE Independent. Own your business; experience unnecessary, selling \$10,000 accidental death, \$50 accident; \$25 kick weekly benefits—\$10.00 yearly. Other amounts proportionate. Guaranteed steady renewal income. \$250,000 deposited insurance department. Universal Policy, 716-A Lefcourt Bldg., Newark, N. J.

LOSING Half your gasoline? New Improved Stransky Gas-saver; more efficient than ever; big profits. Free sample offer. Write quick. Stransky, Dept. 30, Pukwana, South Dakota.

DON'T Be a job hunter—start your own business on our capital; no hard times, no lay-offs, always your own boss; hundreds average \$5,000 annual sales year after year; we supply stocks, equipment on credit, some 235 home necessities; selling experience unnecessary; wonderful opportunity to own pleasant, dignified work backed by \$17,000,000 world-wide industry; for complete information write Rawleigh Co., Dept. A-U-PPM, Freeport, Ill.

MEN—Biggest seller in years. Practical slicing machine. Only low priced machine with sensational food carrier. \$4.95 to \$9.95. Food stores, restaurants, road stands buy. Big cash profits. Write for details. P. Popular, 3 East 17th, New York.

TRADE? Buy? Sell? Can you obtain more people to list an article in our files for the purpose of exchanging, selling or buying? We offer a 90 day checking service from our files and notify nearest parties who might benefit. Cost customer only \$2.00 for 3 months service. Nets representative 50% profit. To prove you mean business send 50c for order blanks, instructions, etc. Deduct from first order. National Trading System, Salisbury, Mass.

NEW Specialty—Sells every business and professional man. Four \$15 sales daily pay \$280 weekly. Foyer cleared \$4920 in three months. Write, F. E. Armstrong, President, Dept. PM, Mobile, Ala.

FINANCIAL Independence and income for life through constant, ever-increasing repeat commissions without call backs. The business made rich by the depression. Business and professional men buy on sight. 400% initial profit. Commonwealth-F Co., 508 S. Dearborn, Chicago.

HERE'S An unusual opportunity to make \$200 monthly extra. Nationally known line work uniforms, coveralls, jackets, pants, shirts, caps. Advertising embroidered. Every business a prospect. Outfit free. Write Master Co., Dept. 412, Ligonier, Ind.

WANDERWEAR Tie saver (new). We want 1000 men to sell them on display cards to dealers. One card \$1.50. Sample 25c. Wanderwear, Dept. PM, P.O. Box 333, La Verne, Calif.

IT Prevents snow, rain, sleet from sticking on windshields. Costs but little to make. Big demand, large profit, valuable instructions \$2.00. Parks-Co., 1010 Armstrong, Kansas City, Kans.

BUILD Steady income! \$5.00 profit on \$6.00 sale. Up to \$25.00 daily easy. New plan protection at cost. All ages. No medical examinations. Not insurance. Experience unnecessary. Outfit free. Provident Aid Society, Dept. M-508, South Bend, Ind.

STRANGE Chemical sponge cleans wallpaper like magic. Banishes housecleaning drudgery. Women amazed. Agents cleaning up. Outfit free. Kristee Mfg. Co., Box 1431, Akron, Ohio.

BIG Money in tire patches. Sell new auto tire patch to service stations, garages, etc. Tiger-Grip patches guaranteed 10,000 miles. \$75 weekly for salesmen or distributors. Protected territory. Write Economy Rubber Co., 672 Burkhardt, Dayton, Ohio.

WONDERFUL Seller. Samples of work free. F. Bold, 5715 Morgan Ave., Los Angeles, Calif.

EARN To \$100.00 weekly. Experience unnecessary. Sell protection at cost. Ages 1 to 80. Not insurance. Benefits to \$1,500.00 natural or accidental death. Also old age and disability benefits. Address Federal Aid Society, Cedar Rapids, Iowa.

SALESMEN—Sell indispensable guaranteed pneumatic tool to garages. Charles Wood, Highland, N. Y.

SELL Retail stores inexpensive premium deal. Excellent sideline. Monarch Company, New Albany, Ind.

ONE Demonstration will sell 1 to 100 Nonpareil reliable alarms. 50c seller. Police endorsed burglar alarms for door, window or drawer. Send 50c money order for sample. Earn up to \$25 per day. J. H. Welsh, 503 West 43 Street, New York City.

BUSINESS Stationery. Largest line. Highest quality. Quickest delivery. Biggest commissions. Free copyrighted cuts. Experience unnecessary. Outfit free. Lionel, 312 South Hamilton, Dept. 19, Chicago.

SALESMEN—Distributors: Handle new Ro-Lo. Sensational new novelty. Do the same tricks with Ro-Lo as with a lariat. Big seller. Best item on market. Appeals to all. Send dime for sample and sales plan. Braun Organization, 611 So. Paulina, Chicago.

DISTRIBUTORS: Represent manufacturer. Sell Latex—self-sealing bandage that breathes. Great demonstrator. Lowest prices. Tremendous profit. Good repeater. Exclusive territory. Neway, 3815-BJ Harrison, Chicago.

SELL Printing at your own price! Big commissions. Job work. District manager positions open. Starline, 74 Cortland, Rochester, N. Y.

SALESMAN Acquainted with garages, filling stations, to handle local business. Write Colgra, Station C, Milwaukee, Wis.

WONDERFUL Opportunity. \$20.00 daily can be earned. No experience necessary. You can start at once. Showing latest thing out. Self protection and home protection at cost. Ages 1 to 80. Not insurance but provides benefits up to \$1000.00 natural or accidental death. \$20.00 per week if sick or injured. Address National Aid Society, Dept. B, Springfield, Illinois.

PENNY Each, any size! Non-tarnishable Window sign letters. 2500% profit! Free working equipment. Samples. Record breaking offer. Atlas Sign Works, 7941 Halsted, Chicago.

BRAND New guaranteed business building plan for all retailers. Sweeping country. Inexpensive. Salesmen cleaning up. Big selling outfit free. Stimulators, Inc., 4311 Ravenswood, Chicago.

SELL Stores or homes—Scissors sharpeners, gas lighters, razor blades, aspirin, breath gum, chewing laxative, adhesive tape, polish, handkerchiefs, polishing cloths, shoe laces, many others. Attractive displays. Catalog free. Superba Co., S-303, Baltimore, Md.

SALESMEN—Four \$15.00 sales to stores net you \$40.00 daily. Sayers Systems, Est. 1895, 2801-123 Sheffield Ave., Chicago, Ill.

GIVE Profits—Up to \$170 weekly. \$500,000 punchboard firm announces new no investment plan. Season starting. K&S, 4326 Ravenswood, Chicago.

HELP WANTED

EVERYBODY Needs food! I'll start you with a regular weekly route supplying famous "Zanol" Products to steady customers. Routes pay \$27.50 weekly up. Pay begins immediately. Write Albert Mills, Route Mgr., 4441 Monmouth, Cincinnati, O.

AGENTS—Mosco corn and callous remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 44 Searle Bldg., Rochester, N. Y.

CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 8A.

MONEY In mushrooms. Earn up to \$25 weekly or more, growing in cellars or out-buildings. Booklet and particulars free. We instruct you. Adamac Mushroom Co., Dept. 147, Toronto 10, Canada.

EDUCATIONAL AND INSTRUCTION

BECOME A landscape architect. Easy to learn by mail. Wonderful opportunity for money-making. Earn while you learn. Write for free opportunity booklet and details. American Landscape School, 805 Plymouth Bldg., Des Moines, Iowa.

WORK For "Uncle Sam." Commence \$105.00 to \$135.00 month. Many examinations being held. Steady. Men-women. 18-50. Common education usually sufficient. Qualify immediately. List positions, sample questions and full particulars—free. Write today sure. Franklin Institute, Dept. T3, Rochester, N. Y.

EARN Money while learning watch repairing at home. Modern—original system. Good watch repairers always in demand and earn up to \$75 weekly. Wisconsin School of Watch Repairing, 526 E. Mason, Milwaukee, Wisconsin.

IMPROVE Your arithmetical work. How? Ask Frederick A. Smith, 2410 Smalley Court, Chicago.

REAL Jobs open—Auto mechanics earn \$35 to \$70 per week. Learn in a few weeks. Write for big free book and low tuition rates. McSweeney's, Dept. 10-1A, Cleveland, Ohio.

U. S. GOVERNMENT Positions. \$1700-\$1900 and up a year. Let our expert (former government examiner) prepare you for a position in the railway mail service, rural carrier, post office, customs and other branches. Write today for free booklet. Dept. 8, Patterson School, Rochester, N. Y.

WANTED—Men-boys, age 18-50, qualify for steady future government jobs, \$105-\$200 month. Paid vacations. Common education. Valuable information free. Write, Instruction Bureau, 101, St. Louis, Mo.

PRINTING, MULTIGRAPHING AND MIMEOGRAPHING

SUPERIOR Printing—Pricelist for stamp. Robert B. Chase, Earlville, N. Y.

250 (8½x11) **LETTERHEADS**, 250 Envelopes printed \$1.50 postpaid. Universal Printing, Bay City, Michigan.

200 **TWO-COLOR** Shipping labels, 2¼x2½, 50c. 1000-\$1.75. Admanpress, Macy, Ind.

BIG Bargain. 150 noteheads 6x9 and 125 envelopes all printed \$1.00 postpaid. Monogram Stationery Co., Station A, Worcester, Massachusetts.

5000 **ATTRACTIVE** Envelope slips, \$3.99; 10,000, \$6.75 prepaid. Circulars, letterheads, envelopes, postcards—\$2.95, 1,000; 2,000, \$4.95; 5,000, \$9.95. Samples. Goodprint, Harrisonburg, Va.

500 **ENVELOPES** Printed \$1.75 prepaid. A. D. Wicks, Oakfield, N. Y.

NEARGRAVURE—250 Letterheads, 250 envelopes, \$2.69 prepaid. Samples. Solidays, Knox, Ind.

BETTER Grade printing, reasonable priced, free samples. Economic Press, Leonia, N. J.

1000 **BUSINESS** Cards, card case, \$1.50. Miller, Printer, Ambler, Pa.

REDUCED Prices, stationery, circulars, checks, loose-leaf binders, ruling. Commercial Press, Batavia, Ohio.

PRINTING OUTFITS AND SUPPLIES

USED Press bargains. What size do you want? Send stamp for reply. Exchange, D-1, 480 E. Main, Meriden, Conn.

PRINT Your own cards, stationery, circulars, advertising, etc. Save money. Easy rules furnished. Print for others; big profits. Junior press, \$5.99; job presses, \$11; power, \$149. Write for free catalog and full information. Kelsey Co., T-11, Meriden, Connecticut.

USED Type bargains, presses. Send stamp. Box 15, Cambridge, Mass.

PRINT Your own circulars, envelopes, with home made press costing less than \$1.00. Illustrated instructions 10c. Carl Edquist, Odessa, Minn.

PRINTING Outfits—Presses, type supplies, type novelties. Send stamp for catalog. Model Press, York, Penna.

DUPLICATORS AND DEVICES

DUPLICATING Machines \$3.85 to \$93. Rotary stencil, clay composition, gelatin film. Most complete line in America. Photo-Litho folder free. Pittsburgh Typewriter Supply, Suite 577, Pittsburgh, Pa.

STENCIL Duplicator—Anyone can make. Particulars free. Rapid Service, Edwardsville, Ill.

TYPEWRITERS AND SUPPLIES

BARGAINS: Underwood, Royal, Remingtons, etc. Free trial. Only \$10.00 and up. Fully guaranteed. Regular \$100.00 office models. Modern improvements. Write for catalog. Manufacturer's Clearing House, Desk A-1 - 1904 No. Nordica Ave., Chicago.

NU-ART. Non-type-filling typewriter ribbon, ¼ off on sample, particulars free. Myers Sales, Codorus, Pa.

TYPEWRITERS \$2.99-\$18.99. Ribbons 30c. Radios 99c-\$7.99. Watches 99c-\$9.99. Knights, 1517 Olive, St. Louis, Mo.

GUMMED LABELS

1,000 **PRINTED;** Name, business, address 50c. JBS Company, Box 93, Holyoke, Mass.

NRA SEALS. Or printed name, business, address stickers, 500-25c, 1,000-40c, 3,000-\$1.00. Wetzel, Valhalla, N. Y.

RUBBER STAMPS

NAME. Address, 2 lines 25c; 3 lines 35c. Stamp Works, Auburn, Nebr.

TWO Lines 25c; three lines 35c. Stamp Works, Coeur d'Alene, Idaho.

RED-RUBBER, 2 Lines 25c; 3 lines 35c. Fehberg, 921 Farnam, LaCrosse, Wis.

FOR SMOKERS

AUTOMATIC Cigarette machine \$1.85. Ask for illustrated folder. Automatic Cigarette Machine Wks., Dept. P-1, 1055 Sheridan Rd., Chicago.

TOBACCO

WISCONSIN Leaf tobacco. Chewing or smoking. 100 pounds \$11.00. Three pound trial package containing five kinds \$1.00 postage paid. Farmers Exchange, Edgerton, Wisconsin.

ECONOMY Smoking, 15 pounds Kentucky's best chewing 5. Kentucky burley 5. Either \$1.00. Bert Choate, Hickman, Ky.

GOLDEN Cigarette burley, mild; 5 lbs. and box full-size cigars \$1.00. Cigarette roller, papers free. Tobacco Exchange, B477, Mayfield, Ky.

GUARANTEED Tobacco—Cigarette burley, 5 lbs. \$1.00. Pipe smoking or chewing, 5 lbs. \$1.00. 10 lbs. \$1.75. Free gift. Howard Bros., Mayfield, Ky.

MILD Cigarette or pipe tobacco, or Red Leaf chewing, 10 lbs., either \$1.25. United Farmers, Mayfield, Ky.

ELECTRIC REFRIGERATION

REFRIGERATION Mechanics, students. Blue prints showing up-to-date installations. Explanatory text with prints. Write for circular. Progressive Refrigeration, Room 600, 201 N. Wells St., Chicago, Ill.

ANTIQUES, WAR RELICS AND INDIAN GOODS

INDIAN Relics, firearms, weapons, minerals, fossils, coins. Catalog 10c. N. Carter Co., Elkhorn, Wis.

SEND 5c For fine new list Indian relics, antique firearms. F. E. Ellis, Webster Groves, Missouri.

INDIAN Relics. Beadwork. Coins. Curios. Catalogue and arrow, 6c. Vernon Lemley, Northbranch, Kans.

RAZORS AND BLADES

DOLLAR Bill brings 60 Gillette type blades. Ohare, 5½ Ashburton Pl., Boston, Massachusetts.

LEATHER

LEATHERCRAFTSMEN—Write for free instruction sheet and price list of leather, tools, etc. Address Wilder & Company, Dept. M, 1038 Crosby St., Chicago, Ill.

FIELD GLASSES, TELESCOPES AND MICROSCOPES

COMPLETE Instructions for building 6 inch telescope, 50 cents. S&S, Dodgeville, Wisconsin.

GENUINE 15X Telescope, 5 quality lenses insure clear colorful vision. Substantial fibre body, brass trimmed, 30" long. 15x—\$1.50, 22x—\$2 postpaid, collect 25c additional. H. Greene, 329 Georgia Avenue, Brooklyn, New York.

FREE Catalog of lowest priced telescopes and microscopes in America. Brownscope Co., 246 Fifth Ave., New York.

MINERALS, (SEMI) PRECIOUS STONES

ROCKS And Minerals, a magazine for mineral collectors. Issued monthly—\$1.00 a year; sample copy 10c. Rocks and Minerals, Peekskill, N. Y.

GUNS, FISHING TACKLE AND SPORTING GOODS

NEW Pocket weapon 40c! Kills game! Blue steel. Maple grip. Illustrated literature for stamp. Grant Sportgoods, Box 75-M, Detroit, Mich.

GUNSMITHS' Secrets—Bluing, engraving, checkering, 20c (coin.) International Agency, Cincinnati.

MUSIC AND MUSICAL INSTRUMENTS

WANTED: Original poems, songs. MMM Publishers, Studio Building, Portland, Ore. LEARN To compose. Home-study course. Zvg. Rondonanski, Groton, Conn.

NEW Deal. Write Sequoia Songwriters Service, Sherman Branch, Los Angeles, Calif.

COMPOSE, Arrange, make money. Wonderful lesson course. Free information. Chenette, DeKalb, Ill.

SONGWRITERS: Submit poems now for new deal! Jary Armstrong, Suite 806, 17 E. 42nd St., New York N. Y.

MUSIC Composed to words. Wonderful proposition. Bauer Bros., Oshkosh, Wis.

SONGWRITERS! Poems, melodies. Amazing opportunity. Hibbele, D1, 2104 Keystone, Chicago.

SONGWRITERS—Send poems, melodies—excellent service at low fee. Superior Song Studios, 211 Hope Ave., Passaic, N. J.

\$\$\$SONGWRITING\$\$\$ Good money being made from songs through talking pictures, radio, phonograph, music publishers. "Hit" writers revise, arrange, compose music to your lyrics, lyrics to your music. We submit to studios and other markets. Free reading. Send for booklet. Universal Song Service, 671 Meyer Bldg., Hollywood, Calif.

DUO-FLEX Reeds for clarinets, and saxophones eliminate your reed troubles. Write for circular. Duo-Flex Reeds, 1204 1st Ave., Evansville, Ind.

SONG Writers. Send for our "Publishing Agreement." McKinley Music Printers, 1201 E. 55th St., Chicago.

PATENT ATTORNEYS

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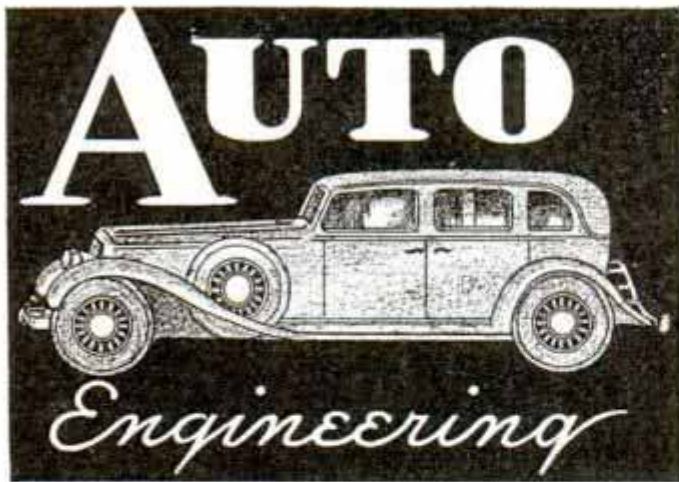


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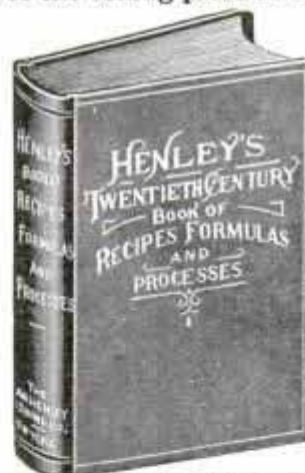
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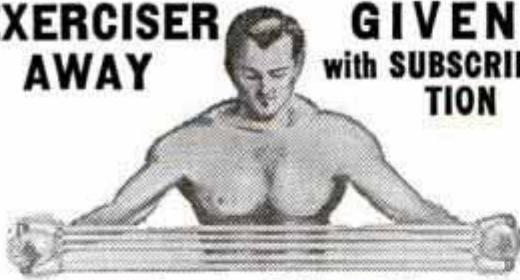
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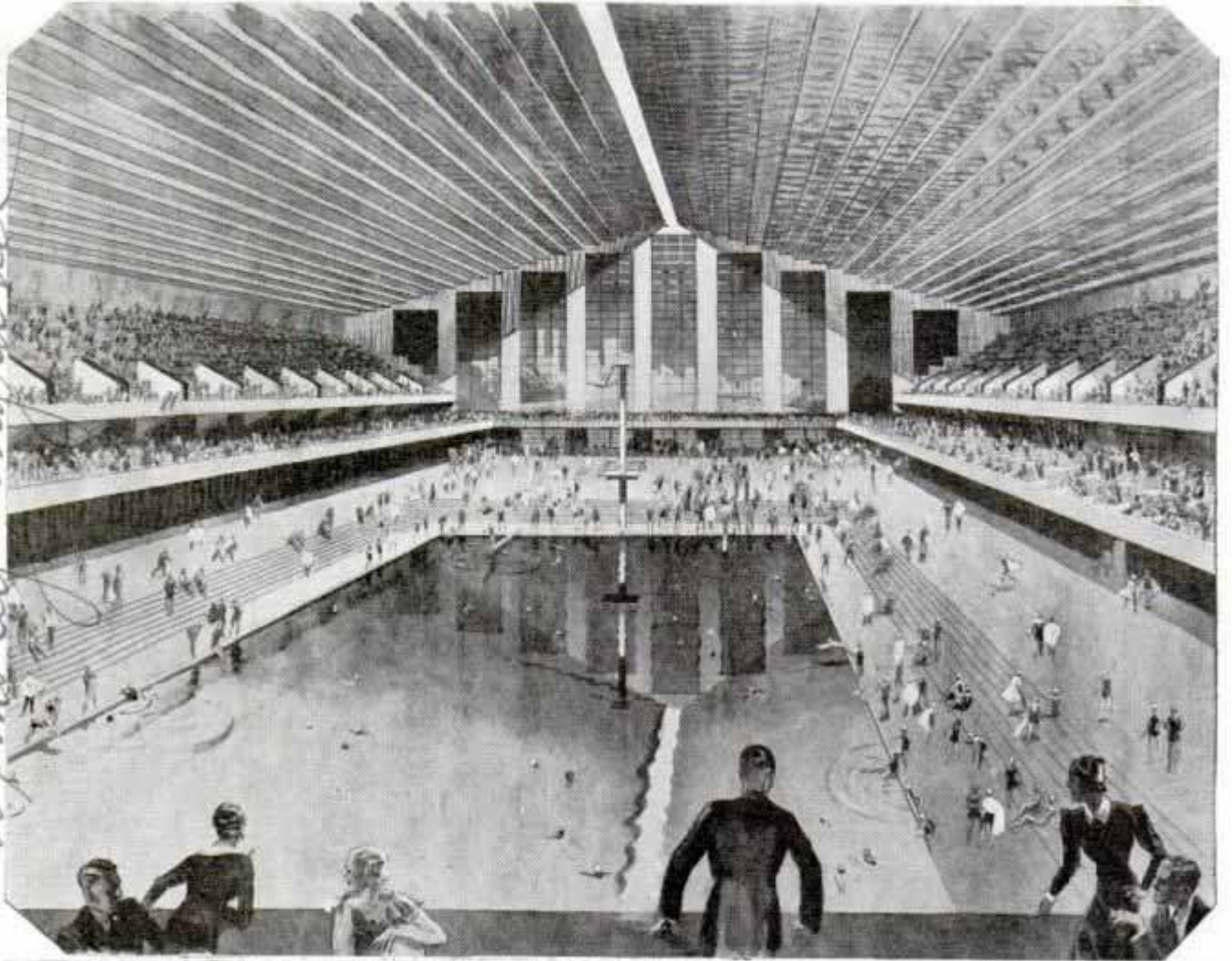
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Vol. 61

JANUARY, 1934

No. 1

Salvaging the "LUTINE'S" GOLD

C1432

GOLD—that precious metal that has lured men to mountain tops and into ocean depths—is the magnet for one of the most unusual expeditions ever undertaken in the annals of the sea.

Twelve million dollars in gold and silver have lain beneath the waves off the coast of Holland for more than a century. Lives have been risked, thousands of dollars have been spent and scores of ships have been battered in efforts to reach that treasure trove, but each expedition has returned empty handed, beaten by the combination of stormy waters and shifting sands.

In the folklore of the little village of Terschelling, the story of how the pride of the British navy, "La Lutine," sank during a storm in 1799 has been kept alive, not only by the knowledge that the frigate carried \$12,000,000 in gold and silver, but also by the grumbling of frustrated salvage crews who have made the village their base of operations. Any one of Terschelling's citizens can tell you that only one of the 250 hands on the ill-fated "Lutine" escaped death. From that point, he may relate how one salvage ship came close enough to the wrecked treasure ship's resting place on the bottom to place a marker buoy that now floats on the troubled surface. That was in 1857.

This same villager also knows

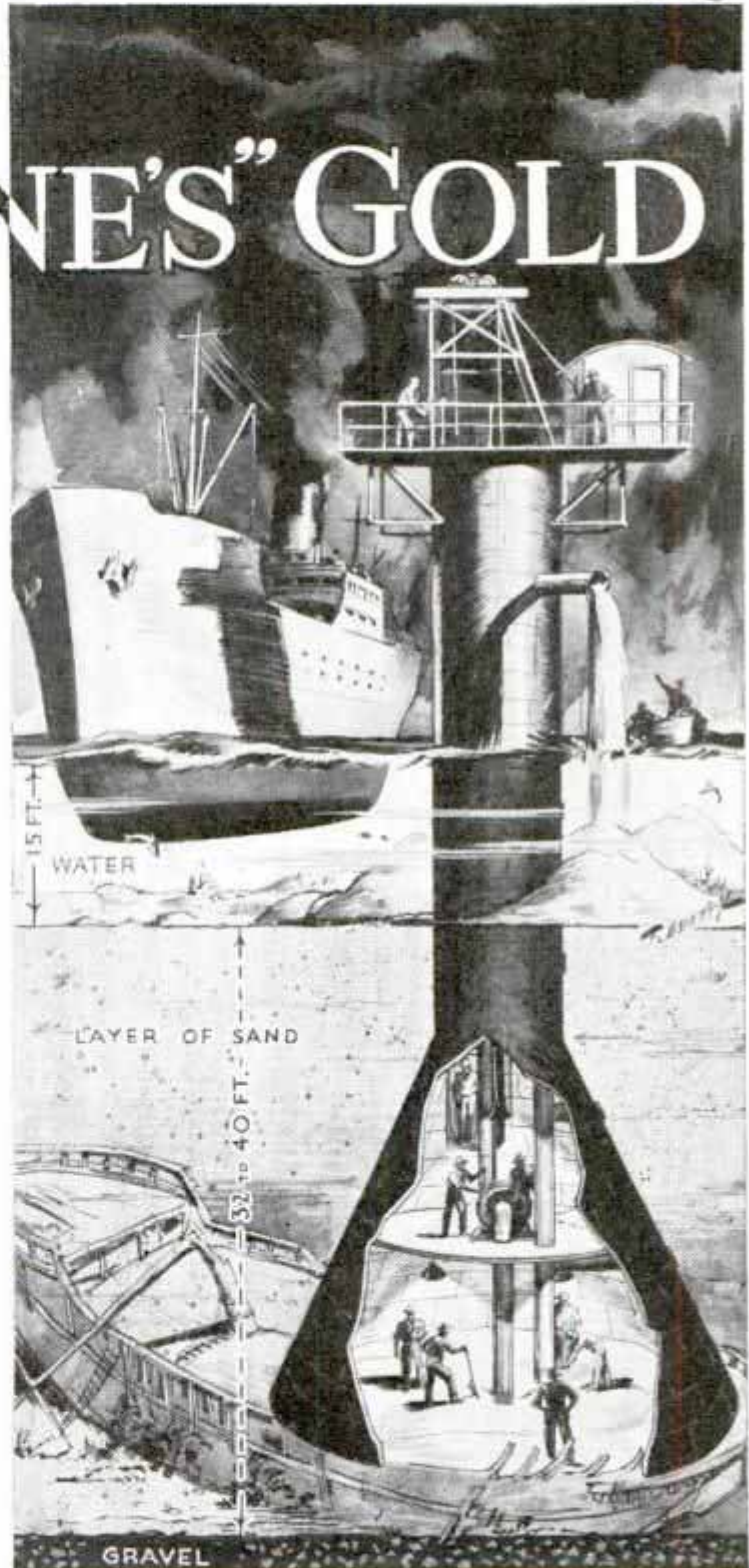
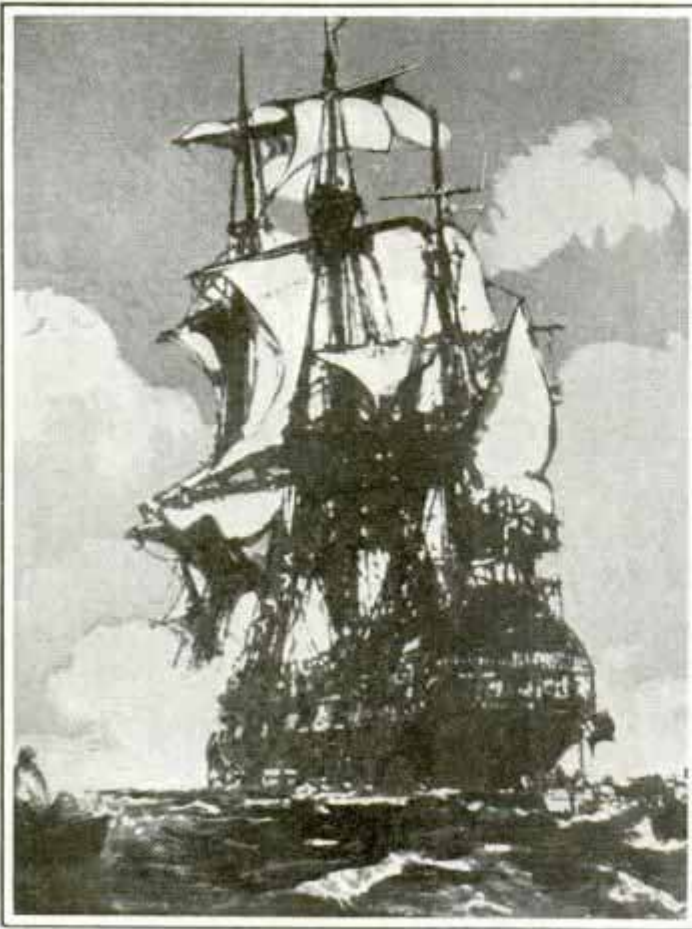


Diagram Showing How Giant Cone Will Be Worked Gradually to Position over Treasure Chamber

Com. Edward Isruben, 28 at 47th



which in turn will reimburse Lloyd's. Hence, if this latest venture is successful, the salvagers stand to reap a rich reward.

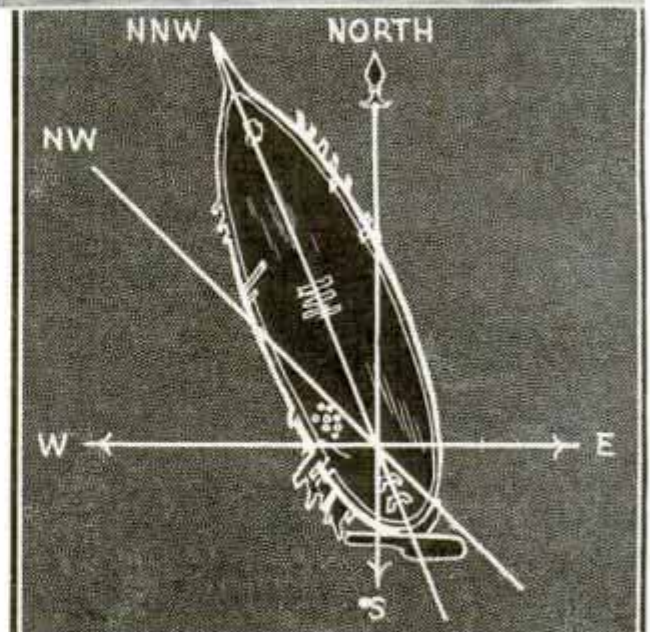
Fifteen feet of water and the thick layer of sand cover the ship. Since any diver may reach the sand layer easily, the problem is to penetrate the sand. To this end, science has contributed a strange device, a cone to fit over the treasure chamber and a shaft to extend above the water. The plans are to place this cone in position on the sand, with the shaft topping the surface, and dig downward, the cone slowly sinking as the sand is pumped up the shaft and out into the sea. By this arrangement, the crew working in the cone receives natural air circulated down the shaft, into the cone and out again.

On a tower at the surface, a giant crane, capable of lifting 6,000 pounds, awaits the time when the cargo chamber is reached. An airplane engine



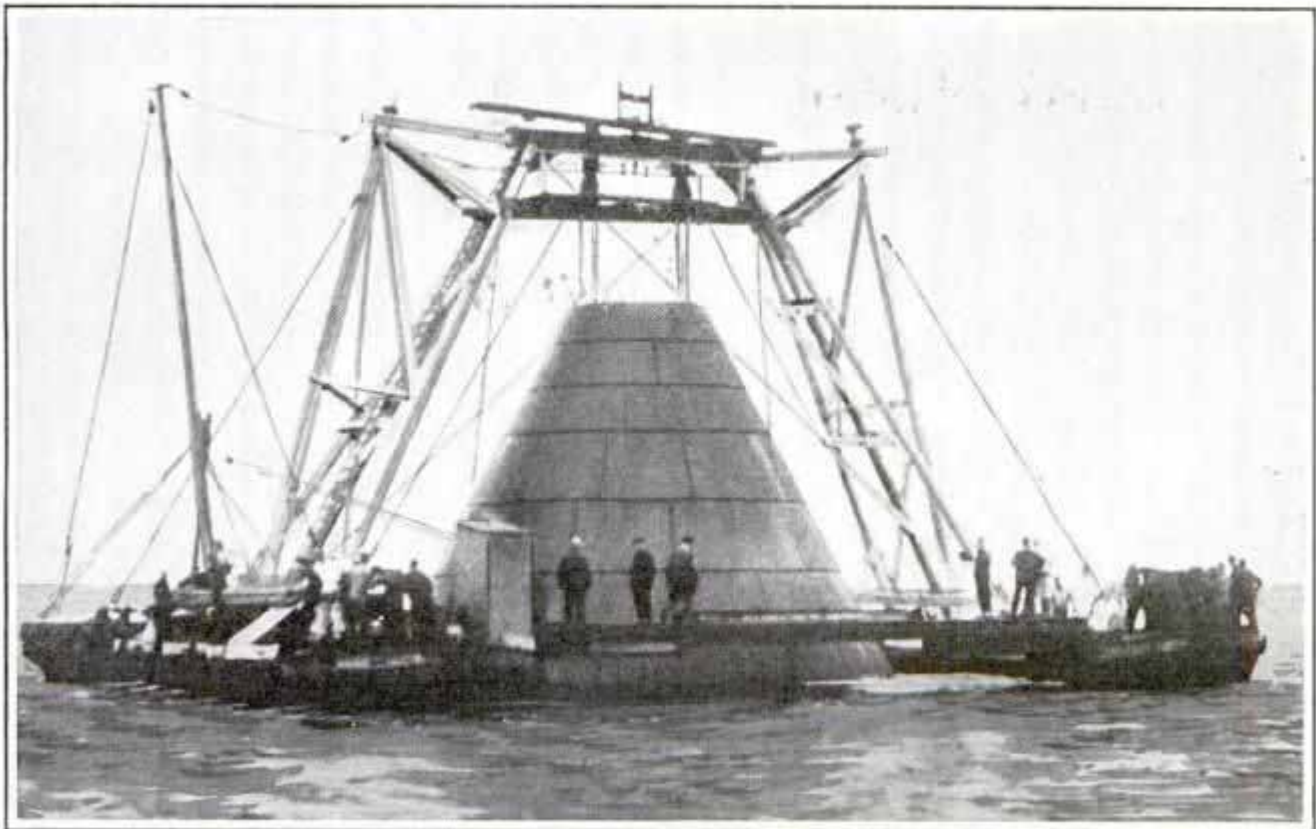
that "La Lutine" lies beneath a thick layer of sand, some thirty-two to forty feet deep, which has been deposited by the storm-tossed waters through the years. That layer of sand, as you may guess, explains why all previous salvage expeditions failed.

And now Terschelling is excited again. A new attempt to bring the "Lutine's" rich cargo to the surface is under way. Many of the villagers have contributed to the venture. A representative of Lloyd's, that insurance company which has played such a great part in the world's shipping, is on the scene. When the "Lutine" sank, Lloyd's reimbursed the British government for the \$12,000,000 cargo. Under an agreement between England and Holland in 1821, half of the salvaged treasure will be returned to the British government,



© Edward Gruber

Top, Painting of "La Lutine"; Center, Salvage Tug; Bottom, Position of Gold Cargo



Showing the Cone Already Towed into Position and Ready to Be Lowered into the Sea; Shaft Will Be Attached to Small End of Cone to Conduct Natural Air to Workers; Sand Will Be Pumped from Interior

busily pumps out the sand. Workers go up and down the ladder extending from the tower to the cone, inside the shaft. Air-conditioning equipment is in readiness for emergencies.

Already towed into position, the cone weighs 175,000 pounds. It is thirty feet long and thirty-nine feet in diameter at the big end. Narrowing to the point where the shaft begins, it is twelve feet in diameter at the small end. The shaft extends more than fifty feet from its connection with the cone, giving a working depth in excess of eighty feet.

Should the forty-foot layer of sand resist attempts to remove it by suction pump, the engineers have two plans. If the cone and shaft become filled with water, work may be continued in the usual way, using divers. The second method is by means of lock gates located inside the cone, with compressed air expelling the water so that the salvage crew may be enabled to work.

Only a violent storm can prevent this attempt to salvage the "Lutine's" gold, engineers and villagers believe, as the work progresses steadily.

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AIDS COLOR PHOTOGRAPHY**



Photo-Flood Lamp Which Gives a Light Strong in Blue Rays and Thus Aids Color Photography

Improved quality in motion pictures and commercial color photography is promised with the development of a photo-flood lamp which gives a light stronger in blue rays than the light from a standard 2,000-watt studio lighting lamp. The need for studio illumination in which the blue components of light are increased more in proportion than the red and yellow has long existed in the field of color photography and this Westinghouse product gives a light in which the blue rays are increased five times while the red and yellows are increased only three times. The resultant illumination, stronger in blue rays, contributes to a more natural color harmony in photography. The lamps are also suitable for black-and-white work. The filament is designed to operate at an extremely high temperature and the operating efficiency of the lamp is thirty-three lumens per watt as compared with twenty-two for the 2,000-watt standard lamp. Thus one such lamp actually gives about fifty per cent more visible light, but its photographic light is about 150 per cent greater. Since fewer lamps are required, wattage is cut in half, it is claimed. Because of their greater efficiency, these lamps make it pos-

sible to take moving pictures where limited power facilities heretofore made it impractical to operate enough lamps to give suitable lighting. The lamps are also expected to contribute to more pleasant working conditions in making color moving pictures, since they do not give off so much heat.

**WOOD GAS DRIVES BIG TRUCK
AT HALF OF USUAL COST**

Tested in a three-ton truck, wood gas has been found to operate at half the cost of vehicles propelled by gasoline in Czechoslovakia. Gasoline prices are high in that country. Beech wood was used for heating of the generator. Early experiments revealed that more attention would have to be given to the generator, which is carried on the truck. There is a possibility that the gas may lend itself to use in automobile busses, but it is considered unsuitable for passenger autos, due to the time taken to heat the generator and due to the extra load that is imposed by the wood-gas plant.

**TWO HANDFULS OF TINY BOOKS
GIVE LIBERAL EDUCATION**

Books so small that two handfuls contain a liberal education are in the collection of the Library of Congress. Included are the Bible, Shakespeare, Dante, Kant, Disraeli, Poe and others. Readers of the tiny volumes need a reading glass.



Miniature Books Representing a Whole Education May Be Held in Your Two Hands

*Westinghouse Lamp Co
Bloomfield N.J.
E. W. Depp, Engineer.*

Dept. of Commerce, Bureau of Standards, 1913

Rare Books Division

H. S. Carter, Chief Engineer, News 10/29/33

*George DeCantu
Berlin Germany*

AIRPLANES HELP SEED GROUND FOR RUSSIAN FARMERS

Russia is increasing the use of airplanes for agricultural purposes. The planes are now being used in some sections to sow seed, eradicate vermin and noxious insects, destroy the larvæ of malaria mosquitoes, execute orders for the supervision of forests and protect them from fires, observe the floating of logs and to participate in other agricultural work. In 1934 it is expected the planes will seed seven times as much ground as last year.

C1703



Man at Right Points to Balanced Ball Which Actuates Gas Shutoff When Earthquake Strikes

REVERSIBLE RUBBER GAS MASK CANNOT BE PUT ON WRONG

Instant adjustment is possible with a reversible rubber gas mask for fumes, vapors, smoke and dust. It folds flat to fit a pocket and cannot be put on wrong because the top is exactly the same as the bottom, enabling the user to adjust it without difficulty if he suddenly encounters dangerous gases. Near the face on each cheek is an air-filter chamber to purify the polluted air, and the exhaled air

C1706



passes out through a valve directly in front of the mouth. A face cloth protects the skin from contact with the rubber and also draws the edges down to make a tight fit around any nose.

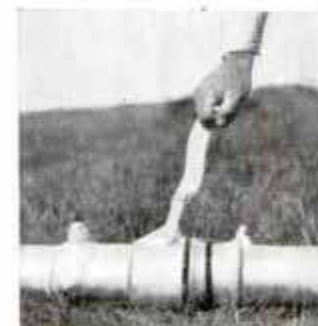
Don't bend and

VALVE CUTS OFF GAS IN QUAKE TO PREVENT EXPLOSIONS

For the prevention of fires and explosions during and after earthquakes, a safety valve has been produced for shutting off gas or electricity. It works by means of a bronze ball mounted on a supporting stem. Only a vibration sufficiently strong to damage the building can shake the ball from its stem, causing the valve to cut off the gas or power supply.

LEVER JOINS SECTIONS OF PIPE WITHOUT ANY TOOLS

No tools are required for making temporary connections between sections of pipe line if the pipe is fitted with a lever coupling which is water and air tight. Neither are any separate gaskets needed. The coupling parts are attached to the pipe, hence there are no loose members. Two sections are placed end to end, and the end of one pipe is fitted into that of the other. Then, by bearing down on a lever connected to one section, the two pipes are drawn tightly together. The resulting joint can be flexed to a considerable degree but special fittings are needed for extreme curves. The pipes can be taken apart quickly.



MOTOR ON DRILL IN OIL WELL BORES TWO-MILE HOLE

Oil-well drilling to a depth of nearly two miles has been accomplished by means of a small motor attached directly to the drill and lowered with it in the boring. A Soviet engineer used a simple turbine driven by water poured from above. This device, however, was not powerful enough to drill through hard rock and a multiple-step turbine is being developed. Present methods of drilling require a rotating tube which becomes practically unworkable beyond 2,500 meters, or slightly more than 8,000 feet.

C1744

Announced by Asst. Director Ermakoff

*Dr. H. A. Brandt
Los Angeles, Calif.
2314 E. 8th.
West Berkeley, Calif.*

California Coordinated Oilvert

6 Cont. Hans J. Kutschbach



Large Mirror at Railroad Crossing Which Shows Motorist When Train Is Approaching around a Curve

MIRROR AT RAILROAD CROSSING SHOWS APPROACHING TRAIN

In the mountains of Bavaria a railroad company has equipped grade crossings, where the view of the track is obscured, with huge mirrors. A motorist approaching such a crossing is confronted with the big looking-glass, and a glance shows him if a train is approaching through a cut or around a curve.

TALKIE FILMS HELP DIAGNOSIS OF NERVOUS DISEASE

Analysis of the tracks of the human voice on sound films is said to give a clue to the identification of the disease of the ner-

vous system known as disseminated sclerosis. This is indicated by work carried on in a London hospital and reported recently. The vowel "ah" in a normal voice appears on the sound film as a series of spiky protuberances, in groups, each beginning with a sharp upward jerk. The upward jerk is the result of a jet of air from the glottis, and the distance from one upward jerk to the next gives the period of laryngeal action. This period changes slowly and never suddenly, meaning that the muscles controlling the tension for laryngeal action are well coordinated. In patients suffering from the condition called ataxia, the upward jerks follow one another at irregular intervals. There are several diseases which can produce this state of irregularity of speech, disseminated sclerosis being one, and by means of the sound film, the abnormality which leads to its identification can be observed when the unaided ear cannot detect it. One drawback at present is that the patient must be taken to a sound studio for a test, but it would be feasible to arrange for a recording over the telephone to a studio.

SNOW GRIPPER FOR AUTO CLAMPS ON TIRE

For traveling in snow or mud, a road gripper, which clamps on the auto tire in a few seconds and can be as quickly removed when out of trouble, offers an easy solution of one of the motorists' difficulties—miring down in a snowdrift or deep mud. The gripper slides over the tire and is attached by means of two cam handles which lock it in place to the side walls of the tire. A gripper is attached to each rear wheel and can



be applied or removed without soiling hands or clothing. It can be applied where chains are impossible to attach.

Bavarian Railway Company (Bavaria)

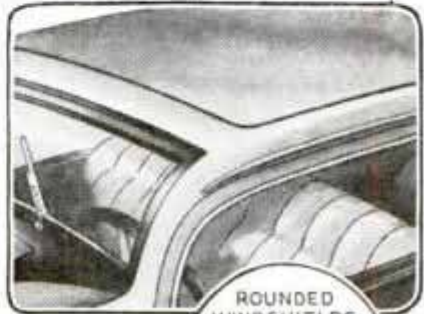
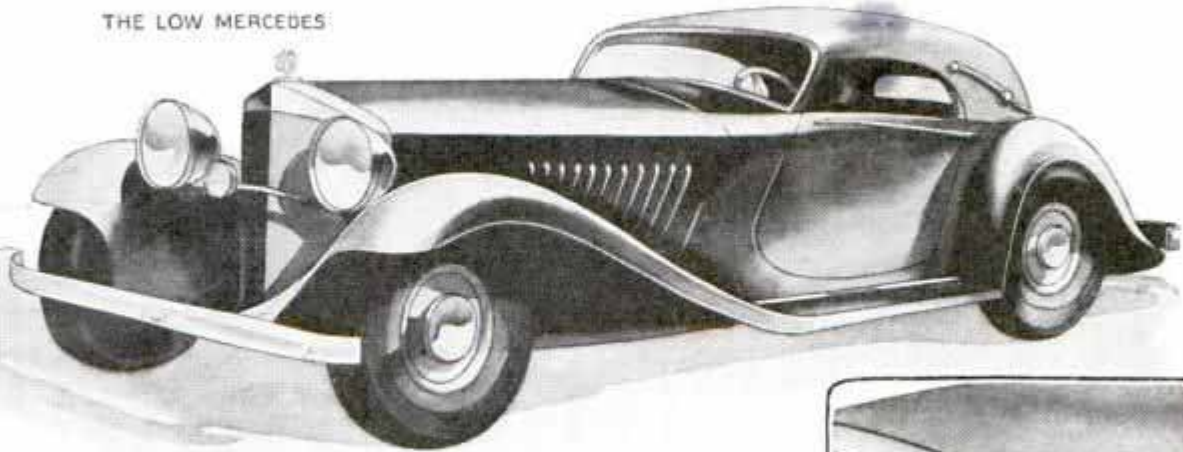
Planned by Hans Kutschbach

C1746 Science Service

W. B. E. Co.

Some of 1934 Models Seen at Paris Auto Show

THE LOW MERCEDES

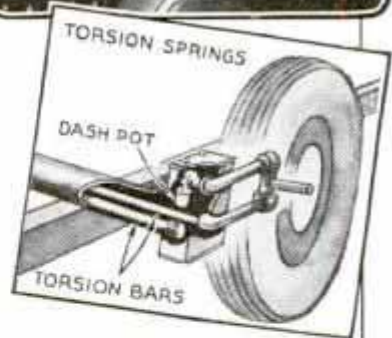


ROUNDED WINDSHIELDS FOR STREAMLINING AND BETTER VISION

ABOVE - BIANCHI
BELOW - CERUS



NOTE WINDOWS IN CORNERS

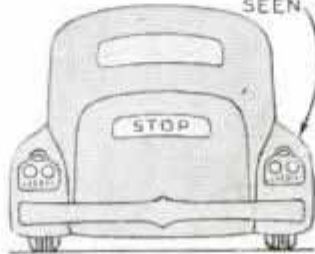


TORSION SPRINGS

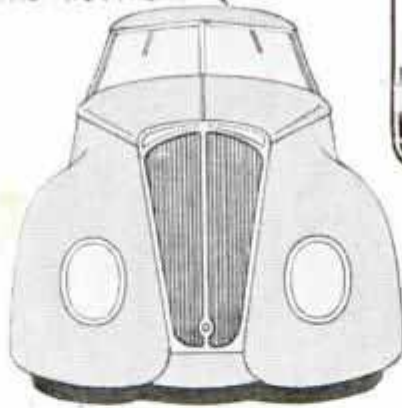
DASH POT

TORSION BARS

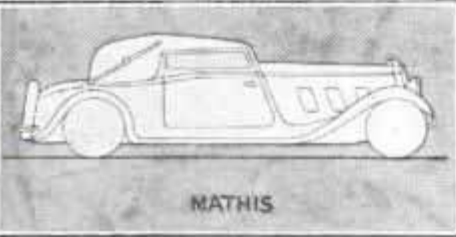
MANY FLUSH TAIL LIGHTS ARE TO BE SEEN



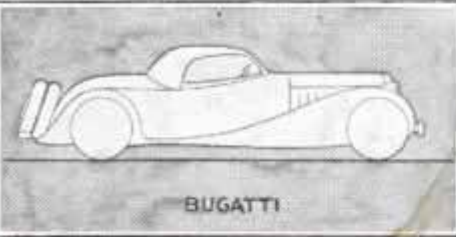
THIS CHENARD AND WALKER CREATION SEATS THREE FORWARD AND TWO IN REAR



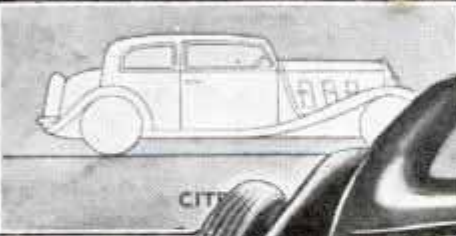
SALMON



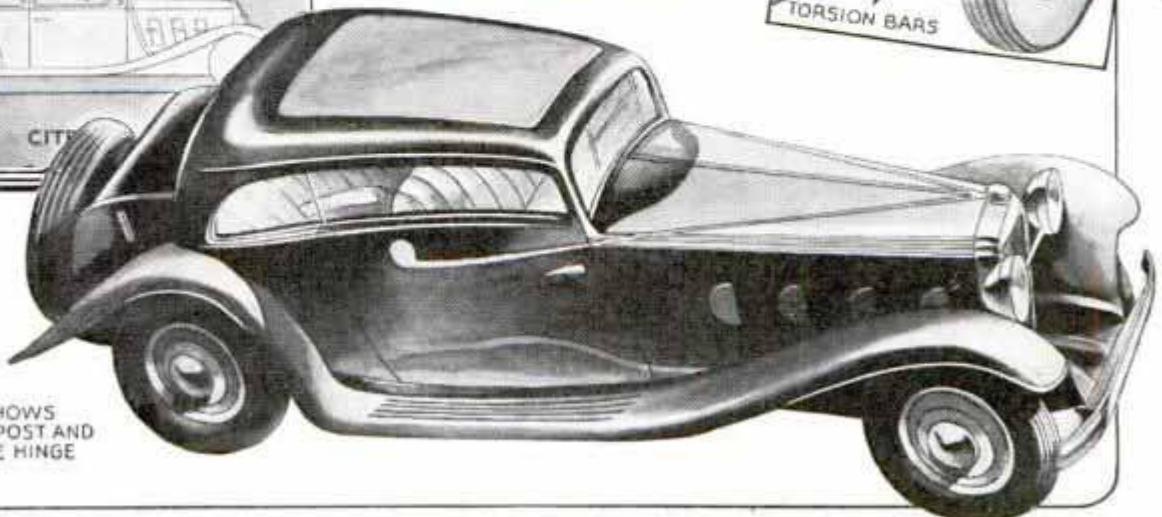
MATHIS



BUGATTI



CITROËN



DELAJE SHOWS NO DOOR POST AND NO VISIBLE HINGE

11/2/33

Chicago, Kansas City and Cleveland R.P. (Build. Co. Saram) sold in dept. stores. Fred Harvey news stands in



Top, Completing the Cardboard Model of World's Fair Building; Bottom, Folding One of Sections According to Instruction Sheet

WORLD FAIR BUILDING MODEL READY FOR ASSEMBLING

Cutting and gluing are unnecessary in assembling a cardboard model of the Hall of Science, one of the buildings at the World's Fair. The model is in full colors, reproduced from the official plans. It is prepared on perforated cardboard sheets, with key numbers and guide lines to aid in folding and putting together in the proper order. There are eighty-eight pieces, the assembly of which requires many hours. The model may be permanently mounted on a baseboard, twenty-one by thirty-one inches. A piece of quarter-inch plywood, painted green, is ideal for this purpose.

Explorers in the polar regions have found that human voices sometimes can be heard a mile and one-half away.

Science News Letter. 11/4/33

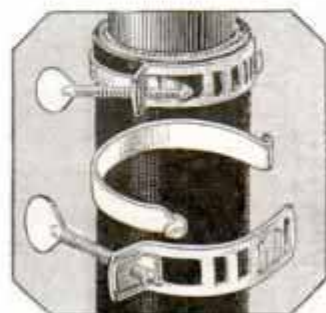
TOO MUCH TO EAT IS MAIN REASON YOU GET FAT

Why do people get fat? Because each day they eat just a little more than they require. This is the conclusion of Dr. Francis G. Benedict, director of the nutrition laboratory of the Carnegie Institution of Washington, who has devoted years of investigation to the subject. It is that extra pat of butter, or its equivalent, taken with each meal, that puts on the pounds. One extra ounce of fat a day, or three pats of butter, means a gain in weight of a pound in about two weeks, or about twenty-five pounds a year. It is the excess—the fat above daily needs—that adds to weight. There is no royal road to slimness, Doctor Benedict asserts, adding that the best way to lose fat is not to get fat. If you are fat, it is nearly hopeless to try to work it off.

The one way to lose fat intelligently is to limit the intake and burn it up slowly. Fats are about twice as concentrated as starches and sugars, so it is helpful to avoid all visible fats in foods.

ADJUSTABLE CLAMP FOR HOSE WORKED BY THUMBSCREW

Operated by a thumbscrew, a new hose clamp gives perfect compression. The clamp, made of metal, is adjustable to ordinary water connections. Tightening or loosening is accomplished by turning the thumbscrew to the right or left.



Climax Mfg Co.

**"MUSIC" FROM OCEAN DEPTHS
TRACED TO CURRENTS** C/747

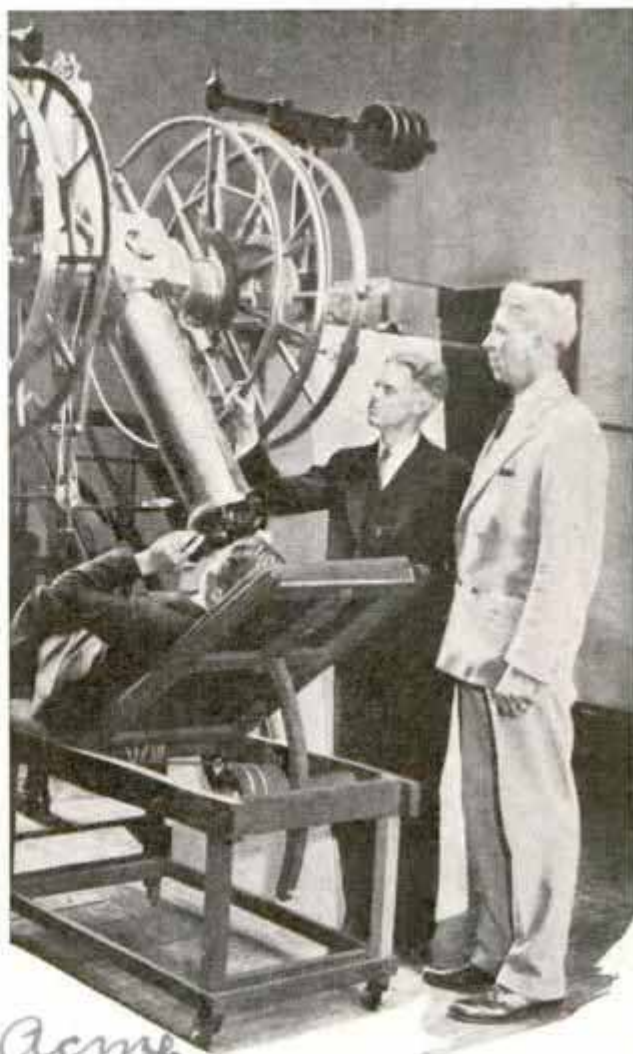
Science has cleared up the mystery of the musical sea waters off the English coasts. For ages, fishermen have steered their craft in the vicinity of the perilous shores in fogs by listening to the "sound" of the water. Through long experience, these men could tell their exact position in proximity to reefs and rocks, as well as the safety of deep water, by listening to the various sounds coming from the depths. It has been found that this "music" is caused by various ocean currents scraping different kinds of sea bottom. The metallic sounds coming from certain quarters are said to be due to currents striking submerged rocks, ringing them like a bell. Every bay and headland and strait has its own note which fishermen learn in time and recognize even in time of dense fog. These notes serve as guides for the small craft in thick weather.

**PERISCOPE ON ELECTRIC TRAIN
GIVES CLEAR VIEW AHEAD** C/661

Periscopes have been installed on the Southern Railway electric trains operating between London and the south coast of England. The instruments give passenger conductors a clear view of the entire train, of the track ahead and of the signals.



© Charles E. Brown
Mirror Directly in Front of Conductor Is Part of Periscope Giving View of Tracks
London S.E. 1



Acme.
Astronomers Engaged in Studying the Heavens for Signs of Drift Between Continents

**DRIFT OF CONTINENTS STUDIED
THROUGH TELESCOPES**

Whether continents shift position, or "drift" on the earth, is the question for which ninety-five observatories are seeking the answer. Nightly examinations of the heavens are made for data that will be compared with the results of similar observations to be made in 1943 and following ten-year intervals. Five observatories in the United States, Indiana, Lick, Northwestern University and the naval observatories at Washington and San Diego are among the seven conducting the study in North America.

**BARGE WITH RUDDER AT BOW
STEERS FROM TOWBOAT** C/778

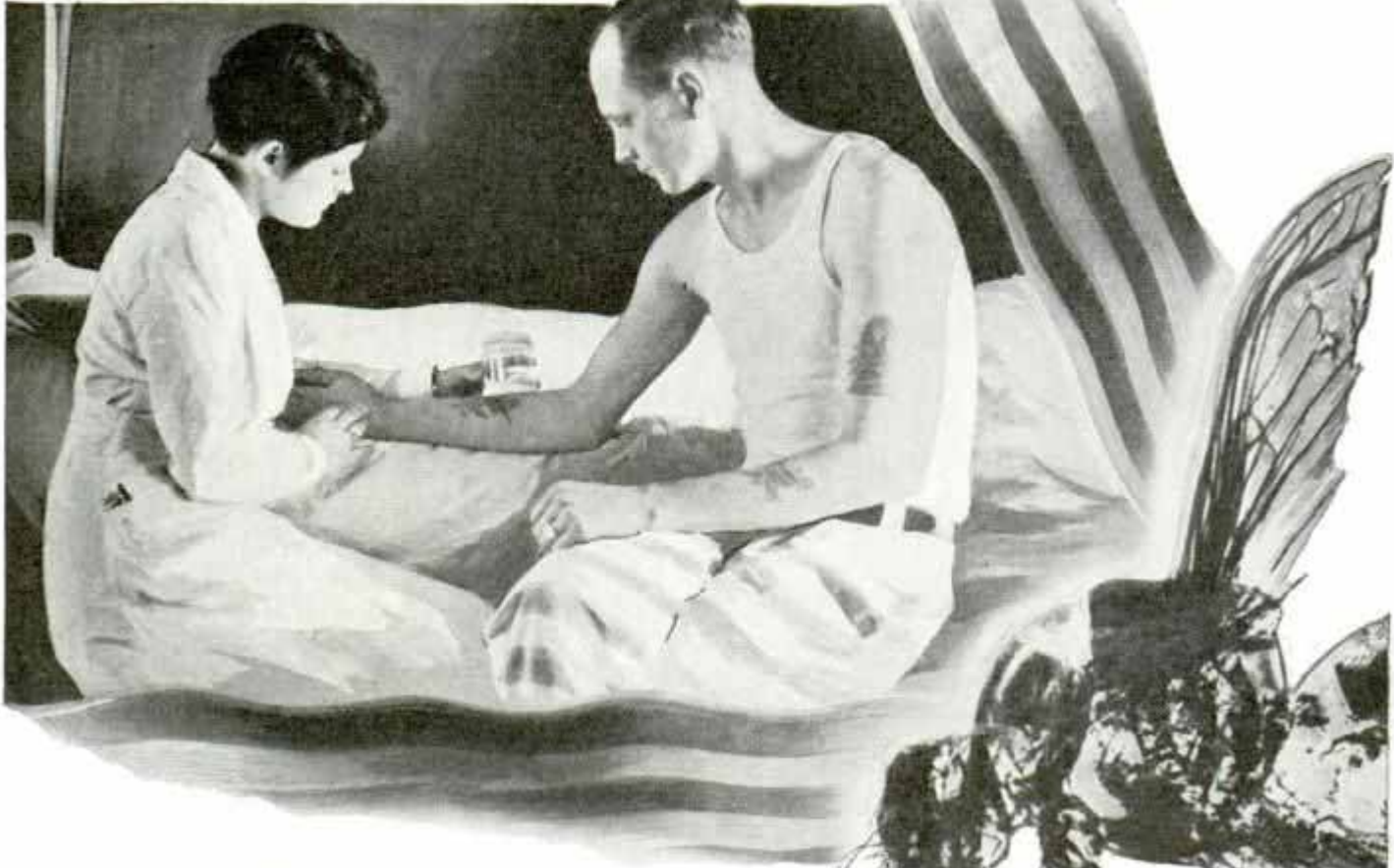
Constructed with its rudder at the bow instead of the stern, a new oil barge is steered by hawsers from the towboat. It is unnecessary to have a helmsman aboard the barge.

by J. H. Mathis to
Canadian. Phil.
ranger. Phil.

International Astronomical Union
and
Geophysical Union

© 1915
1736 Church St. N.W.
Washington D.C.

MICROBE Hunters



A MAN in a mid-western city had a headache, muscular pains, a stiff neck. Before long he was sweating, feverish, then shivering. He went home in a daze, dizzy, his vision blurred. His brain felt as if it were afire, yet he was sleepy and weak.

A physician was hastily summoned and examined the patient, then removed a shoe and tickled the sole of a foot. The toes turned up instead of down. The man was in a coma, eyes wild, delirious. But soon he was asleep—a slumber from which he could be aroused only with much difficulty.

"It's sleeping sickness," said the doctor gravely. "My fifth case today."

"But what is that?" asked the patient's wife.

"I don't know," confessed the man of medicine. "No physician knows—yet. It's a great medical mystery."

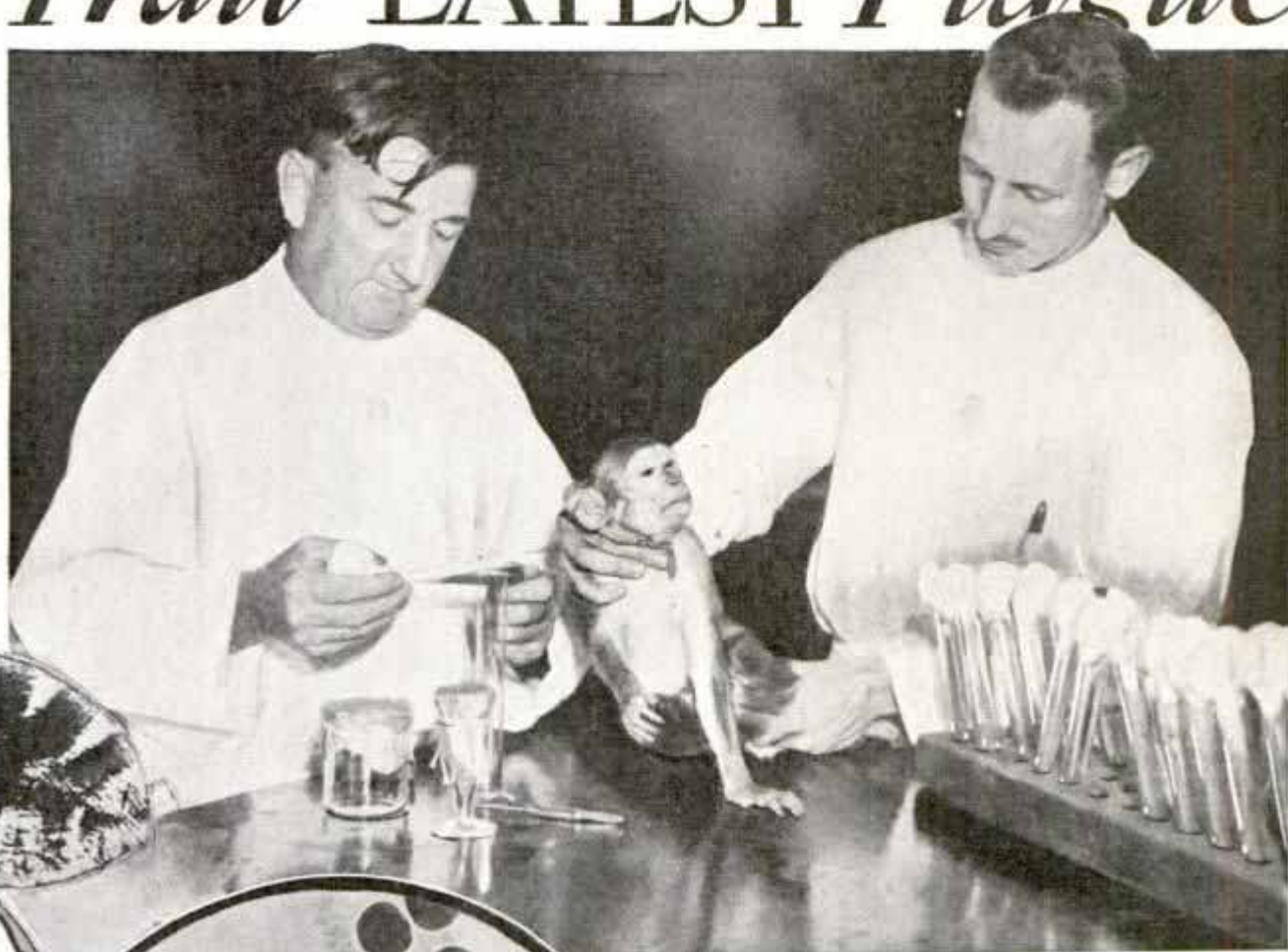
In that one city, nearly 900 cases of the disease were reported and one person out of every sixteen stricken died. It spread to other cities and people visioned an epidemic like that of influenza fifteen years ago.

Top, This Prisoner Won Freedom by Allowing Himself to Be Bitten by Mosquito Which Had Fed on Blood of Sleeping-Sickness Victim; Below, Enlarged Photo of Fly Which Carries Disease in Africa

Because of its fearful potentialities, the government mobilized its detectives of disease to wage war on this sickness, which struck down men and women and children by putting them to sleep and ravaging their bodies. The army sent its best medical men to the stricken area and the public-health service dispatched fifteen of the best microbe hunters in the country. By airplane came 300 "fighters" from Washington—mosquitoes suspected of being able to transmit the disease.

The insects were starved for a time, then allowed to bite a victim of the dis-

Trail LATEST Plague



Above, Injecting Brain Tissue of Victim of Disease into Monkey Which Died; Below, Microscopic Photo of Sleeping-Sickness Germs of African Type

ease. After that the insects were allowed to bite monkeys which were watched for symptoms. Nothing happened, but such tests were not conclusive enough. Human "guinea pigs" were needed for the tests.

Ten Mississippi convicts volunteered to

risk their lives to aid science on promise of freedom if they won their gamble with death. Another group of prisoners in Virginia made a similar offer. They permitted mosquitoes which had fed on sleeping-sickness patients to bite them and for weeks doctors and nurses watched them hour after hour, day after day. Still nothing happened.

Thus these convicts won their bet with death and their freedom by furnishing proof with their own bodies that the insects do not carry the disease. That proof has enabled the microbe hunters to narrow the range of investigation and so to come closer to the knowledge of how the disease is transmitted from the sick to the well.

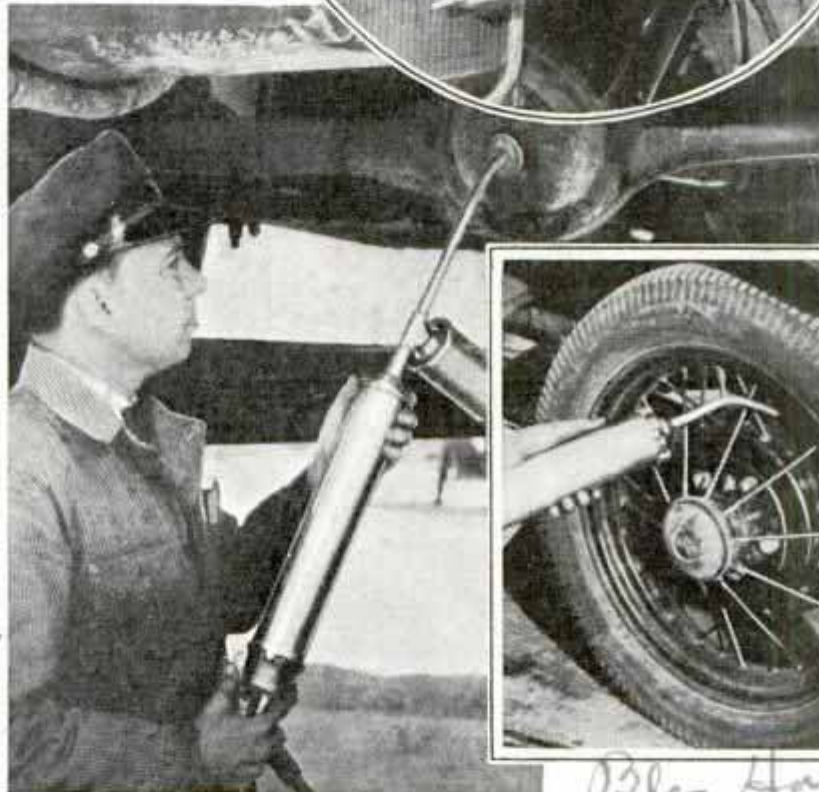
Uncle Sam's disease detectives are sleuthing against sleeping sickness much as real detectives go about solving a mysterious crime. They have found clues, followed them until they were proved false, then have returned and tried other leads. They have been discouraged time after

HOW ANCIENT MAN MEASURED WITH HAND OR FOOT

Early man learned to measure by using the freely moving parts of his own body, hands, arms and feet. From his arms he derived the first crude length standards, the "brace" or length of both arms outstretched; the half-brace or yard and the half-arm or cubit. The length covered by his outstretched fingers was the span. The length from heel to toe survives as the foot. The length of the normal pace survives in the mile, the primary basis of which was a thousand, or "mille" paces. In contrast, the basic measuring rod of science is the wavelength of the red line in the spectrum of the metallic cadmium in dry air, at 760 millimeters of mercury pressure, produced by high-voltage, internal electrode vacuum of a volume greater than twenty-five cubic centimeters. This length is 6438.4696 units, each of which is one ten-billionth of a meter. This measure will remain the same to the end of time.

ELECTRIC LANTERN FLASH LIGHT OR FLOOD LIGHT

Containing two reflectors and two lights, an electric lantern can be converted instantly from a conventional flash light with a 600-foot spot beam to a flood light. The spot light is in the front of the lantern and the flood light is in the top. A single, double-acting switch controls either one. It operates on two flash light cells and, besides a handle at the top, has two at the rear so it can be worn on a belt.



Top, Thawing Out Radiator with Hot-Air Gun; Bottom, Left, Warming Grease to Make It Flow Freely; Right, Thawing Brake Drum

HEAT-BLOWING GUN FOR AUTO FLUSHES OUT OLD GREASE

Supplying 350 degrees of heat with forty pounds of pressure in two minutes, a hot-air gun with flushing device is available for cleaning grease deposits from automobile transmission, differential or other parts. The hot oil forced into transmission or differential melts and flushes the old oil and grease that would not drain out under ordinary conditions. The gun also may be used for thawing out frozen radiators, thawing frozen brake drums, drying distributor wires, etc., and for warming up airplane motors before starting. The gun is heated by electricity.

10/31/33
San Diego Union
2 1/2 volt
Delta Electric Co.

A Curator of Anthropology
National Museum
1922

Valley + McAlpin
Carasco
Ramos City, M.



time, but do not quit. One thing they know. This disease is not the sleeping sickness which has often created havoc in Africa. The African ailment is caused by a tiny parasite carried by the tsetse fly. This parasite works its way into the blood streams of cattle and into the spinal fluid of human beings. The sleeping sickness in this country is not caused by a parasite, and physicians are also convinced that it is not caused by a germ. Instead a virus is blamed, something which lives but is neither parasite nor germ and which cannot be seen even through the most powerful microscopes.

In normal years, it is estimated, from 900 to 1,200 persons contract this disease and about twenty per cent of them die. It breaks out sporadically, here and there, then disappears, only to reappear perhaps at some far distant point. Some believe the cases in the mid-west constitute a special type of the disease and that there are two different kinds.

One of the experiments tried was a

serum treatment. The serum was prepared from the blood of an infected patient, but apparently such treatments are useless. The brain tissues of persons who had died of the disease were injected into monkeys and the monkeys died, too—proving that the disease can be transmitted. But how?

That is what the sleeping-sickness sleuths don't know, but they are still searching. Some have suggested that insects other than mosquitoes may transmit it. Others have opined that it might be carried by human beings who are immune.



Above, Examining Blood of an Infected Monkey; Below, Viewing Suspected Microbes under the Microscope

They admit that they are still baffled, but they are not giving this disease a chance to gain a fresh foothold. They are continuing to experiment, to test, to discard old theories and to scrutinize new possibilities, confident that they will solve the riddle of this dangerous disease which until a few years ago was diagnosed merely as a stomach ache "with complications."



Using an Aluminum Pipe Attached to an Air Hose to Remove Lint from Ceiling of Cotton Mill

BLOWER PIPE REMOVES DUST AND LINT FROM CEILINGS

For removing lint and dirt from ceilings, an efficient blower is formed by using a length of aluminum pipe, flattening one end to form a nozzle and attaching the other end to an air hose. Such an arrangement is lighter in weight than the wood-pole and rubber-hose equipment usually employed for such a purpose and one person can handle it with ease. The idea originated in cotton mills for removing lint from ceilings and overhead equipment, but there are many other applications. A section of one-half-inch pipe is welded to a section of three-quarter-inch pipe, the length depending on the height of the ceilings to be cleaned.

HOW TO TEST YOUR BATTERY AND KEEP IT FUNCTIONING

With a little care and by making a few simple tests your car battery can be kept functioning at full capacity during its useful life. The state of charge can be determined with a hydrometer but, to get an

accurate reading, the temperature must be considered. For each five degrees rise in temperature over eighty degrees, approximately two points should be added to the hydrometer reading. For temperatures below eighty subtract about two points for each five degrees under this mark. A fully charged battery with a gravity of 1.285 at eighty degrees will not freeze until ninety-six degrees below zero. A half-charged battery reading 1.200 at eighty degrees will not freeze until sixteen degrees below zero. You can clean the top of the battery by washing with a garden hose, but be careful that the vent plugs are tight and do not get the water into the cells. Keeping the battery clean is important because the wet acid-soaked dirt may form a short circuit and drain some of the power when standing idle and also may "short out" part of the charging current from the generator when the car is being driven.

SHOW-CARD FOUNTAIN BRUSH USES WATER COLORS

Designed for show-card work, a fountain brush has been produced for use with water colors. The brush has a felt tip through which the paint fluid flows easily from the barrel, eliminating the practice of dipping the brush into an open container. Cleaner work is one result. The



Circle, How Fountain Brush Is Filled; Bottom, Parts of the Felt-Tipped Brush

felt tip is replaceable. Special paint fluid is supplied in various colors for the brush.

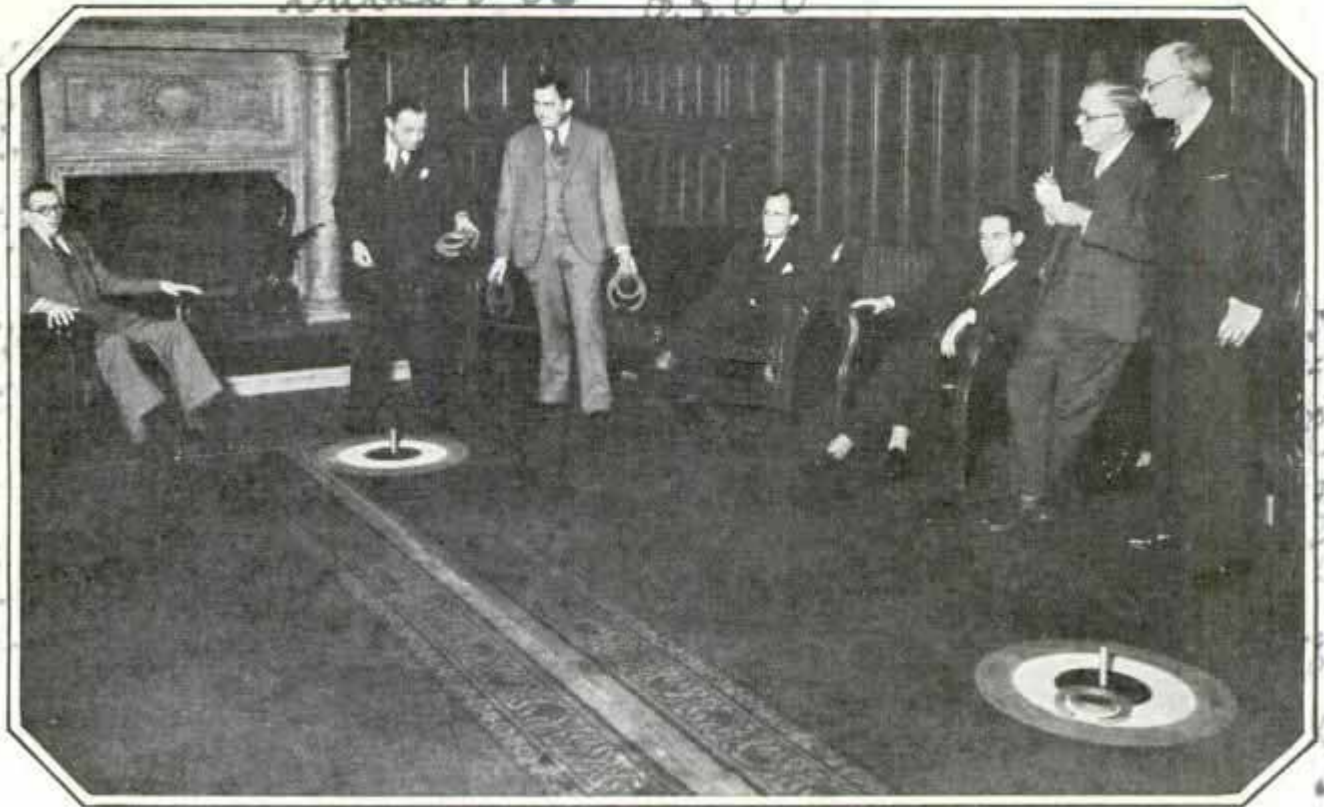
*Used by
of Willard Storage Battery
Co. 246 E. 131st Cleveland Ohio*

*Aluminum in Company of Atlanta Ga
1856
America
Testimonial of*

*Chicago
945 E. 75th St. Chicago
Le Jay Mfg. Co.
Chicago*

Horseshoe Game for Indoors Made of Rubber

1199 Broadway, New York
outdoor: \$3.00
indoor: \$5.00

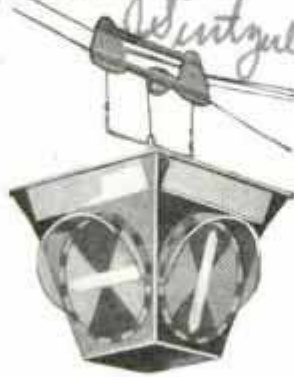


Horseshoe Pitching Has Now Been Brought Indoors and Combined with Quoits; the Shoes Are Made of Rubber Instead of Metal and the Pegs Are Set in Pieces of Rubber Matting

Horseshoe pitching and quoits are combined in a game which can be played indoors, or on a lawn without injury to the grass. Rubber horseshoe quoits instead of metal are used and the pins rest in rubber mats. For outdoor use there is a set consisting of rubber shoes with wooden stakes and also a regulation-weight malleable-iron set of iron shoes and iron stakes.

POINTERS ON STOP-AND-GO LIGHT TIMES FLOW OF TRAFFIC

Equipped with a moving pointer, a new stop-and-go light shows drivers exactly how much time they have before the green signal changes to red. Thus, the drivers slow down or speed up, depending on the position of the pointer. There are four separate signal disks on the faces of the signal clock. A double pointer hand moves around the



signal face, ticking off each second. As the hand reaches a red segment on the clock's face, traffic stops while the pointer slowly moves around toward the green. On all the disks, the red segments are larger than the green so that the four pointers, at certain times, are all on red, causing a pause in all traffic at the intersection. The red and green spaces may be of such sizes as to regulate traffic where the flow on one road is heavier than that on the intersecting route. The double pointer takes two minutes, 120 seconds, to make a complete revolution of the clock face, so that the street is twice closed and twice opened in that time. A half revolution includes a five-second pause, free passage of twenty-five seconds, another five-second pause and a stop of twenty-five seconds.

NOISES FOR JUNGLE LIFE BOOK SUPPLIED BY RECORDS

Phonograph records of jungle sounds are being supplied with a new book on Africa. At certain points in the book, the records are played to give the reader the proper "setting."

Ernie-Treloar, Weyburn

No patented and copyrighted

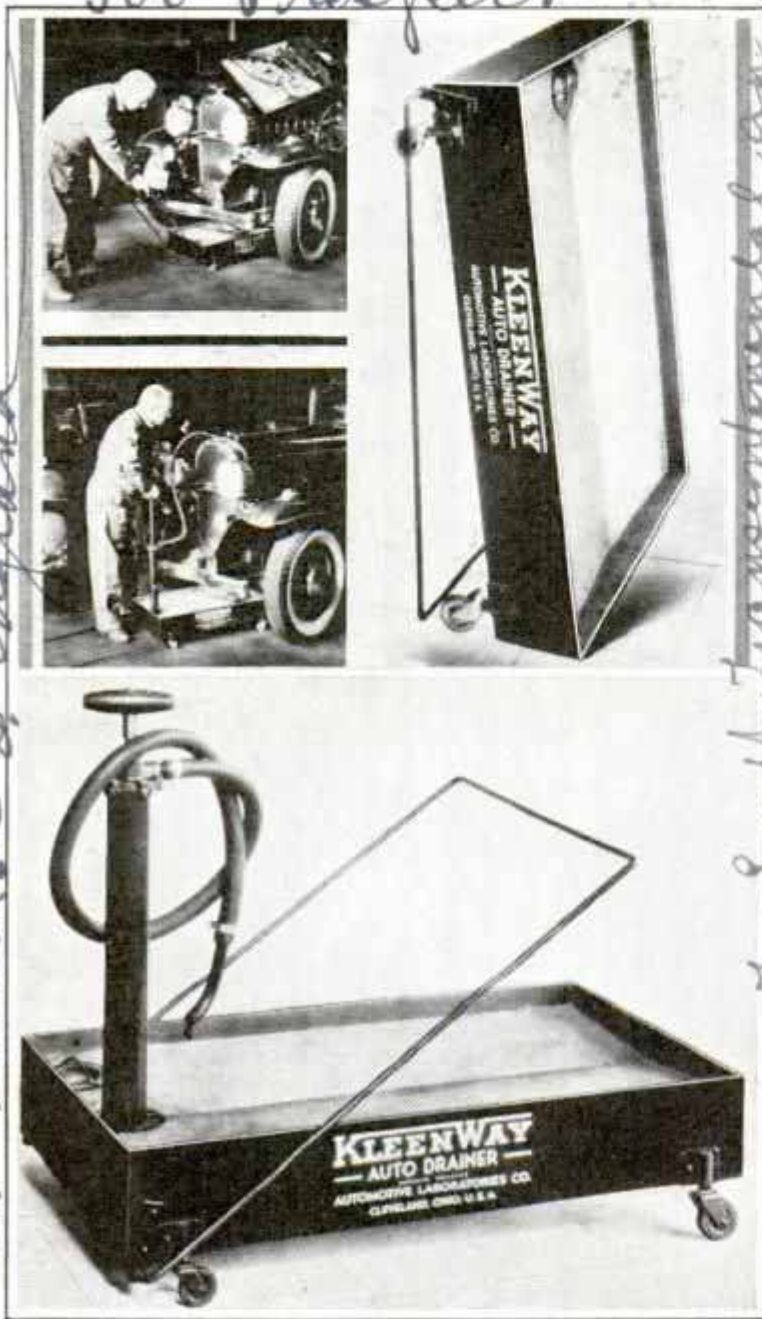
Heuer-Hammer
Walter G. ...

Organized by M. Perie
Ind. ...

500 Prospect

17.39 / 11/5/33

Messrs. B. B. Woodley & Wall, Lead Acetates, Ltd. London E.C. 4, England



Compact Drainer for Auto Radiators Which Filters the Liquid and Pumps It Back into the Cooling System

DRAINER FOR AUTO RADIATORS FILTERS LIQUID

Draining automobile crankcases and radiators is made both clean and easy by using a drainer designed for this purpose. It consists of a tank mounted on wheels and can be rolled under the front or side of any car. It catches and filters all the liquid without spattering and is equipped with a pump to return the filtered radiator solution to the car from which it was removed.

■ A new metallic alloy, tellurium lead, for use in pipes, is said to have twice the resistance of lead pipe to bursting by frost.

TRAVEL BY AIRPLANE SAFER THAN RIDING IN AUTOMOBILE

If you live in Missouri, and have to be shown, the statistics reveal that it is safer to ride in a regular scheduled air-transport plane than to ride in an automobile in that state. Lest you decide to stay at home, it must be added that this is seven times as hazardous as air travel. An air-lines official dug up the figures showing one passenger fatality per 38,231,196 passenger-miles flown by the air lines for the first six months of 1933, according to department of commerce reports. American Automobile association data indicate only 15,581,475 automobile passenger-miles in Missouri for each death among motorists. Life-insurance records show that accidents which occur in the home are much more numerous than those caused by airplane travel, and that one of the most frequent causes of home accidents is getting in or out of bed.

ted South Western Car Kansas City

STRAPPING TOOL MAKES WOOD BOXES STRONGER

For reinforcing wood and fiber boxes, a single-unit strapping tool with automatic seal feed has been developed to speed up such work in shipping rooms. Actually, it is a whole kit of tools in one, for it

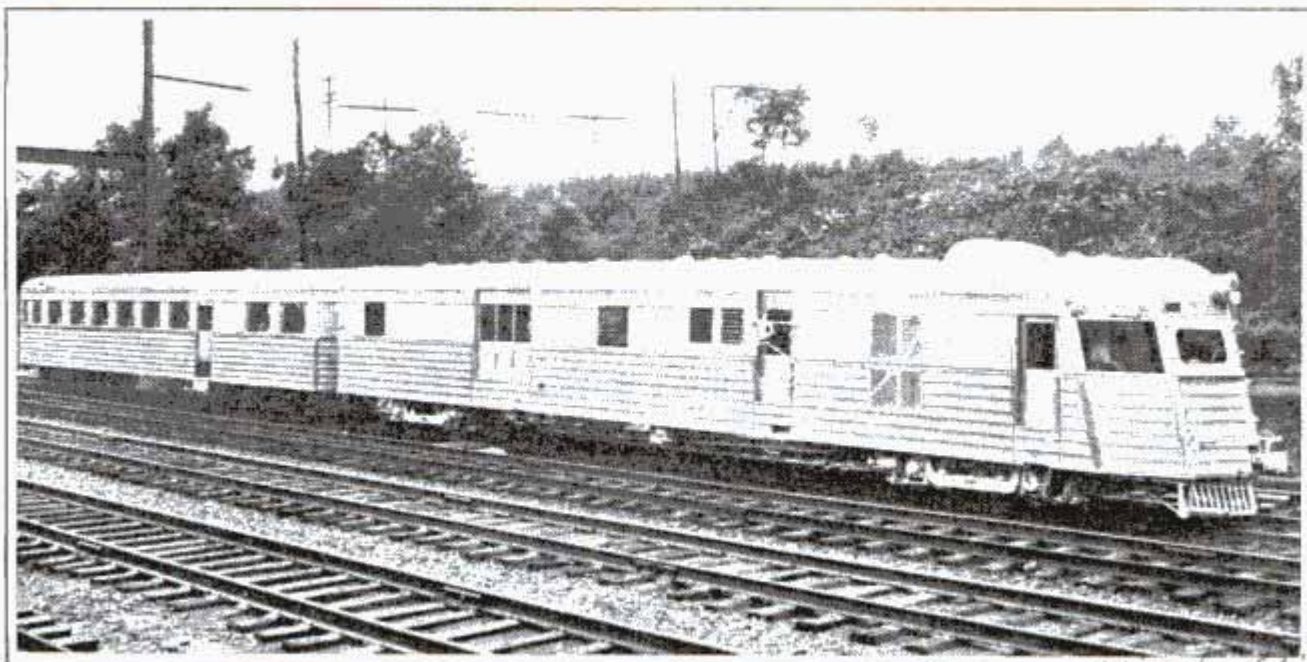
tensions the strap, applies a seal, seals the joint and cuts the strap from the coil. Operations are controlled by two levers. The left hand tensions the strap and the sealing is done with one stroke of the right-hand lever. It is claimed that the uninterrupted operation will reduce time and cost. The automatic feed accommodates clips of 100 seals.



Science Service.

Acme Steel 3840 Archer

Two-Car Motor Train Runs on Rubber Tires



Gasoline-Driven Train Boasts High Speed at Low Operating Costs; Big Engines Produce 450 Horsepower Which Is Converted into Electricity; Baggage and Mail Space Is Provided in First Car

Propelled by a 480-horsepower gasoline engine, a new stainless-steel two-car train has been tested for use by the Texas and Pacific railroad. In preliminary runs, the train attained speeds above seventy-five miles per hour. Noise and vibration are reduced considerably by equipping the rear car with rubber tires. One feature is complete air conditioning, making it possible to exclude dust and dirt while maintaining the proper temperature inside the train. Fifty per cent more speed is claimed for the flyer which has only one-fifth the horsepower and one-sixth of the weight of the steam train which it replaces. Seventy-six passengers may be accommodated. The train was built by the Budd Manufacturing company.

alkali metals are now used extensively in the production of photo-electric cells. The film used as a filter is one hundred-thousandth of an inch thick.

ELECTRIC COLLAR THAWS PIPE OR AUTO RADIATOR

Exposed water pipes or the automobile radiator may be protected from freezing, or thawed out after being frozen, by a "hot collar" which takes its heating current from the nearest electric plug. Placed at the lowest point of water circulation in

the automobile, it keeps oil and water warm so that starting is easy. Grease in a drain-pipe that is clogged may be melted in a short time and a basin of water for shaving may be heated in less than two minutes by the device. The



collar is installed by simply clamping it around the water pipe or some other accessible object, depending on the desired use. Made in fifty and 100-watt sizes, the device consumes about as much current as an electric light of the same capacity.

INVISIBLE LIGHT RAY FILTERS MADE OF METAL FILM

New tools for the study of invisible light rays have been given to science in the form of thin films of alkali metals which possess the property of being transparent to ultraviolet light. Powder films of silver gold and several other metals that are transparent to infra-red or heat rays have been prepared. Both types of films are opaque to visible light. The value of these films lies in their use as filters to remove visible rays from a beam of light. The

Severine has been 10/21/93

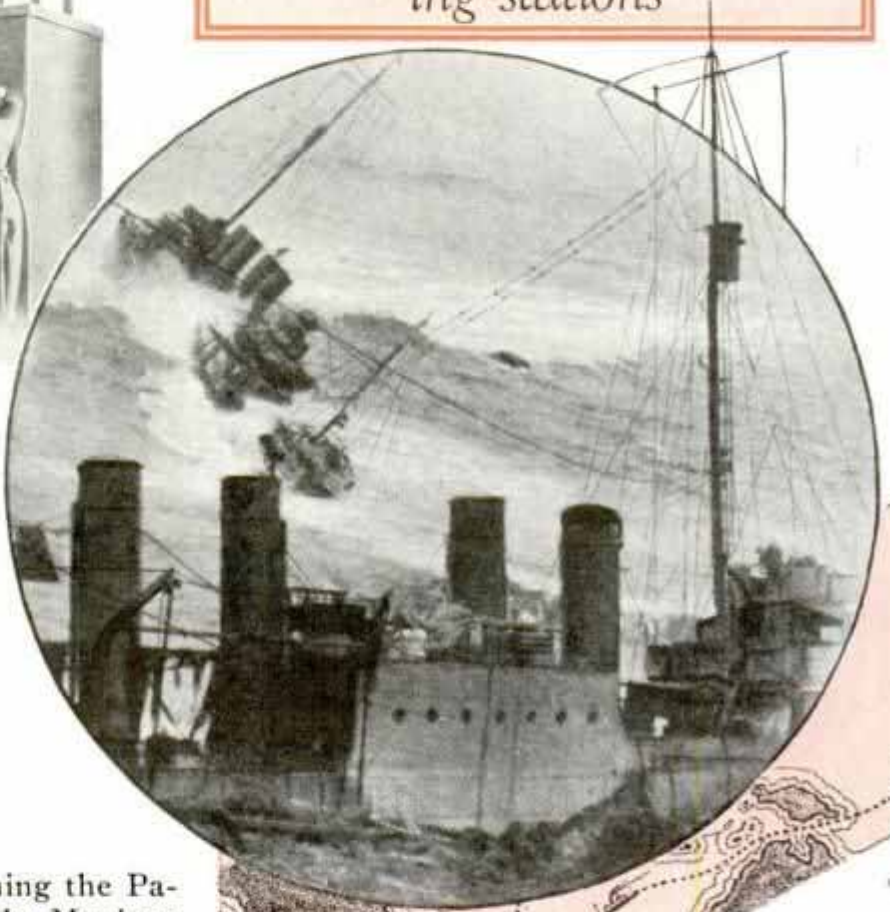
C/165 2. ... altmore ...

Pro. A. U. Good
 Champion Pipe Heater

Mr. Thomas G. Stinson
Jr. 420 S. San Pedro St
Los Angeles, Calif.

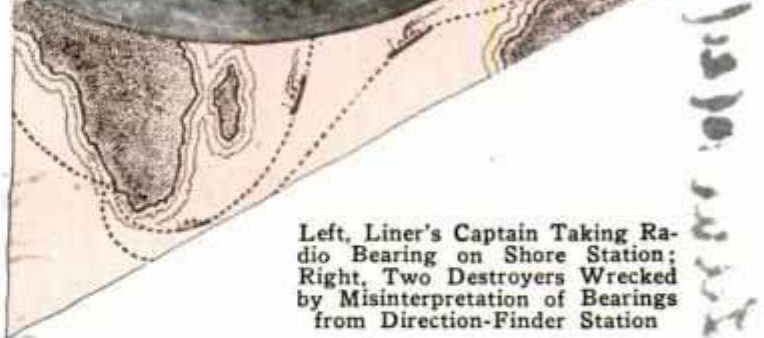
On BOARD

By a conservative estimate 100 ships a year are saved by radio operators of the government direction-finding stations



SITTING in the operating room of NPX, one of Uncle Sam's coastal direction-finder radio stations, perched on the edge of a sea cliff near Los Angeles, Chief Radioman John P. Hixson, U.S.N., hitches the electric heater closer and bends over the receiving sets. Tonight is going to be busy. Beaten off their courses by the storm which has been thrashing the Pacific from Tatoosh island to the Mexican shores, coastwise vessels and transpacific liners will all be calling for positions. Visibility is near zero and the powerful beam of the Point Firmin, half a block away, can hardly be seen at sea.

Hixson straightens as the first urgent code stutters in his earphones. "NPX, NPK, will you give me a bearing? WMCE." He taps back, then, as the incoming signals change to "dash-dash, dash-dash-dash," swings around to the polished control wheel of the radio compass loop. Turning it to the right brings the code in stronger, to the left fades it away. Swiftly Hixson swings the wheel back and forth until the signals are faintest. The huge loop aerial, occupying the



Left, Liner's Captain Taking Radio Bearing on Shore Station; Right, Two Destroyers Wrecked by Misinterpretation of Bearings from Direction-Finder Station

whole room above, is pointed broadside at the distant ship. From the brass surface of the wheel Hixson reads off the degrees and a few seconds later has checked the bearing and dispatched it over the air. Immediately the high, shrill note of NPK, a companion radio lighthouse at Point Arguello, 150 miles away, comes on with a cross bearing on the ship.

a RADIO Lighthouse



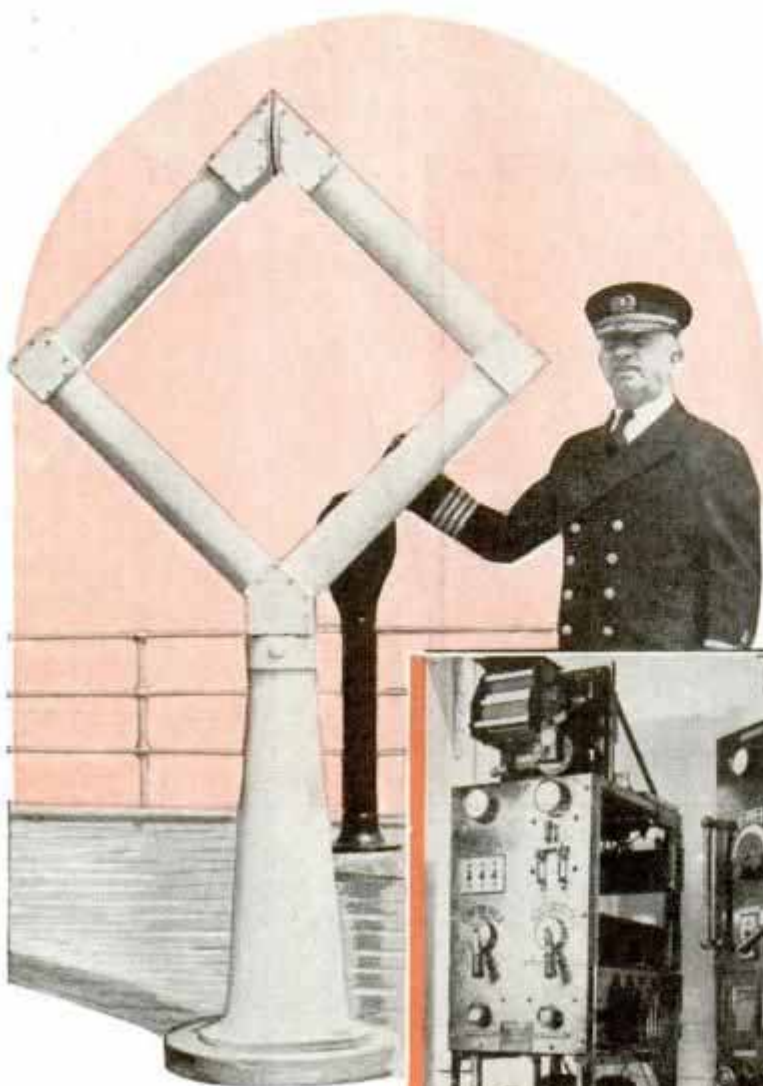
Top, Tuning Receiver at Radio Lighthouse; Bottom, Drawing of How Operator of Direction-Finder Station Helped Save Three Boys Swept into Sea at Foot of Cliff; He Was Commended for Prompt Action

"That's the 'Malolo' on her way in from Honolulu," Hixson says. "Let's see where she is." Radioman J. F. Mulligan moves over to a wall chart from which strings marking each direction-finder station on the coast are attached and quickly supplies the answer by simple triangulation. He swings the string from NPX to 201.5 degrees and fastens it with a thumb tack. The string from NPK is pulled out to meet the 160-degree mark. They cross at a point 100 miles at sea, marking the position of the ship.

Within as short a time the captain of the "Malolo" has duplicated the work on a similar chart in his navigating room.

The bearings from the two shore stations tell to the last mile the exact position of his ship. On a night like this he would reduce speed and remain offshore if it were not for radio. But with the compass stations at his beck and call he can dodge the islands in his path by a wide margin.

Now another ship is checking its course. The "Yale," en route from San Francisco, feels her way along the coast by means of bearings every half hour. The "Santa Rosa," steaming north from Panama, calls three stations for an exact position. The "Java Arrow" wants an up-to-the-minute weather report. Then comes another request for bearings. After Hixson tunes



the loop, Mulligan plots the position of the ship on the chart. A whistle voices his surprise.

"Warn her off," he calls hastily, "She'll be ashore in fifteen minutes." You look up at the chart and see that the two strings cross nearly on the shore line. After one glance Hixson turns to his key and rapidly calls the merchant ship. "You are very close in," he spells out. "Better swing out to sea." Immediately the reply buzzes back in the earphones. "Ok ok tks su."

"That's a close shave," Hixson exclaims. "The chances are now that the next time the ship calls for a bearing we will find her twenty miles offshore."

By conservative estimate 100 ships a year are saved from the rocks by the watchfulness of the operators at the gov-

ernment direction-finder stations. When a ship is found to be dangerously close to shore a special warning message is sent the captain as soon as the bearings have been transmitted.

"Once a green operator sent a ship a bearing that located her on dry land instead of on the ocean," Hixson recalls during a lull. "According to his figures she was steaming down the main street of Pasadena instead of being safely offshore. The operator had forgotten that the loop aerial has two sides to it and that it tunes out signals equally well on either side. The captain of the ship knew enough to add 180 degrees to the figure to obtain his approximate bearing.

"Such reciprocal bearings are troublesome at



Top, Radio Direction-Finder Loop on Modern Steamship; Center, Switchboards of Automatic Radio Beacon Transmitter; Bottom, Transmitting Room of Station; Point Firmin Lighthouse in Background



direction-finder stations that are located on headlands where there is water on opposite sides. Until lately it was hard for an operator to tell whether a ship was approaching from a certain direction or from the exactly opposite direction.

"In 1923 a squadron of destroyers coming down the coast in a dense fog was navigating by bearings from the compass station at Point Arguello. At this point the shore projects away out to sea. The bearings given the destroyers were accu-

rate, but they were misinterpreted, with the result that the squadron turned the corner twenty miles too soon and seven destroyers were wrecked on the rocks. Since then a unilateral device has been perfected that enables an operator to tell the true direction of a ship without becoming mixed up over the reciprocal bearing."

Ships usually obtain bearings from two or three direction-finder stations at the same time. Bearings from three stations are more accurate than from two. When necessary, a ship can find its position by taking bearings at intervals from only one radio station.

The fifty-three direction-finder stations

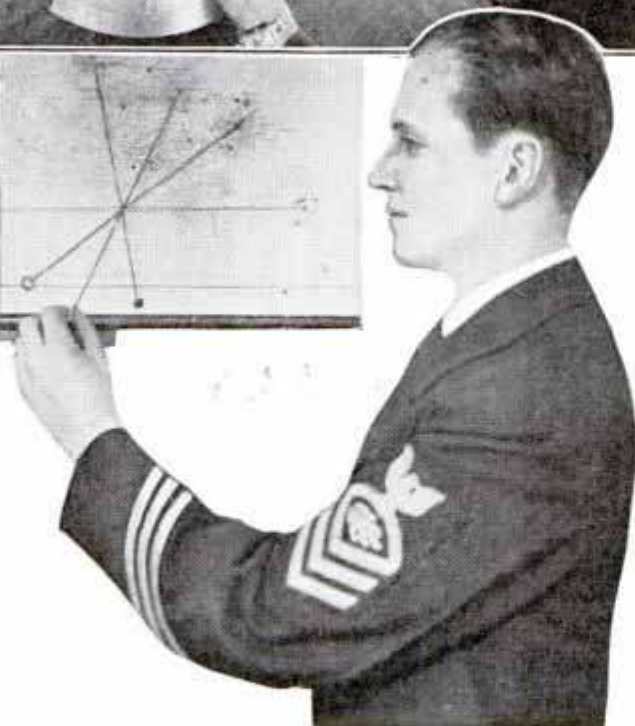


that the government maintains along our coasts are really more than radio lighthouses. The operators perform the first emergency work when a sinking ship broadcasts an "SOS." Each compass station has two receiving sets connected together through "split phones" so that the operator listens over both

sets at the same time. When the symbol of disaster flashes over the sea, each compass operator in range tunes his loop on the ship. Almost before the call ends the operators have bearings by which they can tell the exact position of the disabled vessel.

While H. R. Busby, an operator at NPX, was on duty a few months ago, a boy at the foot of the cliff below the radio station was swept into the sea. Two companions who went to his rescue also were swept away. Busby hurled a life ring, telephoned the coast guard to hurry a boat, and stationed men to point out the spot to the coastguardsmen. His action saved the boys' lives.

Top, Inspecting Lighthouse Lamp; Center, Control Wheel That Turns Loop Aerial in Room Above; Bottom, Plotting Ship's Position by Means of Radio Bearings



Apparatus for Resuscitating Victims of Poison Gas Is Shown in Demonstration on Dummy; It Also Helps to Teach War Safety



Acme
**RESPIRATOR FOR GAS VICTIMS
USED IN WAR TRAINING**

Preparation for safety in time of war is being taught by several European governments. The latest device for preserving human life against the effects of poison gas is an artificial respirator exhibited by the Belgian Civil Union. The respirator is intended for treating civilians and soldiers stricken by gas that an enemy air squadron might release over a city. Its use, for the present, is confined to one victim at the time.

**FISH HAVE POWER TO REASON
BUT ARE "DUMB" IN SCHOOL**

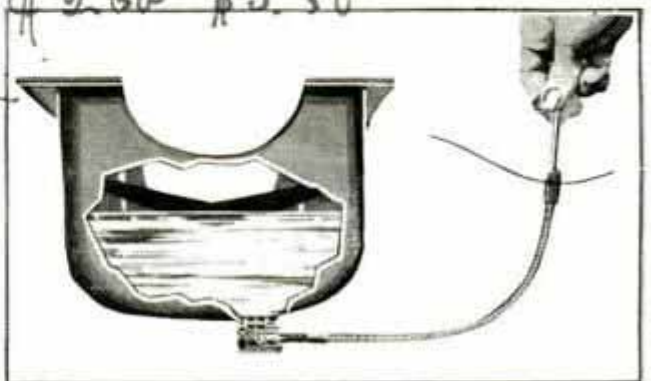
If you want to find a smart fish, don't look for it in school. Fish have an ability to reason and to cope with changing environment and certain species, particularly those that do not go in schools, have a well-regulated family life, like the birds. This is the conclusion of Mrs. Horst von der Goltz, New York aquarist, who has given fish intelligence tests and observed them for many years. She says she never has found any fish without some degree of adaptability and all have a certain degree of intelligence or ability to learn by experience and to change an established habit in order to cope with a new situation. Some even are able to teach this acquired knowledge to others. Fish that travel in

schools are the "dumbest" of all because they are controlled by mob action. The most intelligent fish found by this observer are the cichlids, found in South America, Africa, Madagascar and India. They range in size from dwarfs of one inch to those up to eight and ten inches, take care of their young, teach them to swim, wash them, feed them, put them to bed at sundown and make them get up in the morning for breakfast. In captivity, at least, these fish are strictly monogamous and widows and widowers are faithful to their departed

mates. As the babies begin to swim the parents in pantomime warn them against the dangerous animals and plants and the glass in the tank. The young are put to bed shortly before nightfall. By turning on lights at a certain time and turning them off at a designated time each day, the parents soon learned the schedule and gathered their young for bed about half an hour before "taps."

**FLEXIBLE SHAFT ON OIL DRAIN
IS AID TO AUTOIST**

Made to fit any automobile, a device for draining the oil from the crankcase without getting under the car is equipped with a flexible handle. No matter where the regular oil plug may be located, the flexible shaft permits location of the handle within easy reach. All exposed parts are plated with a rustproof finish.



Draining the Crankcase Is Easy with This Control Which May Be Attached at Convenient Point

Crane Packing Co

*Dr. L. J. Latimer
de Chateaub.
Belgium.*

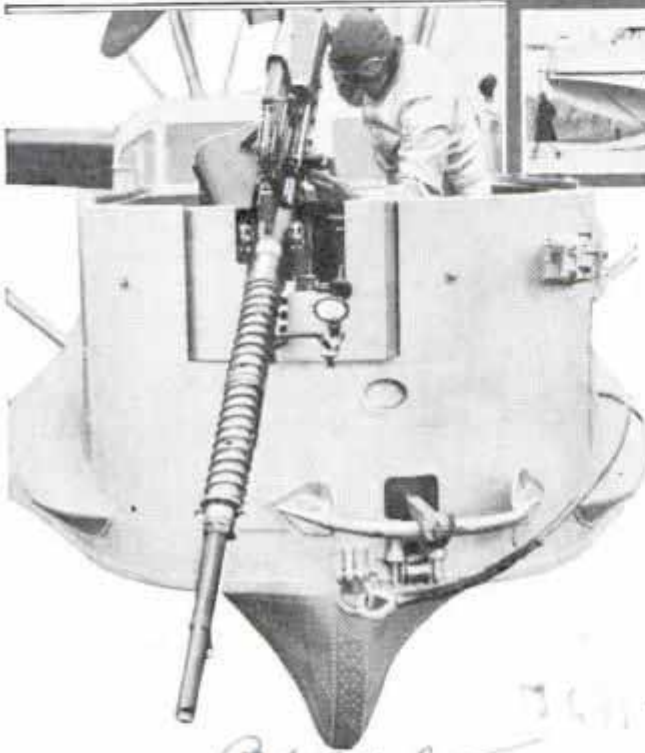
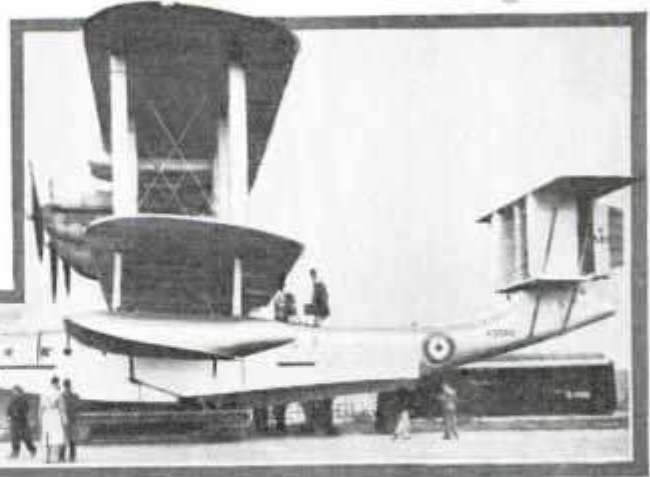
C1679

N.Y. Times 10/28/33

before Aquarium Society

Aerial Battleship Carries Guns and Bombs

Armed with a gun capable of firing one-and-one-half pound shells, the first aerial battleship has been launched in England. It is the largest flying boat in the Royal Air Force. One hundred rounds per minute may be fired by the artillery piece, the first ever installed in a flying boat. The



© Planet News
Left, Aiming Artillery Piece from Plane's Gun Pit; Right, Top, Demonstrating the Size; Right, Bottom, View of Gun and One Giant Propeller

giant craft is capable of 132 miles per hour and large fuel tanks give it a maximum range of 1,500 sea miles. The wing span is ninety-seven feet, its length is seventy feet and it stands about twenty-nine feet high. The quick-firing gun is in the bow cockpit, which also is armed with a machine gun and bomb-release controls. The big ship is regarded as the most formidable aerial fighter ever constructed.

RADIO "BEAM" DIRECTS PLANES ACROSS ENGLISH CHANNEL

Air liners flying "blind" between London and Paris are being guided by a wireless beam emanating at Croydon and Le Bourget fields. A pilot thus is able to reach his destination in fog or bad weather merely by keeping his craft on the beam sent from the radio tower. When the pilot

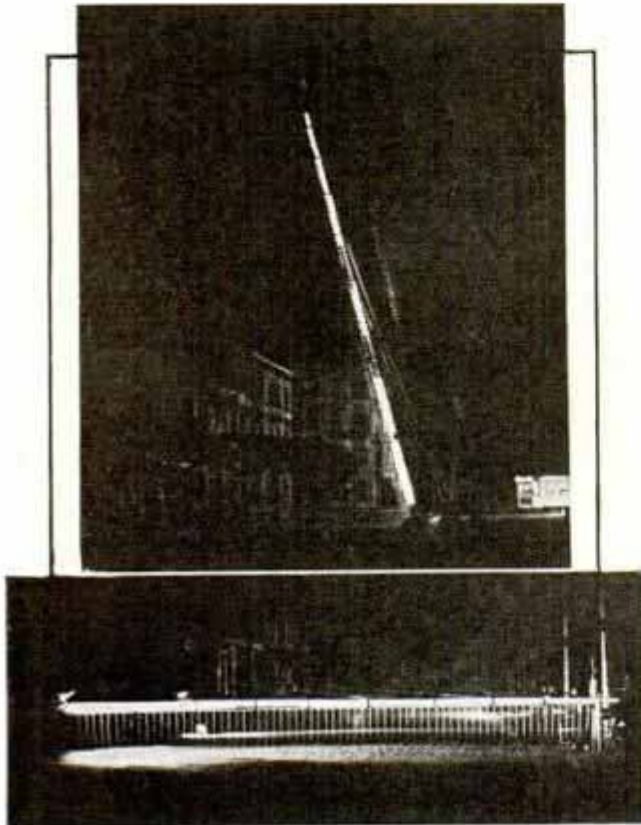
is on his course, a white horizontal line appears on a black background in an instrument in the cockpit. When off the course, the line separates into two thin white lines, the thickness of which indicates the side on which the course lies. This beacon is expected to have a range of 100 miles from Croydon and a similar one at Le Bourget throws a beam to a point on the French coast. Pilots fly down the latter beam and pick up the former to continue on their course. The radio signals do not replace, but augment the present direction-finding system.

Cubs of the grizzly bear may weigh less than one pound at birth, although the mother tips the scales at 500 to 1,000 times that much.

NY Times 10/28/33 Science News Letter

Stettin, Germany

RAIL CROSSING GATES LIGHTED TO PREVENT ACCIDENTS



Top, Illuminated Crossing Gate in Upright Position; Bottom, Blocking the Highway

Complete illumination, instead of a single signal lamp, is being used on railway crossing gates in Germany to prevent accidents. A searchlight illuminates the entire length of the gate so that it resembles a bar of light when let down across the highway. In addition, light is directed upon the roadway directly in the path of oncoming vehicles. This method of illumination has been found to give motorists full warning in all kinds of weather.

SECRETS OF MATTER REVEALED BY SMASHING ATOMS

Smashing of atoms has revealed many secrets about the hidden energy of the building blocks of matter that may some day serve as power in a super-machine age civilization. Some of the recent advances were disclosed a short time ago by Dr. Ernest Lawrence, an American physicist, who collaborated with other scientists at the University of California in this work. The whifligig atom-gun invented by these modern alchemists has fired the most energetic atomic projectiles ever produced by artificial means. They forced the hearts

or nuclei of heavy or double-weight hydrogen, called deutons, to whirl about in a vacuum. Twice during each circular trip the deutons were fed more electrical energy until they were stepped up to the almost unbelievable speed of 3,000,000 volts. Then these atomic bullets were allowed to bombard targets of platinum, brass, wax and other chemicals. Atomic disaster resulted from the collision between the deuton bullets and the target atom hearts. The fragments of the atomic explosions flying out were caught and measured and the measurements told the physicists the story of the atomic disaster. One kind of fragments fly out with a speed of 5,400,000 volts, and as this is much more than the speed of the deuton bullets, small amounts of highly concentrated energy must have been released. The scientists have concluded that the deuton bullet is broken up and energy released when it strikes the target. Scoring a bull's-eye is difficult, however, the best score being about two direct hits for every 10,000,000 atomic bullets bombarding the target. The process is so inefficient that it is only detected by very delicate instruments and as yet cannot be thought of as a commercial source of useful energy.

COIN-IN-THE-SLOT TYPEWRITER HANDY FOR PUBLIC

Any standard make typewriter may be converted to public use by means of a coin box which unlocks the machine for

Placing Coin in Box to Unlock Typewriter



*Science Service © 1667
10/26/33*

*Dr. H. J. Patterson
245 Alhambra St. Los Angeles*

Science Service
10/26/33

thirty minutes when a ten-cent piece is inserted. The timing device may be changed to give longer or shorter service periods. The box is fastened by screws to the side of the typewriter and by a connecting link to the key lever lock of the machine.

FISH WHICH NEVER GROW UP

Fish that never grow up have been found by Dr. William Beebe, deep-sea naturalist. They are the males of a small deep-sea species. The females reach a length of from two and one-third to ten and one-half inches and are normally developed. The males range from one and one-quarter to one and three-quarters inches in length, and are of such generally immature appearance that specimens heretofore dredged up had been judged to be post-larval creatures. However, it has been found that these little fish, despite their looks, are mature and as fully grown as they ever will become.

HOLDER FOR EMERY DRESSER ASSURES BEST RESULTS



To get the best out of emery wheels, they should be kept dressed true. Two dresser holders are on the market, one made with a long base and the other with a square base. Both styles are arranged with bolt slots for attaching to the table or other place on the main machine. The tops of the upright projections of the holder, where the dresser handle comes in contact, are designed V-shaped to accommodate Huntington handles or to take ordinary round shanks. The tops can be altered to suit any special type of dresser handle. The design brings the center of ordinary dresser cutters slightly more than three inches above the surface of the table. The dresser holders are for use on many kinds of common and special grinding machines having tables, flat surfaces or suitable places for attachment.

In the days of the Roman Cæsars, the Emperor Augustus set a limit of 68 feet for the height of buildings.



Gathering Crop on Mushroom Farm in Abandoned Mine; Faster Growth Is Claimed

MUSHROOM FARM IN OLD MINE IS PROFITABLE HOBBY

Mushroom farming in an abandoned coal mine, started as a hobby, has been developed into a profitable business by an Ohio man. By gathering his first crop in seven weeks after starting, this farmer has speeded up mushroom growth considerably. In four months, 14,000 pounds of mushrooms were picked from beds 500 feet underground. Two hundred pounds per day may be delivered to the market.

TUBE EJECTS ASPIRIN TABLETS ONE AT THE TIME

One aspirin tablet at the time is dispensed by a tube fitted with an ejector spring. The dispenser holds twelve tablets. To remove a tablet, the user presses his thumb against the barrel of the tube in an upward movement, causing the ball top to roll over and deliver the tablet which it has picked up.



How Aspirin Tablet Dispenser Works

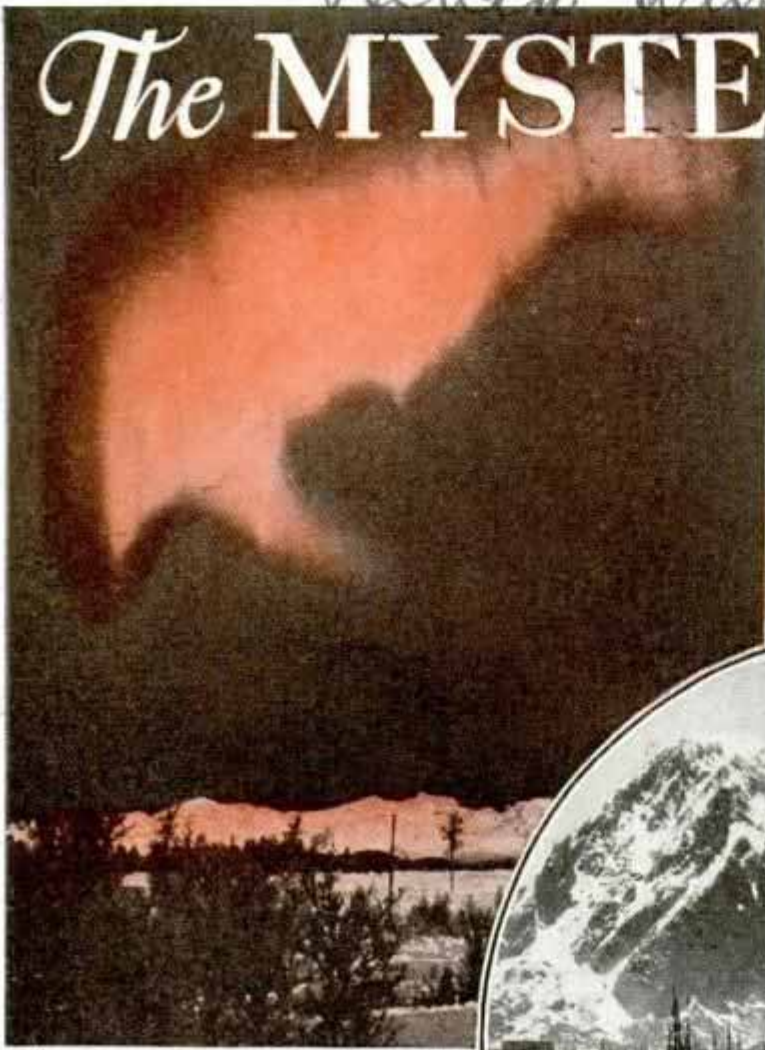
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Polley to Culmerville Coal Mine

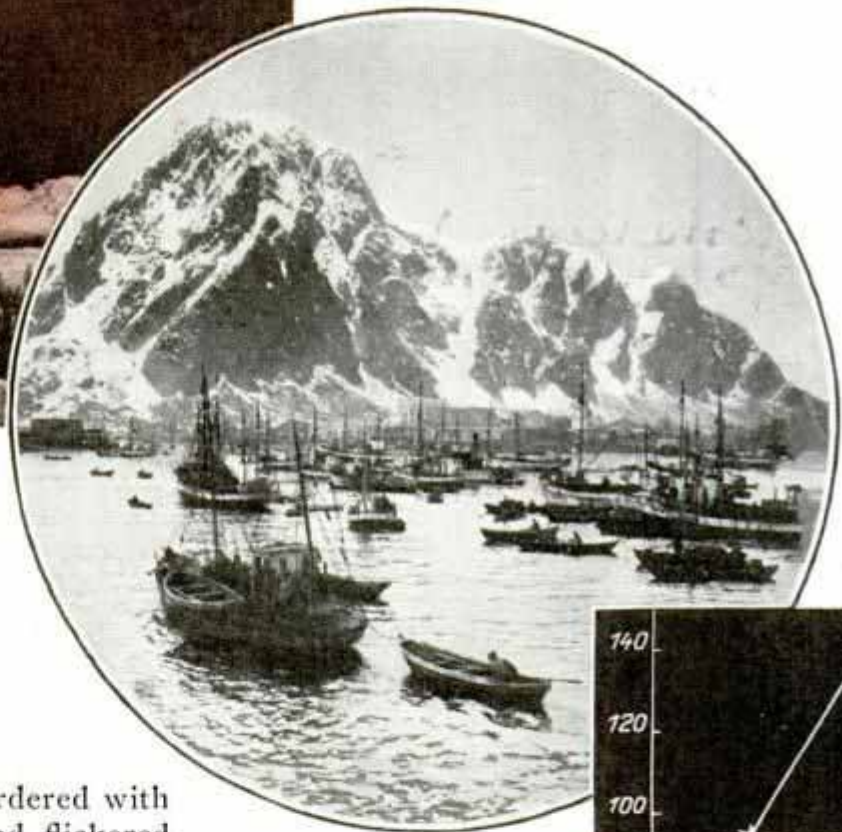
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Kato Engineering Co.

Jahringstrasse 21.
Berlin-Wilmersdorf Germany

The MYSTERY of the



a telegram, and the lights are "turned on," you may find the wires "dead." Or if you want to play the radio, the lights may offer the bugaboo of static. Otherwise, you have probably considered the aurora borealis as a rather fantastic and unreal manifestation of some force of nature to be enjoyed when seen and then

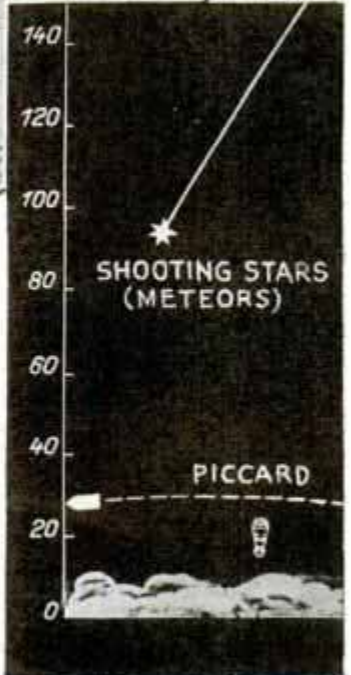


IF you live in the northern half of the United States and have been fortunate, you stepped outside some night and saw painted on the dark sky a moving, colorful spectacle of such sheer beauty as to take your breath away. Bright lights with draperies of a greenish hue, perhaps bordered with red at the bottom, danced and flickered before your eyes, changing in form as though blown by the winds. Again you may have observed crowns of blue rays, arches and other fantastic effects, wavering and shimmering as though manipulated by a master at the control board of a giant color organ.

When Mother Nature sets out to put on a show, she outdoes the wildest dreams of the theatrical impresario, and she is at her best when painting the heavens with the northern lights. To the casual observer the polar lights represent a beautiful natural phenomenon which, once seen, can never be forgotten. If you want to send

Above, Auroral Curtain with Clearly Defined Ray Structure; in Circle, Section in Northern Norway Where Lights Are Often Seen

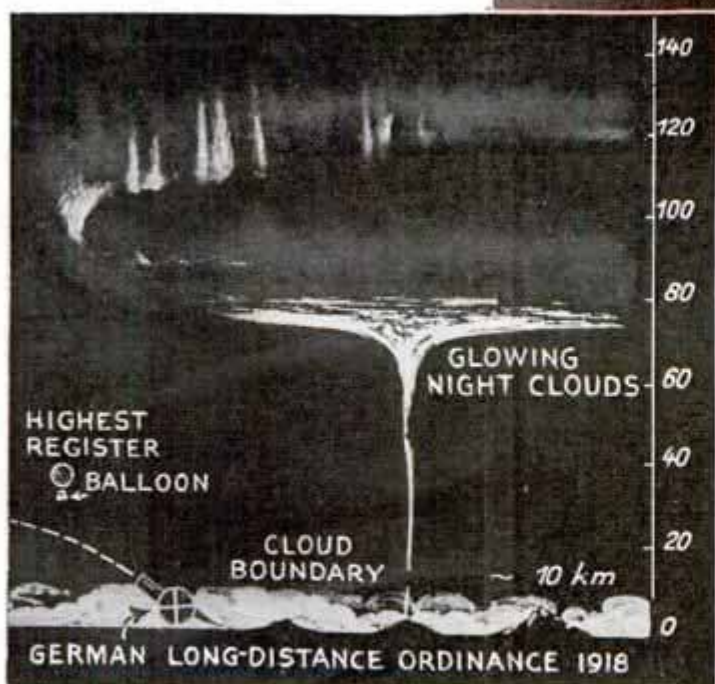
forgotten. To the scientist, however, the polar lights have offered one of the greatest mysteries of our universe, and for many centuries men have been studying this phenomenon, believing the solution of the riddle might offer the key to many other mysteries of nature.



NORTHERN LIGHTS

Bit by bit, facts have been unearthed about the northern lights and their cause until today astrophysicists believe the cause has been found. Many of the manifestations and effects are still not thoroughly understood, but much progress has also been made here.

As early as the beginning of the century, the Norwegian explorer, Birkeland, put forth an explanation of the polar lights which is still fundamentally recognized. He observed a striking concurrence in the frequency of three quite different natural phenomena—sun spots, the magnetic disturbances in the polar districts and the northern lights. He formed the theory that



Above, Making Photographs of Aurora Borealis; Left, Diagram Showing Comparative Height above Earth of Polar Lights

mense numbers. They penetrated interplanetary space and part of them reached the magnetic field of the earth and were attracted by the poles. Entering the upper layers of the atmosphere, the electrons caused the gas molecules to shine.

Somewhat later another research man was able to ascertain the path of the electrons through the magnetic field of the earth by calculations, and then to demonstrate his findings with models. Still more recently, another scientist checked on these reckonings by casting artificially produced electrons into the magnetic field

electric particles, or electrons, are precipitated by the sun spots into space in im-

C1502



Photograph of the Auroral Drapery Which Slowly Changes in Shape as if Blown About by the Wind

it was then possible to compute the height at which the lights play. The lights, it was determined, manifest themselves at heights ranging from about forty miles up to more than 600 miles above the earth.

The polar lights, like the light from the sun, can be dissected in a chromatic spectrum, the characteristic lines of the spectrum revealing the elements. This test has shown that at the immense height of more than 600 miles, there is not only oxygen but also the heavier nitrogen which forms more than eighty per cent of the air we breathe. The spectrographic investigations have been proved conclusively recently by means of filter-photographs.

In this connection, Professor Harlow Shapley, director of the Harvard college observatory, recently announced that he had found that the composition of the sun's corona, likewise a major mystery, consists, in part at least, of oxygen in a high state of excitation.

of a small model of the earth. Theory and demonstration concurred exactly.

During the past year, Norway and Germany have participated in an international polar year during which eminent scientists have studied the entire scope of northern lights research and all questions pertaining to it. Germany has made it her special task to investigate the connection between the lights, sun spots and radio disturbances. Last winter, motion pictures were made of the lights and for the first time the various vaults and draperies were photographed in their natural colors.

One experiment consisted in making simultaneous pictures of the lights from two stations some distance apart. From their divergent positions to the stars, which were also photographed,

This discovery may mean much in future investigation and research because, for the first time since the spectra of the corona in eclipses of the sun were observed by astronomers more than sixty years ago, science now has a definite clue of what the corona is made, and incidentally, of what goes on there in the heat of

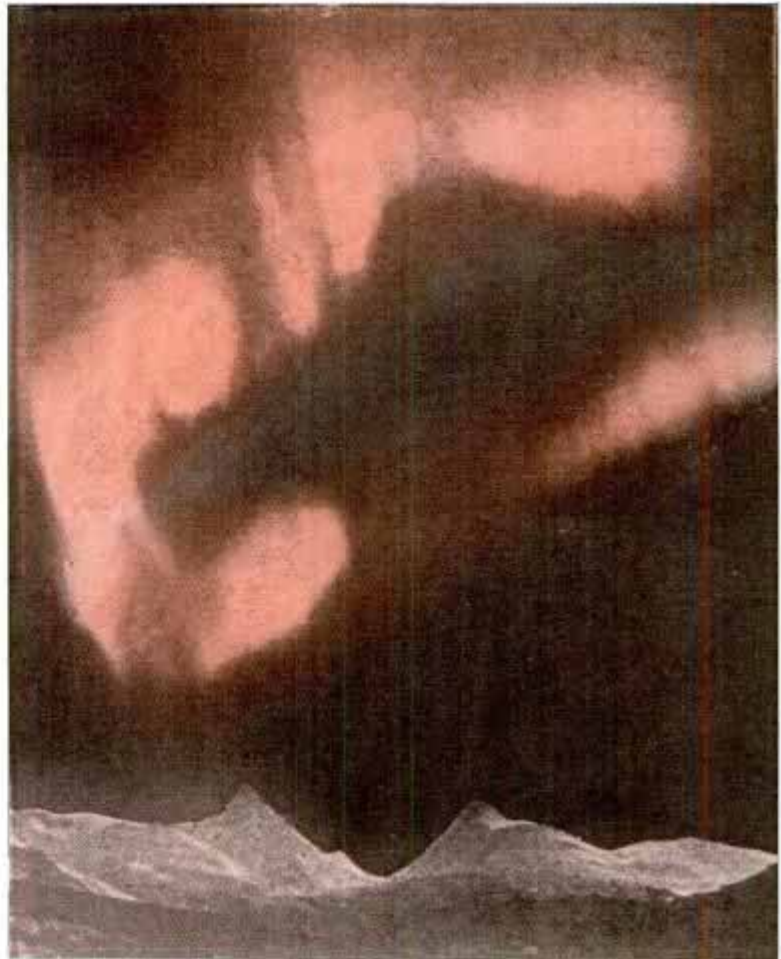


Two Photographs of the Auroral Curtain in Which the Rays Move Rapidly, the Dark Sections Running Rhythmically across the Drapery

the outer atmosphere of the sun. Three of the strongest lines of the sun's corona have been identified as being due to neutral oxygen atoms in the high solar atmosphere, these atoms being in a peculiar state of excitation.

The mysterious radiations of the sun's corona have been attributed for years to a hypothetical element, "coronium," much as the light of the distant nebulae was long attributed to a hypothetical element, "nebulium." A few years ago the riddle of nebulium was solved when it was found that highly ionized oxygen and nitrogen were responsible for the radiations. In the same way, the queer light of the aurora has been found to be due to the ionized oxygen. Oxygen is described as "ionized" when one or more outer electrons are stripped from the oxygen atom. The identification of the oxygen lines, it is expected, will lead, before very long, to identifying the other lines in the corona.

The researches being conducted at present on the height and fluctuations of the heaviside layer of atmosphere, some fifty or sixty miles above the earth, are expected to be important to radio. This layer is blamed for much of the fading in receiving sets and it is believed that the radio waves, upon reaching it, are not cast



Photograph of Auroral Rays; These Lights Are of Many Shapes and They Are in Continuous Movement

back but pass through and are lost. This and other questions involving radio are being studied in connection with polar-lights phenomena. Most scientists are agreed that the appearance of an aurora is closely connected with something that happens on the sun and have decided that

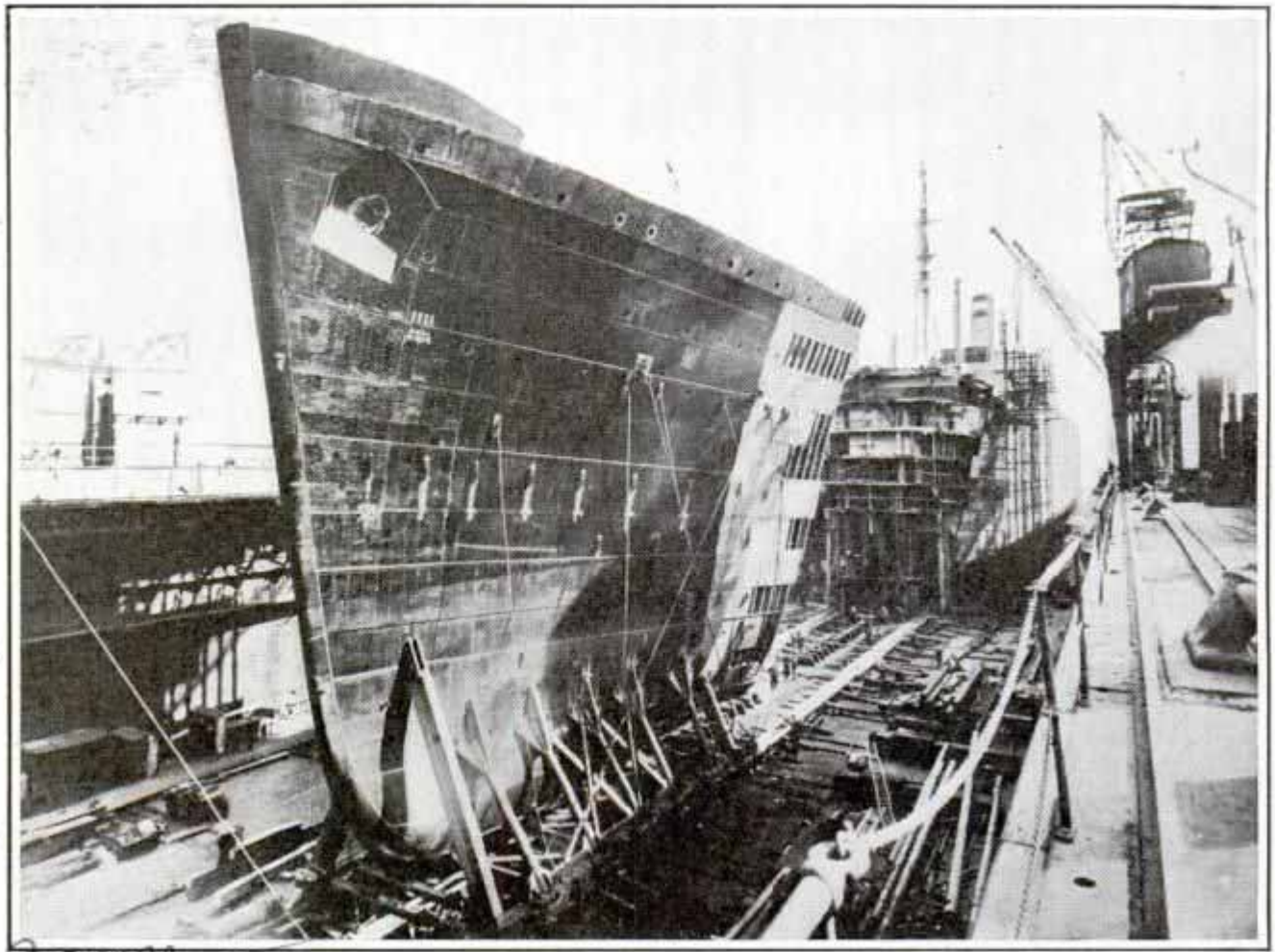
what is seen on the earth is therefore merely a reflex action.

In any event, astronomers are agreed that when the aurora is thoroughly understood, they will have the key to many a cosmic riddle. To you, the aurora borealis may be an awe-inspiring spectacle to be viewed and forgotten, but to men of science it represents the portal behind whose dancing lights may lay hidden the solution to age-old mysteries.



Left, Picture of a Narrow Yellow-Green Auroral Band; Right, Broad Band with Many Folds Hanging from Sky Like a Shining Green Curtain

c1630



39 Broadway, New York

Reshaped Bow of Steamship Being Remodeled to Increase Its Speed; the Vessel's Size Also Is Being Enlarged; This Work Is Another Move in the Battle for Speed Supremacy Among Passenger Craft

SHIP REBUILT TO BOOST SPEED IN PASSENGER SERVICE

Four liners of the Hamburg-American line are being reconstructed at the Hamburg shipyard to increase their speed to

nineteen and one-half knots. This work is another move in the trend to faster ocean-steamship service. The vessels are being enlarged and their bows changed to another shape. The liners are of the "Albert Ballin" class.

CAR BODY WARMED OR COOLED BY DOUBLE DASHBOARD

c1622

Serving the double purpose of warming the interior of the automobile in winter or cooling it in summer, a double dashboard is a feature of a British-made car. Two steel castings, between which is an air space, form an insulating partition between the body and the engine. At the top of this air duct is a flap-type ventilator, and at the bottom is a long slot opening



under the floor boards. If the ventilator is opened in warm weather, cold air flows into the duct, keeping heat and fumes away from the interior of the car. In cold weather, the ventilator is closed, causing the imprisoned air to become heated by the engine. This heat is transmitted gradually to the interior of the car.

c1645

DEVELOPER FOR SMALL FILMS MAKES ENLARGING EASY

Enlarging of small films without bringing the grain into such prominence that the picture loses its sharpness is made possible by a new developer. Any film developed with this product may be enlarged to as large as eighty-five diameters

micrograin

W. B. London, England

Citrolin "Lens" Brook

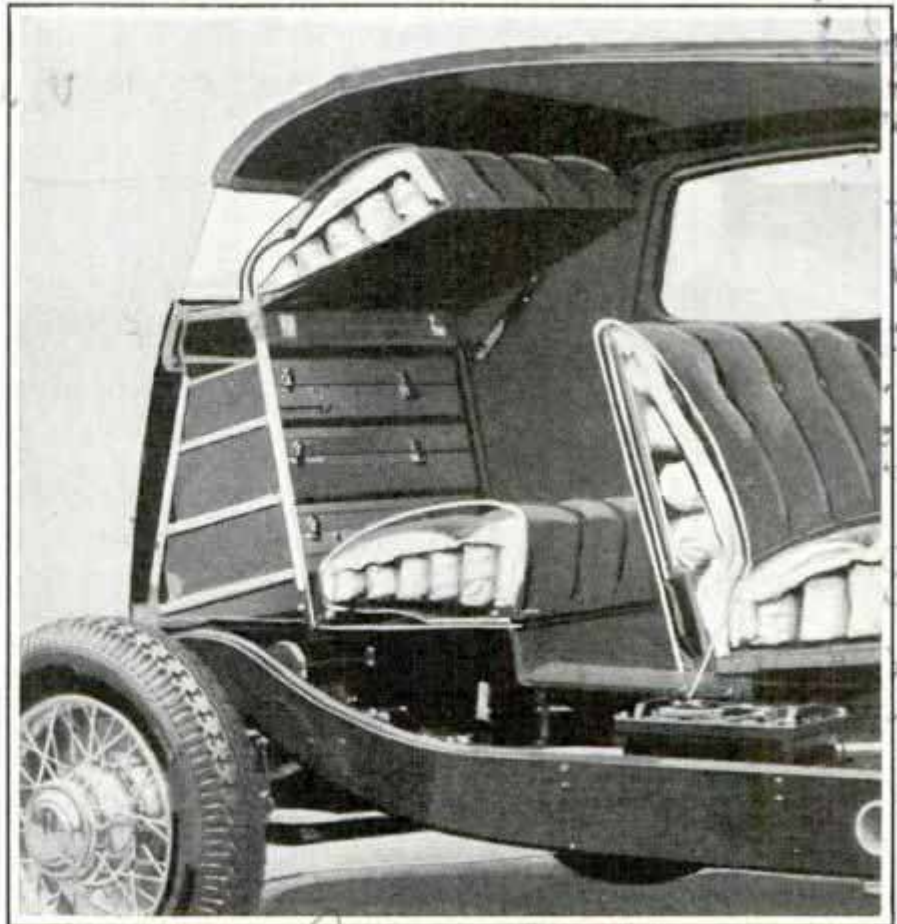
Central Camera Co.

say from one-by-one and one-half inches to seven-by-twelve feet. Thus, from small negatives, enlargements as large as desired can be obtained, enabling the commercial photographer to make pictures of persons in full natural size. The developer may also be used repeatedly and requires no dilution.

01590

DOUBLE SPROCKET FOR BICYCLE AIDS RIDER

Much of the work connected with riding a bicycle up a hill or along level ground at high speed may be eliminated by a new double-gear attachment. Two sprockets, one large and the other small, are operated one at a time by the rider's feet on the pedals. A clutch control shifts the gear from low to high or back. Separate chains are used for each side of the double sprocket. Coasting and braking are possible in the conventional manner at either speed. The attachment may be installed on new or rebuilt bicycles in a few minutes. A variety of gear ratios is possible, the smaller the low gear the easier it will be for the cyclist to climb hills.



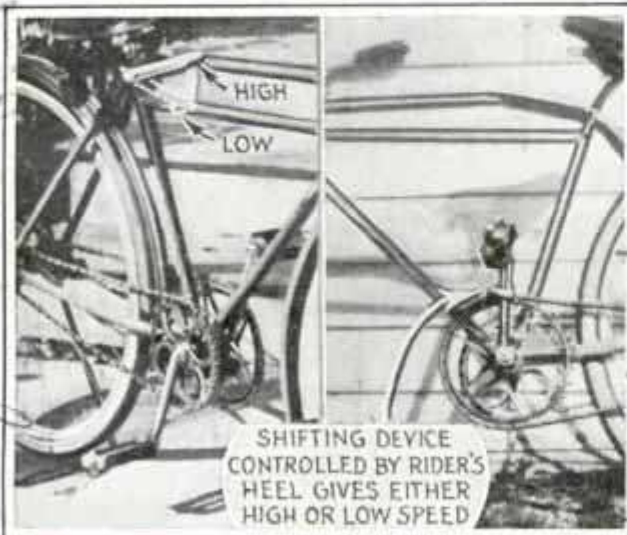
Showing Ease of Removing Suitcases from Built-In Trunk on French Auto; Photo Gives Cutaway View of the Arrangement

AUTO TRUNK OPENS INSIDE CAR BY LIFTING BACK CUSHION

Access to a built-in trunk featured by one European automobile manufacturer is through the inside of the car. By lifting the hinged back cushion of the rear seat, passengers may remove from the trunk any article while the car is in motion. The trunk on this car, a Renault, is equipped with suitcases which fit snugly.

GIANT AND PYGMY MUMMIES OF OLD MEXICO FOUND

Mummies of giants and pygmies who once roamed Mexico have been found in northern Sonora. Some of the mummies were more than seven feet long and had head formations indicating that they belonged to the Mongoloid race. Embroidered symbols on the mummy clothes, the use of shell ornaments and the strata of dust under which they were found tend to show that the people probably antedated the Mayans. Beside the giant mummies were those of a pygmy race, as well as those of a normal-sized people.



Two Views of Double-Sprocket Bicycle; Arrangement Gives Effect of Gear Changes

Alc. June 1935-64

Hollywood 2000ish

W. H. & G. Co. Reported by

10/20/33

Press memo
C/643

ALKALINE INK PROTECTS PAPER FROM EARLY DETERIORATION

Washington 20 C.

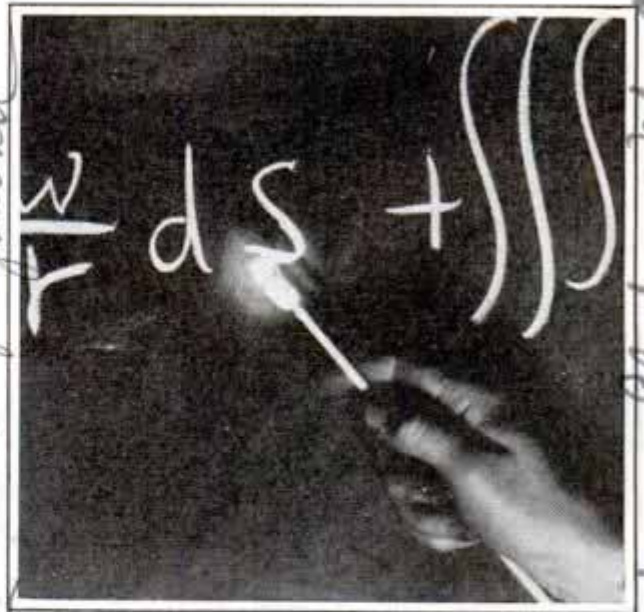
Scientists of the United States bureau of standards have developed an alkaline ink that has little, if any, deteriorating effect on paper. Ammonia replaces the acid used in other inks. The experts inked papers and subjected them to accelerated aging by the application of heat. If ordinary ink was used, the heat treatment resulted in rapid embrittlement of the paper and folding endurance was decreased by as much as fifty per cent. Alkaline-inked paper passed the heat test successfully.

C/624

FLASHLIGHT TOP FOR POINTER AIDS BLACKBOARD TALKER

Lighted pointers to aid the lecturer and blackboard demonstrator have been developed by Westinghouse engineers. By placing a spot of light at the center of interest of a diagram or drawing, the speaker is able to focus attention of his audience at the desired point. When used with a colored-light tip, the pointer aids in lantern-slide talks. The pointer is easily made and may be built by anyone. It is entirely self-contained, consisting of a standard flashlight, a sectional steel fishing rod and

Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co.



Flashlight on Tip of Pointer Is Used in Blackboard Lectures to Emphasize Important Points

some small wire. The flashlight proper is the handle, while the flashlight bulb is placed at the tip of the rod and connected to the battery through the hollow pole. The flashlight switch controls the bulb.

Westinghouse Electric



Examining Contents of Purse by Means of Midget X-Ray Machine Which Is Easily Portable

MIDGET PROJECTOR OF X-RAYS HAS MANY USES

So small that it may be carried without difficulty, a midget X-ray machine has been produced by the General Electric X-Ray corporation. J. B. Wantz designed the portable projector, which has a wide variety of uses, even one so prosaic as to examine the contents of a purse without opening it. The machine is said to be the smallest of its kind in the United States.

METAL AS HARD AS A DIAMOND SCARS EMERY WHEEL

After six years of experiments, a San Francisco metallurgist has evolved a metal within one-tenth of the hardness of a diamond and sixty-four times harder and more resistant to abrasion than the hardest carbon steel. Its cost of production is said to be so low that it can be used widely in commercial fields. An electric furnace which produces 20,000 degrees Fahrenheit is used to turn out the metal, known as "Durox S-20." The metal not only resists this terrific heat which causes most metals to vanish completely in a puff of smoke, but refuses to melt into liquid form at all. Pieces of ordinary steel treated with it will cut scars in an emery wheel.

San Diego News, 10/24/33
Some pygmies of Africa do not know how to kindle fire and depend on borrowing fire when a hearth-fire goes out.

Science News Allie

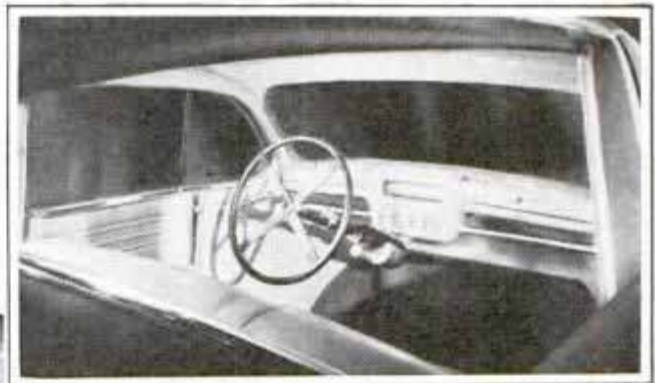
2902-19 H. St.
Mikael Nielsen
2012 W. Johnson Blvd
Scientist, N.Y.

*176-51 Mack Ave
Detroit Mich*

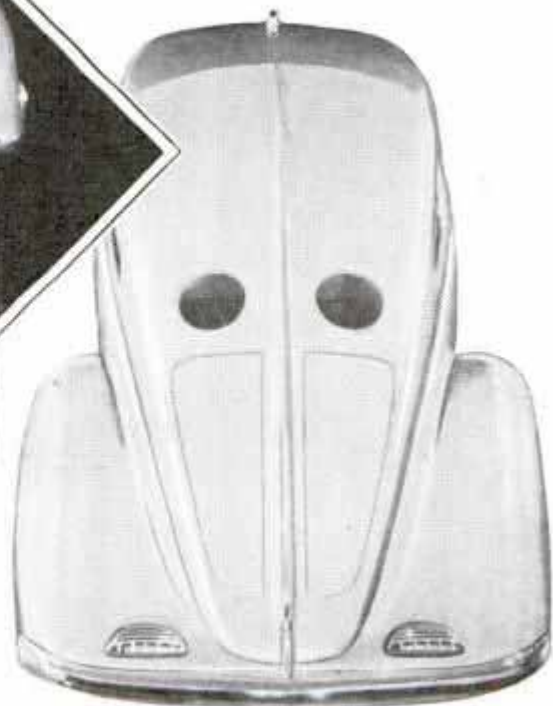
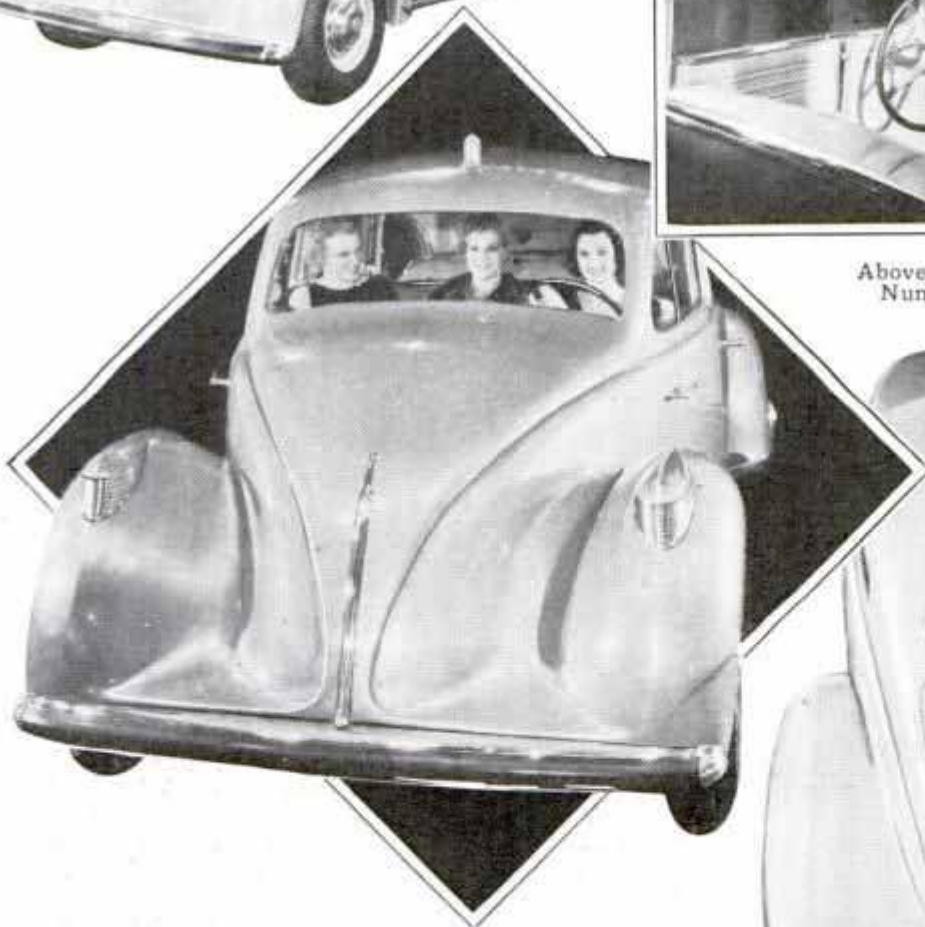
"Dream Auto" Produced in Full-Size Model



"Dream Auto" Designed by Briggs Mfg. Co. It Is Not a Model for Actual Production



Above, Red Line Moves across Numbers on the Speedometer



Top, Showing Modernistic Steel-Frame Chairs; Bottom, Left, Plenty of Room Up Front; Bottom, Right, Rear View of Car; Note Attractive Streamlining

C 1553

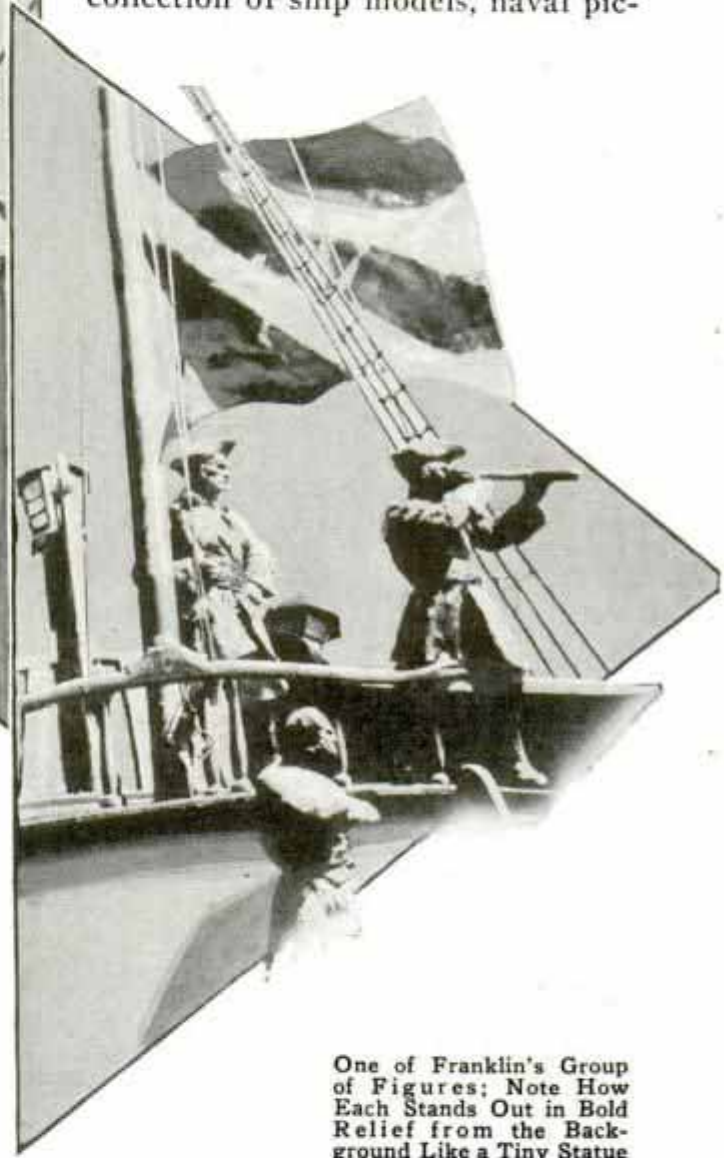
417 W. 118th St
New York City

A NEW ART

It is virtually a new form of art, yet with aspects that partake of science—a "miniature group." This particular one has especial interest now, for it is the latest addition to President Franklin D. Roosevelt's famous collection of ship models, naval pic-



Scene Depicting Columbus on the "Santa Maria"; the Object on the Gunwale Is a Small Cannon



One of Franklin's Group of Figures; Note How Each Stands Out in Bold Relief from the Background Like a Tiny Statue

CANNON flashes and battle lanterns gleam upon white sails and cutlass blades, and upon a short man in blue and scarlet, a truculent figure, a face taut in desperate determination. From the open mouth, a cupped hand hurls across the waves the defiant cry, "We have not yet begun to fight!" Pitching deck, tattered rigging, wounded seamen, dominated by a dauntless figure and face—John Paul Jones, aboard his frigate "Bon Homme Richard."

A great moment, depicted in lifelike figures, amid a vivid setting, inclosed in a sort of box perhaps two feet by three, flooded with light, faced with a gilded frame. A scene from a puppet theater? But it is neither wooden, nor theatrical. This picturing of the most famous sea fight and fighter in American history glows with a warm reality that art does not always attain. It resembles both painting and sculpture, yet is neither. It is beyond taxidermy.

tures and relics, in the foremost American home, the White House. Already such groups have won places in dwellings of prominent Americans, and in great museums. This summer hundreds of thousands of people have viewed a striking series of five, exhibited at the Chicago World's Fair, to show the part played by the geological survey in developing various American industries.

A wide range of subjects is covered by

and SCIENCE.

Dwight Franklin, Exponent of a New Art, at Work in His Studio on the Figures for a Nathan Hale Group for Museum of City of New York



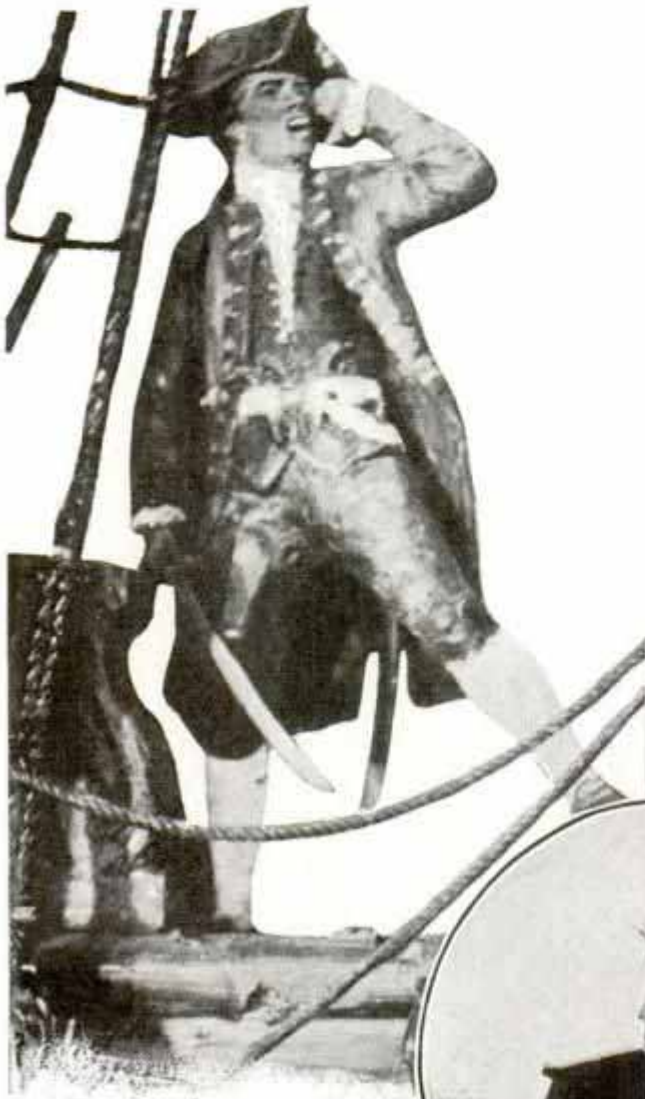
Each Figure Depicted Is Historically Accurate, and This Involves Much Preliminary Research Work

the miniature figures and groups, of which nearly two hundred have come from the creative brain and fingers of Dwight Franklin, the first exponent of the new form. His example has been followed by

other craftsmen, and now there is quite a group of enthusiasts, including an increasing number of boys and youths who find it affords scope both for artistic impulses and for a mechanical bent, and the creative desire to "make things."

The idea came from a man who spent only one month in art school, then left because he did not like it. Now, barely forty, in his studio high in a New York tower, working mostly with hard wax, modeling tools, brushes and fingers, though sometimes with almost anything else, he creates figures and groups that live, breathe, and above all, act. These are no waxworks, but human beings in action. Unceasingly, this artist-sculptor-mechanic seeks life, warmth, action, portrayed with

New York Life Tower, New York City.



Above, Figure of Paul Jones on "Bon Homme Richard"; Right, Pirate Figure

Booth Tarkington, at Ogunquit, Maine, contains a gorgeously swaggering figure beneath a Jolly Roger. Blackbeard burying his treasure ornaments, a Hollywood home and he has made two Long John Silvers. Many figures Mr. Franklin has evoked from the past: Francois Villon, Robert Emmet, Theodore Roosevelt, each with a romantic yet historical flair. That comes in part from the painstaking research and careful workmanship that precede each piece of work.

Recently, he was working at a figure of General Custer, to be the center of a group showing the famous last stand against surrounding Indians. He had modeled from wax, roughly, the debonair "white chief with yellow hair" whose story every Amer-



Above Is a Group of Pirates Who Are Getting Ready to Bury Their Treasure

accuracy and fidelity. His art has been sometimes described as glorified taxidermy. It is more than that, although he started twenty years ago as a young taxidermist at the American Museum of Natural History. He was always experimenting with new materials, finding some new way to build a lifelike figure. Since then he has developed a specialty that has opened new possibilities.

Many new American homes have recently acquired figures or groups by Dwight Franklin. Some are portraits, lifelike busts or full-length figures of some dear one, living or dead. Others are characters of history or literature. Some of his best known figures, that especially enthuse his youthful admirers, are pirates. The library of

ican boy learns. Then he began to glue cotton along the sides of the legs in dabs like fringes.

"Then you're going to show him in buckskin?" he was asked.

"Buckskin to the waist, blue above," replied Mr. Franklin. "That's what Custer wore. So his widow told me, just before she died last April. And the six-shooter that I show him holding poised—"

He opened a box at his feet.

"Here it is," he said. "And here's the old black holster at his belt."

"When I get an idea for a group," Mr. Franklin continued, "the first thing I have to do is, usually, a lot of research, even for the modern themes. I always look for new sources of information, preferably

wheels, exposed bumpers, fenders, headlights and spare tire. One model of the car of the future differed from it by having the windshield inclined at an angle of forty-five degrees, the top rounded front and rear, and a general smoothing of lines. In the other model of the future, the whole upper was rounded, blunt in front and tapered at the rear so it resembled a section from a thick airplane wing, with wheels inclosed in the body. At a speed of sixty miles per hour it was found that air resistance devoured twenty-seven horsepower for a 1922 sedan, twenty-six horsepower for a 1928 sedan, eighteen for a 1933 model, and eight and six horsepower for the two streamlined models. Some of the improvement was due to a reduction of frontal area, rather than improvement in aerodynamic design. At forty-eight miles per hour the power consumption due to air resistance is only one-half of that at sixty miles per hour, while at seventy-six miles per hour it is doubled. As a result of the tests, it was predicted that if the 1933 car were shorn of bumpers, headlights and spare tire, and fitted with a sloping windshield and round top, it would consume ten horsepower less at sixty miles per hour, and about twenty horsepower less at seventy miles per hour. The aerofoil type, as represented in the completely streamlined car, would offer improvement in performance at very high speeds, but a body of this shape at high speeds would produce a lifting force.

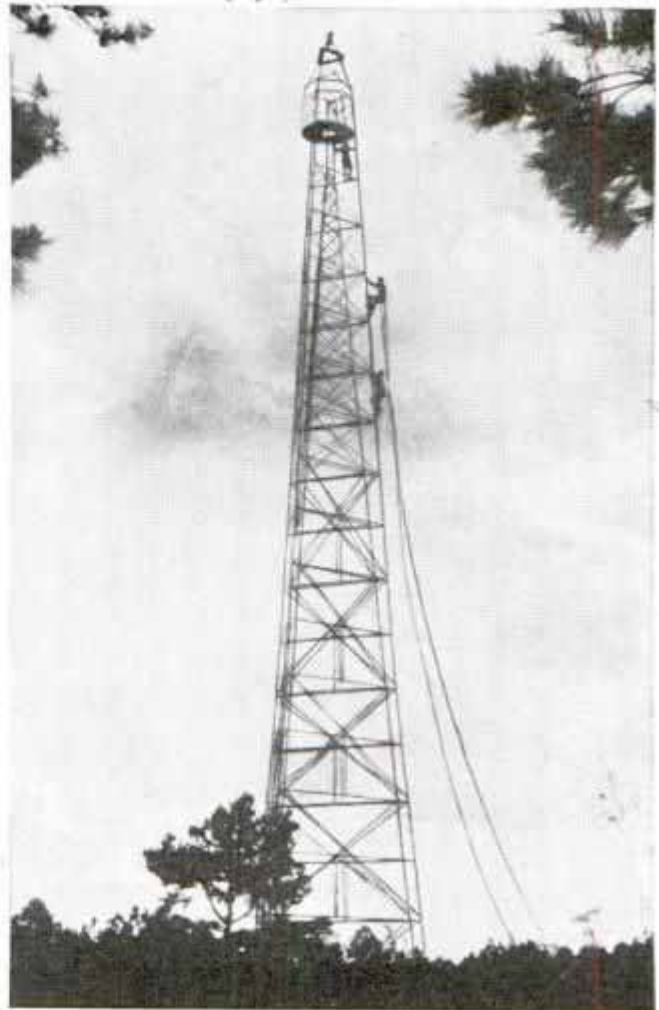
C/660

RUBBER SPONGE FITS ON HOSE FOR WASHING AUTO

Made of porous rubber, a self-watering sponge has been produced for washing the automobile. Three pieces of the rubber are vulcanized together into a block somewhat larger than the hand. Into the center of this block a hollow stem projects for attachment to any garden hose and for supplying water to the sponge. Since the water works from within, the sponge is self-cleaning. It is supplied in several sizes.



U. S. Rubber Specialty Co.



© Harris & Ewing
Surveyors on Signal Tower to Establish Fixed Points from Which Detailed Surveying Can Be Done

HIGH TOWER AIDS SURVEYORS IN TRIANGULATION WORK

One of the greatest single surveying projects in the history of the country is being launched by the coast and geodetic survey at the request of the federal relief administration. Survey parties are at work in every state collecting data which must be on hand before construction or other development projects can proceed. One of the ready-made aids to some of the surveyors is this 116-foot signal tower used in triangulation work which results in a framework of established points from which the detail surveying can be done.

LEATHERLIKE RUBBER GALOSH HAS EYE APPEAL

Leather effects are reproduced in the construction of rubber galoshes to give the overshoes a new appeal. The latest models accurately simulate lizard, shark skin and other leathers.

Dept. of Commerce, Washington, D.C.
B.F. Goodrich Footwear Co. Waterbury, Conn.

38
c/1663

33rd and Spruce
Philadelphia

Roman House Model May Be Built at Home

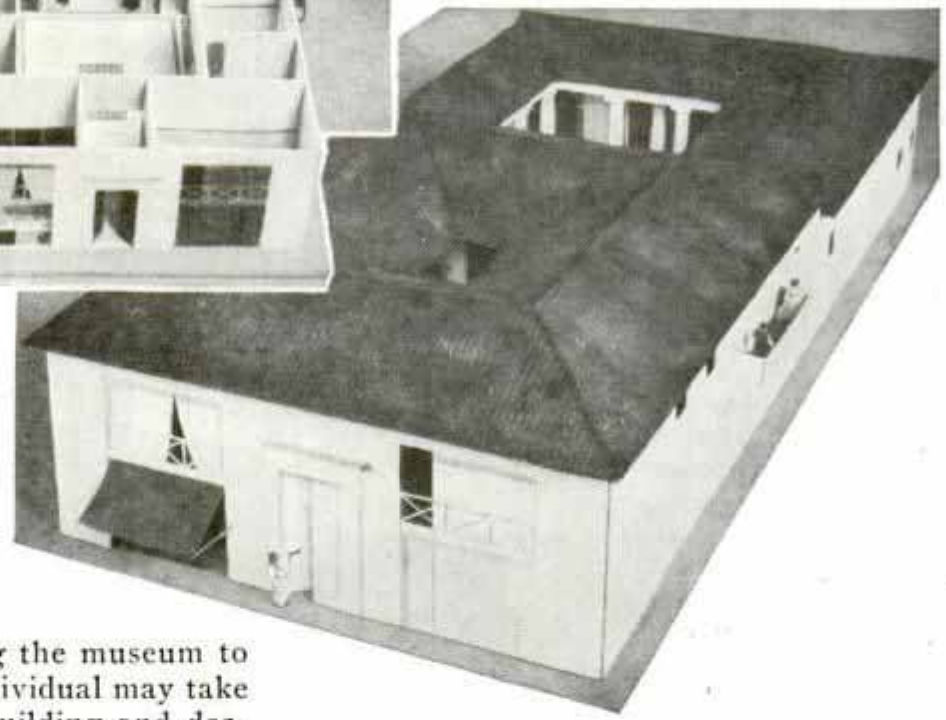
\$9.50



Top, Building Model of an Old Roman House; Bottom, Completed Structure; Model Is Assembled from Prepared Materials

the city. The modern idea of putting a house on a pivot and turning it toward the sunlight was anticipated by the Romans in that they provided more than one dining room, so that one always would get sunlight. The Roman house was a self-contained unit, with all the activities inside the building's walls. The garden was in a court. So little did the exterior count that there were shops at the front for rent to merchants. The museum plans list all materials necessary for constructing the models as well as complete directions for assembling and furnishing. Designed in cardboard, the mod-

4' x 2' x 10"



Introducing a new idea in public education, the University of Pennsylvania museum has constructed a model of an ancient Roman house and prepared plans from which anyone may build the model in their own home. Instead of visiting the museum to inspect the model, the individual may take a personal hand in the building and decoration of the home, such as the wealthy Pompeians lived in before Vesuvius buried

el contains nineteen rooms drawn to a scale of three-eighths inch to one foot.

STREAMLINING CUTS FUEL COST OF MODERN AUTOMOBILES

c/1682

As a result of streamlining, the automobile of 1933 consumes thirty per cent less power in overcoming air resistance than its predecessor of 1928. This has been shown by tests with model cars at the bureau of standards, but it was also shown

that the air resistance of the 1933 car is more than twice that of a completely streamlined auto of the same frontal area. Models ranging from one-quarter to one-fifteenth actual size were used in wind-tunnel tests at air speeds from thirteen to seventy miles per hour. The 1933 car was a composite rather than a duplicate of any actual make. It was equipped with disk

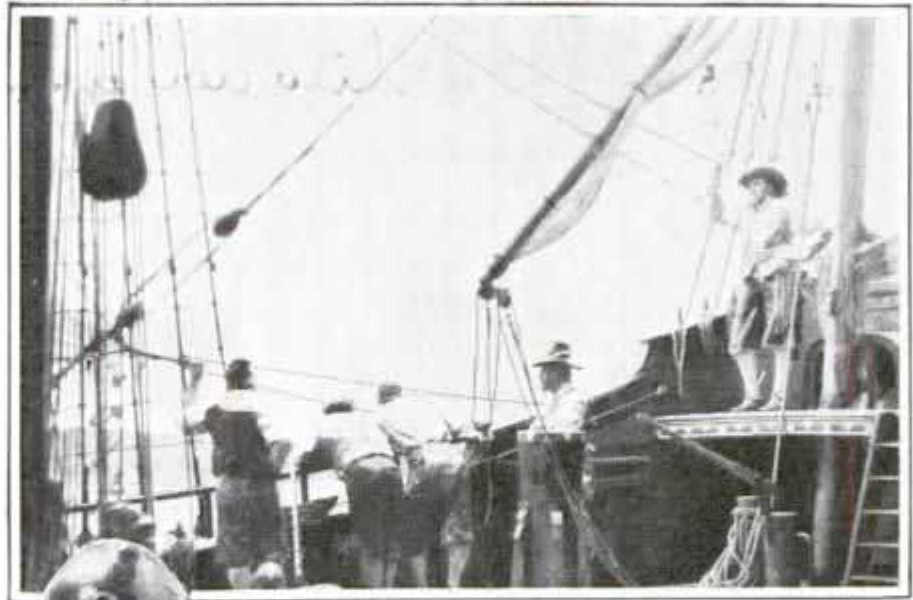
cm. Eckhardt

erine
erine
10/17/33

R. H. Heald.

first-hand; someone like Custer's widow, who knew the man, or saw the event. Then photographs, if possible; other pictures, paintings. I've got quite a library of books on costumes and uniforms.

"Once I know my central figure's costume and background, the next step is more difficult. I plan the scene that I am going to create. That means more than simply deciding that I'll have a cannon here and a sail

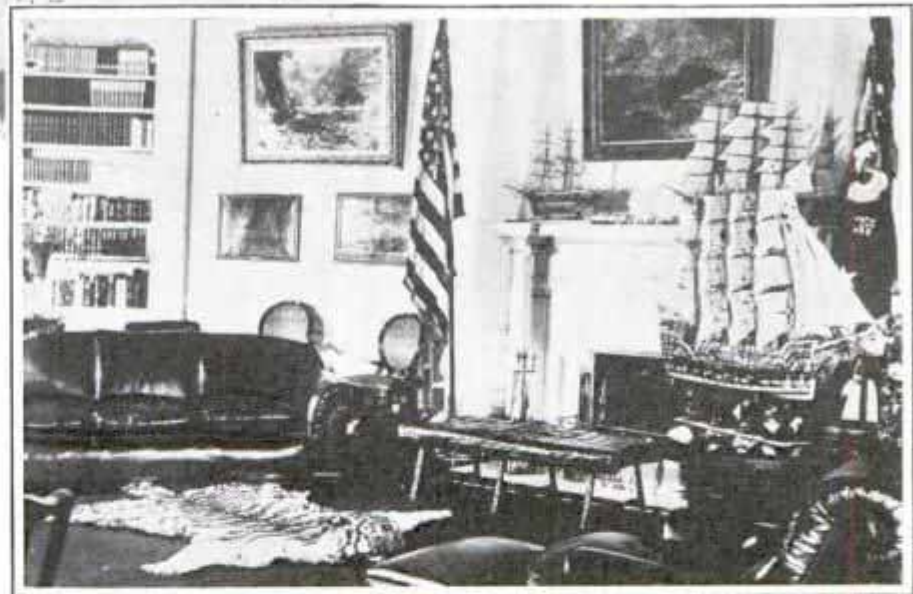


yellow. Green alone would be ghastly, yellow alone would be a bit flat. Together, they are just right. Lighting means so much to a group, that I have had to become an amateur electrician. I must know how I'll light a group before I get too far along with it. Lighting is highly important in treating the 'high spot,' the cen-

there. A miniature group is more than a march of wooden soldiers. There must be composition, and also, emphasis. In every group, the interest must focus on one high spot—like Jones' fighting face. The whole group is planned for that, even the lighting. Watch!"

He reached a hand over the top of the miniature proscenium-scene and clicked off a switch. Instantly, the lighting changed, the clear strength of the great sea-fighter's face dulled. The whole group became much less vivid, less forceful.

"I turned off the green light," Mr. Franklin explained. "There are two electric lamps up in the top, one green, one



Top, Henry Hudson and a Group on the "Half-Moon"; Bottom, White House Oval Room Which Contains President Roosevelt's Ship Prints

ter of interest. To that high spot, all else must be tributary. Everything must taper off from it. So it is a constant struggle to eliminate unnecessary detail, and sometimes, to blur subsidiary figures. Even inanimate objects should not always be highly finished. I spend a lot of time mak-

(Continued to page 130A)

Charlotte N.C.
POPULAR MECHANICS
240 W. Somerset Phila.

TOY BALLOON WATERS PLANTS SHIPPED ACROSS COUNTRY



Prize Flower Ready for Shipping: Note Toy Balloon for Supplying Water in Transit

As a means of getting prize flowers to distant horticultural shows in first-class condition, a North Carolina grower has devised a method of inserting the stem in a toy balloon with a supply of water. The neck of the balloon is tied around the stem so that no water may leak out.

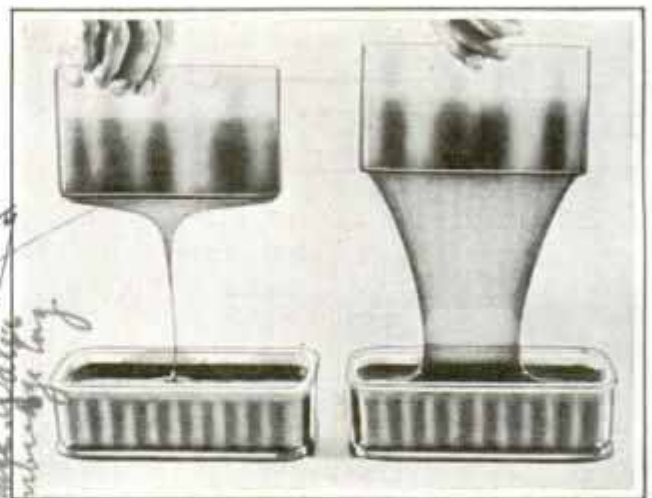
COLOR OF THE THINGS YOU SEE DEPENDS PARTLY ON EYES

If the sky is viewed through a narrow, blackened tube, its blue appears white, clouds are seen as yellow, purple turns pink and a beautiful sunset becomes a mixture of drab colors. Prof. J. S. Haldane, noted physiologist, chemist and philosopher, uses this demonstration to illustrate his theory of vision. He believes the apparent hues of a sunset are not really there but are an illusion created by the human eye in an attempt to make the sunset conform to the normal color balance in the field of vision. The familiar blue of a clear sky is in part imposed by the eye to balance the brilliant yellow rays of the

sun and what we see, Professor Haldane believes, depends as much on the peculiar reactions of the eye to external stimuli as on the stimuli themselves. Newton assumed that the color of any light depended solely on its refrangibility or wavelength. Professor Haldane has shown that he can make light which, by the laws of physics, ought to be yellow, turn blue, white or green or any other color, merely by changing the whole of its background. A small area of a white screen lit by a daylight lamp appeared blue when viewed through a hole in another screen lit by a yellow lamp, and green when the front screen was lit by a red lamp. After a few moments the front screen appeared white, although still lit up by the red lamp. It is necessary for an object to be given the eye's whole attention if its "true" color is to be determined, the scientist explained.

NON-SPATTER LUBRICATING OIL CLINGS TO BEARINGS

By means of a new molecular treatment, all grades of mineral-oil lubricants may be converted into non-spatter oils with a film strength forty to sixty-five per cent stronger. The treatment rearranges the molecules of the oil without changing the chemical content. The result is a closer bond between the molecules. The treated oils cling close to the bearing surface.



Views of Film Strength Test, Showing Mineral Oil Before and After Treatment

Write our Bureau of Information, if you wish to know who makes or sells any article described in this magazine; please inclose return postage.

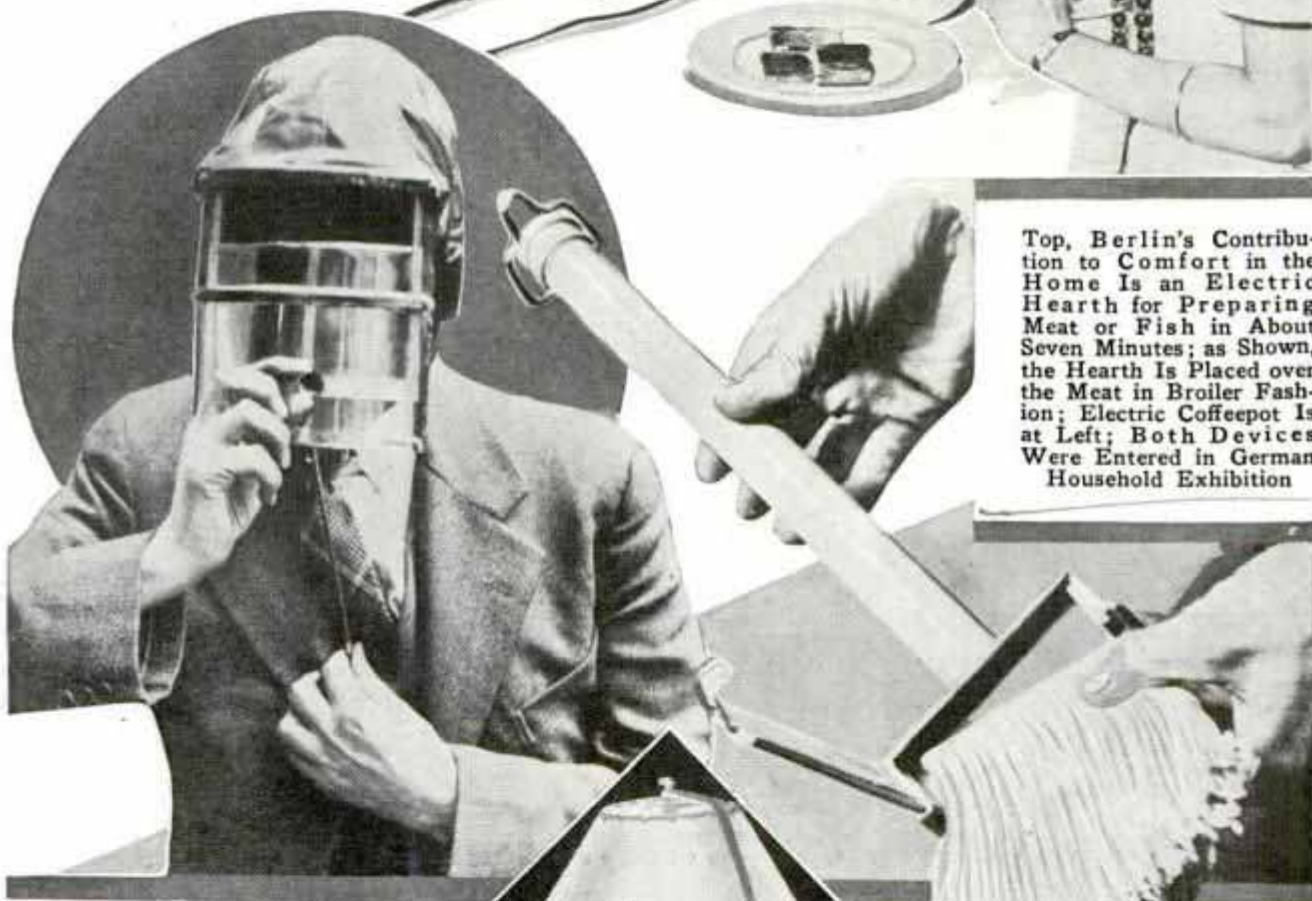
C1700
Water St. Cambridge, Mass.
Edinburgh
Prof. J. S. Haldane
10/30/33
Science Service

Europe's Latest Aids to Comfort and Safety



Top, Night Slipper Equipped with Tiny Flashlight Is Seen Among London's Latest Inventions

Top, Berlin's Contribution to Comfort in the Home Is an Electric Hearth for Preparing Meat or Fish in About Seven Minutes; as Shown, the Hearth Is Placed over the Meat in Broiler Fashion; Electric Coffeepot Is at Left; Both Devices Were Entered in German Household Exhibition



Above, Mask with Adjustable Visor Is Designed to Protect the Motorcyclist's Face; Support Holds the Mask Steady; Right, Alarm Clock in Lamp Form Has Revolving Shade Which Shows Correct Time; Alarm Rings in Usual Manner; Cyclist's "Windshield" and the Clock Were Among Inventions at International Exhibit in Central Hall, Westminster



Above, Household Mop Which Carries Disinfectant in the Handle Was One of Exhibits at Caxton Hall, London, in Recent Show; the Device Has an Interchangeable Mop in the Base; It Combines Cleanliness with Sanitation in a Very Efficient Manner

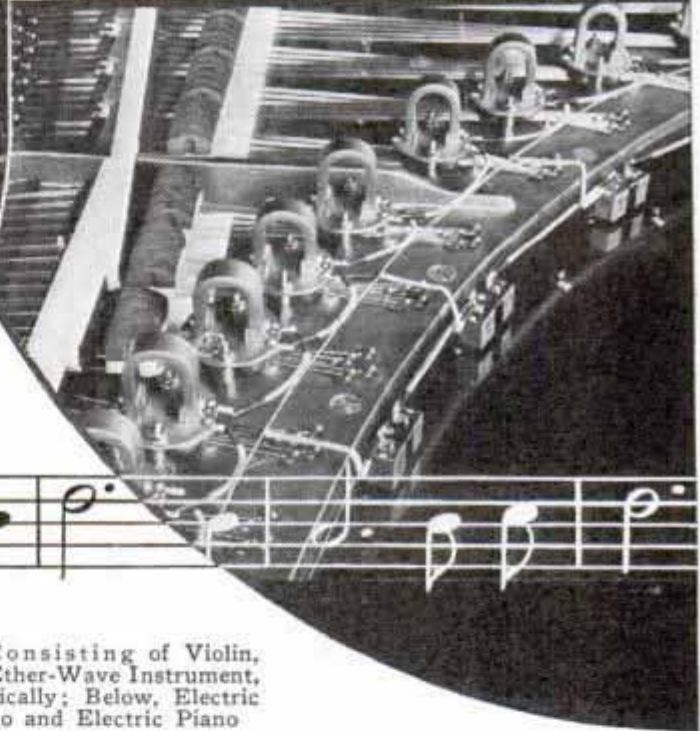
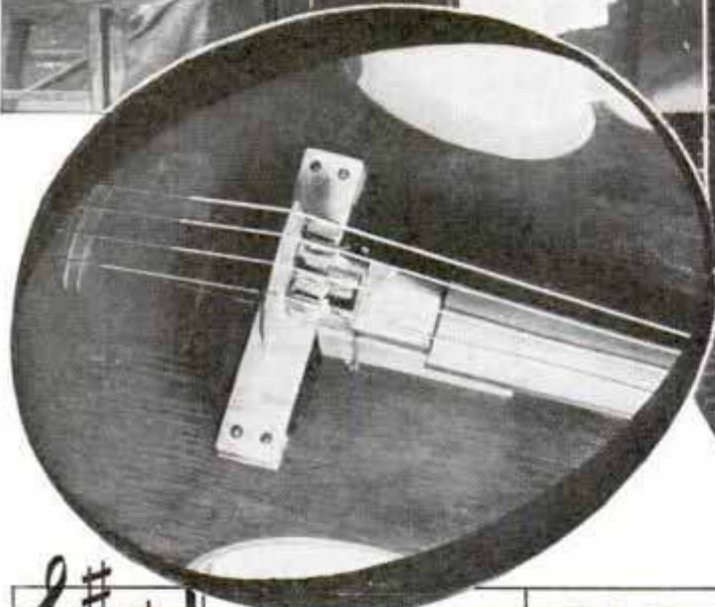
London

Wide World

Assembled at Berlin at Radio
Exposition

Fabrikstraße 2,
Berlin, Wilhelmsdorf, Germany

Electrical



GLORIOUS symphonies of sound more beautiful than anything human ears have ever heard await lovers of music.

When such poems of tone can be enjoyed depends on just two things—the genius of the composer and the ability of the musician.

For inventive genius has forged ahead of musical genius. Instruments have been made available to create tones and melodies more wonderful than any music ever written. The means of expression is at hand and stands as a challenge to composers and musicians.

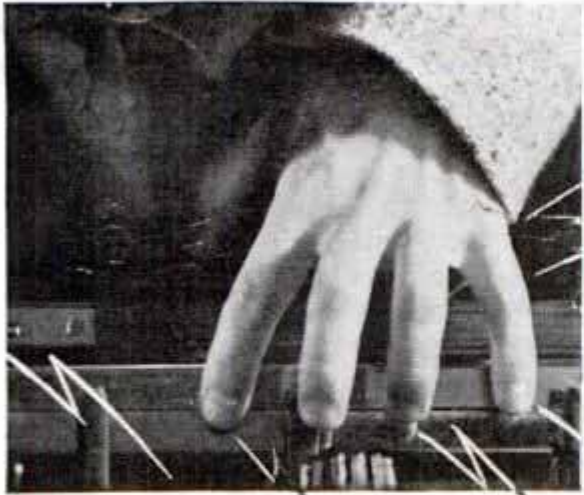
Electricity, the silent servant of mankind, at last has developed a golden voice through the medium of instruments in

Above, Quartet Consisting of Violin, Cello, Piano and Ether-Wave Instrument, All Played Electrically; Below, Electric Pick-Up on Cello and Electric Piano

which the sound is electrically produced. As a result, the fetters have been snapped from the art of music. Unlimited tonal quality, unlimited range and unlimited volume are now at the command of the composer great enough to realize the possibilities, and the musician great enough to interpret the new masterpieces.

Through many centuries the piano, the violin and other string and wind instruments have been developed until they have been accepted as the ultimate means of musical expression. There have been improvements and changes, of course, but

C1583



ing tonality. Strings are stretched loosely and bass tones, for instance, do not die away for more than a minute unless a special damper is used. To the loud speaker can be connected a phonograph record of a violin or cello solo and the pianist can accompany this music, both solo and accom-



paniment emanating from the speaker as a common sound.

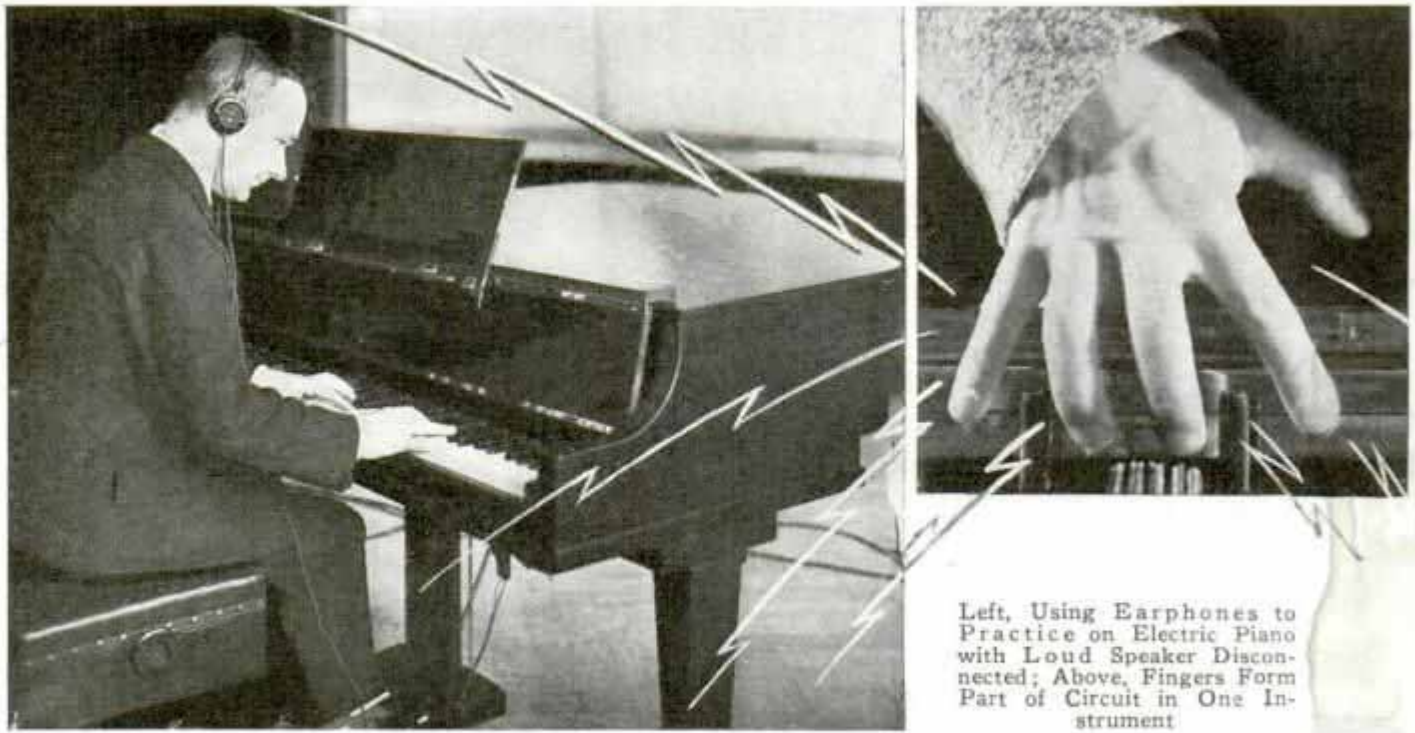
A year ago two German scientists applied the same principle used in this piano to several stringed instruments, transferring the mechanical vibrations caused by passing the bow over the strings into electrical ones which were rendered through a loud

(Continued to page 132A)



Above, Playing Electric "Trautonium" with Ordinary Violin; Center, at Keyboard of a Five-Tone "Hellation"; Below, an All-Electric Orchestra, with Every Instrument Electrically Operated, During a Recent Concert Which Was Presented in Berlin

... maker



Left, Using Earphones to Practice on Electric Piano with Loud Speaker Disconnected; Above, Fingers Form Part of Circuit in One Instrument

trical circuit to control pitch, the movement of this hand altering the capacity of oscillators. One drawback was that the inexperienced player had no guide to enable him to hit the correct pitch, and hence played more or less "by ear."

To overcome this difficulty in regulating pitch and loudness, the "hellertion" was made. In this instrument, the manual is executed in such a way that the position of the fingers determines pitch and the pressure of the fingers determines loudness. This instrument had a range of five octaves but was also single-voiced, producing only one note at a time unless several instruments were combined.

Another German inventor, Doctor Trautwein, went a step farther in his "trautonium" which enabled the player to control pitch, volume and tone and to produce anything from the tones of a piccolo to the depth of large organ pipes or even the beating of drums. This electrical instrument gave a tone range never before possible and limited the musician's expressiveness only to his ability. The manual consisted of a metal rail over which a metal string was stretched. Above the string was a keyboard to enable the player to find the tones, and studs and keys to make tone changes.

These fully electrical, single-tone instruments have been followed by semi-electrical ones, and the latter mark an absolutely

new epoch in music as well as in musical instruments. In such instruments string vibrations are energized, and after being transformed into electrical oscillations are made audible in the loud speaker. The instruments themselves, whether piano, violin or cello, resemble those with which we are familiar—except that the sounding boards are missing. The artist plays in the usual way and the mechanical string vibrations, which without sounding boards are almost inaudible, excite weak alternating currents which are amplified and transformed into acoustic oscillations. An electric piano built on this principle has a micro-hammer which hits a string with only one-twentieth the force of the nor-



mal piano hammer head, setting the string vibrating only slightly and thus enhanc-

experiments show that when the wind blows from the forward quarter at an angle to the fore and aft axis of the moving vehicle, side forces that are strong enough to receive consideration are introduced.

21655
PADDED ROOM AIDS SOUND TESTS

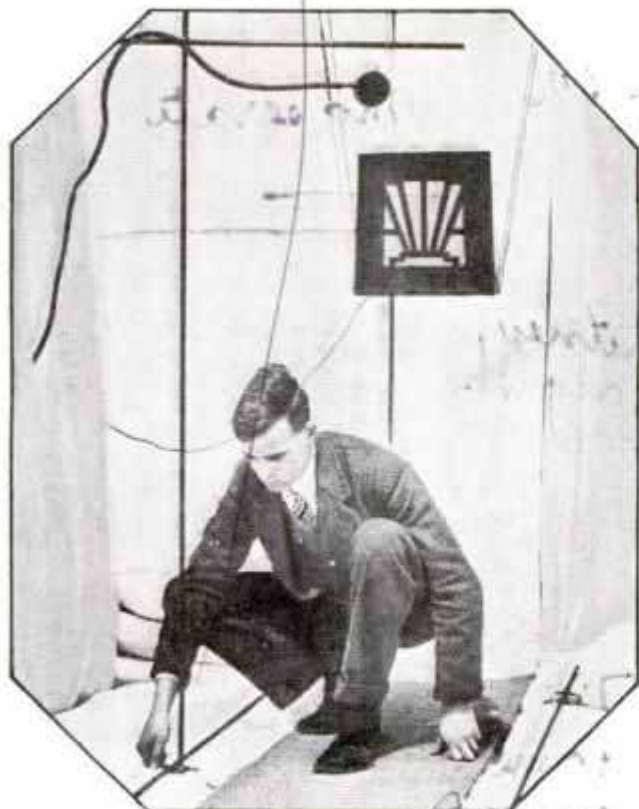
Heavily padded with cotton wool, one room in England's new general post-office research station will be used for testing sounds. A note sounded in the room is picked up by a microphone and carried to another room for recording. The padding is eighteen inches thick. All the latest scientific instruments for discovering defects in cables, telephone wires and the reaction of metals used in outdoor telegraphic work have been installed in the experimental station. The station will help to modernize all post-office departments.



Left, Window Washer Standing on Safety Platform; Right, Worker Hanging by Safety Belt After He Has Fallen from the Platform

PLATFORM WITH SAFETY BELT GUARDS WINDOW WASHER

Greater safety for the window washer is provided by a small platform with a broad canvas belt that goes around the worker's body and is attached to the platform by a five-foot rope. If the worker should step off the platform accidentally, he can fall only the length of the rope, five feet, being firmly held by the safety belt. He may climb back to the platform easily. The entire device weighs only seventeen pounds, but is capable of handling between 400 and 500 pounds. It requires no attachments on the building or window and can be secured in place quickly.



Examining Padding in Sound Research Room; Note Microphone and Loud Speaker at Top

PEAKS ON MOON ARE REVEALED BY MIRROR AND MAGNIFIER

Mountains and plains on the moon may be visible to anyone on earth with simple equipment, only a mirror and a magnifying glass. When the moon is full, or nearly so, the mirror should be held in such a manner that the reflection of the moon appears in it. Then the magnifying glass is focused on the reflection, revealing a fine view of the peaks and valleys on the moon.

Cont. Eckhardt

Scientific & experimental

San Francisco, Calif. 1911

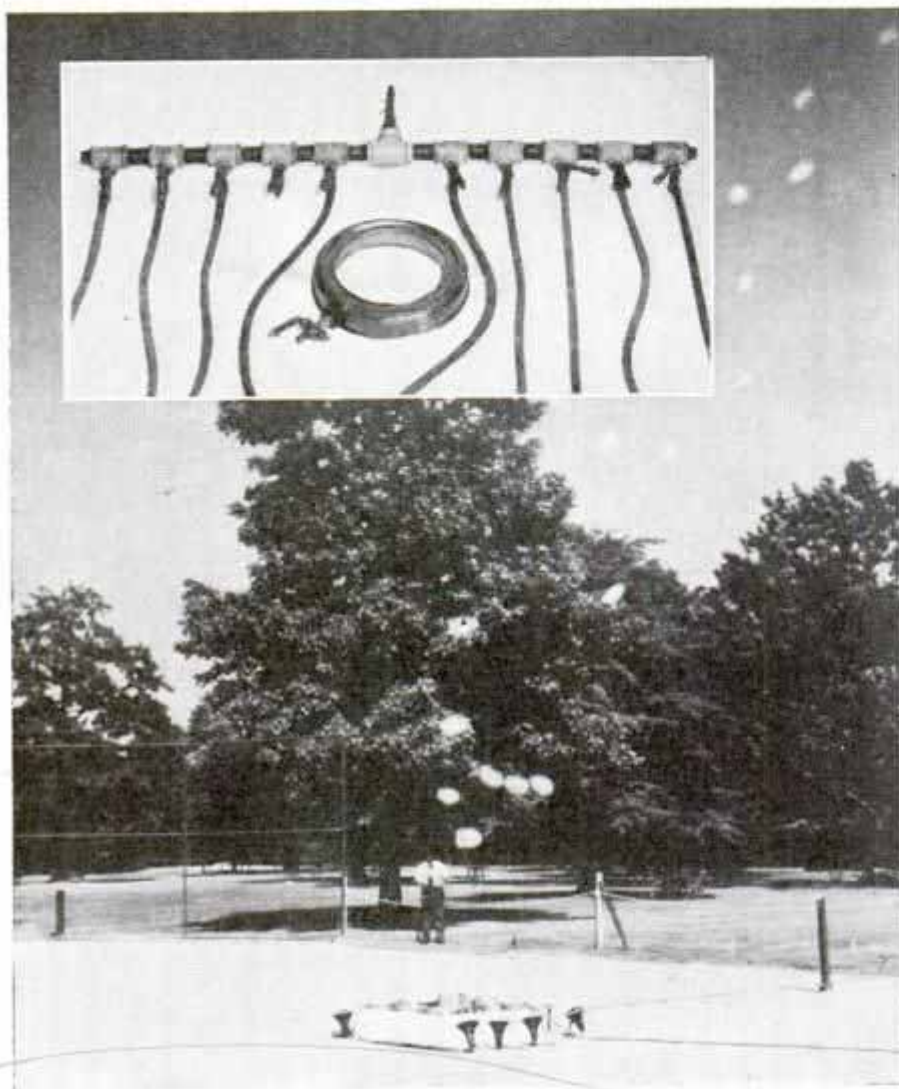
1911

21711

1911

Soap Bubbles Floodlighted in Night Display

Tula Park, Cleveland Ohio



Courtesy General Electric Co.
General View of Floodlighted Soap Bubble Arrangement, with Battery of Lamps in Foreground; Inset, Bubble-Blowing Pipe and Connections

of castile soap and water and one-half part of glycerine is placed in each can to a depth of one and one-half inches. Glycerine strengthens the soap film and makes the bubbles last longer. Submerged in the water of each can is a length of half-inch rubber tubing to which a weight is tied to hold the end under water. These tubes are connected to an iron manifold having ten outlets, the manifold in turn being connected by a rubber hose to the gas supply. Ordinary city illuminating gas may be used. Placed around the cans are three groups of small handy floodlights equipped with colored cover glasses and 100-watt lamps, one group red, one green and one blue, each consisting of three lights. These lights are pointed directly upward so that they illuminate the bubbles to a height of about twenty-

In a new use of light for decorative effects in night displays, gas-formed soap bubbles may be floodlighted in color as they float through the air. The arrangement consists of ten cans about two feet deep by eighteen inches in diameter placed in a group. A solution of ten parts of water to one part of a saturated solution

five feet. More powerful floodlights may be used to pick up the bubbles at a greater height, and the bubbles may be made to change color as they drift from one beam through another. Glare shields made of strips of Bristol board and placed in front of the projectors will keep stray light from spectator's eyes.

LATERAL WIND FORCE RETARDS AUTO AT HIGH SPEEDS

When an automobile is driven at sixty miles per hour with a thirty-mile wind blowing at right angles, a lateral air force of about 300 pounds results. This was shown in recent tests by the bureau of standards with model cars in a wind tunnel. When a car is moving rapidly along

a level road, it was pointed out, a considerable part of the engine's power is employed in overcoming air resistance. At a speed of forty miles an hour in still air, about half the total power of the engine is expended for this purpose, and at higher speeds still more power is used to push the car through the air. Nearly all tests in the past have been made with the car moving into head-on winds. The latest

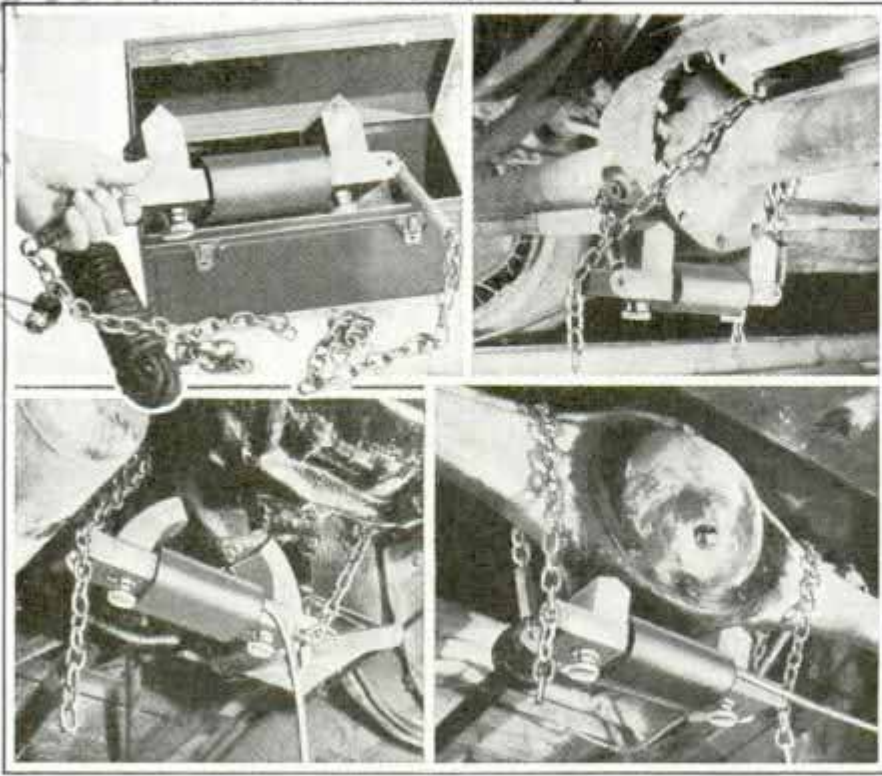
Dept. of Commerce
10/26/37

Washington, D.C.

C1639

110 or 220 volt

Brown & Johnson, 516 Lyndy Ave. Brooklyn, N.Y.



Top, Left, Electric Housing Heater; Other Photos Show Applications of the Device to Auto Housings to Loosen Grease in Winter

AUTO HOUSING HEATER SPEEDS GREASE-CHANGING WORK

Changing grease in the transmission and differential of the automobile is speeded up by an electric heater which is attached to the housings. In below-zero weather, the heater converts cold, thick grease into free-flowing liquid in five to ten minutes so that draining the housing is easy. The heater starts work as soon as the current is turned on. Windings may be obtained for operation on 110 or 220 volts. Two pole pieces, which are clamped against the housing, make heating more rapid and facilitate removal of the grease.

DOUBLE-PAPER TIP ON CIGARET CUTS FIRE HAZARD

If cigarettes were tipped with a double thickness of paper, the fire hazard would be lowered materially when they are discarded. The bureau of standards made tests with tipped cigarettes and it was shown that with half-length, fast-burning smokes, an average of four fires occurred for every ten trials.

Rept. of Comm. C-1012803

With tips of the same length made of paper used on slow-burning cigarets, only one out of every four trials resulted in a fire. Government tests made on representative specimens of materials found commonly on the grounds of forests showed that, with conditions favorable, untipped lighted cigarets caused fires on an average of nine out of ten times. The fire hazard of the slow-burning type was found to be much lower than the fast-burning, since the glow does not progress appreciably after the smoke is discarded. The majority of popular cigarets are fast-burning.

The manufacture of cigarets tipped with a double thickness of paper is believed to be practicable. Losses from fires started by smokers are considerable, the majority occurring in wooded lands or areas where there is dry grass.

TWIN REAR WHEELS ON RACER C1676 PREVENT SKIDDING

Twin rear wheels are part of the equipment of a European car designed at the order of an American sportsman for mountain racing. The double wheels serve a dual purpose, to prevent skidding in ne-



Racer Car with Twin Rear Wheels to Prevent Skidding © Planet News

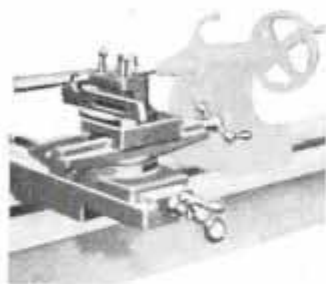
gotiating turns and to stop wheel spin when starting, particularly on steep grades.

**MOSSES PAY THEIR OWN WAY
BY CONSERVING MOISTURE**

Lacking any large direct economic value, the humble mosses pay their own way in the world by conserving moisture and by helping convert forest debris into soil. In addition, says Dr. A. J. Grout, the freshness which delights the eye after a summer shower is, in a large measure, due to the magic transformation of dried-up brown mats of moss into cushions of living green. Mosses cling close to the surface and help to prevent erosion by breaking the force of falling rain and by holding soil masses together. No mosses are used for food, but Doctor Grout indicates that some species might be pressed into the human dietary in an emergency.

**WOOD LATHE IS CONVERTIBLE
FOR METAL WORKING**

Constructed with extra strength and precision, a new wood lathe may be adapted to metal working. A full line of attachments to turn the lathe into a modern, efficient metal-turning lathe is now being prepared. At present, attachment of a compound tool rest to the bed of the lathe enables the operator to do many kinds of metal working, such as turning and boring, straight or taper, with great accuracy. The rest may be set at any angle in the horizontal plane, moved toward and away from the head stock and crosswise of the bed. This arrangement is adapted to light metal work, such as truing valves,



turning down bushings and other parts, turning down armature commutators, winding coil springs and other jobs. It gives the home craftsman new opportunities to turn out metal novelties and to spin brass, copper or pewter. The lathe has a range of speeds including 700, 1,300, 2,300 and 4,200 revolutions per minute. It is fourteen inches high, fifty-seven inches long and the bed at top is six and one-half inches wide. The swing is ten and one-fourth inches.

Walker, Turner Co



© Planet News, Ltd.
Rolling Down Canvas to Form Back and Seat of Chair

**SEAT OF DECK CHAIR ROLLS UP
IN WET WEATHER**

Equipped with a roll-up back and seat, the latest deck chair is ready for any weather. On sunny days, it may be used in the usual way. But when it rains, the back and seat canvas may be rolled up, making it unnecessary to carry the chair indoors to protect it against wet weather.

**CLUTCH FOR WORKSHOP TOOLS
CUTS POWER COSTS**

Costs of electrical current for the operation of tools in the home workshop may be reduced by installing clutches on the various power devices. The clutch is the mechanism permitting the operator to start or stop the tool without throwing off the belt or stopping the motor. In tests, the clutch carries a five horsepower load at 1,750 revolutions per minute, sufficient for home power tools and light machinery in factories. It is a self-contained unit, ready to be attached to the shaft. Control is by means of a lever, only slight pressure being necessary. Action is always smooth, without gripping.



Walker, Turner Co

Exhibition
Central Hall
Westminster
London
Eng

Walker, Turner Co
1113 Bercheman St. Plainfield N.J.

10120/33
C1638

C1562

C1563

1/2" \$3.50

©1383
Walter & Gertie
1032 Florida Ave
Alhambra

MYSTERY



Left, Duck Hawk, One of Fastest Large Birds; Below, Man-Made "Ducks" in Formation; Right, American Eagle Landing with Fish

THE flight of birds has proved an intriguing mystery to almost everyone who has watched birds on the wing. But, despite the work of scores of naturalists, much still continues to be a mystery.

The airplane has made everyone flying-conscious, and led to comparisons of birds with aircraft. Flyers sometimes are concerned with the probable effect of striking a bird with a propeller or other part of the plane, and instances of actual collisions between planes and birds are described by Lieut. Roland Birnn of the army air corps. Lieutenant Birnn himself, while flying in Panama, struck a buzzard while pulling up in a climb at about seventy-five miles per hour. No damage was done, however.

Another flyer was bringing his plane out of a dive at 150 miles an hour when he also struck a buzzard. He landed without mishap, but found that the leading edge "box" was crushed back almost to the

wing spar. Flyers have picked up blue jays with their plane radiators, struck eagles and collided with other birds, but no sensible pilot will fly deliberately into a bird. Such action is both unsportsmanlike and a needless risk.

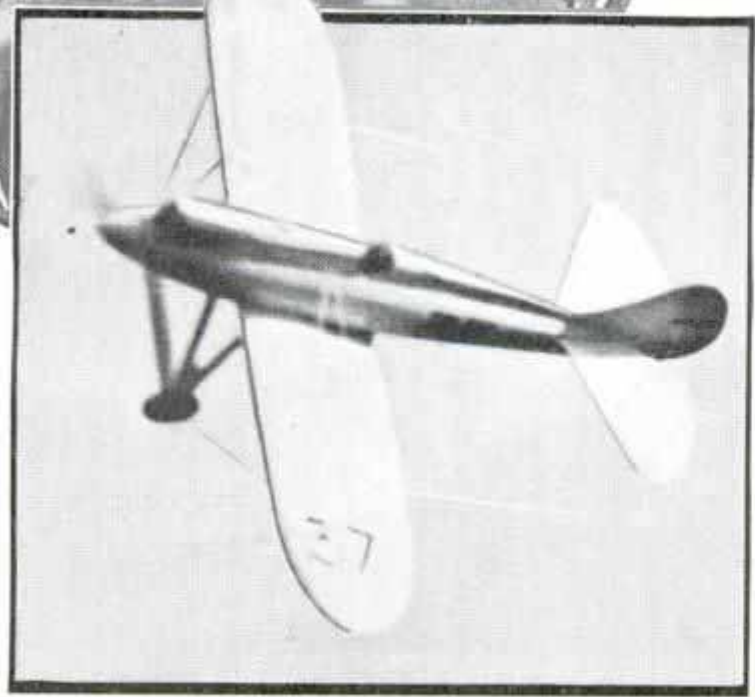
Most birds, like well-designed airplanes, are built with a high degree of flying efficiency. Bird bones, like structural parts of a plane, are hollow to give lightness and strength. The wings of a bird are like those of a monoplane, and its body is a fuselage slung well below the sail area. The bird, unlike the plane, has air sacs under its skin which, naturalists believe, are inflated or deflated in order to move the center of gravity forward or backward.

This adjustment is necessary because the lift imparted to the wings is not always in the same place. Thus, when a bird flies with its wings passing diagonally through the air, the maximum upward

WINGS



Bird Photos Courtesy of U. S. Bureau of Biological Survey

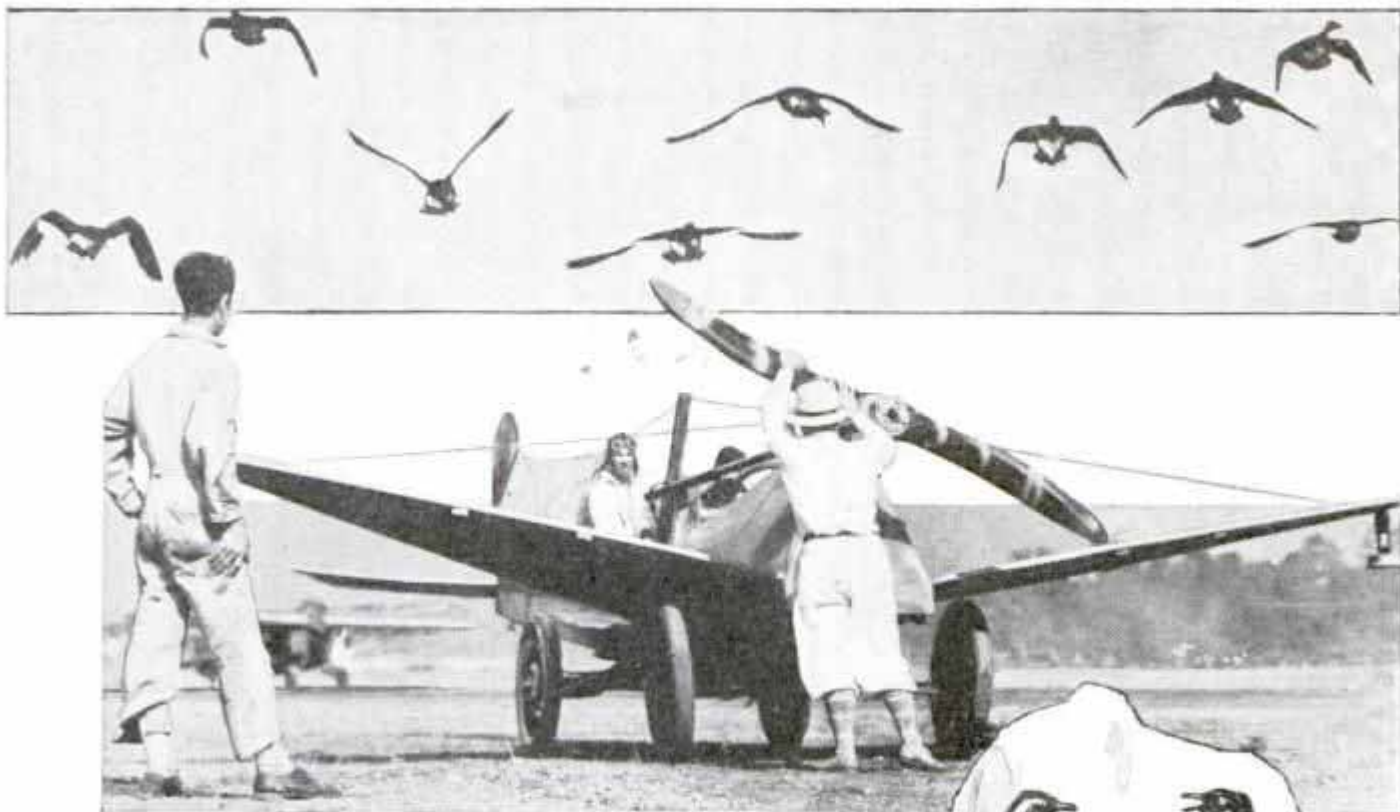


Above, Right, Ducks Leaving Water and Chimney Swift, One of Fastest Birds; Below, Birds Can "Bank" Like the Airplane in Making a Turn to Right or Left

pressure is near the leading edge, and not under the center of the surface. A change in position or angle of flight alters this, so that the air-sac adjustment must be used.

Every bird has a counterpart among man-made flying machines when it comes to taking off. The sparrow that darts from a twig, dropping a bit before its wings become fully active in the air, is not unlike the tiny planes that airships carry and launch from trapeze equipment. The water fowl that flaps its wings along the surface of the water, getting up flying speed, is the ancestor of the modern hydroplane or flying boat. The heavy loon, like an overburdened transatlantic plane, cannot launch itself into the

21383



resistance. To make a turn, the bird need only raise one wing or flip up one side of its tail. Its tail feathers enable it to change its speed and direction of flight suddenly, so that it can catch an insect on the wing or escape an enemy.

The power dive used by military flyers has been going on in birdland for centuries. Some birds are noted for their high flying. Some hawks, for instance, can soar so high that they are invisible from the ground, and swoop down with a swiftness that illustrates their remarkable ability to withstand sudden changes of air pressure.

Such dives are also common practice among insect-eating birds which get their meals on the wing. Coupled to this is an even more remarkable ability, the power of seeing small objects at a great distance. Naturalists claim that the average bird's eyesight is so far superior to that of the average human that there is little room for comparison. You can understand this better after watching a nighthawk dive 200 feet to catch a mosquito.

The speed at which various birds fly is in itself an almost limitless field for study. Naturalists have employed trains, automobiles, astronomical telescopes, artillery range finders and airplanes to study the speed of birds. One of the outstanding facts disclosed, and one that often is overlooked, is that the speed at which you



Above, Wild Ducks in Flight; Below, the Flivver Plane, Like the Penguin, Is a Man-Made Bird Which Does Not Fly

conclude a bird is flying depends entirely on your point of view. If you were measuring the speed of a carrier pigeon from an observation post on the ground, you would get a different figure than if you were following it in an airplane, because the air speed of a bird is very seldom the same as its ground speed. Also, if you were measuring its flight with the wind, you would find its relative ground speed to be much greater than if it were traveling against the wind or at an angle to it. These facts should be kept in mind when the speeds of birds, some of them really phenomenal, are being considered.

Various observers have found that birds depend largely on strong winds blowing in the right direction, when making long migratory flights that otherwise would seem impossible. Prof. Ernest Huebner, German scientist, says birds never attempt to cross oceans unless winds are favorable.

(Continued to page 126A)

into the...



Left, American Eagle Leaving Nest; Note Blurred Wings Despite the High-Speed Camera; Below, the Crow Depends More on Its Wits than Its Wings to Elude Enemies

air from a small area when the wind is not blowing.

But, once in the air, the bird and the plane are not so much alike, except in a few respects. True, the soaring flight of a buzzard or gull is exactly like that of a sailplane or motored glider, but the buzzard still possesses the ability to propel itself by flapping its wings, while the airplane uses a whirling propeller, even though inventors have tried to produce wing-flapping aircraft. No bird has equipment that can be likened to the windmill atop an autogyro.

Airplane designers have spent much time studying birds in flight, particularly the herring gull, which accounts for many of the similarities between nature's and man's aircraft. Scientists and engineers have noticed that the flapping wings of a bird are somewhat like the leather valve in a pump, offering considerable resistance to air in one direction but relatively little in the other. The bird apparently expends little muscular energy in moving its wings upward, the force of gravity combined with the upward pres-

Rate of Speed of Various Birds
Recorded by Col. R. Meinertzhagen

NAME	M.P.H.	NAME	M.P.H.
Rooks	45	Mallards	50
Ravens	39	Teals	44
Starlings	49	Turtle Doves	37
Finches	33	Pheasants	33
Swallows	106	Partridges	32
Swifts	68	Quail	57
White Storks	48	Carrier Pigeons	60
Pelicans	51	Lammergeiers	110
Geese	45	Golden Plovers	60

sure of the air being sufficient. Therefore, all its energy can be devoted to the useful, downward stroke. Individual feathers often are separated to reduce air resistance on recovery.

It is the flexibility of feathers on the tips of wings that makes soaring flight of birds possible, some investigators have declared. The valvelike action of these feathers creates the necessary difference in air



Small Ring Hovers Above Base in Demonstration of Magnetic Properties of Cobalt Steel

"FLOATING" STEEL AIDS MAKERS OF MAGNETIC INSTRUMENTS

Cobalt steel, which has the unusual characteristic of floating in air when prepared in the form of two magnets, is used wherever a very strong, permanent magnet is required. Principal among its uses are in the all-electric speedometer for trains, busses and automobiles and in the portable oscillograph which enables engineers to determine easily the stresses in mechanical structures. To demonstrate the "floating" property of cobalt steel, the Westinghouse Research laboratories arranged two ring-shaped magnets of the material in a framework, one above the other. The lower magnet is inclosed in the base of the framework. The upper magnet, free to move up and down on a celluloid guide, floats at rest about an inch above the base. If disturbed by a slight push, the upper magnet bobs up and down like a cork on choppy water until it slowly

comes to rest in its original position. The magnets are so placed that like magnetic points, or poles, are together. Like poles, of course, repel each other, resulting in the free magnet ring to move upward. The upward movement is limited by the force of gravity. When the two opposing forces balance, the upper ring becomes stationary, floating in air.

C/626
LOOKING THROUGH A PINHOLE IN PAPER TESTS EYESIGHT

Amateurs may test their eyesight by looking at an object through a pinhole, in a piece of paper. If the experimenter sees more clearly and sharply by this method, it is likely that his eyes require corrective lenses. The test was devised from the optical principle that squinting of the eyes concentrates light reflected from an object upon a smaller section of the eye lens, thereby bringing it into sharper relief. Scott Sterling, of the Bausch and Lomb Optical company, explains that this principle is the same as that employed by the modern camera in stopping down the lens.

Rochester N.Y.
LOCK SHUTTER ON WINDSHIELD PREVENTS AUTO THEFT

C-1565
Protection against theft is provided for the automobile by a metal roller shutter that is pulled down across the windshield and locked when the car is parked. Large block letters on the shutter show a sign, "Parked," when the auto is unattended. The purpose of the shutter is to obstruct the thief's vision as he attempts to move the car, as well as to show authorities that the auto is being moved away without the owner's knowledge.



Parked Car with Protective Shutter; Note Sign Notifying Police of Owner's Absence

developed by P. H. Brace, Research Engineer

Out of business
Wetzel Detector
colland. Gard. S.D. 1. car

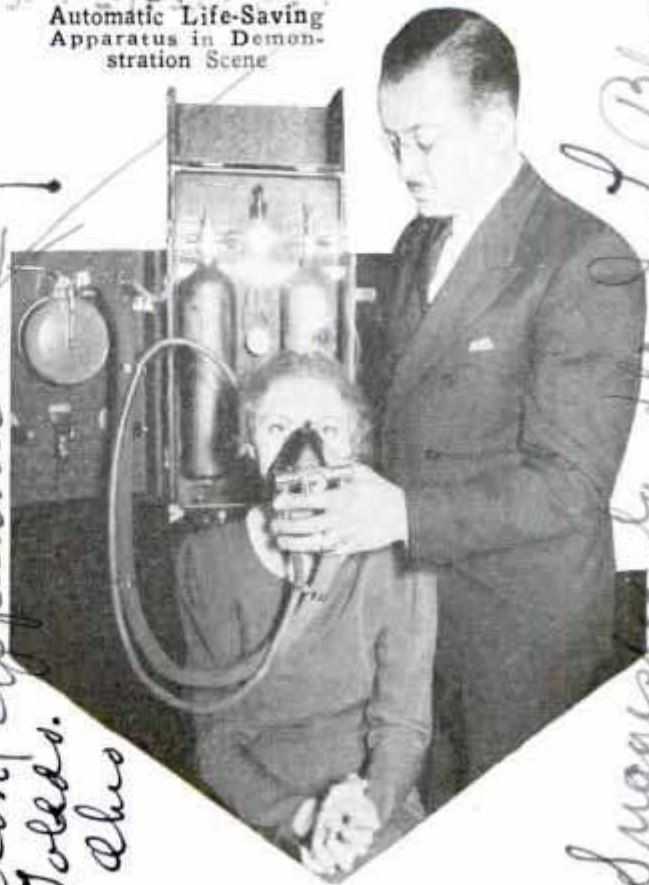
ROCK CONDUCTS SOUND FASTER THAN STILL AIR

Sound travels much faster through solid rock than through still air. In several tests, Dr. L. Don Leet, of the Harvard seismograph station, found that earthquake waves set up by exploding dynamite rush through granite at nearly 17,000 feet per second and through an ancient igneous rock at more than 20,000 feet per second. This is high speed compared with approximately 1,100 feet a second, the velocity of sound in still air. Earthquake detecting instruments were used in the tests.

Science Service 10/17/33

C. 1558

Automatic Life-Saving Apparatus in Demonstration Scene

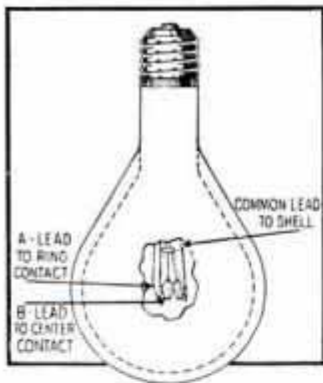


*Suggested by Dr. J. L. Blomhouse
at Abrahamson Congress
Anaesthetists.*

THREE-LIGHT ELECTRIC LAMP HAS TWO FILAMENTS

Three different levels of illumination are produced by a single lamp announced by the General Electric company, Nela Park, Cleveland. This arrangement affords a flexibility in general lighting never before possible. The lamp contains two filaments, each of which may be burned singly or in combination with the other. At present, the bulb is being made in two sizes, one containing 150 and 200-watt filaments and the other, 200 and 300-watt filaments.

*Incandescent C. 1539
Lamp Dept
The Edison Apparatus Co.
Toldeo.
Ohio*



A mogul screw base which has an additional center contact permits separate control of each filament. A special socket is necessary to accommodate the new base. Generally, the remainder of the lighting equipment, including the fixtures and fitting, need not be replaced if they have been satisfactory before. The lamp is expected to find its first application in small and medium-sized establishments which have definite peaks and low points in the volume of store traffic. It will be possible to use the lower-wattage filament alone for minimum requirements, the higher-wattage filament for average requirements and the two together to supply illumination needed for active shopping periods.

AUTOMATIC UNIT SAVES LIVES BY RESTORING RESPIRATION

Automatically forcing inhalation of oxygen and exhalation of used air and gases, a new machine has been developed in the resuscitation field. There is no manual operation, the machine adjusting itself to the normal respiration rate of the patient.

AUTO BATTERY IN RUBBER CASE IS PROTECTED FROM DIRT

Complete protection against dirt, acid fumes and surface moisture is provided in a new automobile storage battery which is encased in hard rubber. All metal parts are covered, reducing corrosion, power leakage and the possibility of short circuits. The battery may be serviced without removing the protective cover. Heavy, full-capacity plates are used in the battery. Manufactured by the B. F. Goodrich company, the battery is available in sizes for all popular makes of automobiles.



Electro Pak

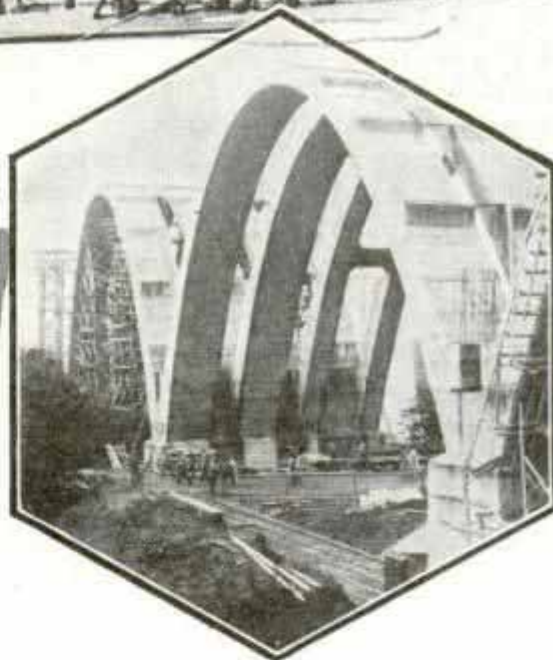
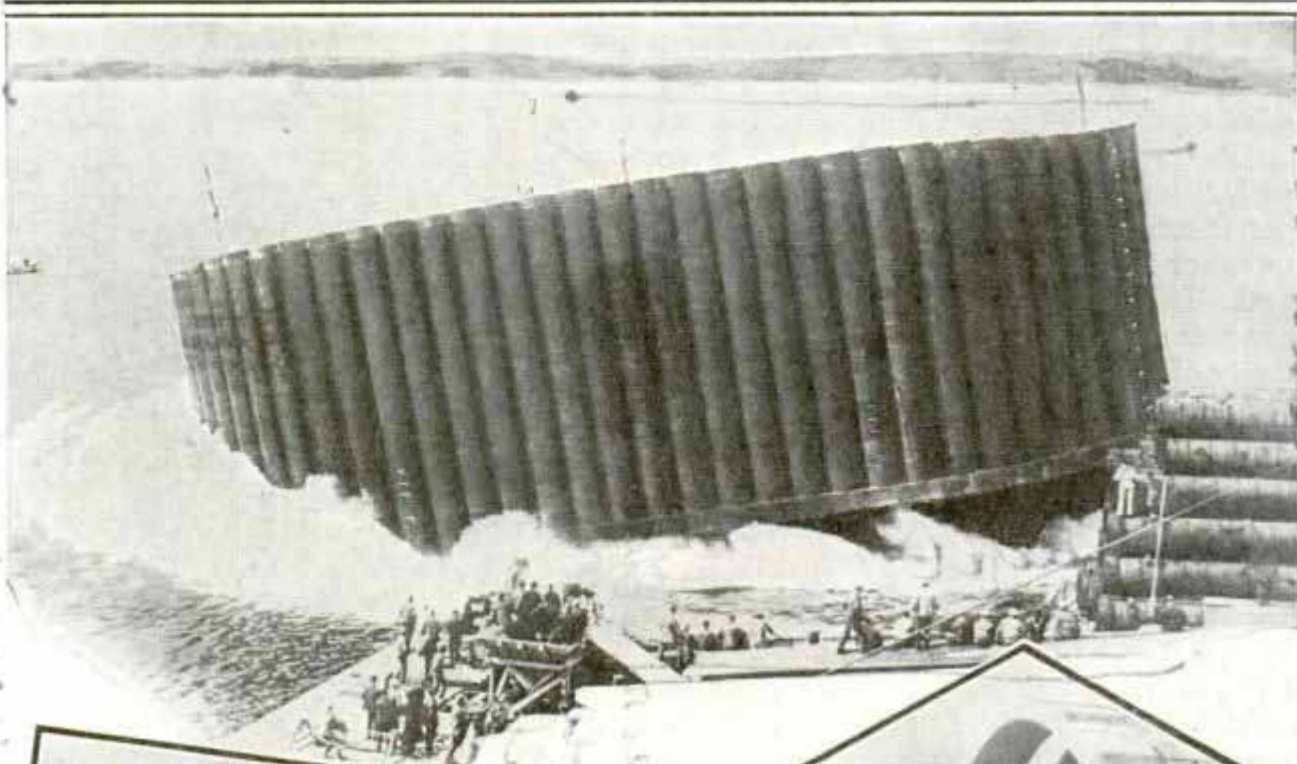
Eight per cent of the oil in a whale's body is contained in its tongue.

Science News Letter

Oct 7 1933

B. F. Goodrich Co.

Railway and Auto Bridge to Span Baltic Sea



Top, Launching Tube Unit for Bridge; Bottom, Left, Building Unit; Right, Preparing the Arches

Two railway tracks and a wide automobile road will cross the Lillebaelt, a part of the Baltic Sea, on a giant bridge which is being constructed by the Danish railway. The span will link the European continent to the Isle of Fynen. It will be about 4,000 feet long, built of arched concrete resting on huge caissons sunk about twenty-two feet in the clay bottom of the sea and extending ninety-seven feet to the surface. Above the water will be great towers, 100 feet high, made necessary by international navigation laws requiring that such bridges be built high enough above the water to permit ships to pass. The Lillebaelt is used by vessels of all nations. Instead of the usual caisson in

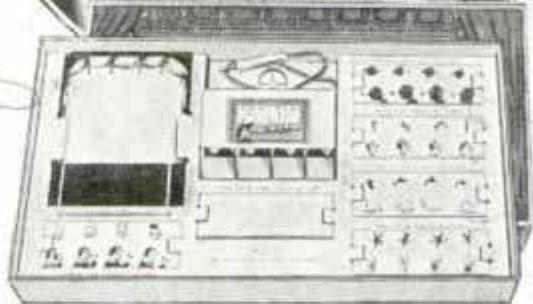
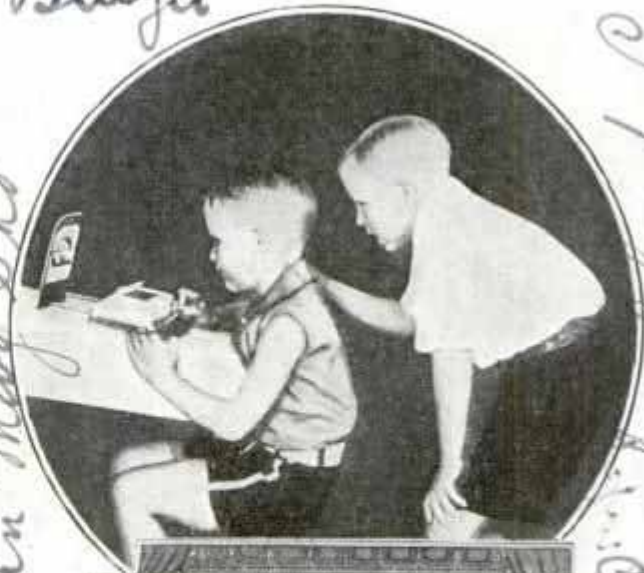
which workers prepare the bottom for the bridge foundations while laboring under compressed air, a wreath of concrete tubes or cells is used. After the wreath has been sunk one tube is pumped free of water and capped with another tube extending to the surface. By this method, the worker may dig on the sea bottom while breathing natural air through the tube reaching to the top. This would be impossible if the bottom of the Baltic were not made of clay which excludes water from the tubes. Each unit weighs between six and seven thousand tons. The bridge will be made up of five large arches which are being built on land before removal to their foundations.

TRANSATLANTIC AIR SERVICES PLANNED BY TWO NATIONS

Two nations, Germany and France, are planning to place in early operation air service between Africa and Brazil. The only transoceanic service in the world at present operated on a regular commercial basis is that maintained by the German dirigible, Graf Zeppelin, between Friedrichshafen and Rio de Janeiro from May until November. Germany is planning to augment this dirigible service by the use of flying boats between Natal and Bathurst, Africa, with regular flights to be inaugurated the coming year end. French aviation interests are considering establishment of airplane communication between Dakar in French West Africa and Natal, Brazil. Definite action awaits consolidation of the Compagnie Generale Aeropostale with the new French air lines under government control. Natal is the northern terminal of the Aeropostale's South American service, air mail to and from Europe being transported between that port and Dakar by former French naval dispatch ships. The contemplated French line would cross 1,900 miles of water between Dakar and Natal.

Chief of Commerce

Pabst may do



Miniature Movie May Be Operated by Child; Bottom, Close-Up of Set Showing Size of Films

MOVIE-CARTOON BATTERY SET PERMITS MAKING OWN FILM

Entertaining for children or adults, a hand-operated movie-cartoon set permits the making of your own animated film. The unit consists of a screen, rack for holding flat films, four small electric lights mounted in separate compartments under the film rack and two standard flashlight batteries. The films contain four illustrations of a subject, each showing a different pose. By rotating a contact pointer around the commutator, the four bulbs are illuminated one after the other, causing the pictures to flash on the screen in quick succession. The set contains twelve films carrying a total of twenty-four subjects and twelve blank films for making home movies. Assembled with metal extension frame for the screen, the set is about ten inches long, five inches wide and two and one-half inches high. Films are supplied in animal, military, freak, circus, nursery, acrobatic and spook series. The outfit is entirely safe.

Edward C. ...
Henry ...
John ...

C1530

AUTO FOR RIDING OVER SNOW TO AID POLAR EXPEDITION

Equipped for riding over snow and ice, an unusual automobile is being taken to the South Pole for use by Admiral Byrd's Antarctic expedition. An endless track fits over the wheels for operations on top of the snow.

see Dec. 1932. 92.17



Arps. Corp. New

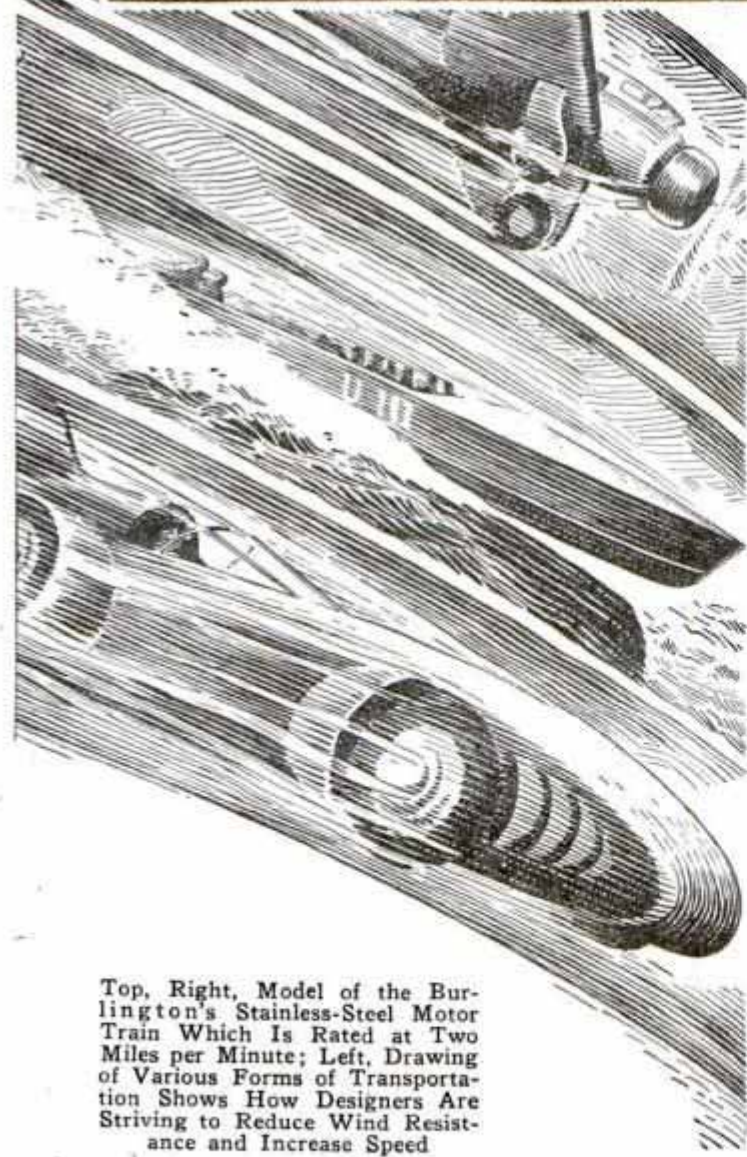
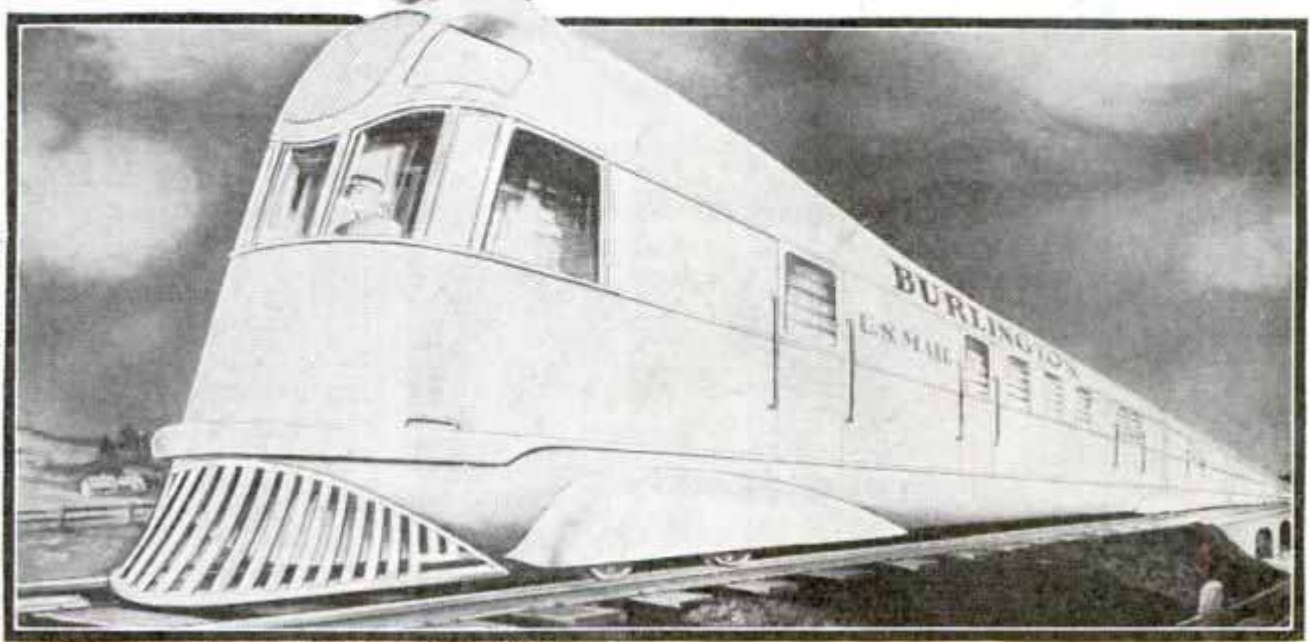
Innov. Corp.

Waco World

This Strange Vehicle Will Enable Antarctic Explorers to Travel over Snow; Note Special Tread Provided for the Six Wheels

suggest Eskimobile

AGE of Transport



Top, Right, Model of the Burlington's Stainless-Steel Motor Train Which Is Rated at Two Miles per Minute; Left, Drawing of Various Forms of Transportation Shows How Designers Are Striving to Reduce Wind Resistance and Increase Speed

studying aviation by the midnight oil. Not that they wish to become pilots, but that the problems of aerial flight have suddenly become supremely important to the automotive industry.

Likewise, there has just grown up a new branch of engineering to deal with the problems of streamlining high-speed trains and all other transports on rails.

Besides, there is another branch of marine engineering to adapt streamline principles to ship superstructures.

And the end is not yet—street-car companies and bus operators are applying for help from streamline engineers. If savings in power, fuel, and materials are in sight, everybody wants the benefits.

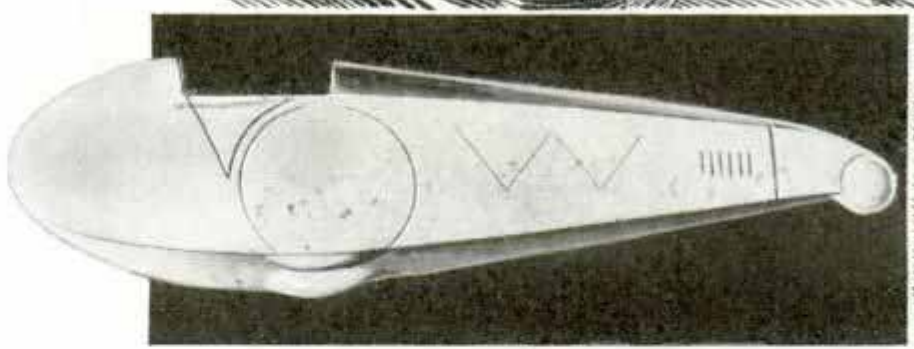
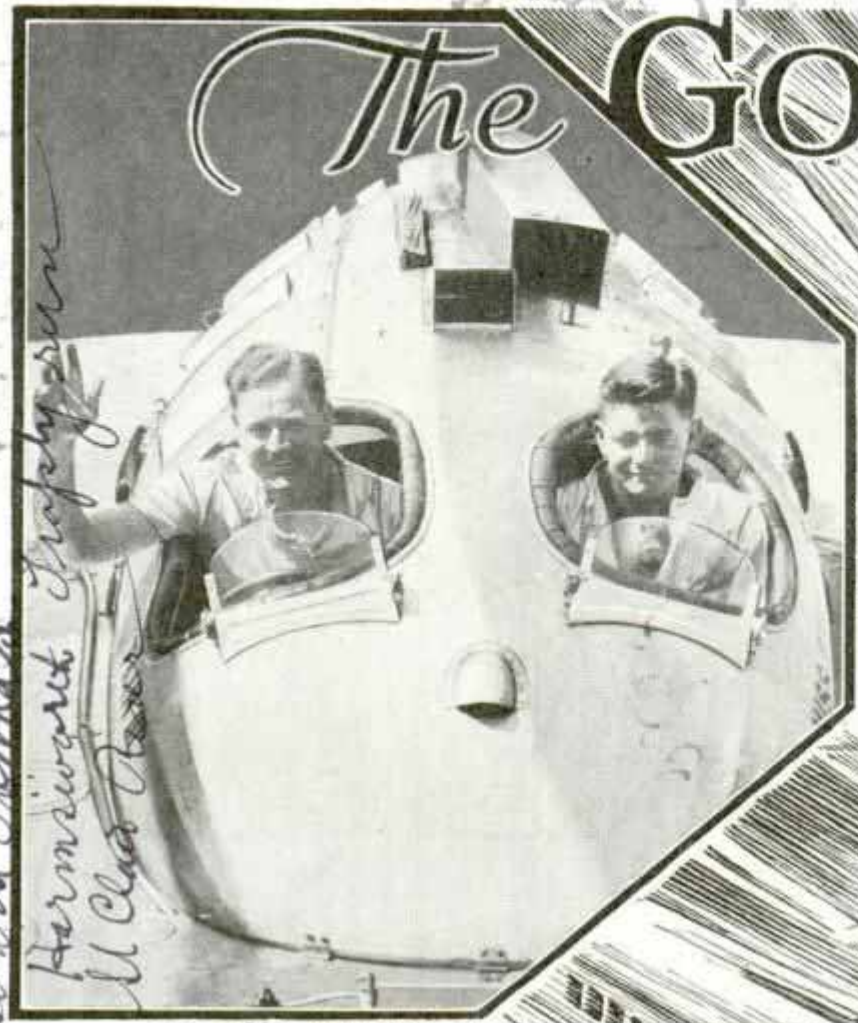
Year by year railroads have watched the passenger traffic dwindle while busses rode away with the business. The railroad locomotive, weighing about 300 tons and drawing a string of steel cars, each of which weighs about 150,000 pounds, drags on the average of 10,000 pounds of equipment for every passenger. The upholstered, pneumatic-tired bus carries only 500 pounds for each passenger.

But what makes rail transportation expensive is not so much the weight as the speed. When speed is doubled, the air resistance increases four times. The air resistance encountered by a steam loco-

Hubert Scott. Paris left and mechanics
Gordon Thomas
Hermsworth Professor
U. C. Clark

55 W. 86 St. New York

The GOLDEN



Top, Left, Streamlined Cockpit of "Miss Britain III," English Speedboat;
Bottom, One Designer's Conception of the Streamlined Automobile

TRANSPORTATION is abandoning its "wind-pushing" epoch to enter the streamlined age—the new era of low resistances, high speeds, matchless comforts, and great economies.

Many machines of locomotion long known on the highways of commerce are going to the wreckage heap and startling inventions in the field of transportation are streaming from laboratories and workshops. To the accompaniment of hum and bustle, transportation enters its Golden Age.

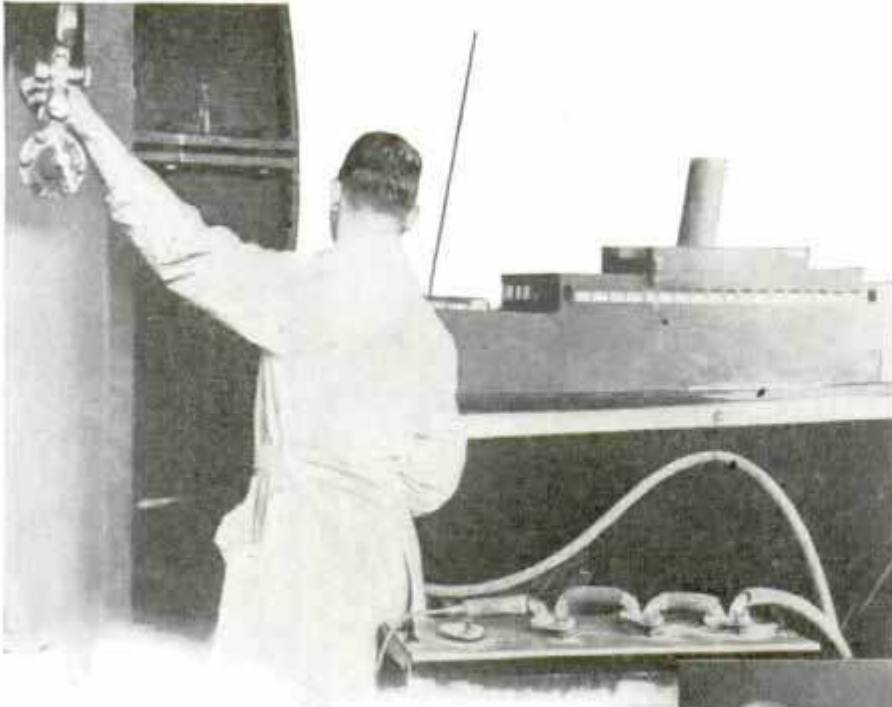
The great force which dominates this new era is streamlining, by means of which the Wright brothers pushed to the fore an idea that bids fair to re-shape all forms of mechanical locomotion.

The Wright brothers' chief problem was

to overcome gravity and resistance with a man-made engine. Gravity is ever present, and no amount of thought can reduce it. But resistance can be overcome by increasing power, and the Wrights made a brilliant application of the idea that resistance can be reduced by designing a flight machine properly.

Of late, automobile engineers have been

[Handwritten scribbles and signatures at the bottom of the page]



No small fraction of this power goes to overcome the increased wind resistance. Present estimates attribute ten to twenty per cent of a greyhound's total resistance to the atmosphere. Hence, about 15,000 of the "Rex's" 144,000 horsepower were practically wasted in fighting the wind.

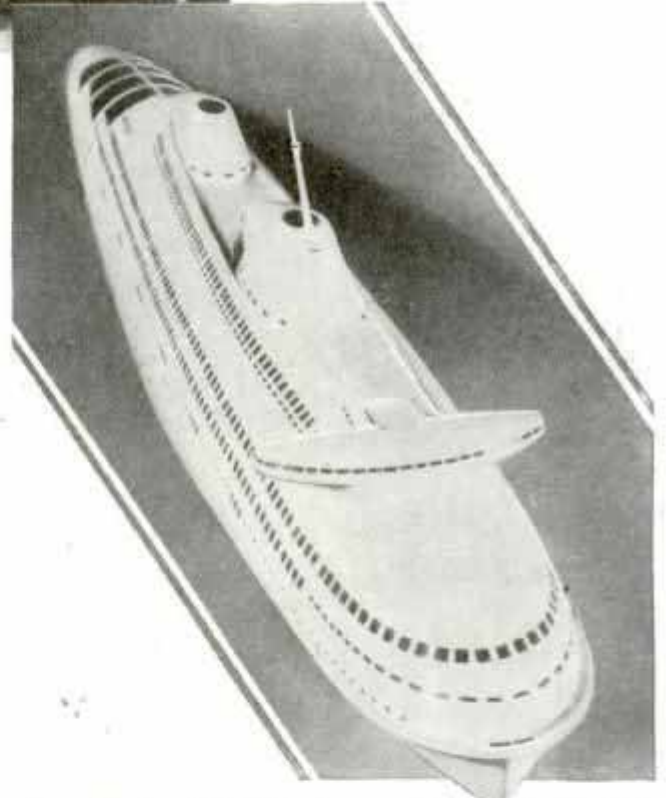
The new French super-ship "Normandie" will have three very short funnels, graduated in size from front to rear. Also, she exhibits the first

tive and twenty coaches is 5,540 pounds per square foot at sixty miles per hour, and 15,380 pounds at 100 miles per hour! But what is actual cost in energy? At sixty miles per hour it takes 885 horsepower to overcome the resistance of such a train; and at 100 miles per hour it takes 4,100 horsepower. The engines necessary to develop such power are costly and the fuel cost at high speeds is terrifying.

Because of their difficulties, railroads are looking to streamline engineers for relief. Something must be done about increasing speeds without incurring staggering losses. The alloys which go into airplanes now will go into trains. Duralumin, magnesium alloys, and stainless steel will reduce the car weight tremendously. A streamlined three-coach duralumin train and 600 horsepower engine weigh only eighty tons, as against 1,000 tons for a steam train and ten steel sleeping cars.

To make the streamlined train safe at 110-mile speeds, the railroads developed new air brakes that respond instantly and weigh only one-third as much as braking equipment on a standard Pullman car.

The experience of the "Rex" in winning the Atlantic blue ribbon proved that one of the greatest obstacles to ship speed is wind resistance. As her chief engineer, Commander Luigi Rizzo, says, "... if we want to increase our usual speed ten per cent, we must almost double our power."



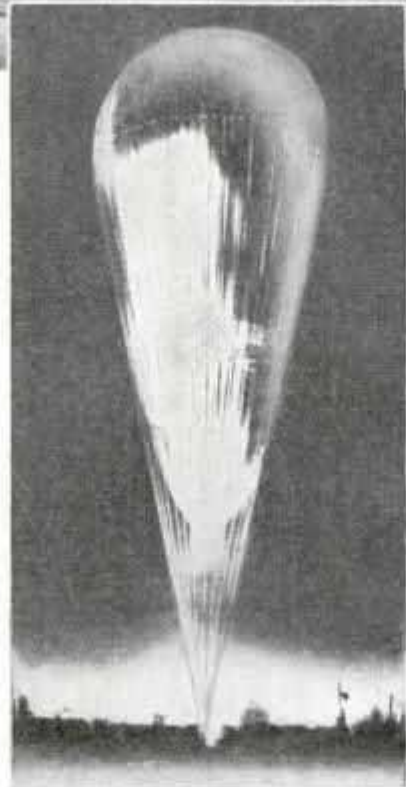
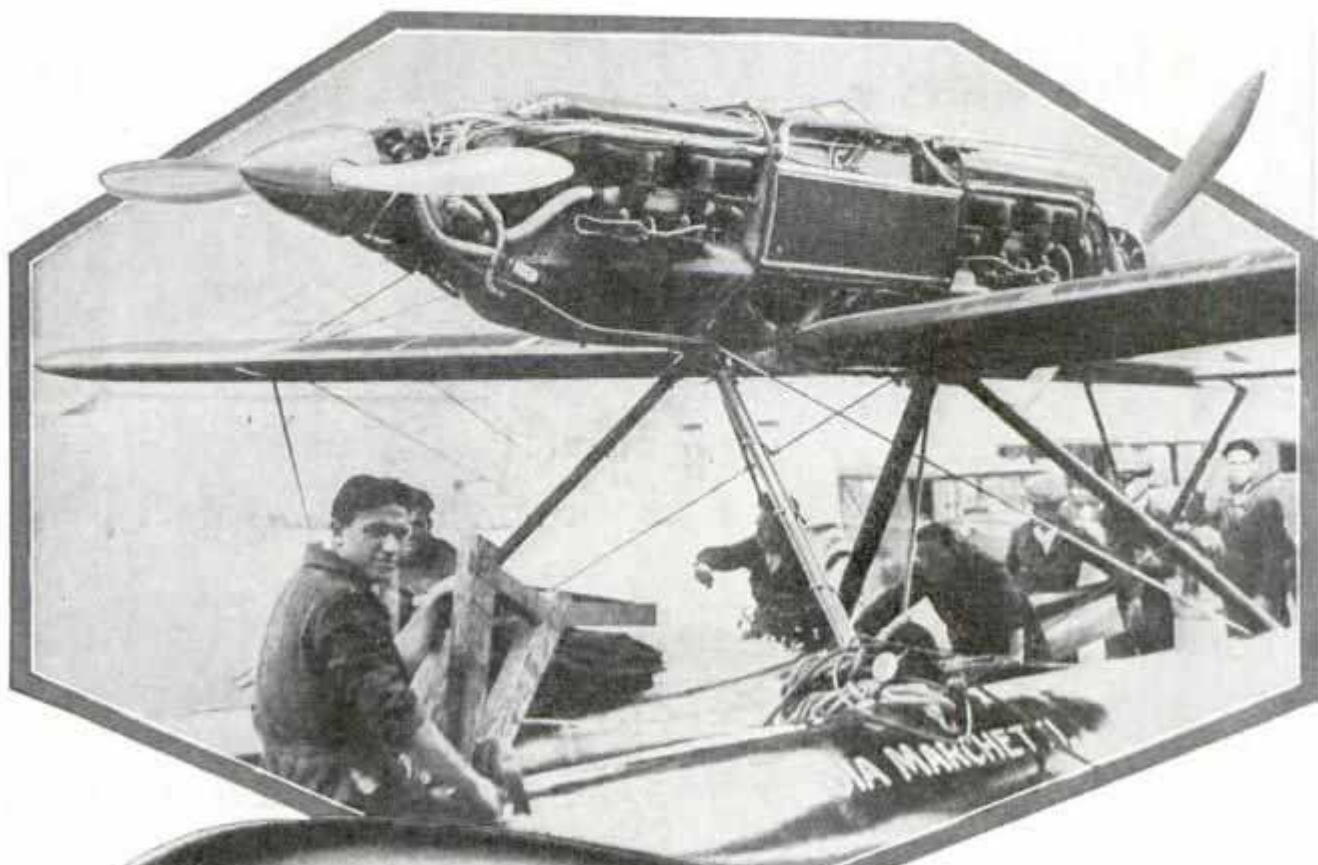
Top, Testing Wind Resistance of Ship Model; Bottom, Bel Geddes' Design for Ocean Liner

"whaleback bow." This will make the forward tip of the "Normandie" look something like the front of a giant seaplane pontoon. An original effort in ship design has come from Norman Bel Geddes, an American architect. It is a ship of 70,000 tons displacement, streamlined from stem to stern. One projection—the mast. The two funnels "dissolve into the mass form." The streamlined foil of the rear funnel contains a hangar and machine shop for two tri-motored seaplanes.

In rough weather, the superstructure is

article by P. M. King Rex Rules Ocean
 Nov. 1933-648

Norman Bel Geddes.
 128 237 the end



Top, the "Flying Egg" with Twin Engines between Which the Pilot Sits; Center, Bel Geddes' Automobile Design; Bottom, Piccard's Stratosphere Balloon, Streamlined from Top Downward

entirely enclosed in the streamlined form, at which time the interior is air-conditioned. On pleasant days, Mr. Bel Geddes holds, the ship is more open than the present liner. The unobstructed play deck is equal to the area of four full-size tennis courts. Such a streamlined supership would cross the ocean easily in four days, and operate under a much reduced overhead.

While streamlining principles are being applied to common carriers, the average man and his automobile are not left in the cold. Automotive engineers have

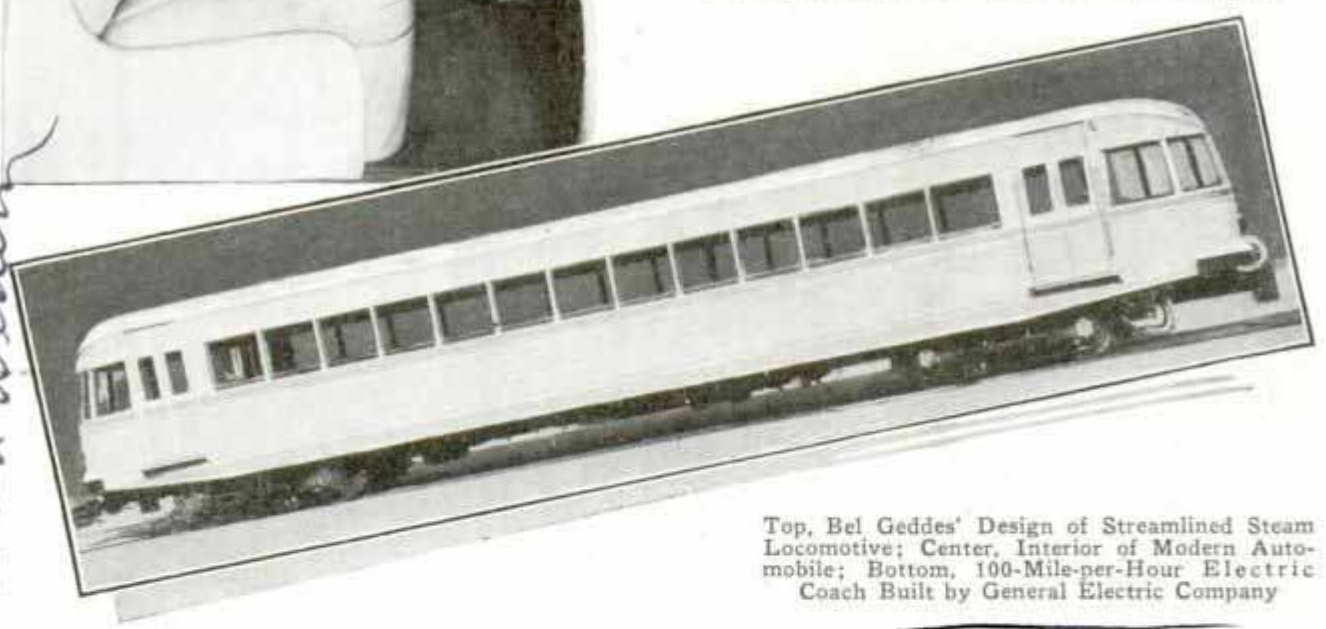
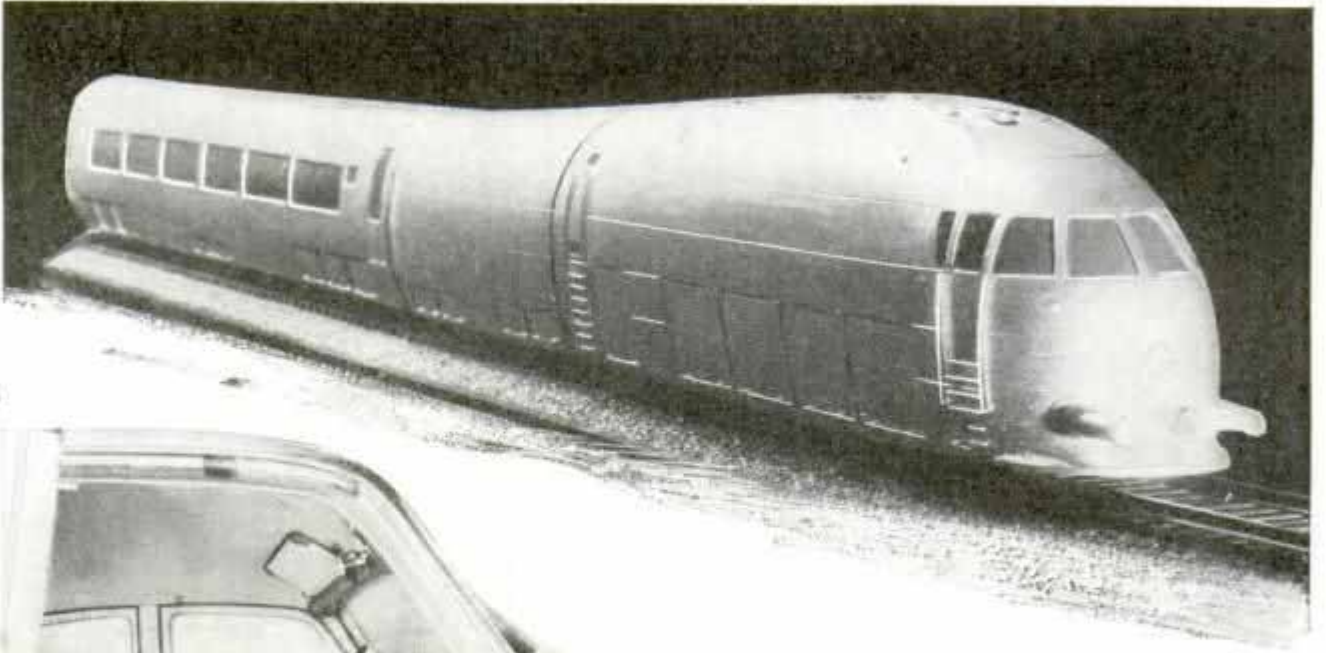
concluded that what the average man wants is more economy without sacrifice of safety or comfort. The only solution at present is streamlining. The present power plant is easily adaptable to streamlined bodies. Half a dozen manufacturers are working at top speed on production schedules for "rear-engined" automobiles.

Engineers are convinced of the streamlined car's advantages. No technical difficulties stand in the way of

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Vertical handwritten notes on the right margin of the page.

C 15 200 0



engine to deliver thirty full miles per gallon. And the cost? About \$2,000 on small production.

And so America's transportation machine responds to the impetus created by the airplane. No vehicle or transport can afford to remain outside the influence of streamlining. Day by day it wins converts. Streamlining has been applied in another

Top, Bel Geddes' Design of Streamlined Steam Locomotive; Center, Interior of Modern Automobile; Bottom, 100-Mile-per-Hour Electric Coach Built by General Electric Company

production. William B. Stout, an aeronautical engineer, has set the goal for the average man's automobile: light alloys to give drivers better control and easier steering; acceleration from naught to sixty miles an hour in three seconds; a forced ventilation and cooling system for comfortable touring in all seasons; wheels inclosed and windows fixed, and a multicylindered high-speed and vibrationless

er field, architecture. Led by Frank Lloyd Wright, architects have pressed the horizontal lines of speed into the service of homes and buildings. Wright's "prairie" house, seen especially around Chicago, gives the impression of a structure rushing through space.

■ About 44,000 thunderstorms occur on the earth each day.

Science News Letter
8/5/33

for Philadelphia and Western Pierce Arrow Special

FLARE PROTECTS AUTO STOPPED ON HIGHWAY

When the automobile stops at night to undergo repairs, it is in danger of being struck by fast-moving vehicles. Especially is this true of the car halted on trunk highways which handle heavy traffic. Often the other driver is so confused by the multiplicity of lights that he fails to notice the car standing beside the road. To eliminate this danger, a highway flare has been produced for the motorist. It burns in ordinary wind or rain for thirty minutes, ample time to repair the tire or other disabled part or to call a service station. The flare is ignited by means of a fuse. It may be set on the road at any desired point, the base being flat like a tin can. Sufficient light for repair work, as well as for warning purposes, is given off. For campers, fishermen, hunters and others, the flare gives adequate light for



Inspecting Packing of Flashlamp Bulbs as the Foil is Carefully Inserted; These Bulbs Produce Brilliant Light for Photographic Purposes

BIG PHOTOFLASH IS BRIGHTER THAN THE SUNLIGHT

Three times brighter than the sunlight at the earth's surface, a new photoflash lamp is being produced as an aid to the speed and convenience of news and certain classes of commercial photography. The lamp gives from three to four times the output of the standard photoflash and will replace that many lamps for taking flashlight photographs. Where the success of news "shots" often depends upon speed, the photographer need use only one of the new lamps instead of three or four of the standard size. The maximum intensity of sunlight on the surface of the earth is approximately 10,000 foot-candles, while the new photoflash in a reflector of proper design produces a light of approximately 30,000 foot-candles on an object ten feet away. The lamp is a product of Westinghouse Lamp company.



Repairing Tire on Roadway with Protection of Flare; Inset, Flare Guards Truck

AUTO INDUSTRY IS USING CORN AT TWO BUSHELS PER CAR

Two bushels of corn are required for the production of sufficient lacquer to give a complete finish to one automobile body. Thus the automobile industry has purchased, indirectly, millions of bushels of corn in the last decade. The Commercial Solvents corporation uses 22,000 bushels of corn daily in its manufacturing.

camping needs and can be used for heating or light-cooking purposes.

see Aug. 1933 1934

*230 Park Ave
New York City*

*of Ford or General
of Progress*

U. S. Establishes Its Own "Devil's Island"



Air View of Island on Which Alcatraz Prison Stands; Here Is Where America's Worst Criminals Will Be Confined; Steep Sides of the Island and Its Distance from Shore Reduce Chances of Escape

Dangerous criminals are being transferred from federal prisons to Alcatraz prison, located on an island in San Francisco bay, as the United States establishes its own "Devil's Island." The prison crowns an island crag about one mile from shore. Steep sides of the crag and rough water in the bay reduce the chances of prisoners escaping, in fact, only one inmate has made a successful break for liberty since the island was taken over for use as a military prison. Four types of prisoners will be housed at Alcatraz: jail-breakers, especially those who are aided by relatives and confederates; the "dangerous" men who are killers; the "irredeemables" who cannot be reformed, and the "trouble-makers." These four classes are said to include about 700 prisoners. Alcatraz island originally was a Spanish fortification. It has been a military prison since 1858 and now the dungeons, hewn out of rock by the Spanish, have been replaced by modern prison buildings.

SAWDUST PRESSED INTO LOGS GIVES SATISFACTORY HEAT

Compressed under eighty tons of steam, sawdust and scraps of lumber are being converted into logs which give excellent heat. Each log of this new type fuel is

said to produce heat equal to a boxful of seasoned forest wood four times its weight. A saving of fifteen per cent over solid fuels is indicated. Straw, cornstalks, bagasse and other combustible materials may be used in manufacturing the logs. To start the logs burning, only a piece of paper is necessary.

BATTERY GRIP IS ATTACHED WITHOUT WRENCH

Non-corrosive and simple to attach, a battery terminal that is wedged into position grips the post



tightly. A curved arm with serrated teeth clutches the battery post. A tapering metal wedge is tapped into place and metal pin is placed in a hole near the smaller end of the wedge to hold the terminal and the wedge firmly. The

terminal fits battery posts as large as three-eighths of an inch. A special alloy with lead as its base, highly resistant to acid, is used in the device.

Handwritten notes on the right margin:
Machine Shop
Cactus, Ariz.
address unknown of 9411
C159
C1646
C1646
Weyerhaeuser Lumber Co
and Chas. J. Allen, Ariz. of Cave Creek Stage
C1646
C1646

240 - 11th Ave
San Francisco, Calif



Rear Wheel of Bicycle Shown on Support Designed for Home Exercising; Bell Records Distance

WHEEL SUPPORT FOR BICYCLE MAKES IT HOME EXERCISER

Any standard bicycle can be converted into a home exerciser by attaching a support for the rear wheel consisting of a stand containing a ball-bearing roller with adjustable pressure against the rear tire according to the effort the rider desires to exert. A signal bell rings to indicate the equivalent of each half-mile of travel. Two special rear-wheel axle nuts to support the bicycle in the frame are the only permanent attachments needed. The exerciser stand has rubber-cushioned frame supports to protect carpets and floors.

WEATHER MILD AT BOTH POLES BEFORE THE ICE AGE

Before the advent of the pleistocene Ice Age, the weather at the North and the South Pole was temperate. Then, explorers could have ventured into the Arctic and the Antarctic with no more equipment than now is needed for an outing in the Maine woods. During the warmer non-glaciated periods of the earth's history, there were no permanent ice caps at the poles. Since the North Pole lies in the midst of the Arctic ocean, it would have had to be visited by ships alone and its location would have been determined by

the captain with his sextant. Land expeditions might have reached the South Pole. Byrd and Ellsworth, two of America's explorers of the frozen regions, are on their way to the Antarctic again. As they departed, a score of scientists returned from the Arctic where they labored all summer. These explorers and scientists are seeking, at both ends of the earth, new knowledge of the world's weather, the cold component of which is manufactured at the poles.

INDUCTION MANIFOLD FOR AUTO C/552 GIVES MORE POWER

Increased power at lower fuel consumption is claimed for an induction manifold for automobiles. The gasoline air mixture from the carburetor passing through an impeller unit is thoroughly atomized, thus forming an ideal mixture for admission to the engine cylinder. This mixture, being under pressure, will expand slightly on account of pressure decline due to the opening of throttles for quick acceleration, thus relieving the carburetor of a portion of this duty. In tests, the inventor, Jay M. Smith, has found that the manifold has several advantages, including greater volumetric displacement, uniform distribution of fuel to all cylinders, absence of stratification of mixture in the manifold or "loading" at low speed, and inherent automatic adjustment of the mixture from minimum to maximum speeds of the motor, tending to produce economical operation and a smoothly running motor. It is



Manifold Designed to Reduce Fuel Costs and Give More Power

possible to get forty per cent more horsepower output on fifteen per cent less fuel from the same motor with this manifold than with the conventional manifold hook-up. The device has something of a supercharger effect, maintaining a high velocity of the explosive mixture regardless of the demands of the engine.

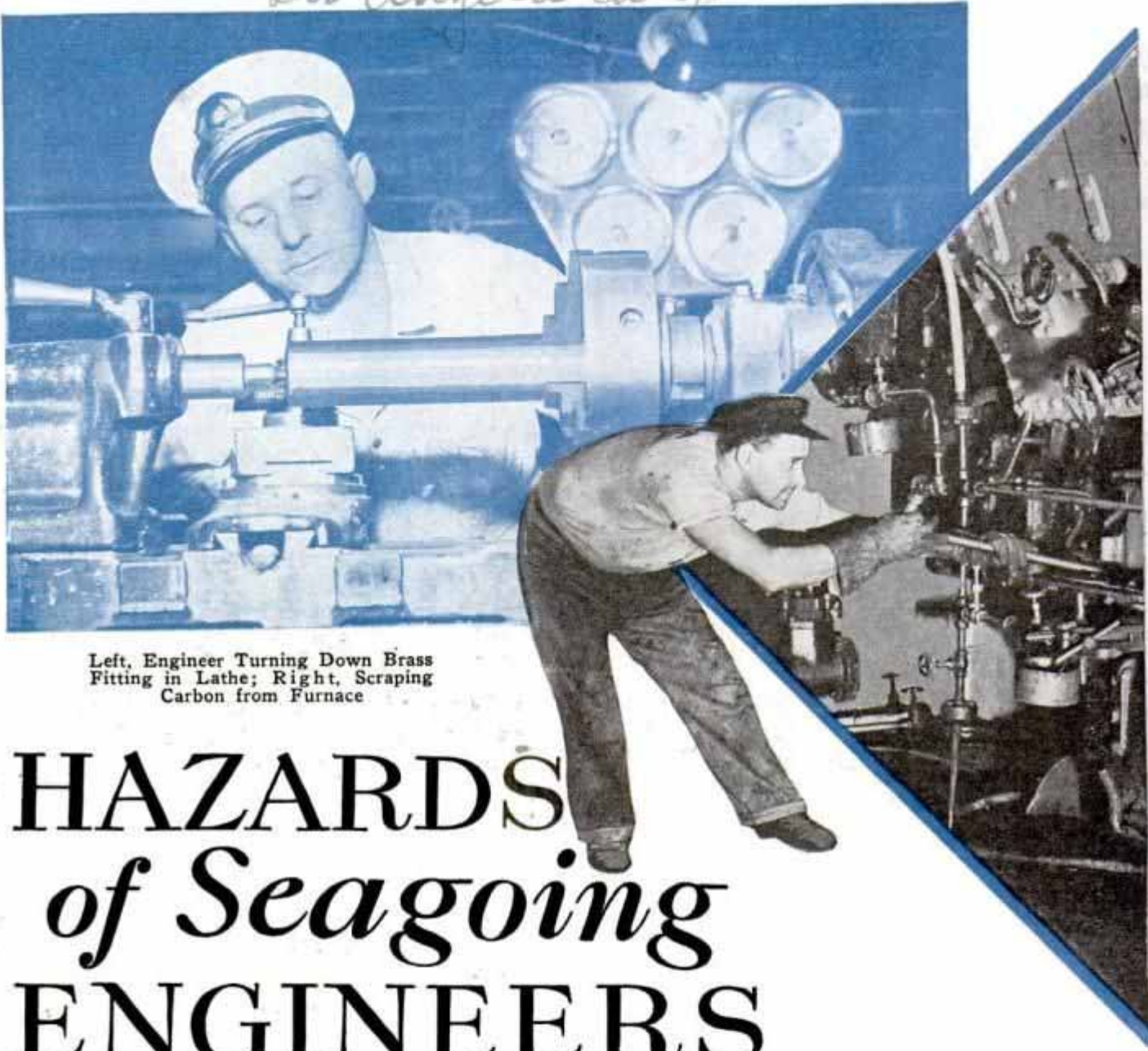
Iver Johnson's new cycle works
Fitchburg, Mass.

Chicago
108 W Lake

Mr. Smith
240-11th Ave
San Francisco

Scientific Service

C-15 32
4:20 S. San Pedro
Los Angeles Calif



Left, Engineer Turning Down Brass Fitting in Lathe; Right, Scraping Carbon from Furnace

HAZARDS *of Seagoing* ENGINEERS

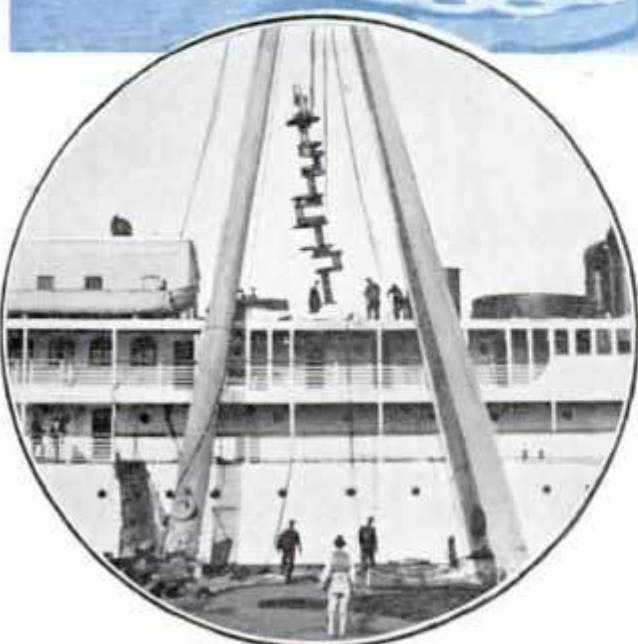
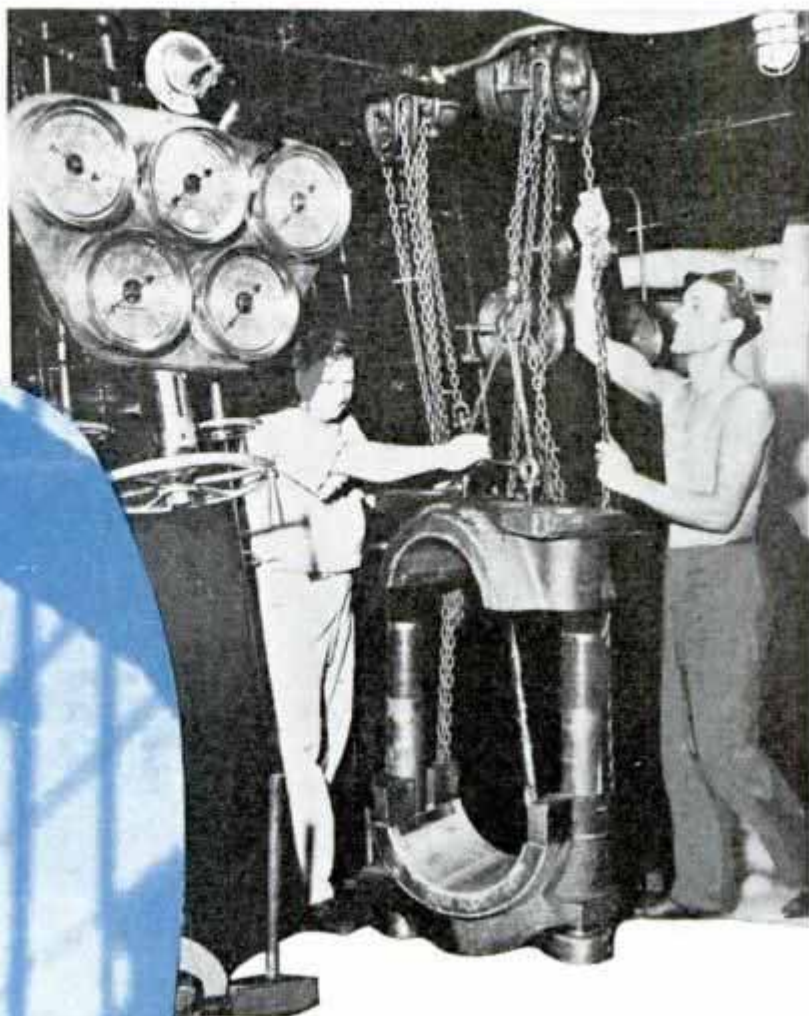
DOWN in the engine rooms of ships is a weird world of humming metal and hissing steam. In this world, completely alien to decks and passenger salons, live men who bravely carry out the finest traditions of the sea when emergencies and disasters occur.

The lore of the engine room harks back to 1890 when a ship had broken its propeller shaft in the lonely Pacific. With few tools aside from hammers and cold chisels, engineers toiled at fitting collars and chipping keyways in the ponderous metal shaft. They robbed the main engine of some of its parts and tore up the gratings for others. After three months of work, the steamer, long since given up for lost, limped into port.

Since then multiple engines have reduced the gravity of a breakdown. The radio stands ready to summon aid. But these improvements, instead of removing the problems of the engineers, have only changed them.

When the S.S. "Tahiti" committed suicide in 1930 by breaking a propeller shaft and stabbing herself with the whipping end, the engine-room staff held the sea back for sixty hours while rescuing vessels sped to the scene. Working in the darkness, the engineers shored up the bulging bulkhead and kept the pumps going. Even with the rescue ship alongside, volunteers returned to the engine room to strengthen the bulkhead in a new place while the passengers were being trans-

Top, Engine-Room Force Moving Spare Main Crank Bearing; Center, Spare Propeller Blade Carried on Tanker's Deck; Bottom, Loading New Crankshaft on Passenger Liner for Installation in Engine

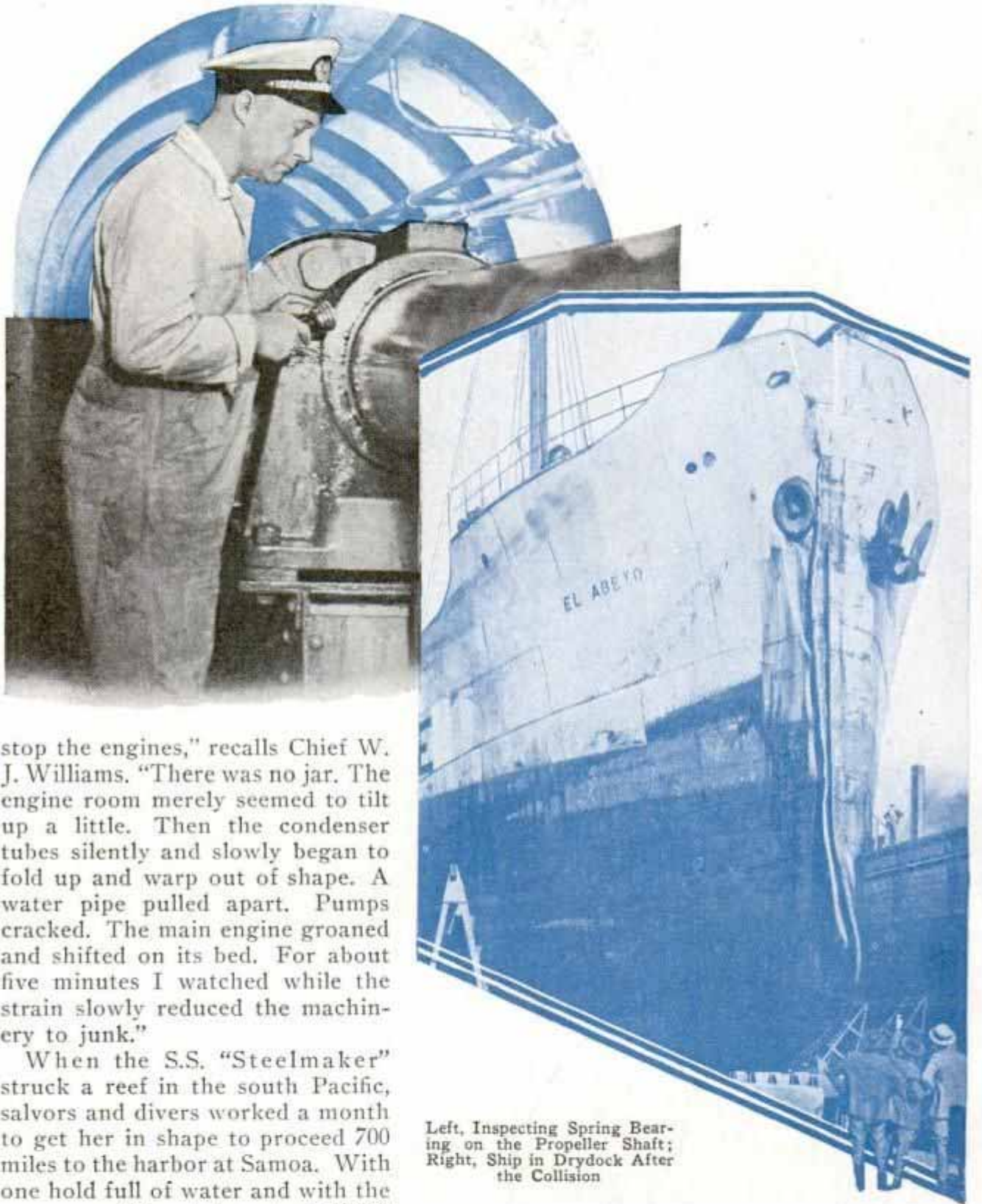


ferred. If the bridge is the scene of intense anxiety during a wreck, the apprehension is multiplied a thousandfold in the engine room because the engineers must execute their orders without knowing the cause.

On a steel lumber carrier several years ago, Chief Engineer Bridgeman was standing his usual watch on the engine-room control platform. Suddenly the telegraph clanged and the pointer moved across the dial to "Full Speed Astern." Bridgeman sprang to the control throttle and wound it down, then opened up the reversing throttle. As he did so, the ship was struck broadside by another vessel, opening up a gaping hole, and water spurted clear across the engine room. Instead of abandoning their posts the engineers stopped the engine and immediately started the pumps, keeping the ship afloat.

One of the strangest experiences of an engineer occurred when the S.S. "Golden Forest" ran onto a shelving reef in the Aleutian islands.

"I received an order from the bridge to



stop the engines," recalls Chief W. J. Williams. "There was no jar. The engine room merely seemed to tilt up a little. Then the condenser tubes silently and slowly began to fold up and warp out of shape. A water pipe pulled apart. Pumps cracked. The main engine groaned and shifted on its bed. For about five minutes I watched while the strain slowly reduced the machinery to junk."

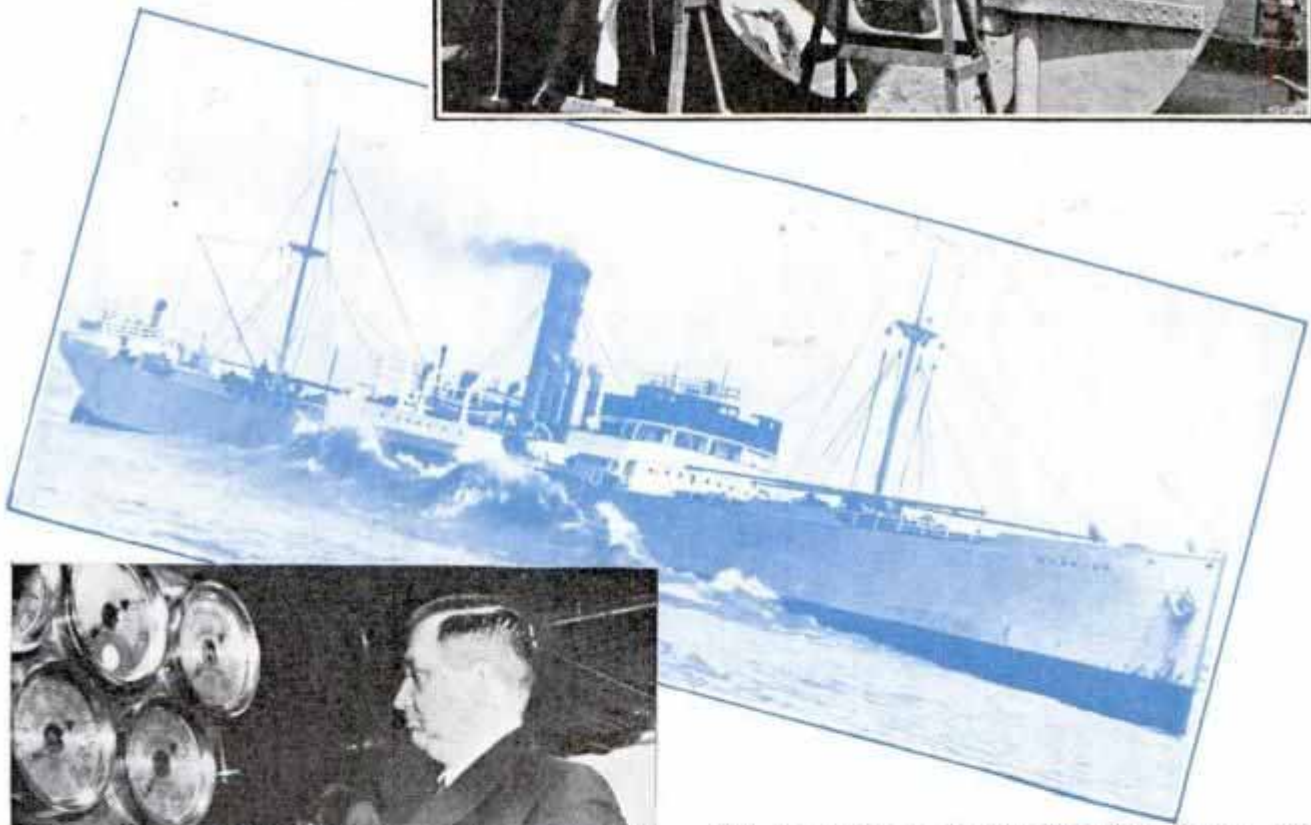
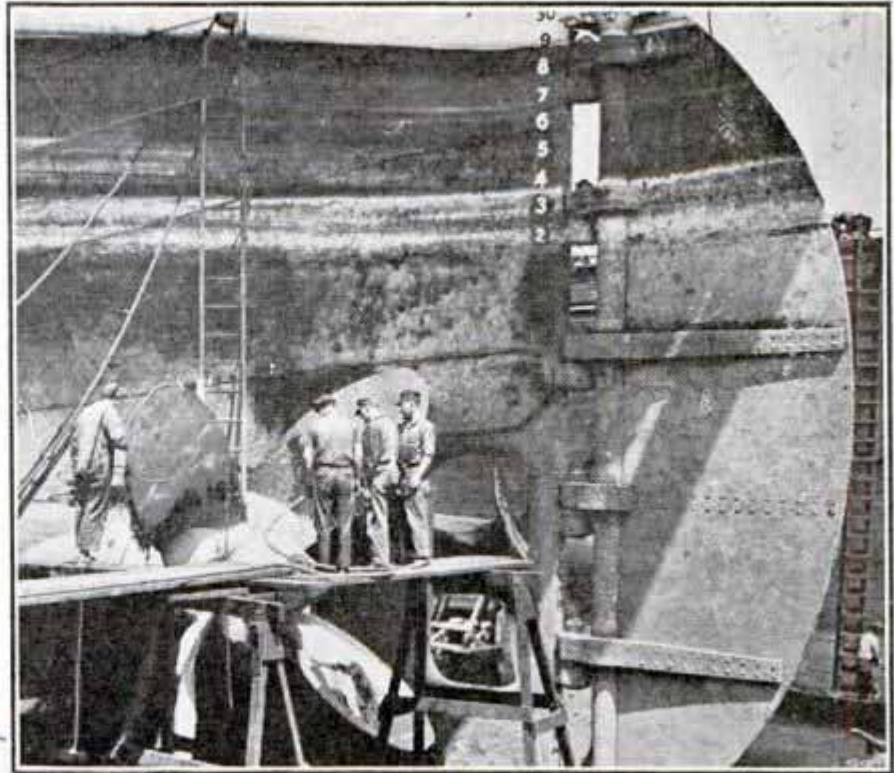
When the S.S. "Steelmaker" struck a reef in the south Pacific, salvors and divers worked a month to get her in shape to proceed 700 miles to the harbor at Samoa. With one hold full of water and with the pumps working at the rate of 16,000 gallons a minute, the "Steelmaker" made her way across the sea. Then, with Samoa on the horizon, it was found that only enough fuel remained to keep the engines and pumps going another hour. When the pumps stopped the ship would sink. There was one desperate chance and Chief Engineer Irwin took it. In a special tank was a mixture of oil and sea water. Irwin

Left, Inspecting Spring Bearing on the Propeller Shaft; Right, Ship in Drydock After the Collision

drained part of the contents of the tank from the bottom, lowering the liquid until the purest oil at the top reached the level of a valve. From there it was piped to the furnaces. The mixture was pure enough to burn and the ship made port.

When a huge marine engine goes on a rampage the engineer on watch jumps at the throttle and closes it, then reverses

custom by moving the telegraph over to "Stop" to inform the bridge of his action. Many things can happen in the engine room and all of them are serious. The propeller shaft may break or the propeller may lose a blade. Then the racing engine turns the engine room into an inferno of sound and runaway machinery. A main crankshaft may break. A piston head on a triple expansion engine may fall to pieces. Bearings may



Chief Engineer at Throttle of the Inter-Coastal Ship "Santa Ana"

Top, Preparing to Unship Propeller; Center, Ship Aground; Smoke Shows Engineers Are Sticking to Their Posts

burn out from lack of oil. Seagoing engineers pride themselves on being able to overcome tremendous hardships to make repairs at sea. Ships that have lost a propeller blade have been tipped by filling forward ballast tanks until the propellers were exposed. Then a spare blade is swung over the stern and bolted in place.

On several occasions an engine-room crew has repaired a broken crankshaft. Emergency follower rings and piston

(Continued to page 122A)

A. Caldwell, Pres. New York Electrical Society, 29 Jan. 37 cc New York



Circle on Rear Window Shows Location of "Electric Eye" Control for Parking Lights

"ELECTRIC EYE" PARKING LIGHT MAKES AUTO OBEY LAW

By means of a photo-electric cell unit, or "electric eye," parking lights on the automobile of one New Yorker are turned on automatically when darkness comes, saving the owner from arrest. When he parks his auto at a suburban railroad station and leaves it for several days, the eye takes care of the observance of parking rules calling for parking lights to be turned on. Withdrawal of natural light causes the eye to switch on the parking lamps. When daylight returns, it causes the photo cell to extinguish the lights. The eye is located on the rear window of the automobile.

REED MATS UNDER BOGGY ROAD TESTED AS FOUNDATION

Reed or cane mats are being tested in Holland as foundation material for roads in boggy areas. The reeds contain a high percentage of silicic acid and are very resistant to rot. Before being woven into mats, they are impregnated with creosote oil under heavy pressure. The drainage of the roadbed is accomplished by means of

porous tiling, but heretofore it has been impossible to obtain the necessary firmness of the road foundation because the steam rollers crushed the tiling. It has been found that by covering the soft-earth foundation of the road, in which the drain tiles are placed, with a two-inch sand layer and placing the reed mats on this layer, the pressure of the wheels is evenly distributed. This prevents breakage of the tiles, to a great extent. The paving is laid on top of the mats. It consists of special paving bricks that are united by an asphalt composition.

C1592

TELESCOPE FOR THE RIFLEMAN AIDS IN WATCHING SHOTS

Compact and easily portable, a telescope weighing only thirty-six ounces has been produced for the rifle range. With its aid, sportsmen may watch their shots, seeing how close they come to the mark, without walking up to the target. In use, the instrument is set up in front and slightly to one side of the rifleman. After firing, the rifleman directs the instrument toward the target so that the bullet hole appears as large as though he were standing near the target. The telescope can be focused for long distances or brought to focus on a target only forty feet away. When not in use for shooting, it makes an excellent portable telescope for summer homes, clubs, resorts and for travelers. It folds away compactly in a small carrying case.



Examining Result of Rifle Firing through Small Telescope Set Up on the Range

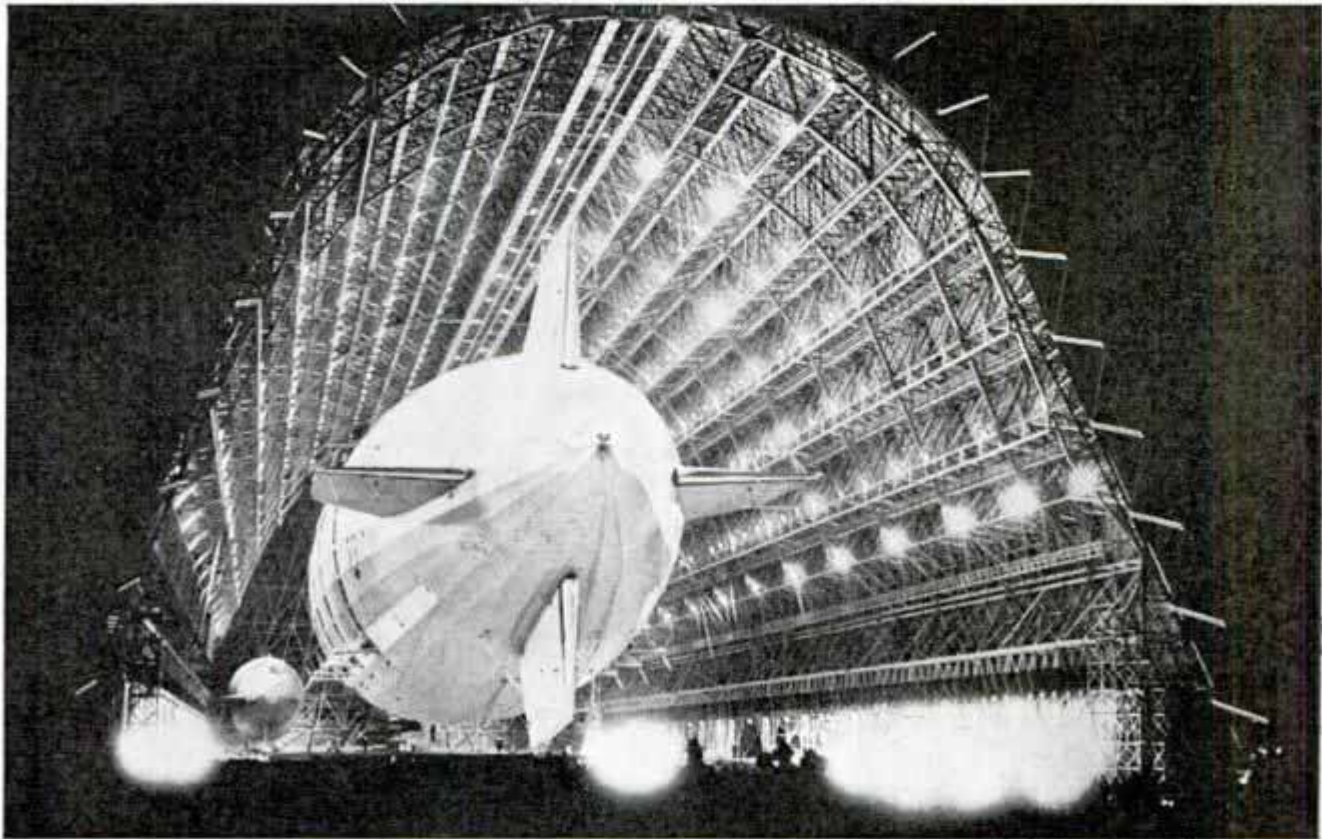
Arrested

Summer memo 10/21/33

Consul General

Bausch & Lomb Optical Co Rochester

Giant "Macon" Berthed in Pacific Hangar



Night View of the "Macon" in Sunnyvale Hangar; Floodlighting Gives the Dirigible's Home Something of the Appearance of a Great Ballroom; Note How Airship Dwarfs Navy Training Blimp at Lower Left

After a flight across the southern part of the United States, the giant "Macon," navy dirigible, has been berthed in its west-coast home at Sunnyvale, Calif. A huge hangar equipped with the latest devices for handling big dirigibles received the "Macon." Under plans of the navy department, the big ship will operate along the Pacific and inland from the Sunnyvale base, which is regarded as ultra-modern for structures of its kind. When the "Macon" was moved into the hangar, a navy training blimp in one corner of the building was completely dwarfed, giving spectators a comparative idea of the size of the dirigible. Giant lights attached to the curving dome of the hangar flood the base with illumination for night operation.

C1644

GASOLINE-DRIVEN MOTOR TRAIN SUCCESSFUL IN ITALY

Operating between two Italian cities sixty-one miles apart, a gasoline-driven motor train has been tested successfully. The train consists of one long car fitted with seats for seventy-two passengers. It

has an eight-cylinder engine of 120 horsepower, which propels the train over the sixty-one miles in one-third less time than required by an ordinary train. Fuel consumption is two-fifths of a quart of gasoline per kilometer, .62 mile, and about three-fifths of a quart of lubricating oil. This is the first time rapid motor trains have been used on Italian railway lines.

C1593

SOCKET WRENCH IN SINGLE UNIT HAS HAMMER ATTACHMENT



Constructed in a single unit but serving the purposes of a complete socket set, a super-wrench fits all square and hexagonal nuts from five-sixteenths to two and one-half

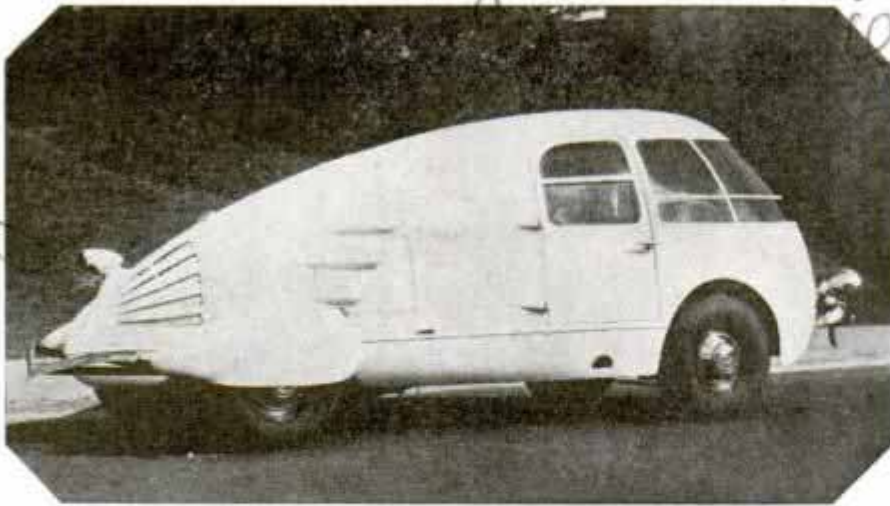
inches. It has special plugs for insert nuts and a hammer attachment. The head is drop-forged, heat-treated steel while the shaft is manganese steel, case hardened.

*made by Diabroica Automobile
I sotto l'occhio
na montano da socie Anitara, mandad
Italy*

*Dept. of Commerce
30/1/27*

*Cincinnati Bull Crank Co
H... near ...*

Wavy of Body Co
818 Reedy St. Cincinnati



Speedy, Streamlined Automobile Designed by a Chicago Airplane Pilot; Note How Its Lines Resemble Those of the Latest Aircraft

CAR STREAMLINED LIKE PLANE HAS POWER PLANT AT REAR

Streamlining like that employed in construction of the modern airplane is characteristic of a new automobile designed by Lyman Voelpel, a pilot. The chassis is practically reversed, with a Ford engine mounted in the rear transmitting power through a front-drive axle. The radiator is at the rear, also, while the gasoline tank is mounted at the front. True streamlining is carried even to the rear wheels, which are covered with airplane "pants." In test runs at sixty miles per hour, the tendency of the conventional automobile to swerve, due to vacuum upon passing large vehicles, was absent. The car's speed is said to be above ninety miles per hour.

TOO-HEAVY OIL DAMAGES AUTO ENGINE

Oils that are too heavy cause excessive trouble in winter starting and untold damage to cylinders because of sluggish circulation. In addition, gasoline consumption is increased by the greater friction. W. H. Graves, of the Packard Motor Car company, points out that the only possible advantages of heavier oils are slightly less oil consumption and perhaps slightly quieter operation. There has been a growing tendency among automobile owners to use heavier oil and heavier lubricants, possibly due to the fact that few of them know what grade of oil is recommended for

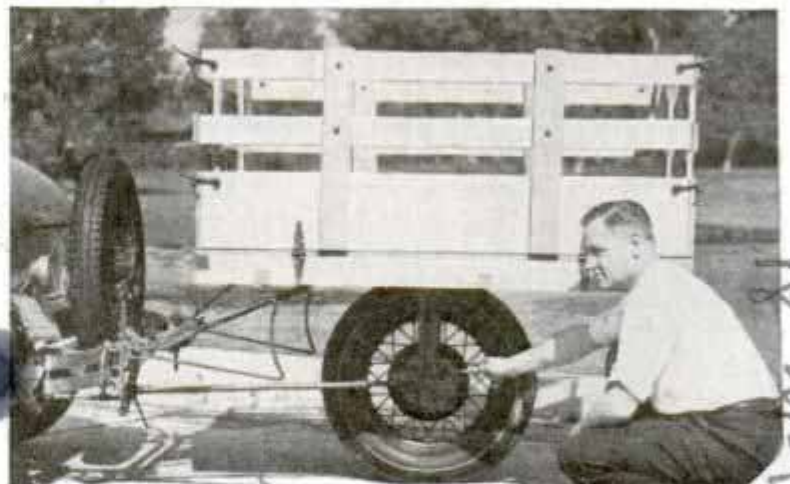
their car by the manufacturer. A special committee of the lubricants division of the Society of Automotive Engineers reports that the safe low limit of viscosity or body to lubricate the car is very low. The light-bodied oils, satisfactory for cold-weather starting, are sufficiently heavy to prevent burned-out bearings or worn cylinder blocks, even in warm weather. Worn cylinder blocks, the committee

finds, are more often due to using too heavy an oil rather than too light an oil, because of improper lubrication during the warm-up period. Several American manufacturers are recommending oils for winter use as follows: thirty-two degrees to 100 degrees, S.A.E.-30; around zero degrees, 20-W; fifteen degrees below zero and up, 10-W; under fifteen degrees below zero, 10-W plus ten per cent of kerosene. By using the right oil, motorists may save their engines from damage.

C1570

TRAILER WITH SINGLE WHEEL CARRIES THOUSAND POUNDS

Capable of 1,000-pound loads, a new safety trailer for automobiles has only one wheel. It may be attached quickly by cou-



This Trailer Mounted on One Wheel Is Capable of Carrying Half-Ton Loads

pling to two points of the rear bumpers and the steering mechanism without using tools. The trailer backs and steers with the car. Standard wheel and tire are used.

44' 2.3' Sherrigan Road Chicago

Reader says Letter 11/13/37

Paper Automobile Passenger Car Motor Oil Recommendations

meeting American

Developed by Robert

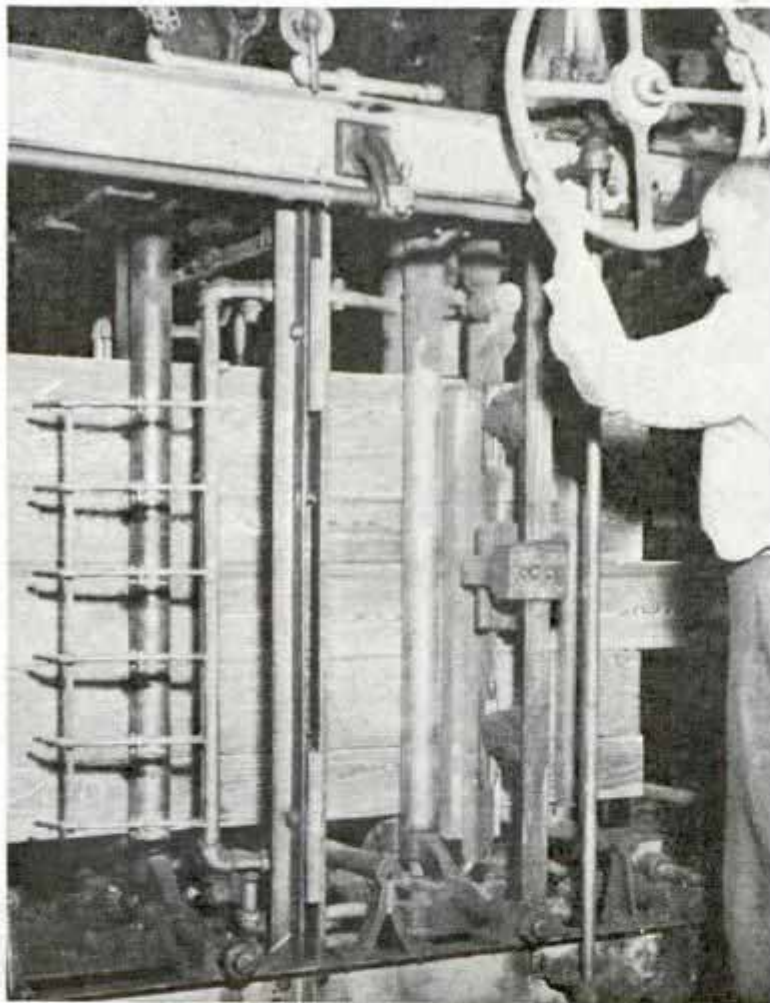
1820 S. Hope St.

Washington, D.C. 1401-22 nd St. S.E.
Rare Sugi-Wood Finish Made at Low Cost

Sugi-wood finish, used for centuries in the Orient but too expensive for widespread application in America, may be produced automatically by means of a machine. The secret of the finish lies in charring the wood surface with flame and brushing it to remove the charcoal. Ancient temples and palaces in Japan have rare sugi woodwork hundreds of years old. Until the development of the machine, the finish was produced by hand in America. Blowtorches were used to burn the wood and wire-bristled brushes were applied to remove the charred surface. The flame burns away softer portions of the wood but does not affect the harder parts, except to impart a richer color. The



Left, Automatic Machine Turns Out Wood with Sugi Finish; Top, Magazine Rack Built from Wood Treated in the Machine



standing on edge are fed into one end and emerge at the other, ready for use. Cost of treating the wood is low, in some cases less than for conventional types of finishes.

C1637

OZONE AS "KNOCK" CAUSE AIDS IN STUDY OF DETONATION

Ozone is more potent in causing detonation than tetraethyl lead is in suppressing it in the automobile engine. Bureau of standards experts have discovered that as little as two-thousandths of one per cent of ozone will cause an increase in "knocking" equal to that occasioned by substituting regular gasoline for premium gasoline. Since ozone and tetraethyl lead have opposite effects, a study of ozone may throw light on the mechanism whereby tetraethyl suppressed detonation.

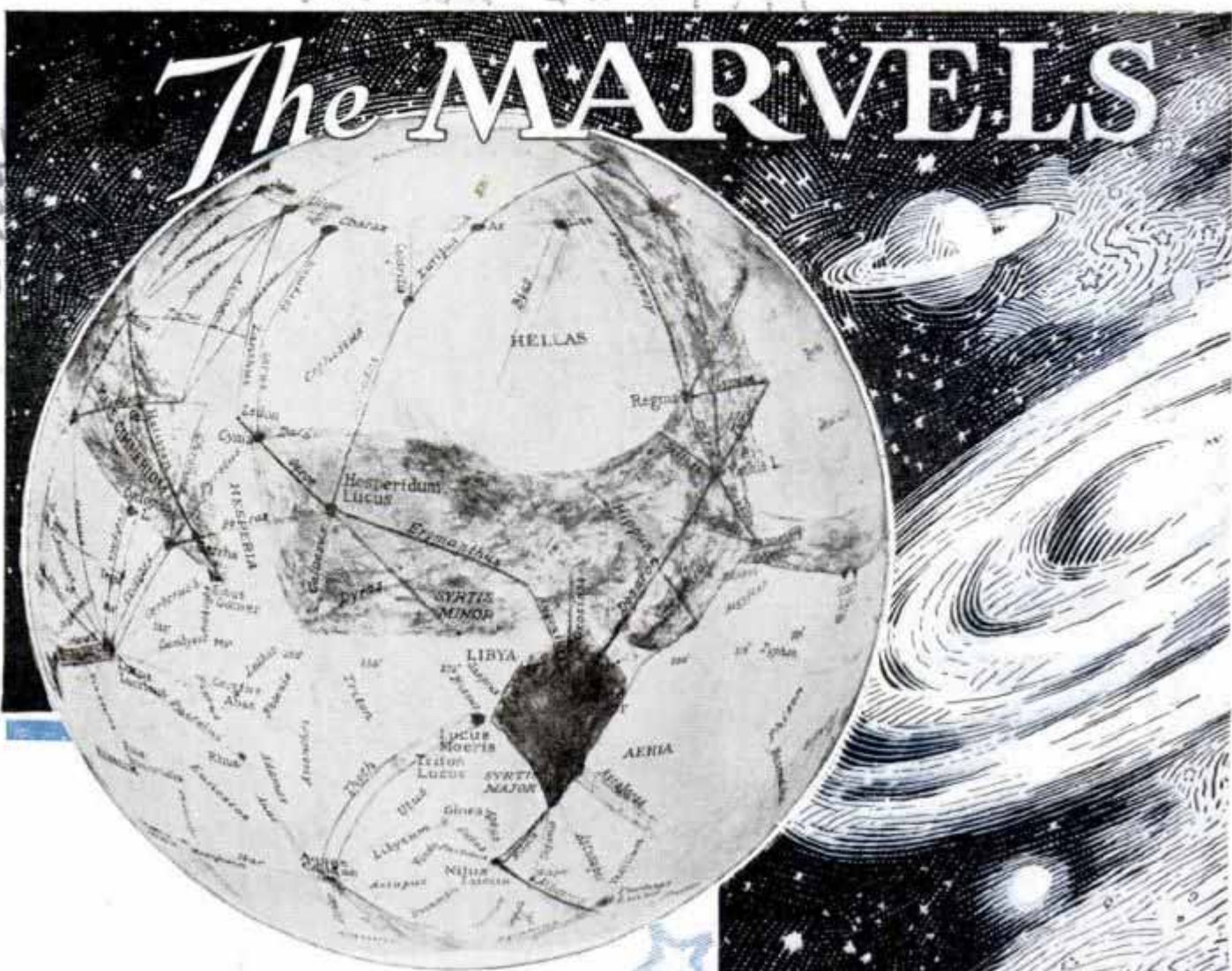
process brings out the natural grain with striking beauty. Cypress, chestnut, oak and other American woods with interesting grain patterns lend themselves to this treatment. All that was done by hand may be done by the new machine. Boards

Cinnamate T. Inquirer 10/8/38

50 Mar in Salencer Co Harvard Conn

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The MARVELS



Lowell's Globe of Mars Showing Dark Areas, Believed to Be Vegetation, Light "Desert" Areas and Lines Indicating Position of "Canals"

By HIRAM PERCY MAXIM

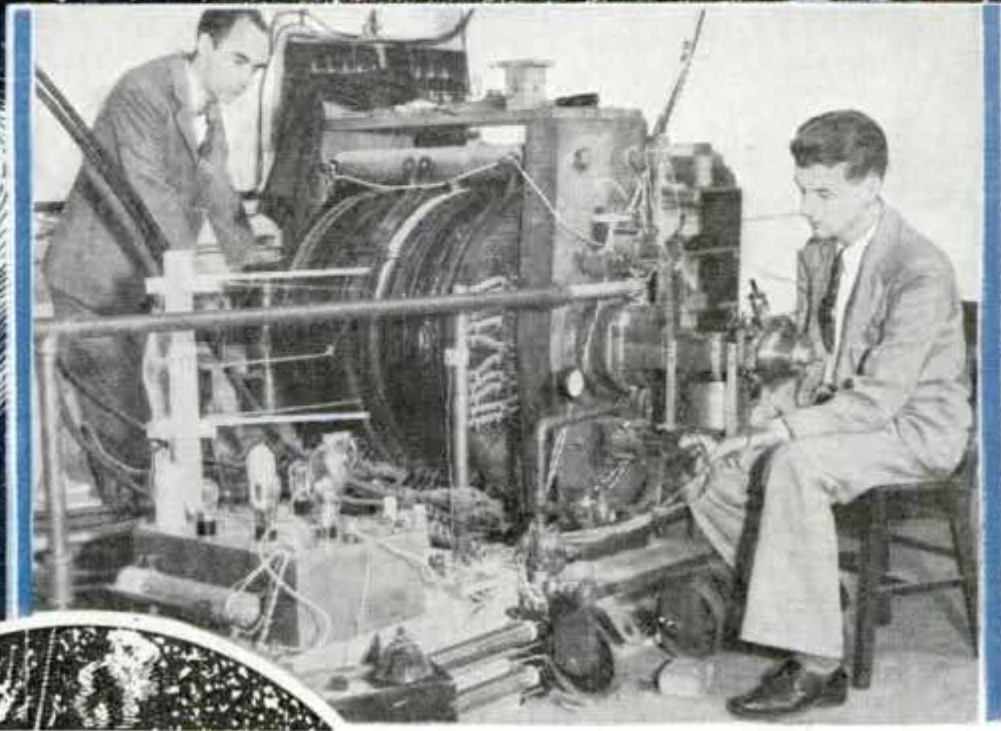
EVERYBODY has heard about Mars and nearly everybody knows that Mars is our next-door neighbor, but few of us know what the surface of Mars looks like and what its strange markings signify. An actual globe which shows Martian geography has been constructed by the late Percival Lowell, founder of Lowell observatory at Flagstaff, Arizona.

Percival Lowell devoted his life to training his eyesight and observing the planet Mars. Just as athletes train themselves, he spent substantially all his time in training which encouraged the sensitivity of vision. He is thought by many to have had one of the keenest visions ever possessed by a man. For many years this superlative eyesight and his trained brain were devoted to the mapping of the markings on the surface of Mars.

Schiaparelli, an Italian astronomer, in 1877 announced that he had seen on the surface of Mars curious lines or channels. The word

C.P. Maitman

of MARS

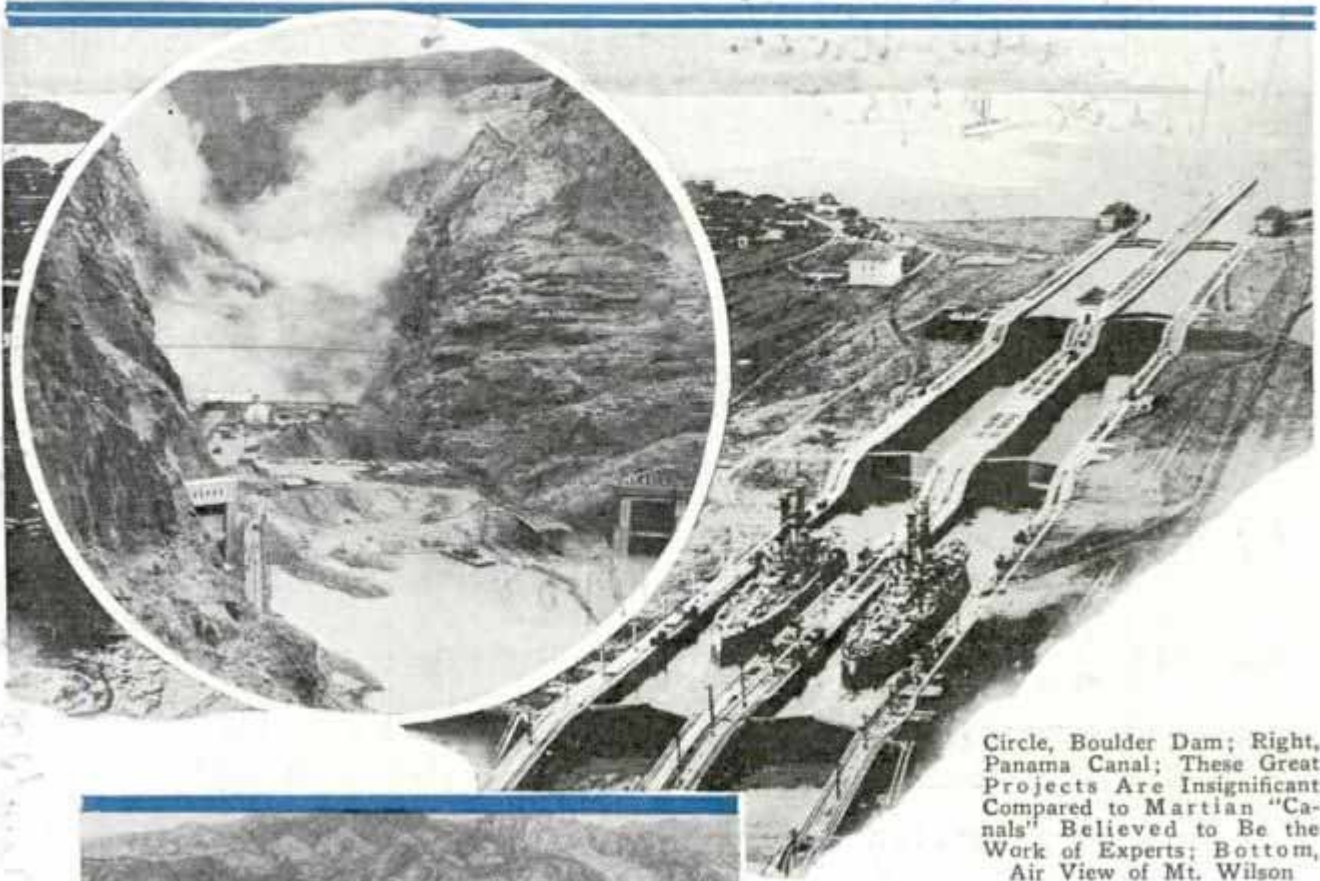


"channel" in Italian is "canali." The English speaking world became intrigued by this word and the idea that there may be real canals on Mars, so they made it "canal." To this day we speak of the "canals of Mars." The odd thing about it is that the more we study these strange markings the more they answer to the specifications of real canals.

Their discoverer said that these lines were just on the threshold of visibility when optical conditions were at their best and the observer's vision was at its best. Many astronomers could not see the canals, so a heated controversy followed. Lowell entered the picture at this time. He built an observatory at a point where he found the air clearest and steadiest, and proceeded to settle the truth of the reported lines on Mars. After several years of hard work with his assistants he announced not only that the lines on Mars were actually there, as reported, but that the planet was literally crisscrossed with them; and in addition, that at many of the junctions where lines intersected, there were curious dark areas. He named these "oases."

The controversy waxed warmer.

Top, Right, Photographing Experiment in Which Pure Motion Apparently Changes into Solid Matter; Circle, Diagram Showing How Matter Is Created



Circle, Boulder Dam; Right, Panama Canal; These Great Projects Are Insignificant Compared to Martian "Canals" Believed to Be the Work of Experts; Bottom, Air View of Mt. Wilson

snow cap in winter. As winter wanes and summer approaches this snow melts, as is proved by the fact that the cap grows smaller. As the snow at the poles disappears, and the liberated water flows toward the equator, the vegetation begins to appear. The astronomer Pickering suggested that the lines we see on Mars may be real canals which lead water from the melting snows down to the ancient ocean bottoms in the temperate zones where the vegetation may have access to it. The light areas are desert wastes, ancient continents, while the dark areas are considered to be the low-lying ancient ocean bottoms.

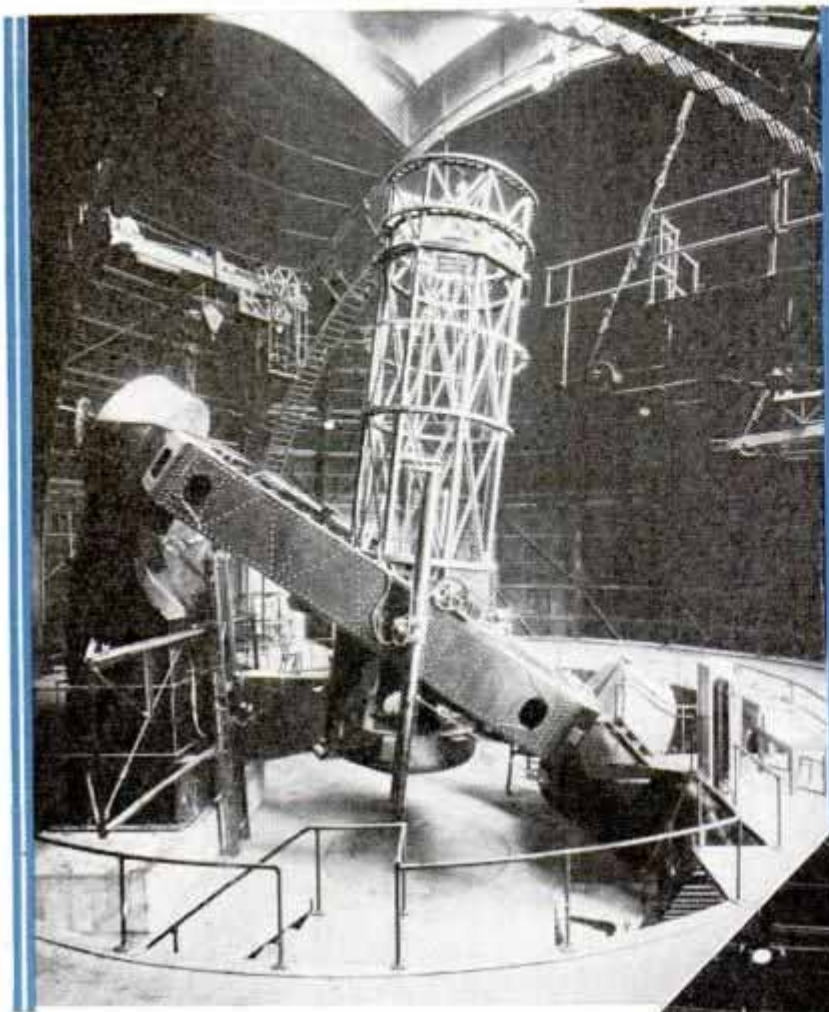
The mysterious thing about the lines is that they are almost exclusively great circle lines. It is inconceivable that such

geodetic tracks were not laid out by ruler and compass. If they are the work of compass and ruler, and a large number of astronomers believe they are, then the fascinating question arises, who laid them out and built them? They are colossal engineering works, far ahead of anything on earth. In fact, we have done nothing on our earth which would be visible were we to go to

Mars and set up our largest telescope. Lowell believed, and many others believe, that the canals are the work of intelligent beings. These canals, or whatever they are, must have a width of about thirty miles in order to be visible to us on earth. This width is made up of probably a water channel plus vegetation growing back from each bank of the channel, as would be natural. Possibly the banks are also the inhabited areas, as the oases are thought by some to be. It has been suggested that the lines are, in addition to being water channels, lines of communication and transportation. Nothing would be more natural, at least as we look at things.

It should be realized that while Mars, earth and all the other members of our

(Continued to page 124A)

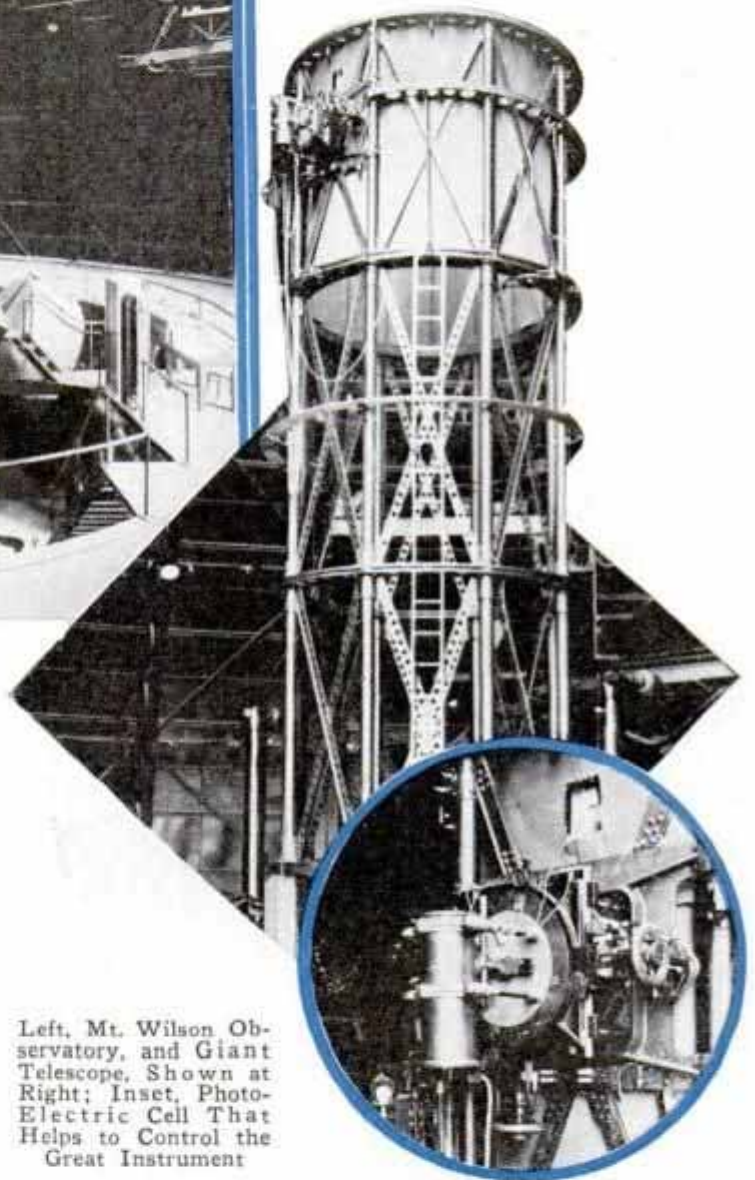


Some said that until the alleged lines could be photographed their existence could not be conceded. They forgot that the trained human eye is a tremendously sensitive discriminator of light values, that the lines are extremely faint and that the air of the earth causes them to tremble and shift back and forth. This assists the eye in detecting them but prevents the photographic plate from recording them.

As Lowell and others continued their observations and new canals and oases were added, it occurred to Lowell to construct a globe of Mars which would show everything known up to that date. He did this, the labor involved being tremendous. No object was admitted to the globe that had not been seen by at least three independent observers. Many of the objects had been seen and reported by over thirty independent observers. In fact, the markings on Mars became so established in astronomy that before the globe was entirely finished names had

been given to a great many of the features.

The Martian polar snow caps are shown on the globe in white. These caps are probably real snow, such as we have on earth. The dark areas are not oceans, as was at first thought. These dark areas, which come and go



Left, Mt. Wilson Observatory, and Giant Telescope, Shown at Right; Inset, Photo-Electric Cell That Helps to Control the Great Instrument

with the seasons, are vegetation. This vegetation begins to appear in the Martian spring in one hemisphere, while in the opposite hemisphere the fully developed vegetation begins to fade, just as occurs here on earth.

There is a terrible shortage of water on Mars, at least as we regard water supplies. It never rains on Mars any more, the nearest thing being a heavy dew which freezes at the poles and accumulates a

612 Stewart St. Seattle, Wash.

\$112.00 - \$595.00



Portable Gold Separator in Action; Increasing the Price of Gold Has Caused Thousands to Join the Rush to Mining Regions

GOLD SEPARATOR HANDLES ORE BY CENTRIFUGAL FORCE

Fast, efficient handling of gravel in gold placer mining is accomplished by a separator using centrifugal force. The machine is said to be capable of recovering ninety per cent of the values from gold-bearing ore. It is especially adapted to the use of individual miners, being simple to operate. The separator is demountable and may be packed on a mule's back.

MIRAGES USED IN MEASURING DISTANCES ACROSS WATER

Engineers of the Canadian government have used the mirage in measuring distances across large bodies of water. This new system of measurement is based on the fact that refraction over water is always greater at night and distances over water which are invisible in the daylight can be seen at night by the use of lights on the distant shore. In the Georgian bay district of Ontario some stations built for measurement purposes cannot be seen from other stations during the day, but at night strong electric lights make the stations visible. After four o'clock in the afternoon, the mirage makes possible better sight of the distant station and at night this becomes still better. Armed with figures on the refraction of light, the engineers are able to calculate the distances accurately.

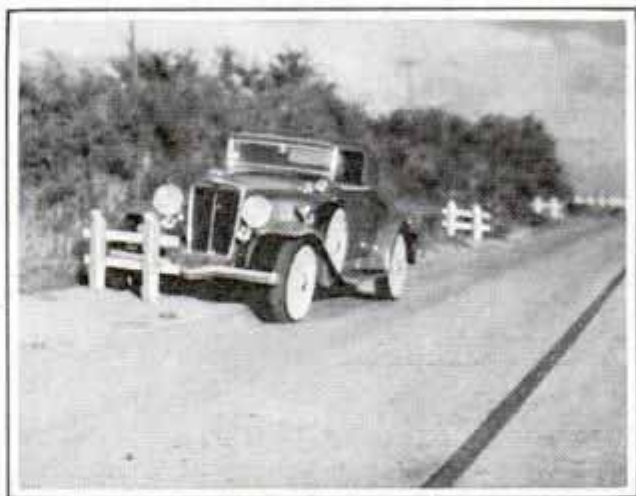
Com. Montagues

EARTH'S STEAM TO RUN TRAINS IN ITALY

Natural steam issuing from the ground will be used to run trains on a railroad between Rome and Florence, Italy. The steam will be converted into electrical energy for propelling the trains. In one section of Italy there is an area of 100 square miles under which steam is constantly being generated. By tapping these underground reservoirs with ten-inch drill holes and casing them, it has been found possible not only to increase the volume of steam but also to control its flow. One steam well is reported to deliver about 220,000 pounds of steam per hour at fifty-nine pounds pressure per square inch. This well, together with two others, will produce steam sufficient to provide 20,000 kilowatts of electrical energy.

BARRIERS ON ROAD SHOULDER KEEP CARS ON HIGHWAY

Serving to retard erosion and to keep automobiles from making ruts along paved highways which pass through grade cuts, spaced barriers have been erected on the



Auto Shown with Its Bumper against Barrier Erected to Protect the Road Shoulder

shoulder of roads in parts of Illinois. The barriers are spaced thirty to fifty feet, depending on the degrees of incline.

Com. Richard P. Kera 118 S. of Illinois St.

Modern 49er

26 Feb 1938

at Karamelle, Turcom

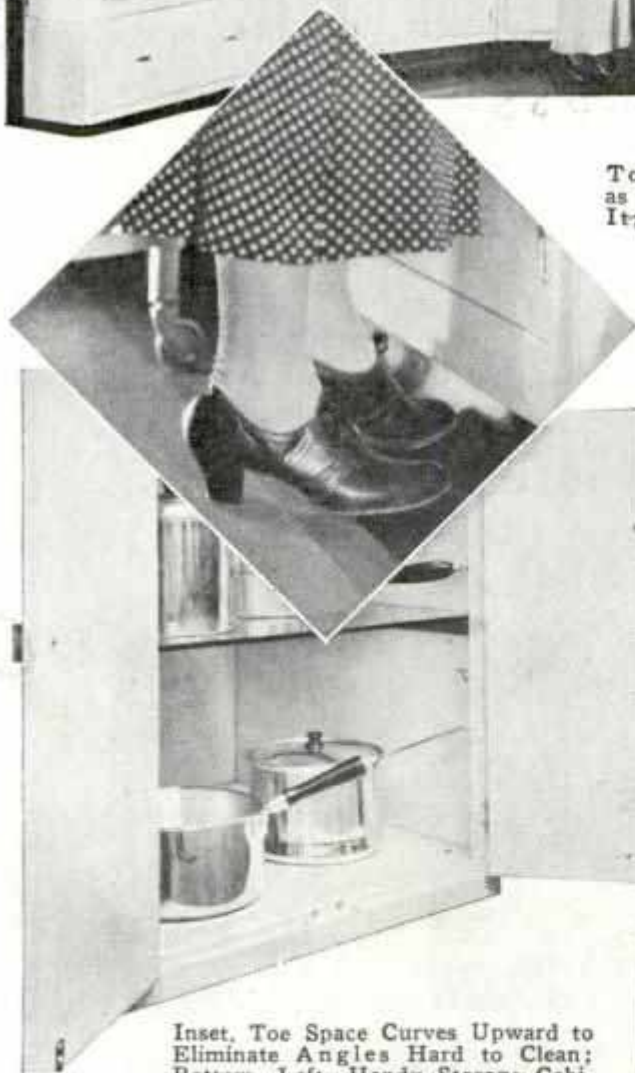
Q B. 6/1/38

Magazine Sept. 1933

Latest Conveniences Save Time in Kitchen



Top, "Ideal Kitchen" as Westinghouse Builds It; Note Convenient Arrangement



Inset, Toe Space Curves Upward to Eliminate Angles Hard to Clean; Bottom, Left, Handy Storage Cabinet; Bottom, Right, New Type of Electric Dishwasher Fits into Cupboard Space, Leaving Usable Surface on Top; Note Lighting Device beneath the Cabinet at the Housewife's Right Hand



SEA SHELLS CUT AND POLISHED FOR TOURIST TRADE



Artist Shown with Shells Which He Has Prepared for Tourist Trade in Distant Ports

Cutting and polishing sea shells for the market is an art that J. F. Heftrich, of San Francisco, has found profitable. After the shells are prepared for the tourist trade, they are shipped to Tahiti, Honolulu and other ports.

ODD OCCUPATIONS ARE LISTED UNDER RECOVERY ACT

Many strange occupations and unusual industries have been revealed by a list of applications for the Blue Eagle of the national recovery act. For instance, "viscose extrusion" and "transparent materials converters" appear under the same classification with the drinking straw, newsprint and soda-pulp industries. The box-toe, pasted-shoe-shank, leather-board, stitch-down shoe and theatrical-dance footgear industries are divisions of the shoe business. The hog-ring maker's industry mingles with those turning out lead-head nails, corset steel, ring travelers, steel posture chairs, kalamein, ash cans, and chucks. Even the preparation of anti-hog cholera serum is a business. Among the miscellaneous industries are: hotels, clubs and theaters, punchboard makers, burial insurance societies, cemeteries, chiroprac-

tors, artificial flower and feather makers, producers of dog foods, pencil slats, curled hair, lava products, covered buttons, tackle blocks, smoking pipes, cement guns, venetian blinds and hardwood crutches.

MYSTERIOUS GAS IN SUN'S HALO IDENTIFIED AS OXYGEN

That mysterious element to which the major radiation from the sun's halo or corona has been attributed is nothing more than oxygen. Dr. D. H. Menzel of Harvard observatory, and Dr. J. C. Boyce, of Massachusetts Institute of Technology, have identified three of the strongest lines in the corona with neutral oxygen atoms in the high solar atmosphere. These atoms appear to be in very peculiar states of excitation. Careful checking of the "flags" flown by the elements in spectrum photographs made possible this latest discovery. These flags are lines that appear when light is dispersed by a prism.

METAL POINTS ON CAR BUMPER KEEP OFF RIDERS

Pointed metal attachments for the automobile bumper are available to discourage riders from sitting on the bumper. Not only does it prevent damage to the bumper, but it keeps children from riding in a dangerous position, feet out in the path of oncoming vehicles. The attachment may be installed quickly.



Sharp-Pointed Device for Keeping Hitch-Riders Off Bumpers; Enlarged on White Strip

Washington D.C.

608

Biographic News Bulletin
Industrial Logography
Safety with the
Lead Pen
130. a

C1657

Cambridge

Science Service 10/25/23

C1555

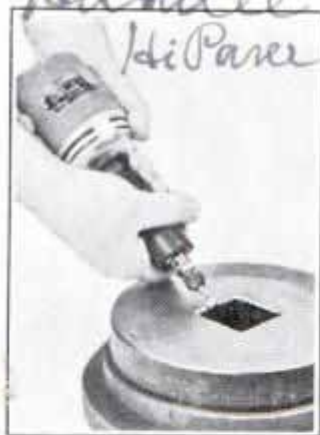
Ashorn Bros. Safely
Co. Frisco, Bldg.

"BOTTLED" GAS FOR HOME PRODUCED CHEAPLY

In the production of synthetic benzine, a German chemical concern has obtained a gas by-product which, it is claimed, can be used for fuel and illuminating purposes. This gas is "bottled" in steel cylinders, one of which would last an ordinary household for one to three months, and render it independent of gas companies. The fuel is called propan gas and is free from carbonic oxide. In Argentina plans are being made to supply a synthetic gas in liquid form in tubes where natural gas is not available. This fuel is likewise a by-product of making a chemical substance, and it is claimed it is less expensive than other forms of fuel now in use there.

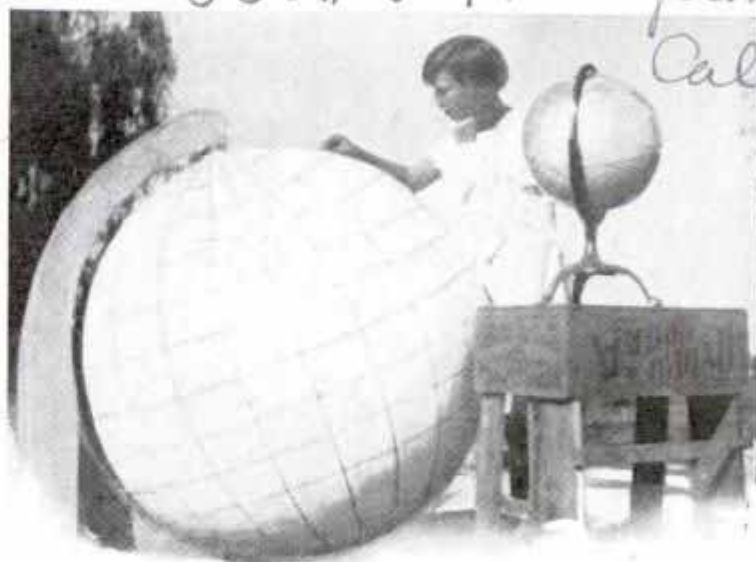
SMALL POWER GRINDER DOES WORK IN CLOSE QUARTERS

Sharpening, grinding and polishing operations, particularly in close quarters, are accomplished easily and quickly with a high-speed, portable electric grinder which works at any angle so it can be operated in irregular-shaped holes or around corners. It weighs three pounds and comes equipped with three grinding wheels although scores of shapes and sizes are available. The tool has a maximum speed of 17,000 revolutions per minute and the universal motor can be plugged in on either alternating or direct current. Dust-sealed ball bearings reduce friction, eliminate over-heating and assure maximum power delivery. It grinds irregular as well as plane surfaces and can be used wherever current is available.



Chicago Wheel & Tool Co.

Rubber-soled football shoes are said to offer a surer footing on frozen fields than leather-cleated shoes.



Maps May Be Drawn in Crayon on Large Concrete Globe from Small Atlas; Note Lines Denoting Meridians and Parallels

CONCRETE GLOBE FOR SCHOOLS USED AS MAP BLACKBOARD

Students learn geography more easily by means of a large concrete globe on which maps may be drawn in crayon. After the lesson, the map can be erased. The globe is three and one-half feet in diameter and ten and one-half feet in circumference. The concrete shell is one inch thick. Weighing about 300 pounds, the globe may be turned easily upon its concrete pedestal. Meridian and parallel lines in contrasting colors enable the student to draw accurate maps.

CONSTANT-FEED OILER SAVES LUBRICANT AND BEARINGS

Adjustable for one drop of oil per minute, or more or less as desired, a new industrial oiler with constant feed saves lubricant and the bearings. It does not permit overfeeding and subsequent waste of oil, nor does it restrict the oil flow and cause bearings to burn out. The oil capacity is sufficient for ten hours. To prevent metallic dust from contaminating the oil, the reservoir is



practically sealed. Air vents in the reservoir insure a consistent gravity feed.

U.S. State Oil Thrifts

propan gas

Mr. W. J. Hadley, 1051 20th St, Livingston, Calif

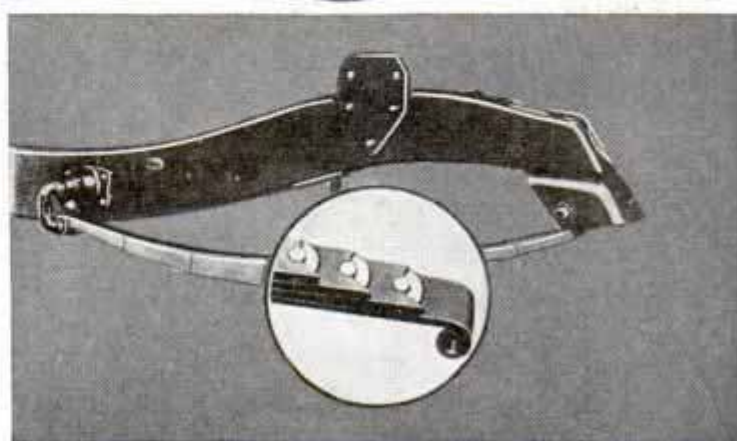
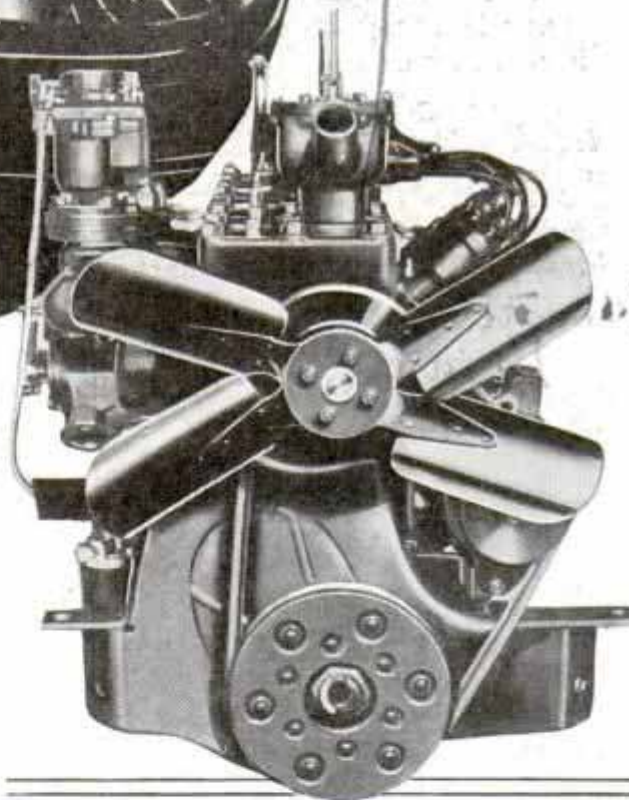
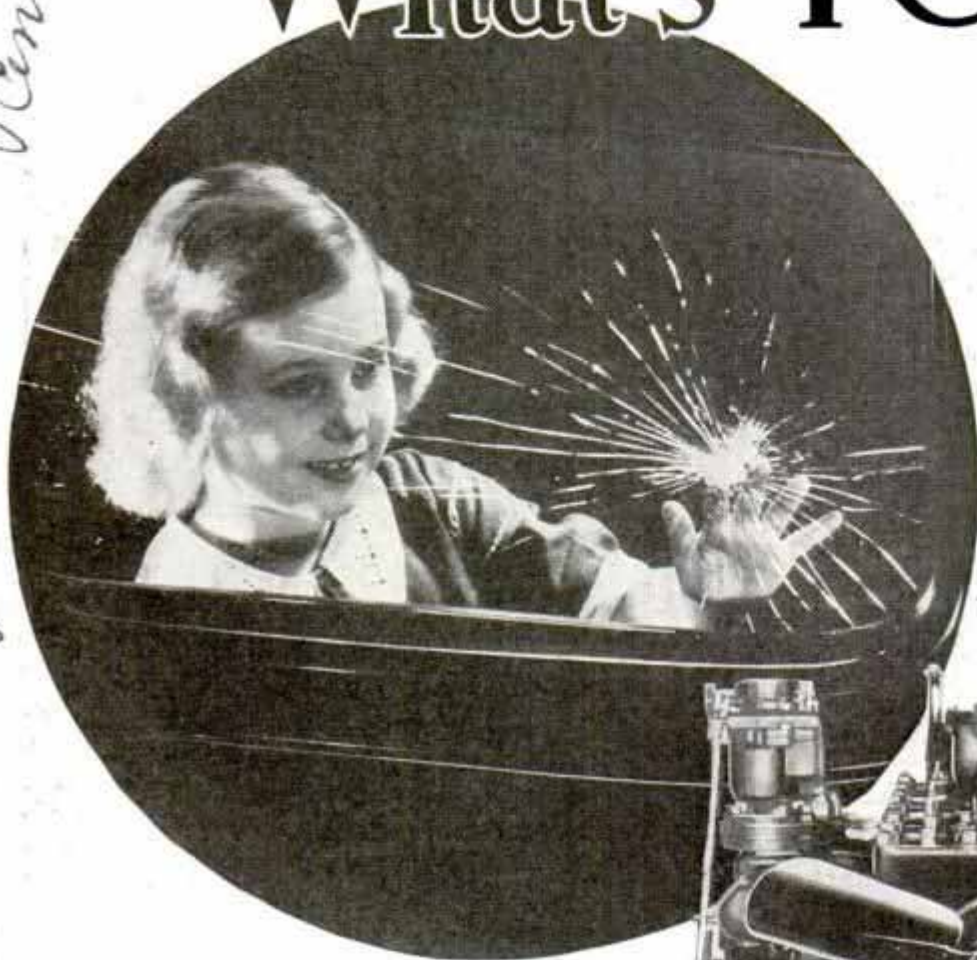
C1522

C1454

are electric, much

What's YOUR

Top, Safety Glass Would Be One Feature of the Ideal Automobile; Center, X-Type Fan Used on the Chrysler to Eliminate Noise, Another Step in the Engineers' Advance toward an Efficient, Quiet Motor; Bottom, Oilite Springs with Inserts Shown in Inset; These Three Things Are Regarded as Valuable Contributions to the Future Car



By FREDERICK C. RUSSELL

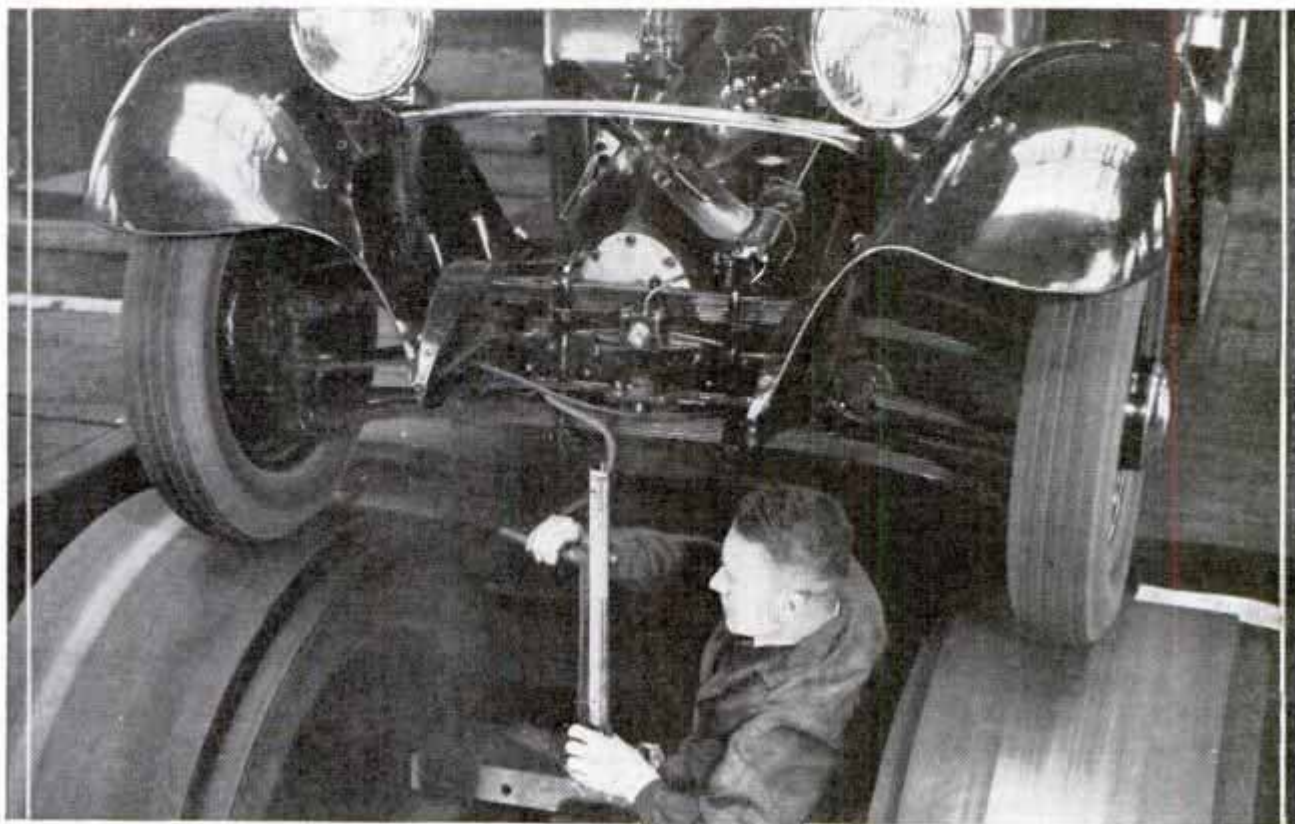
YOU'VE never seen a car like it. Under the hood is a supercharged motor. Its steel body is mounted on an A-X frame and is equipped with a ventilating system and non-shatterable glass. Cooling of the floating power motor is by air alone. For good measure it offers an automatic clutch and a self-shifting transmission. It has no axles to carry vibration to the frame and needs greasing only about once a year.

Probably you never will see a car like it, but one can't be too sure, because in time the average car tends to become a composite of the best features of the individual cars of yesterday. In 1900 the Columbia had the distinction of being the only American car with a front-mounted power plant. Mercedes, Olds and Packard first offered automatic spark advance. Pierce-Arrow pioneered pressure lubrication for the engine in 1904, while in 1908 Ford introduced left-hand steering. In 1921 Duesenberg was a curiosity because

115 W albridge Road, Hartford Conn

Oilite springs

Ideal of a CAR?



Testing German Springing System with Advantages of Both Rigid and Oscillating Axles

Copyright, Paul Popper, Berlin

of its four-wheel brakes, while as late as 1926 Stutz presented safety glass.

These desirable features today are common to all cars. What, then, are the features of today's cars that could be assembled into an ideal creation?

There is no car with the Chrysler automatic clutch, Reo self-shifter and Auburn

dual ratio in combination, but there would be no engineering problem in combining the three ideas. For good measure we might add the oil-cushion clutch of the Essex Terraplane, the banjo-type rear frame of the Graham and the double-cantilever rear springs of the Continental.

Because everyone's idea of an ideal car differs, the greatest difficulty in assembling this perfect vehicle is our own view of the situation. There is the belief that we may expect to see a blend of the hydraulic and mechanical principles in braking. In any event we will want to add the "mechanical foot" as sponsored by Pierce-Arrow or the vacuum booster featured on the Studebaker line. The foot brake pedal will give way to a mere treadle with which the driver brings into action the power needed to actuate the braking system. Clutch pedal and free-wheeling unit will be done away with in this ideal car. Automatic coasting will be by means of declutching. A button would keep the clutch from disengaging when it is desired to hold the car back



Power Booster Brakes Would Make the Ideal Automobile Safer

Sundis Products Corp.

*Essex Terraplane
Hudson Junior Car Co. 12601 E. Jefferson*

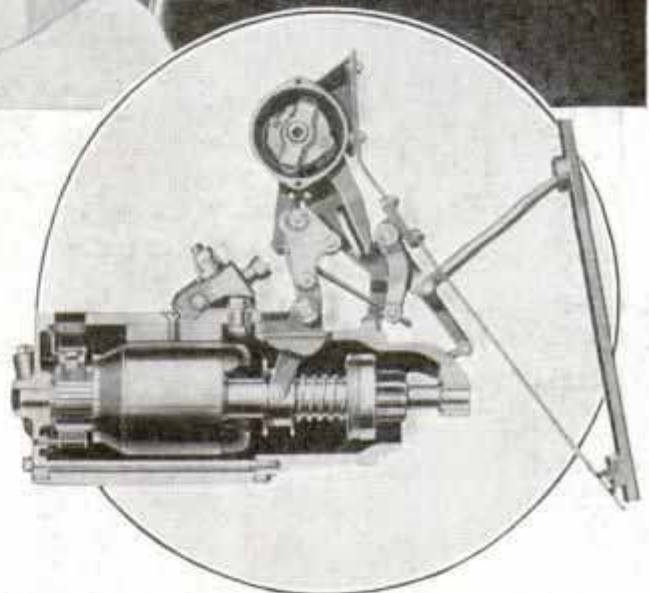


with the aid of motor and second gear when descending a steep hill.

Considering the fact that our ideal vehicle would spend most of its time traversing streets in fair to middling repair, or in dashing over highways that have been patched, we would be justified in selecting air wheels as a necessary part of the scheme. We could not afford to overlook Hupmobile's side-sway eliminator. If we did not have Marmon's selective ride control, the alternative would be thermostatically controlled shock absorbers as on Stutz or Willys.

An idea of how outstanding features can be combined is offered by a close-up of the ideal motor. A V-12 arrangement would enable us to feature the one-piece casting for the two blocks as now offered in the Ford V-8. We would use as much aluminum as possible, as in the Marmon sixteen motor, and the separate heads would be the alloy so successfully used by Graham and Ford. One of our combinations would be to effect such a clever combination of motor specifications as to obtain the result achieved in the case of the Pontiac straight-eight motor, where only fifty per cent of the motive power is being tapped when the car is running sixty miles per hour.

If we incorporate the Franklin's contribution, this hypothetical motor would feature direct air cooling. All cooling of mo-



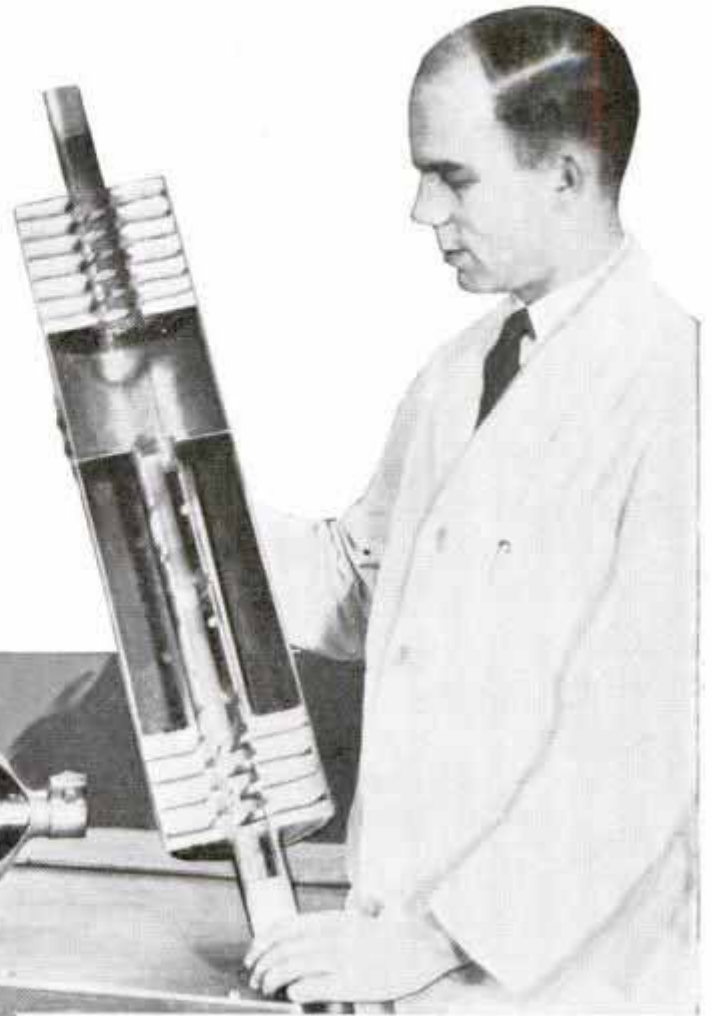
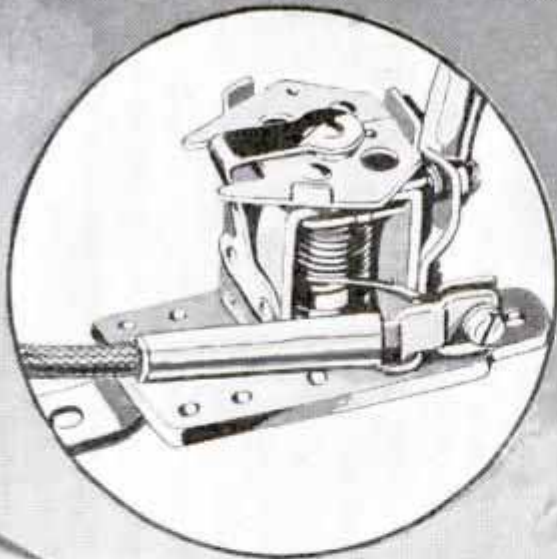
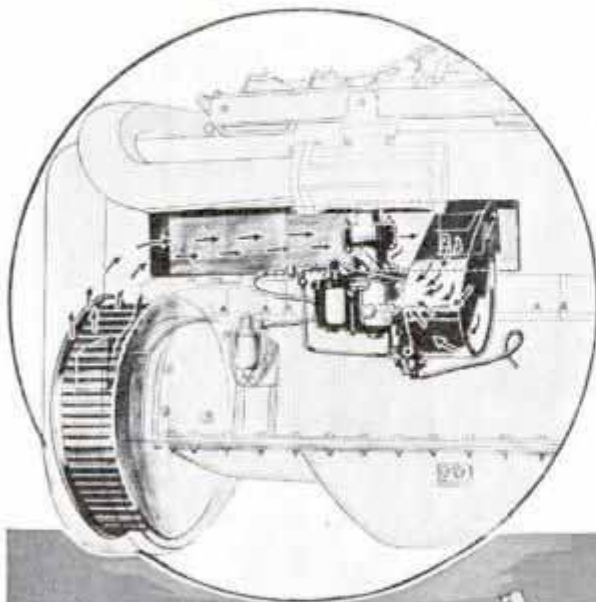
Top, Drawing of Hudson's Built-In Radio; Bottom, Coincidental Starter with Starterator

Not Stutz *Cherrol*
tors is by air, the process being merely indirect where water jackets and a radiator are provided. This would hold true even if the much talked of "closed-radiation" system were adopted. By eliminating the filler cap and the overflow pipe it would be possible to use ethylene glycol or some similar chemical in the cooling system all year round, the motor running cooler in summer and being fully protected in winter. But the system still would be dependent for its success on the volume of air blowing through the radiator and over the motor block. One advantage in using a blower would be that we could add modified supercharging.

To protect and lengthen the life of our ideal motor it would be advisable to add such efficiency accessories as down-draft

and down draft

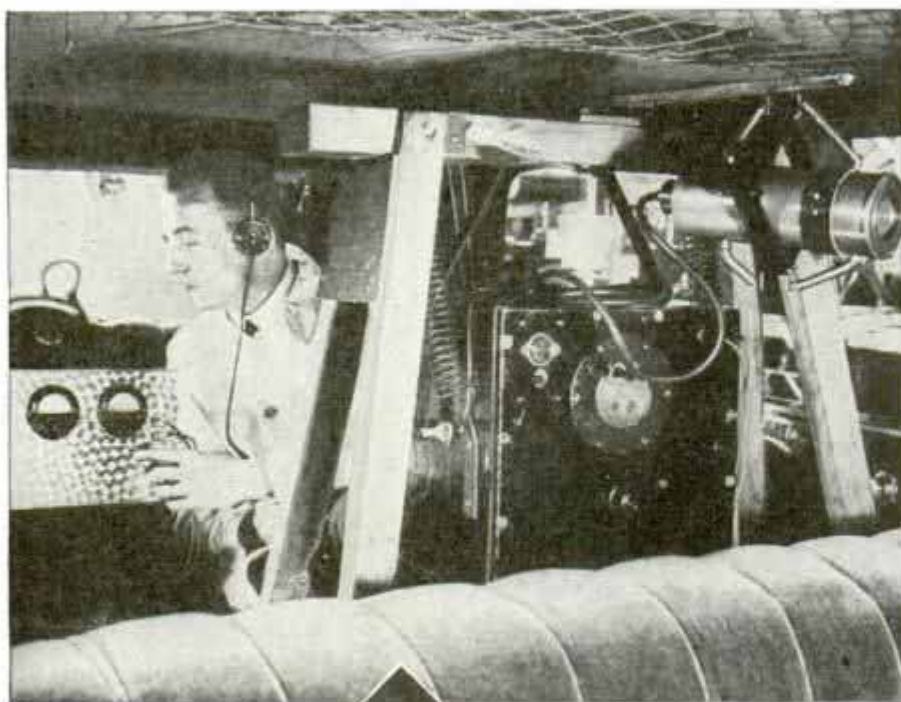
Circle, Blower and Air-Cooling System; Right, Scientist Holding Modern Exhaust Silencer; Center, Circuit Breaker Eliminates Fuses; Bottom, Studebaker's Universals



Copyright, Paul Popper, Berlin

carburetion and a combined air cleaner, silencer and backfire trap. Next we would equip it with a special oil radiator such as one finds on Stutz, Buick, Packard and Hupmobile. Having no water in our special motor, however, it would be necessary to revise the oil-cooling process somewhat. At any rate we would add the essential feature: by-passing the oil so that we can control its temperature.

A note of simplicity would be the use of hydraulic valve tappets as on Cadillac and Packard 12's. Tappet clearances would thus adjust themselves in accordance with temperature changes. In view of the fact that Buick and Chevrolet have gone all these years featuring valve-in-head design, our motor would offer this particular detail. But we would borrow a line from Duesenberg and Stutz by using overhead camshafts. We might possibly use four valves per cylinder in which case we would have a pair of overhead camshafts for each block. Nash's twin ignition and Packard's twin coils would be used, while a number of thermostats would control



engine and carburetor functions. All choking would be automatic. Starting would be by means of the DeSoto coincidental starter or Chevrolet's starterator.

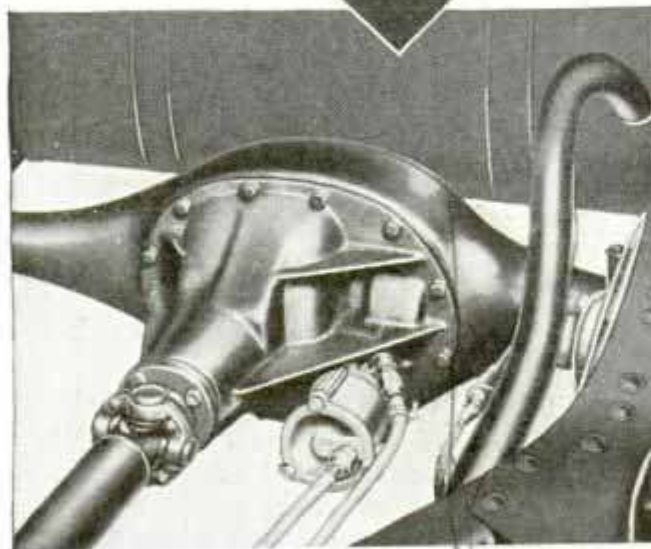
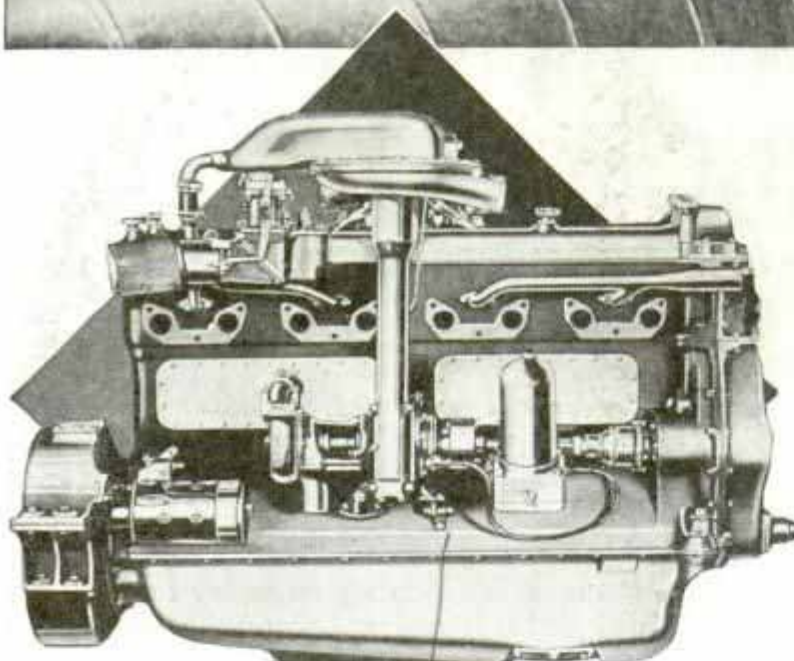
Even if we decided to combine Franklin Olympic's air cooling with fluid cooling, the use of overhead camshafts would provide a means of adopting beltless fans. And we could also use a brace of water pumps. The trend of today being decidedly in the direction of higher compression our motor would be at least six-to-one ratio and would

therefore run at a more efficiently high temperature.

It would be well to place the electrical features as far away from the fuel system as possible. Graham divorces the two so that each occupies a separate side of the motor, affording excellent fire protection. From Lincoln we would borrow the rear-mounted distributor. From Franklin we would annex the practical idea of a crankcase holding ten quarts of oil, or even more.

The entire motor would be a study in floating power, a la Chrysler. It would have Hudson's unique crankcase ventilation and to keep down carbon deposits and to free the piston rings from gums, it would carry a Remo—that handy device offered by Oldsmobile.

Starting with a motor like this it would be fitting that the transmission of power to the gearset should be by means of an oil-cushion clutch such as one finds on Essex Terraplane. A choice would have to be made from several types of transmissions, but it would be worth while to try for a combination of Chrysler's multi-range gearset with Reo automatic shifter and the Dodge all-quiet transmission. Behind this would come Studebaker's roller-bearing universal joints. Rear drive would be either hypoid or Nash's underslung worm drive. Worked in here somewhere



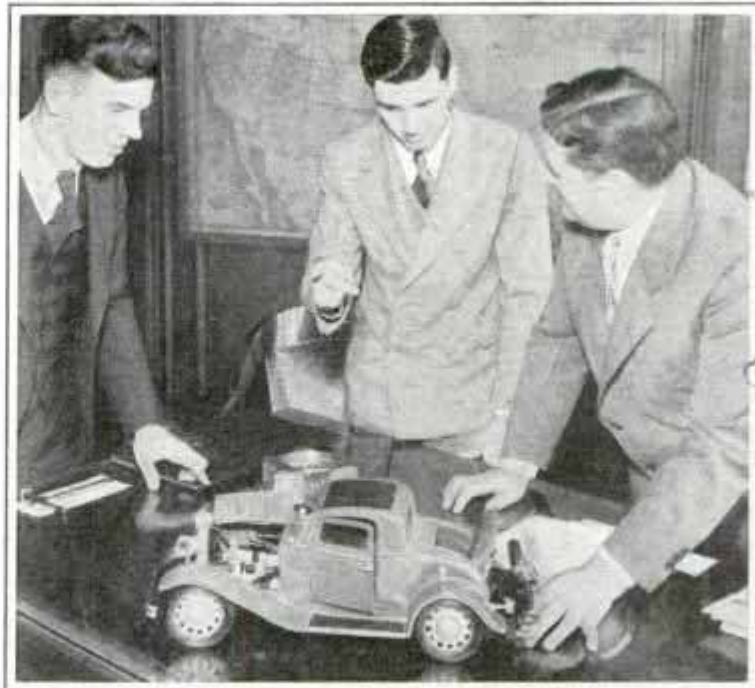
Top, Measuring Car Noises; Center, DeSoto Engine with Supercharger; Bottom, Dual Ratio Unit

Quiburn

POSTMASTER APPOINTED FOR SOUTH POLE

Establishment of a post office at Little America, in the Antarctic regions, has been announced by the United States post office department. Dr. John Oliver La Gorce, vice president of the National Geographic society, has been appointed postmaster of the world's southernmost "settlement." This unique post office is a part of the second Byrd expedition to the Antarctic, led by Admiral Richard E. Byrd, on a two-year stay in the area of the South Pole. A special three-cent stamp has been issued by the government in honor of the expedition and more than 35,000 letters were mailed on the Byrd vessel far in advance of the sailing date. A charge of fifty-three cents is made for each letter to meet the expense of transporting mail to and from the South Pole.

C7614



Accurate in All Details, This Model Auto Even Has Windows That May Be Rolled Up and Down; Note Tiny Motor

EXACT MODEL OF MODERN CAR WINS BUILDERS A JOB

Complete in all details, even to the required number of leaves in its springs, a scale model of a Dodge coupe has been constructed by two Chicago youths. The chassis, built of metal, has the Dodge bridge-type frame, while the engine has been reproduced faithfully, with floating power mountings, generator, starter, horn, spark plugs, ignition wires, oil leads, carburetor and other power-plant features. The body is metal, hand-formed and welded into a single unit. Doors are complete with latches, locks and dovetails. Steering connections are duplicates of those in the full-size automobile. Body interior and rumble seat are upholstered. The instrument board is a perfect miniature of the original. So exactly was the model constructed that K. T. Keller, president of Dodge, offered the young craftsmen positions in the company's tool department.

*Alcesar and Michael
Karlson are the boys
1357*

SCOREBOARD ON NEWSSTAND ATTRACTS BUSINESS

By installing a scoreboard on his stand, one enterprising newsboy has increased his business materially. Persons who are not regular customers stop to examine

C1574



Attracted by Scoreboard, the Customer's Eye Is Drawn to Newspaper on the Stand

the scoreboard and often purchase a magazine or newspaper before leaving. The board is small enough to draw spectators within buying distance of the stand.

EXTRACT FROM WHALE MEAT USED IN MAKING SOUP

Whale-meat extract promises to come on the market in Norway as the result of a new process for making extract for soups and other uses. The extract is taken from whale meat brought in by the Norwegian whaling fleet. Its cost of production is said to be three cents per pound.

C1616

*Carl H. de Mark Palmer
412 2nd St. St. Paul*

Developed by Dr. A. J. Norvegian

*Alcesar and Michael
Karlson are the boys
10/17/33*

Planes 'Destroy' New York in a Mock Attack



Flares Represented Enemy Bombs in Recent Night Aerial Maneuvers at New York; Photo Shows "Bombs" Being Dropped on the City by Attacking Planes; Use of Flares Made Scoring of Hits Possible

Theoretically, New York City was "destroyed" by an air attack a few weeks ago by twenty-seven army planes which "bombed" the city while the residents were at dinner. The mock attack was preliminary to an air pageant and the attackers used flares instead of bombs to score their hits. The flares were dropped from a height of 3,000 feet.

an enameled interior reflecting only definite wavelengths of light not detrimental to the use of the instrument.

c/1540
METER SCORES BRIDGE GAMES FOR CONTRACT PLAYERS

All possible contract bridge scores may be shown, one at a time, by a new automatic device. It shows first what was bid and whether vulnerable or not vulnerable and finally, the exact result in points above and below the "line" after the play when the number of tricks taken has been recorded. The scoring meter shows automatically correct small values where six or seven is bid and made, recording the score when vulnerable or not vulnerable.



1587
MICROSCOPE OF SUPERPOWER HAS SHOCK ABSORBERS

Science news letter 10/19/33
 Capable of highest precision at magnifications of 5,000 times, a new microscope is constructed rigidly to eliminate vibration. Three long benches mounted on wheels support the apparatus, which has plenty of shock absorbers to dampen vibration. Absolutely pure monochromatic light, rugged and accurate focusing mechanism and suppression of distracting noise from the spark gap are among refinements in the microscope. The equipment is installed in a light-tight laboratory having

at Roosevelt Field New York City
ac
463 W. 11th St. New York
1587
Lawyer, J. Lucas

4461 W. 11th St. New York
Robert Don S. Hastings

Robert J. Hastings

10/14/33

CHILD'S SLEEP PERIOD VARIES WITH CHANGES IN WEATHER

Weather affects the length of time that children sleep, naps being noticeably longer on rainy days. Tests conducted by Miss Eunice Pierce, of the Cleveland Child Health association, showed that boys tend to sleep longer than girls. Nap lengths drop tremendously on the first day of severe weather change, either hot or cold, but the sleep goes back to normal if the extreme cold or heat lasts for more than one day. Sleep falls off markedly before an illness. Miss Pierce also found that two and three-year olds do not sleep longer as an average than the four and five-year old children.

in American Journal of Public Health

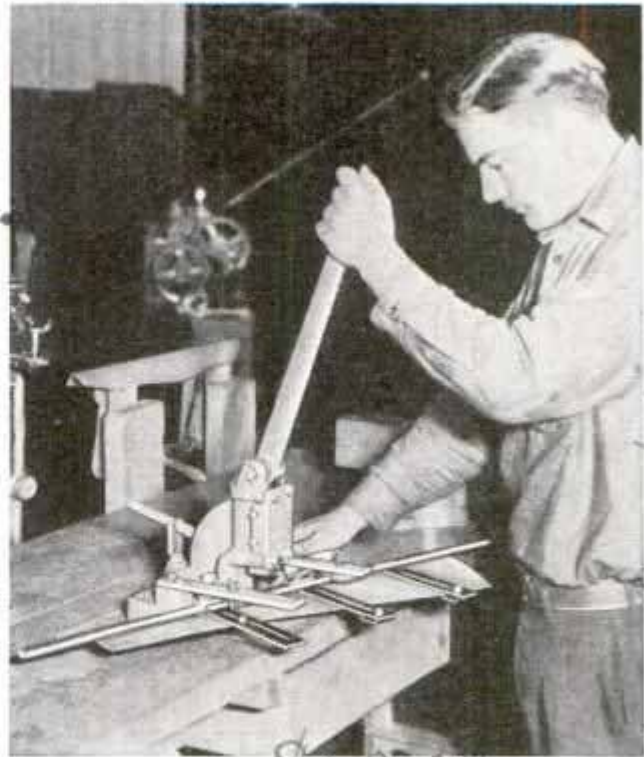
BACKYARD OF OLD MINT MINED TO RECOVER GOLD DUST

Tiny flakes of gold lost in floor sweepings, ashes from the furnaces and broken graphite crucibles are being recovered from the backyard of the old mint at Carson City, Nev. In melting the gold when the mint was in operation, the crucibles sometimes would break and the gold would be spilled into the ashes. Not often were government employes able to recover this gold and the ashes were dumped into the yard. The broken crucibles, carrying small amounts of gold in their pores, were also discarded. By grinding down the crucibles with an emery wheel, the miners recover the gold from the powder. A sluice box is used in the process.



Backyard of Old Carson City Mint Where Mining Operations Are Being Carried on to Recover Gold Lost in Sweepings

Work done by



How New Teeth Are Cut in Old Saw by Latest Machine; It Takes Only Three Minutes

RE-TOOTHER FOR HAND SAWS IS RAPID AND ACCURATE

All kinds of hand saws can be re-toothed rapidly and accurately with a small machine which treats a twenty-six inch saw in three minutes. It is not necessary to grind or shear off old teeth because the new ones are punched over them. Each tooth is uniform and any number of points from four to sixteen per inch can be cut. Ten saw carriers, equipped with graduated bars, are available, each bar punching two different number of points per inch. It is simple to operate since there are no complicated adjustments, and the feed pawl which moves the saw works on the graduated bar, thus insuring uniformity automatically. The punch and die for cutting teeth are of hardened tool steel and the punch can be resharpened by grinding. After the new teeth are cut, it takes only a few minutes to put a cutting edge on a cross-cut or rip saw with an automatic saw filer.

Forty years ago, there were only four automobiles in the United States.

See me Newsletter

My Co. chie. H. H. G. 15 Main St. Minn. mechanical

Foley

10/14/33

Feather ch...
202 Michigan
Sept 1934 Chicago

X-RAYS MAKE WATER DEADLY TO SOME PROTOZOA

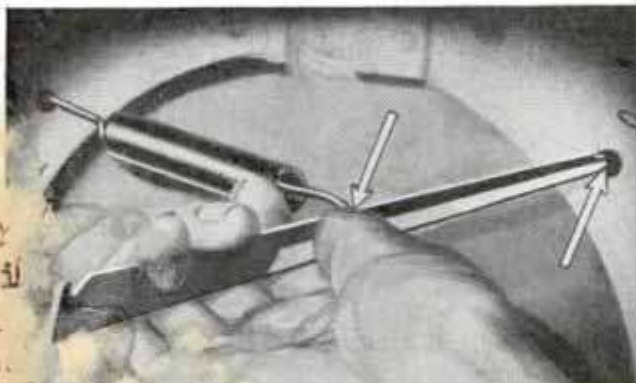
X-rays played upon water or nutrient fluids make them deadly to protozoa by producing very small quantities of hydrogen peroxide. Dr. C. V. Taylor, J. O. Thomas and M. G. Brown, of Stanford University, conducted experiments recently which indicated that the addition of one part of hydrogen peroxide to 450,000 parts of water rendered it toxic to the protozoa. However, X-ray treatment of highly purified water did not have the same effect, due possibly to the fact that all possible traces of dissolved oxygen had been extracted, thereby blocking formation of the poison. The experimenters regard the production of hydrogen peroxide by X-ray action as of considerable significance in the known deadliness of X-rays to protozoa and other types of cells.

Stanford U.C., Calif.

SIMPLE TOOL FOR BRAKE DRUM REPLACES COIL SPRING

Replacing coil springs in automobile brake drums is simplified by an inexpensive tool. Essentially, it is a strip of channel iron about twelve inches long. Each end is especially designed for the work it does. In use, the tapered end is placed in one of

C1507



Coil Spring Is Replaced on Brake Drum by Means of Tool Shaped Like a Channel Iron

the spring holes on the brake-drum frame. One end of the coil spring is placed in the opposite hole on the second half of the frame, with the other end of the spring in the channel of the tool. Pulling the larger end of the tool stretches the spring so that it slides down the channel and into its proper place.

Bonny Forge



Converting Old Rubber Tires into Useful Mats

see ad 117-a

WORN TIRES MADE INTO MATS PROVIDE SURE FOOTING

Old automobile tires can be converted into rubber mats having a variety of uses with the aid of two small hand-operated machines and some galvanized wire for a base. The mats are suitable for use on doorsteps, in bathrooms, behind counters or anywhere else where a sure footing is needed. A cutter slices the tires into strips and a punching machine with an interchangeable double punch measures and perforates the strips at regular intervals. It also shapes the ends of the strips and in addition makes the spacing washers. The two machines weigh less than seventy-five pounds and can be operated in a small space, or even from the rear of a truck. An old tire makes from two to three door mats and from fifteen to twenty-five square feet of matting can be turned out by one man in a day.

Handwritten notes on the right side of the page, including 'Schumacher', 'F. Schumacher', and 'F. Schumacher'.

HEATED SEEDS GROW FREAKS IN PLANT EXPERIMENTS

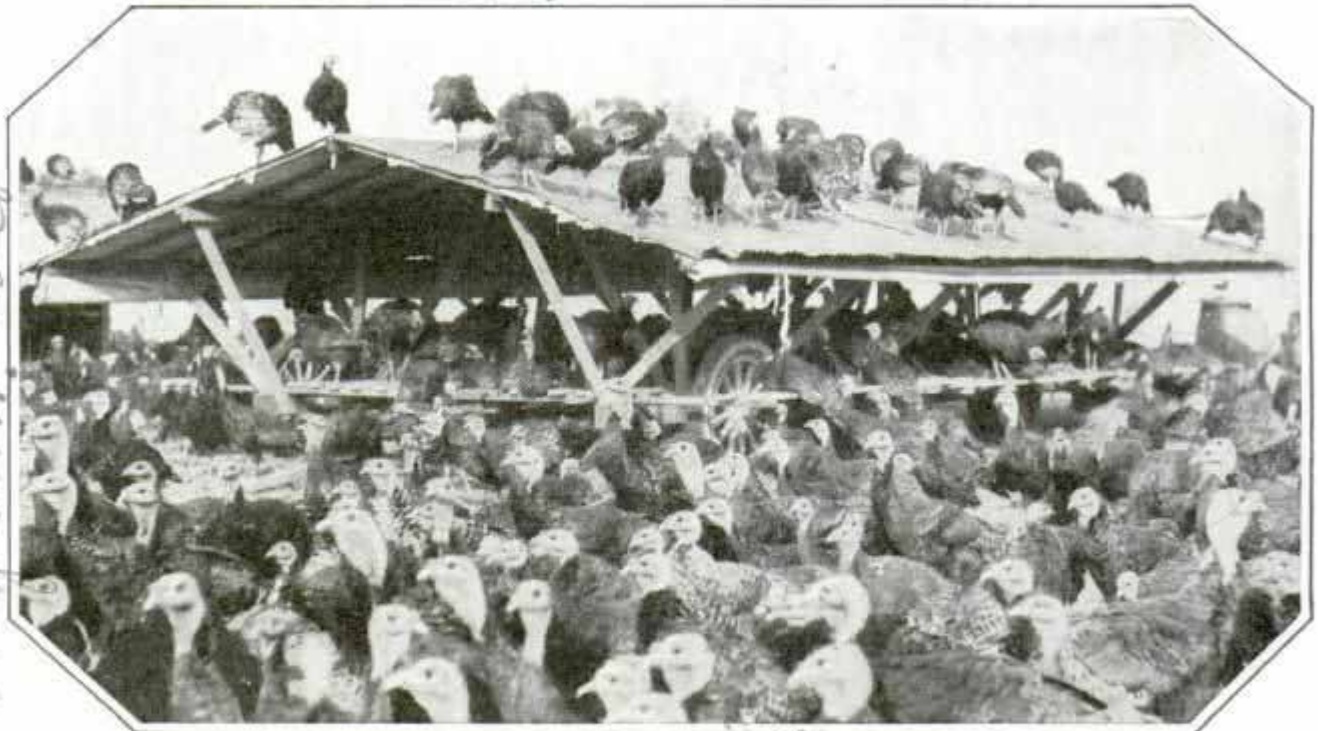
Freaks of plant life are produced by seeds which have been exposed to high temperatures over prolonged periods. Prof. M. Navashin and P. Shkvarnikov, of the Timirjazyev Biological Institute of Moscow, subjected seeds in a closed bottle to a temperature of 131 degrees Fahrenheit for twenty days and then permitted germination. Most of the seedlings produced were abnormal, the development of both roots and leaves being affected.

C1560

Handwritten notes on the bottom right, including 'described in nature' and '10/10/31'.

Farm, Longmont Colo

At the University of Nebraska - Farm Longmont, Colo



Shed Mounted on Wagon Wheels Serves as Roost on Turkey Farm; by Moving the Roost from One Place to Another Frequently, the Farmer Keeps His Flock Healthier; Permanent Roosts Subject the Birds to Disease

PORTABLE ROOST FOR TURKEYS KEEPS THEM HEALTHY

Mounted on four wagon wheels, a portable roost for turkeys is helping keep a flock of Colorado birds healthy. The roost is moved frequently to prevent disease. It may be pulled from one place to another by truck or horses. The frame is constructed of two-by-four boards, with a top, similar to an open shed.

NUMBER RECORDER FOR PHONE SHOWS CALLS MADE

All telephone calls are counted and the numbers are recorded on a roll of paper by a number recorder which is used in Germany with the dial-type of instrument. The telephone user who equips his instrument with this device thus has a complete record of every number called during any period of time. A disk on the recorder fits over the dial on the telephone. This disk has finger holes corresponding to those on the selector, and the telephone instrument is screwed tight to the call recorder so it is impossible to



move the selector disk without also moving the recorder disk. When the latter is turned, it automatically registers the number called on paper moving underneath.

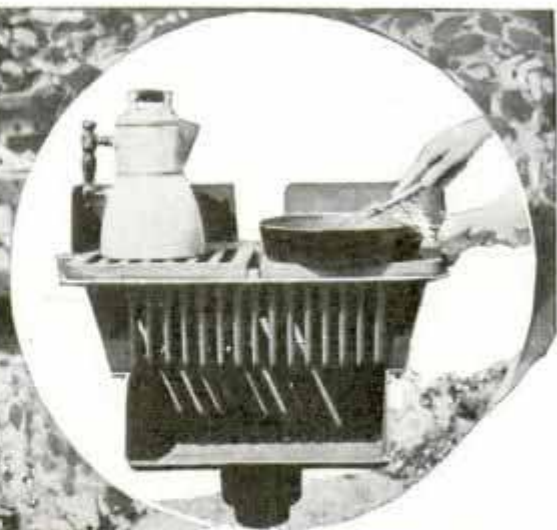
HEAVY WATER KILLS GUPPIES TADPOLES AND WORMS

Valued at \$150 per gram, or \$600 per teaspoonful, the recently discovered "heavy" water is being produced in small quantities, a thimbleful every two days, at Princeton's Frick Chemical laboratory. Heavy water contains twice as much hydrogen, by weight, as ordinary water. It has been found deadly to guppy fish, green frog tadpoles and worms. The tadpoles survived only one hour. Prof. Earle E. Caley has demonstrated that the heavy water has a smaller capacity for dissolving salts than ordinary water. Tests are being made to ascertain its effect upon acids. One part of heavy water is found in every 5,000 parts of ordinary Princeton rain water. Twelve hundred gallons of ordinary water are treated in order to produce three ounces of the heavier product.

Names and addresses of manufacturers and dealers in articles described in this magazine will be furnished by our Bureau of Information upon receipt of a stamped, self-addressed envelope.

At the University of Nebraska - Farm Longmont, Colo

Princeton, N.J.

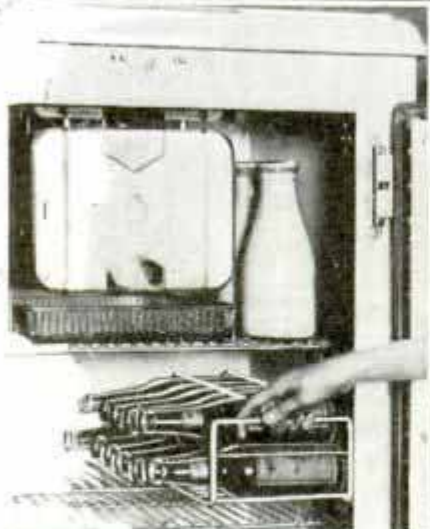


NEW For YOUR

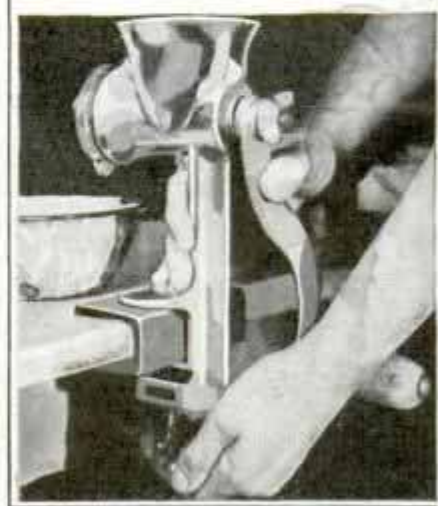
Top, Two Views of Revolving Camp Grill Which Is Turned Toward Wind to Start Fire; After Flame Is Going, Grill Is Turned Away from Wind to Reduce Draft; Grill Is Pivoted on Iron Pipe Inserted into the Ground



Above, Two Views of Double-Cup Utensil for Separating Egg Yolk from the White or Opening Cooked Egg for Eating; Below, Right, Rubber Guard Protects Table Edges from Damage When Food Grinder Is Attached

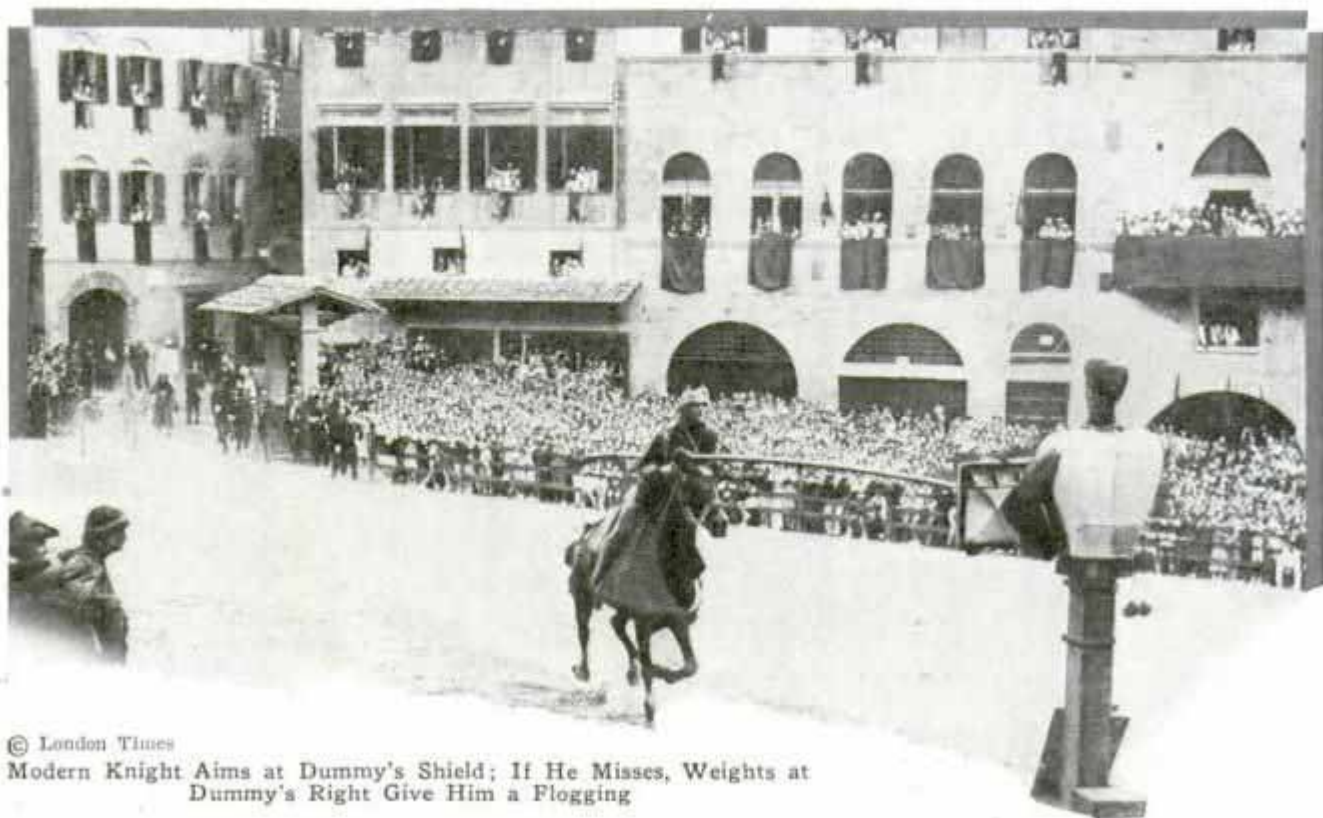


Above, Wire Rack for Refrigerator Holds Bottles Firmly; Right, Garbage Can with Waxed Lining Sack for Clean Removal of Contents; Can Swings under Sink When Not in Use; It Has an Airtight Cover



C1579.

Dummy Flogs Modern Knight Missing Target



© London Times
 Modern Knight Aims at Dummy's Shield; If He Misses, Weights at Dummy's Right Give Him a Flogging

In Italy today modern knights garbed in medieval armor participate in jousts as a part of the government's program to cultivate a high standard of physical training and revive traditional customs and folk arts. At Arezzo, a picturesque Italian town, a knight gallops toward a dummy which wears a shield on its left arm and holds a weighted rope in its right hand. If the knight fails to strike the exact center of the dummy's shield with his lance, springs and weights are set in motion and the dummy belabors the knight with the rope as he passes. In olden days, the

knight who failed in such an encounter forfeited his life. In a modified form of the sport, a straw man was suspended in the air with a full bucket of water under his feet and a ring in the outer bottom of the bucket. Boys mounted on hand trucks pulled by other boys attempted to pass a cane through the ring as they went under the bucket and failure meant a ducking. The government, however, decided this was not exciting enough and did not comply with the high standard of physical training and skill required, so the jousting with horses was substituted.

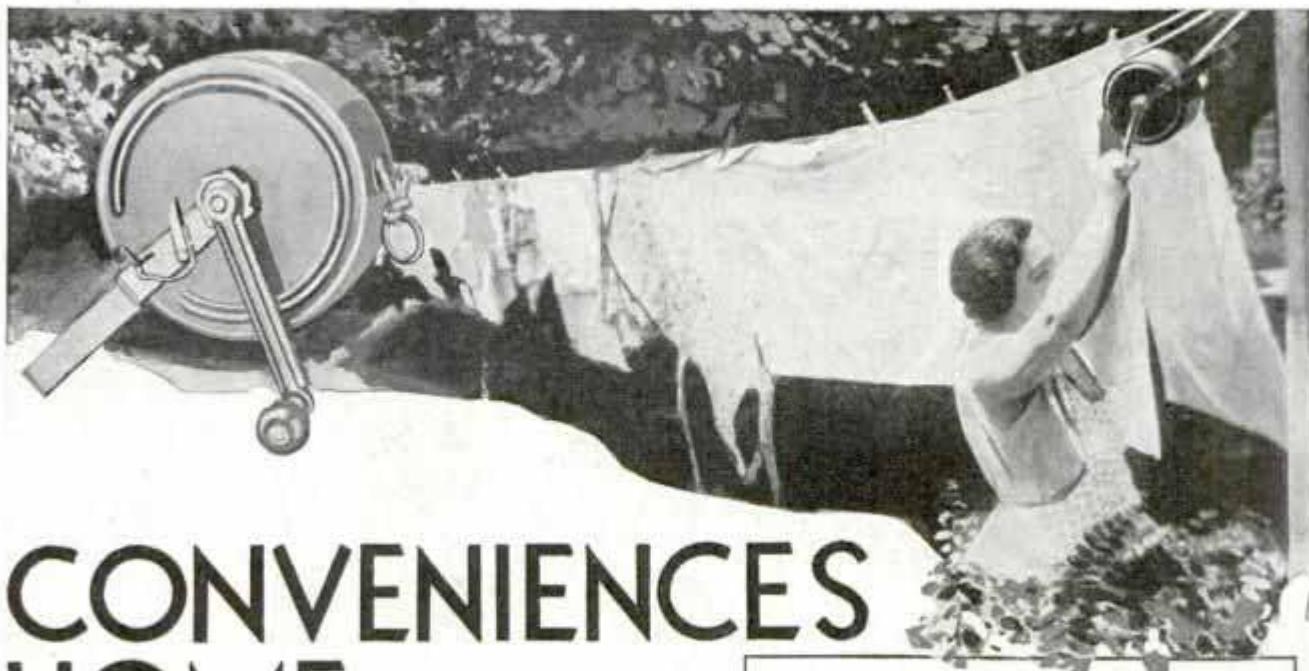


HOLDER FOR MAGAZINE BOOK OR PAPER AIDS READER

Adaptable for use on books, magazines and newspapers, a holding device has been produced as an aid to reading. Adjustable wire clamps hold the pages in position. Extension bars on the back of the back board permit lengthening the holder for larger publications. The bars lock in place. A small arm at the top of the elevator board may be adjusted to give the book a more nearly perpendicular position for reading while lying down. The holder may be closed to the size of an ordinary book.

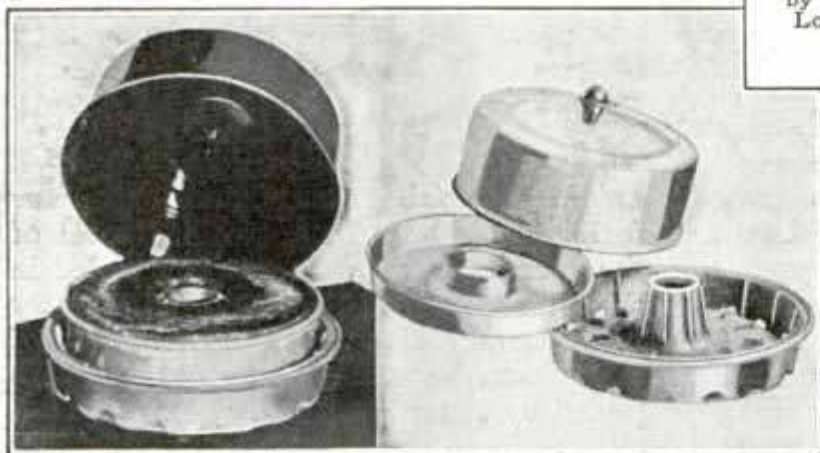
Book Holder with Extension Back Accommodates Several Sizes of Magazines and Newspapers

Rev. Ray W. Mason, St. John



CONVENIENCES HOME

Top, Large Reel Holds 100 Feet of Standard Clothesline; It Is Attached to Post by a U-Shaped Band of Strap Iron; Long Handle Operates the Reel Easily



Above, Three-Piece Utensil for Baking a Cake on Top of Stove, over Single Burner; Cover Spreads Heat over Top of Cake; Below, Felt-Faced Slide Attached to Furniture Legs Prevents Marring Polished-Floor Surfaces



Above, Automatic Light for Attachment inside Electric Refrigerator; Opening the Door Causes Bulb to Light; It Is Installed Easily; Left, Attachment for Jar Makes It Possible to Whip Mayonnaise with One Hand While Pouring Oil; Action of the Dasher Is Unusually Easy

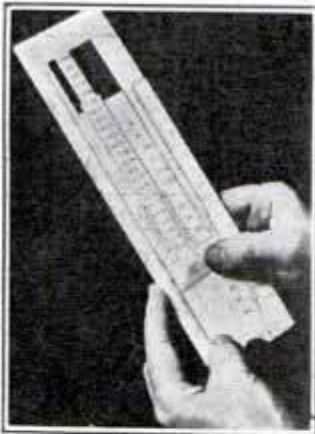


**BRIGHT-COLORED PLANE WINGS
HELP SIGHT LOST PILOTS**

Suggestions have been made recently in aviation circles that planes carrying the air mail be equipped with bright colored wings. This would aid in locating the plane and its cargo if the pilot lands unexpectedly or meets with an accident and crashes, it is pointed out, and might result in saving the flyer's life. The army uses markings in brilliant colors which are easy to see even at a great distance, but the wings of most mail planes are a grayish hue which does not stand out sharply from the surroundings when the ships are on the ground.

**CALCULATOR FOR THE CHEMIST
GIVES MOLECULAR WEIGHTS**

Serving the chemist in the same way that an adding machine aids the book-keeper, a slide-rule calculator quickly shows molecular weights and the correct formula for a large number of compounds. Answers to chemical problems may be checked speedily, while practice with the calculator will facilitate the working of problems. The device consists of two parts, the holder and the slider. On the



slider is a column of symbols representing various positive ions. To the right of this column through the opening in the slider, may be seen the column of negative ions. By moving the slider to align any positive ion with a negative ion, the

chemist readily finds the correct formula of the compound formed when these two ions combine.

**PORTABLE TRAFFIC LIGHT USES
POWER FROM BATTERY**

Current from a storage battery supplies the power for a portable traffic-light signal made by a Canton, Ohio, policeman. The illuminated traffic semaphore is made from a railroad switch light in which red



Policeman Operates Signal Light Which Derives Its Current from Storage Battery

and green lenses were inserted. The light is attached to the top of a ten-foot support and is operated manually. Directly under the signal is a floodlight to illuminate the operator. It has three small bulbs and can also be operated by attaching it to the battery of an automobile parked near by. The signal can be transported easily in an automobile and is for night use at street intersections requiring only occasional traffic supervision.

**LEATHER NECKTIE HOLDS SHAPE
AND IS EASY TO CLEAN**

Leather neckties which resemble cloth ones in appearance but which have the additional advantage of being easy to clean are now offered in both four-in-hands and bows. They come ready-tied, do not get out of shape and can be cleaned with a damp cloth. The ties are available in embossed patterns as well as in dull-finished black leather.

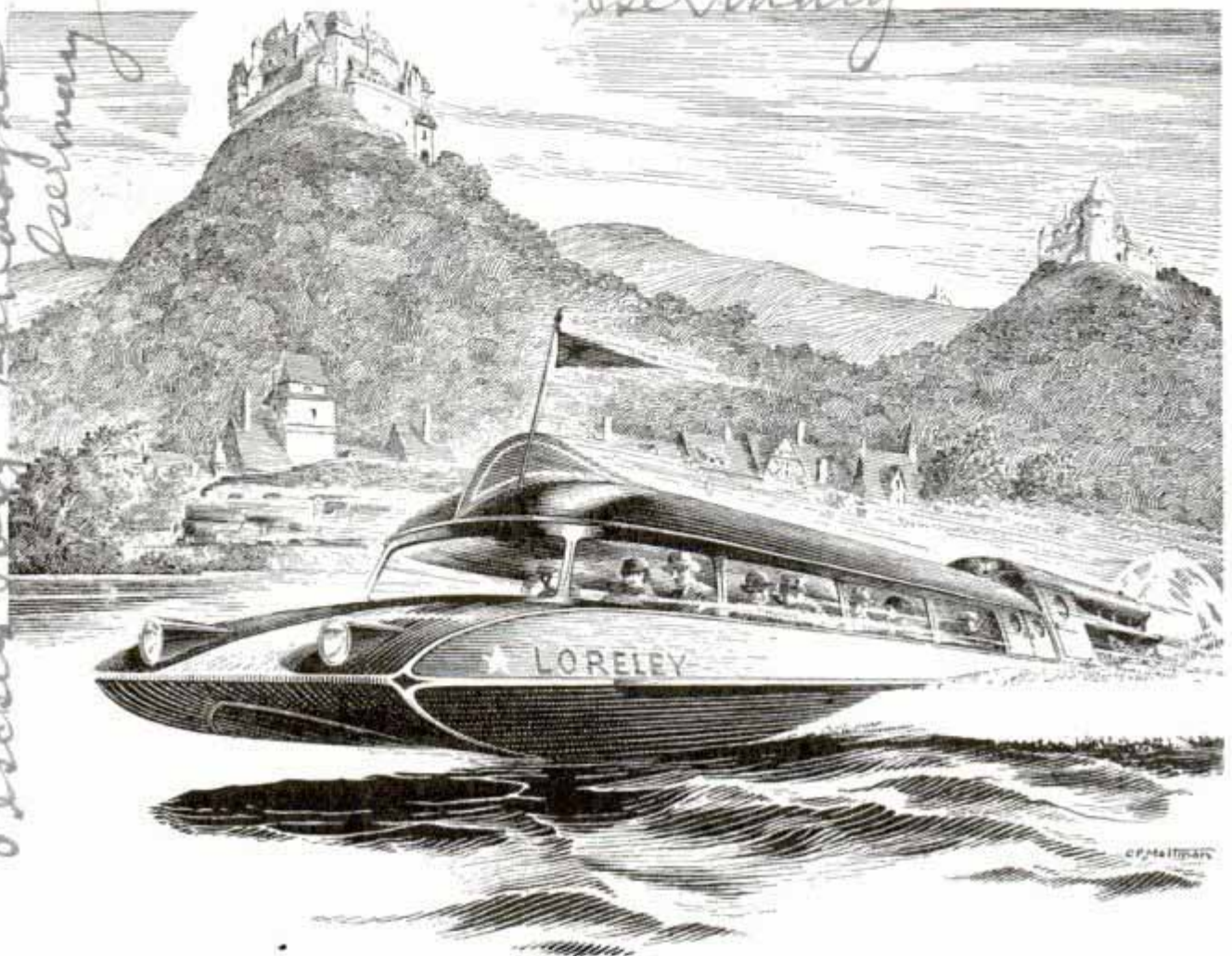


Molecular Weight

Handwritten notes and signatures:
C. 1448
C. 1489
C. 1520
Stay. Rite Tie Co.
1180 N. Edison
St. Mulvanee, W. C.

Air-Propelled Express Boat Has Train Speed

*Mr. Beeches
Borg near Cologne
Germany*



Drawing of Proposed High-Speed River Transport; This Craft Is Propelled by Powerful Engines and Air Screws; Test Boat of This Type Has Been Pronounced Successful

Driven by an air screw in the manner of an airplane, a glider-type boat has been designed for passenger service on the river Rhine in Germany. Several of the new craft will go into use at the beginning of the next season. Junkers engines will propel the boats at a speed rivaling that of the crack German train, the "Rhinegold Express." A small boat of this type was tested with such success that construction of the passenger craft was ordered.

ALUMINUM MIRROR AIDS STUDY OF RADIATION FROM STARS

With the aid of an aluminum mirror, Cornell astronomers and physicists atop an 8,000-foot mountain peak in Arizona have succeeded in catching the "blue rainbows" of nearly 100 stars, made by their ultraviolet rays. The achievement indicates that one of the "blind sides" of ra-

diation from all stars has been opened up on a grand scale for future study. The invisible rays, all of them a blue darker than anything the eye can detect, are reflected by the mirror to photographic plates. The photos record the light as spectra, or rays broken into bands of blue of varying hues, which merge into each other like the colors of the visible rainbow. These color bands appear as straight lines, standing side by side, and each line is an unmistakable sign of some temperature or some electrical condition in the distant star. Each shows the condition and the action of masses of molecules or masses of atoms and each indicates also what kind of substance constitutes the atoms and molecules. The precise meanings of these blue-rainbow lines have been learned in laboratories where the ultraviolet spectrum of light has been studied, but it had not been easy to obtain clear

*Dr. Seeman engineer
Paschen Boat near Cologne
Germany*

*Univ. Physics Dept
Chicago Trib
10/19/1913*

Marie Chaulaugy C. Lawrence

pictures of the ultraviolet spectrum of stars because this invisible light is absorbed by the silver which ordinarily has been used for astronomical mirrors. Aluminum, however, reflects it to a high degree, thus making it much simpler to obtain good ultraviolet images. The mirror was developed by R. C. Williams of the Cornell physics department.

e1605

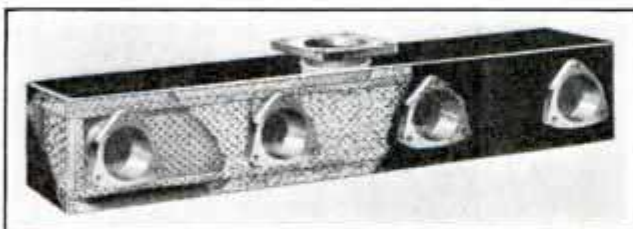
COLOR EMULSION FOR FILMS MADE FROM FLOWER

Films can be made as sensitive to colors as the human eye by means of an emulsion discovered in England. A chemical compound extracted from a wild flower, is the base. Natural color television and photographing of fog scenes are said to be brought nearer by the emulsion, which may be used in connection with the ordinary motion-picture camera at low cost. About ten cents worth of the emulsion will transform 1,000 feet of black and white film into natural-color pictures, showing the shimmer of silk, the sheen of an actress' hair, the color of her eyes, the changing colors of sunset in water and variations in lights and shades.

e1548

MANIFOLD SILENCER FOR AUTO DOES MUFFLER'S WORK

Silencing effects ordinarily performed by a muffler are produced by a new manifold for either the exhaust or intake of the automobile, airplane and other equipment fitted with internal combustion engines. Sound absorption is accomplished by means of a porous material faced with a

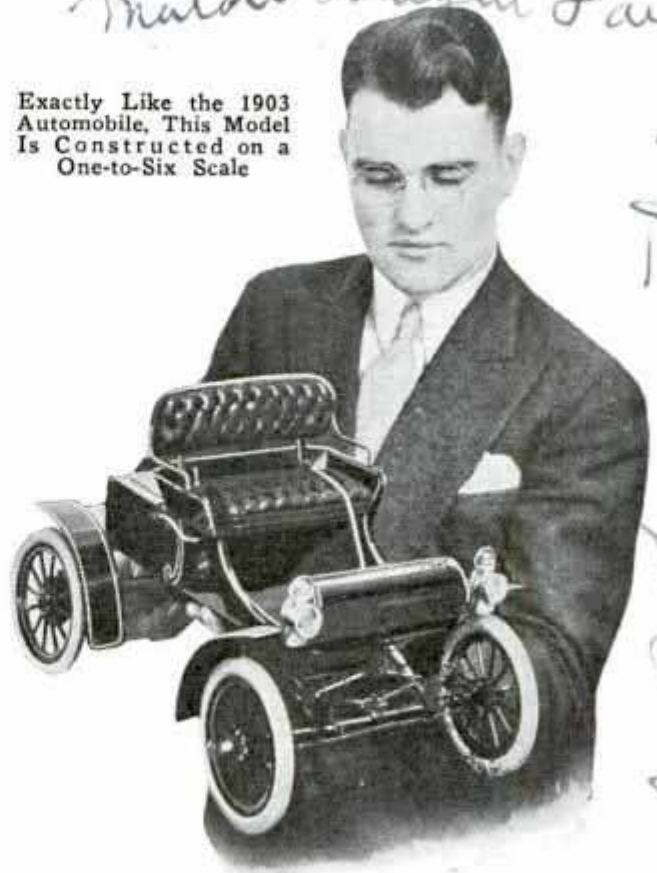


View of Auto-Manifold Silencer after Being Cut Away to Show Noise-Absorbing Material

perforated metal lining through which the gases pass. This lining allows the noise to penetrate into the absorbent material, but does not impede the flow of gases. There are no baffle plates, so back pressure is at a minimum.

Duroco Battery Co.

Exactly Like the 1903 Automobile, This Model Is Constructed on a One-to-Six Scale



MODEL OF CURVED-DASH AUTO COMPLETE TO TINY TIRES

Complete in every detail except the motor, a model of the curved-dash Oldsmobile of 1903 has been produced by a Chicago craftsman. The model has brakes and steering assembly, the latter an old-fashioned "tiller," an axle with chain drive, small flywheel, brass lamps, seat upholstered in leather and even a set of tiny tires. All equipment is duplicated exactly from that in the original automobile. More than 1,200 hours were spent in the work. The model is on a scale of one to six.

e1533

FAST TRAIN WITHOUT WHEELS TO RUN ON BALL BEARINGS

That trains without wheels may be the next step in the progress of transportation is indicated by successful tests of a model in Russia. Operated over a ten-mile run, the model developed unusual speed, leading engineers to predict that the future train of this type will attain a speed of 190 miles per hour. The model, driven by electricity, runs on ball bearings in a shallow trough, thus eliminating both wheels and tracks. A full-size train is now under construction.

Answers 9/30/33

John D. ... General Motors Oldsmobile

Charles A. Freund

MAGIC for



show full). What did the man do? He quietly lifted the matches placed them in his pocket and walked out. (Pick up matchbox with right hand and place in right trouser pocket. Close the left hand.) The man was hardly out of the shop when the proprietor came running and demanded his money. (Extend forefinger of left hand and tap across table.)

The man tells him that he paid for the matches. So they returned to the store. Sure enough, the payment for the matches rested on the counter. (Open left hand and . . . there's a penny.) Of course, the man got the matches back again, but when he opened the box to get a light the matchbox, which a moment before had been shown full, is now empty!

Here's how the trick is worked: First, you need two boxes, exactly alike. One of these, an empty box, is in your right trouser pocket at the start of the trick. The second box, a full box, is prepared by cutting a little projection on the underside of the drawer, as shown in Fig. 1, so that, if you slip a penny between the cover and the drawer and close the box, the coin will be

By SAM BROWN

THIS first stunt takes a bit longer telling than doing. You see, a man wanted a box of matches, so he walked into a cigar store. (Extend left hand to indicate the store and place a penny box of matches on it.) There was nobody in the store (lift matchbox and show hand empty back and palm), but a full box of matches rested on the counter (open box and



Steps in Matchbox and Penny Trick





Top and Center, Untying the String; Bottom, Picking the Color of the Match Tip

apparently conceal the pin tells you which one to pick.

Do you like card tricks?

A card is selected and returned to the pack. The deck is cut a number of times. The performer deals the cards out in two piles onto the extended hands of the spectator, requesting him (the spectator) to say stop at any time. The signal is given. The performer asks for one of the piles and replaces it on the deck. The cards in the other pile are counted. "Nine?" The performer counts down to the ninth card in the deck. It is the selected card.

Do this: Take any playing card and gently crimp over the non-index corners, as shown in Fig. 9. Place this card in the deck. Riffle the deck with your forefinger, as shown in Fig. 10. Click! You automatically stop at the crimped card. That's the basic principle. Fig. 11 shows the start of the trick. The deck is on your hand, the crimped card on the bottom. Spec-

tator cuts the cards and looks at the top card of the pile in your hand, as shown in Fig. 12. The selected card is then placed on the cut portion. The pile in your hand is placed on the pile on the table. The crimped card is, thereby, directly over the selected card. Spectator cuts once and then again. This will bring the selected card roughly to the center of the pack. You cut the cards a third time. Use the riffle cut here, cutting at the "click." This brings the crimped card to the top of the pack, with the selected card immediately



under it. Count the cards out, putting the first card on the spectator's left hand and continuing until the signal is given, ending with the right hand. Ask for one of the piles, at the same time extending your hand toward the right-hand heap, which, as you will remember, has the selected card on the bottom. The rest will just work itself.

The performer arranges eight coins or eight poker chips secretly in his hand, so that, counting one chip out on the table and the succeeding one under the stack, and so on, he arrives at alternate heads

EVERYBODY

pushed out again when the box is opened. This opening of the box, as already described, happens on your left hand, as shown in Fig. 5. When you close the box, do it as shown in Fig. 6, closing the left hand at the same time and retaining the penny.

Place the full box in your pocket, and, while giving the patter, quietly push it up into the extreme top corner of the pocket. Awkwardly palm the empty box and show your pocket empty. In Fig. 7 the edge of the pocket is pulled back to show the position of the concealed full box. This, of course, is ordinarily well out of sight. The rest of the trick is as described in the patter.

Here's a mind-reading trick with cigarettes. A

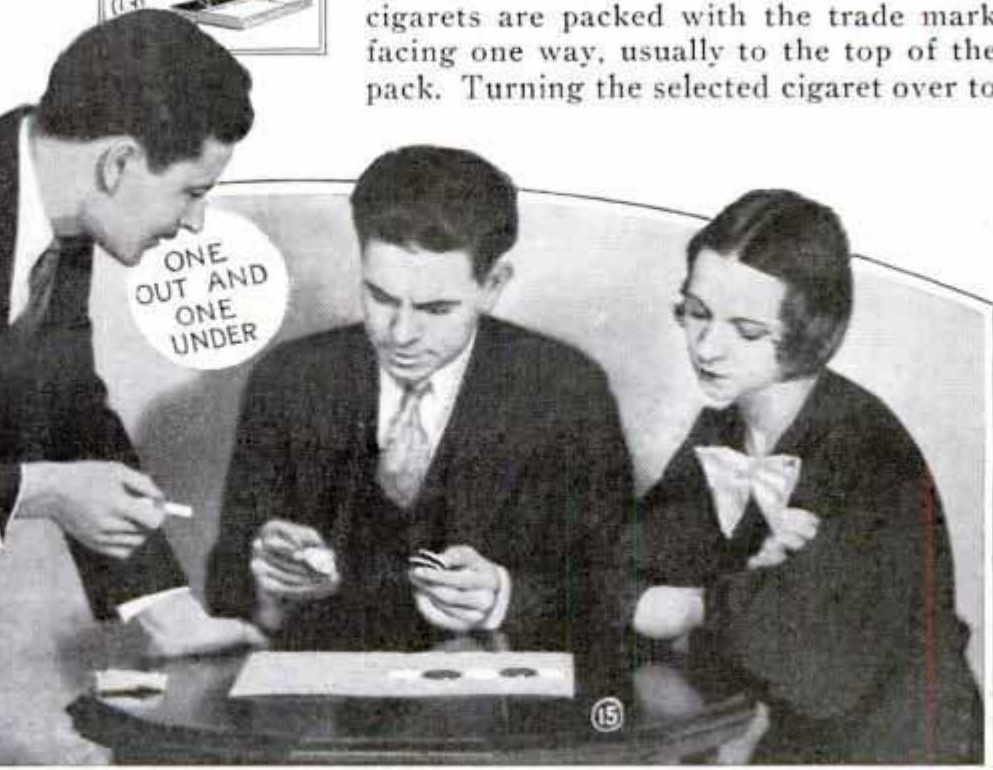


Top, Picking the Card; Bottom, How the Poker Chip or Coin Trick Is Worked

new pack is broken open. The performer turns his back and asks a spectator to push a pin into any cigaret.

"Better turn it over so that I can't possibly see it."

Of course, you are away out in front for the rest of the stunt, lifting the cigarettes one at a time to the forehead until you come to it. The method is simple. All cigarettes are packed with the trade mark facing one way, usually to the top of the pack. Turning the selected cigaret over to





Berth in Readiness for Night Flight of Transport; Note Conveniences Similar to Those Found in Modern Sleeping Car

PLANE WITH SLEEPING BERTHS MAKES NIGHT FLIGHTS

Regular sleeping berths have been installed in the big Condor planes used by Eastern Air Transport in night service between Atlanta and New York. The berths are six feet and five inches long and two feet and four inches wide. There are uppers and lowers, each equipped with reading light, call button, draw curtain, coat hangers, clothing nets and other appointments. Passengers retire on boarding the planes and can sleep through the journey.

"ELECTRIC NOSE" SNIFFS VAPOR AND SOUNDS ALARM

If one part of mercury vapor is mixed with a hundred million parts of atmosphere, a new "electric nose" will detect its presence and sound an alarm. The alarm consists of a red light and a warning gong. The apparatus, developed in the research laboratories of the General Electric company, responds in a few seconds. In oper-

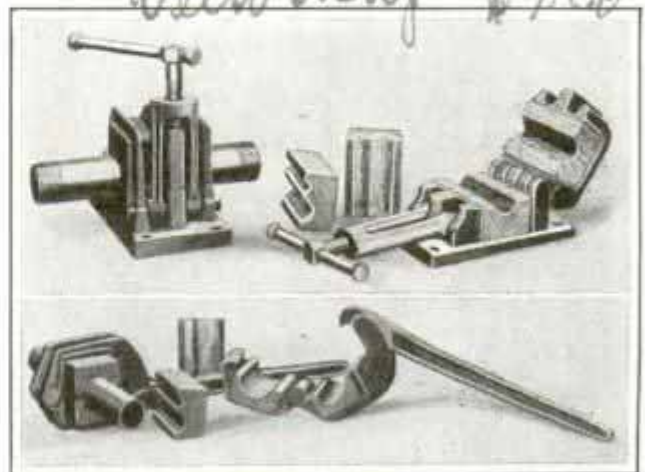
ation it "smells" through an internal "nostril" or intake duct, which draws in flue gases from the stack of a mercury boiler. The gases are given preliminary treatment to remove stack impurities which would nullify the work of the detecting mechanism. The gases then pass through a light beam coming from a mercury light source and on a wavelength known as the resonance radiation of the mercury atom. This radiation is directed from a photo tube which is supersensitive to a beam of this character. The mercury vapor is opaque to this light and casts a shadow, which actuates the photo tube and sets in motion the electrical arrangement for sounding the alarm.

C1550

CUSHION JAWS IN TOOLS PREVENT SCARRING

Scarring of materials is eliminated by means of cushion-jaw tools now on the market. A vise of this type firmly grips pipe or other material without injury. It is positive in grip, compact in design, yet built to stand the hard usage of shop and factory. A companion tool, the wrench, grips the work tightly in the same kind of cushioned jaws. The jaws are made of two-by-four lumber. Sets for standard-size materials are available, but may be made by the user. No fastenings are required on the jaws because they lock in place when pressure is applied.

Velvet Jaw - 8/50



Top, Open and Closed Views of Velvet-Jawed Tool; Bottom, the Instrument Dissembled

C1543

Schenectady, NY

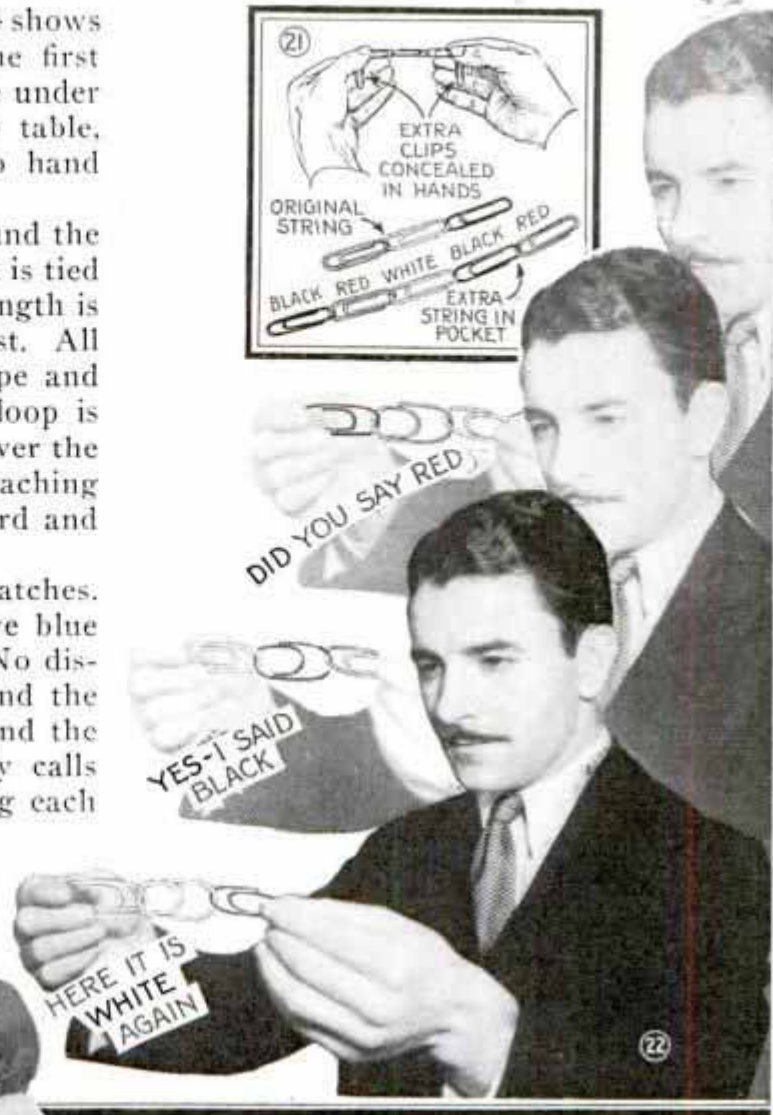
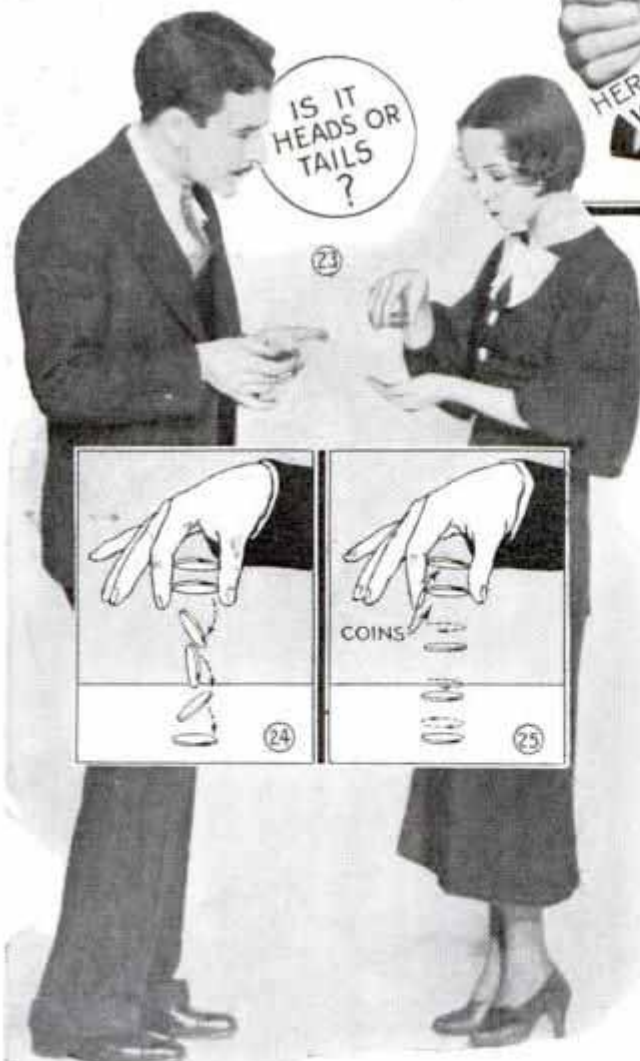
Woburney Harker Industries

Curtiss Aeroplane & Motor Co
Vulcan and Remore Products Co

and tails or alternate colors. Fig. 14 shows the proper arrangement. Deal the first chip onto the table, the second one under the stack, the third one onto the table, etc. "Simple!" That's the cue to hand the stack to the audience.

A length of soft cord is tied around the performer's left wrist. The free end is tied to his vest buttonhole. A second length is tied in a loop around the the first. All knots are sealed with gummed tape and initialed. Fig. 17 shows how the loop is brought up and through the vest, over the head and down over the arm. Reaching up under the vest, you get the cord and pull it free. All in a split second.

The performer exhibits six matches. Three have red tips and three have blue tips. The matches are examined. No distinguishing marks are found beyond the colored tips. The matches go behind the performer's back, and he correctly calls the color of the tip before bringing each match forward. Telling which match is which is simple if you



Top, Changing Color of Center Clip; Bottom, Making a Coin Fall without Turning Over

have previously twisted the blue-tipped matches lightly between your fingers, as shown in Fig. 19. Not hard; just a gentle turn to strain the wood fibers. The match will immediately spring back into shape, but by turning the match head behind your back, you can easily spot the prepared matches.

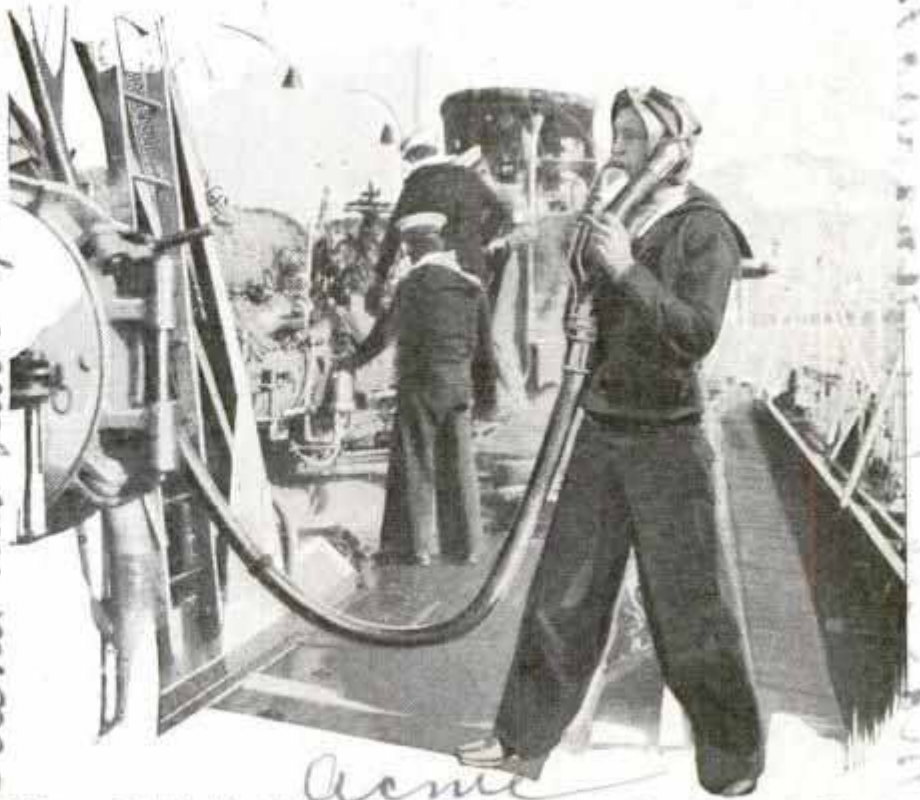
With a little manipulation you can hook three different colored clips together, and then, turning your back for an instant, make any color jump to the center. Red and then black and then back to white again.

The performer has an extra string of five clips in his vest pocket. He exhibits the original three-clip string and then, in turning around, substitutes the five-clip string. Any color called is easily gotten to the center by simply concealing the extra clips in the hands, as shown in Fig. 21.

(Continued to page 124A)

C1561
IMPROVED RUBBER FOR TELEPHONE LASTS LONGER

4636 seal the type
Science News Letter 10/19/33
Moisture may be excluded from telephone transmitters and reception improved at exposed locations by a new rubber compound developed by research chemists. To keep moisture away from the thin aluminum diaphragm of the transmitter, a rubber membrane is interposed between the diaphragm and the mouthpiece. Such a membrane cannot be thicker than about three-thousandths of an inch. Rubber as thin as this has a life of only one to two years. The new compound does not deteriorate when placed for varying periods of time in a vessel of pure oxygen at a pressure of 300 pounds per square inch and a temperature of 158 degrees Fahrenheit. When subjected to this test, ordinary rubber deteriorates in less than one day.



Acme
Sailor on British Warship Is Shown Receiving Order from Bridge by Means of Two-Way Talking Tube Which Speeds Up Handling of the Craft

TALKING TUBE ON BATTLESHIP USED TO TRANSMIT ORDERS

Orders from the bridge of some of Great Britain's fighting ships are transmitted through talking tubes to the seamen below. The end of the tube consists of a combined ear and mouthpiece so that the sailor can not only receive the instructions but can repeat them back to signify that he understands them.

NAIL HOLDER FOR THE HAMMER LEAVES ONE HAND FREE



Hi Head C1525
Only one hand is needed to drive a nail if the hammer is equipped with a nail-holding attachment, particularly useful when working on ladders or when a long reach is necessary. The holder consists of a pair of claws and a spring attached to

Wrought Washer
2100
the handle next to the head with a screw. The nail is inserted between the claws and the hammer head, the latter replacing the ball of the hammer for the first blow. After the nail is set, it automatically slips from the holder and is driven home in the usual manner.

ADHESIVE ON WEATHER STRIP SPEEDS INSTALLATION

728660
Felt weather stripping with adhesive on the back may be applied quickly by merely pressing into place. It may be installed at door window or screen for keeping out cold, dust and odors. The weather-proof rubber adhesive grips any surface instantly and is not affected by moisture or humidity. It is packed in ten-foot rolls, ready for immediate use.



Science News Letter 10/19/33
Acme
C1525
Wrought Washer
2100
Hi Head C1525
728660
Adhesive Weather Strip
Ch. 29 Plyer
Wrought Washer
2100



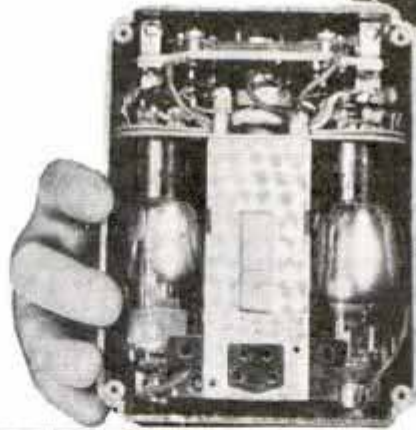
Pocket-Size REFLEX RECEIVER

YOU can actually carry this little set in your overcoat pocket. It is claimed by the manufacturer to be the world's smallest a.c.-d.c. receiver employing two regular-size tubes. It measures 4½ in. wide, 2 in. thick and 6 in. high. The set weighs only two pounds and operates on any 110-volt current either alternating or direct.

The ability to produce a receiver of such small dimensions is due to a number of unusual developments. The new tubes used have revived interest in reflex circuits and, in this set, with only two tubes employed, there is r.f. amplification, detection, the



Set in Operation Showing
Speaker Grill at Front

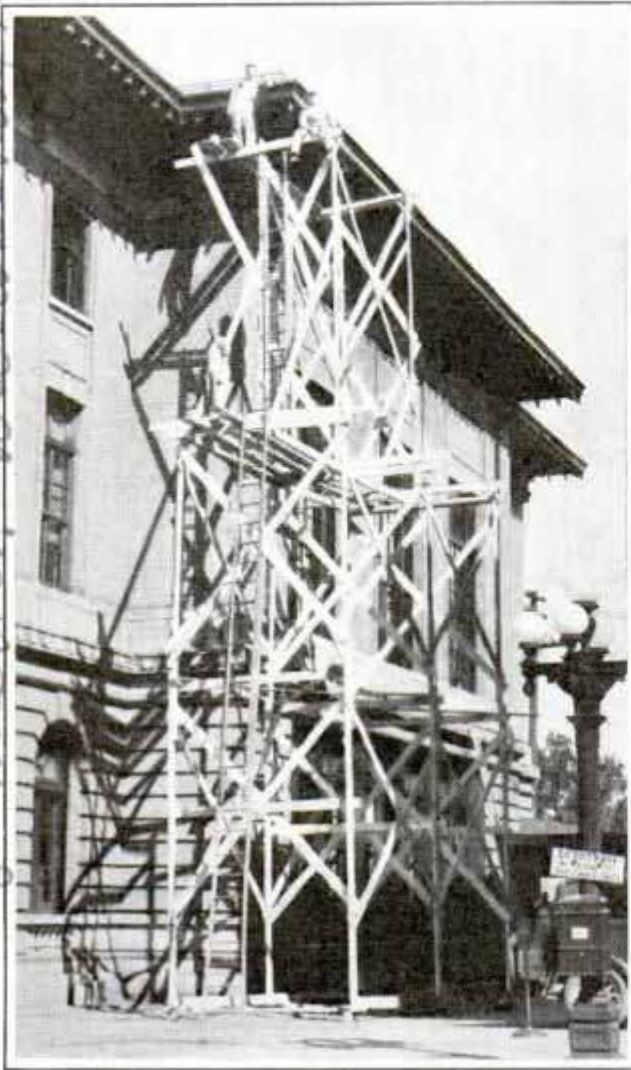


equivalent of two stages of audio amplification and rectification. A special condenser of unusual type is used which measures only ⅜ in. thick yet gives the full performance of a 2-gang tuning condenser unit. The bypass condensers are also of special design and are no thicker than a lead pencil.

The rear-view photo, with the back of the case removed, shows the compact method of assembly. The tubes are mounted upside-down in their sockets. The usual chassis base is missing as the front panel forms the backbone of the metal housing to which are bolted the various parts.

The set will operate in either a horizontal or vertical position. A suitable length of flexible antenna wire, that may be dropped on the floor or out the window, is provided, together with a cord and plug for the wall socket.





Scaffold on Wheels Enables the Painter to Reach Parts of Building without Difficulty

SCAFFOLD PLACED ON ROLLERS TO PAINT WIDE CORNICES

When bids were asked for painting the post office and court house at Fort Dodge, Ia., decorators shook their heads over the six-foot cornice extending out from the top of the building. They figured it would be necessary to build a scaffold around the entire building since the cornice was too wide to reach from a painter's stage or swinging scaffold. The man who got the contract, however, had a different idea. He obtained 1,000 feet of lumber and in one and one-half days four men constructed a portable scaffold on rollers. The scaffold was ten feet wide and twenty feet long for thirty feet up and the second section was six feet wide, twelve feet long and twenty feet tall. Three men moved it around the building as the painting progressed.

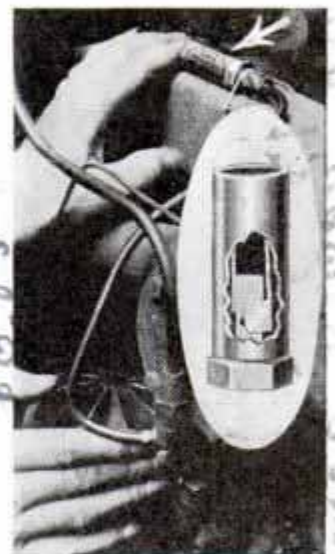
☐ A hen requires almost one-half pound of feed to produce one egg.

INSECTS SURVIVE THE WINTER IN STRANGE WAYS

Many insects sleep through the winter months their hibernation habits assuming strange patterns. Some insects, says Austin H. Clark, of the United States national museum, live through the winter as adults, hidden away in snug retreats. These include some species of the butterfly, wasp, bee and fly. A few warm days in winter often bring them out, but they return with the first cold. More familiar are the cocoons containing the chrysalids of moths, which school children bring in for their first nature studies. Not all cocoons contain chrysalids. Some butterfly species spend the winter as full-grown caterpillars, hidden away in loose cocoons. In the first warm days of spring, these caterpillars change into the chrysalids from which the adults emerge. Still other butterflies live through the winter as partly grown caterpillars.

AUTOMATIC FUEL-MIX CONTROL FOR AUTO SAVES GAS

Smoother and less costly operation of gas-engine vehicles may be obtained by use of a thermostatic device which automatically controls the carburetor mixture. When the engine is cold, it supplies a rich mixture of fuel and air. As the engine warms up, the thermostatic metal gradually opens the air hole to produce a mixture less rich. At the wide open point, enough air is being admitted to assure the driver of a mixture that gives maximum power on minimum fuel. Carbon and crankcase dilution due to over-rich mixtures are prevented by the control, which is said to save from ten to thirty-five per cent in gasoline. Easier starting and faster acceleration are said to be other advantages. The control may be attached to automobiles, trucks, busses and other motors.



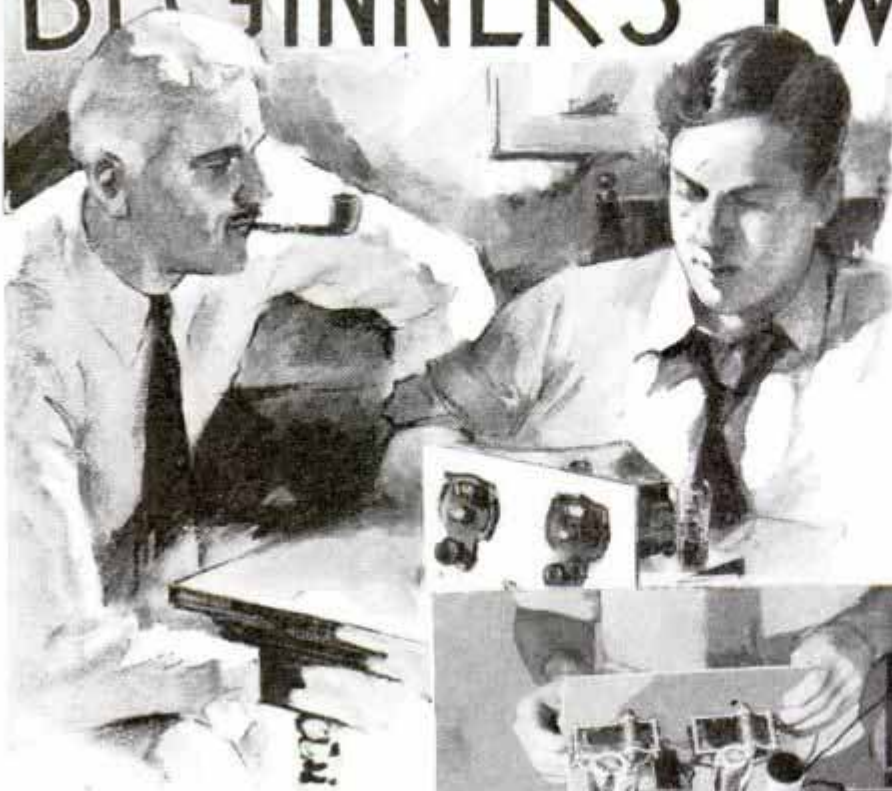
Science News Letter

Plastic Product

C1521
 C1502
 C1524
 Built by Julius G. Petersen 332
 Market Warrington, Va.

9/30/33
 4094

BEGINNER'S TWO-TUBE



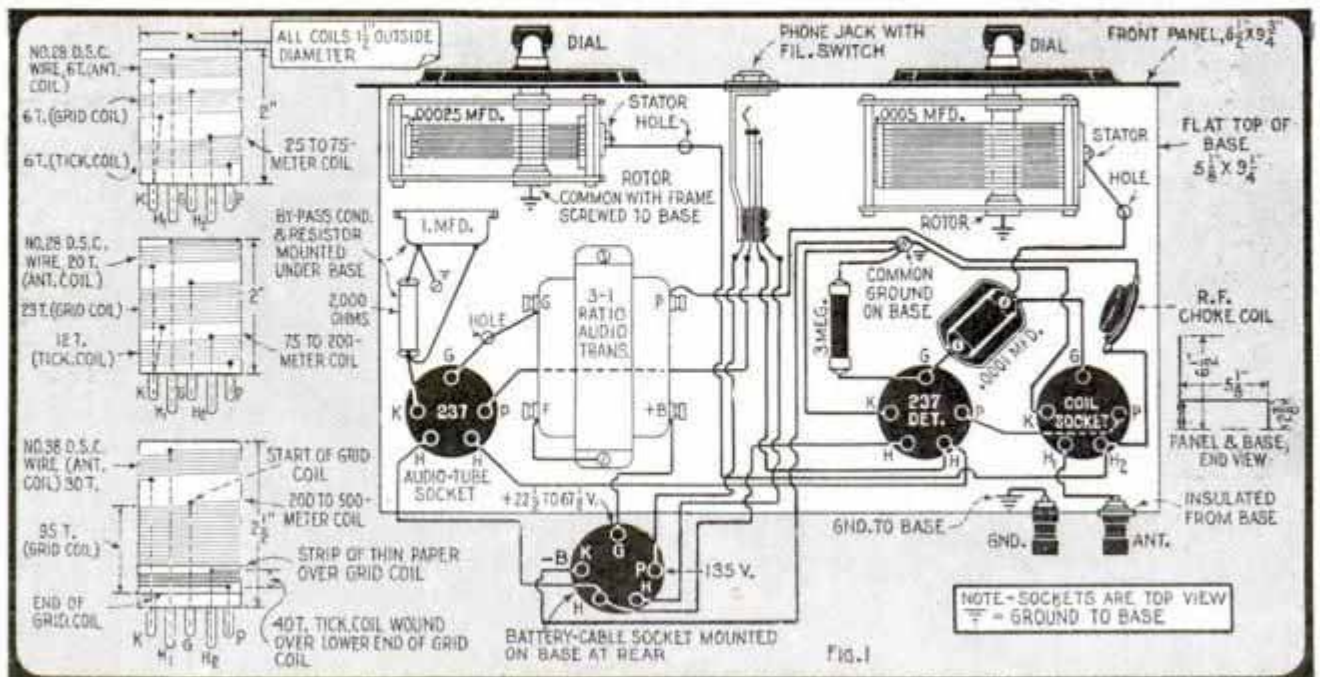
coils and chassis are the same, therefore those who built that set can use the same parts and add the audio stage and a.c. power unit, if desired.

The three homemade plug-in coils cover the amateur, police, aircraft and broadcast bands, and, although a magnetic speaker can be used, headphones are recommended

SPECIALLy intended for the beginner, this flexible little two-tube receiver offers an excellent opportunity to try out either battery or a.c. operation, or a combination of both, at low cost. Few circuits give the beginner such a wide choice of wave bands or methods of operation. It was originally described as a one-tube all-wave battery receiver, in the November, 1933, issue. The



for the short waves. The base and front panel are made of $\frac{1}{16}$ -in. sheet metal and all dimensions are given in Fig. 1. The receiver base is formed by clamping the metal sheet between two pieces of wood in a vise. The ends are then easily bent over with the aid of a mallet. The base



Amplifier Input Stage for Modulator Unit

PART II



Right, Completed Microphone Pre-amplifier; Insert Shows Removable Base Assembly

ALTHOUGH originally designed as a microphone pre-amplifier for the modulator unit, described in the December, 1933, issue, this input stage may also be used as a helpful sound booster with radio sets equipped for home recording. The parts are mounted on a narrow sheet-metal base, 9 in. long, 3½ in. wide and 2½ in. deep. This unit is completely wired be-

fore it is placed in the metal shield box. The box, 9¾ in. long, 7 in. high, and 5¾ in. wide, is also made of ¼-in. sheet metal.

The simplified wiring diagram, Fig. 4, shows all connections below the base and the leads to the various instruments mounted on the front of the shield box. The ends of the base are flattened out to show the connections to the wafer-type sockets for the battery and microphone plugs which are to be inserted through holes cut in the sides of the box. The shielded leads from the tube-to-line transformer are taken out at the rear through a hole in the base and a corresponding hole in the cabinet. These leads go directly to the line-output transformer mounted in the modulator unit. The woven-wire shield on the microphone cable should be

grounded externally through a .001 mfd. fixed condenser if feedback noise is troublesome. All other connections shown as grounded are made directly on the metal base.

It will be noted that the positive terminal of the d.c. milliammeter is grounded. This ground may be made on the lever terminal of the 500,000-ohm potentiometer at the right. Used as a straight vari-

(Continued to page 118A)

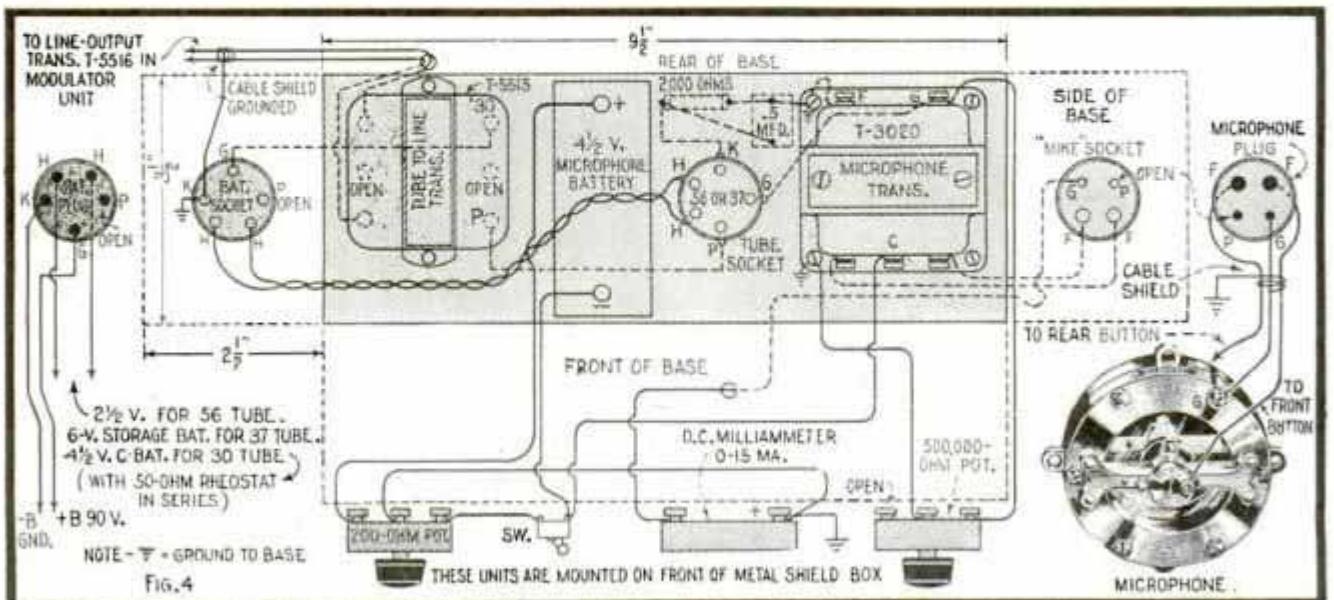
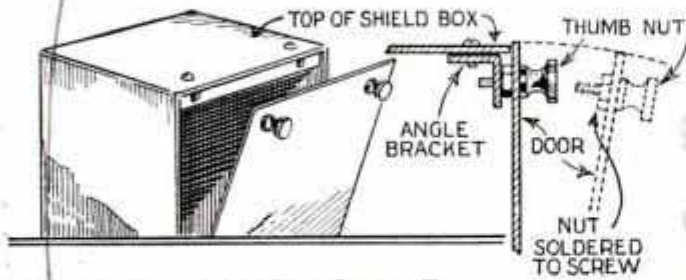
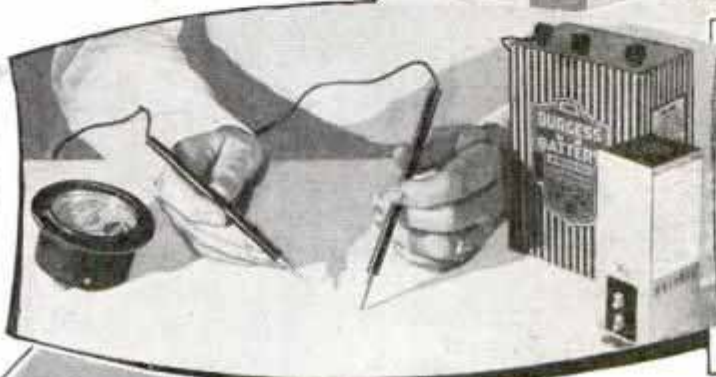


FIG. 4

Practical RADIO SUGGESTIONS



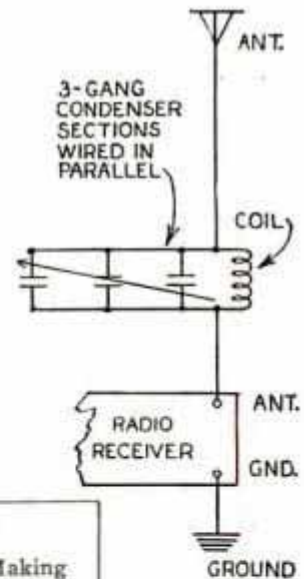
Thumb Nuts and Machine Screws Fasten Shield Covers; Below, Volume Control Made by Molding Carbon on Bakelite



Using a D.C. Voltmeter in Series with a Small B-Battery to Check Wiring for Open Circuits; Shorted Condensers Are Also Easily Located by This Method; Left, Inexpensive Insulated Test Prods with Flexible Red and Black Leads for Easy Positive and Negative Identification

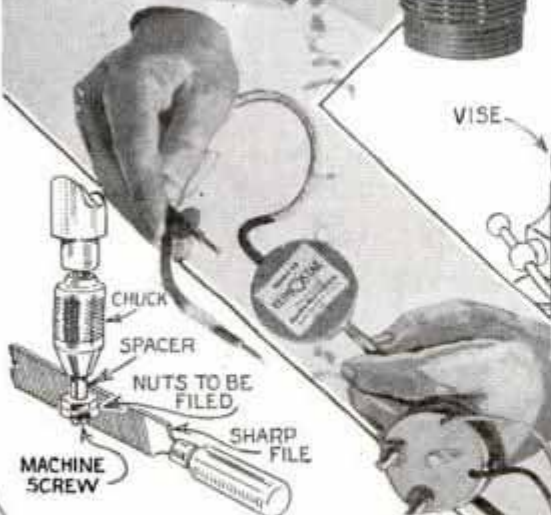


Heavy Wire Coils May Be Space Wound on Threaded Bakelite Tubing; Right, Three .00035 Mfd. Sections Wired to Substitute for .001 Mfd. Condenser in Wave Trap



STRIP TWISTED AT RIGHT ANGLES

Above, a Simple Method for Making Right-Angle Twists in Copper Strip for Short-Wave Transmitter Connections



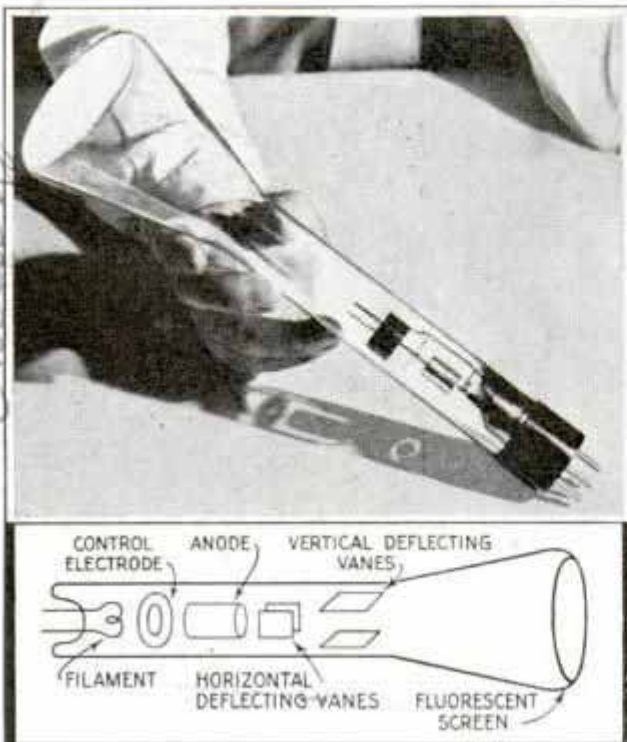
Compact Antenna-Filter Units for Shielded Antenna System; Left, Filing Brass Nuts in Power Drill to Form Round Threaded Bushings for Spacing Condenser Plates; Right, This Shadow-Tuning Device Is Easily Installed



Radio Co. 601 W. Randolph St. Chicago, Ill.

Western Instrument Corp.

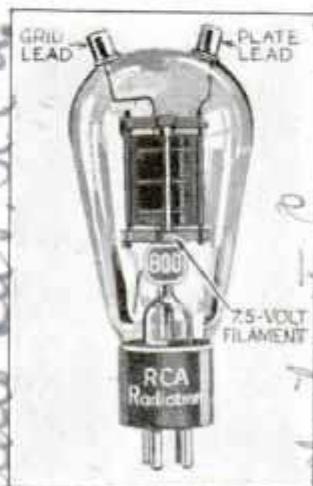
Cathode-Ray Tube Now Available for Experimenters



Cathode-Ray Tube With Six-Prong Base; Diagram Shows the Various Elements

This general purpose cathode-ray tube fits into a standard 6-prong tube socket and opens a new and interesting field to the experimenter. For television reception, radio-receiver measurements and class-room demonstrations, it offers a practical low-cost foundation unit suitable for constructing useful apparatus. A power supply and a sweep-circuit unit are necessary for its operation. The fluorescent screen, in the tube shown in the photo, is 3½ in. in diameter.

Short-Wave Power Tube of Advanced Design



The grid and plate leads of this tube are brought out to metal caps at the top of the bulb thus insuring high insulation and low capacity between the leads. In many respects it is similar to the type-210; however, this tube, known as the type-800,

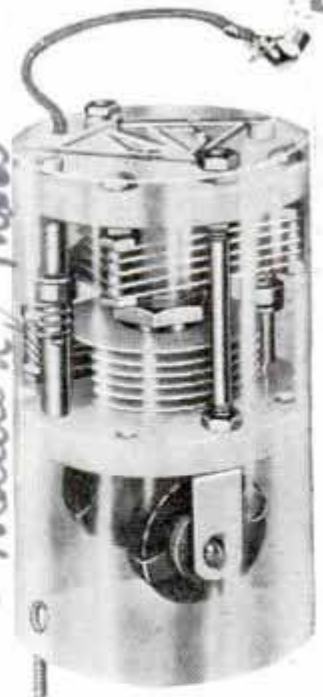
has an amplification factor of 15, as against 8 for the 210; higher plate voltage is used.

Faulty Resistors Common Cause of Receiver Troubles

When you turn the knob marked "volume" on your receiver and a noise like the rumble of thunder issues from the speaker, you either need a new volume control or the one you have should be cleaned. This high-resistance variable resistor usually consists of very fine wire wound on a strip of fiber bent around inside a bakelite case. The constant friction of the sliding arm causes rough spots and poor contact. If badly worn, the resistance strip should be replaced. Sometimes the trouble is caused by dust and dirt, which may be easily removed from the winding with a little benzine on a cloth. Loss of sensitivity, as indicated when you can no longer tune in distant stations, is often caused by faulty fixed resistors, especially if the set is several years old. New fixed resistors throughout will usually restore its original sensitivity.

Improved I.F. Transformers for Short-Wave Supers

You can improve your short-wave superheterodyne receiver by substituting these air-condenser tuned I.F. transformers for former types that employed compression-type mica condensers. They are interchangeable with standard parts. These high-gain intermediate transformers are easily installed and hold their adjustment regardless of changes in temperature.



Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; when material lists are not included in the articles, these are available without charge on receipt of postage.

Paul W. Koch Co., 20 W. Wacker Drive, Chicago
McForest Amateur Radio Club
Radiotron
Natural to 61 Sherman
Transformer



WOODEN PICTURES

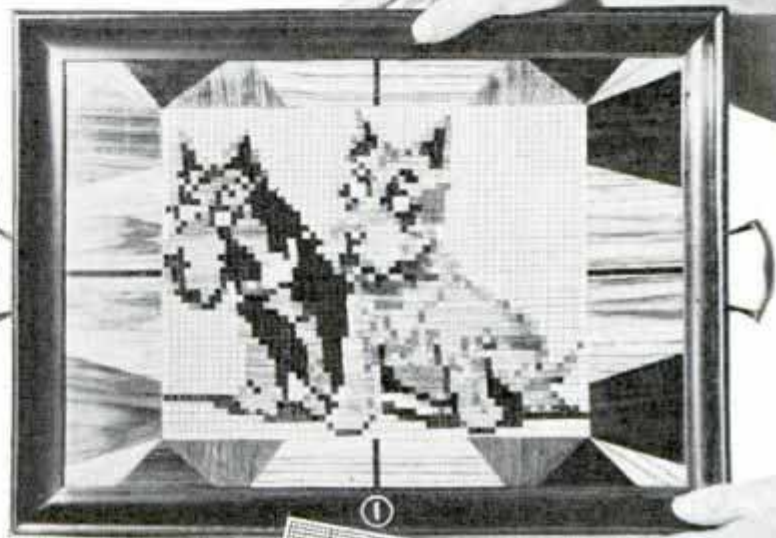
Assembling
Squares of Vari-
ous Kinds of Wood
to Form Wall Plaques,
Serving Trays, Small
Boxes, Table Tops
and Other
Items

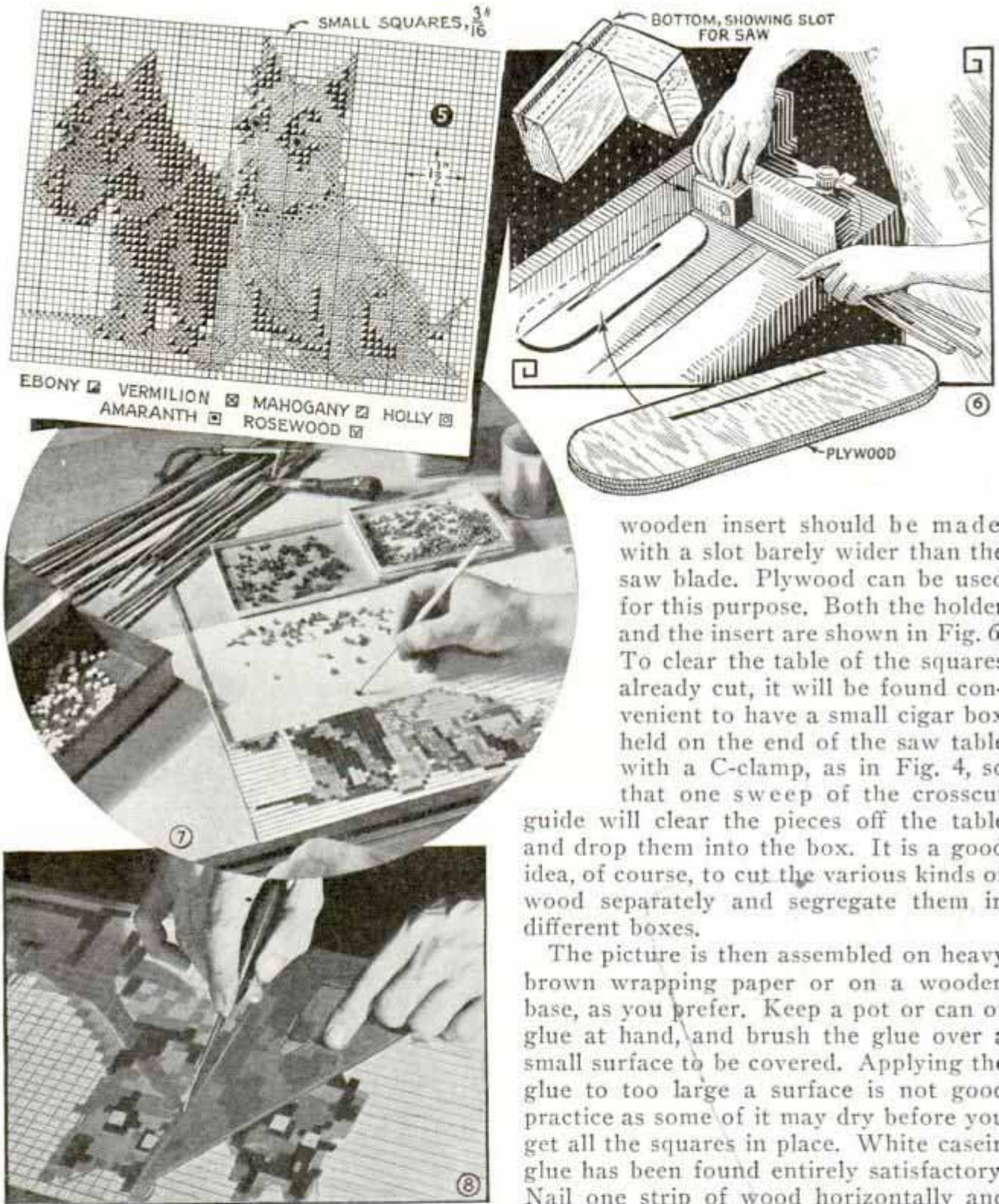
By
FLOYD M. MIX

FANCY overlays made up of small squares of rare woods, in their natural colors, were used in making the interesting serving tray shown in Fig. 1.

First of all is the design. A great variety of these can be obtained from stores selling cross-stitch embroidery patterns, in which the color schemes are already worked out. All you have to do, then, is to change the reference key at the bottom of the sheet to denote the different kinds of wood used. The small squares of the pattern each have one of the key designations, so that it is an easy matter to place the wood overlay accordingly. Figs. 2, 3 and 4 show such embroidery patterns, the latter one being used in making up the serving tray. The patterns serve merely as guides in arranging the small squares of wood, the exact size of these squares being determined by the size that the completed overlay is to be made.

In the case of the "Scotties" used for the serving tray, the wood strips were $\frac{1}{8}$ in. thick, and they were cut into $\frac{3}{16}$ -in. squares. Cutting was done on a circular





saw, fitted with a miter blade. First, the wood was cut into strips $\frac{3}{16}$ in. wide, and the strips then cut into squares. A special holder or jig, accurately made, is needed to hold the wood and to reinforce the edges of the stock while sawing, in order to get clean-cut edges. It is fastened to the regular crosscut guide. Also, the jig will prevent the pieces from flying off the saw table. As you will find the slot in the regular table insert too wide, a special

wooden insert should be made, with a slot barely wider than the saw blade. Plywood can be used for this purpose. Both the holder and the insert are shown in Fig. 6. To clear the table of the squares already cut, it will be found convenient to have a small cigar box held on the end of the saw table with a C-clamp, as in Fig. 4, so that one sweep of the crosscut guide will clear the pieces off the table and drop them into the box. It is a good idea, of course, to cut the various kinds of wood separately and segregate them in different boxes.

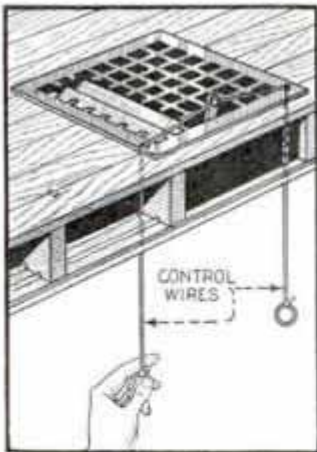
The picture is then assembled on heavy brown wrapping paper or on a wooden base, as you prefer. Keep a pot or can of glue at hand, and brush the glue over a small surface to be covered. Applying the glue to too large a surface is not good practice as some of it may dry before you get all the squares in place. White casein glue has been found entirely satisfactory. Nail one strip of wood horizontally and another vertically at the edges to assure getting the squares in line. Start assembling and pressing the squares on the glue-covered surface, forcing them against the guide strips. Where there are a number of adjacent spaces all to be covered by the same kind of wood, considerable time can be saved by using $\frac{3}{16}$ -in. strips cut to suitable lengths, which are later marked crosswise with a scribe drawn along a straight-edge as in Fig. 8. This will make the strips appear as an assembly of squares.

It was found easy to place the squares in position by using a darning needle or other sharp-pointed instrument as in Fig. 7. One should be careful to lay the squares so that the edges are all in line. Prevent the staggering of the pieces as this will spoil the appearance. When the picture has been completely assembled and the strips scribed, it is set away until the glue has dried thoroughly, after which the surface is sanded smooth and then given one or two coats of shellac.

Extension Makes Bolt Lock Easy to Work with Gloves

Bolt locks are rather difficult to operate when gloves are worn, but are easily handled if a small extension is cemented to the brass knob on the bolt. Take one of the heavy rubber bulbs from an old eye dropper and fill it with sand about to the top. Then fill the end with mending cement and force it firmly over the knob. The bulb permits the bolt to drop into full locked position, but still makes it easy to lift when gloves are worn.

Ceiling Registers Controlled from Lower Floor



Hot-air registers of the shutter type which are placed in a ceiling to heat rooms upstairs, can be operated from below by using a control wire arranged as shown. It is passed through a hole drilled in the operating slide on top of the register and is looped to prevent it from slipping. The ends of the wire pass through the grating in the corners down past the shutters far enough to be within reach and have rings or knobs on the ends. Nickel-plated chain in small sizes looks well when used for the visible part of the controls.

ⒸA clay pipe may be used as a crucible for melting small quantities of metal; the stem is broken off and the hole is plugged.



Dowel at Top End of Clothesline Prop Prevents It from Slipping Along the Line

A Never-Slip Clothesline Prop

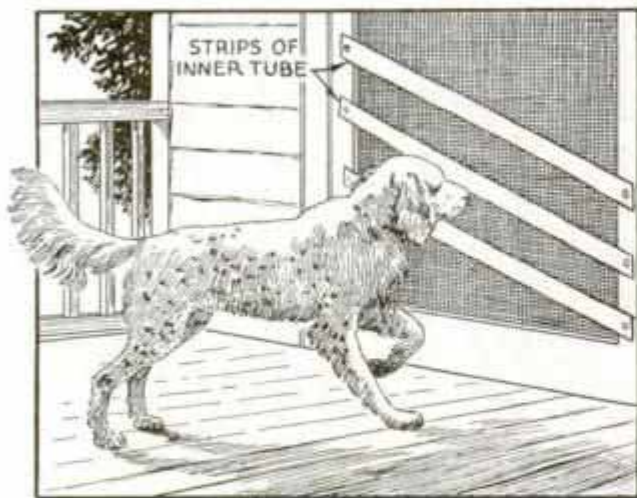
This neat clothesline prop will not slip as it grips the line securely. A hole drilled at an oblique angle through the top end of the prop is fitted with a 12-in. dowel which is glued in place and projects an equal distance at each side. In use, the clothesline is wrapped halfway around the end of the prop as indicated, and the pointed end is set against the ground in the usual way. In this position, there is no side sway of the pole and it cannot be accidentally disengaged from the line.—G. E. Hendrickson, Argyle, Wis.

Paper Fasteners Prevent Soiled and Worn Index Tabs

Tabs of card indexes soon become worn and soiled if there is much reference to the matter filed. To prevent this, take a number of small brass paper fasteners of the kind shown, and clinch them to either side of the lettered part of the tab. This helps to stiffen the portion of the card continually handled and keeps the finger ends from contact with the cardboard.—Frank W. Bentley, Jr., Missouri Valley, Ia.



Practical Suggestions for the Home Owner



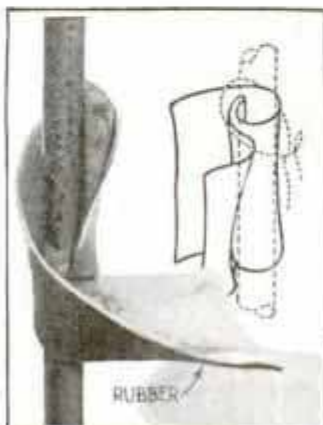
Rubber Strips Nailed across Door Discourage Dog from Scratching on It to Get Inside the House

Rubber Strips Keep Dog from Scratching Outside of Door

When the weather gets chilly, dogs that are allowed to come into the house soon get in the habit of scratching on the outer door. An easy way to break your dog of this habit is to nail three or four strips of inner tube across the lower part of the door. A dog dislikes to have its paw tangled up with anything, and when its foot stretches the rubber, it flies back with a snap that is puzzling to the canine mind. —F. W. Bentley, Jr., Missouri Valley, Ia.

Water Kept from Running on Floor When Thawing Frozen Pipes

In many instances hot water is the only practical means of thawing frozen vertical pipes in the home plumbing system, but it is difficult to prevent the water from running down the pipe onto the floor. However, this trouble can easily be prevented



by wrapping a piece of rubber around the pipe as shown. Cut a piece 6 by 8 in. from an old inner tube, fold it lengthwise and wrap it around the pipe near the floor, tying the upper end to the pipe. Then turn up the lower end to

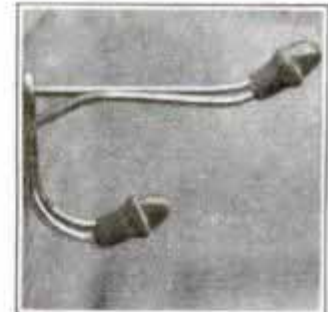
form a spout. Water running down the pipe will be diverted to the spout, under which a pan can be placed to catch it.

Broken Flower Pots Quickly Repaired with Brick-Dust Cement

During the winter when flowers are kept indoors, the pots are sometimes accidentally cracked or broken, which makes it necessary to transfer the flowers. This is not always advisable as it may damage the plant. However, you can repair the broken pot so that it is hardly noticeable. Crush and powder a brick of approximately the same color, and mix the dust with any of the commercial cements contained in tubes, to the consistency of a thick paste. Then cement the broken pieces in place, or, if a small piece has been broken out and lost, you can fill in with the paste.

Two Wardrobe-Hook Kinks That Protect Your Clothing

When several garments are hung on a wire clothes hook part of them usually fall off when one garment is taken down. To prevent this trouble, small rubber eraser tips that are used on lead pencils can be slipped over the ends of the hooks as shown in the photo. The rubber provides just enough friction against the cloth to keep the rest of the garments on the hook from falling off when the top one is removed. The lower drawing shows halves of thread spools screwed to the ends of the hooks to keep them from making holes in loosely knitted sweaters and jackets.



☛ A good filler for cracks in stoves and furnaces is made by mixing equal parts of salt and wood ashes to a paste with water.

Colonial SPINNING WHEEL

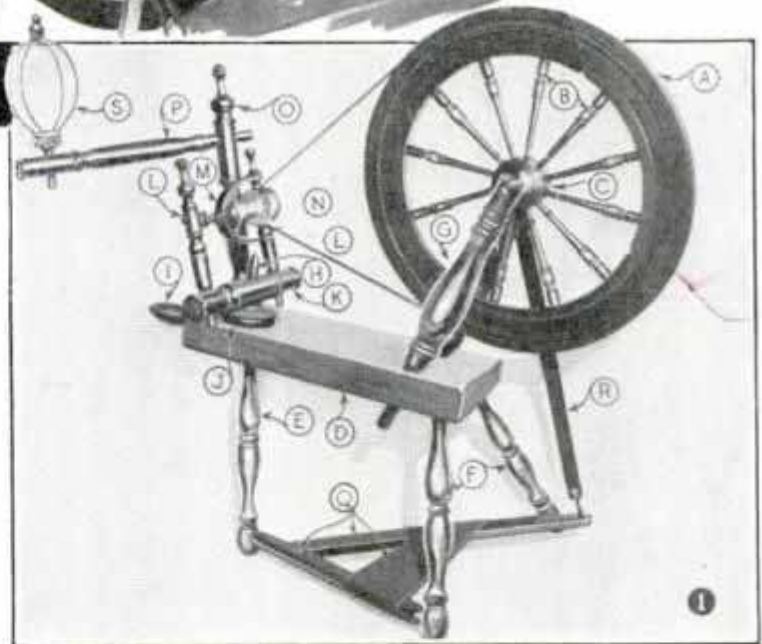


You Can Build

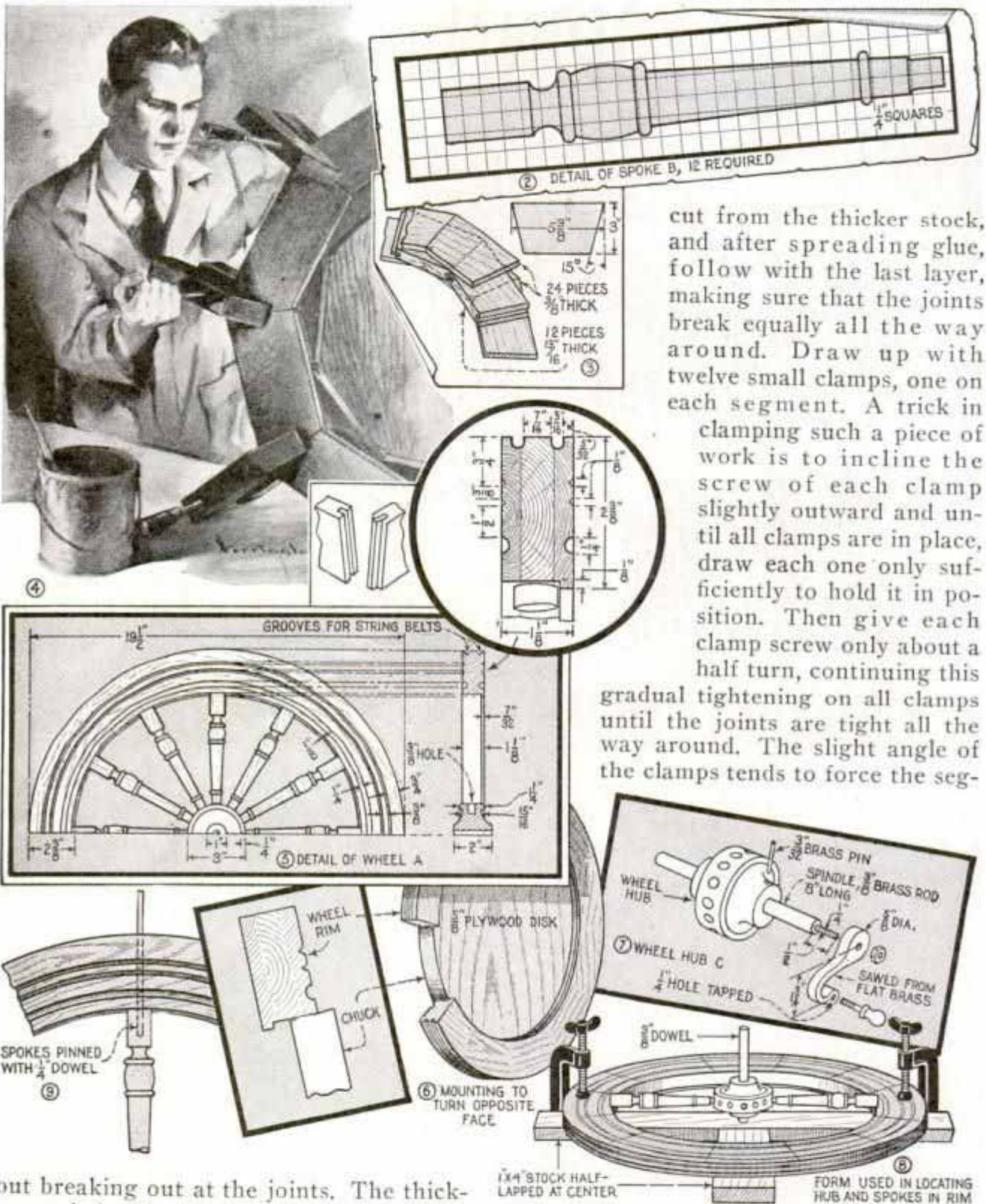
By W. Clyde Lammey

THOUGH the spinning wheel has long since been replaced by machines that multiply hand work a thousandfold, and is used only in a few remote districts where the spinning of wool and flax is still practical, it continues to be one of the most highly prized of all pieces of early American furniture, either exhibited by museums or owned and cherished by private collectors. The type of wheel shown here, which you can easily duplicate, was used almost exclusively for spinning flax, and is especially suitable as a decorative feature in the home, owing to its small size and attractive turnings. Hard white maple and Cuban mahogany were the choice kinds of wood used by the builders of the original wheels, and many times the two were combined in the construction of one wheel. Because of its superior turning and gluing properties hard white maple is preferable to use.

Before starting the construction, it is a good idea to make a careful examination



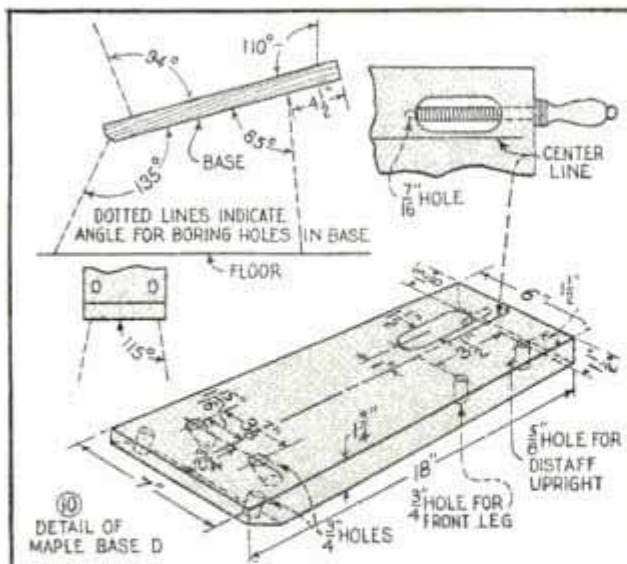
of Figs. 1 and 15 in which the various parts of the wheel are differentiated by letters, each being referred to in the various detailed sketches. The first step is building up and turning the wheel rim as shown in Figs. 3 and 4, which details a method of building up the rim by means of three layers of short segments glued together with the joints broken. This takes more time and labor but results in a rim that will never warp and will withstand any possible expansion of the spokes with-



cut from the thicker stock, and after spreading glue, follow with the last layer, making sure that the joints break equally all the way around. Draw up with twelve small clamps, one on each segment. A trick in clamping such a piece of work is to incline the screw of each clamp slightly outward and until all clamps are in place, draw each one only sufficiently to hold it in position. Then give each clamp screw only about a half turn, continuing this gradual tightening on all clamps until the joints are tight all the way around. The slight angle of the clamps tends to force the seg-

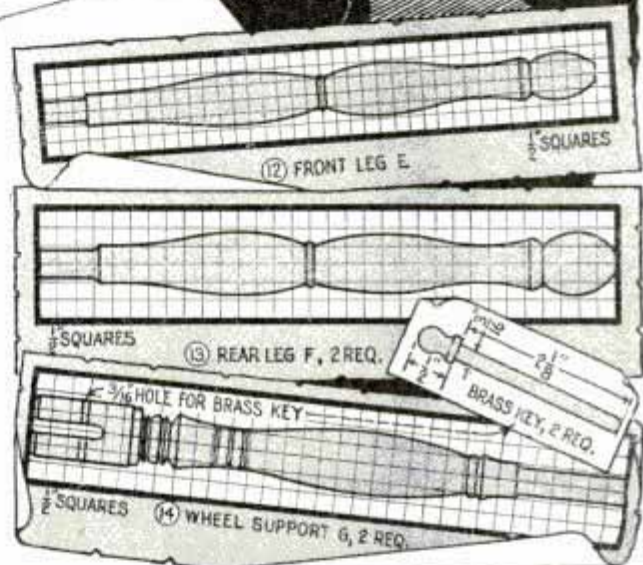
out breaking out at the joints. The thickness of the rim in the rough must be at least $\frac{3}{8}$ in. greater than the finish thickness to allow for turning. Cut twenty-four segments from $\frac{3}{8}$ -in. stock to the size given, and twelve from $\frac{1}{16}$ -in. stock. Next lay out and saw a disk $20\frac{1}{2}$ in. in diameter from $\frac{5}{8}$ -in. plywood, and to one face of this glue a sheet of heavy wrapping paper. Spread glue on both sides of the first layer of segments so that they will adhere to the paper. Then place the second layer

ments tightly together at the joints. Clean off all excess glue before it dries. Next, locate the center of the disk with relation to the wheel rim and screw the lathe faceplate to the back side of the disk. Mount the work on the outer end of the lathe spindle and provide a solid tool rest. Grind and hone the tools to a razor edge. In turning down work of this size, the speed of the lathe spindle should not exceed 350

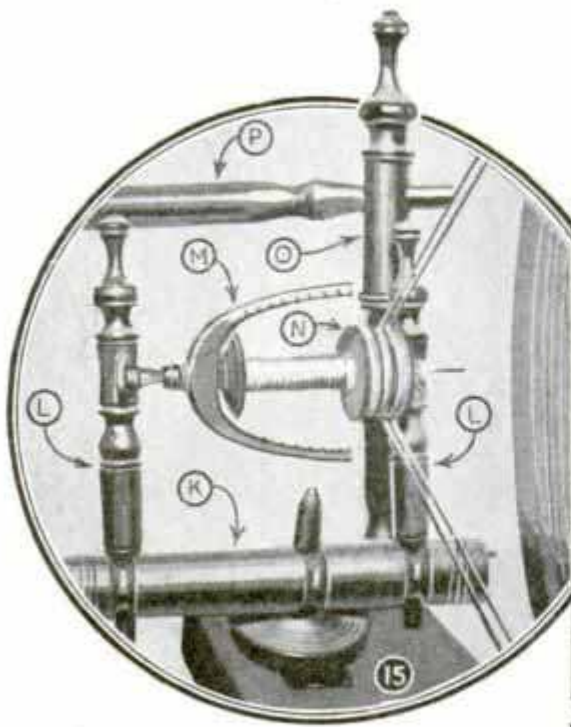


r.p.m. at the most. True the outer edge of the rim first, run finish cuts across the face until it evens up, and bring the rim to outer and inner diameter, and width. Be particular with the inner edge, and note especially the slight flange shown in the enlarged section, Fig. 5. It must be remembered that the opposite side of the rim is yet to be turned down. Leave sufficient stock, measured from the outer face, so that when the back face is finished off to bring the rim to the finish thickness, the flange will be the correct width. Also, the inner edge must be cut exactly square with the face of the rim; be careful not to bevel this edge when truing, for otherwise you are sure to have trouble in fitting the spokes. To finish, run the round-bottom grooves and V-cuts to the sizes indicated in Fig. 5 and sand smooth with fine paper. Take the work off the faceplate and separate the rim from the disk with a knife blade. Re-saw the disk to a diameter $\frac{1}{2}$ in. greater than the inner diameter of the rim, screw it back on the faceplate and true down, beveling the edge slightly from the outside until the rim will just slide on as in Fig. 6. Force the wheel rim on tightly and make sure that it runs true. Finish the face to the required thickness and width, and duplicate the cuts made on the face, which was finished in the first operation.

Next, turn out the twelve spokes as detailed in Fig. 2. To save time turn these from 1-in. birch dowel rod. In turning the spokes it is important to get a uniform diameter. Caliper the tenons to exact size. All spokes should be sanded thoroughly



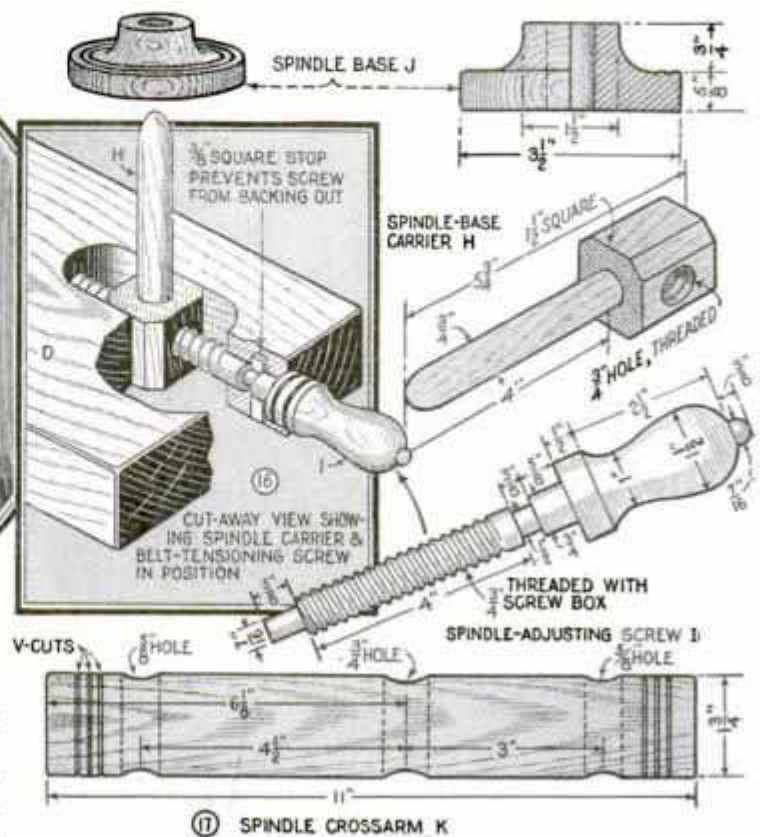
while in the lathe. The wheel hub, Fig. 7, should be turned out from a block made by gluing together several pieces with the grain running at right angles. If the hub is turned from a single solid piece, it is likely to split. When finished, drill the shaft hole and, before the work is removed from the lathe, score a center line on the face of the hub with a V-tool. Locate the twelve holes for the spokes with dividers and drill the holes, preferably on the drill-press to assure uniformity. As detailed in Fig. 2, the spokes are longer than required. To obtain the necessary tight fit in the rim, the latter is clamped to a form as in Fig. 8, the form consisting of two pieces of 1 by 4-in. stock half-lapped at the center. The exact center is then found with dividers or an improvised trammel, the radius of which is slightly greater than that of the wheel. One leg of the trammel is placed successively at three points on the rim, and the other leg is made to strike a short arc at the center of the



frame. Drill a $\frac{1}{4}$ -in. hole at this point and drive in a 6-in. length of hardwood dowel. Insert all the spokes in the hub and set the latter over the dowel, making sure that the spokes are driven in tight. Mark and cut them to length, re-insert in the hub and glue and dowel them to the rim as in Fig. 9. To finish the wheel assembly make the spindle and crank as in Fig. 7. If you do not have a metal-turning lathe, it is easy to make a simple crank from a $\frac{1}{4}$ -in. iron rod bent to the proper form and threaded for a nut on the outer end.

The next step is to get out the base as detailed in Fig. 10, and the three parts shown in Figs. 12, 13 and 14, two of which are duplicated. When making the opening for the spindle-base carrier, first drill two $1\frac{1}{2}$ -in. holes with an expansion bit, trim out the waste with a coping saw and finish up with a fine rasp. If a T-bevel is used to guide the bit when boring the holes as in Fig. 11, there will be little difficulty in getting them accurate with the angles given in Fig. 10. When turning the dowels on the legs, make sure by trial that you have your calipers set right. These parts turned, the base can be set up on the legs and the wheel placed in position on the supports. The key pins that hold the wheel spindle in place should be turned from brass rod, but if no metal-turning lathe is available these may be turned out of wood dowels. The wheel supports are also pinned in

place after the wheel is leveled so that it runs true. No glue is used on these parts



nor are the legs glued in place at this stage.

Fig. 17 details the parts to be made next, and Fig. 16 shows the assembly. When you tap the hole in the spindle-base carrier, drill and clamp two small blocks to the part to be threaded, one on each side, with the holes of the same size lining up. In this way the tap will not splinter the carrier block as it comes through. Cutting the threads on the adjusting screw is simply a matter of careful starting of the screw box. As an added precaution, soak the portion of the screw to be threaded for several hours in raw linseed oil. The crossarm is a simple turning decorated only with three V-cuts at each end. It will be noted that the holes taking the spindle supports must be drilled at an angle with the center hole taking the projecting dowel of the base carrier. The angle is approximately 7 degrees.

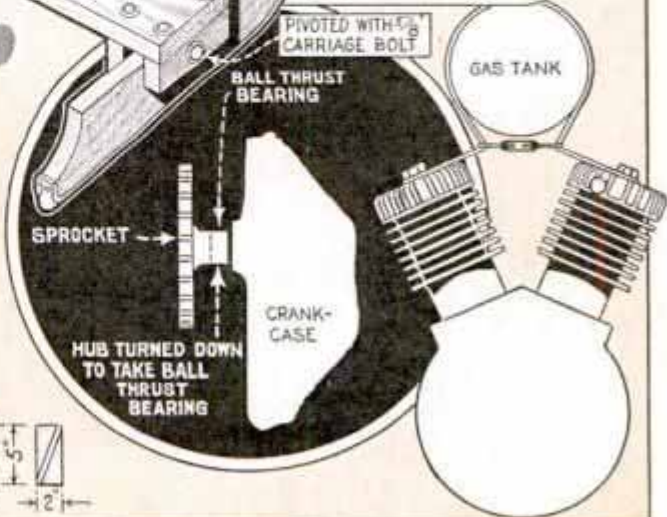
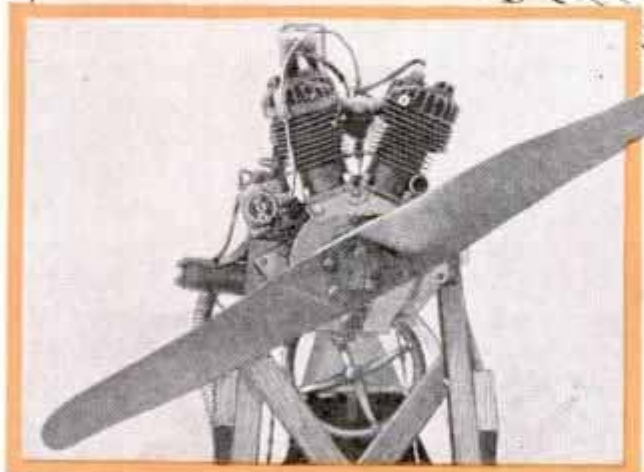
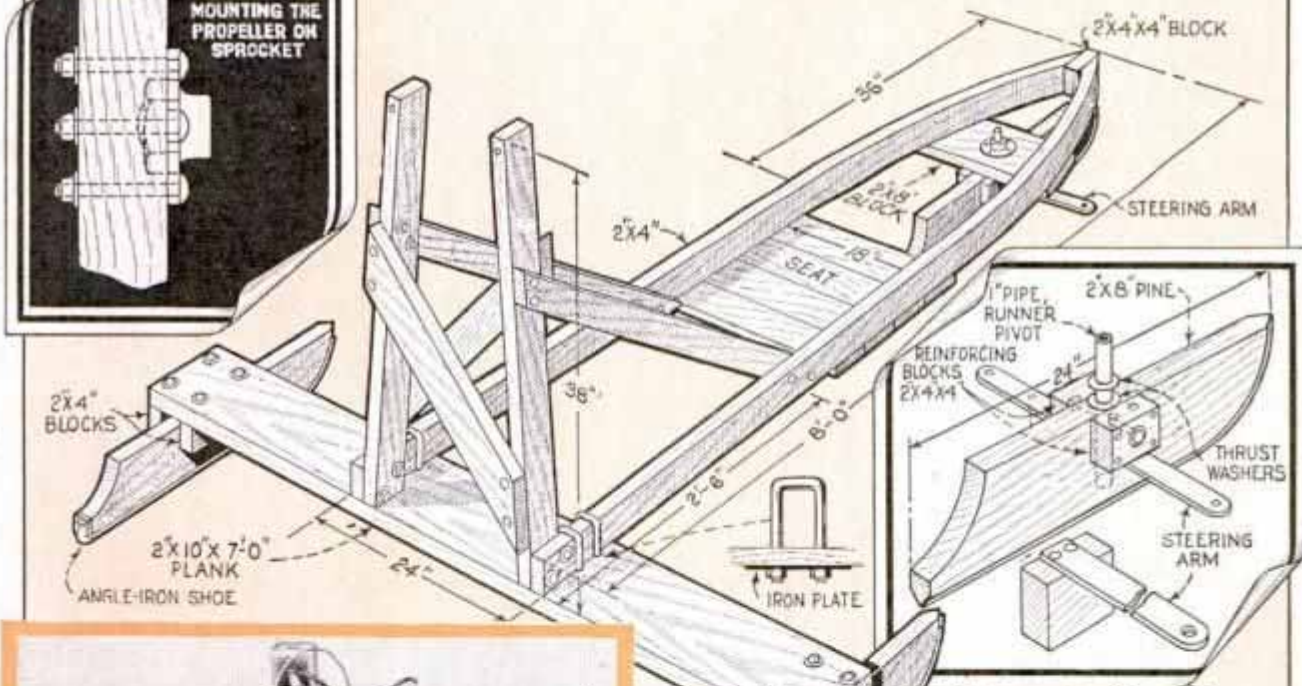
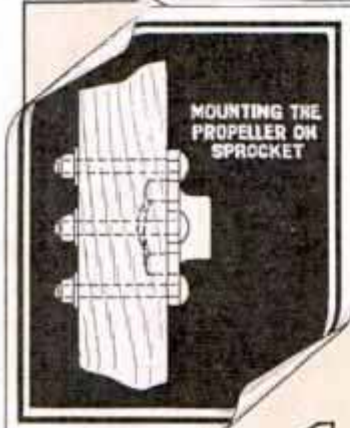
The parts which finish the spindle and flyer assembly are shown in Figs. 18 to 21 inclusive. The flyer is sawed from a piece of $\frac{3}{4}$ -in. maple stock to the form shown, and the two arms taper to $\frac{3}{8}$ in. square at the ends. The stem or drum of the bobbin is glued into a recess turned into the back face of the flanged bobbin pulley. Note especially that the diameter of the bobbin

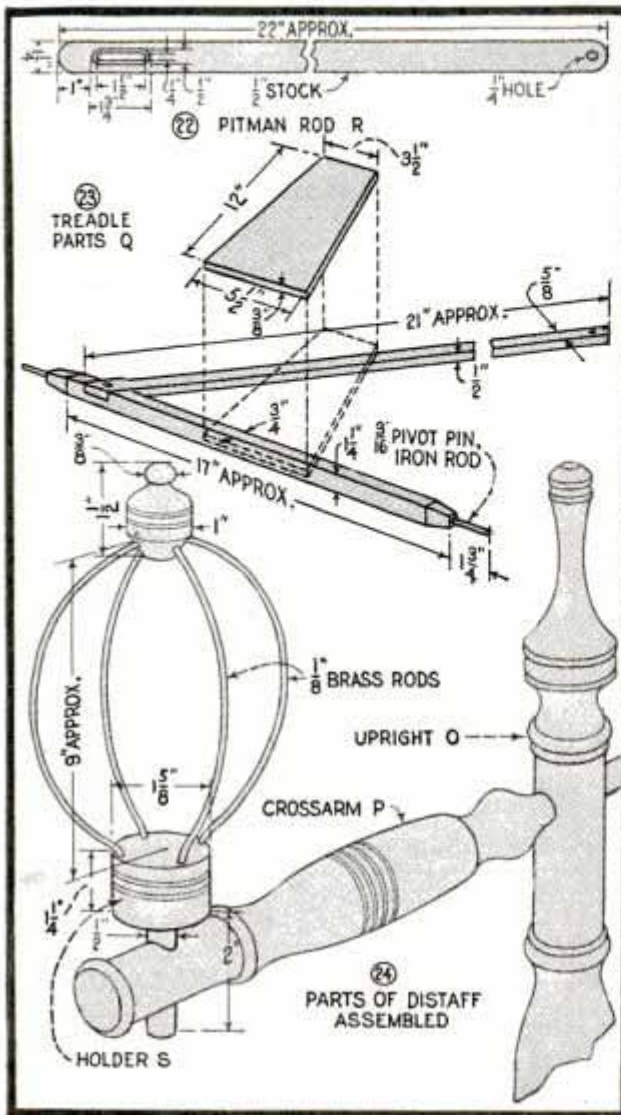
B.O. 785

Air-propelled ICE BOAT



a speed demon!

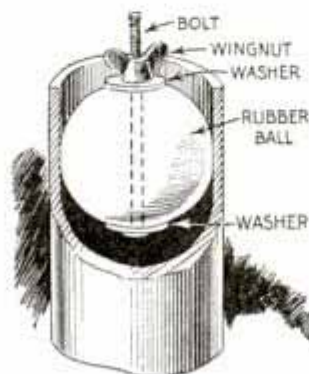




dry, brush on two coats of thin white shellac. When this is thoroughly dry, rub down with No. 00 steel wool and finish with two applications of high-grade furniture wax.

Pipe Plugged with Solid Rubber Ball

To effectively plug the end of a pipe, get a solid rubber ball, drill it through the center for a slender bolt and insert the ball into the end of the pipe to be plugged. Put a washer on the bolt, screw a wingnut down on it and tighten the nut until the ball is squeezed snugly against the inside of the pipe so it will not slip out.—E. V. Michael, Pawhuska, Okla.



Old Motorcycle Engine Drives Ice Boat at High Speed

An old motorcycle engine, a few dollars worth of lumber, bolts and flat iron is all you need to make a fast air-propelled ice boat. The construction of the framework and runners is apparent from the illustration. The two 8-ft. lengths of 2 by 4-in. stock, which are the horizontal frame members, are bolted together at the front end to a small block, after which a piece of 1 by 6-in. stock is screwed to both, 3 ft. from the end, keeping them separated 22 in. at this point. The other ends are pulled together so that they are 24 in. apart when attached to the rear cross member with U-shaped clamps. The motor mount is then built up and attached, using every precaution to make a rigid, well-braced job and being sure that it will fit the particular engine you intend to use. For this reason it may be necessary to alter the dimensions somewhat. The propeller can be either purchased or made. If you decide to make one, use a 52-in. length of 2 by 5-in. spruce, lay it out as indicated in the lower details, and with a drawknife trim the blades down to about $\frac{1}{2}$ in. thickness halfway to the tips, and $\frac{1}{4}$ in. in thickness at the tips. Run a $\frac{1}{4}$ -in. rod through the center and balance the propeller until it does not tend to settle when the rod is carried on parallel edges. Balancing is done by planing the wood off a little at a time from the heavy end. Remove the sprocket, turn enough stock from the inner end of the hub to take a small ball thrust bearing, and then put the sprocket back in place with this ball thrust bearing between it and the engine crankcase. To mount the propeller on the engine, have the sprocket in place and cut out the center of the propeller to fit snugly over the sprocket nut. Use four $\frac{5}{16}$ -in. carriage bolts to fasten the propeller to the sprocket as illustrated. A round gasoline tank of about 1 gal. capacity can be mounted above the engine on a bracket made of 1 by $\frac{1}{8}$ -in. flat iron. The ends of the iron go under the cylinder-head studs. A small turnbuckle or long bolt will squeeze the bracket tight around the gasoline tank. Battery ignition, if available, will help in starting on account of the cold-weather conditions and the impossibility of really spinning the engine.



Heavy Flannel Cloth Soaked in Polishing Solution Is Handy for Cleaning Metal Ware

Cloth Impregnated with Polishing Solution Cleans Metal Ware

A cloth for polishing household metal ware can easily be made by soaking a heavy flannel cloth in a solution of water, $\frac{1}{2}$ pt., ammonia, 2 tablespoonfuls, salt, 1 tablespoonful and finely pulverized rottenstone, 1 tablespoonful. Soak the cloth in the solution about an hour, stirring occasionally, then wring out and allow to dry.

Patching Cement Containers with Foil

When tubes containing patching cement are accidentally split or punctured, get a piece of tin foil and patch them. Fold the foil three or four times, putting a coating of the cement between each one. Apply a little of the cement to the surface of the tube around the hole and put your foil patch in place.

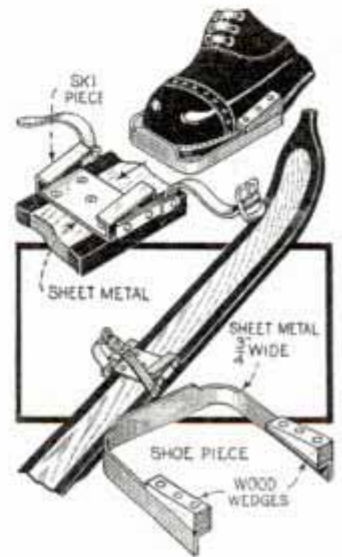


Vignetting Enlarged Photos

By removing the ground glass of a projection printer and substituting a piece of thin paper, you can make unusual enlargements. Move the negative until the desired portion is in the center of the bright spot on the screen. Longer or shorter exposures may be necessary according to the thickness of the paper used instead of the diffusing glass. Enlargements made in this way fade almost to white at the edges.—Neil Nelson, Kansas City, Mo.

This Metal Ski Harness Clamps the Shoe Tightly

When skiing, uncomfortable tightness of the toe strap on a regular ski harness is eliminated by using this metal harness, which consists of a ski piece and a shoe piece. The latter is a strip of sheet metal bent to the contour of the shoe sole, the upper edge being bent over at right angles at the ends to form tapered flanges, which fit over the edge of the sole. Small wooden wedges are riveted to the flanges and slip into grooves formed on the ends of the ski piece, which is also made of sheet metal and is screwed to the top side of the ski. Leather straps, one of which is fitted with a buckle, are fastened to lugs riveted to the side of the ski piece. In use, the shoe piece is placed around the sole of the shoe, as shown, and is slipped into the ski piece, after which the strap is tightened against the heel of the shoe.—James H. Rogers, Toronto, Can.

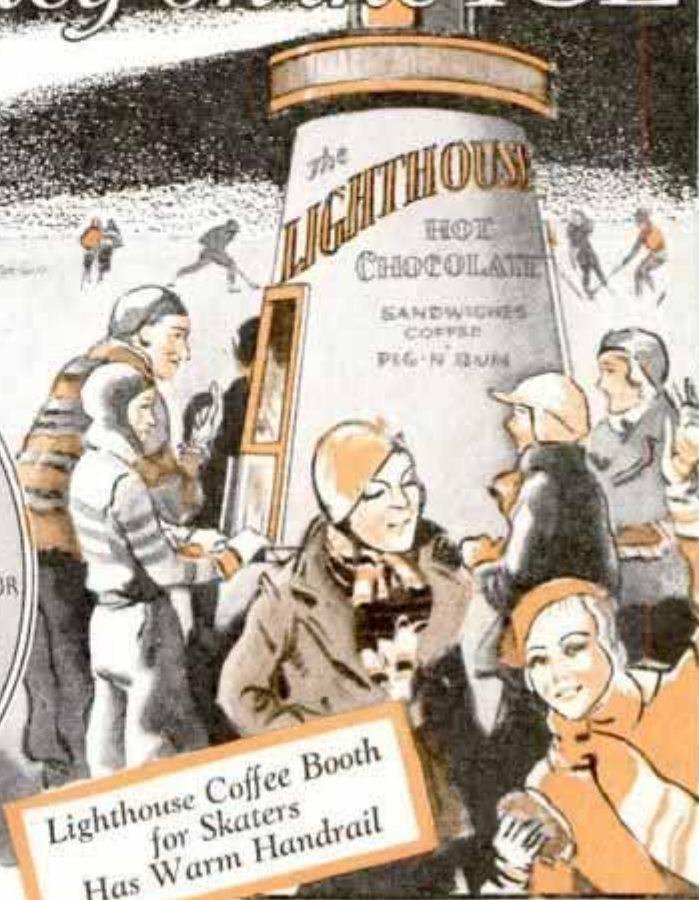
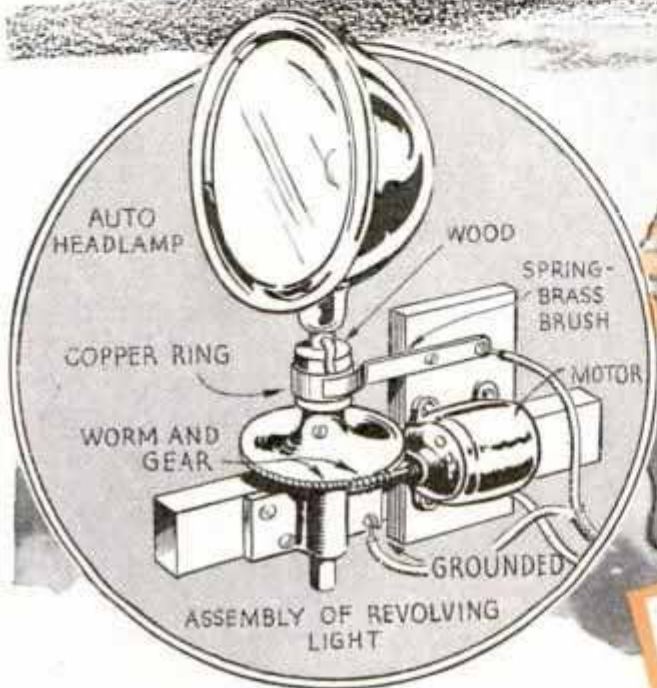


Hinges Made of Sheet Metal

Effective cupboard-door hinges of almost any design can be made of light sheet metal. First cut out the design in two pieces of the metal as shown in the lower detail. Then bend the metal at right angles as indicated by the dotted lines of the upper detail, place a nail in the bend and press the metal around it to form holes for the hinge pin, which in this case was a nail. Now drill small holes in both parts of the hinge and screw them in place. Soldering is unnecessary as the screws will hold the folded parts together.—H. G. Wiles, Moha, B. C., Can.



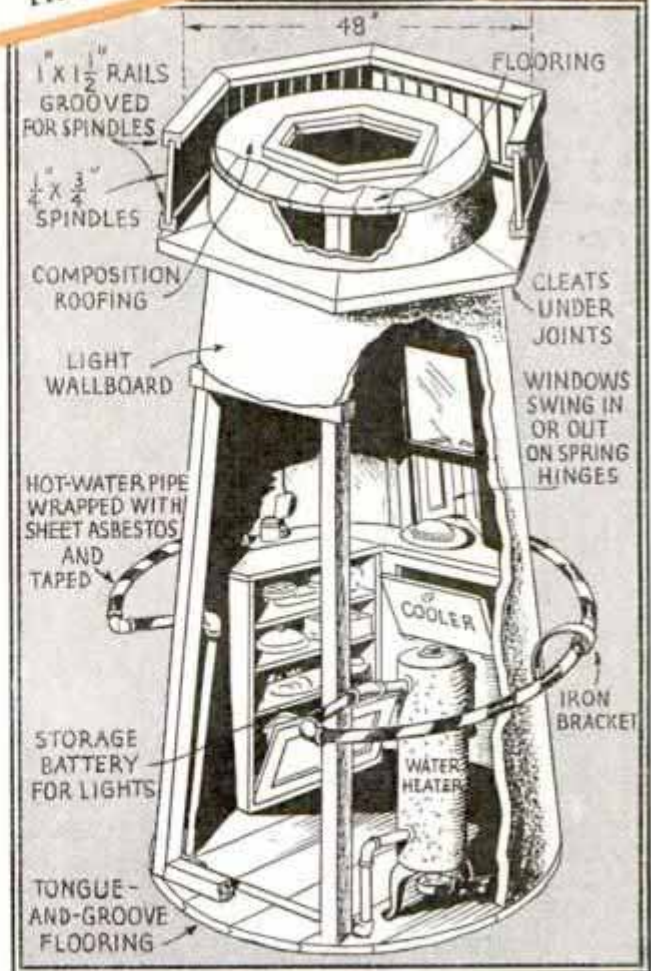
Making Money on the ICE



By BOB HARTLEY

THIS lighthouse refreshment booth can be spotted from afar and will draw trade from great distances, for it not only serves hot sandwiches and drinks, but warms the fingers of patrons while they are being served. A hand rail around the structure is made of pipe through which hot water circulates, and is wrapped with asbestos so that it will not blister numbed fingers. On top is a beacon with a revolving light which casts successively yellow, blue, green, red, violet and white beams across the ice. Mounted on a sled, it can be drawn to the most advantageous spot on the lake for business.

First build the sled, which serves as the foundation. The runners are spaced 54 in. on centers to conform with auto tracks, and 2 by 5-in. cross-members serve as floor joists. Six 2 by 2-in. studs 8 ft. long incline inward to a top 36 in. in diameter, forming a hexagonal frame. These are braced by curved pieces spaced at the levels shown. The frame is further reinforced by X-braces in the bottom panels. A space





is left open at the front for the door, and a service counter is installed at the rear. A light-grade of wallboard, with one coat of paint inside and two outside, is bent around the framework. The beacon is a hexagonal enclosure composed of six sash 12 by 15 in., covered with a circular top on which a galvanized-sheet roof is fastened. Back of each pane, install a sheet of different colored cellophane or similar material. The beacon is fastened to the top of the tower by means of angle brackets. A revolving light will, of course, have much greater attention-value than a stationary light. One can be made according to the circular insert. An automobile headlight is mounted on a vertical shaft and rotated by means of a 6-volt motor through a

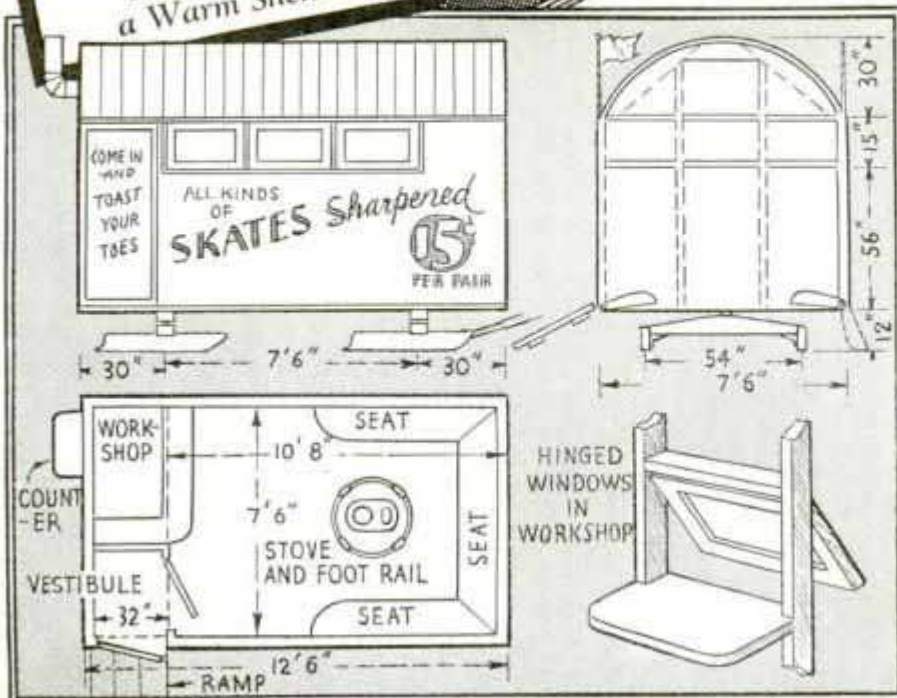
large ratio (about 100 to 1) worm and worm gear. Current is supplied by storage batteries. For the service window, an ordinary sash is installed above with a pair of swinging windows on spring hinges below. A hot-plate or stove fueled with coal, oil or kerosene is located inside, and should have a vent in the wall above it to carry off smoke and fumes. A cooler can be made by building a cupboard under the counter, having a vent to the outside air. For foot warmth, newspapers or insulating wallboard should be laid

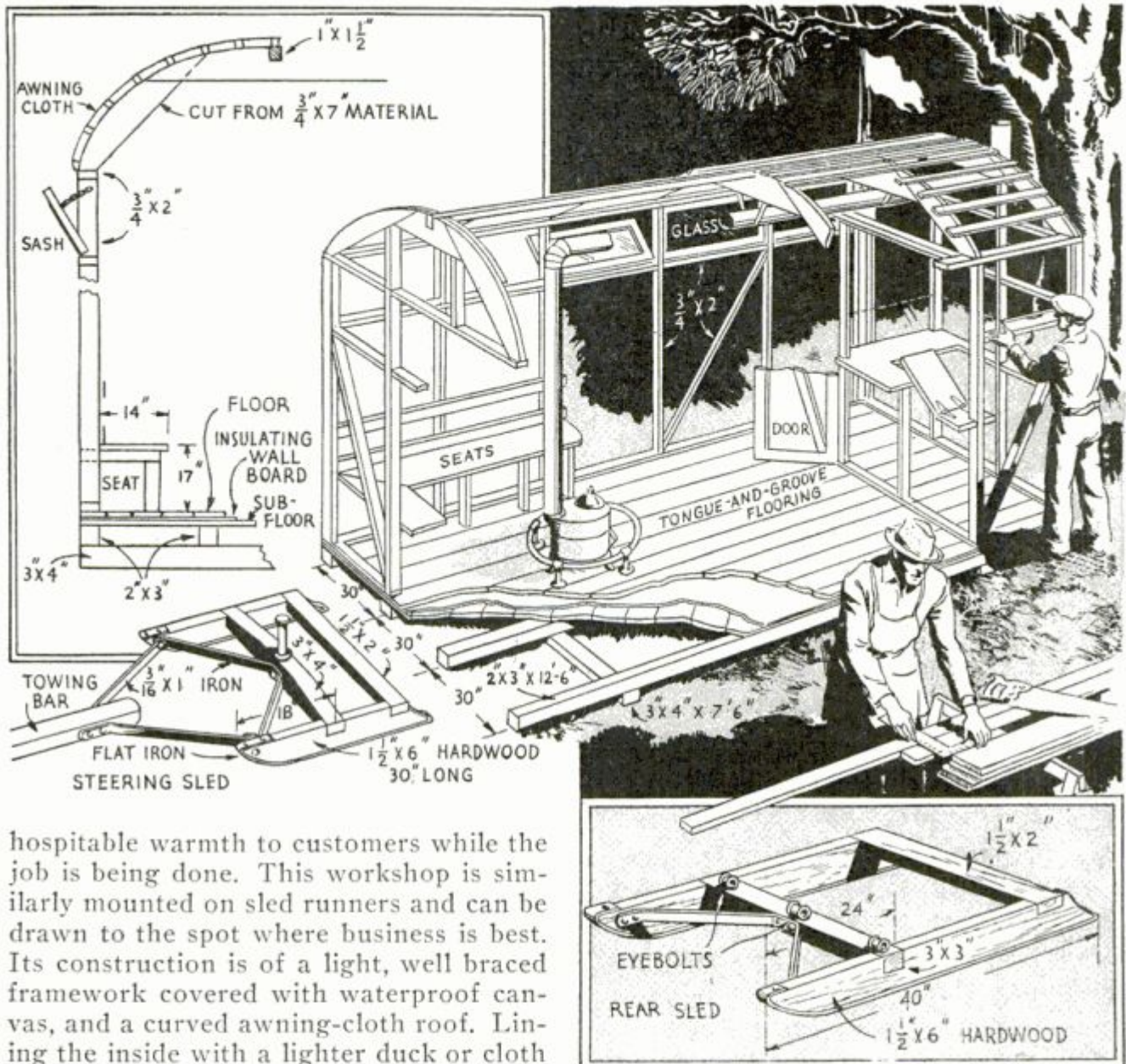
over the floor and linoleum on top of that. The water-heater installation is very simple. Wrap the hand-rail pipe with strips of sheet asbestos wound in one direction, and then with friction tape in the other direction. The insulation prevents excessive loss of heat and protects the hands from the bare pipe.

There is also money to be made in sharpening skates in a workshop right out on the ice, which should be large enough to offer



Skate Sharpeners' Shanty Also Provides a Warm Shelter





hospitable warmth to customers while the job is being done. This workshop is similarly mounted on sled runners and can be drawn to the spot where business is best. Its construction is of a light, well braced framework covered with waterproof canvas, and a curved awning-cloth roof. Lining the inside with a lighter duck or cloth makes a double-walled job with dead-air space between and good protection against the most biting winter wind. Three glass panes permit a view out upon the ice. At night, a storage battery and auto lamps supply illumination. A vestibule with double doors prevents direct draft upon the occupants, while the proprietor has a booth in which his vise, bench and other equipment are installed. Wall seats are built around a stove with a foot rail, and all is snug and warm with the insulated floor, and other protection.

For heating a comparatively small interior, a small "air-tight" stove will be satisfactory. Having a chimney, it assists greatly in carrying off fumes and promotes ventilation, and as a heater it is unsurpassed. Red and green-striped awning cloth makes a striking roof that can be spotted for a long distance over the ice,

and tan canvas on the sides gives the effect of warmth. A double roof will increase the insulating qualities, and can be provided by tacking light duck or even less expensive fabric directly upon the rafters before the slats are installed, and then the awning cloth over the slats. There is no question but that success attends the merchant who brings his goods right at the door of demand, and this trim shop assuredly fills that requirement. Without much additional expense a few cold-weather delicacies, such as hot chocolate and hot dogs could also be dispensed to the profit of the proprietor.

☐ Rust stains on a lavatory can be removed by covering the discolored spot with salt and rubbing it hard with a half of a lemon.



Doubled and Twisted Length of Piano Wire, Makes a Gun Cleaner That Is Easily Carried in the Pocket

A Pocket Gun Cleaner of Flexible Wire

Here is a flexible gun cleaner that can be carried in your pocket on hunting trips. A length of piano wire is doubled so that the ends meet in the center of the doubled piece, which is then twisted to form a loop on each end as shown. Any small round box will serve as a container. In using the cleaner, it should be pulled through the gun barrel, as it is much too flexible to be pushed.

The Tricks of Tracking a Fox

The red fox is one of the most difficult of all fur-bearing animals to capture, yet is one of the easiest to track down and shoot if its habits are understood. In tracking a fox, remember that it prefers to catch food at night and sleep in the daytime. Therefore, after a light snowfall in the late hours of the night, the hunter should be afield early. If it is frosty, it is best to wait until the sun has slightly softened the snow. Find a track that indicates the animal's desire to rest and sleep. A tired fox invariably seeks a cove or a side-hill woodlot that faces the afternoon sun. Whenever the tracks wander about over rocks and fallen tree trunks in the general direction of a sunny slope or cove, it is pretty safe to assume that the animal will be lying there. By coming up facing the wind, you can approach a tired fox at surprisingly close range. But remember that

the wind should never be from the hunter toward the fox, as it invariably lies down with its nose pointing back in the direction of its trail. If the wind changes while the animal is resting, it moves and locates itself again with the wind blowing from its trail to where it sleeps. Therefore, the resting place must be figured out from a distance and a detour made so that the hunter will come into the woodlot from the side opposite that from which the fox entered.

Grooves Cut in Outside Stair Treads Prevent Warping

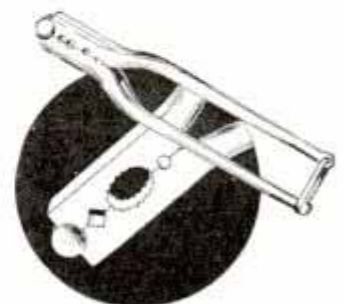
Stair treads exposed to the weather usually warp lengthwise and the ends cup upward. This loosens the nails and causes the tread to be more or less unstable, if not actually unsafe. To avoid this trouble, cut two or three narrow grooves lengthwise on the underside of each tread, the depth of the grooves being about one-third the thickness of the stock. This is



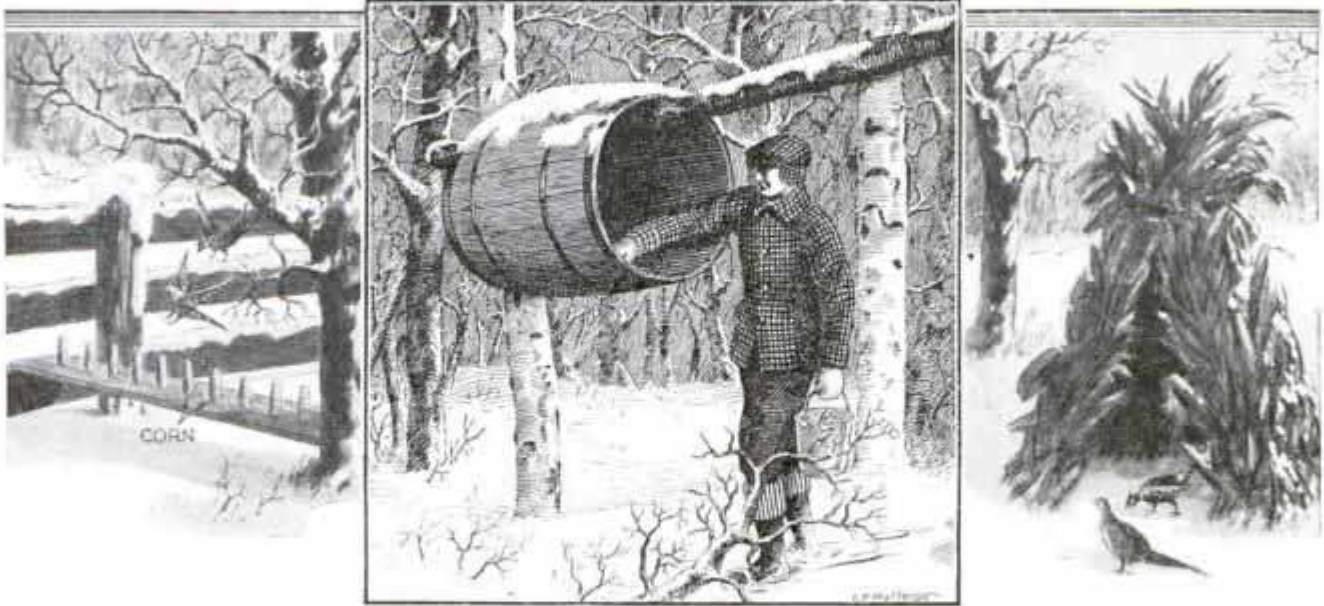
best done on a circular saw, but may be done with a backsaw, using a guide strip clamped to the tread. The sides and edges of the treads should be painted before nailing in place.

Buggy-Top Braces Make Good Clamps

Utilizing the braces from an old buggy top, you can make a couple of tools that have many uses around the shop. They can be used as light clamps or vises, and will be even more useful if locking links are provided at the ends of the handles. The upper detail shows convenient notches for holding wires when splicing, while the tool in the lower detail is made for holding square stock, light pipe, etc.



Winter Feeding Stations Protect Game Birds

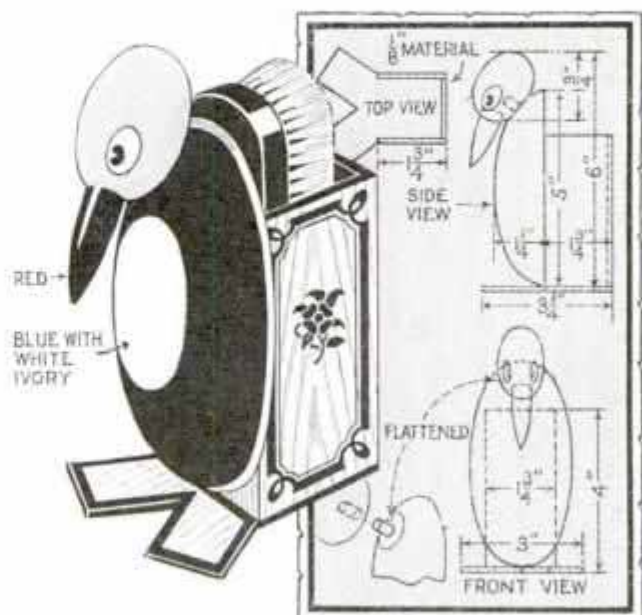


During the winter and spring months when the ground is covered with snow, many sportsmen and farmers go into the fields and feed game birds. As a rule, the beginner throws out a bushel of feed on the ground, which may mean just a waste of feed. After a number of experiments, it was found that one of the most successful feeding shelters was the cornstalk or brush wigam, shown in the right-hand photo. Three or four poles are set on end in the ground and their tops are tied together. Then, leaving an opening for the birds to enter, weave cornstalks or small tree branches into the framework until you have a thick shelter. Be sure that the opening is facing away from the prevailing winds, usually the south side. The birds quickly learn the location of the shelters, and, in cases where necessary, cracked corn or other feed may be scattered from the roosting place to the shelter. In the center photo is shown a feeding station made from a barrel. This type is widely used in the north woods. First select a protected spot where a clump of trees or heavy brush gives way to a small opening. Take a light pole and support it horizontally between two trees. Then get a wooden barrel, knock out both ends, and hang it over the pole, driving a small nail through the top into the pole to hold the barrel steady. The nail-and-board type of station is shown in the left-hand photo. This is one of the simplest to make and consists of a board supported a couple of

feet above the ground. Spikes are driven through the board at intervals to hold ears of corn on which the birds feed.

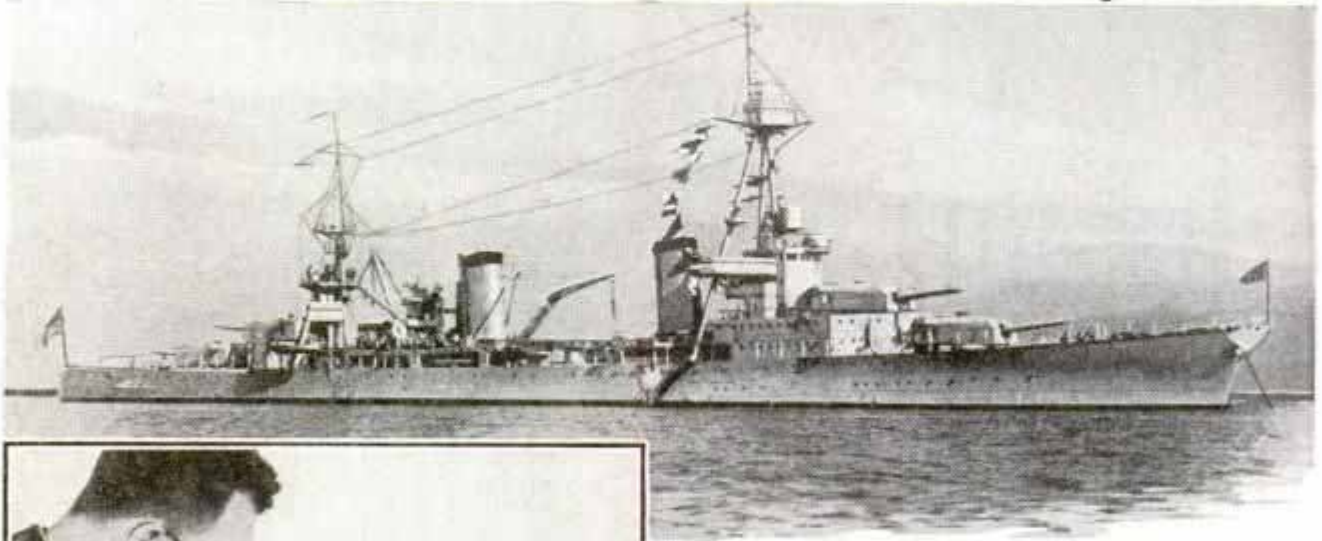
Penguin Brush Holder

This downcast penguin with his sad eyes earns dresser space by holding a small clothes brush in the case on his back. Painted in a bright blue, shaded to an ivory breast, he is an amusing little fellow. Both the beak and feet are bright red. For the base and box, use $\frac{1}{8}$ -in. material. The head and body can be turned on a lathe, the latter sawed in half, or whittled out. Paint as suggested and shellac the holder.



This Penguin Clothes-Brush Holder Will Make a Novel and Practical Addition to Your Dresser

MIDGET MODEL *of the*



THROUGH permission from the navy department we are able to publish these working plans for constructing a model of the 10,000-ton Treaty cruisers, "Salt Lake City" and "Pensacola," which are sister ships. It is to be noted that the department has permitted the publication of sections showing the underwater form of these ships, so that, together with the other plans, an exact miniature model may be made of these very interesting naval vessels.

The "Salt Lake City" and "Pensacola" were the first two of fifteen ships built or being built under the limitations set by the Washington Treaty. Their displacement or weight is 10,000 tons without fuel or fresh water for the boilers, or about 11,600 tons including the latter. They are 585 ft. 6 in. long over all, by 65 ft. 3 in. extreme breadth, by 19 ft. 6½ in. draft. Their battery consists of ten 8-in. 55-caliber

guns, and four 5-in., 25-caliber anti-aircraft guns. In addition each ship carries four seaplanes which are launched from two catapults. These cruisers are driven at a speed of 32.5 knots or about 37 land miles per hour. The propulsive machinery consists of eight oil-fired boilers and steam turbines with reduction gears driving four propellers and developing the enormous amount of 107,000 hp. The ships have a flush main deck, a bulbous forefoot forward, which decreases the resistance, and a moderately broad stern with V-sections under water, aft.

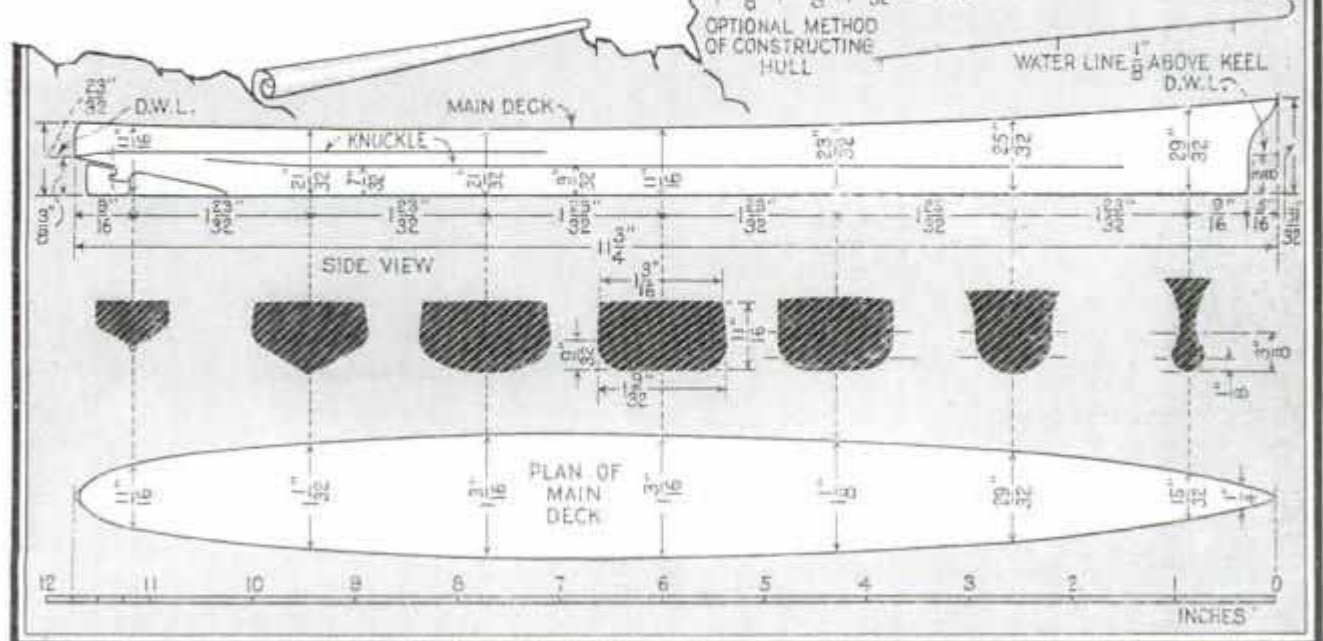
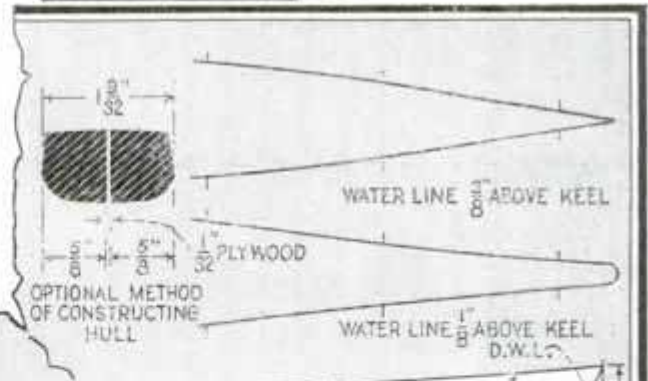
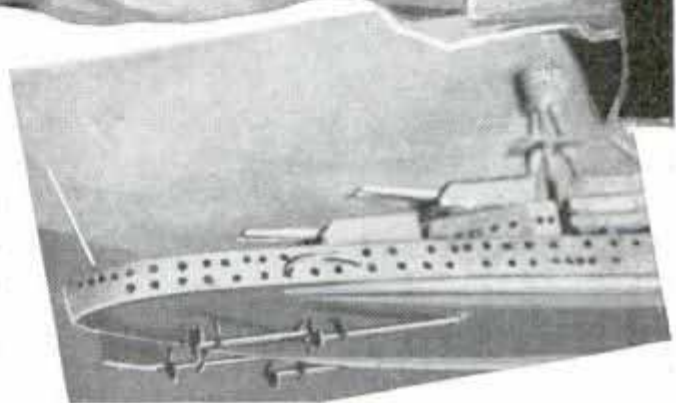
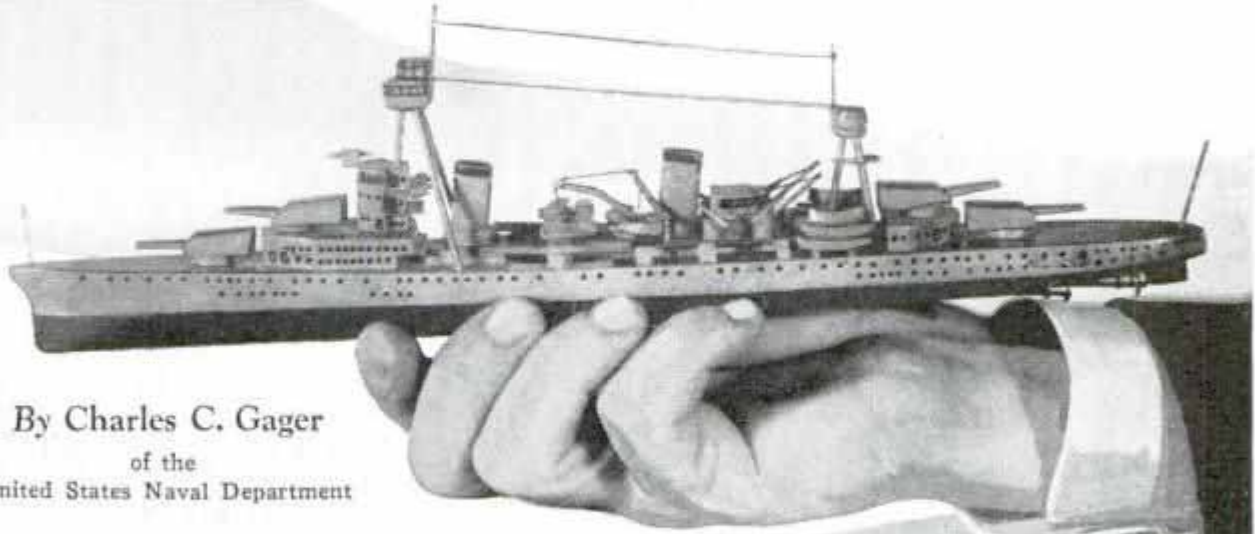
The model shows a pleasing, well-balanced design which is not too complicated for the amateur to construct, and which contains sufficient detail for the worker to exhibit his skill. The plans are drawn on a scale of 1 in. equals 50 ft., which makes the model one-six hundredth the size of the actual ship. The dimensions are set down to the nearest 32nd of an inch. The model can be made with ordinary tools and material.

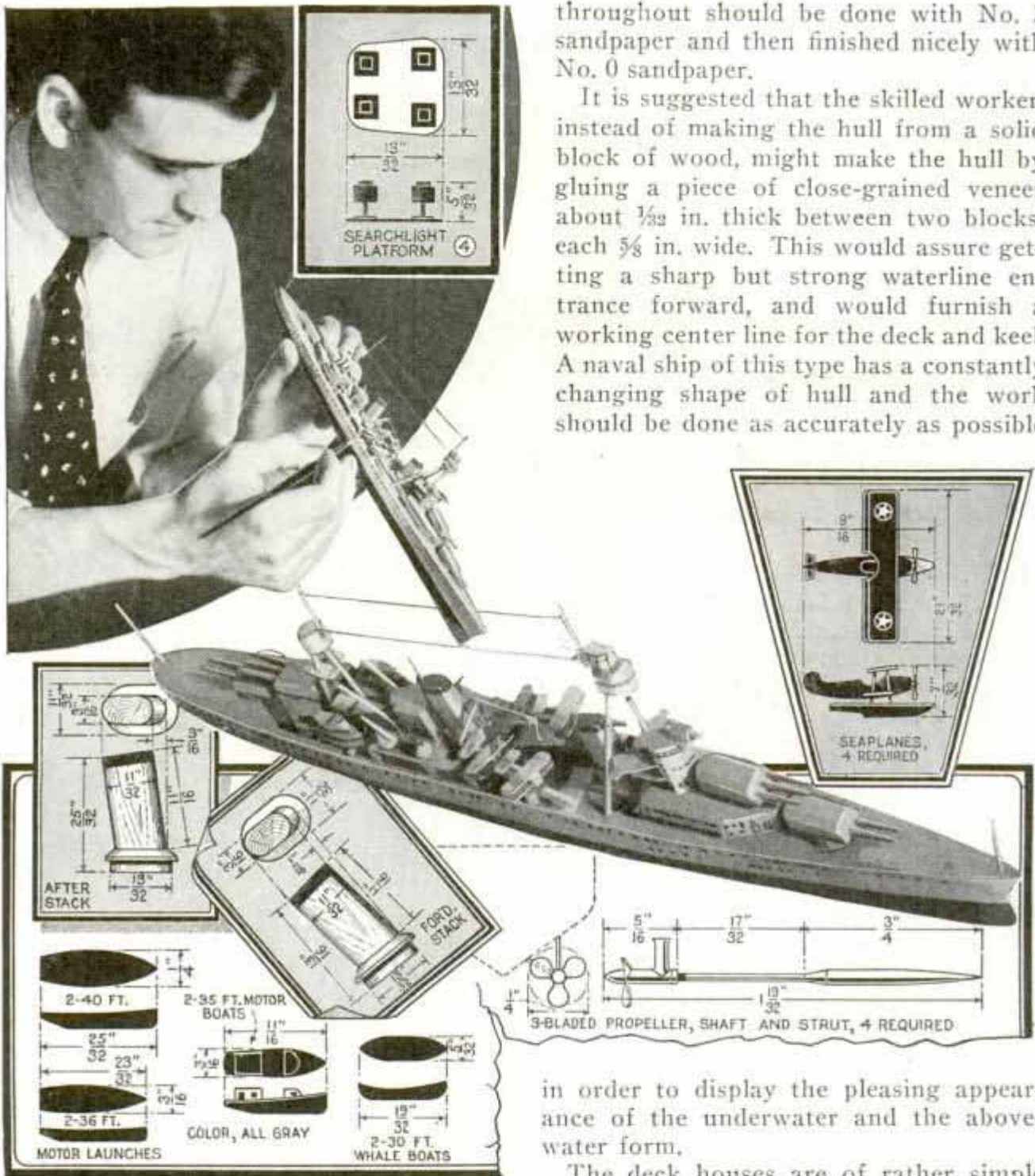
First shape up the hull from a block of clear pine or some other soft wood 1½ in. wide, ¾ in. deep, and 11¼ in. long. The main deck line should be laid off on each side of this block, as shown on the side view. Although the deck of the ship is actually cambered or curved from side to side as shown on the sections, this curvature is so small that it may be neglected on the model if desired. Plane the wood

U.S.S. "PENSACOLA"

By Charles C. Gager
of the
United States Naval Department

block down to the fore and aft curvature of the main deck. Next lay off the shape of the main deck, as shown in the plan view. Plane or whittle the block to this line, taking notice that for the middle portion of the model the sides have a "tumble-home" or straight slanting sides, and that the model here is the widest at the knuckle and not at the deck. The ship is shaped this way so that the armor may be more easily constructed. The stem and stern profiles should then be shaped up as shown in the side view, omitting the rudder and horn, which are to be fastened on later. Draw the two knuckle lines as guides for shaping the hull and make cardboard templates of the sections, applying





them to the model in order to obtain the correct shape. Notice that forward, the model is very sharp at the waterline, as shown in the plan view of this waterline $\frac{3}{8}$ in. above the keel, while underwater forward the model has a well-rounded bulb, as shown in the plan view of the waterline $\frac{1}{8}$ in. above the keel. A gouge will not be of much use in obtaining the flared sections above the waterline as the model is so tiny. It is better to remove the wood with No. 2 sandpaper held on a curved block. Indeed the rough fairing

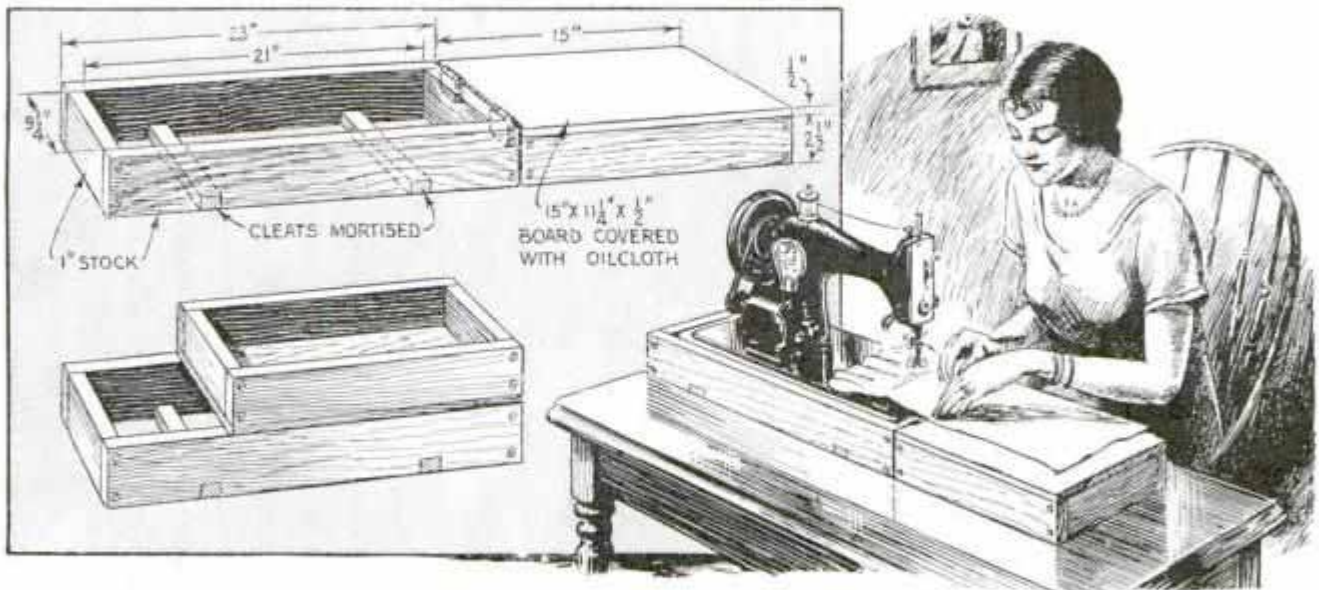
throughout should be done with No. 2 sandpaper and then finished nicely with No. 0 sandpaper.

It is suggested that the skilled worker, instead of making the hull from a solid block of wood, might make the hull by gluing a piece of close-grained veneer about $\frac{1}{32}$ in. thick between two blocks, each $\frac{5}{8}$ in. wide. This would assure getting a sharp but strong waterline entrance forward, and would furnish a working center line for the deck and keel. A naval ship of this type has a constantly changing shape of hull and the work should be done as accurately as possible

in order to display the pleasing appearance of the underwater and the above-water form.

The deck houses are of rather simple shape and should be made of wood. Part of the forward-deck house, which contains the officers' quarters is indicated by No. 12, while the other part of the forward-deck house, containing air intakes to the forward boilers is No. 10. The center-deck house containing air intakes to the after boilers and also containing the galleys, is No. 17. Nos. 3 and 5 detail both parts of the after-deck house, the first containing washrooms and shops, while the latter is the part located under the main mast, and carries provisions and a radio transmitter. No. 4 shows the search-

Work Support on Portable Sewing Machine

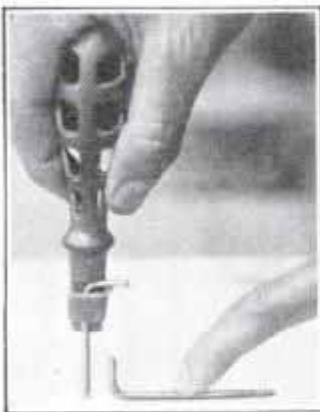


Anyone who has used a portable sewing machine and knows how difficult it is to handle the cloth, which has a tendency to fall down over the end of the machine, will appreciate the convenience of this extension. It is made up of two frames hinged together at the ends as indicated. The larger frame has no bottom or top but is

reinforced with two mortised cleats, on which the machine is set. The smaller frame has a wood top covered with oil-cloth in order to provide a surface on which the fabric being sewed will readily slide. When it is not being used, the extension can be folded and set away.—Louis F. Pietz, Harvey, Ill.

Driving Screwhooks with Metal File Handle

In cases where a number of screwhooks are to be driven, it is a good idea to get a metal file handle of the type shown, to make the work easy. Fasten the hook to the handle by means of the clamp used to hold the file tang, and you can drive the screw so that it will be perfectly straight.



A Simple Window-Shade Repair

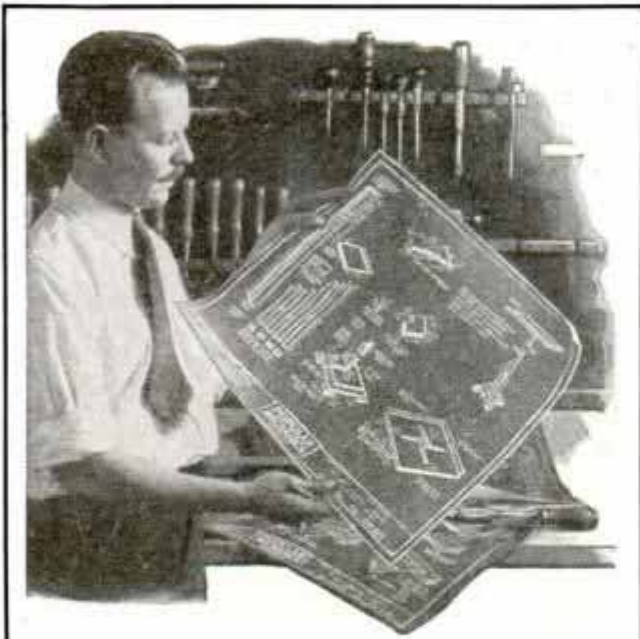
To renew the lower end of a window shade, cut off the torn or soiled part, and re-hem it on a sewing machine, or use gummed tape for fastening the hem in place. If this makes the curtain too short, remove the top end from the roller and

lengthen it by adding a piece from an old curtain. A piece of heavy paper or cloth of the necessary length may be used if no old curtain is available. Tears in shades may be repaired with gummed tape.

Improvised Column Clamps

Efficient clamps for gluing up tapered polygonal or column work can be made by cutting round holes in the center of a few pieces of square wood blocks. The clamps keep the work perfectly true while the glue is drying, and, if made of hardwood, their gripping power is exceedingly great. The holes in the clamps are of different sizes to fit various points on the work. They are driven in place by tapping the edge with a hammer.—Wayne C. Leckey, Aurora, Ill.





380 BLUEPRINTS for Home . . . Craftsmen

Iceboats, skis, snowshoes, all kinds of models, toys, simplified furniture, bric-a-brac shelves, garage, four-room bungalow and numerous other practical things to build. Complete list 3c postage. Price of prints are 25c each, or six for \$1.00 postpaid. Address Blueprint Department.

(See list of blueprints in advertising section)

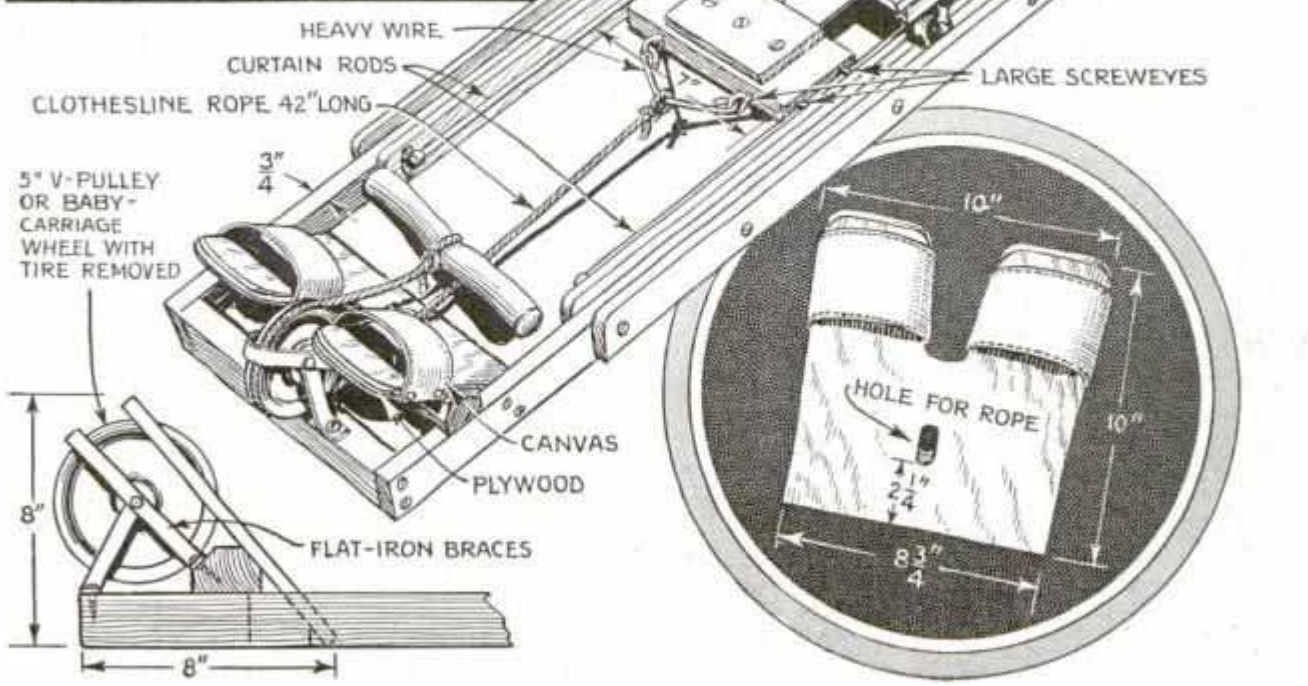
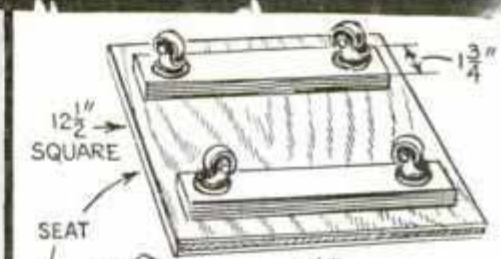
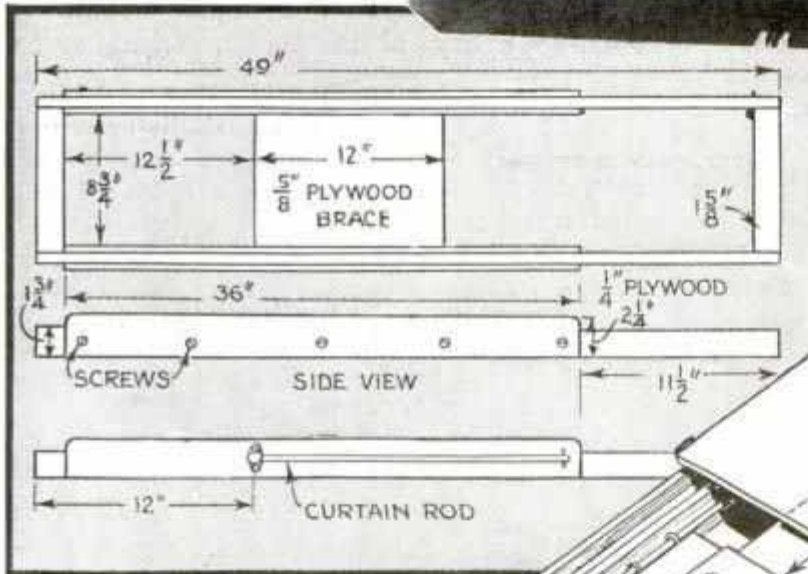
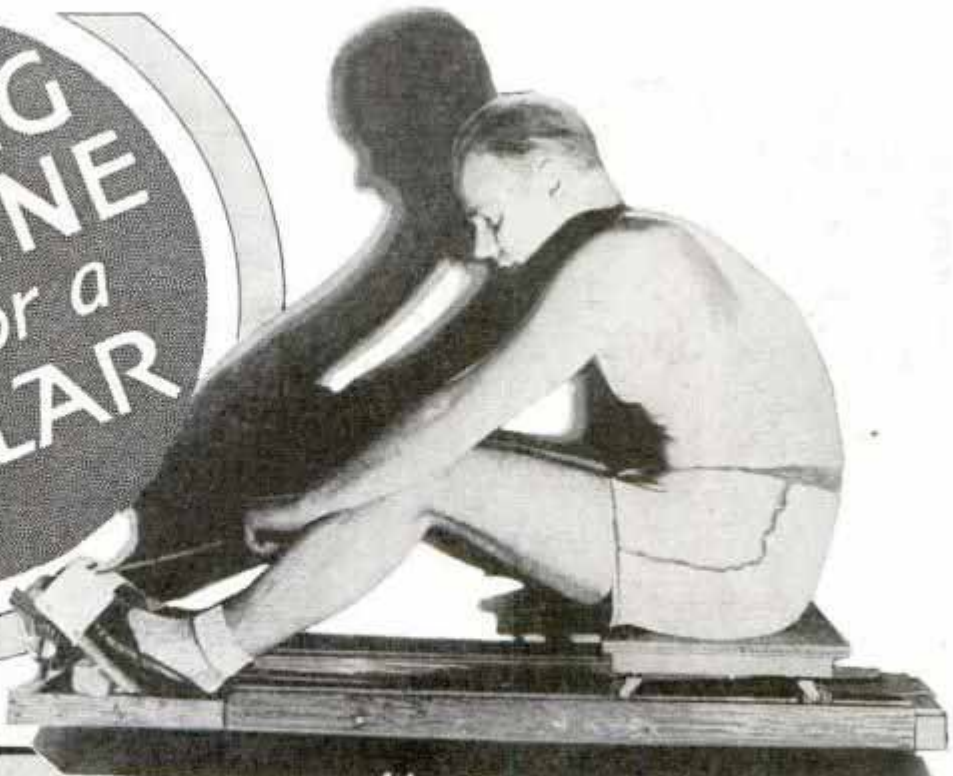


Homemade Electric Corn Popper

An electric corn popper is easily made from a 1-gal. pail fitted with a tight lid. A 650-watt heating element, consisting of 28½ ft. of No. 20 Nichrome wire, is strung on the top of an asbestos disk, cut to fit inside of the pail. The disk is drilled at three equidistant points, located ½ in. from its edge, to receive screws, which pass through the bottom of the pail and serve the dual purpose of holders for the element and leg supports. Iron washers are slipped over the screws before assembly, to raise the asbestos above the bottom of the pail. Legs are made by mounting porcelain insulators on the ends of the screws. Another hole is drilled in the bottom of the pail to receive a porcelain bushing through which a drop cord is inserted. The next step is to make the element by winding the Nichrome wire on a ⅛-in. rod, after which the wire is removed and stretched until the turns are about ⅛ in. apart. A hole is next drilled in the center of the asbestos disk and one end of the element is fastened between washers with a screw. The coil of wire is then placed spirally around the center of the disk so that its turns are about equally spaced. The wire may be held in place by drilling small holes in the asbestos and pressing iron staples through them, to straddle the element. Care should be taken to prevent the binding wires from touching each other or from coming in contact with the pail. The free end of the element is next fastened to the asbestos with two washers and a screw, and the drop cord is connected to the screws. To complete the popper, cut an aluminum disk to fit inside the pail. In cutting the disk, leave four projections, 2 in. long and ¾ in. wide, so they can be bent down and pressed between the asbestos and the pail to support the disk just above and out of contact with the heating element. The lid is drilled centrally to take a small rod or wire, which is used to stir the corn. A U-shaped strap, drilled in the center, should be riveted to the underside of the lid in such a position that the center is directly under the hole previously drilled in the lid. The end of the rod inside the popper is bent at right angles, while the other end is bent to form a crank, for keeping the corn in motion while popping.

ROWING MACHINE

built for a DOLLAR





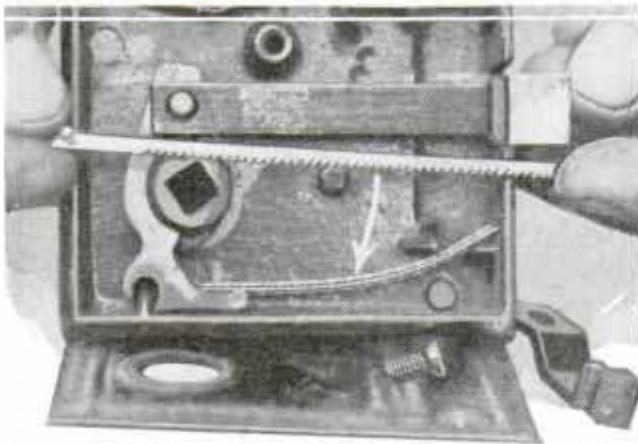
Strip of Felt between Laces and Tongue of Skate Shoe Gives Skater Foot Comfort

Felt on Shoe Increases Skaters' Comfort

To keep the laces on skate shoes from biting into your feet, place a strip of thick felt between the laces and the tongue of the shoe as shown. If the felt is allowed to project over the end of the toe and above the top of the shoe, a further protection is added against injury from being struck on the foot with a club when playing hockey.

Coping-Saw Blades to Replace a Broken Latch Spring

If the latch spring breaks in your door lock, and another one is not available, take a couple of old coping-saw blades, break them off to the proper length and substitute them for the broken spring.



Two Coping-Saw Blades Serve Efficiently as a Spring to Operate Latch in Door Lock

This improvised spring will operate the latch until a new one can be purchased.

Rubber Helps to Open Fruit Jars

The old inner tube scores again in helping in our daily tasks. If a piece about 8 in. square is kept handy in a cabinet drawer, it will be a great aid in opening fruit and salad-dressing jars. By holding the jar on the pad, it will not slip when the top is being turned, or, if you prefer, the rubber may be wrapped around the jar to aid in holding it with the hand. A piece of fine-grained sandpaper is excellent for gripping the jar top.

Groover Head Made from Auto Cam-Shaft Gear

On a job, I needed a groover head for my circular saw and, none being at hand, one was improvised from an old cam-shaft gear taken from a model-T Ford. Part of the teeth were removed with a hacksaw, leaving every sixth tooth, which was sharpened on a grinding wheel. When trying the wheel on the mandrel of the saw, the hole in the center was found to be too large. This was quickly remedied by forcing in a brass bushing and reaming it to fit.



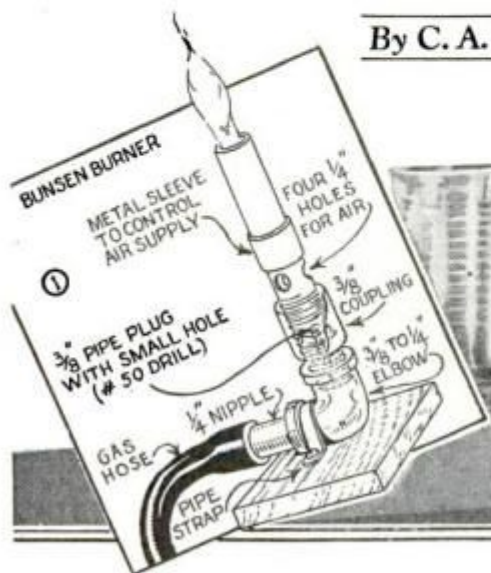
The groover head has proved very satisfactory, and, when used in connection with a tilting saw table, many different cuts can be made with it.—Earle Strand, Siren, Wis.

A Substitute for Rubber Stamps

An efficient and durable substitute for a rubber stamp may be had in your own handwriting by using sealing wax instead of rubber. First cut a mold of the desired size in a cake of hard soap. Then, using a pointed nail as a stylus, scribe the lettering or writing in the bottom of the soap mold and carefully wash away all loose particles. Moisten the mold with water, melt the wax and pour it in, immediately pushing a small wood block on the melted wax to serve as a handle for the stamp. When cool, pry from the mold. With a little practice you can produce neat stamps with sharply raised lettering in this way.

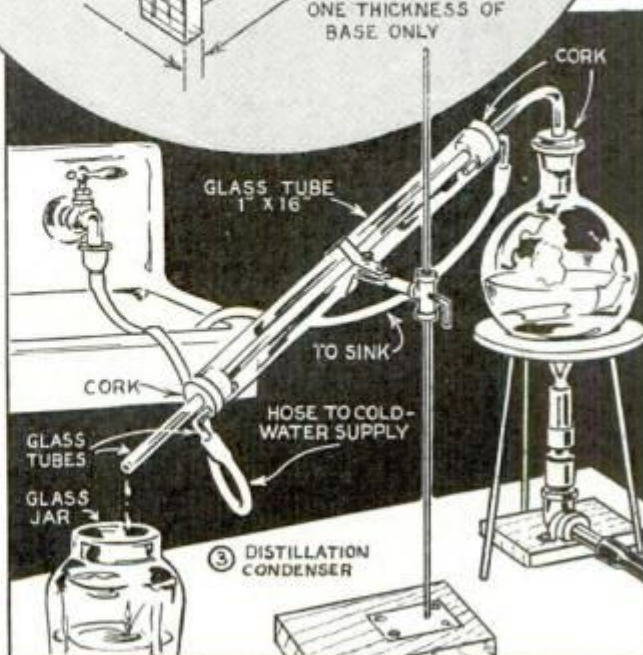
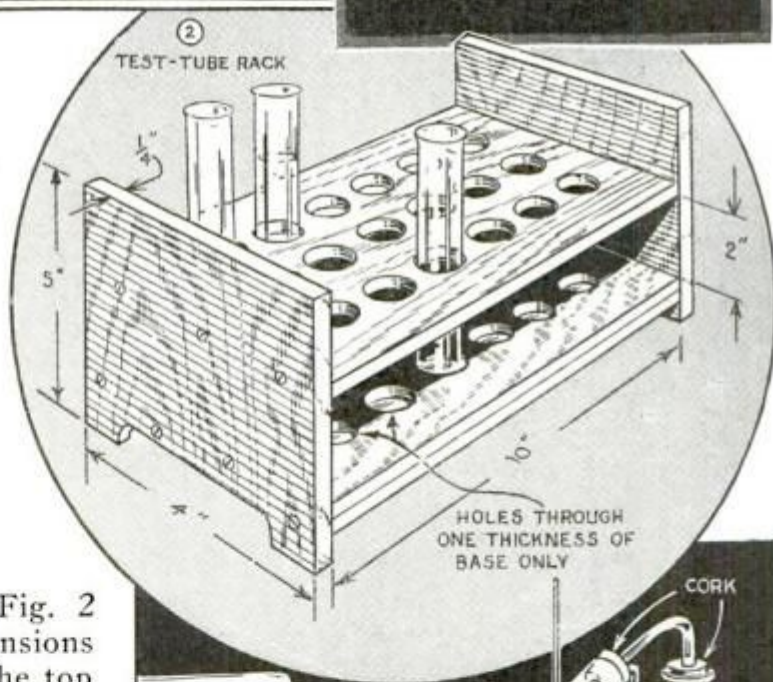
Equipping your CHEMICAL LAB

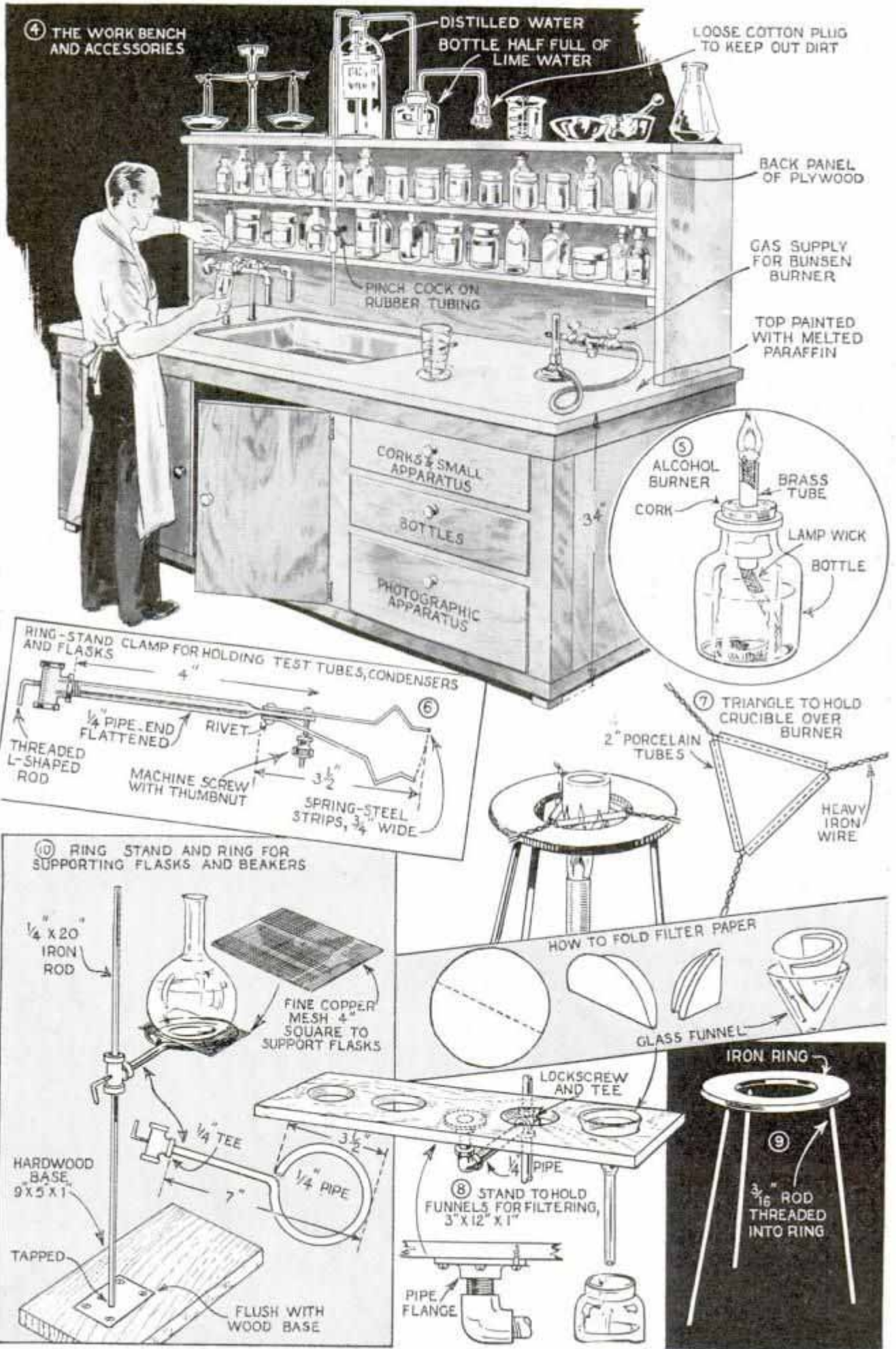
By C. A. Crowley



A SIMPLE laboratory in which many miracles of chemical magic may be made to take place at your command can be easily assembled at almost no expense. In Fig. 1 you will find complete details for making an efficient bunsen burner from pipe fittings and a few other odds and ends. The hole drilled through the pipe plug to admit the gas should be small. The sleeve, which is slipped over the burner tube, permits the flame to be adjusted so that it is very hot and almost colorless. Fig. 2 shows a test-tube rack. The dimensions may, however, be varied to suit. The top board and the upper section of the base board are lightly nailed together, laid out and drilled with a bit of the proper size to accommodate the tubes. Holes $\frac{3}{4}$ in. in size are convenient. The boards are next drilled while still nailed together. After drilling they are separated and mounted between end pieces as shown. An undrilled third piece of wood, the same size as those drilled, is mounted under the bottom drilled piece to support the tubes.

A distilling condenser of homemade construction is shown in Fig. 3. Gas pipe or thin-walled metal tubing, 1 in. in diam-





④ THE WORK BENCH AND ACCESSORIES

DISTILLED WATER BOTTLE HALF FULL OF LIME WATER

LOOSE COTTON PLUG TO KEEP OUT DIRT

BACK PANEL OF PLYWOOD

GAS SUPPLY FOR BUNSEN BURNER

TOP PAINTED WITH MELTED PARAFFIN

PINCH COCK ON RUBBER TUBING

CORKS & SMALL APPARATUS

BOTTLES

PHOTOGRAPHIC APPARATUS

⑤ ALCOHOL BURNER
BRASS TUBE
CORK
LAMP WICK
BOTTLE

⑥ RING-CLAMP FOR HOLDING TEST TUBES, CONDENSERS
RING-STAND CLAMP FOR HOLDING TEST TUBES, CONDENSERS
4"
1/4" PIPE, END FLATTENED
RIVET
MACHINE SCREW WITH THUMBNUIT
3 1/2"
SPRING-STEEL STRIPS, 3/4" WIDE
THREADED L-SHAPED ROD

⑦ TRIANGLE TO HOLD CRUCIBLE OVER BURNER
2" PORCELAIN TUBES
HEAVY IRON WIRE

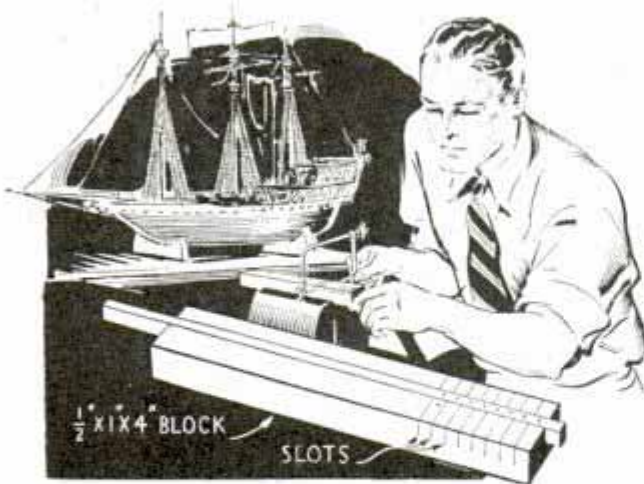
⑧ RING STAND AND RING FOR SUPPORTING FLASKS AND BEAKERS
1/4" x 20" IRON ROD
FINE COPPER MESH 4" SQUARE TO SUPPORT FLASKS
HARDWOOD BASE 9x5x1
TAPPED
7"
3 1/2"
1/4" PIPE
FLUSH WITH WOOD BASE

HOW TO FOLD FILTER PAPER
GLASS FUNNEL

⑧ STAND TO HOLD FUNNELS FOR FILTERING, 3"x12"x1"
LOCKSCREW AND TEE
1/4" PIPE
PIPE FLANGE

⑨ IRON RING
3/16" ROD THREADED INTO RING

Hints to Help Solve Modelmaking Problems



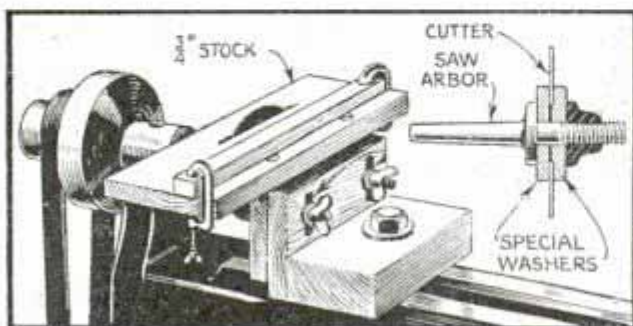
Blocks for Ship Models Can Be Made Quickly with This Simple Jig

Ship-Model Blocks and Deadeyes Quickly Made in Jig

Blocks and deadeyes for ship models are easily made with this jig. First, take a strip of stock from which to make the blocks and deadeyes and dress it down to the same width and thickness that the finished work is to be. Then get a wood block, square it up and groove the center lengthwise to take your stock. With a jewelers' saw, cut a number of slots in the face of the block at right angles to the groove. The spaces between the slots should be the same width as the length of the finished blocks and deadeyes. Now groove each side of the stock for the strops of the blocks, put it in the groove of the wood block, drill tiny holes through the stock between the slots and saw off the blocks. These can be sanded to shape.

Woodworking Lathe Used to Saw Small Wood Strips

Modelmakers who have a small lathe can rig up an adjustable saw table on it

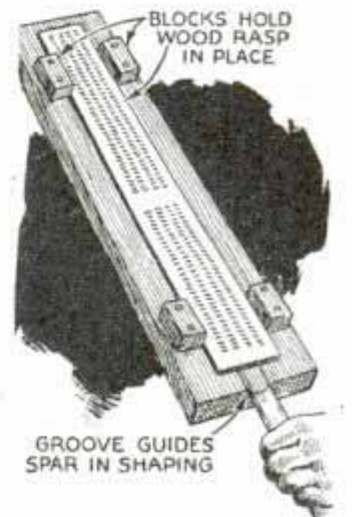


Improved Saw Table Mounted on Bench Lathe for Cutting Small Strips of Wood for Models

to cut small wood strips. If saws of the proper size for this work are not available, slotting cutters, which are much cheaper than saws, can be used. The saw is mounted on an arbor and is chucked in the lathe. If a slotting cutter is used, it will be necessary to turn up a couple of washers, as shown in the detail, to clamp the cutter on the arbor. The saw table is a 2½ by 12-in. board recessed on the underside to clear the arbor. The table is fastened to a milling attachment, which permits vertical adjustment. In the absence of this, the improvised attachment shown will be found handy.

Improved Tool to Shape Tapered Spars and Masts

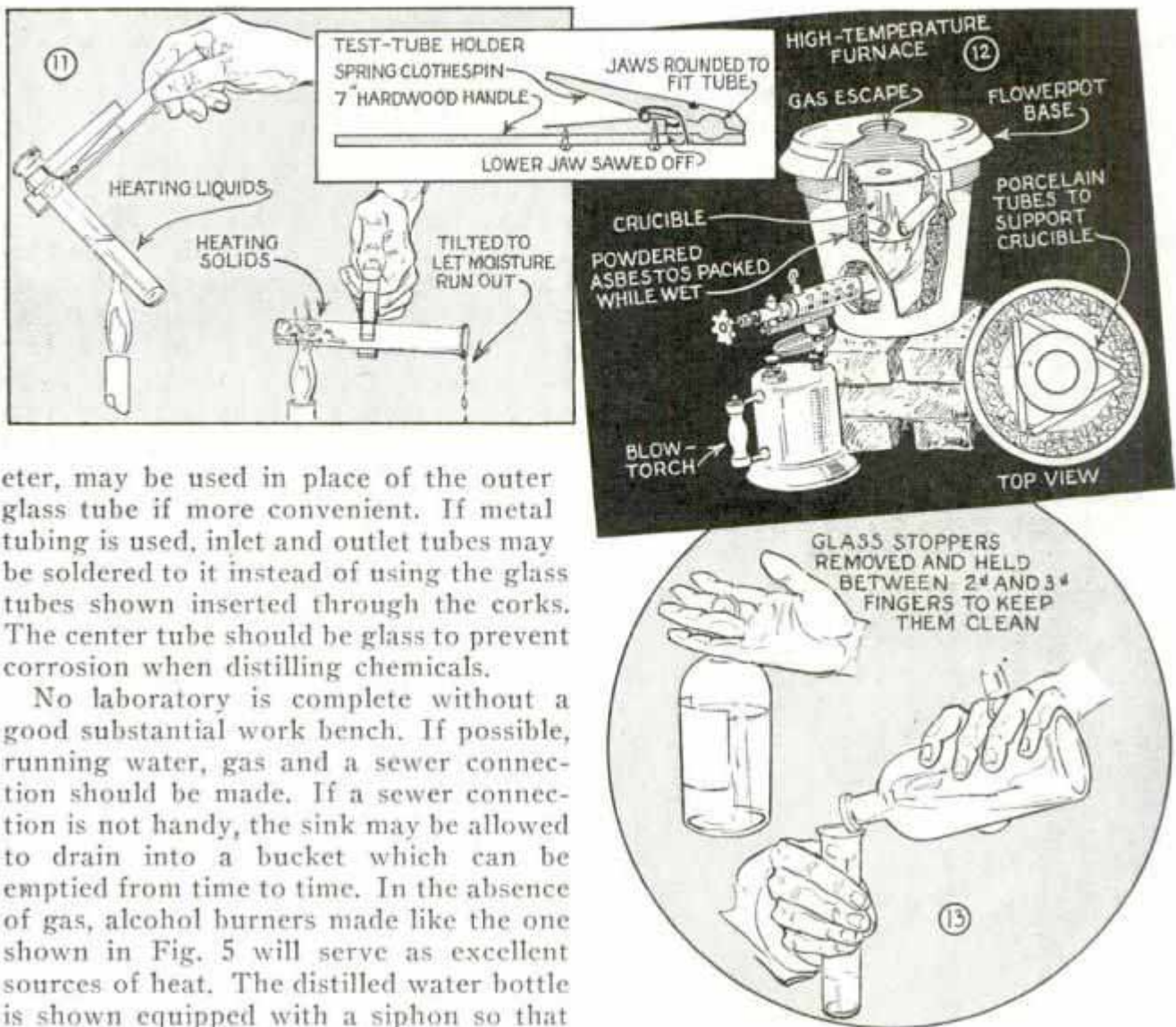
Here is a simple tool to use in tapering spars and masts for ship models. It consists of a block of wood and a wood rasp. Nails or small blocks are placed along the sides to guide the rasp. The dowels, or strips to be tapered, are inserted under the rasp and are pulled back and forth while being turned with the fingers. A shallow groove in the face of the block will help to guide the work.—J. W. Clement, St. Paul, Minn.



Making Model Chain Plates from Small Fishhooks

Small fishhooks can be used to make chain plates on ship models. Cut off the barbs and bend the end of the hook to take the deadeye strops. These have a much neater appearance and are stronger than those made of soft wire. Fishhooks can also be used for eyebolts in decks, tops, rails, etc.

It is a good idea to keep a special file on hand for filing babbitt, and oil it slightly to prevent the metal from sticking to it.



eter, may be used in place of the outer glass tube if more convenient. If metal tubing is used, inlet and outlet tubes may be soldered to it instead of using the glass tubes shown inserted through the corks. The center tube should be glass to prevent corrosion when distilling chemicals.

No laboratory is complete without a good substantial work bench. If possible, running water, gas and a sewer connection should be made. If a sewer connection is not handy, the sink may be allowed to drain into a bucket which can be emptied from time to time. In the absence of gas, alcohol burners made like the one shown in Fig. 5 will serve as excellent sources of heat. The distilled water bottle is shown equipped with a siphon so that the water may be drawn by pressing the pinch cock. The second bottle, attached by glass tubing, washes the air and thus prevents contamination of the pure water. Fig. 6 shows details for making serviceable burette clamps such as are used to support distilling condensers and flasks on tripods over burners for heating. Fig. 3 shows one of these clamps in use. Details for making the tripod are shown in Fig. 10. This illustration also shows a simple method of making a ring which can also be attached to the stand for supporting apparatus. In Fig. 7 are shown details for making a triangle and crucible stand, which is very handy for heating dry chemicals.

The proper method of folding filter paper and inserting it into a funnel is shown in Fig. 8 just above the details for the filter rack. Filter racks of this type are supported on a ring stand. The unit is assembled from pipe fittings and a piece of wood bored as shown for the funnels.

When heating substances in test tubes

breakage is avoided by following the suggestions shown in Fig. 11. Fig. 13 shows the proper method of removing stoppers from bottles to prevent their becoming dirty and thus contaminating the contents of the bottle when replaced. When intense heat is required it may easily be produced by directing the flame of a blow-torch into a hole cut in the side of a flowerpot lined and mounted as shown in Fig. 12. The efficiency of such a simple furnace is surprising. It is very convenient for melting metals and making alloys.

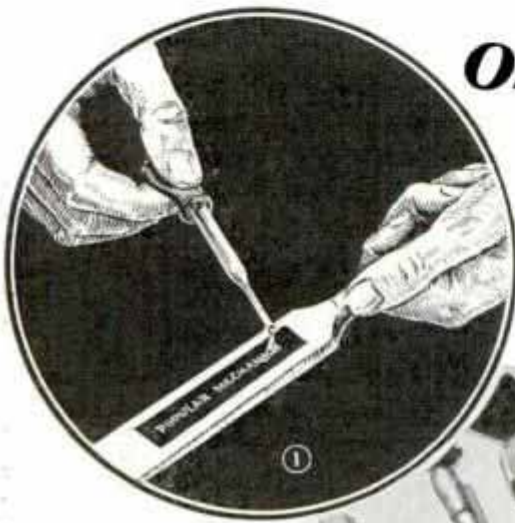
Tape Protects Thumb against Knife

If you like to carve novelties from wood with a jackknife, try this trick to protect your thumb against deep cuts. Place a piece of adhesive tape across the ball of the thumb, letting it extend down below the knuckle. This is also a good idea for the housewife who uses a sharp knife.



SHOP NOTES

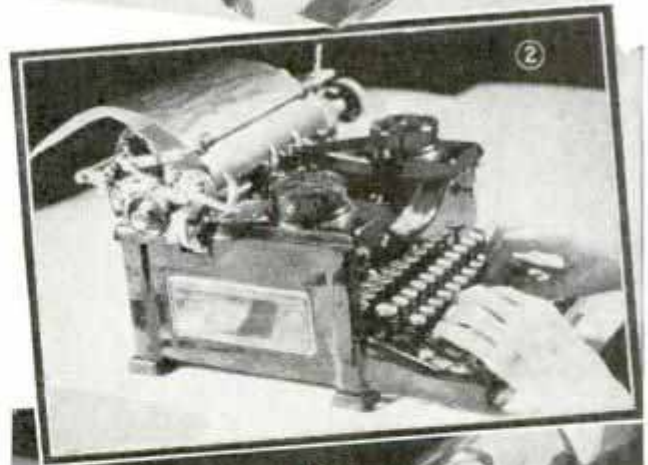
TYPEWRITE *your Name* on TOOLS

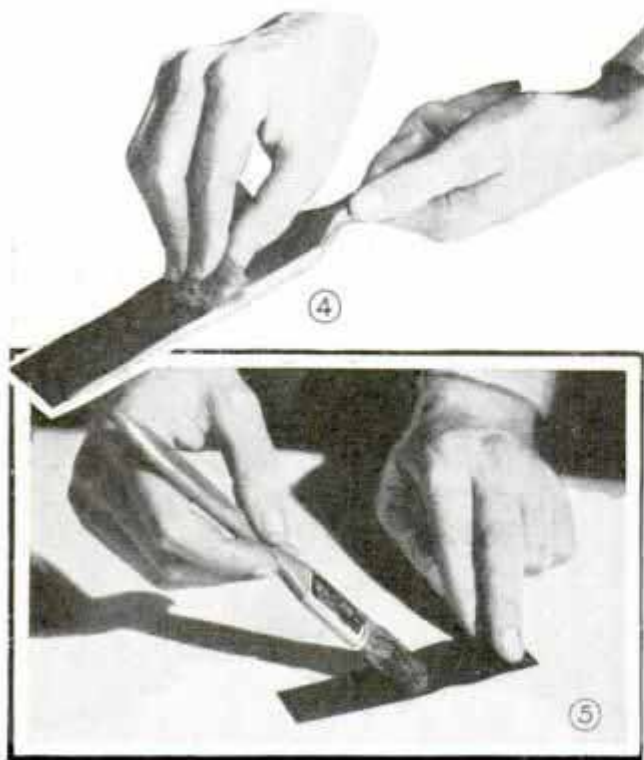


YOUR name, or that of your company or school can be permanently etched on your tools or other metal objects, without the use of acids or electricity, and the lettering may be done on your typewriter.

A regular dry-type mimeograph stencil is inserted in the typewriter and your name and address or other information are cut into it in the usual manner, Fig. 2, disengaging the ribbon, of course, so that a sharp stencil will result. Make as many stencils on the sheet as you have tools to mark, allowing a 1/2-in. margin all around for each one so that they may be cut apart as in Fig. 3. While it is possible to use a stencil several times, unless it is an elaborate one, time will be saved by using a fresh one each time.

The surface to be etched must be made smooth and clean, Fig. 4. Rust or grease will prevent the etching solution from acting. After you are sure that the surface is perfectly clean rub it thoroughly





with a handful of dry salt for good measure. Results depend almost entirely on a well-cut stencil and a clean surface. The stencil is pasted to the surface of the tool by means of a thin coating of ordinary library paste, spread evenly on the surface of the stencil with the tip of the finger or with a brush as in Fig. 5.

To make up the etching solution, dissolve in 2 oz. of water as much copper sulphate as it will take up. To an equal quantity of water add potassium bromide in a similar manner. The etching is done with a solution of equal parts of both. The etching is accomplished by simply applying the solution to the portion of the stencil in which the lettering is cut, by means of a medicine dropper, Fig. 1. If this area is moistened with saliva, applied with the tip of the finger, it will prevent the solution from running off the stencil even if the surface is not perfectly flat. About 30 min. is required for a light etch on tools, the exact time depending, of course, on the hardness of the steel and the depth of etching desired. After the etching is complete, wash the copper-like deposit and solution off thoroughly, then dry and polish lightly with fine emery cloth. Black paint, rubbed into the etched lettering makes it stand out very sharply.

☐ A strip of string solder is convenient as a spline for laying out irregular curves.

Doubling the Life of Conveyor Belts

Conveyor belts commonly wear on one side, most of which occurs during the process of loading. To double the life of one of these belts, simply turn it end for end. The material being loaded will then strike and wear the unworn side. It is obvious that there is an advantage in not loading a belt in its center. A center-loaded belt will last only about half as long as one that is first loaded on one side and then on the other.—W. F. Schaphorst, Newark, N. J.

Angle Grinding of Fillets and Necks

In grinding fillets, it is much better to use a small wheel with a rounded face, and approach the work held between centers at a 45° angle than to depend on the corner of the wheel to do the work as is usually done. This also enables one to grind a neck, which might be classed as an internal fillet. The reason for using a fillet is not so much to provide additional metal



as it is to avoid the sharp corner, for fractures always begin at sharp corners more easily than anywhere else. Therefore, a necked corner is actually better and stronger than

a sharp, square one, as any strain falling on the part will be distributed over the rounded neck instead of localizing in one place.—John E. Hyler, Peoria, Ill.

Saw Cut Aids in Flattening Pipe Ends

On a job where a number of pipes were to be flattened at the ends and bolted to a framework, it was found that a strong job resulted if saw cuts were made in the ends before flattening them. Cut the pipe back from the end just as far as it is to be flattened.—H. E. Benson, Denver, Colo.



Graphite Helps When Breaking In Rebores Motor

The time necessary to drive a rebores-auto motor slowly can be shortened by applying a paste made of finely powdered graphite and oil to the cylinder walls when the motor is being re-assembled. The paste is rubbed thoroughly into the walls with a cloth, any excess being removed. This provides a lubricant for the pores of the cylinder walls that is not easily removed by tightly fitting pistons and rings.

Safety Chute Protects the Workers When Filling Ice Houses

Filling ice houses with the use of an ice chute is sometimes dangerous, and many workmen have been injured because the ice tongs pulled loose and allowed the ice cake to slide back on them. To prevent this, one man made a simple safety chute. Several strips of thin spring steel were bolted to the center plank of the chute in the manner indicated. The strips do not interfere with the cakes of ice being pulled up into the ice house, but effectively stop them from sliding down.



Strips of Spring Steel Bolted to Center of Chute Prevent Ice Cakes from Slipping Backward

Water Removed from Boiler Ash Pit with Steam

Water in the ash pit of a boiler is an inconvenience and can be removed by steam with this homemade outfit, which was rigged up by a fireman. One end of a length of 2½-in. galvanized pipe is placed



Suction Created by Steam Escaping from Small Pipe inside Large One Removes Water from Ash Pit

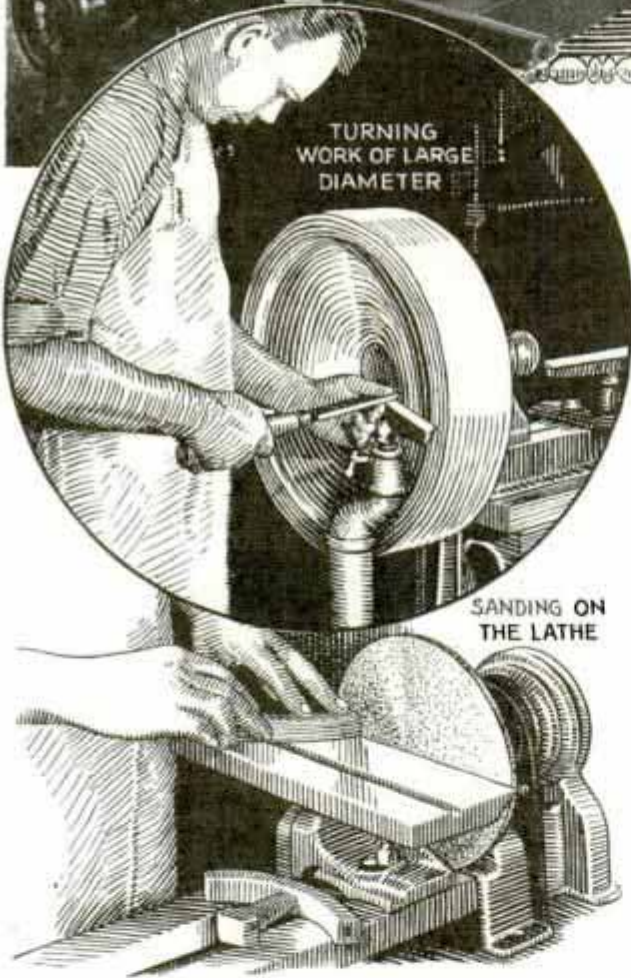
in the ash pit and the other end is run into a drain. Then a ¾-in. pipe is bent so that one end extends several inches inside the bottom end of the larger pipe, as shown in the detail, and the other end is connected to a steam pipe by means of a rubber hose. When the steam is turned on, it escapes through the end of the small pipe, creating a suction inside the larger one, which pulls the water from the pit and discharges it into the drain.—William H Leach, Cleveland, Ohio.

Absorbent Cauls Aid in Gluing Plywood

In gluing up plywood, especially where the veneers being handled are quite thin, much better results will be had in the finished job if some sort of absorbent caul is used. The idea is to use a caul of absorbent material to take up part of the moisture from the glue. If all of the moisture remains in thin veneer, excessive swelling and shrinking will result, and this, in turn, will cause checks or cracks in the face veneers. A good absorbent material, where none better is obtainable, is ordinary pressed-paper wallboard which can be cut to the size of the material being glued. However, it is a good idea to use a layer of newspaper between the veneer and the beaver board to prevent the glue from binding them together.

Boston & Underwood, Inc.
Fairfield, Conn

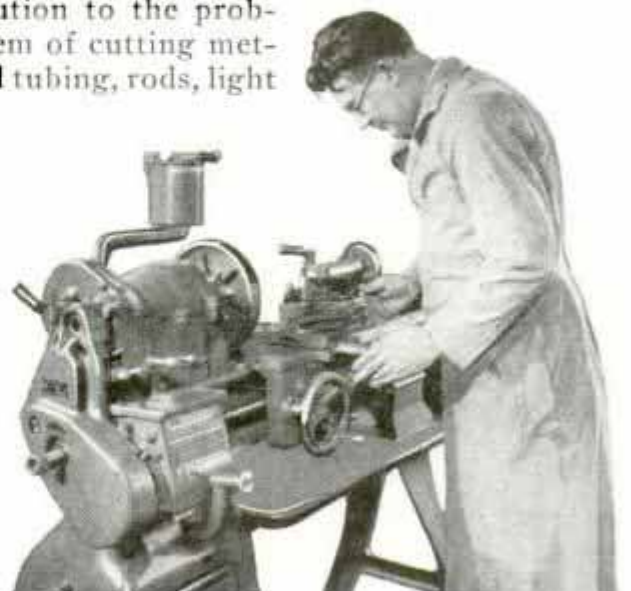
Motorizing



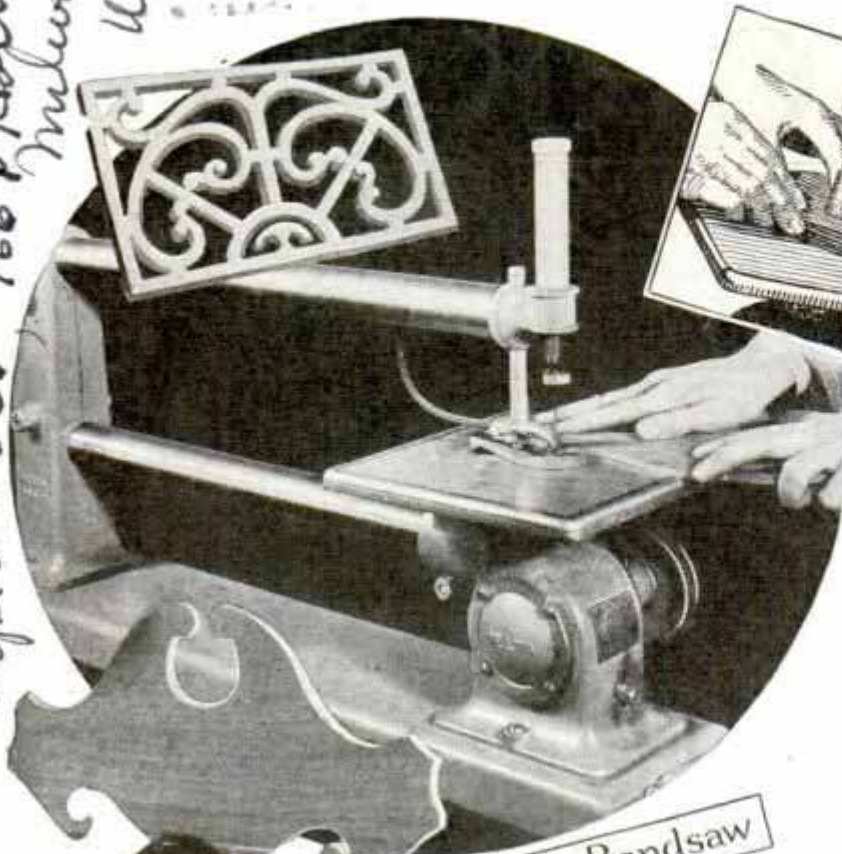
utility, is the circular saw, shown on the right. Some of these include a jointer and a mortising attachment, all run by a single motor, and arranged on a single stand that occupies little space. Accessories for the circular saw include dado and grooving heads, metal-cutting wheels and molding-cutter heads, the latter providing a means of making practically any common molding shape as it is needed. Though accurate grooving may be done with the circular-saw blade by making a series of adjacent cuts, a dado head is practically indispensable when one has considerable grooving to do or when time is an important consideration. The metal-cutting wheel on the saw arbor offers an easy solution to the problem of cutting metal tubing, rods, light

WITH the cost of motor-driven woodworking machines so low that almost every craftsman can afford to own them, homecraft hobbies are becoming increasingly popular. Practically every woodworking operation done with hand tools can be done by machine.

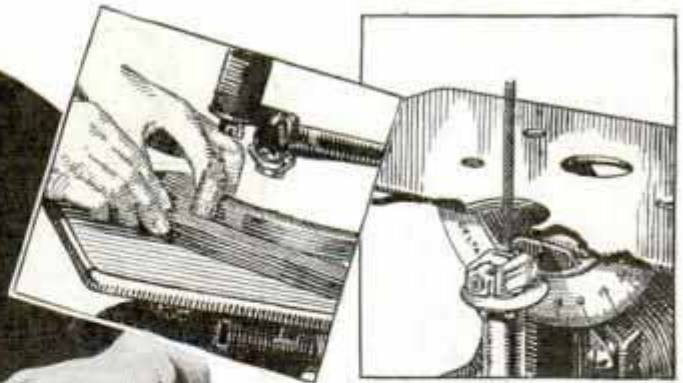
One of the most useful of all power-driven tools, from a standpoint of general



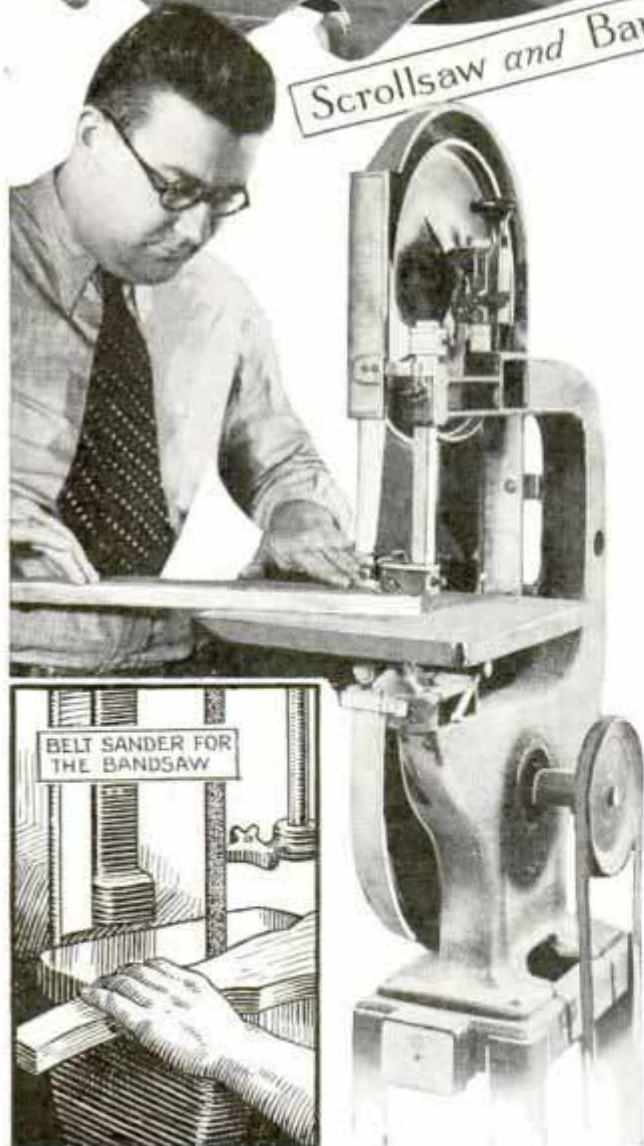
*Delta Specialty Co
Dept. A-500 166 S. Holston St
Milwaukee Wis*



Scrollsaw and Bandsaw



SANDING AND FILING ON THE SCROLLSAW



nal cost. Metal-turning work as a hobby has a fascination all its own, and with a precision lathe, accurate work can be turned out readily.

The bandsaw effectively supplants the hand scroll and turning saws commonly used for this particular work. The advantage of the bandsaw is its speed in sawing and its capacity for

large-sized work, most small machines being made sufficiently heavy to cut stock 6 in. or more in thickness. One machine is also fitted with a belt-sanding attachment which makes easy the tedious job of finishing curved surfaces. However, the endless blade permits sawing only outside patterns.

A power scrollsaw, which will cut both inside and outside designs, due to the detachable blade, is one of the most popular machines in the home workshop. In many ways it is more universally useful than the bandsaw but its capacity is limited to work of lesser thickness than that within the capacity of the bandsaw. For sawing heavy stock in the scrollsaw, the small fret blades are not suitable and most machines are not made to use the heavier saber blade without alteration of the chucks or guides. This type of blade is attached to the lower or driving plunger only. The upper end of the blade runs free and is prevented from turning or bending sidewise by the regular saw guide, which also takes the thrust of the blade in sawing. Special files and even sanding attachments are also available, which are driven in the same way as the saber blade. The table insert is removed to allow room for the files of various shapes or the sand-

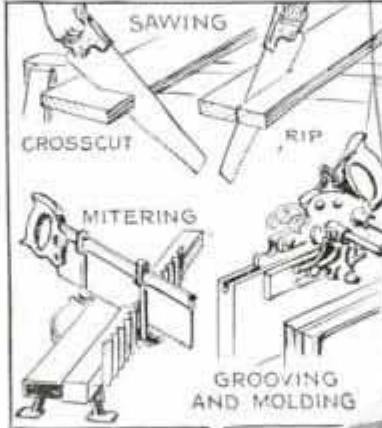
*Specialty Co.
1661 Holton
Milwaukee Wis.*

your WORKSHOP

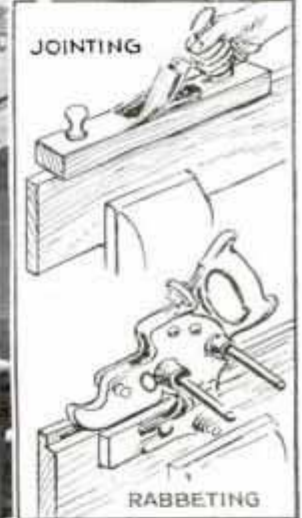
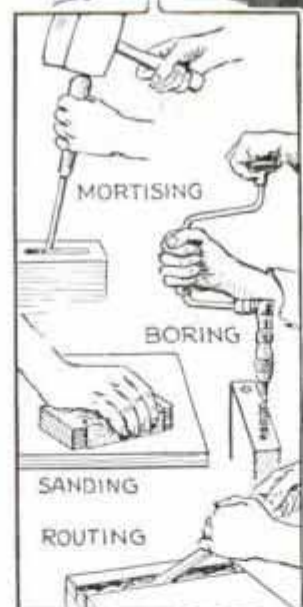
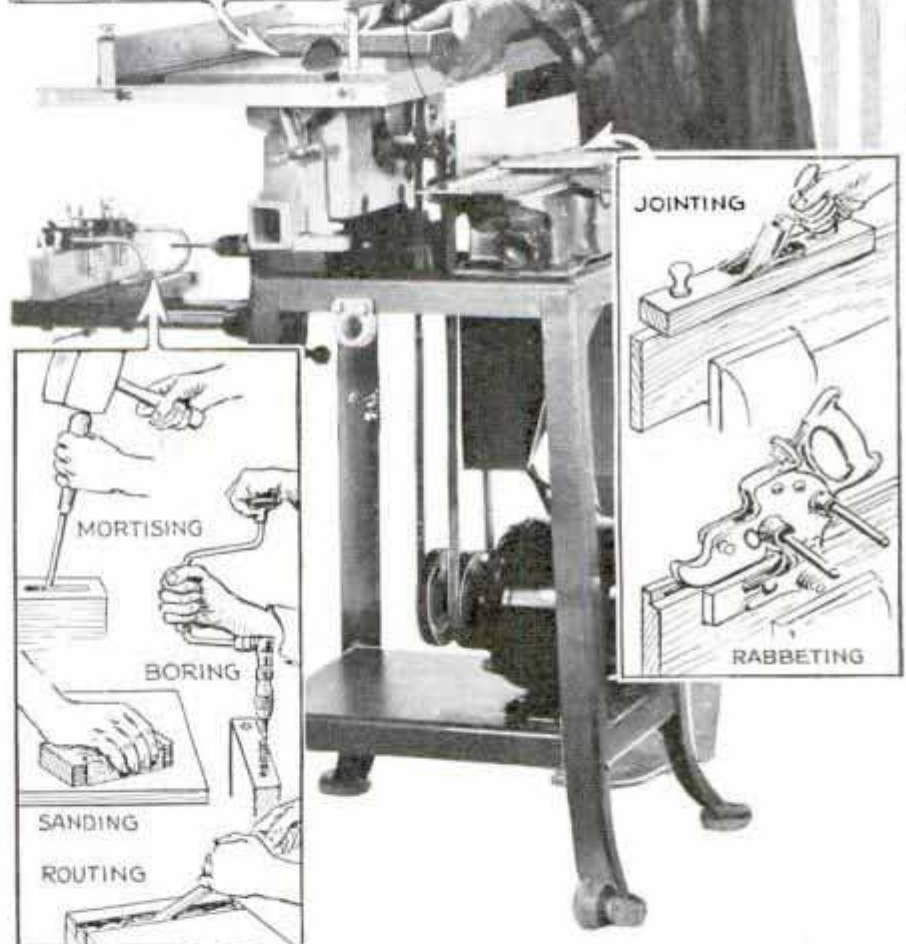
shafting and similar work. The planer or jointer does the work of the hand plane in a fraction of the time and with correspondingly less effort. For making mortises quickly and accurately without the tedious work required with a hand chisel, and for the various intricate boring operations so often necessary in woodworking, the mortising attachment is coming into great favor in the home workshop.

Another power-driven tool for the home workshop is the wood lathe, the smooth, graceful turnings of which cannot be duplicated by any hand method. There are two common types of woodworking lathes: In the first, the motor forms the headstock and is mounted directly on the ways with the live center attached to the armature shaft. In the second type, the motor is belted to a countershaft, which is mounted as a separate unit either above, below or directly behind the lathe headstock, driving the lathe with a belt running over cone pulleys. This arrangement makes possible a wide variation in the speed of the live center, a feature which is practically indispensable when heavy stock must be turned down to a cylindrical form, or when large disks must be trued on the faceplate. Only a variable-speed motor will equal this arrangement. For turning large-diameter work, some lathes have an outside faceplate on the headstock. A toolrest of suitable height must, of course,

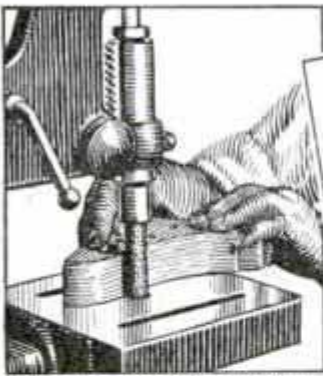
be used. The lathe can also be used for other operations as disk sanding, grinding, buffing, sawing, as a substitute method where regular machines for these purposes are not at hand. Small woodturning lathes may also be used for metal turning with some degree of accuracy, especially if they are equipped with a compound slide rest now available. However, for those interested in metal turning, precision lathes, especially built for home workshop owners, can be had at a nomi-



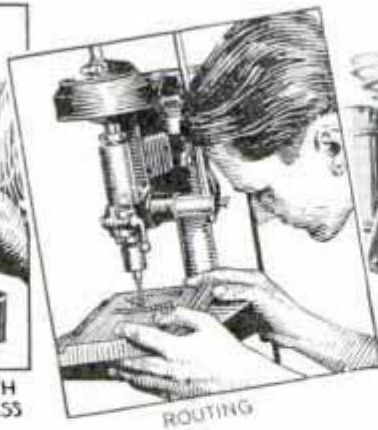
**RABBETING
MORTISING
GROOVING
JOINTING
ROUTING
SANDING
BORING
SAWING**



*South Bend
South Bend*



SPINDLE SANDING ATTACHMENT ON THE DRILLPRESS

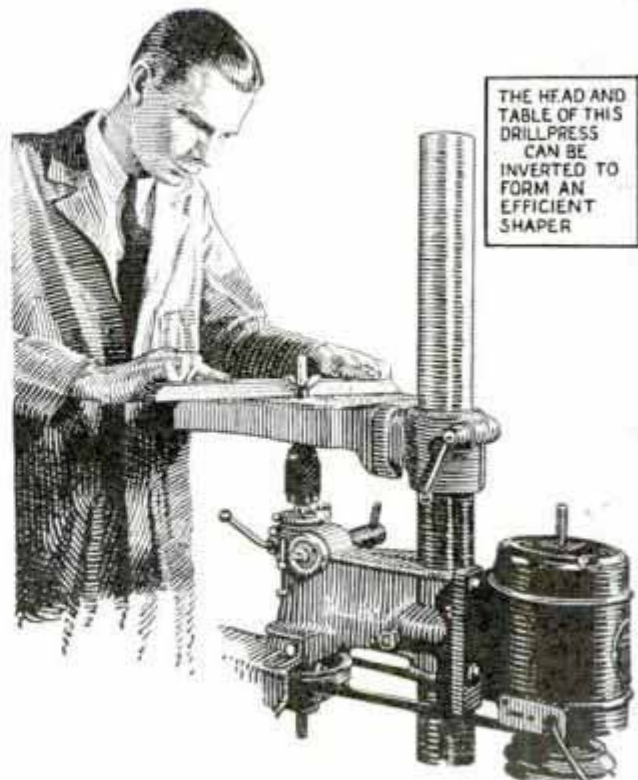
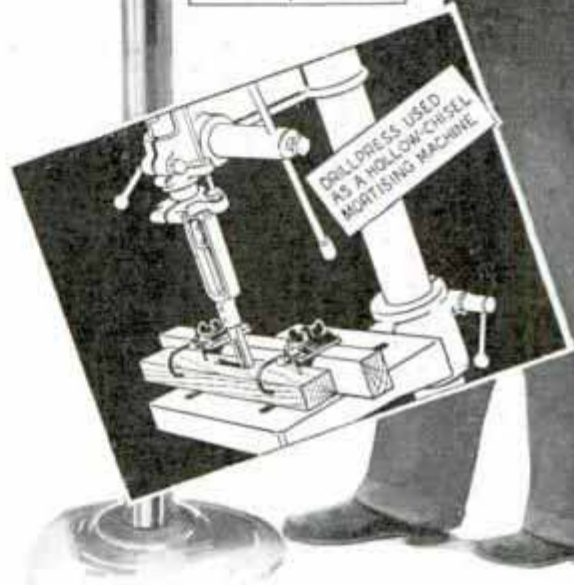


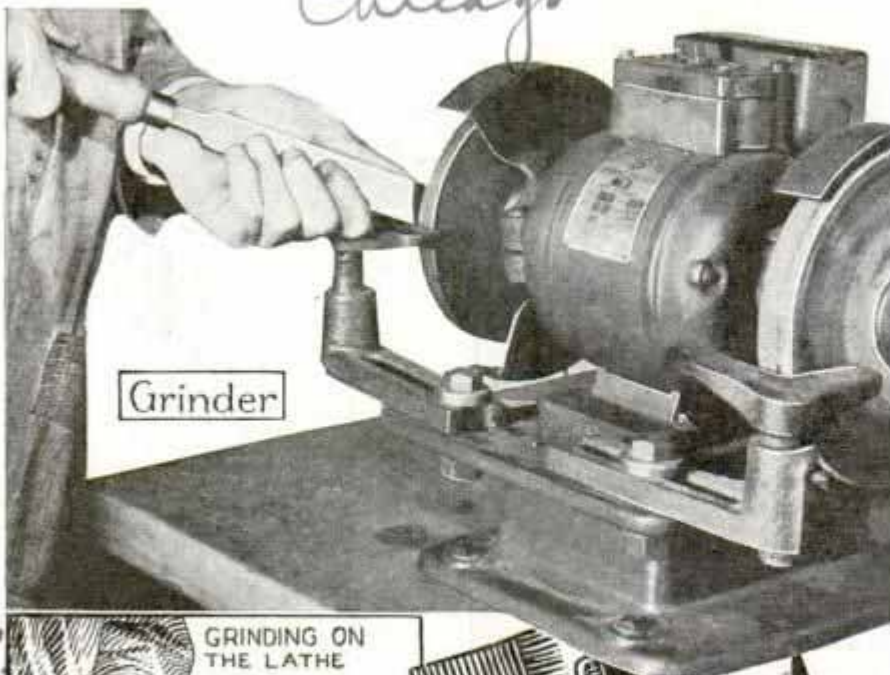
ROUTING

ing drum, and the high speed of the plunger must be slowed down to about half that used in sawing. This is done by altering the pulley sizes. The work is held flat on the machine table and the position and action of the file make it possible to do both internal and external filing with equal speed and accuracy.

Another power tool that is always useful in the small shop is the drillpress in either the floor or bench types. Fundamentally the power drill is used for drilling and boring operations in both wood and metal but, as made at the present time, the machine may be adapted to other work. Among the refinements now provided on the popular-priced machines are a special spindle or quill lock, and a depth scale which makes it possible to lower the spindle to a given distance from the table and lock it in position. This makes it possible, by means of specially made jigs and guides, to do both straight and curved routing, dovetailing, sanding, filing and shaping, all on one machine. Special interchangeable spindles are available for large boring bits, dovetail and router bits. The spindles are so designed that they reduce the overhang of the ordinary drill chuck and make possible the use of special high-speed steel bits for this work without chattering or undue vibration. Attachments are also available to convert the machines into efficient hollow-chisel mortisers and shapers.

Any well-equipped shop does not lack a grinder, and one of the motor-driven type will soon repay the owner by the saving in time effected. Buffing wheels for polishing metal work, add to its utility. As a substitute method of grinding, if you do not feel justified in purchasing a separate machine, try either your lathe or drillpress





workbench on which you do the assembling of your work. Once begun, the well-planned hobby shop, with facilities to properly and quickly turn out the many things you wish to make, will never cease to be the source of constant and growing enjoyment, profit and usefulness.

Cements for Modeling Purposes

A strong, durable cement, useful for molding small objects, for filling cracks in marble and stoneware, and for fastening metal, glass, or wood parts together can be made by thoroughly mixing finely powdered zinc oxide, 12 oz., and powdered calcined magnesia, 1/4 oz. Both ingredients should be pulverized to the finest possible powder. The mixture will keep indefinitely if stored in a tightly stoppered bottle. To use the cement, take the amount of powder required and work it to a stiff paste with sirupy phosphoric acid. A spatula or pocket knife and a piece of plate glass are handy for the mixing. When the paste is even, it should be

for the purpose. For many jobs of intricate grinding or curved surfaces, a small hand grinder, like the one shown, is practically indispensable. Many attachments for wood carving can also be obtained to fit its chuck, which will enable you to do jobs that are almost impossible with any other method.

In planning a motor-driven workshop, one usually purchases the units piecemeal, and at the outset it is best to arrange your shop from the standpoint of conveniently getting at the machines from a central

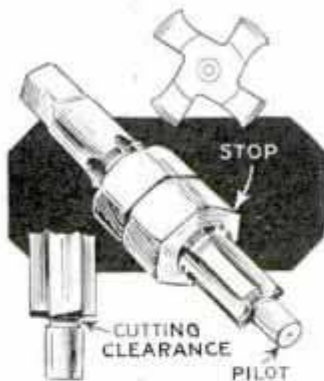
packed into place and allowed to set, which will only take a few minutes. This type of cement is used by dentists for filling teeth and for setting inlays. It is waterproof and can be polished. A less expensive cement, and one that is equally serviceable for many purposes is made by thoroughly mixing powdered glass, 1/2 oz., with silicic acid, 1 oz., and zinc oxide, 20 oz. All of these ingredients should be finely powdered, mixed, and stored in a tightly corked bottle for future use. To use this cement, work it into a thick paste

Hande Power handgrinders P.S. Chicago Wheel & Mfg. Co. 1101 W. Monroe

with a sirupy solution made by adding a small amount of distilled water to dry zinc chloride. This solution should be kept in a tightly corked bottle, otherwise it becomes too thin for use. It also hardens rapidly and can be polished. An even less expensive filling and molding cement, which can be finished with sandpaper or other abrasive and is considerably slower in setting is made by mixing finely powdered asbestos with good varnish.

Counterbore Improved from Tap

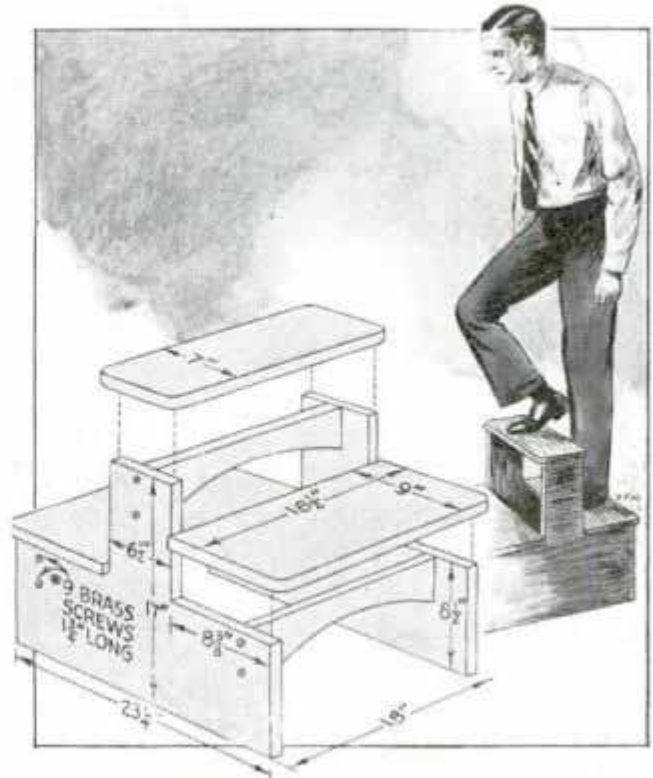
Small shops not having suitable equipment for making counterbores from high-speed steel can quickly improvise small ones from damaged taps. The center detail shows the cutting diameter and pilot diameter of the counterbore ground to size. A slight taper, smaller toward the shank, should be ground on the cutting diameter to prevent binding in the hole. The pilot size should be such that it will run freely in the drilled hole. It is advisable to grind a neck between the two diameters to provide space for the emery wheel when grinding the clearance angle on the cutting edges of the various flutes. Naturally, the clearance must extend under



the other to lock the adjustment. The upper detail shows how the round flutes should be ground on the cutting sides to present a straight cutting edge to the work. Care should be taken when grinding not to draw the hardness of the tap, especially at the cutting edges.

Exerciser Used When Testing for High Blood Pressure

Doctors will find this stile highly effective as an exerciser when testing patients for high blood pressure. A few trips over the stile, after taking the first test, are

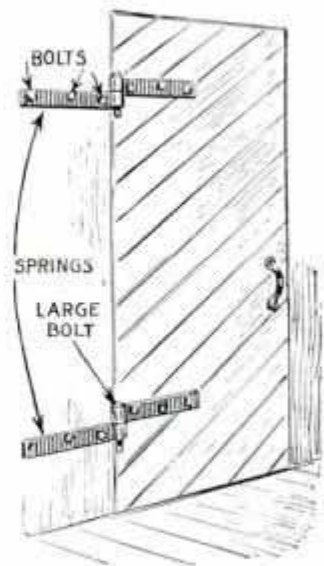


Consisting of Three Steps, This Stile Exercises Patients Before Testing Them for High Blood Pressure

equal to the usual run around a room for increasing the heart beats. The stile consists of three steps, made to the dimensions shown in the detail. It is a good idea to tack a corrugated-rubber tread to each step.

Auto Springs Used as Door Hinges

Owners of garages and repair shops will find a use for old broken auto springs by making them into door hinges. The ends of the main spring leaf, through which the shackle bolts fit, are cut off with an oxyacetylene cutting blowpipe. The hinges are attached with lag-screws, the holes for which are also cut with the torch, as the spring is too hard to drill. Large bolts or old piston pins are used for hinge pins.



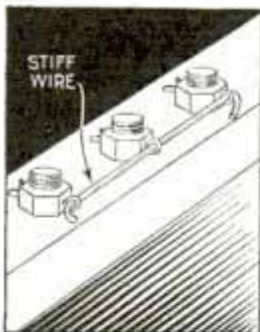
☛ For every 10° Fahr. added to the temperature of feed water by exhaust steam, nearly one per cent of fuel is saved.



To Avoid Wrinkled Stencils in Typewriter

Typists who have considerable stencil cutting to do will find that a narrow strip of writing paper folded over one edge of the stencil will be a great aid. The paper stiffens the thin stencil paper and prevents it from wrinkling while it is being fed into the typewriter.

Studs Locked in Place with Wire



Studs used on machinery that is subjected to considerable vibration often loosen in their holes even though the nuts are keyed. This trouble can be eliminated by running a wire through the eyes of

the cotter keys used to keep the nuts from turning, as shown.

Cup Grease Prevents Damage to Hollow Steel Flag Pole

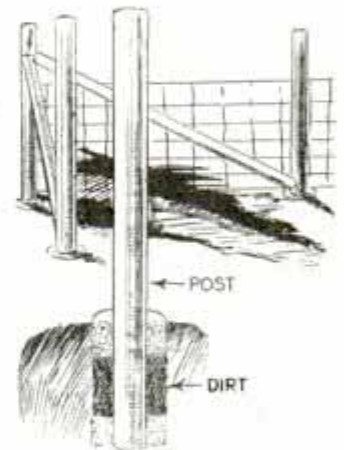
When telescoping flag poles of steel tubing are erected, it is customary to provide good drainage at the bottom of the anchor hole. If this is neglected, rain entering the joints of the pole may fill the lower section where it will freeze and split the pole. To eliminate this trouble, smear the joints of the pole liberally with cup grease before they are assembled.

Portable Tool Chest

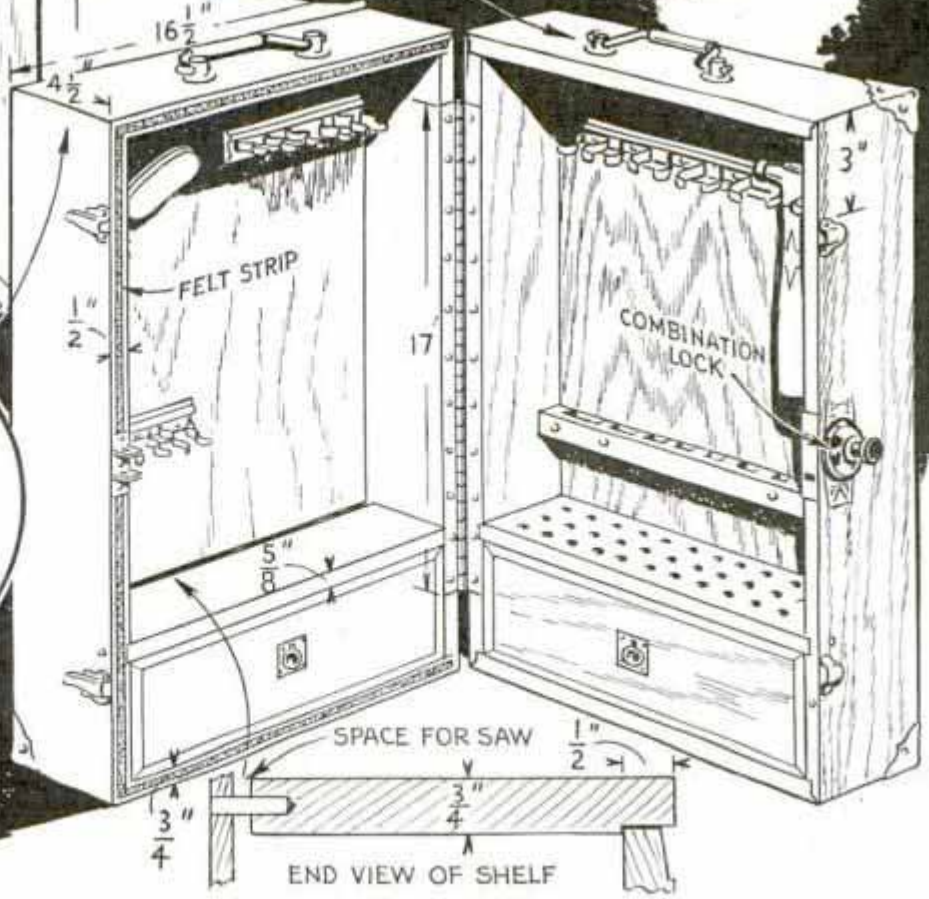
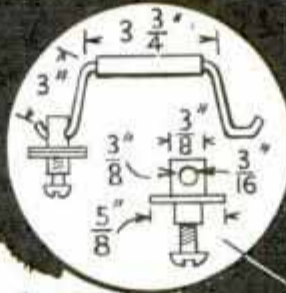
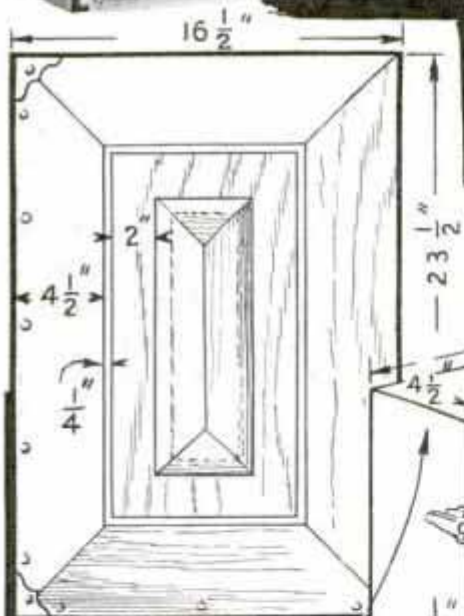
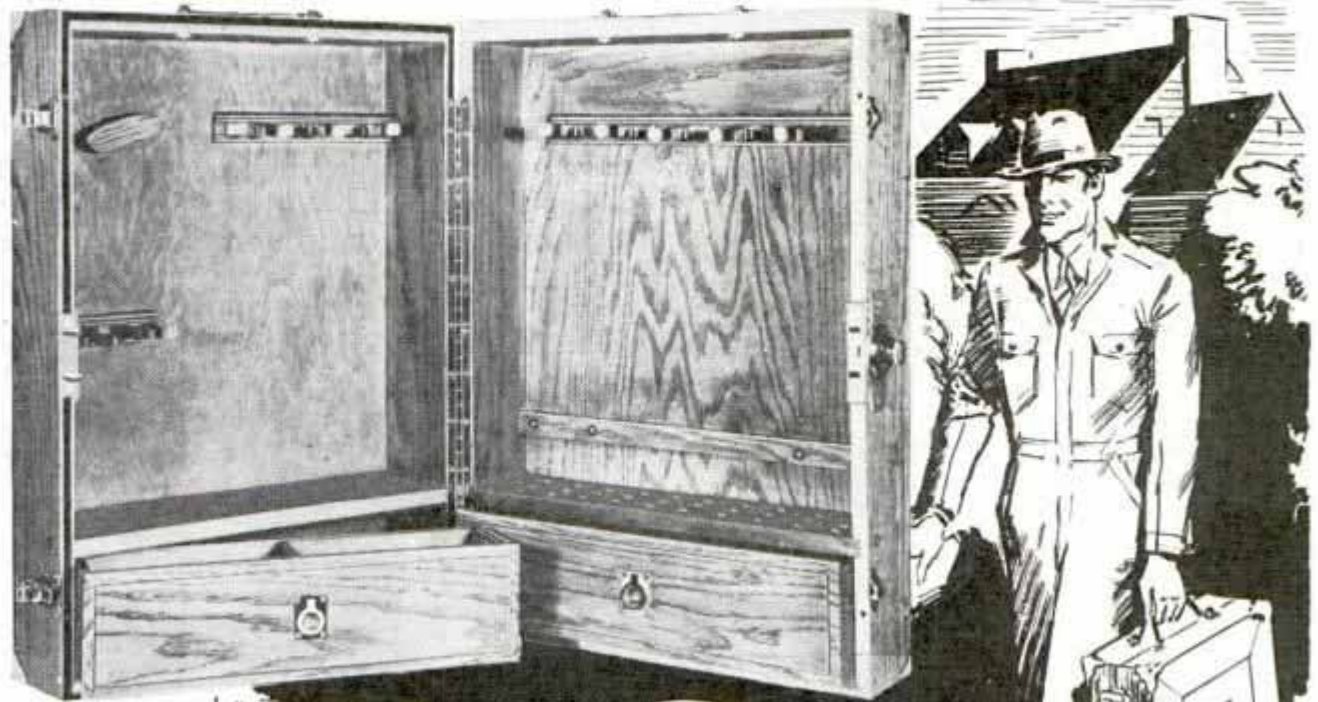
Here is an accurately made and attractively finished tool chest such as you have often wanted for your best tools. Light oak is used in its construction and it is assembled without nails or screws. Combination miter and dovetail corners assure strength and rigidity, while dowels hold the sides together. In the original, the holes for the dowels were counterbored to permit the insertion of hard-rubber or bakelite bushings, the inside of which is of a size to fit the dowels tightly so that when the latter are driven in place the bushings are expanded and fit the holes snugly. The bushing hole goes only through the outer piece of the two members to be joined. The dowels are glued in place and they are then sanded flush with the surface of the wood. Both the back and front of the box are set in rabbets cut in the edges of the ends and sides so that they are flush. Two shelves are provided and are doweled in place, one to hold drills and the other for larger tools, while drawers are installed under the shelves. The outside corners of the box are protected with nickel or chromium-plated hardware. A piano hinge joins both parts of the box and clips are provided to hold tools. Two handles at one end and a combination lock mortised into the front complete the job, with the exception of trunk fasteners, which may be added if desired. —A. D. McPherson, Elmhurst, Ill.

To Save Cement When Setting Posts

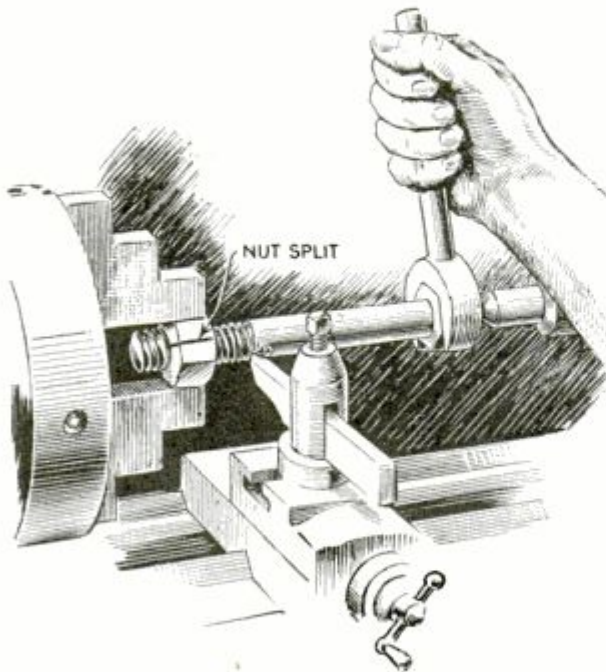
When setting fence posts in concrete, considerable cement can be saved by using it only at the top and bottom of the post hole as shown. First pour in a little cement, set the post, and then tamp in dirt, leaving enough space at the top for a cement cap. I have found that this holds the post just as well as when the hole is filled with cement. —W. F. Schaphorst, Newark, N. J.



Portable TOOL CHEST



Labor-Saving Ideas for the Lathe Operator



Bolt Threads Lengthened in Emergency on Speed Lathe by Means of This Setup

Cutting Threads on a Speed Lathe

While assembling a machine in a small town, it was found necessary to lengthen the threads a couple of inches on a 1-in. bolt, and, no screw-cutting lathe being available, the work was done in a speed lathe by means of the setup shown. A nut of the proper size was sawed through one side, screwed into the bolt and then gripped in the chuck. The live spindle was locked and the tailstock center was brought in contact with the center of the bolt head. A thread-cutting tool was placed in position in the toolpost, and, with a wrench, the bolt was turned by hand. This slides the tailstock along the ways because the bolt, as it turns in the nut, also unscrews. After each cut, the bolt was again screwed into the nut, the tailstock adjusted and another cut taken. Six cuts were required to finish the thread.

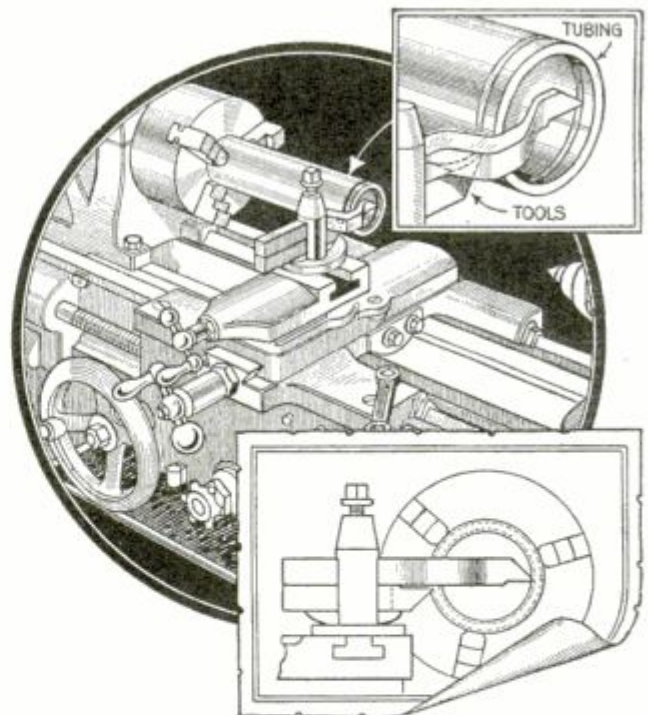
Lubricants to Use in Machining Metals

Lard oil is used extensively as a lubricant when turning steel or wrought iron, but for some classes of work, especially at high-cutting speeds, soda water is more satisfactory than the oil, which does not penetrate to the cutting point with sufficient rapidity. A good lubricant of this kind is made by mixing sal soda, 1 lb.,

lard oil, 1 qt., soft soap, 1 qt., and water, 10 or 12 gal. The mixture should be boiled for one-half hour before using. If the solution has an objectionable odor, this can be eliminated by adding unslaked lime, 2 lb. A mixture of equal parts of lard oil and paraffin oil is very satisfactory for turning and threading operations, plain milling, deep-hole drilling, etc. Brass, bronze and babbitt are usually turned dry. Milk is a good lubricant for machining copper, although a mixture of lard oil and turpentine is also used. For aluminum, use either kerosene or a mixture of kerosene and gasoline.

Two Parting Tools Used to Cut Rings from Tubing

When parting thin tubing and trouble is encountered by having the tool break through one side before the other, which often ruins the job, try this trick of using two tools to cut simultaneously, one that cuts the inside and the other the outside. Two toolposts are set up on the carriage, so that they will cut in perfect alinement.



Parting Thin Tubes in Lathe by Means of Two Tools Cutting Inside and Outside of Work

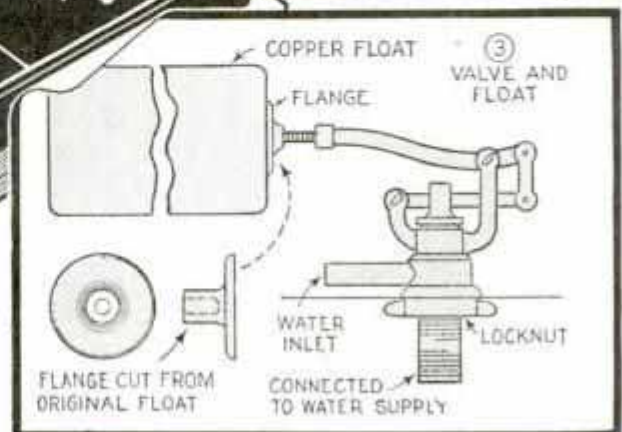
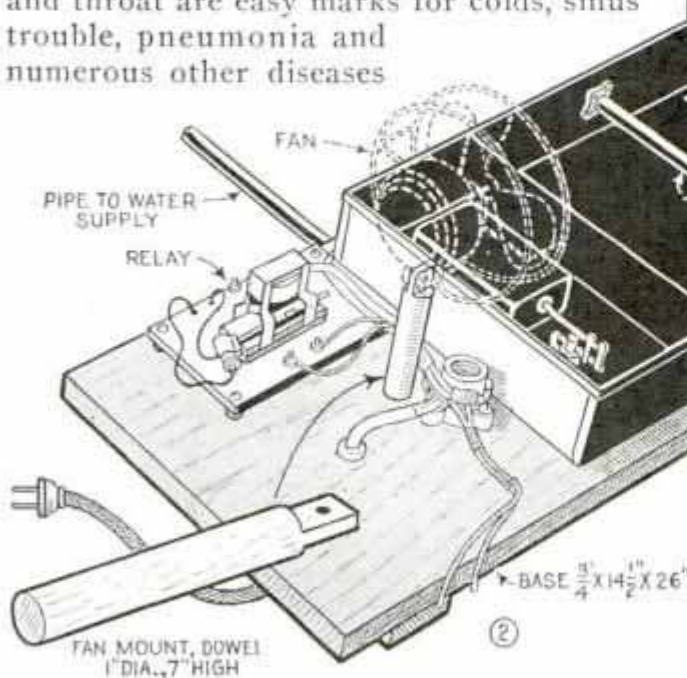
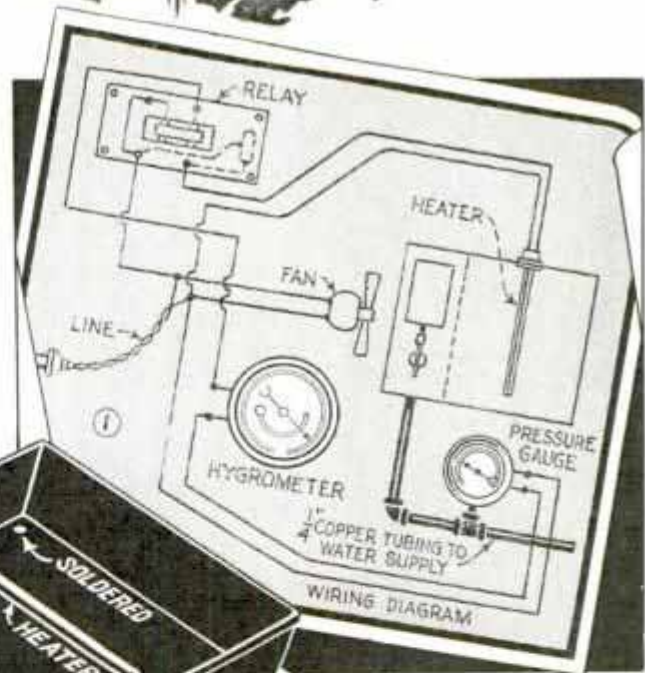
Ⓒ A round broach is particularly effective when finishing holes in cast iron, as it has a tendency to harden the surface of the hole considerably.

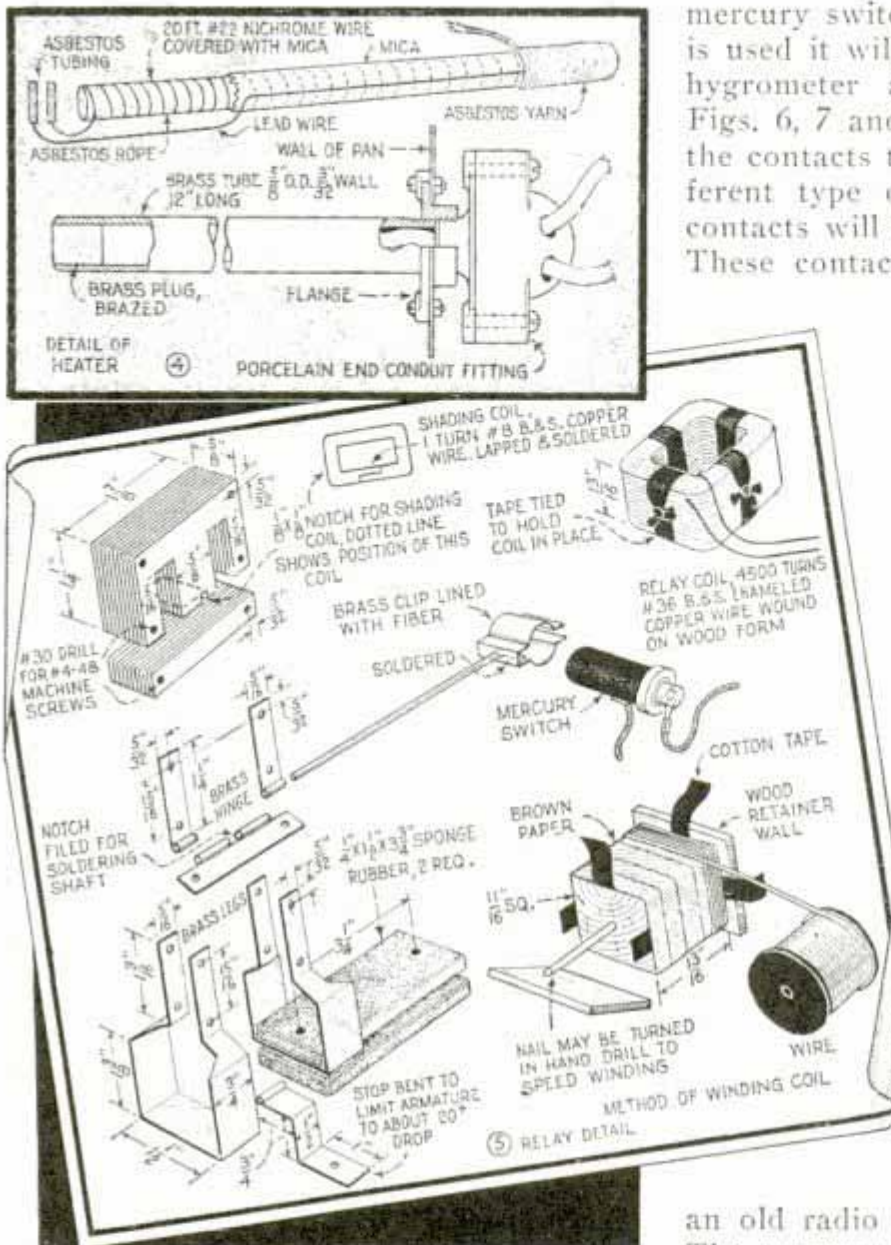
Automatic HUMIDIFIER



for HOME or OFFICE

THROUGHOUT the winter months the heated air in our homes, offices and shops is so dry that it acts like a sponge, sapping large quantities of much needed moisture from our bodies. This evaporation of moisture from the membranes of the nose and throat and from the skin leaves us feeling cold although the thermometer registers that the room is overheated. In addition to this discomfort, dry, parched membranes of the nose and throat are easy marks for colds, sinus trouble, pneumonia and numerous other diseases





mercury switch already installed. If this is used it will take the place of the hair hygrometer and relay later described. Figs. 6, 7 and 8 show details for adding the contacts to the hygrometer. If a different type of hygrometer is used the contacts will need to be changed to suit. These contacts must be made carefully and care must be taken to avoid damaging the sensitive instrument. The screws which fasten the contacts to the instrument must be well insulated from the face of the instrument with fiber, bakelite or mica washers. The holes for the screws are drilled large enough to take an insulating washer of the same thickness as the face. This will prevent the screws from touching the face. The contact points carry only the very small current required to operate a relay. However, if they are to be long lived and satisfactory they must be made of a tungsten or regular electrical contact alloy. The contacts shown in Fig. 7 were cut from

an old radio jack and soldered in place. The contacts from a Ford coil could also be used. In cutting the contacts from the jack or coil leave a thin ring of metal around the contact which can be soldered in place as shown. The adjusting screw is used for accurately setting the contacts so that they will come together and start the humidifier when the humidity gets to 35%. They should open and turn it off at 45%. The instrument may easily be made to work closer than this. The thin wire spring is made from No. 32-gauge piano wire. It may be bent slightly if the screw is not long enough to make the adjustment required. The frames for the contacts may be made from aluminum, brass or copper, the first being the easiest to work. The installation of the contacts and the adjustment of the hygrometer are the only delicate parts of the entire job. To test the completed instrument, set it on a

of the lungs, throat and head. Dry air also loosens the joints of furniture, causes doors to warp, impairs the tone of musical instruments, makes floors squeak and renders the appearance of paintings, rugs and tapestries lifeless.

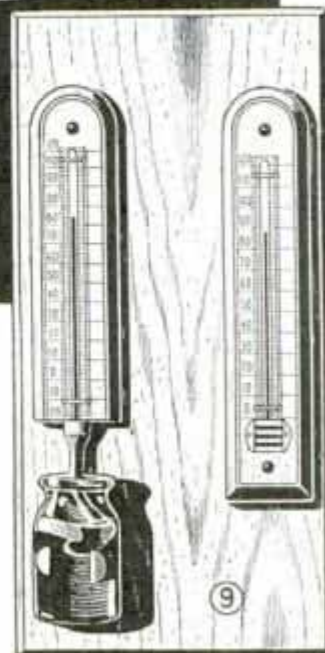
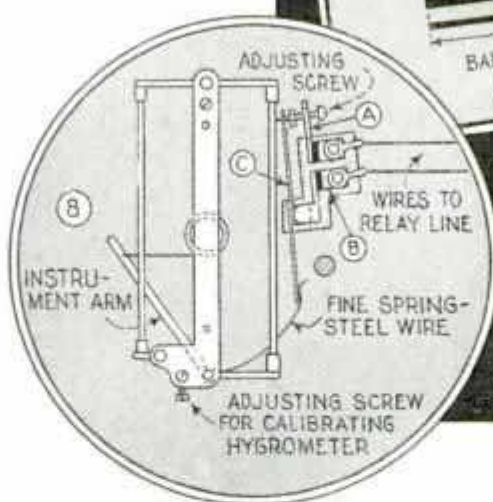
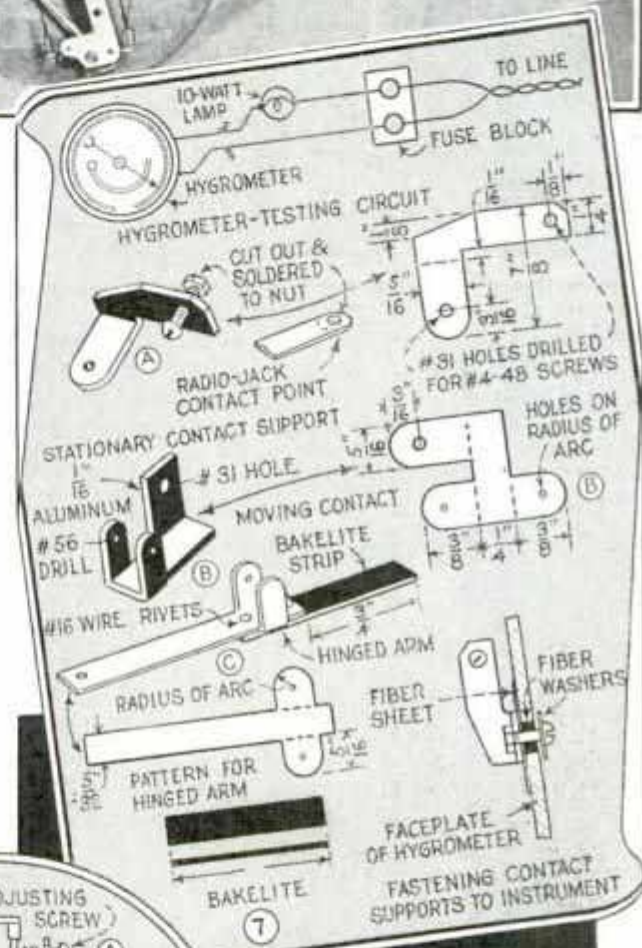
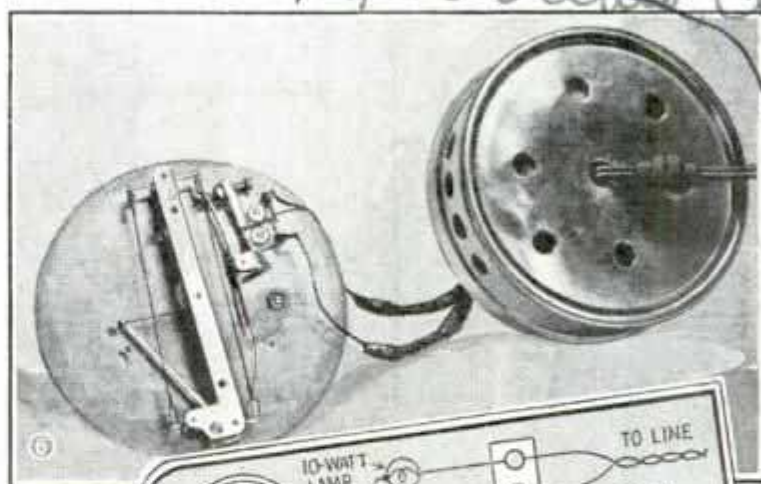
During winter months the heated air in most homes and offices is drier than the air of the lifeless Sahara desert and the provision of a good humidifier is of considerable importance. An automatic, electrically controlled humidifier will maintain a healthy, comfortable, humid atmosphere in an average-sized home. It can be easily constructed by anyone handy with tools and at a cost of only a few dollars.

An ordinary hair hygrometer equipped with a pair of electrical contacts is used to control the water evaporator. There is available a hygrometer which contains a

table and connect its wires to a 10-watt lamp. When the humidity gets to 35%, the lamp should light. At about 45% the light should go out if the contacts are working. In order to increase the humidity for a test, blow your breath on the hair of the instrument. This will momentarily increase the reading. The needle will quickly return to room humidity if the instrument is gently fanned to circulate the air around it. When installing the contacts, the hygrometer may be thrown out of adjustment. In order to calibrate it to its original sensitivity, mount two ordinary thermometers as shown in Fig. 9. This is known as a wet-and-dry-bulb hygrometer. By reading these thermometers and consulting table you can find the humidity. Knowing this, turn the small adjusting screw on the bottom of the hair hygrometer until the instrument reads the proper value. The wet-and-dry-bulb hygrometer is much more accurate than the hair hygrometer and may be used to re-adjust the humidifier when necessary.

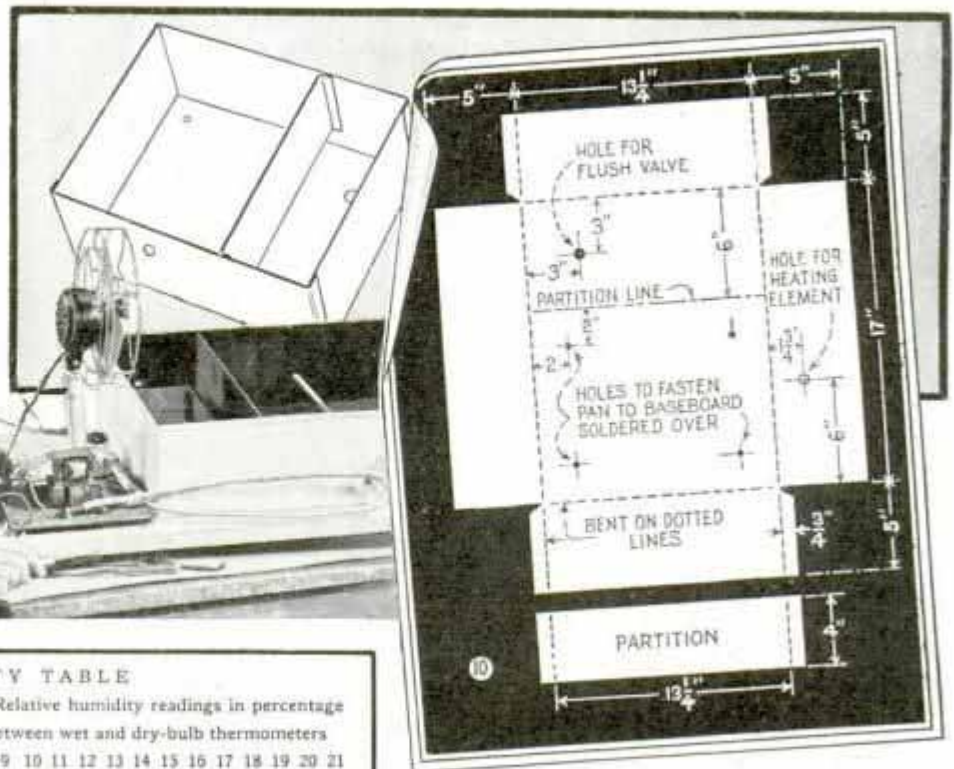
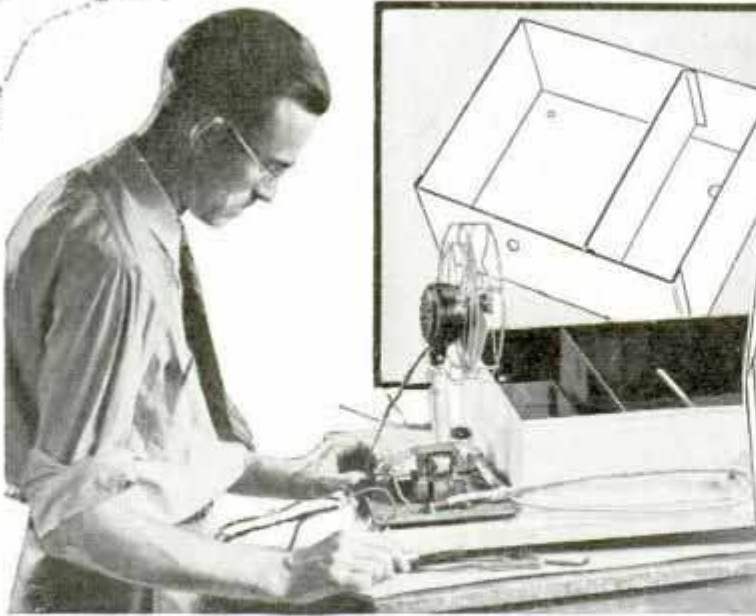
Fig. 10 shows the water pan. Into this pan is mounted an ordinary flush-box valve and float such as is shown in Fig. 3. The standard round float is replaced with a rectangular sheet-copper float. The electrical heating element, which evaporates the water, is detailed in Fig. 4. In building this element great care should be taken to prevent short circuits. If a brass tube such as is shown in the illustration is used the end may be brazed with a gas torch of the type used in battery-repair shops. To the ends of the No. 22-gauge Nichrome wire are attached by tightly twisting 2½-ft. lengths of heavy copper wire. If these lead wires are encased in asbestos tubing they may be run directly to the relay and light line as shown in Fig. 2.

On account of the delicacy of the contacts in the humidifier it is necessary to use a relay to turn on the heating element.



Ordinary Hair Hygrometer, Fitted with a Pair of Electrical Contacts. Is Used to Control Water Evaporation; a Hygrometer Containing a Mercury Switch Can Be Obtained for the Same Purpose

1400 Downing Park Blvd, W.



HUMIDITY TABLE

Temperature readings in Fahrenheit. Relative humidity readings in percentage

Dry-bulb thermometer	Difference in degrees between wet and dry-bulb thermometers																				
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
50° F	93	87	81	74	68	62	56	50	44	39	33	28	22	17	12	7	2				
51	94	87	81	75	69	63	57	51	45	40	35	29	24	19	14	9	4				
52	94	88	81	75	69	63	58	52	46	41	36	30	25	20	15	10	6	0			
53	94	88	82	75	70	64	58	53	47	42	37	32	27	22	17	12	7	3			
54	94	88	82	76	70	65	59	54	48	43	38	33	28	23	18	14	9	5	0		
55	94	88	82	76	71	65	60	55	49	44	39	34	29	25	20	15	11	6	2		
56	94	88	82	77	71	66	61	55	50	45	40	35	31	26	21	17	12	8	4		
57	94	88	83	77	72	66	61	56	51	46	41	36	32	27	23	18	14	10	5	1	
58	94	89	83	77	72	67	62	57	52	47	42	38	33	28	24	20	15	11	7	3	
59	94	89	83	78	73	68	63	58	53	48	43	39	34	30	25	21	17	13	9	5	1
60	94	89	84	78	73	68	63	58	53	49	44	40	35	31	27	22	18	14	10	6	2
61	94	89	84	79	74	68	64	59	54	50	45	40	36	32	28	24	20	16	12	8	4
62	94	89	84	79	74	69	64	60	55	50	46	41	37	33	29	25	21	17	13	9	6
63	95	90	84	79	74	70	65	60	56	51	47	42	38	34	30	26	22	18	14	11	7
64	95	90	85	79	75	70	66	61	56	52	48	43	39	35	31	27	23	20	16	12	9
65	95	90	85	80	75	70	66	62	57	53	48	44	40	36	32	28	25	21	17	13	10
66	95	90	85	80	76	71	66	62	58	53	49	45	41	37	33	29	26	22	18	15	11
67	95	90	85	80	76	71	67	62	58	54	50	46	42	38	34	30	27	23	20	16	13
68	95	90	85	81	76	72	67	63	59	55	51	47	43	39	35	31	28	24	21	17	14
69	95	90	86	81	77	72	68	64	59	55	51	47	44	40	36	32	29	25	22	19	15
70	95	90	86	81	77	72	68	64	60	56	52	48	44	40	37	33	30	26	23	20	17
71	95	90	86	82	77	73	69	64	60	56	53	49	45	41	38	34	31	27	24	21	18
72	95	91	86	82	78	73	69	65	61	57	53	49	46	42	39	35	32	28	25	22	19
73	95	91	86	82	78	73	69	65	61	58	54	50	46	43	40	36	33	29	26	23	20
74	95	91	86	82	78	74	70	66	62	58	54	51	47	44	40	37	34	30	27	24	21
75	96	91	87	82	78	74	70	66	63	59	55	51	48	44	41	38	34	31	28	25	22

This relay may be made from an old radio transformer. The core iron is removed from the coils and restacked and mounted as shown in Fig. 5. The coil consists of 4,500 turns of No. 36 B & S gauge enameled wire. This coil need not be wound in even layers, but it should be well insulated from the iron core. One end of the coil is attached to the light line and the other end is attached to one of the lead wires from the hygrometer. The other lead from the hygrometer is connected to the other side of the light line. When the relay is mounted and connected its movable iron armature should jump into close contact with the core when the hygrometer con-

tacts come together. The shaft, which carries a brass clip to hold a mercury switch, should be soldered to the brass strip which supports the movable armature after the position of the switch has been located which turns on the heating element when the hygrometer contacts are together. When the contacts are apart the heating element should be off. A lamp may be connected in place of the heating element while making this adjustment. Relays of this type, when operated on alternating current, tend to chatter and make noise. The small one-turn shading coil made from No. 8 bare copper wire and installed on the relay, as shown, will reduce this noise to an almost negligible quantity. If the relay is loosely mounted between thick sheets of sponge rubber, as shown, no noise should be heard. The mercury switch may be of the new iron-clad type or of the usual glass-encased type. Its current rating should be at least 6 amperes at 110 volts.

Any 6-in. electric fan, preferably of the noiseless type, may be mounted on the baseboard, as shown in Fig. 2, to distribute the humidified air. The fan is connected so that it will run continuously, thus keeping the air in circulation, which is essential if the apparatus is to work at its full

efficiency. The cabinet in which the humidifier is kept may be varied in design to suit the taste of the builder, provided the sides and ends are of open grill work to permit free circulation of air. Also the hygrometer must be separated from the vapor from the pan. The hygrometer case must be well ventilated so that it will quickly register changes in the humidity of the room. The hygrometer may be mounted separate from the humidifier if desired. It may be placed anywhere in the room and still serve its purpose if connected to the relay as shown. It should not be placed in the humid draft from the apparatus.

In using the humidifier it is important that the water supply be continuous. If the water is shut off the heating element will melt down the solder joints and perhaps cause a fire. If your water supply is uncertain it would be well to procure a Bourdon type pressure gauge from a local plumber, of suitable pressure range for your water service, and install in it a set of contacts which will break the circuit running from the light line to the hygrometer when the water goes off. Simple contacts may be readily built into any of these gauges by following the method shown in Fig. 7. Care should be taken in insulating the contacts from the metal parts of the pressure gauge. The contacts should be tested frequently and the float valve in the evaporation pan should be kept clean and in good working order at all times. Fig. 1 shows the method of connecting a modified pressure gauge as a safety switch besides showing a wiring diagram. Another safety feature which may be added is a fuse of the type used in electric percolators. These low-melting point fuses are readily available and offer the best kind of protection against overheating and fire in the event of water failure. A receptacle for these fuses may be made from a small brass tube, installed in the side of the pan and close to the heating element. If you wish to use this kind of safety method, have your electric dealer show you the style of percolator fuses he handles and the method of installing them. In any event, electrical connections must be kept dry at all times. If this type of fuse is used a pressure-gauge contact as described above is unnecessary.



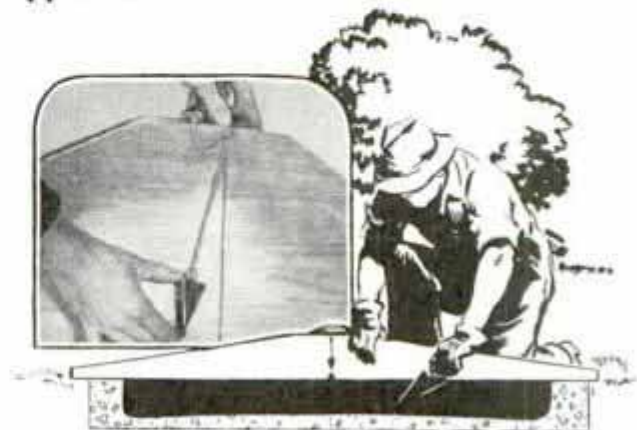
Identification Letters on Side of Milk Can Built Up of Solder

Soldered Initials on Milk Cans Assure Lasting Identification

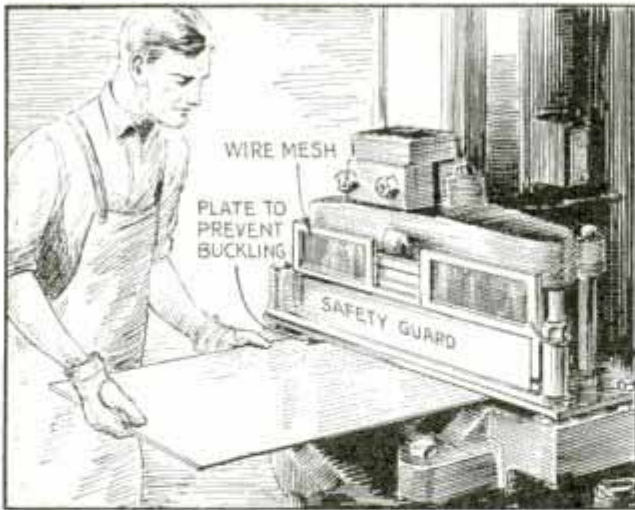
Finding that painted letters quickly wore off his milk cans, a Wisconsin dairyman formed initials of solder on the cans. To do this, the side of the can where the letters are to be placed is first cleaned thoroughly and then acid flux is applied, after which a heated soldering iron is used to melt the solder, shaping it so that the letters are built up in relief.

Plumb Bob Levels Large Straightedge

This plumb-bob arrangement will accurately indicate whether or not a large straightedge is in a level position. A line is scribed at the center of the straightedge, exactly at right angles to its lower edge, and the plumb bob is suspended from a screweye directly over the line. The least variation from a true level is immediately apparent.



Alignment of Plumb Bob with Center Line Shows When Straightedge Is Perfectly Level



Iron Plate Fastened above Bed of Punchpress Keeps Sheet Metal from Buckling in Machine

To Prevent Buckling of Sheet Metal in a Punchpress

In order to prevent sheet metal from buckling in this punchpress, a broad $\frac{3}{4}$ -in. iron plate was spaced a little above the bed of the machine by means of thick, iron washers, and a narrow iron plate was welded vertically to its front edge to serve as a stiffener and a safety guard. To the ends of this, short pipes were welded to take the corner bolts, which were replaced with other pipes long enough for the purpose. To allow the operator a view of the punches, wire mesh, attached to a frame, is held on the plate by two steel forks.

In Our Next Issue

MASTERPIECES OF AMERICAN FURNITURE

With **GOVERNOR WINTHROP'S DESK** as a "sendoff," we are introducing a series of articles telling how to make accurate copies of several distinctive pieces of early American furniture, the originals of which are now carefully preserved in museums or in private collections. Each piece has a historic, romantic background that makes it doubly interesting. All constructional details are given so that this furniture can be readily duplicated by the home craftsman or in the school shop.

LAKE ERIE BATTLE SHOWN IN MINIATURE

A new departure in model-ship building in which an entire fleet of tiny craft is set on a board, a fad of growing popularity among European modelmakers.

WINDOW-DISPLAY ATTENTION ARRESTER

This store-window novelty emits glowing circular designs that are ever-changing and will stop the crowds. Small motor and two neon bulbs needed.

MAKING UNUSUAL HOME-MOVIE TITLES

Tells how to obtain novel, artistic effects that enable the home-movie owner to simulate professional work. Does not require skill at lettering.

FORGE FOR FARM WORKSHOP

How to convert an old cream separator into an excellent blower for a small forge, which is attached.

PLAYING WITH LEAD

Another one of those entertaining and educational stories that involves experiments in simple chemistry.

WORKING IN GLASS

Many tricks of the trade which enable the amateur to handle glass efficiently.

EASTMAN'S

Annual Gift Guide

● Sharpshooters for experts . . . sure shots for beginners—there's a Kodak gift for every need. Kodaks for miniature snapshots . . . for large pictures . . . for movies . . . for "stills" . . . whatever your picture-making desires, there's a Kodak that fills the bill. See these latest cameras at your dealer's . . . make this a Kodak Christmas. Eastman Kodak Company, Rochester, New York.

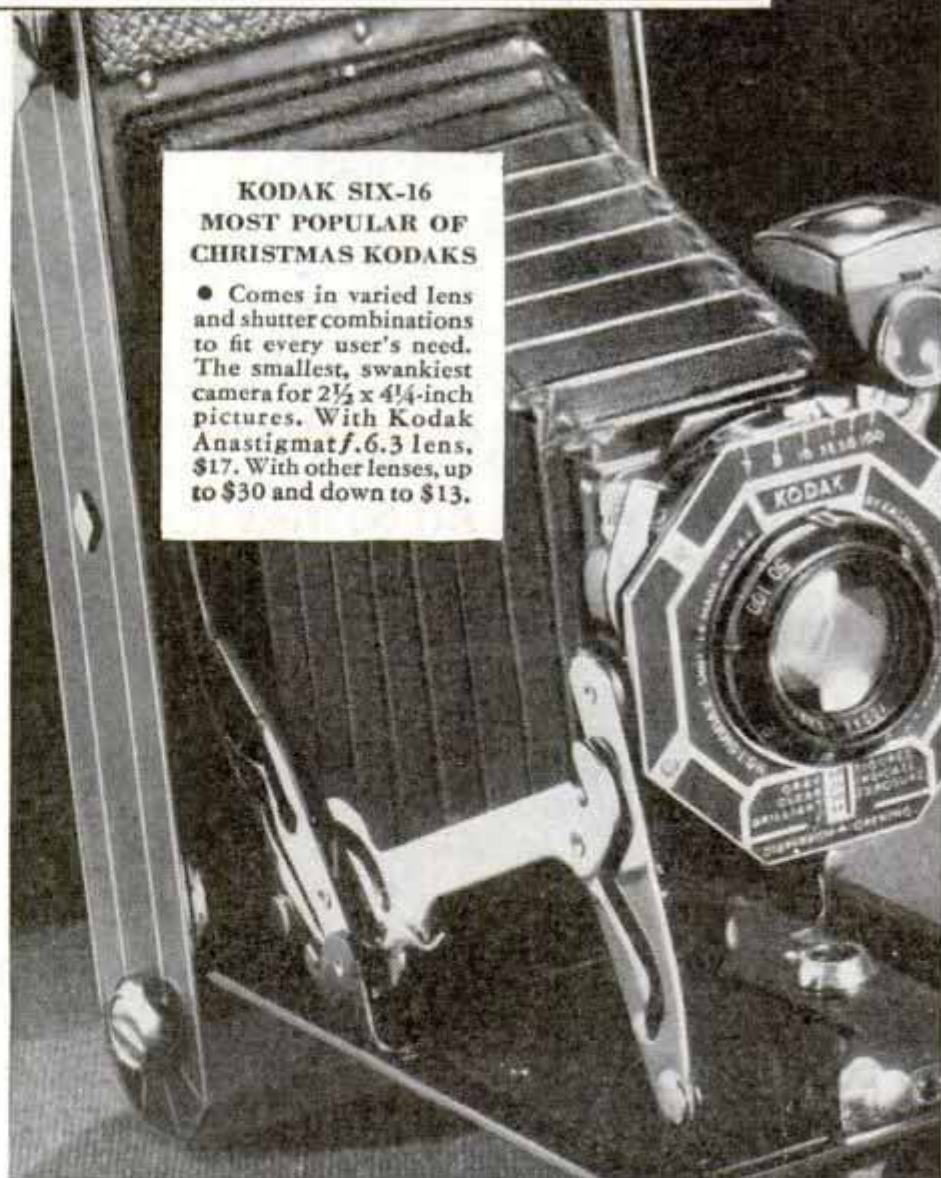


A CAMERA AT \$29.50
FOR MOVIES AT 10¢ A SCENE

● Ciné-Kodak Eight brings the excitement of movie-making within the means of everyone. Makes 20 to 30 scenes—news-reel length—on a film roll costing only \$2.25, including finishing. Pocket size, easy to use, yet a real, full-fledged movie camera.

KODAK SIX-16 MOST POPULAR OF CHRISTMAS KODAKS

● Comes in varied lens and shutter combinations to fit every user's need. The smallest, swankiest camera for 2½ x 4¼-inch pictures. With Kodak Anastigmat f.6.3 lens, \$17. With other lenses, up to \$30 and down to \$13.



Learn to Mount Birds

1 HELLO, SON. SPENDING THE EVENING AT YOUR WORK-BENCH AS USUAL?

SCHOOL OF TAXIDERMY. IT SAYS THAT MOUNTING BIRDS AND ANIMALS IS A GREAT HOBBY FOR THE MAN WITH A WORK-BENCH—AND PROFITABLE, TOO. WHAT DO YOU THINK?

2 COME IN, DAD. I WAS JUST READING THIS AD OF THE NORTHWESTERN SCHOOL OF TAXIDERMY. IF IT'S AS INTERESTING AS IT SOUNDS, I'M AT LEAST GOING TO INVESTIGATE. AND I COULD SURE USE SOME EXTRA MONEY RIGHT NOW—ALICE WANTS A NEW DRESS AND I'D LIKE A NEW SET OF TOOLS.

3 WELL, SON, I DO KNOW THAT THAT SCHOOL WAS TEACHING TAXIDERMY WHEN I WAS YOUR AGE—THIRTY YEARS AGO. I OFTEN WANTED TO LEARN IT MYSELF.

NOT SO BAD FOR A BEGINNER. THERE'S A LAMP THAT WILL LOOK DANDY IN MY DEN. GUESS I'LL ASK DAD TO DROP OVER TONIGHT AND TAKE A LOOK.

4 WHY BOB, YOU CERTAINLY DID TAKE UP TAXIDERMY IN EARNEST, DIDN'T YOU?

I SURE DID. I'VE MADE AND SOLD A BUNCH OF BOOK-ENDS, MIRRORS AND SO ON TO HUNTERS FOR THEIR DENS. AND FUN? SAY DAD, TAXIDERMY'S THE GRANDEST HOBBY IN THE WORLD!

5 THAT SQUIRREL BOXING GROUP IS ONE I MADE FOR GREEN'S SPORTING GOODS STORE FOR A WINDOW DISPLAY. SO FAR THIS MONTH I'VE BOUGHT THOSE THINGS I WANTED, AND MADE MY WORK-BENCH PAY ME AN EXTRA \$68—JUST FROM TAXIDERMY.

6 AND I NOT ONLY MOUNT TROPHIES FOR OTHER SPORTSMEN, BUT MOUNT MY BEST ONES FOR THE DEN HERE. WHY DAD, I NOW GET TWICE AS MUCH FUN FROM MY HUNTING AS I USED TO. YOU WOULD TOO IF YOU LEARNED TAXIDERMY.

IT SOUNDS GREAT, SON. WHEN DO I START?

LATER

Send Coupon for Free Book!

Fun-Fascination-Profits

Be a Taxidermist. All Secrets Revealed. Learn at Home



Save Your Hunting Trophies
 Mount (stuff) expertly your valuable game-birds, animals, fish, game-heads. Preserve them just like life. That is Taxidermy. Learn at home by mail. Decorate home and den with nature's art. Make undreamed-of profits in spare time, in your shop. You can. Will you? Win fame as a taxidermist. Investigate. Mail coupon NOW.

Success Guaranteed
 This old reliable school has graduated 200,000 students in Taxidermy. 30 years in business. Our great success permits this guarantee. We know we can teach you. It's a grand money-making hobby. You must be interested, if you hunt or fish or have a work-shop. Ask for the free book and learn all about Taxidermy.

Mail Coupon
 Or a postcard will do. No obligation on your part. The beautiful Book, with hundreds of entrancing Pictures is Free. Don't miss your Only Chance to get this remarkable book Free and Postpaid. Write today. State your Age.

Wild Game Not Needed
 Use common specimens; squirrels, rabbits, chicks, pets, owls, pigeons—even frogs. Make useful articles like those shown here. Mount them in human and humorous positions. This is craft and novelty taxidermy. It's fun—and profitable. All included in our unique lessons. It's marvelous. Write the school this minute.

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 Many students earn from \$40 to \$75 monthly in spare time. Some earn thousands of dollars each year. Sportsmen bring their trophies to be mounted. Besides you can sell your own Novelty groups for homes, dens and for merchants' window display.

LEARN TANNING
 The lessons teach tanning harness, sole, crone leather; also furs. Expert methods. Very profitable.

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 Gentlemen: Please send at once, your free 48-page book on Taxidermy without any obligation on my part. Tell me how I can learn Scientific Taxidermy at home.

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THE PICTURE**

● Jiffy Kodak opens like a jack-in-the-box. No fussing, no fiddling. Simplest folding camera ever devised. Handsomely finished in metals and enamels. For $2\frac{1}{2} \times 4\frac{1}{4}$ pictures, \$7.50; $2\frac{1}{4} \times 3\frac{1}{4}$ pictures, \$6.75.



**ULTRA-FAST LENS
AND SHUTTER—
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● The tiny Kodak Pupille is a gem of a camera that fits in the palm of your hand. A gift for the camera enthusiast. Takes 16 sharp, clear pictures without reloading. Price, with $f.2$ Anastigmat lens, $1/300$ second Compur shutter, accessories and case, \$75.



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**BOYS AND GIRLS,
AND—**

● Boys and girls, and others who like to take pictures the easiest way, will get real joy from this Brownie Six-16. The well-known Brownie ease plus new refinement in looks and action. Price, \$3.50. Other Brownies priced as low as \$1.50.

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IT TAKES HEALTHY



Steady Smokers turn to Camels

WALTER BEAVER, holder of the coveted Grand American Handicap, says:

"Winning a trap-shooting championship is partly a matter of luck, partly the result of practice and partly *healthy nerves*. I'm a steady smoker. People kid me about it at the tournaments. They say I never have a cigarette out of my mouth. During all these years I've been smoking *Camels*, not only because I like their *taste* and their *mildness*, but also because they *never jangle my nerves*."

It's no fun to feel that your nerves are ragged—and to wonder why. Check up on your eating...your sleep...your cigarettes. Get a fresh slant on smoking. Switch to Camels. Your nerves and your taste will tell you that Camels are a more likable cigarette—and that they don't upset your nerves.

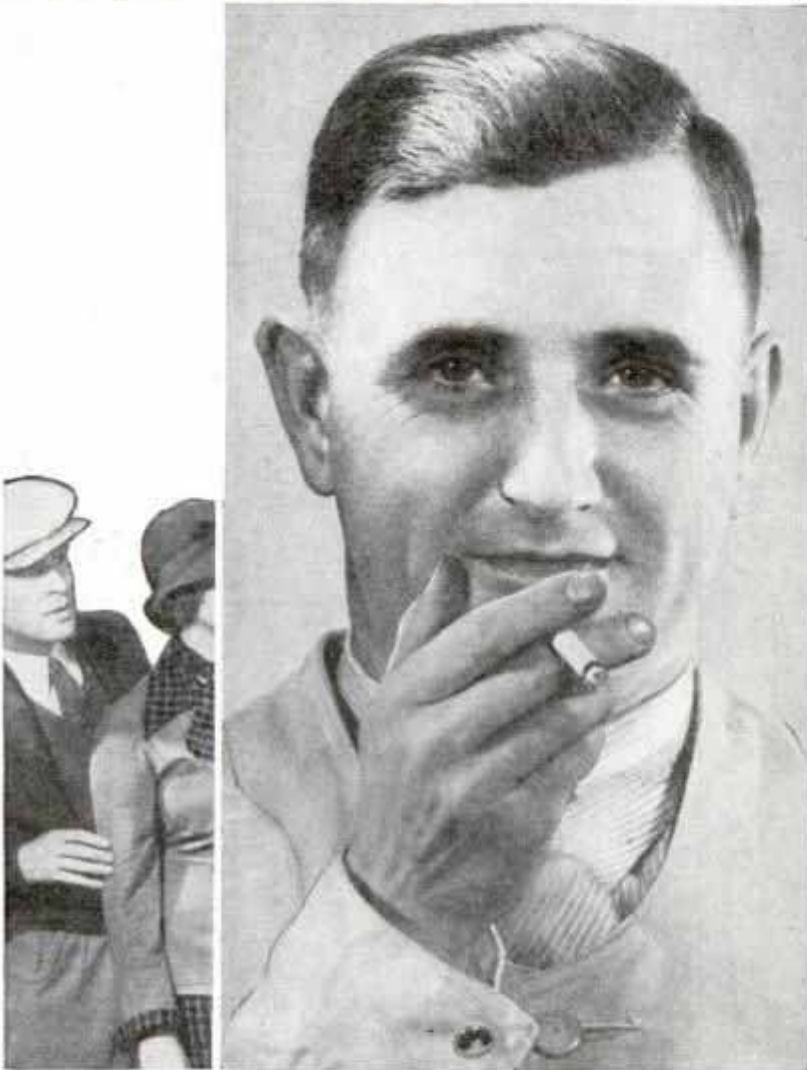


HOW ARE YOUR NERVES? If you smoke a lot... inside...outdoors...wherever you are... join the swing to Camels. You'll find them milder, better tasting, and they never get on your nerves.

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NERVES

TO BE
THE CHAMPION
TRAP SHOOTER



SHOOTING FROM SCRATCH, 25 yards behind the traps, Walter Beaver pulled out of an exciting tie to win the 34th Grand American — the first time it has been won by a limit contestant! He has been a steady smoker of Camels for years, and says: "I like their taste and mildness...they never jangle my nerves."

**IT IS MORE FUN
TO KNOW**

Camels are made from finer, **MORE EXPENSIVE** tobaccos than any other popular brand.



A
MATCHLESS
BLEND

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CAMEL'S COSTLIER TOBACCOS

NEVER GET ON YOUR NERVES...NEVER TIRE YOUR TASTE

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THE MOST COMPLETE LINE IN THE WORLD

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MOST PRACTICAL HITCH MADE!

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Trailer House Blue Prints, working size 36" x 24". Ideal and Deluxe \$3.00 per set of three. Ideal Drop Axle, Combi-Chasi Axles and Body Corners. Free with trailer sets or rebate when parts ordered.

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Harris makes over \$8.00 CASH SALES from 63c in Potatoes. Amazing NEW OUTFIT—works like magic—takes like wildfire—experience unimportant—everything furnished. We help finance and locate you. A million dollar market waiting. WRITE QUICK. Get FREE FACTS. Long-Eakins Co., 128 S. High St., Springfield, O.

WORLD WIDE SHORT WAVE RECEIVER \$4.75

12,500 MILES ON TWO TUBES!! NOT A TOY! NOT AN ATTACHMENT!



Clear detailed instructions enable you to build this professional appearing set yourself. World wide reception record established! Tunes from 15 to 200 meters. Gets foreign broadcasts, police calls, airplanes, amateurs, etc. DIRECT! Complete KIT (all holes already drilled) with every necessary part and simple instructions to build this remarkable radio receiver, dry cell or AC Model \$4.75. Send \$1. Balance C. O. D. Satisfaction Guaranteed! Order direct from this ad or send for literature.

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WOOD WORKING MACHINES FROM OLD AUTO PARTS!

Every one can afford real lathe, drill press, saws, etc. Built at home from auto parts with our blueprints and special parts. Send dime for 1934 illustrated catalog listing our plans and parts; also contains bargains in workshop supplies, free suggestions, and instructions on wood finishing.

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STOPPING LEAKS WHERE THE METAL IS THIN

THIS is the easiest kind of a Smooth-On repair to make and anyone can get good results.

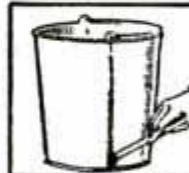
Merely mix the Smooth-On with water until it forms a putty. If the leak is at a seam, pry open a little, clean off, and force the Smooth-On in with the finger or a knife blade. At a rusted spot, scrape off the rust, force the Smooth-On through and press it to anchor on both sides. At small holes, put the Smooth-On between washers inside and out and use a small machine screw and nut for drawing up tight.

Smooth-On No. 1 forced into seam openings, between rivets, or into the holes quickly metallizes and thereafter is tight against hot or cold water, steam, smoke, oil, gasoline, gas, etc. It holds in any metal and can be used as well to stop leaks at joints and cracks in cast or wrought metal pipes, radiators, boilers, and furnaces. Use it also to tighten loose handles and to anchor loose bolts, screws, etc., in metal, concrete, tile and wood.

By following the simple directions in the Smooth-On Repair Booklet, you can make dozens of home and automobile repairs at a very small fraction of what a repair man would charge, and if you keep a small can of Smooth-On ready for emergencies, you also avoid annoying delays.



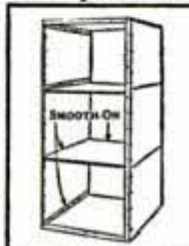
SMOOTH-ON Radiator



Leaky Pail



Leaky Kettle



Leaky Tank



Stove Pipe



Oil Leaks



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Get Smooth-On No. 1 in 7-oz., 1-lb. or 5-lb. tins at any hardware store or if necessary direct from us.

Do it with SMOOTH-ON

SMOOTH-ON MFG. CO., Dept. 37, 574 Communipaw Ave., Jersey City, N. J.

Please send the free Smooth-On Repair Book.

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Protection for BRIGHT METAL

Use Esso Handy Oil all around the car for cleaning, protecting, preventing rust, and taking out the squeaks. Can't gum or corrode—right for your starter and generator, too. Fine long spout puts the oil where you want it without waste or drip. Leak-proof cap is a big comfort. Get a can today. On sale at dealers everywhere. Esso, Inc., 26 Broadway, N. Y. City.



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PORTABLE DRILL for HOME and FACTORY

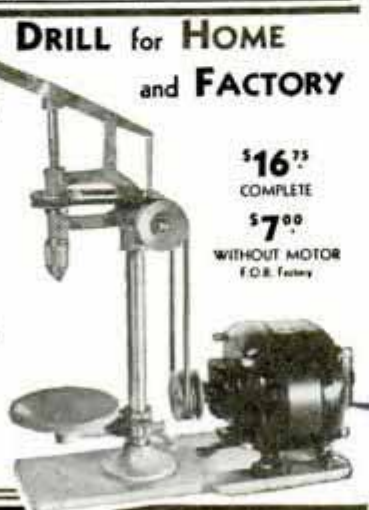
SPECIFICATIONS FOR MODEL 707

- Drill Capacity - 0 to 3-16"
- Motor - 1-6 H.P. - A.C. - 60 cycle
- Drills to center of 6" circle.
- Distance from chuck to table - 6"

Weight - 35 lbs.

MONEY BACK GUARANTEE

ASHLEY MACHINE WORKS
ROCHESTER, N. Y.



\$16.75
COMPLETE

\$7.00
WITHOUT MOTOR

F.O.B. Factory

AMPLIFIER INPUT STAGE FOR MODULATOR UNIT

(Continued from page 118A)

total winding is 5 volts, the brown and black lead being the center tap.

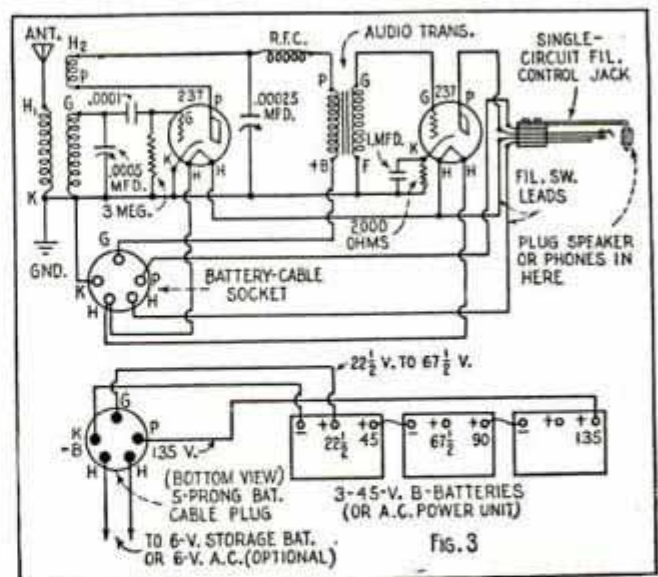
The microphone pre-amplifier is not used when amplifying phonograph records. The leads from a low-impedance phonograph pick-up are connected directly to the line-output transformer T-5516 in the modulator unit. To amplify radio programs from a receiver, couple the detector tube through the same type of tube-to-line transformer as that used in the pre-amplifier. An enlarged blueprint of all diagrams is available; those who wish it should specify blueprint No. R192. The method of coupling the output transformer of the modulator unit, through a high-voltage condenser and choke, to modulate a single type-210 tube in a phone transmitter, is shown in Fig. 6. Taps 1 and 2 are used for two 210's, push-pull or parallel.

BEGINNER'S TWO-TUBE ALL-WAVE SET

(Continued from page 109)

Figs. 2A and 3. An enlarged blueprint of all diagrams is available if desired. Specify blueprint R-193.

If a metal front panel is used for this two-tube receiver, or the one-tube all-wave set of November, the combination



filament-control and phone jack must be insulated from the metal panel. If there are any points not clear to the builder, the radio editor will be glad to explain them in further detail.

Xmas Joy Lasts Longer

The New Boeing 247 Nearly 5 foot span; weight 16 oz.



building these C-D 3/4" scale flying models

Highly detailed 3/4" scale authentic Cleveland-Designed model of the big 10 passenger planes now flying America's air lanes. This is actual photo of the "C-D" model itself. Colored silver entirely. Complete Kit SF-35 with everything needed, at your dealers, or express charges collect (weight not over 7 lbs.) \$6.50.

To Canada and England: Add 15%



1932 AERONCA C-3

Span 27", length 15 1/4", weight 1.9 oz. Colored red and silver. Complete Kit SF-40, only \$2.00

Printed-Out Wood Parts feature these two Kits. Give one to your friends. Send 3c stamp for new catalog No. 12B.



1932 Lincoln Sportplane

Span 18", length 12 1-8", weight 1 oz. Colored cream and black. Kit SF-36, only \$1.50

CLEVELAND MODEL & SUPPLY CO., Inc. 1866-P1, West 57th St., Cleveland, Ohio, U. S. A.



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You'll advance faster with an easy playing Conn. Choice of the world's greatest artists. Many exclusive features yet they cost no more. Home trial. Easy payments. See your dealer or write for free book. Mention instrument.

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ONAN A. C. PLANTS furnish the same current as city service—110 volts, 60 cycle A. C. Operates Radio, Water Systems, Refrigerators, all Household Appliances. Sizes 300 to 10,000 Watts Available from stock. No battery used except to start the engine. Ideal for farms, camps and lake homes. Also a complete line of D. C. Models. **D. W. ONAN & SONS** 928 Royalston Ave., Minneapolis, Minn.

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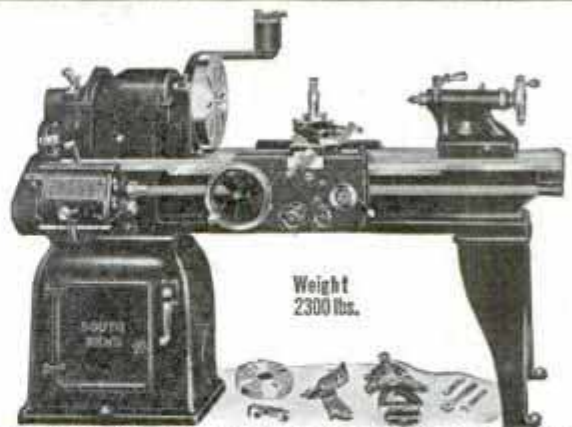
KALAMAZOO STOVE CO., Mfrs.
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Ranges 12" and up

A Kalamazoo
Trade Mark Registered **Direct to You**

South Bend Lathes

Back-Geared, Screw Cutting Precision Lathes



Weight 2300 lbs.

16" x 6' Quick Change Gear Lathe with Underneath Belt Motor Drive - - - \$777.00

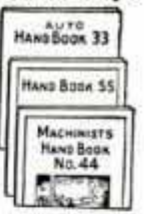
South Bend 16" swing lathes are recommended for and used in the manufacturing plant, tool room, machine shop, repair shop, and automotive service shop. Have the precision for finest tool and die work, also the power and rigidity for heavy jobs. Are available in Quick Change and Standard Change Gear Types—in bed lengths from 6' to 12'—in countershaft drive and individual motor drive models—\$475 to \$1076. Easy Terms. 96 other sizes and types of lathes from 9" to 18" swing, including 36" Brake Drum Lathes. Write for 1934 Catalog No. 94. Free.

PRICES OF A FEW POPULAR SIZE LATHES

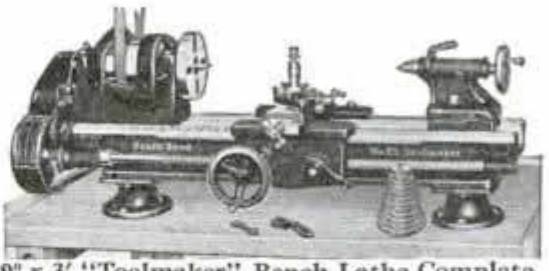
Size of Lathe	Countershaft Drive		Underneath Drive	
	Standard Change	Quick Change	Standard Change	Quick Change
9" x 3'	\$235.00	\$275.00	\$362.00	\$402.00
13" x 5'	352.00	402.00	552.00	602.00
18" x 10'	689.00	759.00	981.00	1051.00

To Our Friends Overseas: South Bend Lathes are used in 88 countries in many of the world's finest industries and shops where accurate, precision work is done. If interested in the most popular lathe in the U. S., write for one of the following Handbooks, free, postpaid, on request.

Motor Mechanics' Handbook No. 33 on latest precision methods in auto servicing.
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Machinists' Handbook No. 44 shows modern industrial shop practice in precision lathe work.



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9" x 3' "Toolmaker" Bench Lathe Complete as shown, wt. 325 lbs., \$128.00

The 9" Swing "Toolmaker" is a back-geared, screw cutting precision Lathe for light manufacturing, laboratory and tool work, also for the repair shop, auto shop and home workshop. Eighteen other models of 9" swing lathes are shown in new 9" Lathe Catalog No. 39. Write for copy, free, postpaid. Use Coupon Below or Write

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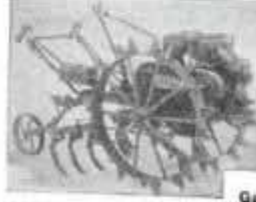
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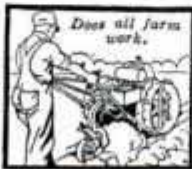
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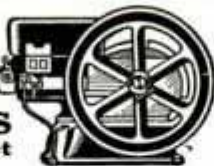
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 1843 N. Pitcher St., Kalamazoo, Mich.



**HAZARDS OF SEAGOING
 ENGINEERS**

C/532 (Continued from page 69)

rings have been made by cutting steel from a deck. Once when a slide valve broke, disabling a tanker's engine during a storm, the entire crew worked frantically at lifting the valve chest cover and removing the one and a half tons of broken parts. Two hours later the tanker was able to go ahead at reduced power.

Engineers who went to sea on coal-burning ships made the rounds each watch to feel with their hands if the bearings were hot. On modern ships today they stand on platforms and watch a waterfall of oil tumble past a glass window in the main oil line. A spinning metal flag operated by the moving oil in each bearing cap tells whether the bearing is plentifully supplied. Caring for the engines is simplified by indicators and gauges that tell the condition of each part. Periscopes show the amount of smoke in each stack, taking guesswork out of the fire rooms.

Most of the auxiliaries needed to operate a modern liner are run by electricity, one result being that occasionally a tiny fuse that may be held between the fingers blows out and stops a 30,000-ton ship.

A few years ago the pleasant monotones in the warm engine room of the R.M.S. "Tuscania" came to an abrupt end when a piece of steel from a tooth of the geared drive broke off and caught. It looked like a shipyard repair, but while the "Tuscania" limped on under its remaining engine the engineers went to work inside the confined space of the gear casing. Moving in short shifts because of the heat and the blistering hot oil, they drilled into the metal, tapped holes, and fitted new steel into the broken part. After many hours the exhausted crew finished and the "Tuscania" proceeded at full speed.

Oil has replaced coal on modern ships and occasionally a leaking boiler tube requires a fireman to crawl into a furnace from which the fire was drawn only a short time before. There he must worm his way through the tiers of tubes to reach the leak and repair it. Sometimes a fireman becomes panicky from the heat and finds himself caught in the maze of hot tubes. Then other firemen turn a fire hose into the furnace and wash him down with cold water.

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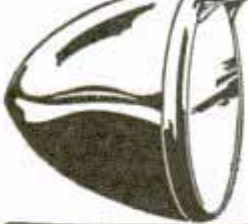
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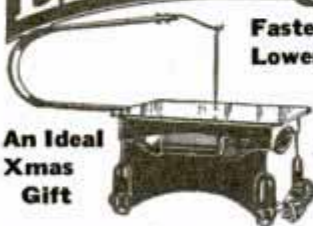
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Brannon Appliance Corp., 629 S. Dearborn, Howell, Mich.

THE MARVELS OF MARS

c1385 (Continued from page 77)

solar system were formed out of the ancestral sun about 2,000 million years ago, Mars, being smaller than earth, cooled more quickly. Therefore, life could have begun on Mars millions of years before it did on earth. With this head start intelligent beings could have been evolved earlier than was the case on earth. This head start might conceivably place the Martians today where we Earthians will be a million years hence, or half a million or even 100,000 years hence.

Such a condition of affairs gives us the right to regard the lines on the surface of Mars as possibly gigantic engineering undertakings, worked out to preserve life in the face of planet wide shortage of water.

If the Martians are as far ahead of us in civilization and engineering as their canals suggest, it is reasonable to expect that they are equally ahead of us in radio engineering. Were this to be true, then it is possible that they have been signaling us for centuries, hoping the time would come when we would be intelligent enough to detect these signals and answer them. One radio engineer reports a mysterious radio "signal" on 14.6 meters wavelength, which appears to come from a source in outer space.

Mars was something like thirty-four million miles distant last spring and now is about fifty-eight million miles away. In five or six years from now it will be something like twenty million miles distant, or less, at which time we may have a lot of exciting Martian news.

MAGIC FOR EVERYBODY

(Continued from page 103)

At the conclusion of the stunt, the three-clip string is substituted . . . "here it is white again," and everything can be handed out for examination.

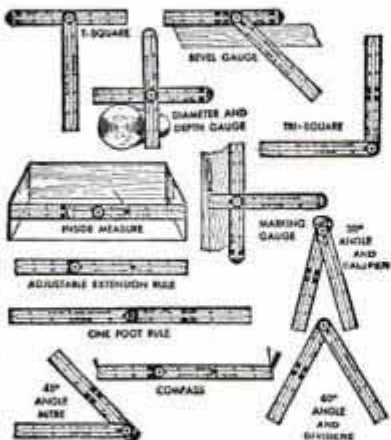
Take a couple of quarters. Hold them between your thumb and forefinger, as shown in Fig. 23, about an inch apart. Now, loosen your grip so that the lower quarter will be released. It is a fairly well-known bit of magic that the released coin will turn over exactly once (half-a-turn)—but—can you drop it without making it turn over? A circular snap of the thumb as you release the coin does the trick.

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MYSTERY WINGS

(Continued from page 53)

He found that birds determine, from the direction of air currents, just when to start on a migratory flight. Not even low temperature, snow or ice will make them move if the wind is not right.

Col. Richard Meinertzhagen has used trains, airplanes and anti-aircraft equipment for studying bird speeds. He has reached the conclusion that migratory flight does not differ greatly from everyday flying among some birds, except that it generally is more steady and unhurried. Some of the findings of Colonel Meinertzhagen concerning speeds of birds are:

Rooks in northeast France, thirty-eight to forty-five miles per hour. Some measurements made with air-speed indicator of airplane; ravens, south Palestine, thirty-two to thirty-nine miles per hour; altitude 310 to 380 feet; starlings, forty-three to forty-nine miles per hour in calm wind, about 130 feet altitude; finches, thirty-three miles per hour.

Swallows in France, 106 miles per hour. The birds were taken from Roulaix to Paris, a distance of 160 miles, and released. They were back home in ninety minutes.

Swallows, East Africa, thirty-eight to thirty-nine miles per hour.

Swifts, observed from airplane at 6,000 feet, more than sixty-eight miles per hour. The birds circled around the plane with ease when the air-speed indicator read sixty-eight.

White stork, Mesopotamia, forty-eight; pelican, south Palestine, fifty-one at 1,240 feet; geese, forty-four to forty-five; Brent geese, Scotland, forty-five; mallard, France, fifty; teal, south Palestine, forty-four; turtle dove, thirty-seven; pheasant, thirty-three and eight-tenths; partridge, thirty-two and one-tenth in open; quail, fifty-seven; Geoffrey's plover, thirty-four; carrier pigeons, thirty to thirty-six normal speed, but jumps to sixty when "homing"; golden plover, escaping plane, sixty.

Colonel Meinertzhagen considers swifts the fastest of birds, and says they can increase their speed from seventy to more than 110 miles per hour. These birds have been known to fly at 4,000 to 5,000-foot altitude for fifty or more miles.

It is the variability of wind and bird speeds that produces the elements of un-

(Continued to page 128A)

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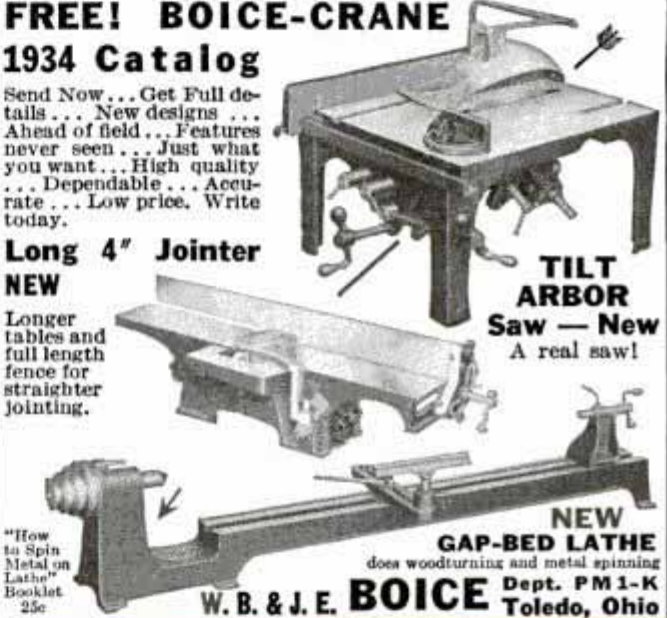
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MYSTERY WINGS

(Continued from page 126A)

certainty which make duck hunting such a popular sport. The hunter can learn, from the manufacturers of his arms and ammunition, all about the velocity and range and behavior of lead shot, but he must cultivate the art of estimating instantly the probable speed of the birds in relation to him. One of the first things he discovers is that he seldom fires directly at a bird, but that he must aim his gun so that its pellets and the birds will meet at some point in the lines of flight.

In learning to do this, the hunter will find it useful to know something about the speed of various ducks. Some of the speeds generally given, in addition to those already mentioned, include the following:

Shoal-water ducks and mallards, forty-five miles per hour and not over fifty-five; pintail, up to sixty; teal, speeds up to sixty-eight have been reported; Canada geese in migratory flight, forty-five to forty-seven; canvasbacks, when pressed, seventy; ducks flying downward toward decoys surpass average speed, and have been estimated to reach 125 miles per hour.

The speeds of small birds like those you see in your garden are generally comparable to those of motor cars traveling within the law along city streets. Most perching birds fly at seventeen to twenty-five miles per hour, according to one report. Robins and birds of the same size reach thirty-two miles per hour. Humming birds, swallows and swifts usually are difficult to time because of their erratic flying. Birds of the same flock or species do not all fly at the same velocities except in formation. Even then, some individuals lag behind the others, or suddenly dart from one position to another.

The amateur naturalist can make valuable contributions to the science of bird flight by measuring flying speeds, observing maneuvers and unusual actions. Often the monotony of an automobile trip can be broken by noticing the speed at which birds fly alongside the car or ahead of it. The photographer who likes to snap action pictures will find a fertile field in shooting birds with his camera. Eventually the work of scores of students of bird life will clear up many of the mysteries of how birds behave in the air, and may throw light on puzzling aviation problems.

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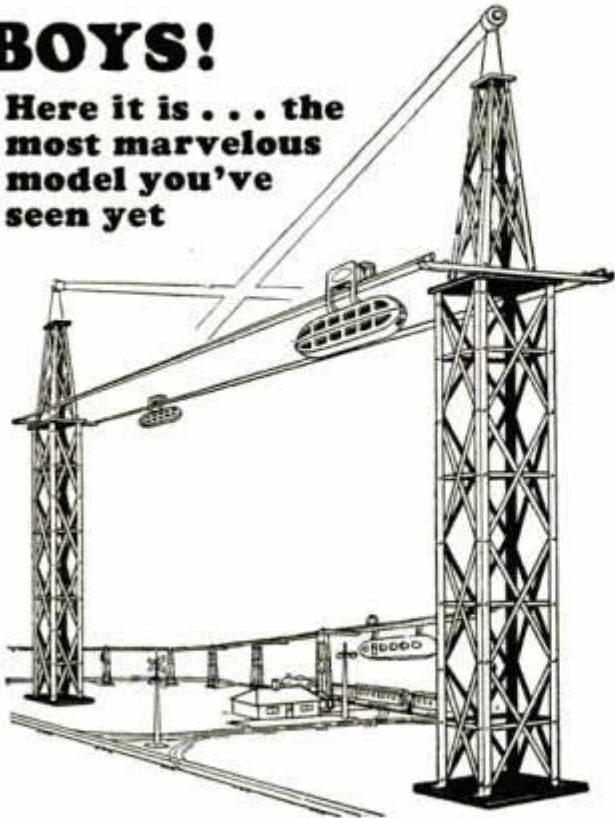
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A NEW ART AND SCIENCE

(Continued from page 37)

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"Now, that black cannon," he said critically, pointing to an incomplete scene aboard the famous old frigate "Constitution." "It's too shiny, too perfect. I'll tone that down. I do that usually, by modeling with my fingers, using wax coating, giving a dull finish. Things like that are discovered most easily after the work is fairly well along. I don't try to build up a group piecemeal, finishing one part at a time, but gradually, working toward the symmetrical group it must be. I have to have a plan, like every other workman.

"First, I do my working drawing or blueprint. That is a pencil sketch, showing approximately the final conception. Then I do my main figure, my high spot. For this I sometimes use wood or papier mache, but mostly, I use a special hard-wax composition. It is not like ordinary wax, not translucent, and can be modeled with thumb and fingers or sculpted with special tools of wood or metal. I build it up, as and where needed, with various plastic, permanent materials, such as the cotton I used for fringes on Custer's buckskins, covering it over with melted wax or, often, oil paints. Thus I get the figure into a sort of semi-final form. Then I stop work on the figure, and get at the background.

"For the background, I use every sort of material—wood, plaster, beaverboard, cardboard, papier mache, metal—I am always looking for new materials. Above all, they must be lasting. My backgrounds vary, but in historical subjects, they may be almost as important as the figures. I use all sorts of tools, fine chisels, sandpaper.

"In planning backgrounds, colors are always important, and there are tricks. For instance, many of my groups are outdoor subjects, which need a blue sky, painted, of course. But the sky for a miniature group must have a low horizon line, to give the figures more prominence. Once I have the main figure or figures, and the background, the next step is to get them together. I try different combinations of the figures. I try lights of different colors.

"It is only when I have it all as nearly right as I can get it, that I inclose the

(Continued to page 132A)

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ELECTRICAL MUSIC

(Continued from page 45)

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A NEW ART AND SCIENCE

(Continued from page 130A)

whole in a case which is, usually, made of beaverboard and faced by a frame of wood which may be of whatever design or color seems most appropriate. The top I leave partly open, for up there I put electric lamps of from fifty to 1,000 watts, depending on the lighting requirements of the group. They generate heat enough to melt something, unless there is ventilation at the top. When even these finishing touches have been taken care of, I set the group aside for still more study.

"But the untouched possibilities are infinite," he concluded. "Always new subjects, new materials, new methods—always something to fascinate the worker."



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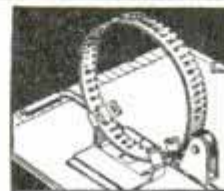
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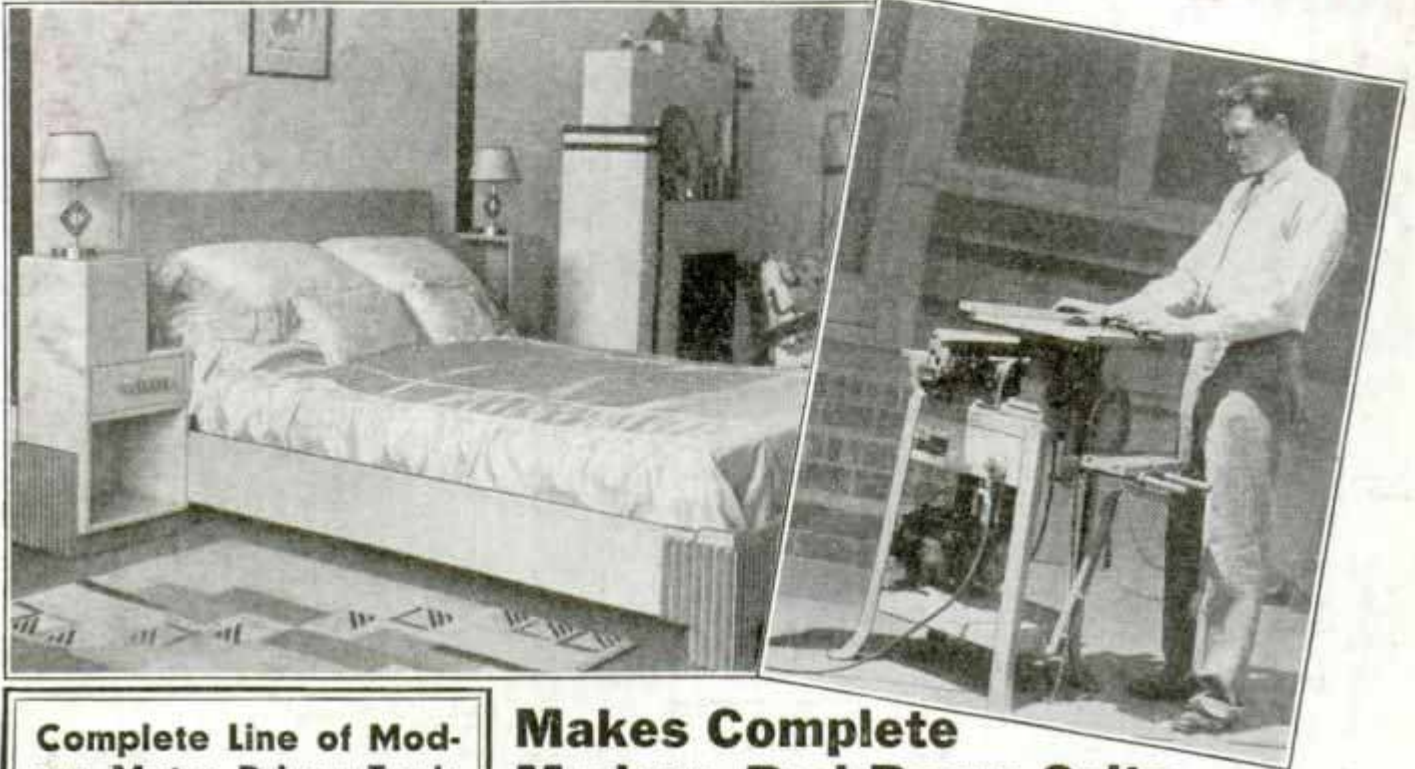
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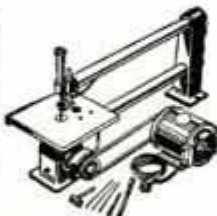
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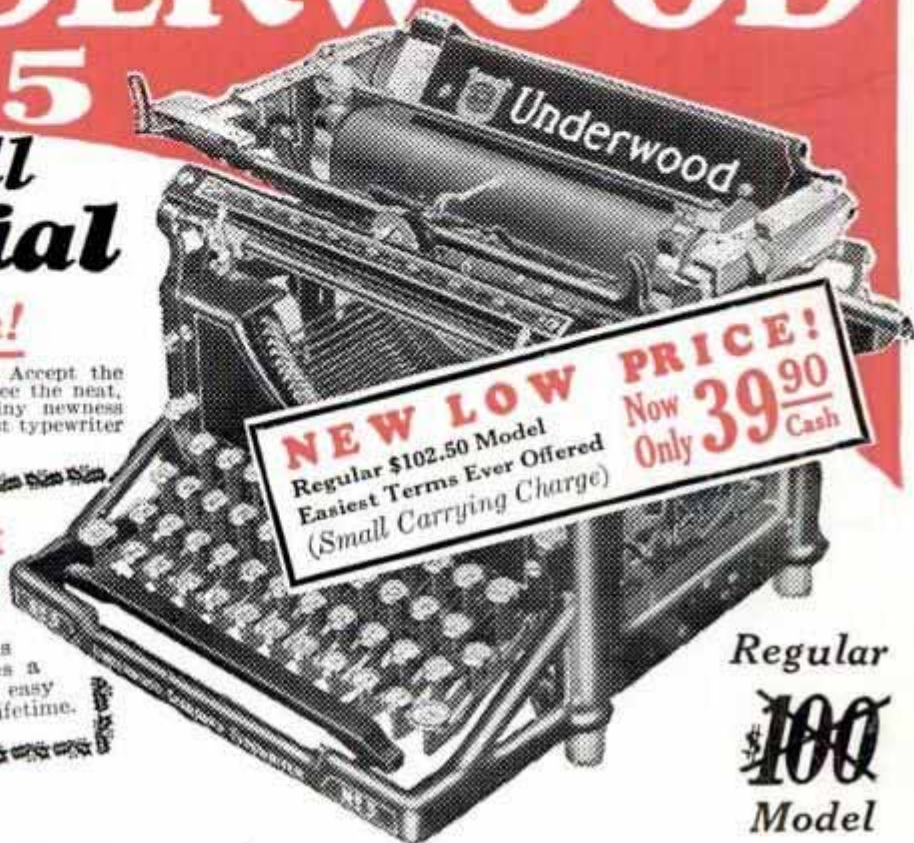
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\$800	OR WOMAN	CLASS "A"	1 EMPLOYEE	3 HELPERS
\$700	WITH 1 UNIT	EXCEPT	AND	8 UNITS
\$600	CAN MAKE	OPERATING	OPERATION	NET FOR
\$500	UP TO \$162.00	2 UNITS	OF 4 UNITS	OPERATOR
\$400	PER MONTH	\$301.00	CAPACITY	\$1,026.00
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\$200			PER MONTH	PAYING
\$100				SALARIES
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THE Machine Age is foundering. Mechanization and centralization of industry with attendant over-production has plunged the world into the worst economic chaos of history. Now, for the first time, certain clear-cut, definite ideas begin to emerge. Among the most definite of the new trends is that toward manufacturing decentralization. "The old order changeth" and born of the change comes an opportunity for both men and women, which can make the thinking people of today the dominant leaders of tomorrow. Whereas, in the past, great companies have controlled the distribution of America's food (the most basic of all industries); whereas most manufactured and cooked foods have been turned out by the thousands of dozens in great bakeries and factories with the aid of huge machines and distributed far and wide; there is, today, the clear-cut, unmistakable trend toward having these same foods manufactured locally by local people, who will turn out smaller quantities, but will make a larger profit.

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It is because this revolution in manufacturing and merchandizing has come with such lightning-like rapidity that this company, for years a leading manufacturer of food producing machinery, has converted its entire physical and financial resources to the manufacture of small units. To keep in step with breath-taking changes, we have decided to be the first to give men and women in scattered communities an opportunity to cash in, even as these stupendous changes take place. Now, instead of having all profits go to a few big corporations, one of America's most staple, every day articles of food—a product that is consumed by hundreds of millions yearly—is to be manufactured locally in

every community in the United States, distributed by these local manufacturers through outlets that are already established, and the profit is to remain where it belongs—in the community in which the goods are consumed.

Fits Your Ideas—Your Community!

This plan necessarily had to be flexible. It had to be adaptable to the smallest community as well as to the largest city. As a result, the unit system of manufacturing has been perfected. By this plan anyone can take advantage of the system—anyone can start with one unit at a total investment of less than \$50.00. The monthly profit which can be realized from the operation of one unit is \$162.00, while a battery of eight units, with two employees and with your supervision and help, can net you \$1,026.00 per month, after paying for labor and all other costs. (See Chart.) This is what we mean by "flexible." This astonishing business can be adapted not only to your community, but to your personal ambition and your ability. You can start small and add additional units to your system as demand justifies.

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conducted tests to considerably increase the already enormous consumption of the product.

Complete Plan Sent Free

This is as much as we can reveal concerning our unit system in the public prints. We are ready now to start with the appointment of the first 200 men and women. We do not care to hear from curiosity seekers, dreamers, or people who dabble in every new thing that comes along. We invite inquiry from serious minded men or women, who are willing to put forth great effort for great rewards. If you are that kind of a person, then write for complete information. Facts and exact figures will be sent you by return mail. You do not obligate yourself in any way. No salesman will call on you and no "high-pressure" literature will be sent you. After you have digested the facts, you can decide for yourself.

There is, at present, no way to calculate how great this business can become, how much you can take from it. But, unquestionably, the opportunity is greater today than it ever will be again. It is always the people who get in on the ground floor who reap the richest rewards. We have intentionally omitted a coupon from this announcement. Coupon clippers are not wanted. But, if the facts presented lead you to agree that this opportunity is worth a letter—or a telegram—we shall send you without cost or obligation all of the figures and complete plans that will enable you to take advantage of the newest and most revolutionary plan we know for making money at once. Address inquiry to

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