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PAGE 394

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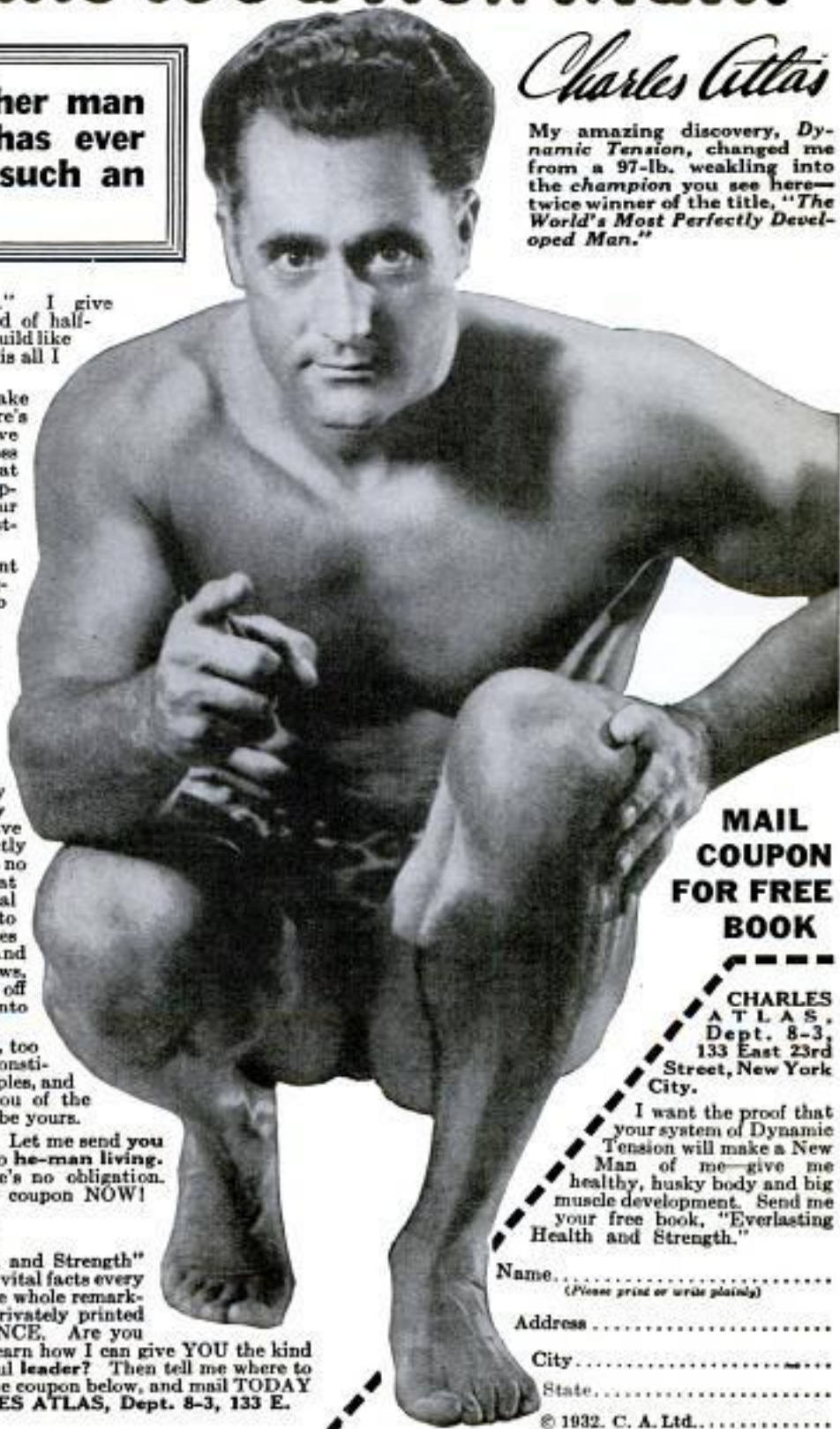
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A complete guide to profitable poultry and squab raising. Low prices on 40 varieties chicks, breeding stock and pigeons. All-Pullet chicks. Send 5c for postage.

FRANK FOY, Box 18, Clinton, Iowa

Classified Advertisements

WORLD'S BEST WANT AD MEDIUM

Advertisements in this section, 35 cents per word, each insertion, minimum 10 words, payable in advance
To be inserted under proper classification in April issue, copy should be in our office February 18th

ADVERTISING AGENCIES

ADVERTISE: \$15 reaches 4,000,000 Sunday newspaper readers with 24 word ad. Newspaper and magazine rate-guide, free. Chicago Union Agency, 20 West Jackson, Chicago.

ADVERTISE in rural weeklies. Lists free. Meyer Agency, 4112 Hartford, St. Louis, Missouri.

FREE—New 1933 Advertisers Rate Guide, 44 pages. Includes everything. Lowest rates. E. H. Brown Advertising Agency, 140 S. Dearborn, Chicago.

25 WORDS in novelty monthly magazines, \$1.00; 3 months \$2.00. Demco, 114 Ford St., Providence, R. I.

FOR ADVERTISERS

GET into advertising. Learn quickly at home. Experience unnecessary. New easy plan. No text books used. Practical work. Old established school. Send name and address for interesting free booklet. Page-Davis School of Advertising, Dept. 3439, 3601 Michigan, Chicago.

ADVERTISE: 24 Words in 250 newspapers \$10. Advertising Bureau, 4650 Drexel, Chicago.

SAVE Money on your advertising. Send for our big combination offers. Buchanan, 177 State Street, Boston, Mass.

20 WORDS, 20 Magazines, 3 months, \$1.20; inch display, 3 months, \$2.50. Sample copies, list, 25c. Midwest Service, Bloomfield, Iowa.

ADVERTISING—20 Words, 50 magazines, three insertions, \$1.20. Inch display, three months, \$4.00. Mailing Bureau, Lawndale, Calif.

YOUR 24-Word ad. Monthly-weekly combination \$4.98. Magazine free. Darnell, 730 Hays, Jackson, Tenn.

ADVERTISE 53 Magazines, 3 months, \$0.80 inch. List, special offers, free. Evans King Co., Box 672P, Wilmington, Delaware.

70 WORDS insert in World's Advertiser \$2.10. Empire, Shawano, Wisconsin.

WRITERS SERVICE

STORY Ideas for talking pictures, magazines, accepted any form for revision, copyright and submission to markets. Established 1917. We know market requirements. Free booklet gives full particulars. Universal Scenario Company, 410 Meyer Bldg., Western and Sierra Vista, Hollywood, Calif.

SALES PROMOTION

SPECIALIZE Writing sales letters, advertisements and folders. Satisfaction guaranteed. Ray J. Thompson, 20 Front, Youngstown, Ohio.

INFORMATION

ANY information desired 25c coin and up. Fred Klotz, Reading, Pa.

TECHNOCRACY! What is it? Every well-informed person should know. Here is the first book on the subject. "The A B C of Technocracy," by Frank Arkwright. Based on authorized material and written in simple language that anyone can understand. Price \$1.15—sent postpaid anywhere upon receipt of price or C.O.D. by mail anywhere in U. S. Popular Mechanics Press, Room 803, 200 E. Ontario St., Chicago.

AUTOMOBILES

AUTOMOBILE Racing book. How to build dirt track races championship racers, fast road cars. New, 10 chapters, 137 illustrations, track records, winning drivers, contest rules, speed, "revs," balance—Postpaid \$1.00. Ray Kuns, Dept. B, Madisonville, Cincinnati, Ohio.

PATENTS—Small ideas may have large commercial possibilities. Write immediately for free book, "How to Obtain a Patent" and "Record of Invention" form. Delays are dangerous in patent matters. Free information on how to proceed. Clarence A. O'Brien, 58-W, Adams Building, Washington, D. C. See pages 129A and 148A.

AUTO Fanciers. Beautiful, modern, streamlined coupe. Clever, realistic desk ornament. Only 25c coin. Engineering Studio, 8445 Curson, Cincinnati, Ohio.

AUTOMOBILE SUPPLIES

REPLATE Your auto parts, faucets, tools by new method. Our plating powder gives that silvery white plate without electricity. Dispenses with polishing. Half pint can \$1.00 prepaid. Free particulars. Gunmetal Co., Ave. J, Decatur, Ill.

REPAIR Broken Model A flanges with Kwik-Link, seamless steel, guaranteed for life of car. Gives you big profit. For details write Kwik-Link Products, Dayton, O.

3 VALUABLE Auto kink books—The Auto Owner's, Auto Repairman's and Auto Tourist's handbooks are ideal for the practical minded, thrifty person who likes to make his own adjustments and save expensive repair bills. Here are hundreds of helpful ideas. The touring information will make your trips easier, less expensive and more enjoyable. Get this low cost information today. All 3 books only \$1.65 postpaid or C.O.D. anywhere in U. S. Popular Mechanics Press, Room 803, 200 E. Ontario St., Chicago.

AUTOMOBILE SERVICE EQUIPMENT

BARGAINS—Compressors, 8-hour charger, test bench, also arc welder. Terms—30 day trial. Ken's Equipment Exchange, Box M-331, Troy, Ohio.

TWO Profitable shop books—Lathe and Drilling and Thread Cutting handbooks—filled with hundreds of valuable "kinks" discovered by successful mechanics all over the world. To do regular jobs more quickly, easier and better send for these low cost books. Both sent postpaid for \$1.15 or C.O.D. by mail anywhere in U. S. Popular Mechanics Press, Room 803, 200 E. Ontario St., Chicago.

MOTORCYCLES, BICYCLES AND SUPPLIES

MOTORCYCLE Bargains, lowest prices, bargain sheet for stamp, motorcycle accessories, largest line in America, lowest prices. Largest motorcycle mail order house in the United States. Rochester Harley Davidson Corporation, 129 West Main St., Rochester, N. Y.

HENDERSON, Excelsior, Harley, Indian, used parts, alloy pistons, catalogue and wings pin 10c. Ballak, 100 N. 12th, St. Louis, Mo.

MOTORCYCLES—Direct to you at wholesale prices. Guaranteed Indians, Harleys, etc. Cash or easy terms. Send 10c today for latest illustrated Bulletin "B." Cramdall-Hicks Co., 780 Commonwealth Ave., Boston, Massachusetts.

REPAIR With good used parts, save 1/4 or more, state parts needed, no lists, J. B. Dahl, 5661 Archer Ave., Chicago, Ill.

SEND 15c For illustrated used Motorcycle catalog. Large stock. Bargains. Indian parts. Accessories. Indian Motorcycle Sales, Kansas City, Mo.

100 GUARANTEED Used Harley-Davidsons. Prices reduced 25% to 50%. Send 6c for new bulletin. Knuth's, 2525 Fond du Lac Ave., Milwaukee, Wis.

BATTERIES

EDISON Lighting plant storage batteries. Non-acid, non-sulphating. Odorless. Guaranteed, 15 year life. Lowest prices. Lighting plant, motor bargains. Interesting literature. B. Hawley Smith, 22 Washington Ave., Danbury, Conn.

AVIATION

MEN Wanted for good positions as airplane mechanics and pilots after taking necessary training in government approved school. We qualify you for good positions paying \$150.00 to \$500.00. Lincoln Flying School, 2003 Aircraft Building, Lincoln, Nebraska.

"**CARVE** A propeller." Amazing prizes. Particulars, self-addressed stamped envelope. Atlas Model Propeller, 408 Spencer Avenue, Currick, Pittsburgh, Pa.

USED Airplanes \$30.00 and up. Easy payments. Catalog 10c. Federal Equipment Co., Deerpark, Ohio.

BETTER Propellers, Harleys, \$4.50; Henderson, \$8.98; Ford, \$9.98. Hibbs, Ft. Worth, Texas.

PATENTS—Small ideas may have large commercial possibilities. Write immediately for free book, "How to Obtain a Patent" and "Record of Invention" form. Delays are dangerous in patent matters. Free information on how to proceed. Clarence A. O'Brien, 58-W, Adams Building, Washington, D. C. See pages 129A and 148A.

BIG New catalog of lowest prices on model airplanes. Materials, supplies, 5c. Ideal Company, 19 West 18th Street, New York.

NEW Navy Spalding, winter, heavy lined helmets, \$10.00 value for \$1.95. New 8' propellers \$3.00. Telescope sights, new \$1.95. New altimeters, 25,000 feet \$1.95. Air Transport, Garden City, N. Y.

MODEL AIRPLANES

NEW Idea model airplane construction. Build model Lockheed on jig drawing. Stamp for circular. Tra-Build Model Products Company, 442 West 27th St., New York.

MODEL Airplanes, Building and Flying—Joseph S. Ott, America's foremost model builder and designer teaches you how to build ships that fly. Very interesting and fascinating sport. 350 pages, 165 plans. Cloth. Price \$2.50. Purchase of book entitles you to membership in Junior Sky League of America. Postpaid upon receipt of price or C.O.D. anywhere in U. S. A. Popular Mechanics Press, Room 803, 200 E. Ontario St., Chicago.

BOATS, OUTBOARD MOTORS, ETC.

BOATS!!! Build your own boat now, taking advantage of your spare time and save two-thirds regular builders cost using our ready-cut semi-assembled materials. Cruisers, runabouts, outboards, sail and row, 38 designs as well as complete assortment fittings. Send 10c for catalog. Brooks Boat Co., Inc., Box N-20, Saginaw West Side, Michigan.

LATEST Boat sensation—The 18 lb. Mead "Ki Yak." Snappiest thing afloat. Complete kit of all parts cut to fit \$11.75. You can assemble it in 3 days. Send 10c for circular. Mead Gliders, Dept. B-3, 12 So. Market St., Chicago.

BOAT Show number 35c, 1933 stork boats and engines. Free catalog. The Rudder, 15 Murray Street, New York.

PROPELLERS, Gear pumps, stuffing boxes, bearings, etc. Wm. Baker, Pond St., Quincy, Mass.

CHALK TALKS

LAUGH Producing program, \$1.00. Catalog free. Balda, The Cartoonist, Oshkosh, Wis.

CARTOONING

AMATEUR Cartoonist: Make money. Particulars free. Graphic Cartoon Service, Box 724, Phoenix, Ariz.

AMATEUR Cartoonists: Sell your work. Write Smith's Service, PC1194, Wenatchee, Washington.

MAMMOTH Mystery packet of rare stamps for only 10c to serious approval applicants also valuable free premiums with every selection afterwards. Our stamps are better and our service is different. Fair-play Stamp Service, 1215 Browning Blvd., Los Angeles, California.

FREE—Fifty all different rare air mail stamps from Siam, Ecuador, Venezuela, etc., worth \$3.00, free to approval applicants becoming regular customers. Bargain Stamp Service, 1332 S. Hope St., Los Angeles, California.

5 **YEMEN** 15c. Unused stamps accepted. Imperial Stamp Co., Allahabad 89, India.

HOMESTAKE Unusual packet 10c; approval request. Box 613, Sioux Falls, S. D.

400 **DIFFERENT** 15c; approvals included. Mantle Stamp Company, London, Canada.

STAMPS, 100 All different. Postage 3c. Lists free. P. M. Quaker Stamp Co., Toledo, Ohio.

1,000 **ASSORTED** U. S., 25c. Commemoratives, precancelled, bijects, etc. Auburn Stamp Co., Syracuse, N. Y.

200 **DIFFERENT** 10c, 7 Fiume 10c, 60% discount approvals. Covert Stamp, 39 State, Rochester, N. Y.

FREE \$1.00 Stamp with 500 mixed 10c. Turner, Box 1492, San Antonio, Texas.

TRIANGLES, 12 Different 25c. Fred Onken, 630 79th St., Brooklyn, N. Y.

100 **STAMPS** Free, postage 3c requesting mixed approvals. Bredin's Stamp Shop, College Point, N. Y.

1000 **MIXED** United States—25c. Wilcox, 607 Bear, Syracuse, N. Y.

GOVERNMENT First flight covers. Many rare. 10 different—\$1. Riedell, Greensburg, Pa.

TWO Triangles!!!! 25 different from British Colonies! Postage 5c, approval applicants. Adirondack Stamp Co., Box 935, Tupper Lake, N. Y.

500 **STAMPS** For 12c! Giant packet 500 mixed stamps including Afghanistan, Latakia, Inini, Andorra, Epirus, etc. Only 12c to approval applicants. Send today! Arlington Stamp Company, Box 81, St. Johns Place, Brooklyn, N. Y.

LOOK! 20 Beautiful scenery, 10 air mail, 25 Russia (old and new) free to approval applicants sending 6c postage. Extra premium to early applicants. West Coast Stampco, Box 304, Glendale, Calif.

300 **DIFFERENT** 10c. Lists free. Michael, 942m 23rd, Bellwood, Ill.

STAMP Cat. \$2 and 45 two-color stamps 5c with approvals; also how to get a stamp album free. Box 552D, Glendale, Calif.

PENNY Approvals that satisfy. Ned Gronberg, Box 5441-P, Philadelphia, Pa.

TRY Holmberg's better penny approvals. R. D. Holmberg, Needlesha, Kansas.

POOL Your friends; mail your letters from California. Use our address. Send 10c (coin) with letters to be mailed. All replies forwarded free. Obee, 3400 Diamond, Oakland, Calif.

500 **DIFFERENT** Stamps 25c. Approval applicants only. Ohio Stamp, Box P249, Cleveland, Ohio.

FREE. Complete mint set to all approval applicants sending 3c stamp for return postage. KenMore Stamp Co., Kenmore, N. Y.

NICABAUGUA 10 Var. 10c. United States Mission 40c per lb. Foreign 80c. Mission Co., 4512 North Racine, Chicago.

100 **DIFFERENT** Stamps free to all asking for approvals. Postage 3 cents. Christensen, Milwaukee, Wis.

FREE 100 Different stamps with approvals. Postage 3 cents. Badger Stamp Co., Milwaukee, Wis.

FREE! Azores. Complete set of Azores commemoratives given approval applicants 3c to cover postage. Cosmos Stamp Co., 87 P Nassau St., New York.

MACAO! Azerbaijan! Eritrea! Congo! 100 others! 6c with approvals. Dumeco, 4312-M Madison, Gary, Indiana.

ITALY 100 Different 25c (send coin) postage extra. Satisfaction guaranteed. No approval. Reliance Stamp Co., 170 W. Champlott Ave., Philadelphia, Penna.

50 **DIFFERENT** Stamps cataloging over \$1.00 only 10c to approval applicants. 20,000 different stamps of prices ranging from 1/2c up. All stamps guaranteed genuine and fine selection of U. S. revenues at 1c and up. Address F. G. Stein, Dept. 123, 7360 N. Seeley Ave., Chicago.

FREE! United States \$10.00 stamp to approval applicants who send 10c for our unexcelled 19th century combination containing 20 genuine very old stamps, including a 92-year-old classic. Globus Stamp Co., Dept. 50, 248 - 4th Avenue, New York City.

UNITED STATES Olympic mixture; strong in commemoratives, airmails. Half pound 50c. Tandrum, 4334 Russell, Hollywood, California.

SET Latest Chile airmails 5c. Approvals. H. Rundell, Wadena, Iowa.

LIBERIA Packet free to approval applicants. Welsh, Elsmere, N. Y.

70% **WONDERFUL** Br. Col., U. S., etc. Box 114, Minneapolis, Minn.

ILLUSTRATED U. S. list, price 50c; large complete U. S. price list free. Stanley Gibbons, 28P Park Row, N. Y.

STAMPS Sent on approval, at 50% discount. Fred Herzberg, 197 E. Grantley Ave., Elmhurst, Ill.

5000 **MIXED** Stamps only \$1.00. Long-acre Shop, 100 West 42nd, New York.

WHOLESALE Catalog for dealers; 4c postage. Grossman, 102 W. 42nd, New York.

FREE! North Borneo (Jungle Village); Abyssinia (New Issue); Sudan (Desert Scene); Congo (Explorer Stanley); picturesque Azerbaijan; big packet other Jungles-land beauties—everything absolutely free to approval applicants enclosing 3c postage! Midwood Stampco, Midwood Station, Brooklyn, N. Y.

STARTLING Approval bargains rushed to you. Dandy premium waiting. C. W. Helber, Bonne Terre, Mo.

FORTY Different United States and price-list 10c. Seidenberg, Baroda, Mich.

LIBERIA Snake triangle, two other triangles in our packet 53 different stamps, 5c. Crowder Company, Druid, Baltimore, Md.

CANADA Conference 2 values free with 30 different Canada or 25 different airmails, either packet 15c; both for 25c. Lists free. Specials: 500 diff. 25c; 1000 diff. 75c; 2000 diff. \$2.00; approval selection with each order. Victoria Stamp Company, London 4, Canada.

SCARCE Belgian airmail, pocket album, commemorative set, 40 more stamps from South Sea Islands, Africa, Asia, Canada, South America, etc., for 5c to approval applicants. Glendale Stamp Co., 1342P Linden, Glendale, Calif.

EARN Cash, stamps, album. Sell my nickel stamps packets. Eljison, 2841 West 37th Street, Brooklyn, New York.

ONLY 5c. 33 Different stamps including scarce Latvian triangular airmail stamps, 10 airmail, 12 United States (early issues, commemoratives, etc.) and 10 Canada. Approvals and illustrated price-list sent with each order. Curhan Stamp Company, Gloucester, Mass.

24 **VARIETIES** Cuban stamps, 10 cents. List of stamps free. Chambers Stamp Co., 111P, Nassau, New York City, N. Y.

READ This. Inini, Gwalior, Cyprus, French Colonials. 55 all different. Also stamp wallet, hinges. All 5c to approval applicants. United Pacific Philatelists, Dept. M, Box 25, Ventura, California.

FREE! Loose leaf postage stamp album at rate of 8 pages each month given with subscription to monthly journal. Send 3c stamp for prospectus. United Stamp Co., Marquette Bldg., Chicago, Ill.

FREE—Five Siam to approval applicants. Bernard Karch, Middle River, Maryland.

FREE Dollar packet to one cent approval applicants. Harlan, 5307 S. Marshfield Ave., Chicago, Illinois.

250 **GOOD** Mixed foreign stamps, 10c. 500 very finely mixed, 25c. Stanton, East-Lyme, Conn.

1000 **UNIVERSAL** Hinges 10c; lists free. Harter Trepple, Decatur, Indiana.

U. S. 25 **DIFF.** air mails, commemoratives, revenues; 10 South America; all 5c with approvals. Hudson & Co., Plainfield, N. J.

UNPICKED Stamps from foreign missions, \$1 per pound or 25c per sample thousand. Approvals sent unless forbidden. Elmer, 192A Washington Street, Boston.

105 **(CHINA, Etc.)** 2c. Album (500 illustrations) 2c. Bullard, 44 Tremont, Boston.

PACKET 52 Different from Absouties, Lebanon, Siam, etc., also watermark detector and rare old Hawaiian stamp—all for only 5c to approval applicants. Highland Stamp Co., Newton Highlands, Mass.

BEST One cent approvals in America. F. Hand, 1117 So. 60th St., Philadelphia.

QUALITY Stamps on approval 1/2c up. Free premium. Kelgwin Stampco, Vineland, New Jersey.

200 **DIFFERENT**, including triangle, airmail, etc., 10c. E. H. Carleton, 1040 So. Broadway, Los Angeles, Calif.

5 **SARAWAK** Free to approval applicants. Edward Hammond, Auburndale, Mass.

RARE COINS

SPECIAL Prices on United States old coins. 10 large cents \$1.00; 10 2c pieces 75c; 10 3c pieces 35c; 4 half dimes 50c; white cent and bargain selling price list 10c. Arcy, Box 483, Muskogee, Okla.

15 **DIFFERENT** Fine coins 25c. Oddobon, Box 681, Kansas City, Mo.

CALIFORNIA Gold, quarter size, 27c. 3/4 size, 53c. 3c piece and catalogue, 10c. Norman Shultz, Salt Lake, Utah.

U. S. **COMMEMORATIVES**, 10 different mint blocks one dollar, E. Donner, 729 Hunterdon, Newark, N. J.

CUBAN Bill and new price list, 5c. Drutz Coinco, Saranac Lake, N. Y.

GET Profit and pleasure in collecting old coins. Send 10c for 48-page illustrated coin catalog. You'll be delighted with it. Send for it now. It's free. B. Max Mehl, Numismatist, Mehl Bldg., Dept. P. Fort Worth, Texas. Largest rare coin firm in U. S.

OLD Money wanted. Will pay \$100.00 for 1894 dime, S. mint; \$50.00 for 1913 Liberty Head nickel (not buffalo.) Big premiums paid for all rare coins. Send 4c for large coin folder. May mean much profit to you. Numismatic Co., Dept. H, Fort Worth, Tex.

16 **DIFFERENT** Coins 25c; 60 diff. \$1.00. Bishoff, North Kansas City, Missouri.

UNITED STATES. Large cent, two-cent bronze, three-cent nickel and bargain list, 25c. Thirteen dates large cents, \$1.00. George P. Coffin, Augusta, Maine.

FINE Foreign coin before 1890. Confederate state note and bargain list 10c. Geo. Best, Cedar Rapids, Iowa.

RARE United States, foreign coins, war medals. Catalogue 10c. Mengella, Colorado Springs, Colorado.

GENUINE Silver coin, 5 different notes and bargain catalogue 10c. Lester White, West Newton, Mass.

UP To \$10.00 each for certain Indian head pennies. Send dime for list of these wanted. Coin-Shop, D, Springfield, Mo.

SEND 10c For 5 different coins and catalog or 50c for 25 different. Troyer Coin Co., La Fontaine, Ind.

\$5 To \$500 Each paid for old coins. Many very valuable. Keep all old money. Get posted. Send 10 cents for illustrated coin value book, 4x6. Guaranteed prices. We buy and sell. Coin Exchange, Box 5, Le Roy, N. Y.

7 **DIFFERENT** Coins, 11 bills and catalogue, 25c. Creamer's, 1112 Somerset, Baltimore, Maryland.

CAMERAS AND PHOTO FINISHING

SEND For our 1933 bargain book listing drastic reductions on all makes of cameras, lenses and accessories, including motion picture equipments. All sold on ten days' trial or money back guarantee. Central Camera Co., 230 South Wabash Ave., Dept. PM-3G, Chicago, Ill.

AN Income from your camera instead of expense. Low cost home study course in Journalistic Photography teaches you to make photographs for magazines, newspapers, advertisers. Tremendous demand. Earn good money, right where you live; delightful spare time occupation. Write for free book today. Universal Photographers Corporation, Dept. 6, 10 East 33rd St., New York.

IF You are interested in photography see pages 114A and 115A this issue.

DEVELOP Your own films, plates, and prints. Fred Carpenter, Hamlin, Texas.

FILMS Developed, 2 prints of each negative and enlargement offer 25c. 25 reprints 30c. Summers, Unionville, Mo.

TRIAL Offer. Developing roll 5c, prints 3c each. Beautiful 10-inch enlargement 25c. Young Photo Service, 405 Bertha St., Albany, N. Y.

WATCH Cameras, twenty exposures, every tick a picture. Complete outfit—\$3.98 post paid. Send for economy list—cameras and supplies. Genmert, Inc., 20 W. 22nd St., New York, N. Y.

SNAPSHOT Or photo enlarged to 8x10 size free if you send negative, photo or kodak picture and 25c to cover cost of packing, mailing and clerical work. Mail to Geppert Studios, Dept. 61, Des Moines, Ia.

20 **REPRINTS** 25c. Films developed, 2 prints each negative 25c. Skrudiant, 4118 Overhill, Chicago.

YOUR Favorite kodak picture enlarged, size 5x7. 10c. Three for quarter, coin. Send best negative (film) today. Address Darmer Photo Lab., 221 Securities Bldg., Des Moines, Iowa.

MAKE Money in photography. Learn quickly at home. Spare or full time. New plan. Nothing like it. Experience unnecessary. American School of Photography, Dept. 3432, 2601 Michigan Avenue, Chicago.

SPECIAL Trial offer: Developing any size roll 5 cents; prints 3 cents each. Beautiful 7 inch enlargement 20 cents. Send for special bargain list. Roanoke Photo Finishing Company, 209 Bell Avenue, Roanoke, Virginia.

HAVE You a camera? Write for free sample of our big magazine, showing how to make better pictures and earn money. American Photography, 118 Camera House, Boston, 17, Mass.

MOTION PICTURES AND SOUND EQUIPMENT

THE Secret of making money! Saving money is making money. Bass Bargaining No. 210 does that. Book—"How to Make Your Own Motion Picture Plays," 60c; 16mm. automatic cameras from \$22.50; 400 ft. Peiko 16mm. motor driven projector, brand new, \$15.95; automatic DeVry Standard 35mm. camera, F:3.5 lens, \$175.00 value at \$53.98; Cello 35mm. projector, motor driven, at \$16.50; Victor Animastrophone 16mm. sound projector and amplifier, list \$450.00, complete like new at \$132.50; fresh motion picture film at cut prices. Send 5c in stamps for four section Bass Bargaining No. 210. Covers 16mm., 35 mm., still cameras and text books. Bass Camera Company, 179 West Madison St., Chicago, Ill.

\$1.250 FOR Original photograph story. Our sales department sold unknown author's first story for above amount. We revise copyright and submit to studios stories for talking pictures. Being located in the heart of motion picture industry we know production requirements. Established 1917. Free booklet. Universal Secario Company, 205 Meyer Bldg., Western and Sierra Vista, Hollywood, Calif.

BELL-HOWELL Camera \$65. Other equipment 3/4 off. Victor model 5 camera (F 2.7 lens) \$125. Duograph deluxe projector \$19.50. Kodatoy projector \$4.50. 100' art 33. Travel comedies 40' \$8. Film softener 35c. Passion Play—complete, 1600', \$50. Request library (membership free) and bargain list. Mosull Brothers, 1944-J Boston Road, Bronx, New York City.

BARGAINS—Machines, Films, Stereopticons, Cameras, National Equipment Co., Duluth, Minn.

100 FT., 16MM. Library Films, \$1.95. Send dime for big catalogue and usable souvenir films. Eastin Films, Galesburg, Ill.

LEARN The motion picture theatre business at home. Free catalog. Theatre Managers Institute, Elmira, New York.

B&H 16MM. 70-A camera and 57-G projector with screen complete \$165. Like new. Formerly cost \$363. Money-back guarantee. Room 691, 333 N. Michigan Avenue, Chicago, Ill.

16MM FILMS 35c Up. Lists. Home Movies, Box 32, Easton, Pennsylvania.

16MM HOME Movies, 2000 foot Life Christ, sale \$60, rental \$10. 400 foot Felix Cartoons, sale \$10, rental \$2.50. Beasts Vaidt, 800 foot jungle, sale \$15, rental \$3.50. 100 feet comedy western, \$2.00. Excelsior Films, Box 524, Cincinnati.

READ The message to you on pages 1144 and 1154 this issue.

WESTERN'S Comedies, cartoons, cheap. Jersey Films, 2650 Chesterland, Lakewood, Ohio.

WORLD'S Greatest "Passion Play" 16 MM. (new) 5 reels. Rent or purchase. Write Hemenway Film Co., 37 Church Street, Boston, Mass.

BARGAIN Lists 3c. Hoffman Film Service, 57 Broad, Albany, N. Y.

TRADE AND TECHNICAL SCHOOLS

MEN—Learn barbering. For world's fair positions. Just time to qualify. Earn while attending. Write, Dept. B, Moler, 59 E. Monroe St., Chicago.

LEARN Watch repairing. Hiles School, 5330 Mission St., San Francisco.

WOODTURNING For amateurs. Excellent instruction book for the amateur and home work shop owner. Contains all the needed information and is well illustrated yet published to sell at the low price of 25 cents postpaid. Send for your copy today. Mail remittance with your order. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

LEARN A trade that's in demand. Shoe rebuilding, clothes pressing and hat renovating. Write for catalogue. Gustas, 7 W. Division, Chicago.

TECHNOCRACY Explained for the man on the street. To the average person technocracy vaguely means "a new deal" with some sort of scientific background. You owe it to yourself to become informed. The new book, "Toward Technocracy," by G. A. Laine, is written for the express purpose of furnishing an authoritative yet easily understood explanation. Price \$1.65 postpaid upon receipt of remittance or C.O.D. by mail anywhere in U. S. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

BUSINESS OPPORTUNITIES

PLASTEX Industries offers industrious men an opportunity to start a business of their own, manufacturing art goods, novelties, souvenirs, etc., in Plastex and marble imitation. 5c material makes \$1 articles. Rubber moulds furnished for speed production. Small investment brings big returns. You are just in time for big 1933 business now starting. Write for interesting booklet mailed free. Plastex Industries, Dept. A, 1685 Washington Ave., New York.

LIQUID-MARBLE, Scientific composition. Poured into molds, brushed on wallboard, concrete products, anything, takes glossy finish, equals best polished marble. Sets hard in four hours. Practical mold making with our plastic formula allows undercut. If interested send dime for samples plastic, formula, and composition powder with directions. Address: Cowell Institute, Grayling, Michigan.

I MADE \$50.00 weekly renewing colors in rugs, upholstery, etc. Free booklet explains. Alhambra Laboratories, Box 44, Alhambra, California.

MAKE World's fastest selling specialties. Have others selling for you everywhere. Amazing free offer starts you!! Particulars free. John Miller Company, Southern Building, Tampa, Florida.

MANUFACTURE Chipped glass house numbers. Beveridge, 160-22 Locust, Jamaica, New York.

COOK'S Auto. formulas. Guaranteed \$1.00 formula and \$1.00 trade directory both for \$1.00. Geo. E. Cook, Box 281, Oyster Bay, New York.

MAKE Money at home. Experience, capital unnecessary. Illustrated booklet free. Dept. 60, Egard, 1 East 42nd, New York.

AFRICA Has unlimited possibilities for disposal of your products. Advertiser, over twenty years civil servant, well acquainted with every part of South Africa, has opened agency. (Manufacturer's representative) in Durban. (Harbour, Point Natal.) If interested, submit proposals addressed to: H. Language, Main Road, Malvern, Natal.

MAIL Order drug store. Let us supply your drug store wants. Information given; stamp appreciated. Meqson Drug Store, Thiensville, Wis.

FREE Book. Start little mail order business; home employment evenings. Hadsell, 2A-72 Cortlandt Street, N. Y.

200 MONEY Making opportunities, schemes, tips, secrets, plans. (100 pages full) 25c. "Faubus," Box 65, Flint Station, Fall River, Mass.

YOUR Own business—Building and selling model furniture. Send \$1.00 today for kit and instructions. Something new. Dept. 311, Model Furniture Company, 5121 No. 23rd St., Omaha, Nebraska.

"FIXIT" Service always makes money. Particulars. Hozelgate's "Fixit" Service, 1205 N. Elmhollo, Pasadena, Calif.

NEW, Original, different exclusive mail order business for you. Practical, proved profitable. Very small capital. Details free. Burckham, 177 State Street, Boston, Mass.

MEN To buy old gold. No experience necessary. Our free book "Gold Testing" tells all. North American Refiners, 1003-Z Ashland Block, Chicago.

MAKE Big money! Free booklet gives full particulars, write today. Swanco, 4720A N. Ashland, Chicago.

POPCORN Machines—Crispette—Carmelcrisp. Long Eakins, 1969 High St., Springfield, Ohio.

START Business at home. Make tremendous profits without canvassing, experience, capital; booklet free describing 80 plans. Dept. 59, Egard, 1 E. 42nd, New York.

EARN Up to \$25 weekly or more growing mushrooms in your cellar or shed. Illustrated booklet free. American Mushroom Industries, Ltd., Dept. 630, Toronto, Ont.

START Concrete garden pottery business anywhere. New, easy system makes bird-baths, vases, etc., without molds. 2,500 designs. Book free. National Potteries Company, Minneapolis, Minn.

MAKE Products yourself. Tested formulas. Catalog free! Grinstead Laboratory, Edwardsville, Illinois.

"SCHEME Magazine." Alliance, Ohio, year free. Copy, dollar check, pays first year, only 10c.

100% DEPRESSION-PROOF, Practical, legitimate business. Send 25c for copy-righted instructions. Dickson, 33-17 84th Street, Jackson Heights, N. Y.

SELL By mail—New fast selling merchandise, circulars supplied, write, Superior Specialties, Springfield, Ill.

NEW! 24 Money making plans (home-work) 10c. International Agency, Cincinnati.

FIFTY Ways to make money, 15c. Superior, BX-534, Red Lion, Penna.

A \$1500.00 SAFE, Dependable, actual life insurance policy protects you against death from any cause for only \$5.00. Backed by old reliable company. No medical examination required. Full details by mail without cost or obligation. Address Suite 604 at 1332 So. Hope St., Los Angeles, California.

10c BRINGS Mail order supply source directory; worthwhile money making opportunities. Demuth, 11923 Cromwell Ave., Cleveland, Ohio.

SEND Your name on post card. Receive three free books. Mail order business. 3c postage appreciated. Dolson Herald, 36 Liberty St., Brooklyn, New York.

BARGAINS—Paint spray outfit, gasoline engine drive. Terms—trial. Helmick Paint Spray Exchange, Box M-332, Troy, Ohio.

MAKE Money quickly operating collection business. Easily learned. Write Hartwell Cole, Pres., Tower Building, Syracuse, N. Y.

AMAZING Chemicals, gives jet-black gloss, waterproof, stainproof, burnproof finish to wood. Samples, details 10c. 7529-A Melrose, Hollywood, Calif.

START 1933 Right! Making successful products from guaranteed formulas. No machinery needed. Profits great! Metallic cold solder; Water Wax; Platona; Polish-plater; Oilater; Dry Anti-froze; latest advertised specialties, all lines. Get my 36th unequalled free anniversary offer. Miller, Chemist, 1706BP, Tampa, Florida.

MAKE Artificial marble, colorful glossy tiles, no polishing; rather easy. Novelties, tabletops, bookends, floors, whetstones. Hard, inexpensive, fireproof, enamels wood. Secret cement methods. Amazing samples 3c. John A. Payn, 945 Grande Vista Drive, Los Angeles, Calif.

SUCCEED With your own products. Make-sell them yourself. Formulas, processes, trade-secrets. Analytical service. Catalog free. B. Thaxly Company, Washington, D. C.

STEADY income with "chain" of amusement and merchandise vending machines. Start small capital. Robbins Corp., DeKalb and Broadway, Brooklyn, New York.

MANUFACTURE—Sell your own beverages, extracts, candles, soaps, perfumes, etc. Free booklet. Trusway Laboratories, 1333 Walton St., Chicago.

AMATEUR Cartoonists: Sell your work. Write Smith's Service, PW1191, Wenatchee, Wash.

SELL By mail. Books, novelties, bargains! Large profits. Particulars free. B. Elfe, 525 S. Dearborn, Chicago.

MIRRORS Resilvered at home. Costs near 5 cents per square foot; you charge 50 cents. Profitable business plating like new brassy worn-off autopaets, reflectors, tableware, stoves, etc. Outfits furnished. Details free. Sprinkle, Plater, 127, Marion, Ind.

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

WHOLESALE Directory 300,000 articles 10c. Other valuable information. Moran Company, Wareham, Massachusetts.

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.

CHEMICAL Expert will furnish formulas and trade secrets. All lines. Lists free. W. L. Cummings, Ph. D., 223 Gordon Ave., Syracuse, N. Y.

WHOLESALE Directory, nearly half million articles, 10c. International Agency, Cincinnati.

LEARN The collection business. Good income, quick results. Interesting booklet, "Skillful Collecting" free. National Collectors Assn., Long St., Newark, Ohio.

CHARTERS: Delaware; best, cheapest; free forms. Colonial Charter Co., Wilmington, Del.

OPERATE Chain of vending and amusement machines. Be independent for life. Start small, grow big. P. Goodbody, 1826 East Main Street, Rochester, N. Y.

ARTIFICIAL Marble sanitary flooring. Instructions covering wood or cement flooring $\frac{3}{8}$ 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.

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.

15,000 PROFIT Making formulas. Following and many others: Accidents and emergencies, agriculture, alloys and amalgams, artist's materials, beverages, cements, glues, pastes, mullages, bleaching, renovating, coloring metals, dyeing glass, heat treatment of metals, household formulas, ice cream, confectionery, chewing gum, lapidary work, exterminating vermin, lubricants, paints, varnishes, photography, condiments, canning formulas, rubber, soap, candles, soldering, toilet preparations, perfumes, waterproofing, fireproofing, writing materials. Just write for "Scientific American Encyclopedia of Formulas." When postman hands you book pay \$5.50 and postal charges. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

CHEMISTRY

CHEMICAL Consultation. Analytical service. Formulas rectified. Processes developed. Submit your problem. C. Thaxly Co., Washington, D. C.

HANDBOOK For chemical experimenters. Hundreds of experiments, illustrated, 50c. Booklet of experiments 15c. 1932-33 chemical apparatus catalogue 19c. Lowest prices. General Chemical Co., Reading, Penna.

USE Shortcuts in Figures. Save valuable time. The quickest ways of working all problems. Instructions for drilling yourself to become rapid with figures. Complete, yet simplicity itself. Just write a postal for "Shortcuts in Figures." Pay postman \$1.00 and postage. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

FORMULAS AND TRADE SECRETS

MAKE It yourself—save profits—with guaranteed formulas; liquid solder, plastic leather, \$1.00 all. Full instructions. Sawyer Specialty Service, Ann Arbor, Mich.

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

METALLIC Liquid solder, plastic leather; gold, silver mirrors; plating formulas. All for \$1.00. Custer, 85 Leslie, Highland-Park, Michigan.

LAUGH At depression, make—sell your own products—500% profit. Free auto formula, send stamp. Electro-Thermo Works, Peoria, Illinois.

THAXLY Formulas produce perfect products. All lines. Catalog free. B. Thaxly Co., Washington, D. C.

GUARANTEED Formulas—Trade secrets—Analysis. Catalog free. Special: Send 50 cents for Improved Cold Solder formula—Mends anything. Industrial Institute, A-3, 602 Centre Street, Newton, Mass.

BRUSHLESS Shaving cream formula. Sample 2c coin. Linko Bros., 4096 E. 108 St., Cleveland, O.

FORMULAS. Business plans. Interesting literature free. Belfort, 4042 N. Kosler, Chicago.

3,000 FORMULAS—Industrial facts, tables, processes, rules, trade secrets, and calculations for all kinds of trades and businesses. Dr. Brown's Book of Secrets—380 pages. Sent postpaid for \$1.00. Ogilvie Publishing Co., 57 Rose St., Dept. 21, New York.

500 FORMULAS And big illustrated catalog 25c. Ideal Book Shop, Park Ridge, Ill.

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

SUCCEED With your own products. Make sell them yourself. Formulas, processes, trade-secrets. Analytical service. Catalog free. B. Thaxly Company, Washington, D. C.

1100 SELECT Formulas, 36th anniversary offer, free materials for specialties worth \$47.00. Valuable selling systems, all free! Stamp brings amazing offer!! Miller, Chemist, 1706PP, Tampa, Florida.

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.

10,000 MONEY-MAKING Formulas. Tells you how to make and sell almost everything under the sun; cosmetics, mullage, anti-freeze solutions, battery solutions, beverages, cheese, chewing gum, cleaning preparations, extracts, hair preparations, inks, bluing, leather polish, mirrors, perfumes, polishes, typewriter ribbons, carbon paper, washing powders, liquid soap, and hundreds of other profitable articles. Send no money. Just write a postal for "Hensley's 20th Century Book of Formulas." Pay postman postage and \$1. Popular Mechanics Press, 200 E. Ontario St., Room 802, Chicago.

AGENTS WANTED

STRANGE Invention. Backed by written guarantee. Cuts gas bills 35% to 50%! Territory now being assigned on new amazing simple device that fits around gas range burners. For natural or manufactured gas. Furnishes full heating power in about half time. Prevents discoloring of cooking utensils; protects flames from overflow of liquids and against drafts. Homes, apartment houses, restaurants want them, buy on sight. Men needed at once to bring this amazing invention to the bill-burdened consumer. No competition. No sales resistance. Earnings up to \$5 to \$7 an hour. Write quick. Economy Appliances, 1213 Van Buren, Dept. A-23, Chicago.

STIK Tite sticks rubber, leather, soles, heels on shoes, boots, rubbers. Use old inner tubes, tires. Outwear leather, cost nothing. No nails. Guaranteed outfit 35c. Wonder Products Company, 2335 Avalon, Los Angeles, Calif.

SALESMEN. Distributors. New 100% profit specialty for garages and stores. \$100.00 profit a month easy. Main or sideline. Wonderful repeater. Write to-day for prices and description. Lloyd Mfg. Co., Massena, N. Y.

MAKE Big money selling remarkable new lawn mower sharpener retailing for only \$1.00. Sharpens any mower in five minutes. Send \$1.00 today for sample and county agent's proposition. Royal Lawn Mower Sharpener, 501 E. Ten Mile Road, Royal Oak, Michigan.

REFLECT Brassy worn-off bath fixtures, reflectors, spoons, forks, etc., with pure silver. U-Kan-Plate polish, \$1, 8 ounce bottle. Satisfaction guaranteed. Agents wanted. Dept. A, U-Kan-Plate Company, Philadelphia.

NEW Invention. Attachment for electric bulb perfumes home. Appeals to everyone. 25c brings outfit. Werner Mfg. Co., Brooklyn, New York.

LATEX Bandage distributors—Agents cleaning up. New fast seller. Quick repeater. Best proposition. Lowest prices. Neway Products, 3813-P Harrison, Chicago.

NULUSTRE Metal polishing cloth brightens all metals instantly and Nulustre furniture cloth waxes, polishes furniture like magic; unbeatable 25c sellers; enormous profits, samples free. Shof. D. Mfg., Union City, N. J.

WORK At home, easy handwork; pays well. Sun-Co, Box 175, Brockton, Mass.

NO Canvassing home propositions. Profitable, interesting. Work for yourself. Hetzel, 802 Garden, Hartford, Conn.

AGENTS: Make 600% profit. Selling cleaner, polish, shampoo, vanilla, tonic laxative, metal polishing cloth, spot remover, etc. Your name on labels. Free sample. Standard Chemical Company, Dept. E-3, Dayton, Ohio.

MEN Wanted to distribute free samples of soaps, face powders, extracts to housewives. Up to \$30 weekly. No investment. Experience unnecessary. Permanent. Demonstrating 300 necessities to established routes pays well. Blair, Dept. D-3, Lynchburg, Va.

MYSTERY Heat—New, harmless chemical liquid. Simply give it air and have 120 degree heat. Can't wear out. Thousand uses. Sample \$1.00. P. Smith, 1241 Malberry, Reading, Penna.

NEW Low priced household item. Write Unger, 571 Harrison, Chicago.

SELL New 2000 light gas lighter—Lights all kinds of gas. Metals 25c. Costs you \$1.00 doz.; \$9.00 gross. Sample 10c. Square Deal Mfg. Co., Desk PM-2, Bradford, Pa.

NEW Transparent neonlike signs; 8"x14", 2c. Sells for 25c. Sell retail stores. Fast seller. Lowy, 8 West Broadway, Dept. 30, New York.

BIG Money selling shirts, ties, underwear, dresses, hosiery, raincoats, coveralls, pants, uniforms, playsuits. Big outfit free. Nirood Co., Dept. 8, 4922-28 Lincoln Ave., Chicago.

NEW Rubber goods line. 47 revolutionary inventions. Homes, offices buy instantly. Agents cleaning up \$90 weekly. Outfit free. Kristee Mfg., Box 1433, Akron, Ohio.

300% PROFIT Selling new "20-in-1" kitchen utensil. Metals 25c. Costs you \$1.00 a dozen. Sample 10c. New Method Co., Desk PM-3, Bradford, Pa.

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

500,000 ARTICLES Wholesale. Directory 1500 jobbers \$1.00. 300-25c. Arts, B-1611-M, Denver.

BE Your own boss! I'll start you with a regular weekly route supplying famous "Zanol" products to steady customers. No capital or experience needed. Routes pay \$27.50 weekly up. Write Albert Mills, Route Mgr., 3774 Monmouth, Cincinnati, O.

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

SELL Fade-A-Way, household necessity. Good profit, repeat sales, open territory. Coming season. Write Fade-A-Way Co., Dept. 1, Mt. Vernon, O.

DEATH To moths and insects with cedar crystal bags, sample 10c. B. Ross Company, 45 Parkway, Maywood, N. J.

SELLS Like hot cakes, big profits, new laundry soap flakes, perfumes clothing lastingly when washing. Canvassers to homes, etc. Sunset Laboratories, Lynbrook, N. Y.

25c HOUSEHOLD Item 5c; 753 other 5c-25c fast sellers; 24 assorted samples (retail value \$3.84) sent postpaid in United States for \$2 that you can buy and sell at 200%-600% profit. Superior Mfg. Co., 151-11 W. 20th, New York.

MAKE And sell your own goods. Expert chemist tells how. 32 years experience. Satisfied clients. 44 page book free. B. Mystic Company, Stamford, Conn.

ROASTED Prunes, new confection, thoroughly cooked, gently laxative. Tremendous repeater. Send 50c retail package. Calpruno Organization, 1118 Lincoln, Alameda, Calif.

NEW! Airheat reduces home gas bills—uses more air, less gas. Big demand. Kardon, 9 Central Park, Chicago.

MAKE Any spring wound clock electric. Simple easy installation. Do it for others, make money. Thiel Company, 3838 N. Ashland Ave., Chicago.

I NEED More men to make real money selling Durham waxes, wax, liquid cleaner. Extra profits renting machines, servicing floors. Write today. Durham Company, 9 School St., Des Moines, Iowa.

BOYS! Big profits in our fast-selling college pennant stickers. Send 10c for 10 samples. District Novelty Co., 710-B 14th St., Washington, D. C.

MAGIC Cream separator for bottled milk. Earn big money. Sample 35c. Also Magic duplicators. Magic Separator, Michigan City, Ind.

DISTRIBUTORS—Capable organizing women crews. New remarkable necessity. Women buy on sight. Sensational profits. No competition. Tekshon, Dept. KC-14, 103 Park Ave., New York.

100% PROFIT in the Everlasting Match. No flint or friction. What makes it light? No wind can blow it out. Retail 50c. Sample and sales plan 25c. New Method Co., Desk PM-3, Bradford, Pa.

NEW, Profitable—Sell auto step mats. Quality rubber with owner's name molded white. Details free. Ebonite Products, Dept. Q-40, 895 Main, Akron, Ohio.

CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 14A.

AGENTS Canning money, applying automobile initials. They go like hot cakes. No experience. Free sample. "Balco," 1084 Washington, Boston, Mass.

CUT Me out. I'll make you big money. Christy's polishing cloth, tremendous seller. Wonderful demonstration. Free sample. Write Christy, 7167 Lakeway, Newark, New York.

METALLIC Liquid: Solders, repairs, metal, wood, glass, without heat. Sells 25c, costs 6c. Sample free. Bestever, 4317PM Irving Park, Chicago.

PROPELL-O-LITE: Amazing, automobile radiator accessory. Produces, revolving colored light. "Big profits." Propell-o-lite, Newtown, Ohio.

WE Start you without a dollar. Soaps, extracts, perfumes, toilet goods. Experience unnecessary. Carnation Co., P.O. St. Louis, Missouri.

WHOLESALE Dealers' directory: 100 pages. Free circular. Magwood, 921 Broadway, New York.

SURE Fire quick seller! Write—get real surprise. Product every woman wants. \$10 day easy. Mission Factory P, 2328 Pico, Los Angeles.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1954W Broad, Richmond, Va.

"SPARKLE Polish" repeats; profits big; sample free. J. Home, 3949 Metropolitan, Chicago.

SUCCEED With your own products. Make-sell them yourself. Formulas, processes, trade-secrets. Analytical service. Catalog free. B. Thaxly Company, Washington, D. C.

START 1933 Right! Free valuable formula information for making best selling specialties. All lines, 300-750% more profit. See my advertisements—Business Opportunities—Formulas columns. Miller, Chemist, 1706AP, Tampa, Florida.

AGENTS For Hasslick: Powdered hand-soap. Approved Good Housekeeping. Everybody a customer. Fine opportunity. Sample free. Solar Products, J-2144 So. Troy, Chicago.

YOU Are wanted to refinish mirrors at home. Profitable business plating auto parts, tableware, etc. Write Sprinkle, Plater, 128, Marion, Ind.

POLMET Polishing cloth removes tarnish from all metals without the use of liquid, paste or powder. Our agents say it sells like "hot cakes." Retail 25c; sample free. Gale & Co., Inc., 15 Edinboro St., Boston, Massachusetts.

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., 302 Dugraw St., Brooklyn, N. Y.

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

FAST Mail seller—Free sample. Plans, Circulars furnished. Seavogon, 2328 West Pico, Los Angeles, Calif.

NEW Discoverer. Washes clothes without rubbing. Whirlwind seller. Great repeater. Splendid profit. Sample free. Besco, 4315P Irving Park, Chicago.

PIKE "Basket of money making opportunities," new ideas, original plans, money making secrets and other valuable information. None require peddling or outfits. Elite Co., 214 Grand St., New York.

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

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.

AGENTS Everywhere making money with our line of kitchen specialties, demanded in all homes. Big earnings possible. Write today for details. P. Seed Filter Co., 333 Broadway, New York.

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 samples. American Monogram Co., Dept. 40, East Orange, N. J.

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.

SELL Men's neckwear—wonderful proposition. Astor M., 39 East 28th, N. Y.

FLAVORING Extracts—Bottle yourself! Labels furnished. 600% profits! Whirlwind money-makers! Repeaters! Free offer. Thomas Manufacturing Company, Indianapolis, Ind.

HIGH-GRADE SALESMEN WANTED

WANT A depression breaker now and a fortune maker for your future? B. C. Alexander came to us without advertising selling experience. In five years we paid him \$102,930.21 in commissions. Two of these were depression years. His best year brought him over \$31,000. Others have done even better. If you can travel in that class let us tell you how we have paid nearly 2½ million dollars in commissions to salesmen for selling the most powerful and economical form of depression-killing publicity. It's talking film advertising in local theaters. About 20 million business sold in 11 years. Every merchant a prospect. New super service now ready. It sells for \$6.00 per month and up. Operations in all states. Full commissions on renewals. If you feel you can qualify for protected territory and pay your own travel expenses to start, write us fully about yourself, and get ready to start now with our free personal training and red-blooded cooperation. Alexander Film Co., Room 3-G, Colorado Springs, Colo.

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 250 home necessities; selling experience unnecessary; wonderful opportunity to own pleasant, profitable, dignified business backed by \$17,000,000 world-wide industry; for complete information write Rawleigh Co., Dept. C-U-PPM, Freeport, Ill.

HEADQUARTERS For bulk stop leak supplies, capsules, cleaner cards, etc. Lowest prices. Start your own business. Zenith, 3635 Lyndale Avenue So., Minneapolis, Minnesota.

SELL 2-Pants suits \$16.50. Virgin wool—\$5 profit. Finest workmanship. Barked by \$25,000 guarantee bond. Fastest selling line out. 6½x20" double samples free. Actual leads furnished. Bonus sample suit. Williams Bros., 879 Broadway, Dept. M-47, New York.

DO YOU want to better your financial condition? If so write in for our circular explaining our plan for men and women. An easy and assured way for you to succeed. No sales experience required. Pyramid Sales Co., 312 W. Fifth Av., Gary, Ind.

NEW Patented safe safety razor taking country by storm. Gives diagonal barber stroke automatically. Fool-proof. Principle entirely different. Sells on sight. Low priced. Every man hot prospect. Tremendous profits. Blastroko, Dept. K-610, 180 W. Washington, Chicago.

THOUSANDS Buying new exclusively designed business and blotter cards printed two colors, \$1.65 thousand. One color \$1.45. Leather case free. Two selling plans. Big comm. Outfit free. Chicago Business Card, Dept. B, Gladys at Hamilton, Chicago.

EASY Money quick, 1000 business or blotter cards with beautiful card case, \$1.50. Commission 50c advanced. Cuts and outfit free. Universal, 631-D Jackson, Chicago.

SALESMEN: New red hot free deal. Dealers profit 400%. 5000 mile guaranteed tire patches. Complete line fast selling auto necessities. National, 1910 D Wentworth, Chicago.

BIG Money selling shirts, ties, underwear, dresses, hosiery, raincoats, coveralls, pants, uniforms, playsuits. Big outfit free! Nimrod Co., Dept. 65, 4922-28 Lincoln Ave., Chicago.

SALESMEN—Distributors, new product offers you up to 400% profit. Sells to merchants in attractive counter display cartons. Confidential details on request. Sales Manager, Box 217, Newport, R. I.

100% PROFIT For direct salesmen—Sell new patented pant and skirt hangers. Fast turnover. Samples and particulars. Write Kellert Manufacturing Co., Norfolk, Ill.

DIRECT Salesmen: We have high-grade cleaning cream; vanishing cream; shaving cream; perspiration deodorant; shoe polish. 3-ounce sample for 15c prepaid. Henderson Bros. Corp., Johnstown, Pa.

AMAZING New plan offers earnings up to \$85.00 weekly. Life and disability protection at cost. Not insurance. Benefits up to \$1000. Membership and registration only \$8.00. You keep \$5.00. Everybody, ages 1 to 80, prospects. American Aid, Dept. G-1, South Bend, Indiana.

SALESMEN-DISTRIBUTORS. New auto tire patch; guaranteed 10,000 miles. Repairs blowouts permanently. Sells garages, gas stations, tire shops. Salesmen's profit 100%. Up to 300% to dealers. Easy seller. Exclusive territory. Economy Rubber, 605 Burkhardt, Dayton, Ohio.

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

GALLOPING Ivories—New game thrills America. Absolutely legal. Every cigar counter waiting. \$125.00-\$200.00 weekly. K&S, 4319 Ravenswood, Chicago.

BEST 1933 Sellers and moneymakers. California wine bricks, port and sherry wine syrups, at greatly reduced prices; high commissions. Agents, distributors apply; Vino Sano Co., Dept. 53, San Francisco, Calif.

100% TO 200% Profit, new easy selling smokers' specialties. No investment required. Marvel Mfg. Co., 478 Broadway, New York.

TAILORING Salesmen: Sell all-wool suits \$14.95, extra pants free. Union made. Deluxe suits \$18.95, free pants. Absolutely guaranteed. Earn up to \$5.00 an order. Sample suit to producers. Marvelous outfit free. Dept. P1, MacRae, 915 Broadway, New York.

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.

WANTED: Man in each county who will be satisfied with \$25 to \$35 a week earnings at the start doing service work and demonstrating new automatic fire alarm in schools, homes, hotels, theatres, public buildings, etc. Write quick for county appointment. Fire-Cry Company, Dept. 615, Dayton, Ohio.

\$18 TO \$25 Daily; biggest selling line of men's suits. Meets present day conditions. Amazing values at \$11.95, \$14.50, \$16.95, \$18.95. Also raincoats, slickers, topcoats and boys' suits. Biggest commission paid in advance. Liberal bonus. Free outfit. State ace and selling experience. "Jim" Foster, Inc., Dept. 23, 2250 South Spaulding Ave., Chicago.

SELL Pearl Essence dollar bracelets at 15c. Very latest. Unique. Particulars free. Sample 10c. Perfectoid Co., Bellmore, New York.

NEW, Profitable household necessities. Free plan. Anco, 3551 Viset St., Milwaukee.

SALESMEN! Distributors! New fast selling offer specialty. Nothing like it! Good for \$18 daily. You take orders. We deliver. Mather, AX-155 E. Superior, Chicago.

BECOME Independent. Own your business; experience unnecessary, selling \$10.000 accidental death. \$50 accident. \$25 sick weekly benefits—\$10 yearly. Other amounts proportionate. Guaranteed steady renewal income. \$250,000 deposited insurance department. Universal Policy, 718-A Lefcourt Bldg., Newark, N. J.

SALESMEN: Establish steady income for life representing national manufacturer. Write Bostonian Mfg. Co., 289 Buckford St., Boston, Mass.

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., 8-363, Baltimore, Md.

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

WONDERFUL Opportunity. \$20.00 a day can be earned. No experience necessary. You can start at once. Showing the 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, Springfield, Ill.

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

EXPERIENCED Salesmen. Wonderful opportunity selling full line accident and health policies. Sell easy. Liberal commissions. Twenty-four-year-old legal reserve company. Write for special offer. Inter-State Business Men's Accident Co., Dept. 18, Des Moines, Iowa.

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

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

HELP WANTED

RESTORE Linoleum and be well paid. Sales and service makes double action business. Write for offer. Vanjo Company, Dept. P, 1511p Terrace, New York.

SALEMEN, Patented \$2.95 "unlaminated" work shoes; safety soles, heels. Big commissions. Widdie sellers. Free sample. Henry M. Avon Shoe Co., 100 Court St., Brockton, Mass.

STOP Worrying about money! 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., 3775 Monmouth, Cincinnati, O.

MAKE It Yourself. Hundreds of practical and useful devices described in our big book. The plain instructions and illustrations show you how to make them. By making for your own use you save money. Through selling to others you can make a profit. 900 articles of great variety. 480 pages. 823 illustrations. Price \$5 postpaid or sent C.O.D. by mail anywhere in U.S. Popular Mechanics Press, Room 803, 200 E. Ontario St., Chicago.

AGENTS—Mosco corn and callous remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 384 Searle Bldg., Rochester, N. Y.

CASH Paid for butterflies, insects. See Sineclaire Display Advertisement on page 14A.

EDUCATIONAL AND INSTRUCTION

BEGINNERS Hotel positions, Bermuda, Florida and summer resorts. Train by mail. Lee Institute, Drawer 1706, Boston.

LEARN To repair and rewind electric motors. Free information. Handle Bros., 520 Fourth St., Waukegan, Ill.

WANTED—Men-women, 18-50. Qualify for future government life jobs. \$195.00-\$250.00 month. List positions free. Write today sure. Franklin Institute, Dept. G 3, Rochester, N. Y.

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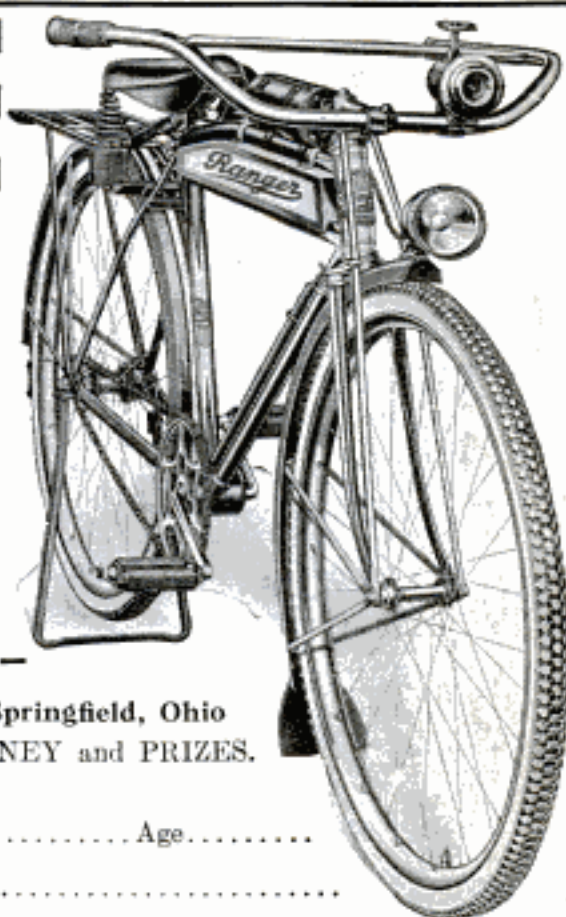
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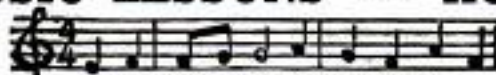
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THIS may be the most important year in your life! Your whole future is apt to depend on how you take advantage of present business changes. For months—maybe years—companies will be able to choose whomever they want, out of the millions now unemployed or dissatisfied with their work and pay. Naturally they will pick the men with most ability.

You should make yourself more valuable now—not only to protect what you have, but to win promotions, to make up salary cuts. It is being done by OTHERS—it can be done by YOU.

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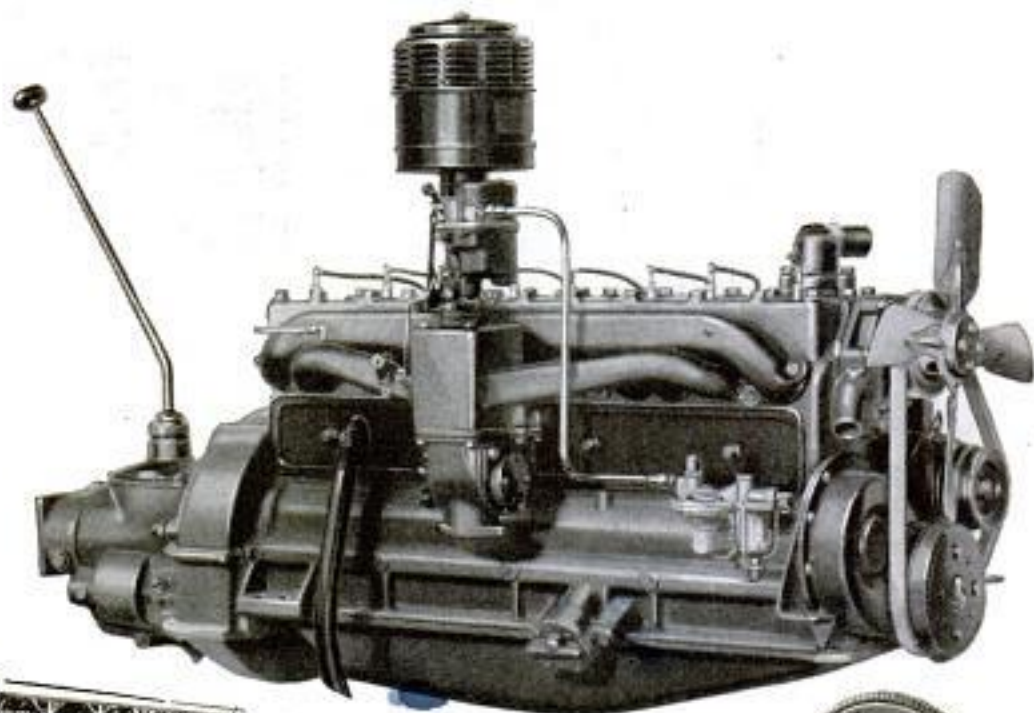
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PRACTICAL SHOP TRAINING NOT A CORRESPONDENCE SCHOOL

Pontiac perfects the Economy STRAIGHT EIGHT

The new Pontiac's power plant is a 77-horsepower Straight 8, mounted on 5 encased rubber cushionings. L-head type. Bore, $3\frac{1}{4}$. Stroke, $3\frac{1}{2}$. Compression ratio, 5.7 to 1 Std. Full force feed lubrication. Down-draft carburetor and manifold.



In the past ten years, every first place winner of the 500-mile Decoration Day Race classic at Indianapolis has been a Straight Eight. Also, 29 of the 30 who finished 1-2-3 over this period, have been Straight Eights. This is the most impressive record ever made by any single type of car.



Crankshaft is 5-bearing type with integral counterweights, statically and dynamically balanced. Over-lapping main and crankpin bearings. Drilled for full pressure oiling. Harmonic balancer built into fan drive pulley. Pontiac's engineers pioneered the harmonic balancer; have used it seven years.



Electro-plating of the piston skirt permits close fit in cylinder bore, cuts down breaking-in period and prolongs life of piston. Pin has snug press fit in one piston pin boss and is retained in place by locking screw. Opposite end of pin slotted, with light press fit in boss. All pistons machined to uniform weight within $\frac{1}{8}$ ounce; pins case-hardened and ground to .0002-inch tolerance.

YOU men interested in things mechanical know that economy is more than just a matter of low first cost and easy gas and oil consumption. It's also—and mostly—a matter of long life and freedom from servicing expense. The less strain there is on each and every part of the engine, the less chance there is of wear. With eight cylinders Pontiac produces 77 horsepower with a third less strain on each part than if this power were developed in a Six. A speed of 78 miles an hour is developed. This Straight 8 engine is designed and engineered to give a maximum of service-free operation—and to consume a minimum of fuel. See the big, low-price Pontiac Economy Straight 8—a General Motors value—at the nearest dealer's showroom. Examine it carefully. And if you want still more information, write to Pontiac, General Motors Building, Detroit, Michigan, for literature. No obligation. Just mention this magazine.

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WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 59

MARCH, 1933

No. 3

C-60

New Billions from Oil!

By C. E. PACKER

6750 normal Blood
Chicago
ABANDONED oil wells are springing to life, and the output of present oil wells is being increased.

These developments have been made possible by a chemist who was thinking deeply while washing oil from his hands.

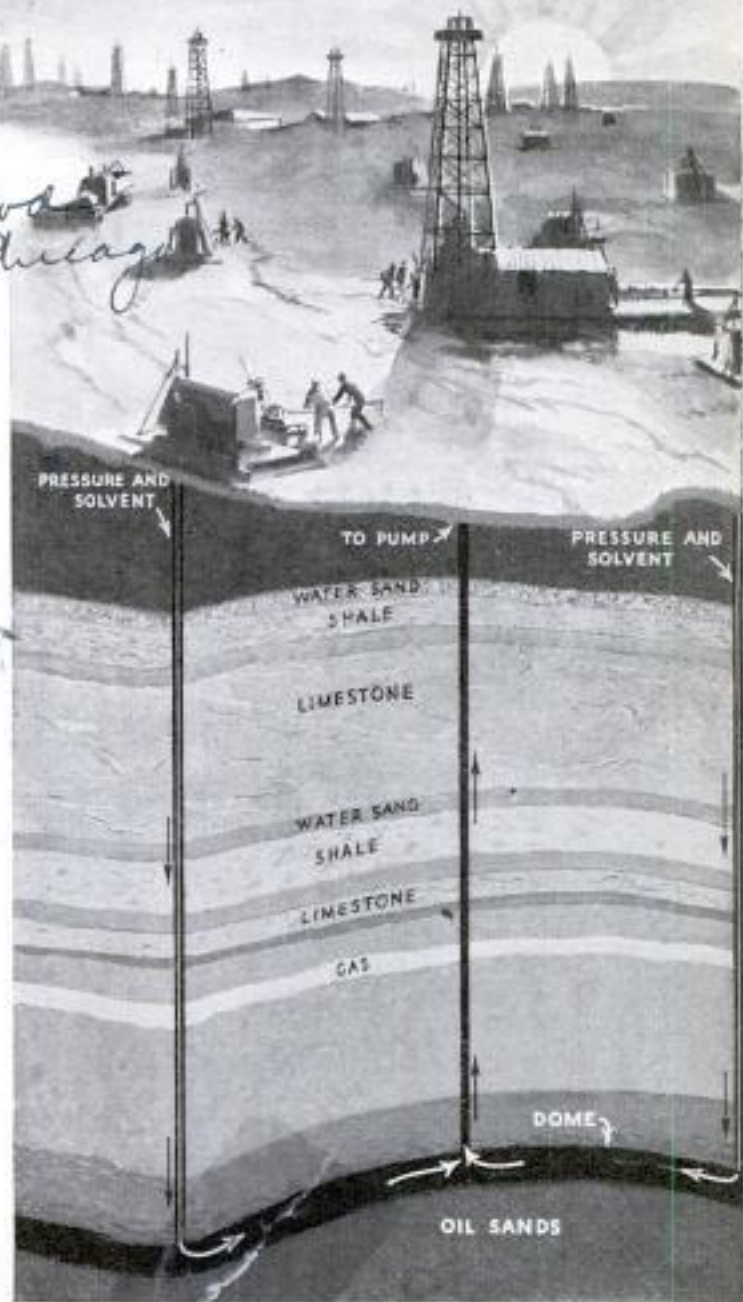
Cold water did little good. One soap helped. But another did the trick.

"I've got it," he cried as the second soap removed the oil from his hands with little effort. "Just imagine something like this soap shot down into the earth to loosen the crude oil that is there."

And this thought has resulted in the development of materials—solvents, they're called—that promise to revolutionize the oil industry.

Crude oil comes from oil sands. But these sands are more like the hard sandstone of a grinding wheel than anything else. And it is hard sandstone that holds the crude oil.

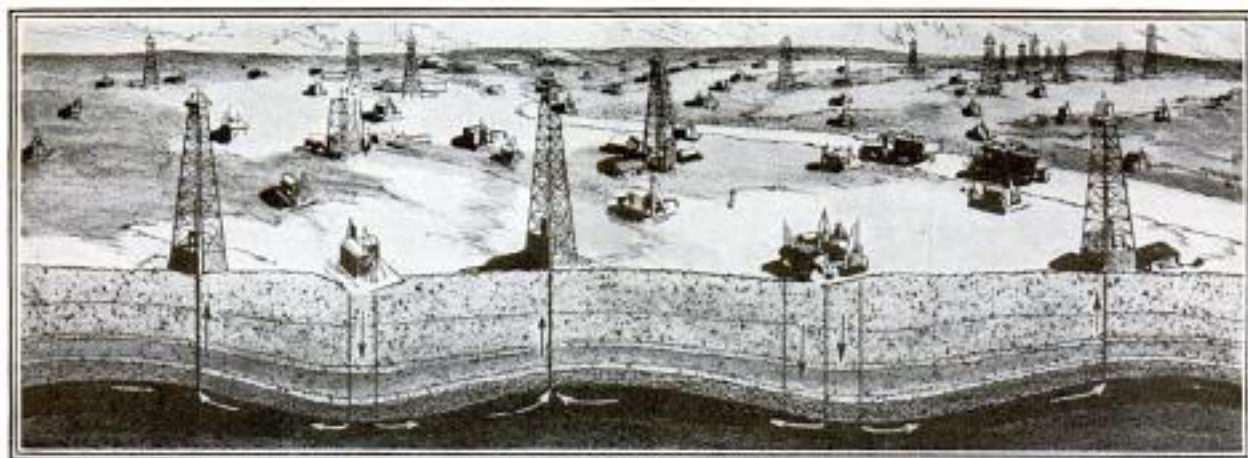
Most of the oil sands are dome-shaped. To locate the top of these domes, and also their lower edges, large scale maps of the oil fields are used. At right angles to the surface of the map, steel rods



Diagrammatic Drawing, Representing the Strata of Minerals Overlying the Oil Dome and Method of Extracting the Oil by Injecting Solvents under Pressure into the Sands

Pennsylvania

secret-known only by
Mr. A. W. Sanger
State College, Pa.



An Oil Field in Operation under the New System, Showing Several Pressure and Lift-Pump Installations for Injecting Solvents and Recovering the Oil

stand up. These rods represent holes to be bored possibly thousands of feet into the earth. Samples of earth removed at various depths indicate the types of material passed through. By marking to scale on these rods the depths at which these materials are found, the location and direction of the various layers of the earth's crust are charted. Then the various rods are connected with a ribbon of different color for each kind of material found. This gives in miniature a clear picture of the various layers of the earth.

Knowing where the oil domes are, a single hole down into the center of the dome may be drilled. Then a pump is used to suck the oil up from the sand. Another method is to drill the center hole, and four more equally spaced around it down toward the lower edge of the dome. Then pressure is applied in these four holes, thus forcing oil up the center hole.

Water is sometimes injected through

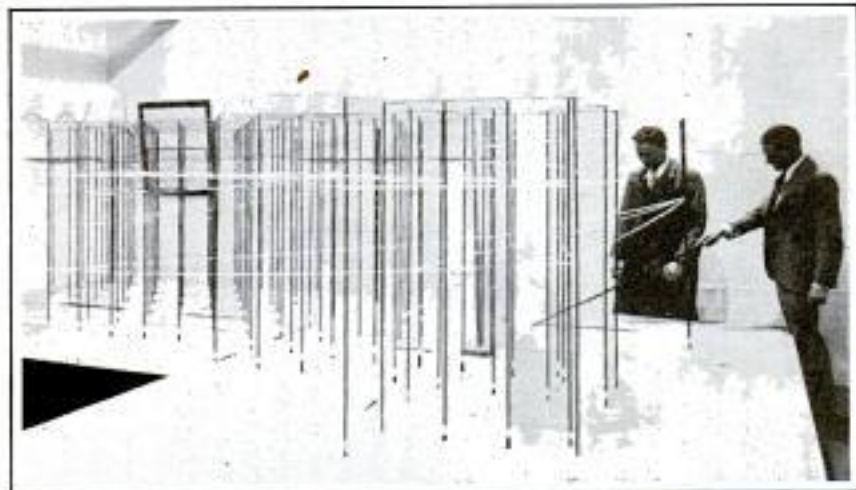
these holes. Still it is common knowledge that water is not effective in removing oil.

But now there are important solvent developments. These solvents fairly flush the oil from the sandstone. Some of them are costly, but can be salvaged and used repeatedly.

Such applied mechanics and chemistry bring a number of valuable results. Tests indicate that wells that are no longer productive may be made to give up as much oil again as has already come from them, and wells with output so small as to make operation unprofitable can be made profitable again.

HOUSE DROPPED FROM BOMBER c.37 ON MOUNTAIN TOP

How an overnight camp for forest rangers could be built on the summit of Koolau range in Hawaii without carrying the materials over a hard, dangerous trail was solved by the U. S. army air corps. Instead of attempting to transport the 1,200 pounds of sheet iron, lumber and nails on the backs of rangers, the materials were divided into three bundles and dropped, one by one, at the site of the camp, from a bombing plane. Since there usually was no space between the mountain and the huge clouds formed by condensation of moisture in trade winds rising some 300 feet, the



Scale Map of Prospective Oil Field before Development; the Rods Are Placed at the Points Where Holes Are to Be Drilled

news letter

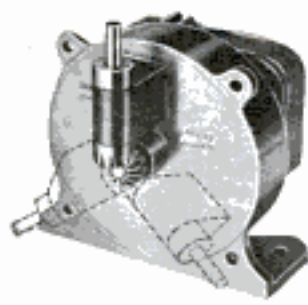
pilot was forced to take advantage of rifts in the clouds. The camp site was marked by large panels of white cloth. After hovering over the spot for several hours, the pilot dropped the first bundle. Three days of heavy rain followed, but on the next day, the other two bundles were delivered. The operation, accomplished in about six hours of flying, would have taken at least two weeks by other methods.

B2278

GEAR-SPEED REDUCER HAS INCLOSED DRIVE

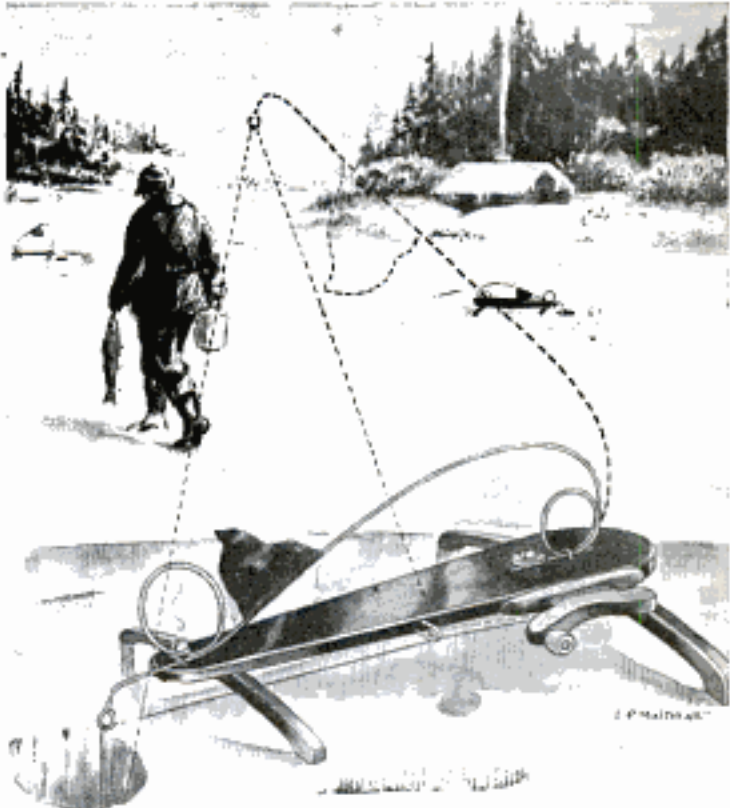
Compact and easily adapted to any device or mechanism, a small speed-reduction unit with an inclosed-motor drive has been produced. The unit can be supplied for almost any speed desired, from motor speed of 3,000 revolutions per minute downward. Both horizontal and right-angle drives can be furnished. The latter are available with the output shaft in any position around 250 degrees of the circle. The reduction units can be obtained with several different-type motors as an integral assembly, including induction or shade-pole type, synchronous, unidirectional, reversible and

direct-current motors. The gear housing is neatly designed, the gears running in grease and sealed in to insure positive lubrication and quiet operation.



LINE HOLDER FOR ICE-FISHING SIGNALS THE CATCH C. 45

Fishing through a hole in the ice is made easier by a device that holds the line and signals when a fish takes the hook. It consists of a wooden stand on which is mounted a spring wire with an eyelet at the upper end. The fishing line is passed through this eyelet, the hook baited and the tip of the line holder pulled down against one side of a wire ring at the other end of the stand. When the fish bites, the

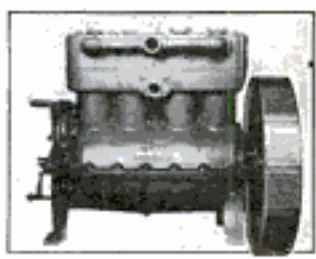


When Fish Bites, Line Holder Springs Up, Warning Fisherman That Catch Has Been Made

line holder is released, springing up and signaling by means of a small flag attached to the wire about twelve inches above the stand. As the fish pulls, the line holder moves up and down, waving the signal. A reel-like attachment at one side holds additional line.

AUTO ENGINE COMPRESSES AIR BY MEANS OF CONVERTER C. 7

Speedy compression of air at low cost is made possible by equipping a model-T Ford engine with a conversion attachment. At 450 revolutions per minute, forty-five cubic feet of air are compressed by the engine, ten additional cubic feet per minute being obtained by increasing the engine speed another 100 revolutions up to 1,000. Only five horsepower is necessary to attain 150 pounds' pressure. The average automatic compressor used in garages and gasoline-filling stations delivers only eight to twelve cubic feet per minute.



*Myra (2) Alex. Halden
Fair Haven Mich
Mc White Compressor
Attachments by Perry
1302-6th St. Iowa*



Each Company of Tokyo Firemen Is Identified by a Banner; This Photo Shows the Standard Bearers at a Recent Fire in the Japanese City

EMBLEMS OF TOKYO FIREMEN CARRIED TO ALL FIRES

When the fire alarm sounds in Tokyo, Japan, each company that hurries to battle the flames carries a distinctive marker. Always in the forefront of the fire fighters is the standard bearer, holding aloft the emblem of his group.

from the body and rear wheels of the auto, repairs made and the mechanism attached again, or a new one installed.

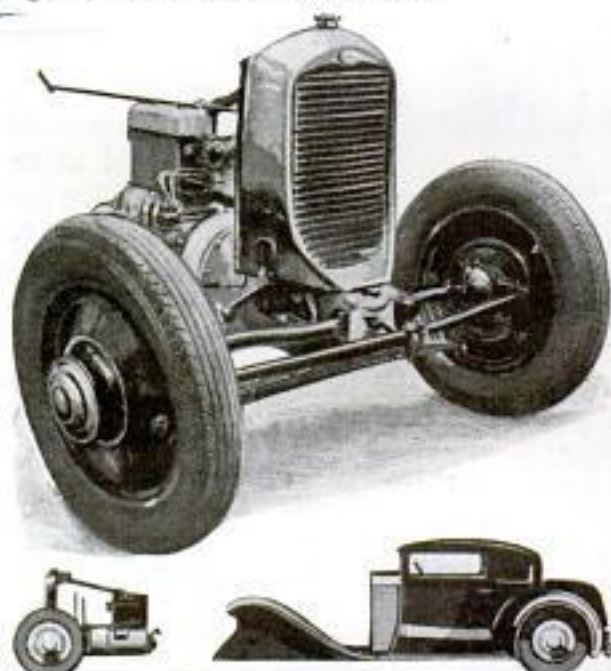
NOT ALWAYS COOLER HIGH UP PLANE PILOTS FIND

Temperatures high above the ground are not always cooler. Airplane pilots have found that it is possible to ride over wintry blasts. For instance, one day when ground temperature of twelve degrees below zero was recorded at Des Moines, Iowa, and Omaha, Nebr., pilots flying between the two cities found that 6,500 feet up their thermometers registered twenty-eight above zero. At 14,000 feet, it was fourteen above. Another pilot, circling 600 feet up before landing at Chicago, noticed

that it was five above zero. When his plane landed, the temperature was four below. Frequently planes passing each other at different heights on the same route encounter differences in temperature amounting to six to eight degrees. This dispels the common belief that there is a one-degree drop in temperature for each 300 feet gained in altitude.

DETACHABLE AUTO ENGINE SPEEDS REPAIRS

Permitting repairs to be made more quickly and cheaply, a detachable engine for automobiles has been produced in France. The engine is supported on a narrow, rigid chassis, while the front wheels are independently sprung. In fifteen minutes, the whole unit can be taken

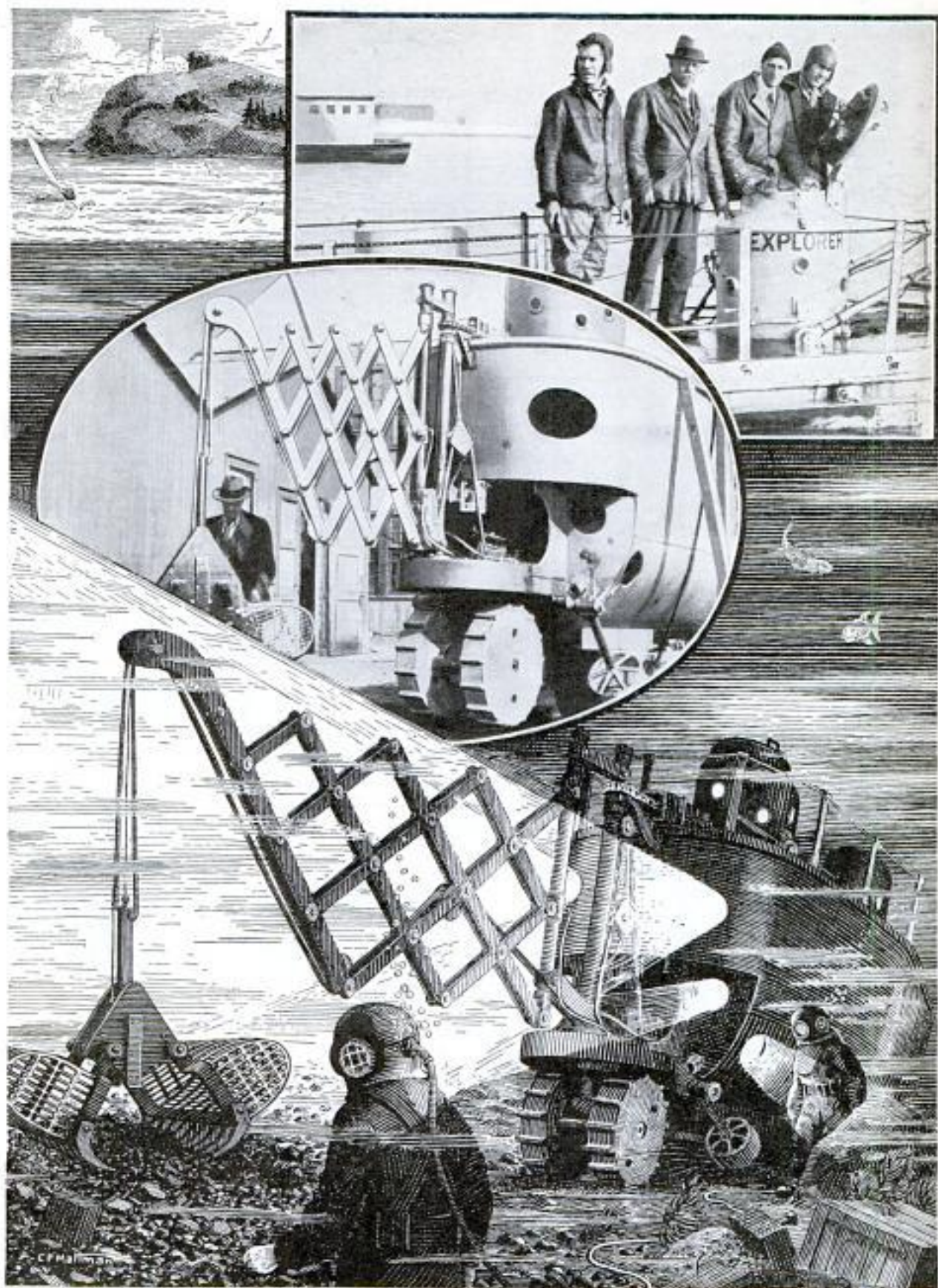


When This Engine Needs Repairs, It Can Be Removed with Front Wheels from the Auto

Philadelphia, Pa. Inquirer 7/8/33

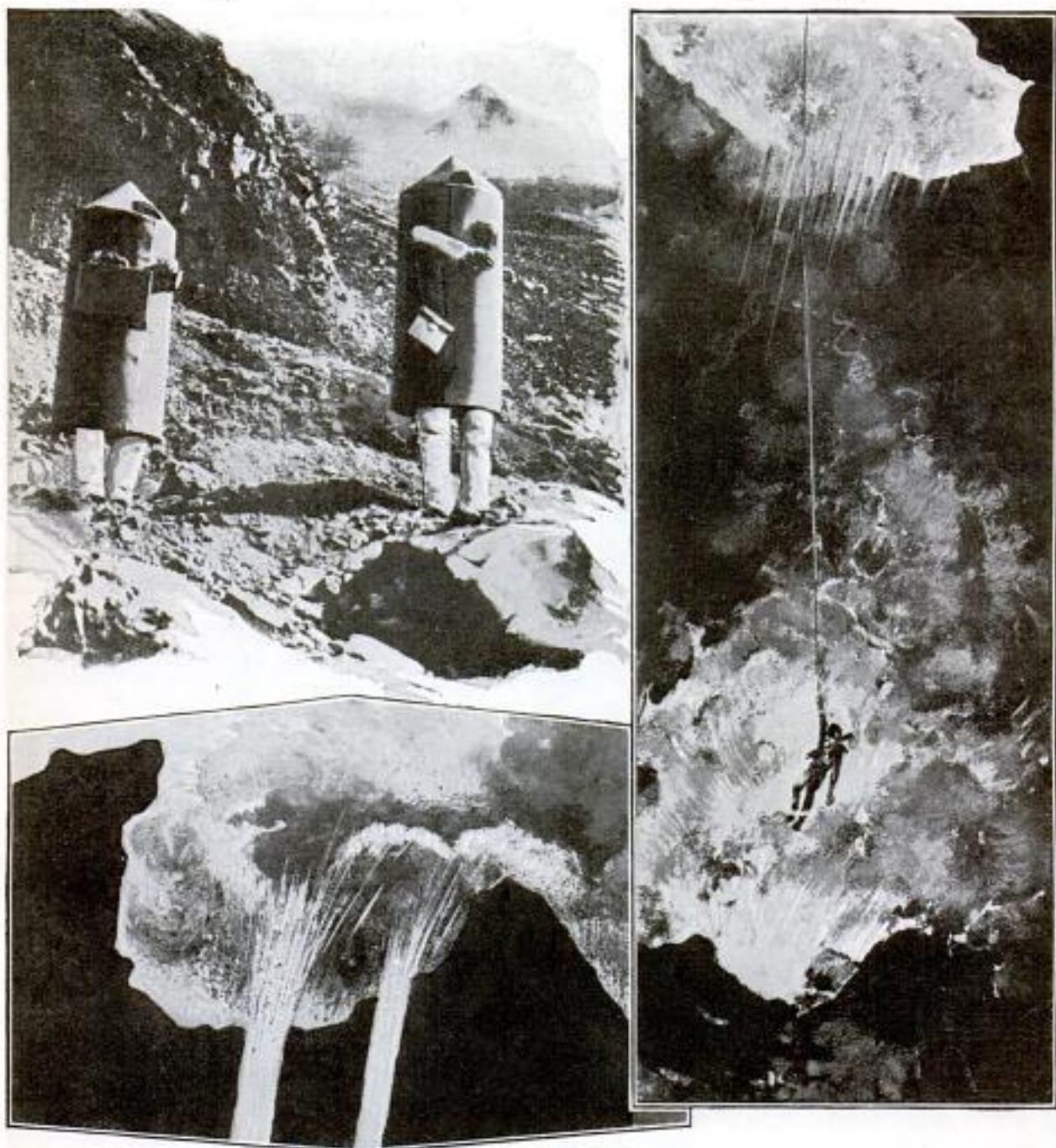
2283
2175
Harty 25 Boulevard,
de Verdun,
Courbevoie, France

Baby Submarine on Wheels to Seek Treasure



Views of Dwarf Submarine Invented by Simon Lake for Salvaging Sunken Treasure and Gathering Sponges, Oysters and Pearls; It Is Twenty-Two Feet Long, Six Feet Wide and Armored for 600-Foot Depths; the Craft Is Equipped with Air under Pressure, Telephone, Electric Lights, Grappling Iron and Motor

Exploring the Interior of an Erupting Volcano



Top, Scientists Wearing Armor on Way to Make Pictures of an Active Volcano; Right, Drawing Showing How Man Was Lowered into Erupting Crater; Below, Jets of Lava Spouting Upward

Anxious to learn what it is like inside an active volcano, a European scientist recently descended more than 800 feet to the very bottom of an erupting crater and emerged none the worse for the trip made at the end of an asbestos rope. Heretofore most of the exploration of volcanoes has been confined to cautious peeps over the rim or a short but perilous descent along the inner side of a crater during a lull between outbursts. The man who made this

trip is M. Arpad Kirner, and he selected Stromboli, a volcanic island between Sicily and the Italian mainland, for the attempt. The preparations required much time. He ordered an asbestos suit, gloves and shoes of incombustible material, an asbestos helmet as protection against the rain of hot lava, an oxygen helmet, the asbestos rope and two sets of cylindrical steel armor. With some friends and a few natives of the island, he climbed to the rim of the vol-

Le Miroir du Monde
72/17/32 P. 800

C-25. Chicago Furniture Co
666 Lake Shore Drive, Chicago 343

cano, donned all equipment except the armor, attached the rope to a copper belt about his waist and was ready for the descent. The rope ran through a pulley at the edge of the crater and back to a reel operated with a crank. Wound around the rope were electric wires connected to a battery and lamp at the reel. It was agreed that if the explorer pressed a push button and the lamp lit up, he was to be raised immediately. "What I felt during the drop of over 800 feet is beyond words," said M. Kirner, "I did not know whither I went or how and where I should land. My suspense was at its height when my feet touched ground. It was hot and the air was filled with gases, but I breathed with the aid of the oxygen tank. Unhooking the rope, I approached the mouths of the volcano, immense vertical shafts ten to thirty feet across and comparable to large cannon. From them spouted jets of lava accompanied by formidable explosions. Fortunately for me, the outbursts took such a direction that I was able to approach even closer and look straight down into the interior to see, beyond a cloud of varicolored mists, an incandescent sea of boiling lava convulsed by violent agitations." The ascent offered no difficulties and shortly afterward the scientist and a friend donned the cylindrical suits of armor and ascended Stromboli to take photographs. The armor protected them from the continuous rain of pebbles and loose sand pouring down the sides. At last they found a firm footing on a rock and planted the camera. In the midst of making pictures, there was a sudden landslide and the two quickly divested themselves of their armor, allowing the suits to roll down the slope while they themselves slid and rolled with the lava, arriving at the foot of the mountain badly bruised—but with their camera and the films safe and whole.

PADS FOR RUBBER STAIR MATS PREVENT SLIPPING C-51

Rubber stair mats are prevented from slipping by small adhesive pads now offered. The pads are applied to each corner of the mat at the stair edge and cling to the mat and also to the stair without marring the wood finish in any way.

Central Chic. Yardstick Co
West Lafayette, Ind.



Unusual Radio Cabinet Modeled after Chicago's Old Fort Dearborn



Chicago Furniture Co
666 Lake Shore Drive, Chicago

FORT DEARBORN RADIO CABINET IS REMINDER OF FAIR

As a reminder or a souvenir of Chicago's world's fair, a radio cabinet modeled after old Fort Dearborn is being offered to those who like a radio of unusual design. The top of the cabinet can be raised to expose the set, making adjustments easy.

SHARPENER FOR BREAD SLICER IS RUN BY SMALL MOTOR C-20



For sharpening the blades of bread slicers, a grinder driven by a small electric motor has been produced. A gauge adjusts the grinder for different types of blades. Emery wheels mounted on a

small spindle do the sharpening. The grinder is so compact that it may be carried by hand.

Potash in commercial quantities is being recovered from the Dead Sea.

Service Short 12/19/02

The Electric Co. Racine Wis
95-16 St

Dyes Provide Variety of Colors for Flowers

also results shown in photos



Top, Left, Flowers after Several Hours in Dye Solution; Below, Flowers in Dye Bath; Right, Using Paper Bags to Dust a Flower

the stem protruding, and the closed sack is shaken vigorously. When removed the flower is evenly coated with the powder, and it is then placed in water. After an hour the color apparently sets, and it is claimed the petals absorb the coloring

Probably every lover of flowers has wished for a magic substance which could be poured about the growing roots of plants to produce any flower color desired. So far, this dream remains without realization, except for hydrangeas. When this ornamental bush grows in alkaline soil, its flowers are pink. When the soil is acid, however, the flowers are blue. One of the easiest ways to produce blue blossoms is to add aluminum sulphate to the soil. Ordinary druggists' alum will do the trick. There are other means, however, of producing flowers of rare color. From Germany comes a finely divided powder which is simply dusted on the petals. A small quantity of the powder is placed in a paper sack, the flower is inserted with

ing until it becomes virtually a part of the flower structure. The most favored method of juggling flower colors in this country, however, involves the use of liquid dye solutions. The dye is sold in powdered form and is dissolved in water. Fresh flowers, with stems cut on a bias, are placed in the liquid, the stem being covered for about three-fourths of its length. Some plants show the action of the dye in fifteen or twenty minutes. First, the veins of the petals become deeply colored with the dye solution, then the color collects around the edges of the petals. This spreading continues until the dye is evenly distributed or settles in localized streaks. Roses are among the easiest flowers to dye, but other flowers, if without joints or

*Cmd. Walter E. Burton
1032 Florida Ave. Alton
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POPULAR MECHANICS

C 13
 345

knobs in the stems, respond equally well. White flowers exhibit the greatest change, but by using blossoms of a light hue and adding a color which will blend, startling combinations are produced. For instance, a light-yellow rose treated with blue dye takes on a greenish tinge.

REVOLVING KNIFE SLICES WOOD WITHOUT WASTE

Wood is sliced into boards at the rate of 12,000 per hour by a revolving knife that leaves no sawdust. Since there is no waste, the operation represents a considerable saving in raw materials. The machine cuts at high speed, leaving a fine, smooth surface. Boards up to a half inch in thickness and thirty-six inches in length are produced, but the capacity of the machine can be increased to handle thicker and heavier timber. At present, the device is being used for cutting thin strips for box and barrel making.

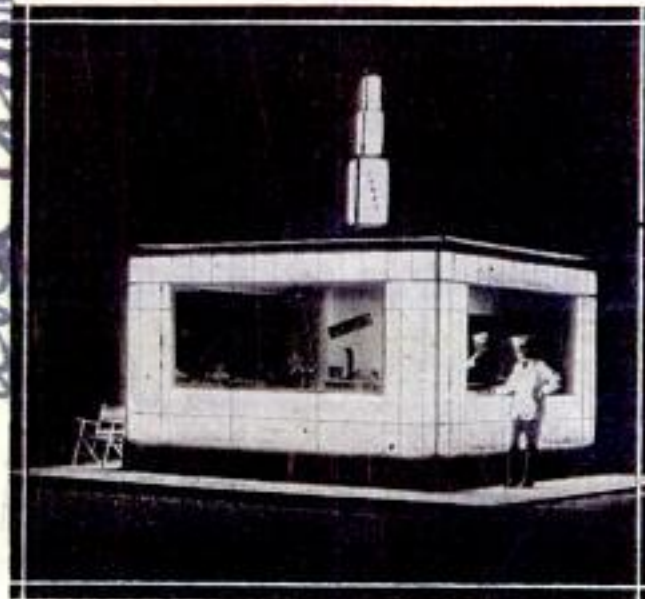


W. J. Wollman 947
Los Angeles
California
W. J. Wollman 947

Saltman

CURB STAND LUMINOUS IN DARK HAS GLASS SURFACE

Surfaced with opal glass which is illuminated by concealed electric lamps, a curb stand at Buffalo, N. Y., glows with a white light at night. During the day the stand looks like an ordinary glass-covered structure. When darkness comes, the lights with their specially designed reflectors are turned on to cast a white glow through the glass.



Concealed Lights Shine through Opal Glass to Illuminate This Refreshment Stand at Night

Designed and
Constructed by

Using a Small Electromagnet Operated by a Battery to Lift and Carry Tacks in Quantities

ELECTROMAGNETS FOR TACKS MAKE HANDLING EASY

Handling tacks in quantities is difficult because scooping them from a container is like attacking solid metal. Turning the container on end and dumping them from one carton to another is wasteful. A Los Angeles furniture manufacturer solved this problem by making a small electromagnet operated by a battery. The current is controlled by a button in the handle. Plunging the magnet into a carton and turning on the current is all that is necessary to carry the tacks from one container to another.

HARDENING GEAR TEETH

Gear teeth, particularly for automobiles, are now being hardened by heating them with an oxyacetylene torch, then quenching them with jets of water. By this method a gear can be machined to size, and due to the localized method of hardening, there is no distortion of the gear itself in the treatment.

Whitcomb
Electric

Service Bureau Buffalo and

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Story

DAREDEVIL Tells

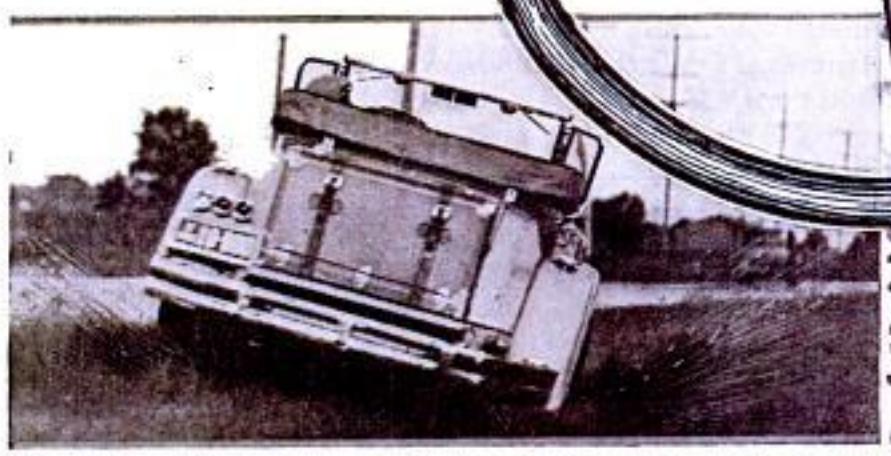


AB JENKINS, Stunt Pilot Tells How to Avoid Accidents

A MILLION miles of driving without an accident. A world record in safe motoring—established by a professional daredevil pilot.

A paradox? Perhaps, to you and me. But Ab Jenkins, who for more than a decade has followed the pre-carrier of special-air-raising auto-acrobatics, sees it illogical in his judgment. Indeed, he regards his safety title as a natural and fitting addition to his road-racing, mountain-climbing and stunt records.

"I know how to drive," he explains simply. It isn't a boast; just a statement of fact. And a glance at his list of accomplishments during that million miles of motoring is mighty convincing. First, to pilot a car across the continent faster than the fastest trains; thirty-nine records up America's toughest mountains in less than a year; a new world record of 2,710 miles in twenty-four hours, 112 miles per hour average from dawn to dawn on the desert salt beds—on and on reads the



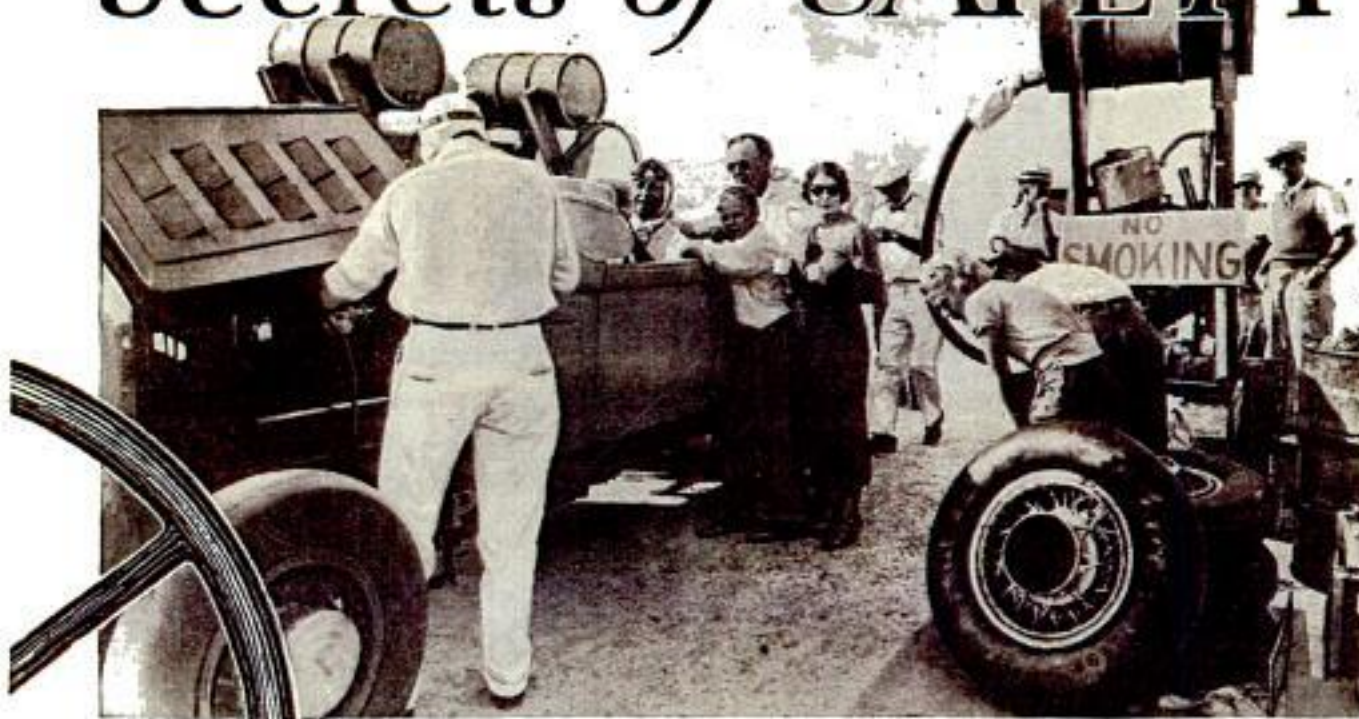
Above, Proper Way to Grasp Steering Wheel; Below, Wrong Way to Get Back on Road; Driver Is Applying Power and Heading for Other Ditch

record roll through scores of point-to-point road titles. Obviously, Ab "knows how to drive."

"The so-called daredevil usually is a far more cautious driver than the average motorist," says Jenkins. "He has to be to stay in one piece. He knows the limits of his ability and of his car, and he stays religiously within those limits. He always

52107

Secrets of SAFETY



leaves a margin for emergencies. On the other hand, too many motorists drive beyond their safe limit. You see them on the highway 'gunning' along right up to the hairline of their ability to control the car. If all goes well, they're safe. But, if a tire blows, if they get forced off the road, if the next turn is too sharp, if the car goes into an unexpected slide, they've got nothing left for the emergency.

"You see them in city traffic, too, trying to beat the lights, crowding cars in the approaching lane, dodging in and out of their line, trying to get everyone's attention, knowing that everyone is going to look out for them. And, when two chaps get together—look out.

"Accidents are like wars; they don't simply happen. They have their causes. Eliminate the causes and you eliminate the accidents. Sure it's old stuff, but people are still being killed just because motorists do not use common sense in their driving."

Jenkins has his own code of safety, a sort of golden rule of the open road. It is rather brief, but long on plain "auto sense."

Assume responsibility; treat every other motorist as if he were your personal friend; keep your car always in the best mechanical condition; don't "show off" or "stunt" on highways;

Top, Jenkins Taking On Fuel at One of Stops during a Cross-Country Run in Attempt to Lower Record; Below, Seeking a Mountain-Climbing Record—a Test of Stamina for Any Car





Above, Wrong Way to Get Out of Skid; Right, the Proper Way—Wheels Turned in Direction of Skid

always expect and be prepared for an emergency; don't fight for your rights.

Foremost in importance is the acceptance of responsibility, Jenkins believes.

"There is a sign on a western highway that explains my point," he said. "It reads, 'Watch Yourself—You May Meet a Fool.' Not very elegant, but it has done more to prevent accidents in the mountains than all the formal warnings and speed traps



One Wheel off Pavement on a Soft Shoulder; the Driver Should "Float" Back on the Road without Trying to Apply Brakes

combined. In my fast driving, I make a policy of viewing every other driver as a green beginner. I expect him to turn off without a signal; swing over on my side or stop without any reason whatever. Every time I head into a turn, I expect some other car to be coming out on the wrong side. Every time I get to the top of a hill, I expect to find the road full of approaching cars. Of course, those expectations aren't often fulfilled, but when they are, I'm ready.

"Most people think that in order to break a transcontinental record, you've got to 'step on it' through towns and all

You don't. I've broken the record twice, and I never yet have failed to observe city speed laws or stop signs and lights.

"A few years ago, I made a series of tests for a mid-western city police department on the running time from limit to limit, driving lawfully and 'kicking it loose.' I discovered that I saved just four

minutes in eighteen miles of traffic by jumping lights, broadsiding the corners, cutting in and out and battling with every other motorist on the street.

"Standing pat on your rights often may lead to serious consequences.

You may be in the right, but right or wrong, you're apt to be in the hospital if you always refuse to let the other fellow 'get away with anything.' I've had to jump curbs, and I've taken the ditch frequently even though the other fellow obviously was in the wrong. Of course it makes me mad, but I'd rather be imposed upon than stand before a judge all swathed in bandages and argue the matter afterward."

Many of the lessons in driving which Ab has learned in his million miles of speed chauffeuring are applicable and valuable to everyday motoring. For instance, tire blowouts. Contrary to the generally



accepted belief, a rear-tire blowout is far more difficult to maneuver than one involving a front tire.

"When a front tire blows, you freeze the steering wheel against the pulling force of the flat tire," Ab explains. "A soft front tire always pulls steadily and in one direction only. If you have strength enough to overcome that pull, you're safe. Let the car coast to a stop.

"A rear blow, on the other hand, keeps you plenty busy. It swings the rear end of the car first one way then the other, with a tendency to broadside. You've simply

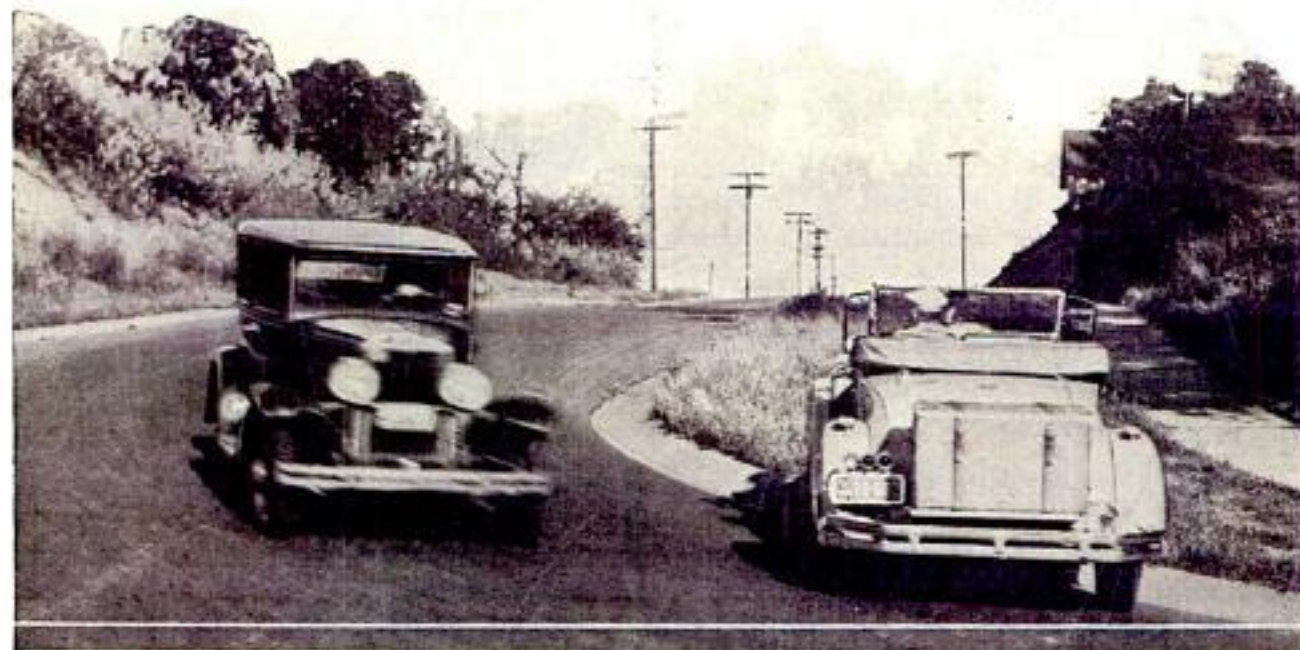
got to outmaneuver it. The feeling is like driving in slimy mud—the car is all over the place."

For a second or two after the blowout, there is still enough air in the tire to permit use of the brake, Jenkins says. If you can react quickly enough to make use of that flash of braking, you can decrease speed appreciably. But after the tire is flat, never under any circumstances jam on the brakes. Just let the car coast.

Another common source of highway accident is dropping one wheel off the pavement on to a soft shoulder.

"The big danger lies in attempting to get back on the concrete too quickly," says Ab. "You feel that sickening lurch and immediately you are tempted

(Continued to page 131A)



Top, This Driver Tried to Take a Turn under Full Power and Lost Control of His Car Momentarily; Below, Driver at Left Took Inside of Curve and Has Forced Other Car off Road



*United States and
Parachute Co
United Airforce
California*

Seventy-Five Pound Loads Can Be Handled by This Automatic Parachute, Shown in Inventor's Hands

AUTOMATIC PARACHUTE OPENS AT ANY FIXED TIME

Emergency parachutes have been developed to open at any fixed time by means of an automatically controlled release that after the chute leaves the airplane, if a plane were flying at 2,000 feet the release mechanism were set at ten seconds, the parachute would open approximately 1,600 feet before opening, or within 400 feet of the ground. This eliminates drifting in high winds. The chute makes the dropping of food to marooned persons as accurate as bombing a certain spot. It is fireproof, waterproof and will float. The apparatus can be set so the chute will drop to within seventy-five feet of the earth before it opens.

SHOES TO BE MADE OF INSECTS BY JAPANESE PROCESS

Bagworms, one of the commonest of American insect pests, are to be used by the Japanese in making shoes, purses and other articles if present plans materialize. Recently a quantity of bagworms were shipped to Japan from South Africa, and it is this particular type of insect, larger

than either the American or Japanese varieties, which the Japanese hope to use. The process has not been disclosed, but the bagworm belongs to the silkworm family and is so named because of the small bag it constructs out of its own silk. Whether the Japanese will be able to spin the material or utilize it merely by cutting and sewing in various shapes is not known. The American bagworm is about one and one-half inches long and is cigar-shaped. Upon hatching, it begins fashioning a bag, and on reaching maturity, the male generally leaves the bag and turns into a moth.

COMBINATION SCOOTER AND SKI FOR USE ON ICE OR SNOW

Combining features of the scooter and ski, a winter toy for children is designed like the familiar wheeled scooter, but is mounted on pivoted steel snow runners shaped somewhat like seaplane pontoons. This allows the sled to be used over level land or downhill without causing the runners to sink deeply into the snow. Since the runners are pivoted in the center, there is a rocker action in gliding over uneven surfaces, and the forward glider can be turned to enable steering. A rubber pad and a strap fitting over the shoe prevent the foot from slipping off the scooter while it is being propelled.



Scooter Mounted on Pivoted Steel Snow Runners to Permit a Modified Form of Skiing

*Winters & Cranston
N.Y. Co. Escondido
Calif.*

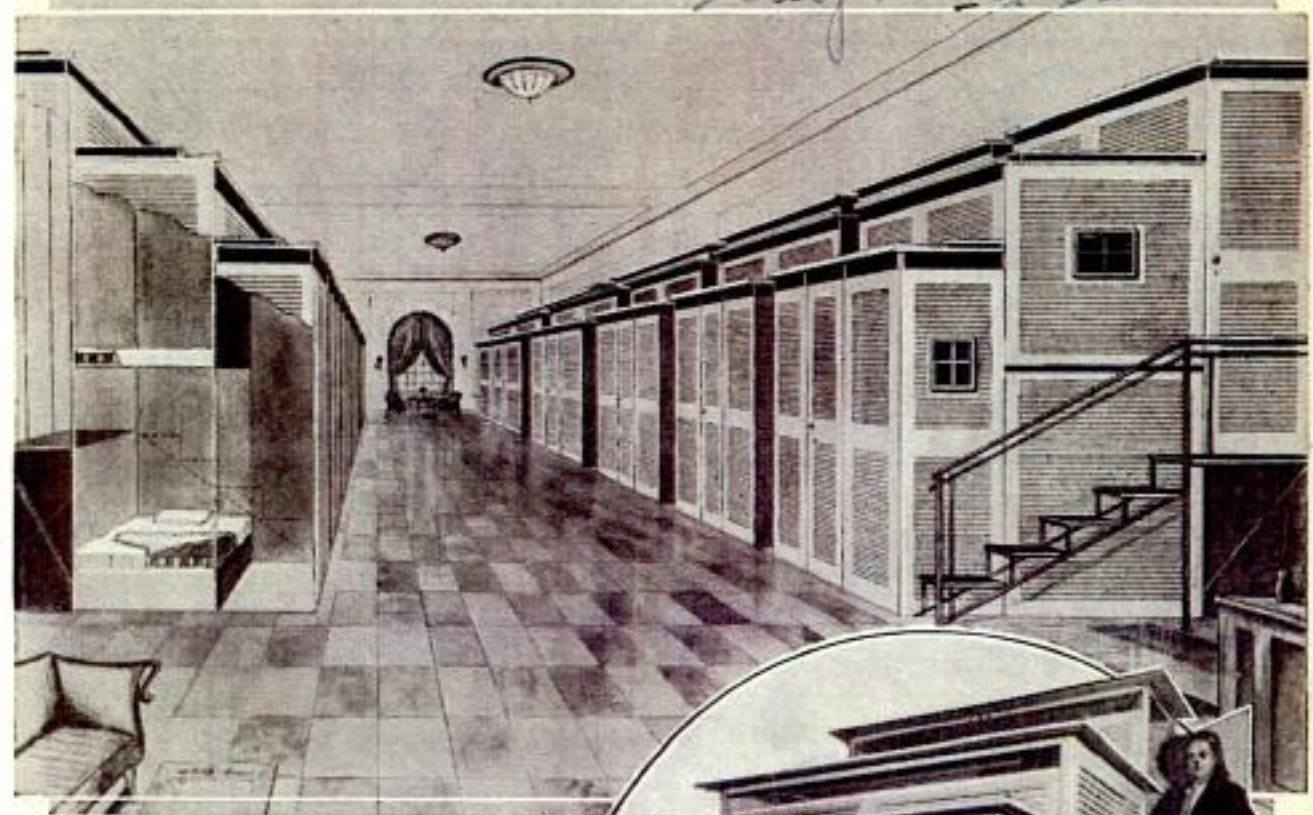
*Consul. H. S. Fullerton,
Merban, South Africa*

*B 2230
Shook. Ski
Mrs. Henry S. Spector*

Dr. Charles E. Isiblesper
Hotelette No. 1
 POPULAR MECHANICS 351

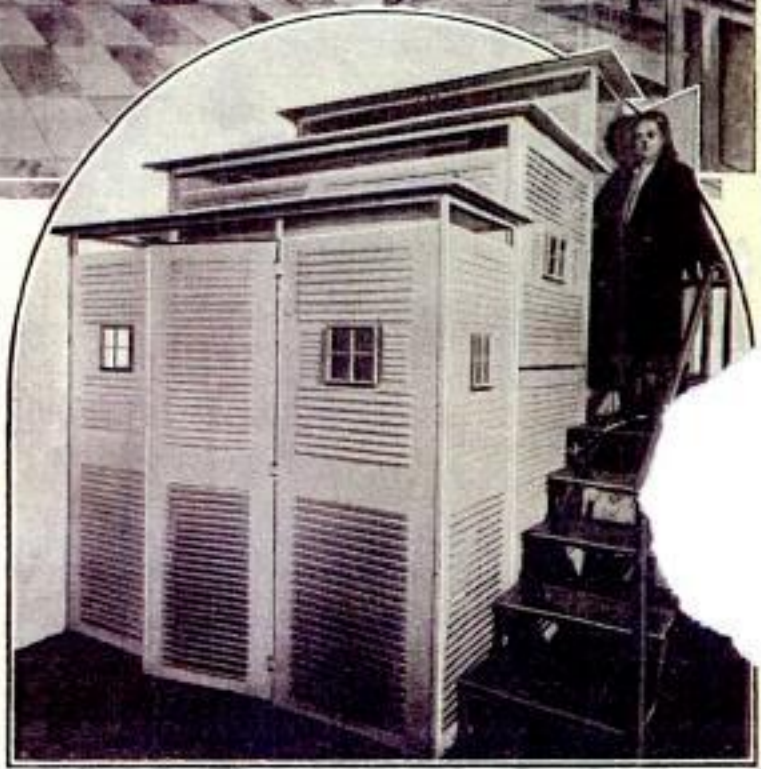
Hotel Built in Two-Bed Units Like Pullman

211 S. Chestnut St.
Seymour, Ind.



How Two-Room Units Are Arranged in New Kind of Hotel; Cross Section at Left Shows One Unit with Beds, One above the Other; at Right, Guest Enters Upper Section; the Rooms Are Entirely Separate

Offering inexpensive accommodations to tourists and traveling salesmen, hotels constructed in two-bed units not unlike the berth arrangement of Pullman cars are being installed in American cities. Each unit consists of two full-sized or three-quarter beds, one above the other, and a separate room containing a combination dressing table and writing desk, a large mirror, chair, hooks for clothing and space under the bed for bags and suitcases. The upper portion of the unit is directly behind and slightly above the lower section and is reached by a few steps on the outside of the unit. The halves are back to back, but while one bed is above the other, each sleeping unit is as separate from the other as though divided by a six-inch wall. Fifty or more of these units may be erected in minimum space. Lobby, ladies parlor and adequate toilet facilities are provided in the building, called "hotelette." All air is washed, ster-



ilized and changed every three to five minutes. Each unit is made of metal, therefore fireproof, and the sides are louvered for ventilation. Arranged in rows, the units have the appearance of miniature Spanish bungalows. Uniform temperatures in the hotelette are made possible by insulating the building and regulating the heat, regardless of the outside weather. Since only a minimum space is required, buildings already put up may be utilized, a two or three-story building being large enough for installation of fifty units.

one in Richmond Ind.
one in Louisville Ky.

\$250.00

Job. factory
Copyrighted material
Ind. Spring

Sea-Floor Scene Shows World as Fish See It



Above, Part of Group Constructed to Show Life as It Exists on Floor of Ocean; in Circle, Model of Submarine Plant Done in Wax; Right, Diver Descending to Study Life on Sea Bottom

er weeks of rework on a coral the coast of Ber- some of it done ing helmets, artist- entists have created a scene showing a bit of the ocean floor and some of the sea life as it appears twenty-five feet under water. Sketches in color, exact measurements and plaster and wax casts were made to produce the submarine scene for the Buffalo museum of science. The Bermuda waters are so clear and the sun so bright that the artists found a riot of color twenty-five feet under water which excelled that of the most bright-hued flower garden. The greatest care was taken to obtain exact measurements of the various forms of life, and



exact colors were duplicated by netting specimens and studying their hues. Besides scores of fish, the scene depicts sponges, coral formations and plant life. Sharks and the spotted moray abound in the waters and made the research work on the ocean floor dangerous, but the

eighteen trips to the bottom were completed by the artists without injury.

Old autos are being converted into new steel by use of a form of briquetted ferro-alloys.

Science News Letter
no. 12/1932

Curator
131 Delaware Road
Buffalo, N.Y.

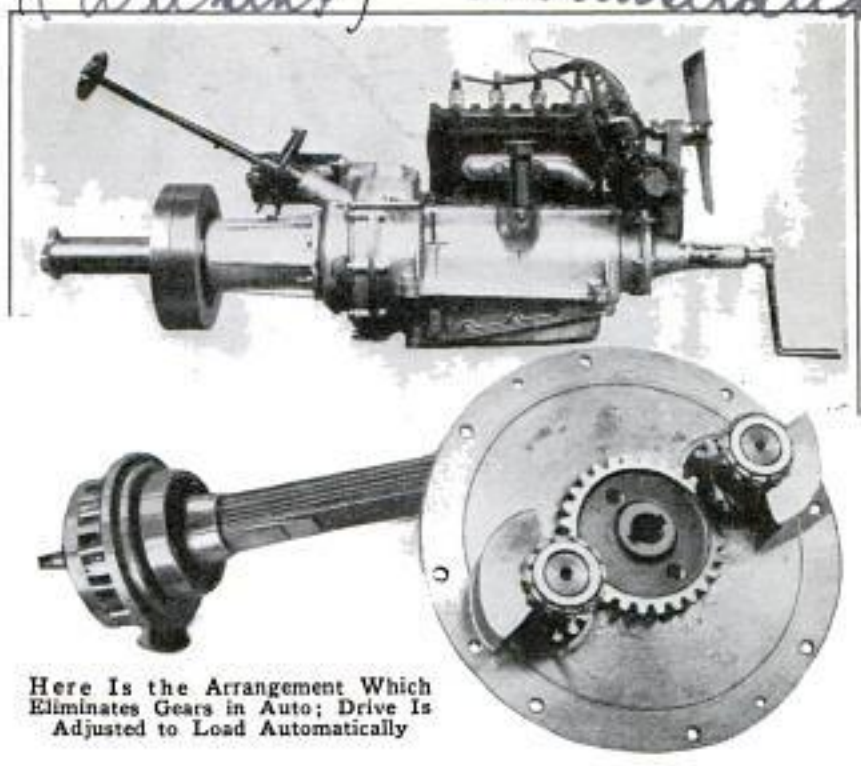
B2237
Meteorological
Observatory

POPULAR MECHANICS
D. W. Howard
Labbe,
an Australian

Chicago Tribune, 12/16/32

**BLASTS FAR AWAY
AID SOUND STUDY**

Dynamite explosions 2,000 miles away have been recorded on instruments in a study of sound waves, especially that part of sound that arches high into the stratosphere. It is thought that such sounds may carry great distances in a path resembling that of a shell from a super-cannon. There is a hypothesis that temperatures in the upper stratosphere are warmer than those which have been measured by instruments carried aloft by balloons. If this is true, scientists think it might be revealed by the way sound waves break when they pass into the warmer layers. The explosions set off in Nova Zembla were "heard" by instruments at Potsdam.



Here is the Arrangement Which Eliminates Gears in Auto; Drive Is Adjusted to Load Automatically

**AUTOMOBILE WITHOUT GEARS
SUCCESSFUL IN TESTS**

Controlled by only an accelerator, brake and reverse lever, an automobile without gears has been tested successfully over a 30,000-mile run. The device replacing the gears gives the driver the choice of every possible gear ratio between fifty to one and direct drive. When the engine is started, the auto moves off briskly and when it has gathered speed, the driver lifts his foot from the accelerator, and the change to what corresponds to top or high gear is made automatically. On a hill, the car automatically adjusts the gear to the load and the gradient. The car cannot run backward unless the reverse lever is set. The device is said to be durable, fool-proof and inexpensive.

B2113

**CHILD'S DESK FITS ACROSS BED
AND HOLDS PLAYTHINGS**

Adjustable for the use of a child in bed, a lightweight wooden desk has a miniature Ferris wheel arrangement for storing toys. The wheel, which can be turned, has suspended baskets for the playthings. The desk top is supported at either end by a set of shelves and a drawer which hold the top away from the child's body.

and Mrs. J. E. King, 5, The High Road, Promenade, New York



Budd's The Craftsman

**NEWS PRINTED ON FOG CLOUDS
FOR LONDON READERS**

News articles and advertisements "printed" on fog clouds compose London's newest and most unusual "newspaper." Powerful searchlights are used to project the stories on clouds, with the "ads" sandwiched between news articles. Since the winter sky in London is seldom clear, clouds of fog or smoke are plentiful, providing the screen. The writing should be on clouds at 2,000 feet for best visibility.

see July 1931
Ray Saerman

The Child Will Be Happy, Even in Bed, with This Desk Which Has Space for Toys

Budd's The Craftsman
Shop, East Lauderdale
Florida

Spence
Bermel
11/20/32

B 1985. Cont. Elm Lclassman
55 W. 86th. New York

A Modern



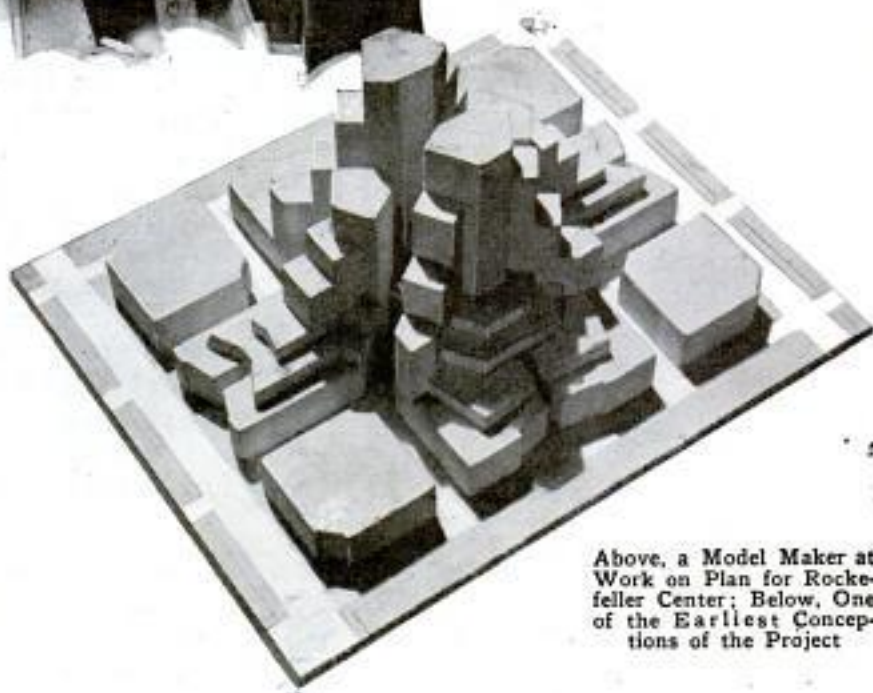
in Rockefeller center. And the canal spreads over a zone more than fifty miles long, while the New York project might easily be lost in the jungle beside it.

The committee, in fact, had enough money to have duplicated almost any structure ever built by man except some of the ancient wonders created at the whim of tyrannical kings. There was not enough, for instance, to duplicate the pyramids of Egypt, for Great Gizeh alone contains 2,300,000 stones, some weighing two and one-half tons, while Cheops covers fif-

BUILD a city to accommodate a floating population of 200,000 people on an area of one-fifth of a square mile!

That, in effect, was the command issued to the board of strategy given the task of planning Rockefeller Center, New York's latest wonder. In their control, the builders had \$250,000,000—enough money to build five power dams like Muscle Shoals, or to drill a twenty-two-mile tunnel under the English channel and still have \$100,000,000 to spare. Or they might have built a tower of Babel higher than Mount Everest.

We usually consider the Panama canal a costly and colossal project. But the investment in the canal's fixed property is about \$6,000,000 less than the investment



Above, a Model Maker at Work on Plan for Rockefeller Center; Below, One of the Earliest Conceptions of the Project

teen acres and includes about 85,000,000 cubic feet of rock.

Neither was there enough money to have recreated the palace of King Sargon II, of Assyria, which contained one building covering twice the area of New York's modern project. Under straining muscles

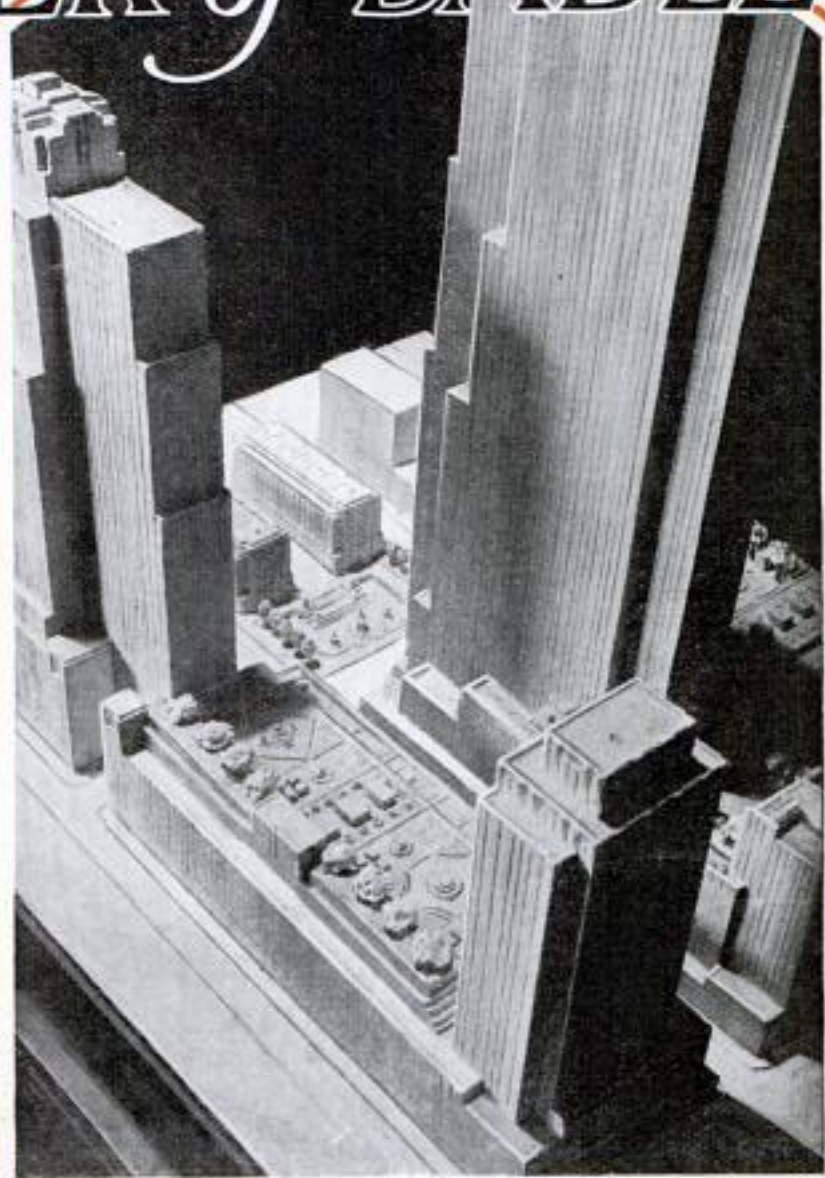
TOWER of BABEL

and cracking bones, millions of slaves also created some other rivals to this modern marvel, such projects as the Hanging Gardens of Babylon, the cities of the Yucatan and Peru, the Aztec cities of Mexico, the Roman aqueducts, the now buried cities of Ceylon and the magnificent temples of Angkor.

But the fabulous metropolis just sprung from the gray chaos of New York has features which would be respected even by our venerable ancestors. It is literally a city standing on end, a city of gardens, plazas, theaters, studios, offices and shops driven into the blue skyline until it is visible to ships at sea or, on other occasions, loses itself in the clouds.

With \$250,000,000 in its pocket, the board of strategy soon found its chief concern was what not to do with it. People from all over the world offered ideas and bushels of them were sifted down to a few pertinent facts. Imaginary schemes of grandeur, staggering visions of transparent buildings, suspended highways and Chinese pergolas all went the way they had come, as also did a man from Georgia and one from California offering to sell mountains.

The planners finally decided a modern city intended to become a world capital of business, merchandising and recreation should be built exactly contrary to ancient models, and this is what has been done. Instead of building a large basin-shaped city, they modeled one after a mountain—the highest point in the center. And near



A Bird's-Eye View of a Plaster-Cast Model of This City within a City; Many Such Models Were Made and Studied Before Construction Started

the base they placed fair-sized molehills.

This interesting plan allows the people living in the highest levels to look down upon the roof gardens of their neighbors, and the people in the lower levels to look down upon a sunken plaza. And the whole populace enjoys unobstructed sunlight and circulating air.

The strategists next sought the best method of carrying out their plan. Each stated his notion on an ideal city, and one by one, these notions vanished in a ruthless process of elimination. Zoning laws limit the bulk of buildings; fire laws govern the dimensions of floors and walls.



Another Model Showing How This City of 200,000 Will Appear When Completed; the Finished Project Will Cost \$250,000,000

And then they had to provide enough space to cover the project's operating expenses. A thousand considerations governed every plan. What they finally chose was a compromise between art, engineering and the heavy hand of John Law.

When such tenants as the National Broadcasting company, the Radio Corporation of America, and others, had stated their space requirements, it was possible to know how to plan the individual buildings, and this also determined the time for commencing construction. All the buildings were located and numbered on a preliminary plot plan, and each was placed in charge of a job captain.

Almost overnight the wreckers came upon the scene. Caravans of trucks carried off the wreckage from scores of buildings at the site of the new city. Never in history was a city built on such exacting

schedule. The workmen were maneuvered like army regiments.

Locked in their quarters, the board of strategy debated the issues of design and construction, and how to defeat their enemy, time. Clay and plaster models of the various buildings were before them. They examined schemes until they could no longer hold off time; then they gave the awaited order of attack.

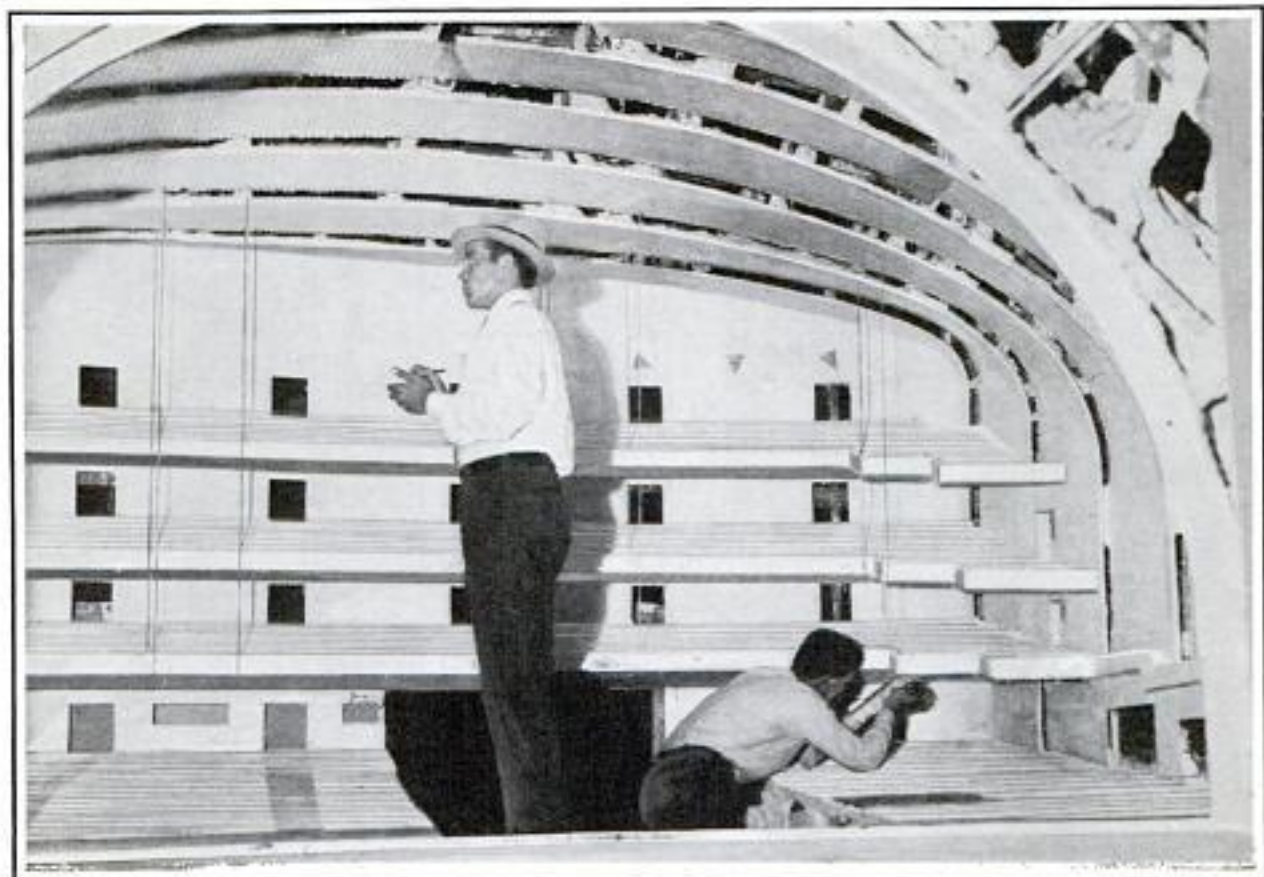
Dispatch bearers rushed their commands to the drafting rooms, where corps of men in shirt sleeves reduced the three-dimension plaster models to two-dimension schemes on paper. Next came the blueprints, which other dispatch bearers rushed to city officials for approval and to contractors for execution.

Ideas grew and shapes crystallized, the plans became more and more detailed. The first blueprints were on a scale of

one-eighth of an inch to the foot. The drafting regiments, working at high speed, soon enlarged the entire conception to quarter, half, and even to full-size drawings. Then specification writers began describing the numerous materials which might be purchased for the work. Contractors were invited to bid. Not always the lowest bidder won, but the man whose reputation and resources inspired the most confidence.

Bids turned out unexpectedly reasonable, and it was possible to order white limestone instead of brick for the face of a seventy-story building, notwithstanding that brick prices fell thirty per cent in the course of several days. Bidding was so spirited and conditions so favorable that certain construction, originally valued at about ninety cents per cubic foot, cost about one-third less.

B 1985



A \$15,000 Model of the Auditorium of the International Music Hall; It Weighs More Than Two Tons, Is Fifteen Feet Wide, Fourteen Feet Deep and More Than Seven Feet High

Meanwhile, the site had been cleared and the iron workers marched on the scene. Simultaneously, transports came up to the front on train schedule and dumped their loads. The mouths of furnaces belched forth the steel soon to be riveted into the framework of the buildings. Agents in Europe and all over the states searched for new or better building materials. Others were sent to mines, quarries, laboratories, and manufactories.

The huge, swift and widely scattered operations necessary to build Rockefeller center would have been impossible in any but the present century, when all the arts and crafts are knit by a code of disciplined efficiency. On the battlefront and behind the lines, it is estimated that 75,000 men joined hands in the fabrication of this city. In all, they will have labored for 10,000,000 days when the project stands completed.

Testing, inspecting, and checking the work and materials required the attention of a small army. As the contractors purchased materials, they were required to submit four samples for approval. These were tested for strength, durability, ap-

pearance and quality. And if approved, other inspectors saw that those very materials were used. Besides the architects' inspectors, there were city, fire, accident and insurance inspectors. And on the completion of each building, there was a general inspection by the owners, contractors, architects and lessees.

With its offices and shops, its proposed opera house, its music and variety hall, its cinema, its broadcasting studios, hanging gardens, and public plazas, Rockefeller center becomes the city within a city.

UNDERGROUND RADIO ANTENNA AIDS PLANES IN LANDING

Underground radio antennas for radio beacons that designate runways at airports proved successful in tests. The beacons guide incoming planes to safe landing. The arrangement is particularly useful where two runways intersect, because it eliminates duplication of beacons, one guiding transmitter serving all four directions. The hookup was effective for ten miles—ample for landing purposes.

Ms. Brady 12/13/32

B 2170

Perfecter by Aeronautics Branch Dept. of Commerce at College Park Md.

*national Association of Insurance Agents
convention*



Wide World
Score of Hose Lines Manned by Philadelphia Firemen in Simultaneous Operation; 9,000 Gallons of Water a Minute Passed through Them

SCREEN OF WATER IS FORMED BY SCORE OF HOSE LINES

More than 9,000 gallons of water per minute were shot from a score of hose lines connected to a high-pressure water system in a recent demonstration by Philadelphia firemen of how engines and fireboats might attack a waterfront blaze. At one time, twenty-one lines of hose were in simultaneous action, the result being a veritable wall of water tossed into the air at the rate of more than 500,000 gallons an hour.

MASTER ELECTRIC CLOCK RUNS ON ANY POWER SUPPLY

Operating on any power supply, a master electric clock with a free-swinging pendulum is offered as an unusually accurate timekeeper. The clock may be obtained complete or in parts on the "build

*Hartford Clock Co.
Booram and Central
Ave. Jersey City, N.J.*

your own" plan. It uses alternating or direct current, and any voltage from one to 500, while a dry cell and reserve mechanism enable it to run automatically, sometimes as long as six months, in case electricity is cut off or fails. Any number of clocks may be operated by the master clock, which is supplied in the grandfather-style case, six and one-half feet high. A pilot dial control is installed on a panel in the same case and is furnished with a step-up key and necessary connections for synchronizing the whole system. Adjustment within ten seconds per month is possible.

B32152 WRENCH FITS ANY SCREW LID

Adjustable to any size of screw top for jars, cans or bottles, a wrench with a web strap has a wide variety of uses. The strap is adjusted closely around the lid and locked by the curved part of the metal handle. Loosening or tightening is easy after the strap is locked in position. The wrench also can be used for loosening rods, pipes and cylindrical objects without leaving teeth marks to mar materials. Bottles with ordinary crown tops may be opened with the device.



With Strap Gripping Lid, the Wrench Applies Loosening or Tightening Force

*Jack St. Pierre
6242 Rhodes Chicago*

02220.

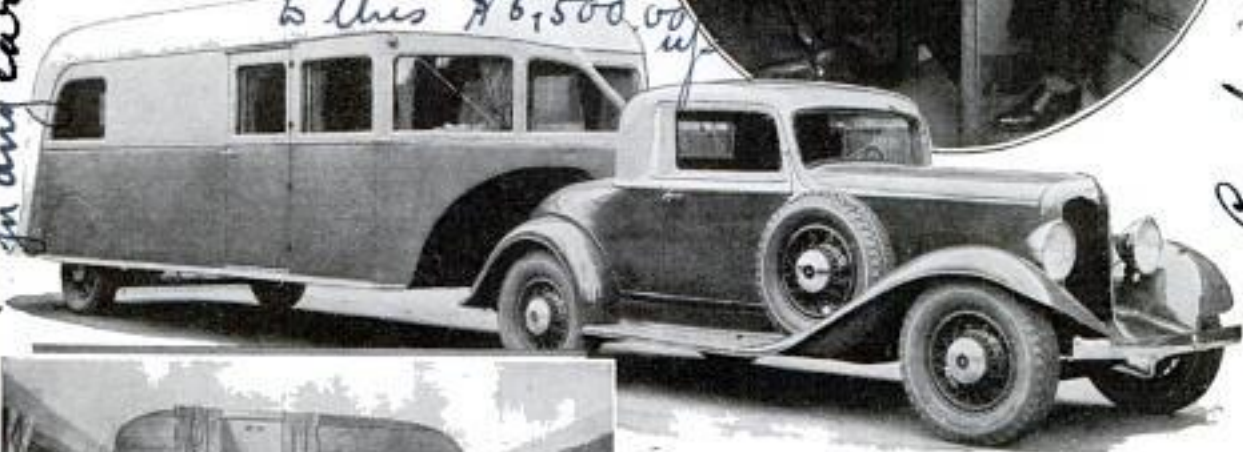
George A. Hughes, President
Edison Appliances Co.
POPULAR MECHANICS
5600 Taylor, Chicago

Office on Wheels Saves Time for Executive

To enable him to work while traveling, the president of a Chicago company who spends much time visiting distributors of his product, makes the business trips in an office on wheels—a luxurious streamlined trailer attached to his automobile. The trailer, or "land yacht," is equipped like a modern business office with comfortable chairs, desk, typewriter and filing cases. Another compartment of the coach contains washroom and shower, refrigerator, kitchen equipment and other household



Custom built streamline
to this \$5,500.00 up



Interior and Exterior Views of a Business Office on Wheels; It Also Contains Living Quarters

furnishings. There is a phone connection between the coach and the driver's seat.

SMALL BOAT FIRST TO CIRCLE FRANZ JOSEF LAND

Sailing around Franz Josef land, long regarded as impossible, has been accomplished by Russian explorers in a small auxiliary-motor sailing craft. A heat wave which started from Florida four years ago and worked northward in the Gulf stream

helped the explorers by keeping the polar seas open. So closely was the trip planned that the little boat was loaded with only thirty days' fuel and forty days' provisions. When the party completed the voyage, only two hours' fuel was left. The explorers had a narrow escape once when an ice pack almost closed on their boat, but the wind changed, opening several waterways. The expedition made 400 wire soundings at five-mile intervals, established thirty-eight oceanographic stations at which temperature, salinity, oxygen, hydrogen-ion concentration, phosphates and nitrates were determined; investigated animal life at the sea bottom and made the usual meteorological observations. These data are expected to be of value to fishing boats in arctic waters. One important result is that it proved Prof. N. N. Subov's theory of forecasting polar climatic conditions. Professor Subov, leader of the expedition, had predicted that the seas around Franz Josef land would be found free of ice, due to the influence of the Gulf stream.

fully equipped
in any car
standard \$1860.00
\$1350.00

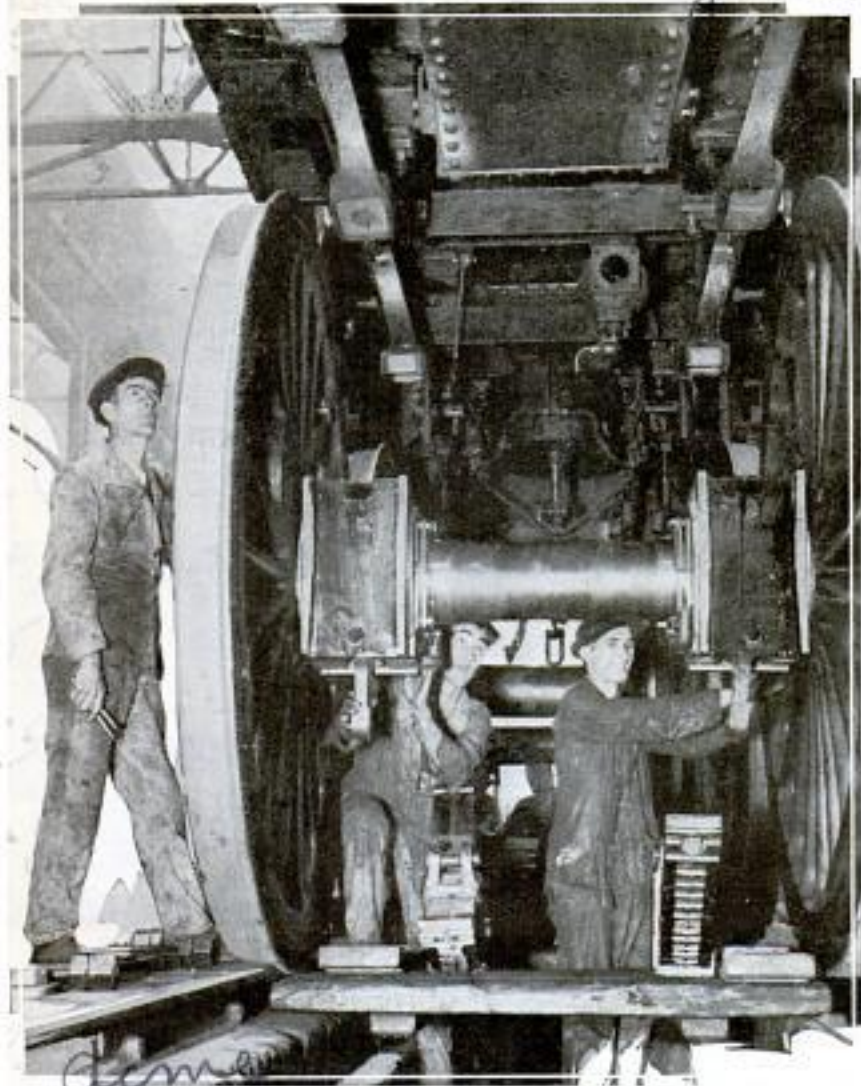
Quill by Aerocar Co. of Detroit
7424 Melrose Ave. Chicago - H. S. Norton
7424 Melrose Ave. Chicago - H. S. Norton

Science Service mail report
12/0/32

031788

Announced by Dr. Albert S. Hyman, 1235 Park Ave New York City.

Worked Eastleigh, Hampshire, England



British Workmen Assembling One of a Fleet of Fast Locomotives with Which England Hopes to Retain Her Train-Speed Record

SPEEDIER ENGINES BEING BUILT FOR BRITISH RAILROADS

While England holds the record for the fastest train on a scheduled run, British railroads are striving for still greater power and speed in their locomotives. The Southern Railway in that country recently ordered a fleet of express engines which are now being constructed. It is expected these locomotives will enable the road to maintain faster schedules on all its long-distance runs.

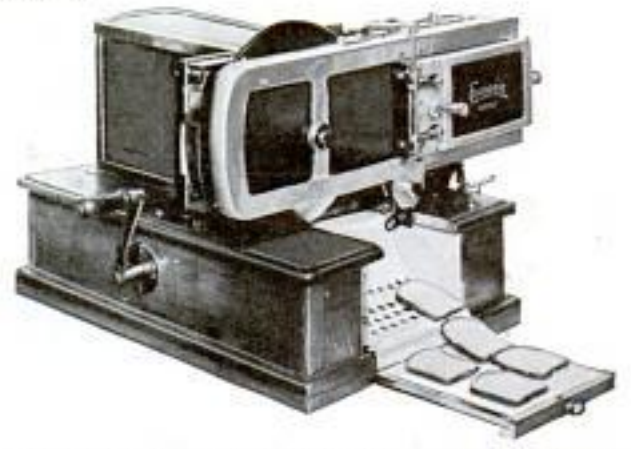
BEATING OF HEART IS REVIVED BY ELECTRIFIED NEEDLE

Restoration of heart action by means of an electrified needle has been found possible in development of an apparatus called "the artificial pacemaker." When the heart stops, the needle is inserted into the right

auricle. Electrical impulses of low power are applied with a generator. These impulses can be regulated to forty, eighty or 120 per minute, depending on the age of the patient and the normal rate of his heartbeat. Where the operation is successful, the electrical stimuli restore the inert heart to its natural beat. This device does the same thing that the natural pacemaker does for the heart, supplying a tiny electric current that is responsible for the regularity of the heartbeat. The natural pacemaker is a small group of cells in the region of the right auricle of the heart. In one instance, the artificial pacemaker revived the heart fourteen minutes after it had stopped.

BREAD SLICER ALSO APPLIES BUTTER

Bread is cut and spread with butter or jam at the turn of a crank by a slicer suitable for restaurants or hotels. It has a capacity of sixty slices a minute. The thickness of the slice and of the spread can be regulated, and no special preparation of either the bread or the butter is necessary to use it in the sandwich machine.



Bread Slicer Which Cuts the Bread and Spreads Butter or Jam on Each Piece

Director. With an increase in the number of the heart. The natural pacemaker is a small group of cells in the region of the right auricle of the heart. In one instance, the artificial pacemaker revived the heart fourteen minutes after it had stopped.

032199

Made by Siemens & Halske, Berlin, Germany

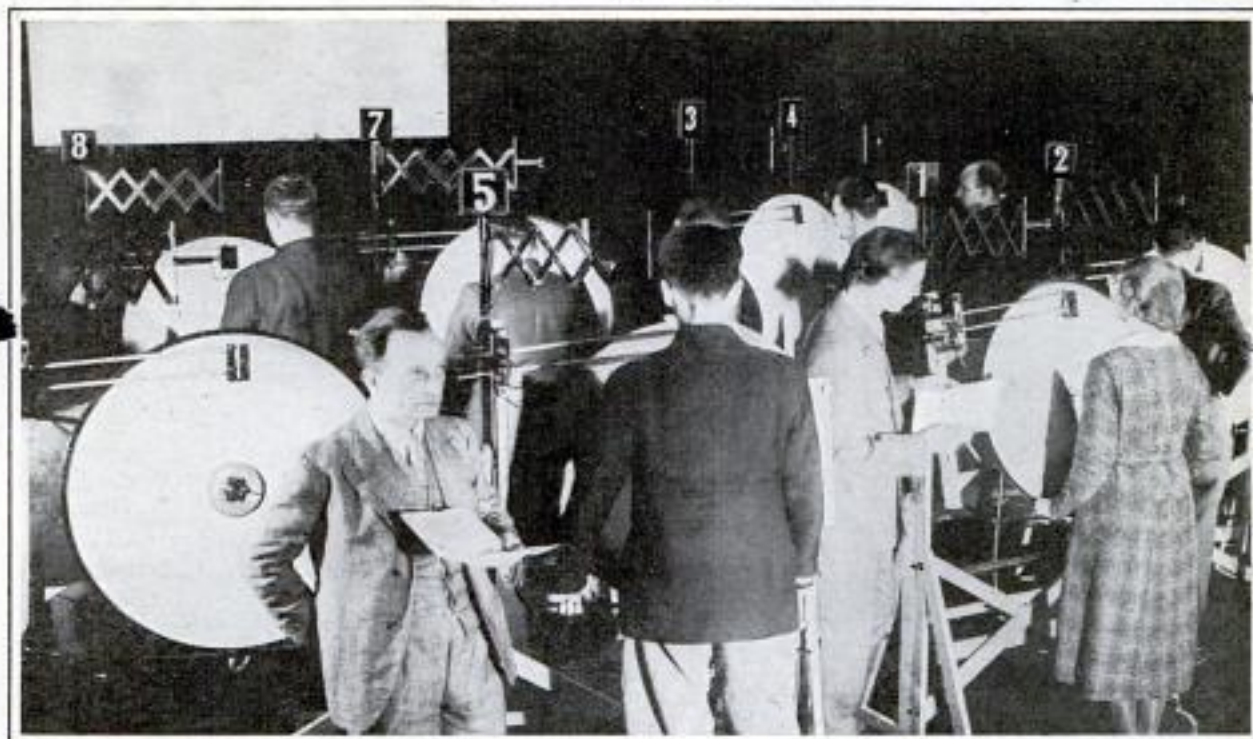
Hyman, maker

B 2181 Jobis. Polyphon. Filmgesellschaft

m. v. H. Maserstrasse 43
POPULAR MECHANICS

Berlin, N. W. P. Germany

Talkie in Several Languages Made with Disks



Some of the Disks Used in Making a Talking Picture in Several Languages at the Same Time; Disks Are Synchronized and Actors Speak the Words as a Revolving Pointer Indicates Them

Topoly method

Heretofore, in making talking-picture records in several languages the voice recordings have been made separately by actors in the various tongues, but the method has not been very satisfactory because the actors spoke at different rates of speed. This led to confusion and made it difficult for an audience to follow action and words. By a recent German method, however, all languages desired for a production are recorded at the same time and synchronized. The original script is translated into the several tongues, an effort being made to select corresponding words of equal numbers of syllables. These are inscribed on the edges of large round disks, one for each role. Above each disk is a microphone and behind the disk the foreign actors stand. The action is projected on the screen at a certain speed and the disks turn at the same rate. The actors fix their eyes on a pointer and speak each syllable of the text at the moment the same syllable on the disk coincides with the pointer. Thus the uttering of a word is synchronized with a lip movement of the screen image of the actor. The sounds are recorded on separate tone films and these are photographically copied onto

the film used for the combined talking and action.

B 2091

AIR-CONDITIONER IN CEILING SAVES FLOOR SPACE

Designed to be suspended from the ceiling or high up on the wall, a new air-conditioning unit saves floor space. The device may be used with either ice or mechanical refrigeration.

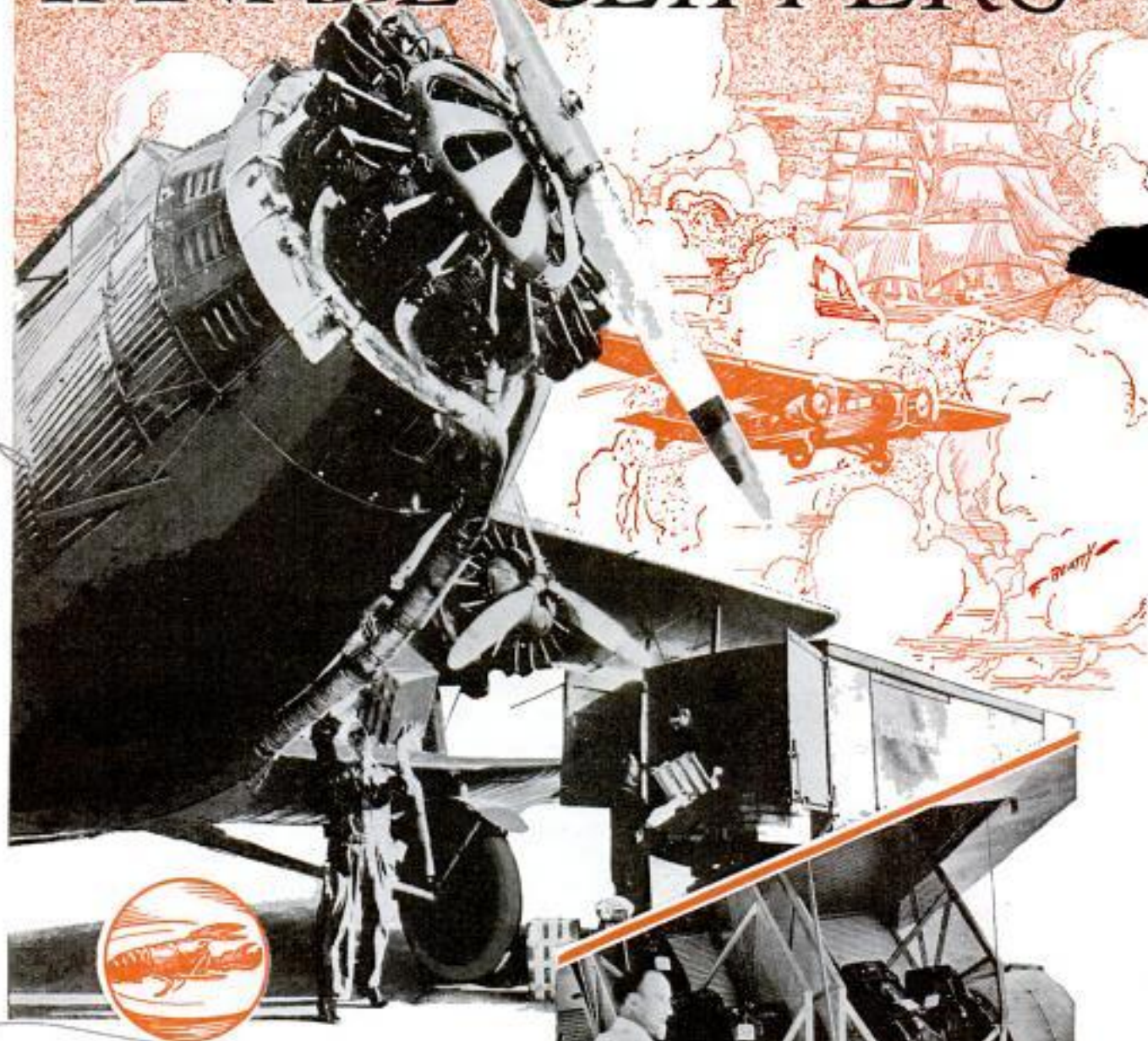


A fan draws the upper air of the room between the fins of the cooling surfaces. Excess moisture is removed, and the cool air is discharged at any desired angle toward the ceiling. Pipes connect with an ice-melting tank or a refrigerator. During cooler weather, the system can be connected with the cold-water supply, reducing operating costs.

McCord Radiator & Mfg Co 2588 E Island Blvd. Detroit Mich

*% United Air Lines Publicity Dept
Burbank, Calif*

YANKEE CLIPPERS



By DON BLACK

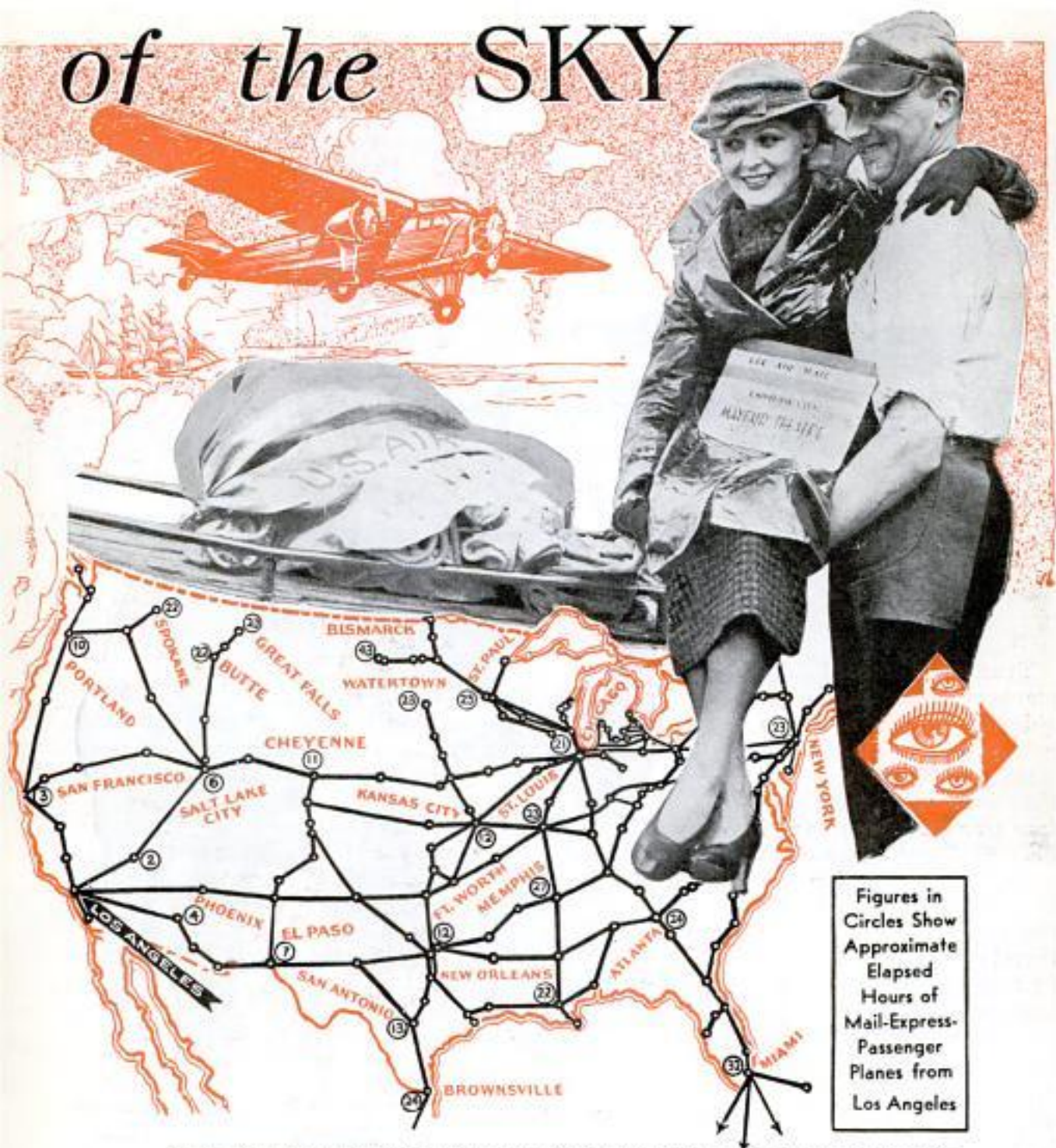
IT was the driving speed of Yankee canvas and clipper hulls that dominated the seven seas a century ago. It is the speed of wings and pounding pistons today that promises to write more prosperous pages in the annals of American commerce. Three or four years ago, aerial freighting was not even a practical dream. Today cargoes running into hundreds of tons streak back and forth across the firmament. Business, big and little, has suddenly awakened to the magic of coast-to-coast freighting in twenty-seven hours.

Banks, to whom time is money on de-



Top, Stowing Cargo in a Transport; Below, Baggage and Express Compartments of a Trimotor

of the SKY



Figures in Circles Show Approximate Elapsed Hours of Mail-Express-Passenger Planes from Los Angeles

Above, Air Expressman with an Attractive "Shipment"; Below, United States Airline Map

posit, were quick to accept the new rapid transit and they daily pluck fancy profits from the air. It has been estimated that Los Angeles banks alone save \$5,000 a day in interest charges in this manner. Checks, drafts, securities and other paper broadcast over the national-airline network every twenty-four hours are worth millions. Reliable estimates for this total valuation in 1931 are \$7,000,000,000!

Wide attention was directed last summer to a \$1,000,000 shipment of Utah state

bonds. These had been signed at Salt Lake City by Gov. George H. Dern, who then departed for the democratic national convention at Chicago. Immediately it was discovered that an error in printing had invalidated the entire block. Another printing was made and the new bonds rushed by air express to Chicago. The governor signed again and sped them on to a New York brokerage firm for delivery to purchasers just under the legal deadline.

B2/48



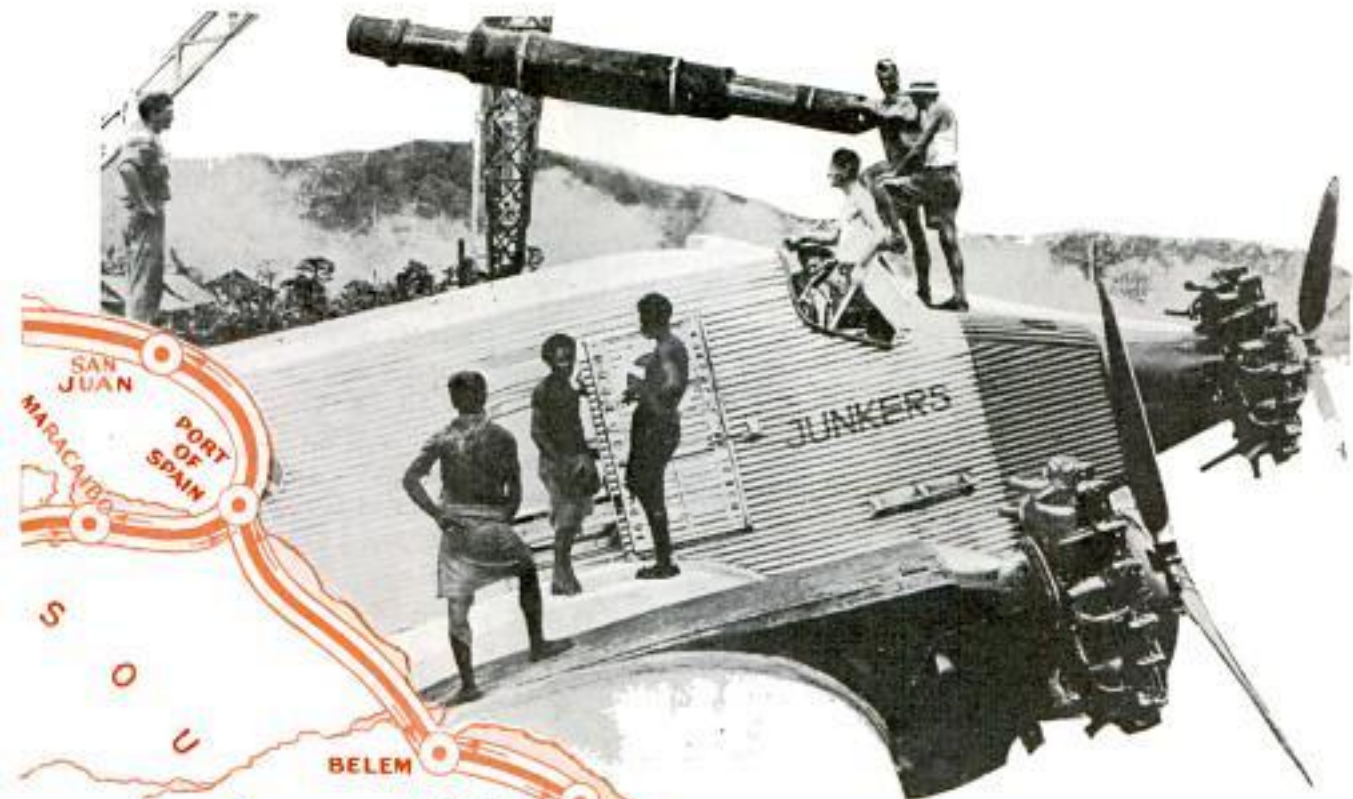
Transcontinental shipments are especially profitable for the banker. On one San Francisco-New York consignment the time differential over surface transportation saved \$1,700 interest. The costs were \$27—a negligible factor. Surplus deposits of the country banks also travel quicker to the money markets. On the other hand, urban reserves are available sooner. A Moline, Ill., banker a few months ago, stopped a run on his bank with quick cash from Chicago.

Losses in transit of bank business are virtually nil. The percentage is about four hundredths of one per cent. The low rate is due to operating efficiency of the air lines, to the asbestos bag adopted by railway express agency, and to photostat processes of identification. The bags are fire, smash and theft-proof. Inexpensive movie-film records of securities make replacement simple, banks have found.

Another heavy commodity movement by air is the news picture, in canned photoprint and matrix form. Most perishable

of all commercial products, its essence is speed. The race to screen and print the latest news calls for the swiftest transportation. No competition is keener, no distribution so universal. Air-speed played a vital part in distributing a decisive news-reel beat of important events on the Pacific coast. This service was valued by the winner at \$250,000. During the Olympic games, express and postage bills on syndicated photographs, news reels and other press releases ran into thousands of dollars each day.

Above, Big Trimotor Plane Taking on Express Shipments; Below, Loading Packages of Silk Hosiery into an Air Transport



Loading a 6,900-Pound Tumbler on a Plane for Trip into Gold Field in New Guinea Jungle



Pan-American Airways System; the Circles with the Dots in Center Indicate Overnight Stops

Inter-city newspaper bundles are another item of daily transport. Californians in New York read San Francisco papers—early Sunday editions printed Saturday afternoon—the date of publication. News stands in every large city supplying “home-town” papers sell editions only twenty-four hours old. The Hollywood-New York movement of photoplay negatives,

prints and stills also grows in volume. Screen tests of promising players and “rushes” from the production studios fly east each day to company executives.

Time like noise flies, literally, these days. Delicate watches, clocks, rings, gem-set adornments and precious stones are more of the curious cargoes that travel about in skyland. Jewelry salesmen ship valuable samples by air, fly in the same plane or follow by automobile or train, show their wares and repeat the process. It is a new technique in the trade, safer, less nerve-wearing, economical, practicable.

If women have nothing to wear these days, it's no fault of the air lines. City women no longer have a monopoly of fashion, thanks to transport speed. Today the latest styles reach New York, Miami, New Orleans, Hollywood and Spokane almost simultaneously. The same hats, cloaks, frocks or gowns that create a flutter on Fifth avenue one day, perform a similar function on Main street the next. Indianapolis mills recently distributed nationally a ton of silk stockings by air. It was an experiment in “fresher” silk to the wearer.

Agriculture has a real pocketbook in-



Above, Transferring an Airplane Shipment to a Truck for Delivery in Los Angeles; Right, Loading a Giant Trimotor Ship with Air Express

terest in air transportation. Fruits shipped out-of-season snag fancy prices in the urban markets. Ozark strawberries are a regular item to St. Louis and Kansas City and the Georgia peach is warmly welcomed in New York and Boston. Melon growers of California are contemplating plane speed to the early market. In Oregon, ranchers are not yet moving their apples by air, but they do save large sums by the dispatch of selling orders, bills of lading and other seasonal documents that way.

The cut-flower business is using air express to sensational advantage. California gardenias are shipped east in 200-pound lots several times a week. They are packed in special containers of dry ice and bring top prices in Gothamtown ten months of the year. A Colorado florist makes nightly shipments of sweet peas to Chicago. The light weight, relatively high value and perishable nature of cut flowers make

them profitable cargoes for operator and florist alike, but strawberry cuttings, valuable tree seedlings and plant life are also wafted to and fro on the upper trade winds.

On the west coast, fresh salmon and oysters go by air from Portland to southern California. With further dry-icing facilities, the eastern blue-point may soon grace the menu at Coronado, while packaged steaks of Cata-

lina tuna tickle the palates of Chesapeake bay. Two lobsters cooked by a favorite San Francisco chef were served "air-express" on the table of a motion-picture director in Beverly Hills.

All sorts of queer cargoes find their way into freight compartments of the air liners. One such item was a packet containing 8,000 artificial eyelashes for the beauties of filmland. Two queen bees flew from Fresno to Medford, Ore.—but under airline power and not their own. Other queens, sometimes with their entire hives, have taken to the air lanes. Another curious shipment set down at Los Angeles was a package of Mexican jumping beans.

A Pasadena duck farm ships regularly to pillow manufacturers in Hartford, Ct.

B 2074
Armstrong Whiteoath
Co

Newcastle,
England

Bulky book manuscripts often are air-expressed by authors.

In a strong bid for the \$8,000,000,000 Central and South American business, the Pan-American airway has wiped weeks out of the American time handicap. Women's apparel, replacement parts on American machinery, automobile accessories, batteries, medical supplies, pipe fittings, motion-picture film, silks and samples of other commodities by the score wing their way southward daily.

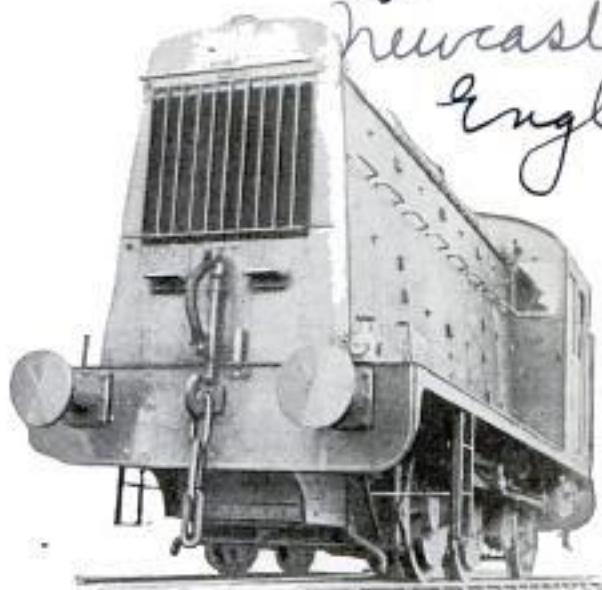
Yeast—its freshness is a matter of hours—is successfully handled even in the tropical jungle countries. Brood eggs that would spoil by any other transport hatch seventy per cent and better when carried long distances by air. Even baby chicks are often shipped. Paradoxically, dated coffee sometimes goes back to Brazil.

In far-away New Guinea, two years ago, gold was discovered in a district so inaccessible that only planes could bring it out. The strike was forty miles inland and at an altitude of over 5,000 feet. In a total of 1,207 round trips, three freight planes in a year carried in two 1,200-ton dredges, piece by piece, except the hulls; a 4,000-kilowatt hydroelectric plant, complete machine-shop equipment, boilers, air compressors, a steam engine, two complete sawmills, tractors, automobiles, roadbuilding machinery, tools and general supplies, totaling 4,900 tons.

In this country air transport is revolutionizing business practice and procedure. Rural merchants and firms remote from manufacturing centers now carry smaller stocks. Shelves may be speedily replenished by telegraph and air express, particularly in the specialty items for which there is less call. Capital, previously tied up, is thus released for other purposes.

Antitoxins are an item of almost daily transport to some stricken individual or threatened community. Special virus for the victims of venomous reptiles is another frequent mercy cargo. Oxygen tanks also have been carried by air.

With each intermediate step-up in transportation this nation has mounted to new standards of living. Today the soaring transport is taking its place with Fulton's "Folly," the pony express, the iron horse and automobile in the economical evolution of mankind.



Loads of 800 Tons Can Be Handled Economically by This Diesel-Motored Switch Engine

SWITCH ENGINE LIKE TRACTOR DOES WORK CHEAPLY

Resembling a giant tractor, a forty-ton switch engine has been operated at fuel costs of between 16 and 18 cents per hour in railroad yards at Newcastle, England. Loads up to 815 tons have been hauled, although the locomotive is equipped with only a 250-horsepower Diesel engine driving an electric generator. During three months of service, the locomotive was employed for twenty-four hours a day, six days a week.

No U.S. agent known

IMPROVED METAL-STRAP TOOL USED TO BIND PACKAGES

Speeding up the binding of packages, an improved tool for applying metal straps has been produced. The stretching is done with a single movement of the left hand, while the metal strap is sealed with one stroke of the right hand. This fast operation reduces strapping time to a minimum, as compared with that required formerly, when two or more tools were necessary. When the metal band has been applied, the tool still retains the loose end of the strap, ready for the next box.



B 2221
Acme Steel Co. 2840
Archer Ave. Chicago



How the Housewife Talks over Improved Public-Address System to Salesman without Interrupting Her Work in the Kitchen

LOUD SPEAKER AT FRONT DOOR SAVES HOUSEWIFE'S TIME

Installation of an improvised public-address system over which the housewife in the kitchen can talk to the caller at the front door is saving time in a Portland, Ore., home. A microphone and a loud speaker are placed at the front door and another set in the kitchen. The radio is used for amplification. When the caller rings the doorbell, the housewife speaks into the microphone to learn who's there. The visitor answers and the entire call may be made without the wife leaving any task at which she is occupied.

GOLD TEETH OF NATION VALUED AT MILLIONS OF DOLLARS

If some enterprising dentist pulled all the gold teeth, then saved the gold, he would be able to retire immediately. It has been estimated that, for the entire nation, there is at least one tooth per person with some gold in it, and from ten to 100 grains of gold goes into a tooth. At the mint, one troy ounce of gold, or 480 grains, is worth \$20.67. Jewelry, mint officials estimate, takes about half the gold not used for coinage purposes or to support monetary sys-

tems. The rest goes into optical goods, dental supplies, scientific purposes and other similar uses. Since 1492, about \$22,000,000,000 in gold has been produced in the world, and of this a little more than half is now in monetary use.

B2203 LOW-COST DELIVERY CAR HAS REAR POWER UNIT

Low-cost delivery has been attained in a light vehicle which is virtually a one-horse wagon with the horsepower installed at the rear in the form of a gasoline engine. The car is designed to sell for about the same as a horse, wagon and set of harness and to operate more cheaply. A novel control system enables the driver to advance the vehicle with no more delay than is required to grasp the reins and cluck to his horse. The power unit consists of the engine, clutch, transmission and final drive assembled into a unit with the springs, hubs, wheels, service brakes and tires of the rear wheels. In emergencies, the entire power unit can be replaced on the street within fifteen minutes without disturbing the load. There are no axles, all wheels having independent springing. The body is made of steel so that it can be washed inside and outside with the hose. For use by dairies, there is space for fifty-two standard-size quart cases. A maximum speed of eighteen miles per hour, three times that of a horse and wagon, is provided by the seven-horsepower engine.

Power Unit of This Light Delivery Car Can Be Removed and Another Installed on the Street within Fifteen Minutes



Bully Fred Miller street address.

B 2236 Tribune 12/17/32

*Stutz Motor Car Co
1002 Capitol Ave
Indianapolis Ind*

B2139

L. F. Yates. Wax Studios, Inc
105 E. 10th St

Los Angeles Calif

see June 1934 - 1942

History's Famous Faces Reproduced in Wax

Faces of figures famous in the world's history have been reproduced in wax by a Los Angeles artist. Napoleon, Confucius and some two score other great characters live anew in the lifelike masterpieces produced for a motion-picture company. Months of research were necessary before the artist could find suitable material. Expressions characteristic of each subject have been captured, making identification easy.



In This Group of Waxed Reproductions of Famous Faces Is the Artist; Can You Find the Only Real Face in This Picture?

B2265

CAGED FLIES ARE POLLENATING PLANTS

Flies in cages have been put to work, aiding plant breeders in pollination. In an attempt to produce better onions, crosspollenation has been done by hand, but the process is tedious and expensive. Under field conditions, onion flowers usually are pollinated by a fly that feeds, as a larva, on spoiled meat. The plant breeders made large fly-tight cages of cloth in which they grew the onions they desired to crosspollenate. By setting meat waste where the flies could lay their eggs, large quantities of larvae were obtained and placed in the cages with the onions. The adult flies did a thorough job of pollen-carrying as they went from flower to flower. As a result, far more seeds were obtained than possible by hand pollination.

Univ. of California experiment station at Davis

LINEN LAID IN CONCRETE ROADS MAKES REPAIRS EASY

Generally when a concrete road is damaged, a whole section of the concrete must be removed to make repairs. Recently, however, an improved method of laying the concrete has been tried which makes it necessary to remove only a small upper layer of the road. Instead of being one

solid mass of concrete, the road is divided into layers by sheets of linen. If the roadway is broken, the concrete is taken out only to the first linen sheet.

B2261

OILSTONE OPERATED BY MOTOR SHARPENS TOOLS QUICKLY

Sharpening tools is simplified and speeded by the use of a motor-driven oilstone. The motor, and a frame concealing it, form the base. The axle carrying the disklike stone is vertical and causes the stone to turn like the revolving table of a phonograph. The tool can be held in both



hands, so the blade meets the stone at the usual angle, thus giving a keen edge without moving it back and forth. A felt wiper, suspended over the stone in a metal frame, keeps it clear of debris and excess oil and also serves to feed the oil to the stone by gravity.

June 7/14/36

Pulse Mfg Co
Pulse H. H.

Com. H. P. Behrke
19186 Stottler Ave
Detroit Mich

B2050
370

Col. Horace C. Sargent
% White Star Line
POPULAR MECHANICS

1 Broadway New York

Close-Ups of Grotesque Faces at the Zoo



Unusual Photographs of Some of the Strange Inhabitants of the London Zoo, and Other European Animal Houses, were Obtained by a Photographer Who Equipped His Camera with Metal Tubes of Various Lengths to Extend the Lens and Get Close-Ups; the Tubes, from One to Seven Inches Long, are Threaded into the Opening from Which the Lens is Removed, and the Lens is Inserted in the End of the Tube; the Seven-Inch Tube Enables a Picture to be Made with the Object Only Four Inches from the Lens; at Left, is the Crested Cariama from Brazil Which Resembles a Pheasant; the Picture was Made Outside the Cage, the Lens and Tube being Inserted between the Bars; Below It, is Old Colonel Walrus, and at the Colonel's Right Appears a Green African Bullfrog Which Exists by Eating Smaller Frogs

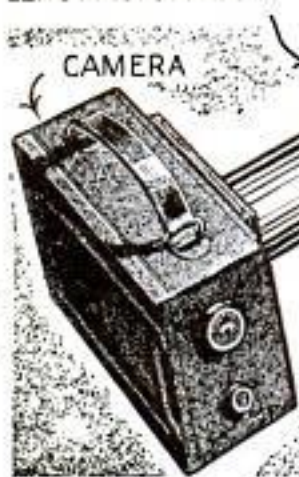


METAL TUBE
INSERTED BETWEEN
LENS AND CAMERA

CAMERA

THREADED FOR
FOCUSING

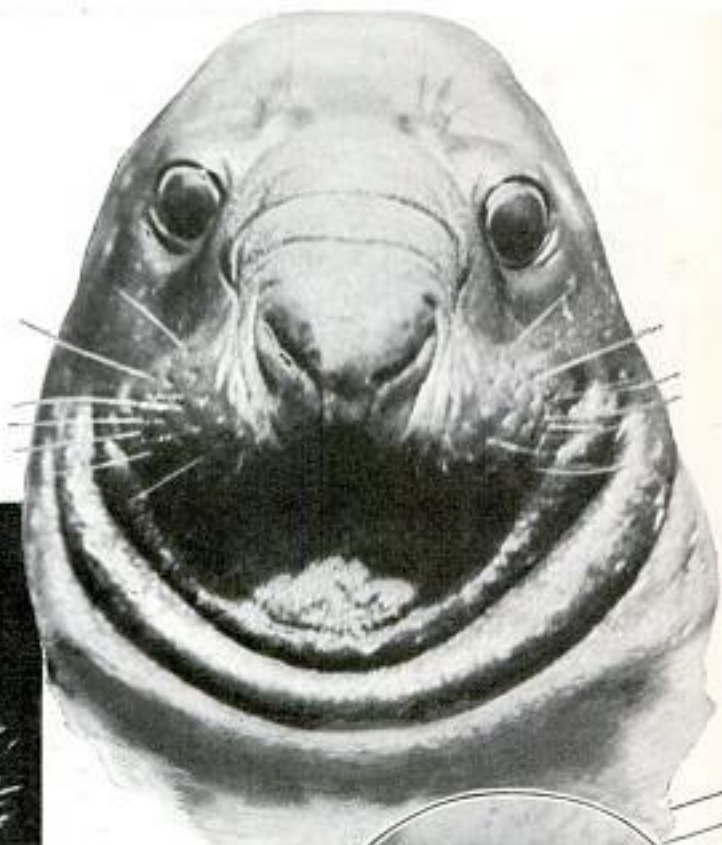
TUBES VARY FROM
1 TO 7 IN. IN LENGTH



Close-Up of Eyes of an Australian Owl; Note the Reflection of the Photographer Which Appears in the Pupils of the Eyes

Made with Tubes to Extend Camera Lens

Right, "Roland," the Sea Elephant of the Berlin Zoo; "Roland" Comes When Called by Name—Particularly if a Meal Is in Prospect as Was the Case Here; He Weighs Two Tons, Is Twenty-One Feet Long and Gets Fifty Pounds of Fish Daily, but Would Like 150 Pounds, Although He Can Fast for Two Months if Necessary; Below Is the African Crested Crane Whose Head Has as Many Colors as the Tail of the Peacock; at the Bottom Appears the Saddle-Bill Stork, So Named Because of the Saddle-Shaped Cartilage on the Upper Surface of Its Bill; It Is as Tall as a Man, but This Particular One Was so Tame That It Posed without Protest.



Above, in Circle, Unusual Picture of Eye of a Lion; Lens and Tube Were Thrust between Bars and Picture Was Snapped with Lens Only Nine Inches from "Nero's" Pupil; Note Reflection of Bars of Cage Which Appear as Curved Lines in the Eye; Below, the Kinkajoo or Honey Bear Which Is About the Size of a Domestic Cat

Radio Dial Phone Calls Planes from Airport



length, he turns a switch that automatically shifts the transmitter to that frequency. Then he dials the proper number on a standard telephone and the necessary change is made on the dispatcher's radio receiver, giving the proper frequency as well as the desired volume. This makes it possible for receivers to be located some distance from the airport. Four different frequencies are used on the New York, Chicago-Pacific coast route of the line.

B2281

INVISIBLE WIRE USED IN LAMP OF THREE-WATT POWER

Wire invisible to the naked eye is used as the filament in three-watt electric lamps. This tiny filament is produced by drawing tungsten through an almost invisible hole in a diamond, then etching it with acid to reduce the diameter of the wire still more. The three-watt lamp is used in decorative ornaments, house numbers and as indicator lights on house-lighting currents of 110 to 125 volts. Diamonds used for these wire-drawing dies are so hard that drilling is a tedious and

La Salle. Wacker Bldg. Chicago

As Simple as the Dial Telephone, This Apparatus Is Link in Communications between Airport and Airplanes Flying U. S. Routes; Note Dial by Which Plane Is Contacted by the Dispatcher

By dialing a number, it is possible to talk to pilots of planes in flight between airports of the United Air Lines. A radio-phone switchboard system is used. When an airport dispatcher has been talking to the pilot of one plane and desires to communicate with a plane on a different wave-

long job. Sometimes as many as twenty-five diamonds are drilled before one with a hole small enough for the invisible wire is completed. Conical holes are drilled from each side until they just meet and barely break through. The smallest hole drilled is between three and four ten-

B 2218

Diamonds from Trevois
France, on banks of
Savoie River, few miles north of
thousandths of an inch in diam-
eter and requires two weeks of
continuous drilling. All the while,
fresh diamond dust and oil are
dropped on the spot where the
needle is drilling. The needle,
made of steel, remains stationary
while the diamonds revolve at
rapid speeds. Apparatus for this
work is found in the wire-drawing
department of the Westinghouse
Lamp company at Bloomfield,
New Jersey.

POPULAR MECHANICS

373



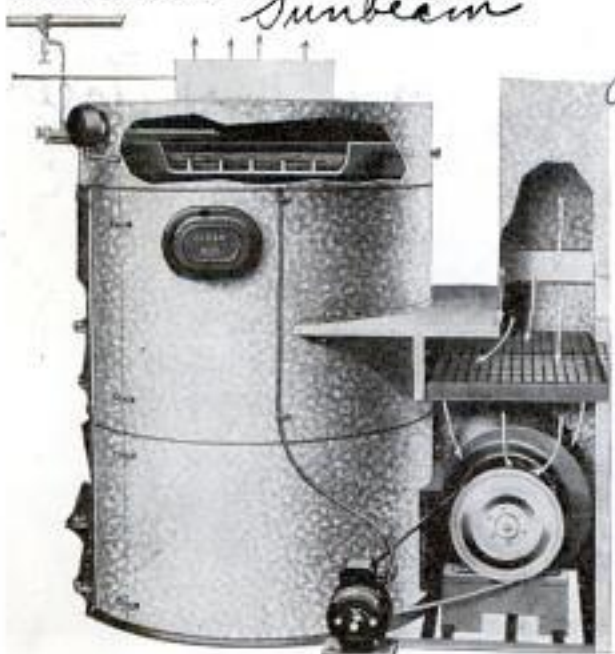
As Young Lady Sings, the Disk Revolves; the Line Appearing at Standstill Indicates Voice Pitch

Seeing show in Cook County
Sept. 20th
Chicago High School of Music

B 2252
**AIR CONDITIONER AND
FURNACE IN ONE**

Combined with a furnace, an
air conditioner for the home
cleans, humidifies, heats and cir-
culates air in winter and delivers
cool air in summer. The unit con-
tains a hot-air furnace and the
conditioning equipment. Before air
leaves the unit, it is humidified
automatically, and cleaned and
purified before being forced
by a blower into the heating com-
partment for proper warming. Then
the blower sends the warm, condi-
tioned air to every room, provid-
ing from four to six complete
changes every hour. A special
control automatically prevents the
blower from delivering cold air
during the heating season. On
summer days, the blower forces
a breeze from every register.

Sunbeam



This Cross Section Shows How Air-Conditioning Unit
Is Connected to Hot-Air Furnace

The Fox Furnace Co.
Elyria, Ohio

**VOICE IS VISUALIZED ON DISK
TO SHOW THE PITCH**

Voice vibrations are visualized on a
rotating disk that shows the pitch,
providing a test for singers or
musical instruments. The disk is
covered with white and black
checkered lines. When the sub-
ject sings into the phone con-
nected to the device, one white
and black line on the disk seems
to stop while the others continue
to rotate. This line indicates the
pitch of the voice.

B 2272
**PLASTIC RUBBER FOR MENDING
IS WATERPROOF**

Plastic rubber that is squeezed
from a tube like toothpaste or
shaving cream is available for
mending or making adhesive,
insulation, rubber shapes, water-
proofing and the like. Automobile
tires and tops, electrical insula-
tion, leather, rubber boots, rain-
coats and other articles may be
mended quickly with the rubber,
which can be thinned to any
desired consistency by stirring
water into it immediately after
pressing from the tube. Surfaces
on which the plastic material is to
be applied are prepared by
scraping, sanding and washing
with gasoline.

Tests have shown that, pound for
pound, burning pine wood gives
more heat than hickory.

Science News Letter
Oct. 22, 1932

Grind Rubber Co.
154 E. Erie, Chicago
Stock
Sub: 4200

Copyrighted material

B2166
374

System perfected
by *W. L. Barker*
POPULAR MECHANICS

*A trace
my*



Student Speaking into Dictaphone While Instructor Points to Chart in New Method of Studying Foreign Languages

DICTAPHONE AIDS IN TEACHING FOREIGN LANGUAGES

Helping to improve students' pronunciation, dictaphones have been installed in one American university as an aid in teaching foreign languages. Students are required to pronounce and accentuate correctly the words listed in a manual, with the dictaphone recording the lesson. Teachers then listen to the records and criticize the students' pronunciation.

SLEEPY SEEDS AWAKENED BY CHEMICALS

Seeds of many trees, shrubs, and other plants of commercial or ornamental value, are wrapped in coats so resistant that many months or even years are required for germination. This does not make much difference in nature, but to nurserymen it is a matter of economic importance. As a result, plant physiologists have de-

voted much time to the awakening of these stubbornly sleeping seeds. Prof. J. Nelson Spaeth, of Cornell University, found seeds of linden or basswood did not germinate in two years if left untreated, but when treated with concentrated sulphuric acid for from twelve to twenty minutes, they showed from forty-nine to sixty-three per cent germination in four months.

B2154

FREE-WHEELING RACER DRIVEN WITH STRAP

Propelled by pulling a strap, a new sport racer for boys and girls has a free-wheeling arrangement similar to that in automobiles. Pulling the strap starts the racer, which rolls while a spring mechanism rewinds the strap on a drum, ready for the next pull. Moving a control lever allows the vehicle to coast, while a further movement of the lever supplies a powerful brake. The racer is steered by foot control of the front axle. Bicycle-type wheels are equipped with non-skid rubber tires. The seat is mounted on four small flanged wheels that roll on an inclined steel track, causing the seat to return to the forward or starting position without effort by the rider. The propulsion movement is similar to that in rowing and other exercise machines.

Easy Sport Racer



When the Rider Pulls Strap, Racer Moves Ahead and Free-Wheels While the Strap Is Rewound Automatically

*University of Maryland
College Park*

*Science Service
12/24/22*

B2268

*and Florence
2 Emerson Boyce
Thompson Institute*

*The Colson Co
Elyria, Ohio*

Copyrighted material

B2049

Steel Islands Speed Hunt for Oil Under Sea

After half a dozen oil companies in California had spent \$300,000 apiece to build steel piers 1,500 feet into the ocean in order to drill for oil on tideland, a marine engineer in Los Angeles showed a small independent operator how to save \$200,000 by constructing a steel island in water thirty-eight feet deep. The job has just been finished and the well drilled through a fifty-four-inch caisson. The contractors, Robinson & Roberts, did the job in eighty-two days by a patented method. It is believed that in future years many of these islands will be used for oil development, for it already has been demonstrated, at Huntington beach, Seacliff, Elwood and Summerland, that there are great reservoirs of petroleum underneath the ocean. At Summerland, they found it at 200 feet, along the bathing beach. At Elwood, they drilled 3,500 feet and got 4,000-barrel wells 1,000 feet from shore. Preparatory to constructing the steel island at Seacliff bay, west of Ventura, the contractors had deep-sea divers explore the bottom of the bay, using hydraulic jets, in some places, to determine the depth of sand overlying the rocks. After the floor of the ocean had been carefully studied, they built a temporary wharf by driving piling off a barge. From this temporary platform they constructed the steel island. One of the most important features of the island was a steel template which was dropped overboard from the temporary wharf, for use as a foundation frame. Divers went below and guided the engineers in lining up the template. With the template in position, the construction engineers, using pile drivers, drove steel H-beams through the openings in the template, creating the frame for the island.

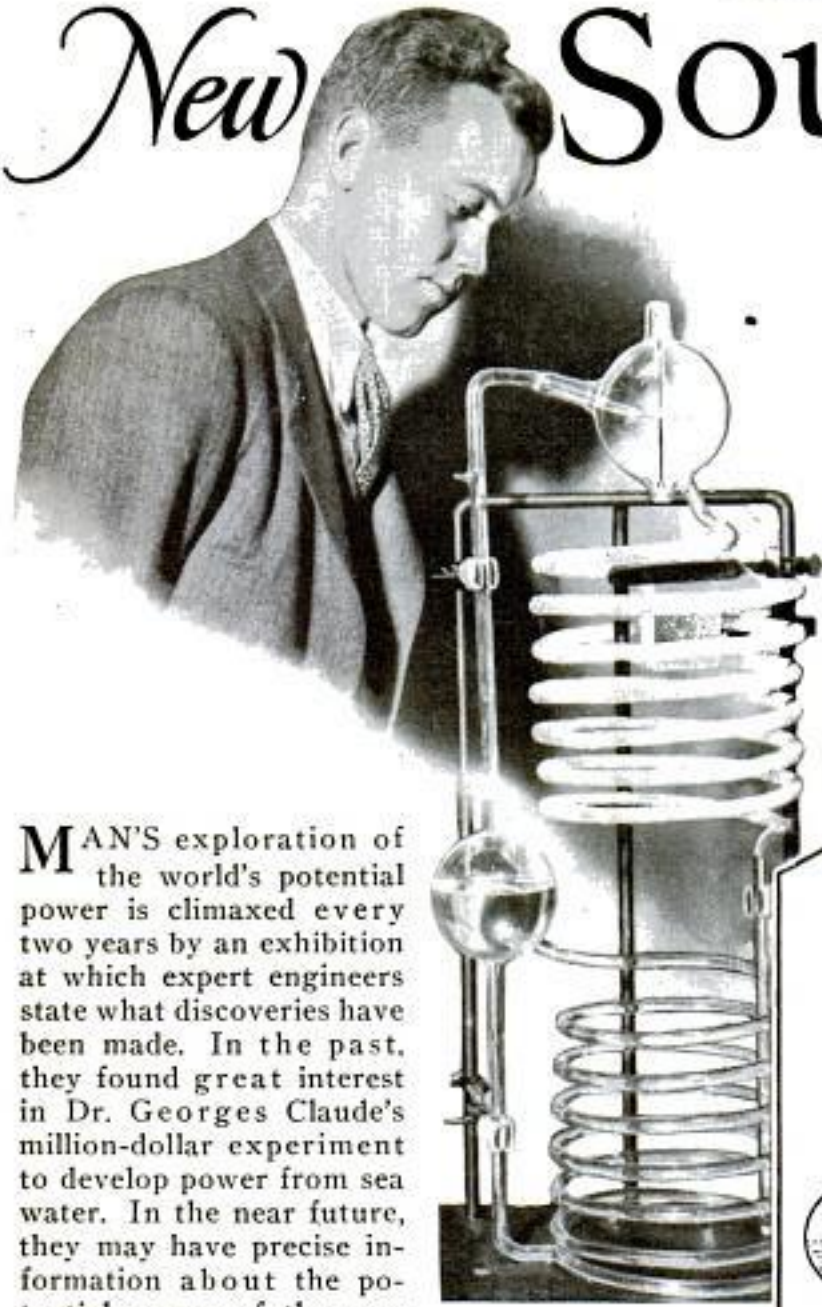


This Steel Island Built off California Coast Has All Machinery Necessary in Drilling an Oil Well under Water

Emb. Harold J. Wood
91349 La Vista Terrace
Los Angeles, Calif.

02213 Cml Elm Islandman
 65 W. 86th St
 New York

New Sources

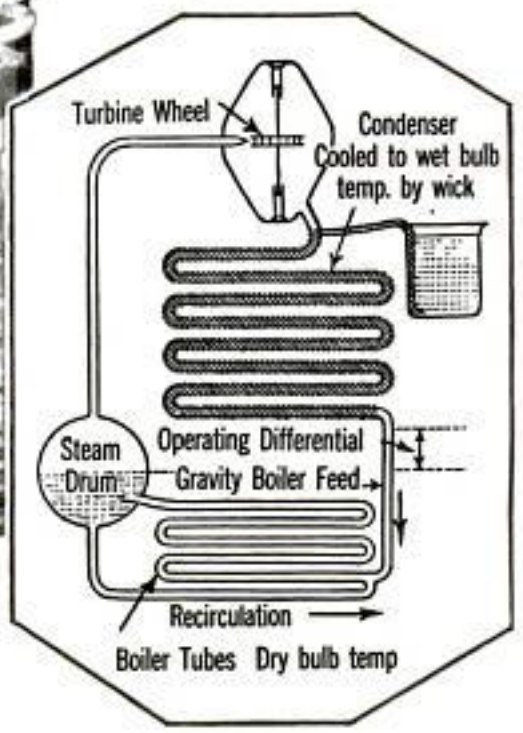


apparatus are so simple that anyone can construct an atmospheric power plant for himself.

A thermometer, suspended in the atmosphere, gives the temperature of the dry air; but a wet-bulb thermometer gives a lower temperature because of the evaporation of the water on the wet bulb. In ordinary circumstances, this difference amounts to ten degrees Fahrenheit, and it is the sole motivating energy of Gibson's engine.

The plant consists of a boil-

MAN'S exploration of the world's potential power is climaxed every two years by an exhibition at which expert engineers state what discoveries have been made. In the past, they found great interest in Dr. Georges Claude's million-dollar experiment to develop power from sea water. In the near future, they may have precise information about the potential power of the cosmic rays. For the present, however, a revolutionary "atmospheric vapor-power plant," invented by George H. Gibson, a New York engineer, has created intense interest. Although rated at only .000016 horsepower, this power plant may be regarded as about twice as efficient as Doctor Claude's sea-power plant, and, of course, would require a much less expensive apparatus to produce equal results. Claude utilized the temperature difference of depth and surface sea water to create steam for a turbine. Gibson makes use of the temperature difference found in the atmosphere around us. The principle and



Model of Vacuum Vapor-Power Plant Which Derives Energy Directly from the Atmosphere, and Diagram Showing How It Is Operated

er in which steam is generated by heat in the surrounding atmosphere; a small jet, through which the steam blows against the buckets of a turbine, and a condenser cooled by a cheesecloth wick. The turbine will spin in an ordinary atmosphere, and if the end of the wick is kept moist, it might conceivably turn forever, creating energy out of the surrounding air.

In Gibson's toy model, the boiler heating surface is 1.88 square feet; the con-

100 sold in New York

and Uses of POWER



*Andrew Campbell
Bridgeport Conn*



denser surface is 1.25 square feet; the temperature difference between wet and dry bulbs about ten degrees, and between steam in the boiler and in the condenser, three degrees. Steam spouts from the tiny nozzle and is generated at the rate of .004 pound per hour. Except for the jeweled bearings, the turbine and the wick, the entire engine is made of glass.

Among other devices research engineers have just brought out, is one which performs miracles in cutting. Heretofore, it was considered impossible to cut a diamond with anything but a diamond. But the new machine, with a carborundum disk for an edge, cuts diamonds, pyrex glass, chrome steel, nickel steel and hard minerals as easily as a sharp knife cuts butter. It is the same carborundum which heretofore had no effect on diamonds, but its cutting powers have been increased wonderfully by submerging it in water.

As applied to cutting glass, it also is a great improvement. Until now, it has been necessary to scratch the glass and break it along the scratched line. If a smooth edge was desired, the broken surface had

Top, Applying Copper Sheets to Roof; Below, Jute Fiber Expanded by Steel Screw, Holding Four Men

*Orawfuling Co
98 Lafayette NY*

B2213

see Jan 1833



copper was used for printing 800,000 Christmas cards. It is also being tried for awnings, automobile tops, card-table tops and wall paper. An oil company has used it for wrapping 100 miles of submerged steel pipe as a protection against rust.

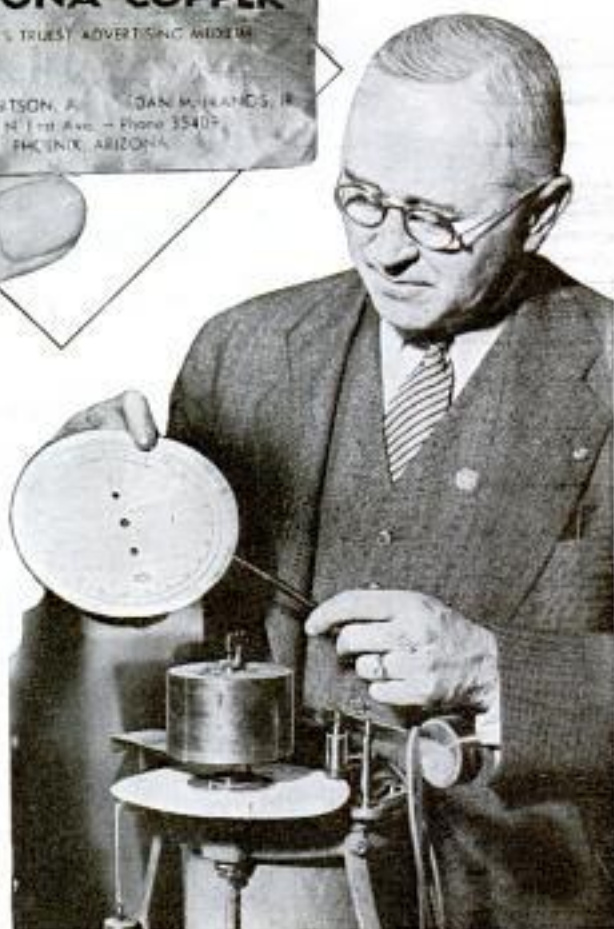
The short life of paper books, documents and magazines, has troubled librarians and publishers for years. Engineers now advance electrolytic sheet copper as an ideal substitute for paper. It takes ink easily, is thinner than many grades of paper, and the copper book is not thicker than one of paper. As advertising inserts for magazines, coverings for walls and bookbinding material, the

Above, Gauge Which Records over Telephone Wire Rate of Water Flow at Any Distance from Given Place

to be polished. The carborundum wheel spinning under water cuts as clean and smooth as a razor, and with a minimum of waste. The twelve-inch disk is only .042 inch thick, rotates 1,200 times per minute, and is driven by a one-horsepower motor. A similar apparatus has been designed to cut sheets of metal.

A thriving industry will soon spring out of a process for making endless sheets of copper by electrolysis. Six years of research went into the effort of finding the best process for manufacturing copper in paper-thin sheets. Copper, as the anode of an electrolytic cell, is deposited around a drum of lead, which is the cathode. The copper rolls off in a sheet as fast as the solution deposits it around the drum. The sheets weigh from one to eight ounces per square foot, and are up to fifty inches in width and from .0013 to .01 inch thick.

It has already been tried successfully as a fireproof, waterproof, vermin-proof, and practically permanent roof covering, and the cost compares favorably with many other types of roofing. In 1932, such sheet



In Center, Printing on Thin Copper Sheet, a Substitute for Paper and More Lasting; Below, Dust Detector Which Measures How Much Dust We Breathe

Western States Copper Co. 335 N. 1st Ave. Phoenix, Ariz. Col. Edith H. Hobbs Research Professor of Hygiene & Institute

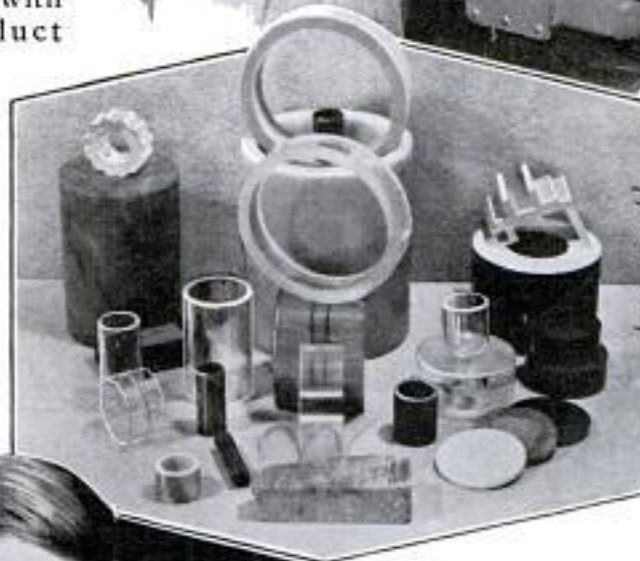
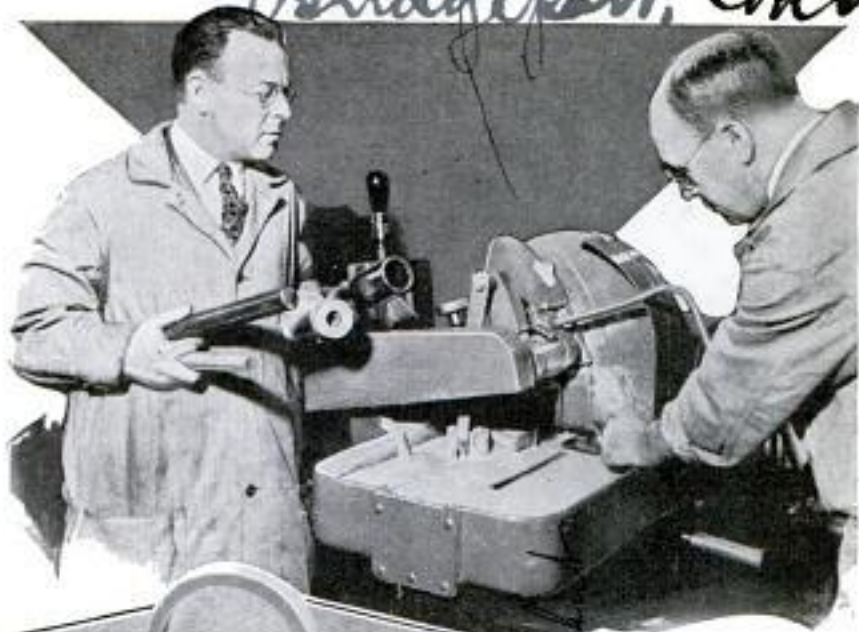
0322/3

Andrew C. Campbell
dne.
379
Bridgeport, Conn.

POPULAR MECHANICS

thin copper sheets may soon become popular. Cut into proper sizes, they can also be used for letter-heads. They take impressions from typewriter ribbons as easily as paper.

Among the great array of new inventions, are several meters with almost human qualities. One has a face which records over telephone wires the rate of water-flow at any distance from a given place. One such meter was connected with the Catskill aqueduct which carries water to New York City, and miles away it was possible to see at a glance that New York City was consuming 65,000,000 gallons of water each twenty-four hours. This

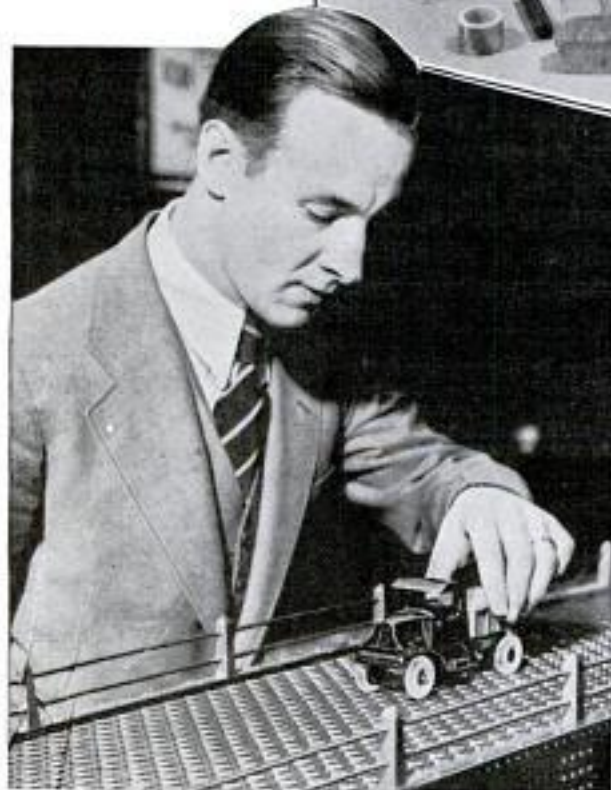


long-distance meter is hooked to a telephone wire without disturbing conversations on this same wire. A similar meter can be used for long-distance measuring of the steam generated by large power plants.

As an aid to draftsmen, architects and engineers, an instrument company has marketed a rapid lettering system which makes it possible for one man to draw thousands of words on one sheet of paper much more rapidly than the human hand, and without the use of guide lines.

From the laboratory there has also come an all-metal, non-skid roadbed for bridges and viaducts. This decking is like a grating. No matter how cold, ice will not form on such a surface, and snow falls through the grating. The decking cleans itself, for dirt drops out as soon as it falls. Rubber-tired vehicles running over this surface make less noise than on ordinary roads.

For lessening vibration and deadening noise in factories, engineers have devised a flooring which absorbs shocks and confines them to a small area. This system calls for resilient mats, built of cork strips



Top, Cutting Machine Which Slices Diamonds Like Cheese; Center, Examples of Its Work; Below, Grating for Bridge Surfaces Which Is Self-Cleaning

(Continued to page 124A)

Ed Karbell
155 E. 44th St. N.Y.C.

Subsidiary, American Chain & Pipe Fittings



Half O. Tee



Cotton Golf Ball on an Elastic Cord Attached to Rubber Mat, to Permit Indoor Practice

COTTON GOLF BALL ON ELASTIC FOR INDOOR PRACTICE

Golfers who like to practice indoors when the weather prevents a trip to the club, may now satisfy their longing without danger to windows or furniture by using a cotton ball attached to a rubber cord. The cord in turn is held to a rubber mat containing a tee, so floors or rugs are not damaged by "taking turf."

INVISIBLE LIFE BELIEVED KEY TO MYSTERY OF UNIVERSE

That the universe is filled with life too small for the highest-powered microscope to detect is the opinion of Prof. D. F. Sinitsin, Russian scientist. Physicists, he says, point out that the shortest wavelength of visible light is not less than 400 millimicrons. Nothing smaller actually

can be seen by man with any instrument. However, it is possible, by means of diffraction of light, to see the reflection of things as small as 150 to 200 millimicrons. Even smaller life has been revealed by porcelain filters over which are placed films whose pores are known to be of a definite size, say eight millimicrons. These filters have proved the existence of invisible organisms in the investigation of disease virus, including that of smallpox. The foot-and-mouth disease virus is among the smallest that science is able to detect. The chemical theory of the origin of life is that, after the earth cooled, chemical substances came together and formed living organisms. Science knows that some disease virus resist heat and poisons that no known form of life can withstand, and that some virus can live without oxygen. The Russian scientist concludes from these facts that there are invisible living organisms, perhaps of eternal life, that are back of all life processes. They are so small that they can escape all means of observation. He believes this invisible life exists everywhere, on earth, other planets and throughout all space.

B2253

TRICYCLE HAS AN EXTRA SEAT FOR SECOND PASSENGER

Fitted with a combination seat and compartment, the latest type tricycle can carry an extra passenger. The operator sits on the regulation seat and propels the vehicle as usual, while the other rider occupies a seat similar to the sidecar arrangement for motorcycles.

Trio Car

Here Is Arrangement by Which Tricycle Carries Extra Passenger or Parcel; Compartment Is Set between the Rear Wheels



merch. parking goods July 12, 1932

B22
Chicago Tribune
12/2/32

Beasley
material
Marshall, Mo

COMMENT AND REVIEW

TIMES of human stress usually produce prophets. In dark days man wants some assurance that there is light ahead. He used to turn to soothsayers and astrologers for hope and guidance. Now intelligent persons turn to science.

Modern Prophets

The astronomer can predict eclipses and other celestial phenomena. The chemist can predict the reactions which will follow certain combinations of elements. Not all sciences are exact, however. Prediction is more hazardous where the reactions of human minds and emotions are involved. For that reason any attempt to blueprint the future of civilization must be taken with caution. Howard Scott and his disciples, who preach the new gospel of technocracy and forecast important changes in the social order, base their prophecy on engineering. Perhaps that base is too narrow. Perhaps they do not make sufficient allowance for the exceedingly variable human factor. But they have done a service in arousing the public mind to the possibilities latent in technological progress and in the tremendous development of energy available for the world's work. Unquestionably potent forces are in operation which need be better understood and appraised in order to be controlled intelligently for the higher interests of mankind.



THE scholarly students of social trends reporting to the President, are more cautious than are the Technocrats. Nevertheless they warn us of a dislocation in our national life that needs correction. They note that governmental and economic organizations in our social structure are growing at a rapid rate, while the church and the family have declined in social significance, although not in human values. In other words, the machinery of our political and industrial institutions is developing a weight that needs better support from those sources of moral strength and spiritual vision which are represented by the church and the family. These latter make the roads and build the bridges of mutual faith which must sustain

Shaking Bridges

the advance of a highly mechanized civilization and give to it such direction as will promote the welfare and happiness of the race. To say that these factors, which have been fundamental in humanity's progress, have declined in social significance although not in human value, is merely to say that our sense of values has been blunted or dazzled by the immense strides we have made in the domain of material development. It is as if we had temporarily lost sight of certain precious possessions, the worth of which has not depreciated in the least, but the use of which we are rather stupidly neglecting. The warning is one that we cannot afford to treat with indifference.



DEAN THOMPSON, head of the School of Commerce at the University of Illinois, has a favorite saying that is worth recording. "Many persons," declares the dean, "who think they are thinking are merely rearranging their prejudices." The more you ponder on that statement, the more truth you will find in it, and most of us will have to plead guilty to the indictment. A prejudice is a judgment reached before we have taken time to learn and consider all the facts. Sometimes an intuitional prejudice may be justified, but more often than not it is unfair to the person or subject against which it is directed, and misleading to the person who holds it. Feeling leads to prejudice. Thought leads to understanding. Once a prejudice is established, thought is blocked by it. We think as far as our prejudice, perhaps, but we cannot think beyond it. It is a wholesome exercise to take

Prejudices and Thinking

our prejudices out for an airing, review them, face them up to facts, make them defend themselves if they can. It is dangerous to have blind spots in the mind.



CITIZENS of New Jersey set an example to the rest of the country in the thought they take for the winged wild life of their state. Throughout this winter, an organization known as the New Jersey Consolidated Sportsmen has been providing food for the birds in forest and marshlands. With consent of the U. S. Department of Commerce, whose wise regulations forbid throwing things from airplanes, more than 750 pounds of corn, wheat, millet and rye, contained in paper sacks that burst on falling, were distributed from the air over snow-clad woodlands in remote parts of the state. Some 200 bird self-feeders have been placed at points where they can be of most service. They are filled at regular intervals with grain which, as the birds eat, escapes slowly through a pipe onto a tin plate. The organization engaged in this fine work of conservation has a junior group numbering some 6,000 boys who share actively in its program, and are being trained in conservation and true sportsmanship. Great good would result in this wasteful country if every state in the union were to adopt the New Jersey plan. Conserving bird life is of vast value to agriculture, and the development in the younger generation of the conserving spirit is even more important.

*Taking
Thought
for Birds*



SOMEBODY has said that if the size of our world fifty years ago were represented by a football, its size today should be represented by a walnut. Progress in transportation and communication has occasioned the shrinkage. The airplane and radio have been chief factors in bringing it about. Many of our perplexing questions arise from the fact that our world has ceased to be a planet of vast, separating distances, inhabited by peoples remote from one another, and has become one great neighborhood. We are all living so close to one another, mingling with one another, listening in on one another, that we have to be more than ever careful of what we say and do. How to live together peacefully and helpfully has become a major problem for nations and races. Another source of bewilderment is the tremendous acceleration of the speed of change. Our world and our times won't jell long enough to let us study them. They outrun our thinking and planning. Today's program has become inadequate before we have realized its promising possibilities. That is a phase of life which is not likely to become less trying. We must learn to think more quickly; we must develop those resources of intellect which experts tell us lie fallow in the human mind.

*This
Faster
World*



IN an age that tempts us to think and live on the material plane, it is well that we should be reminded frequently that man cannot live by bread alone; that he is more than a mere physical being; that he has spiritual possibilities. Many persons are a little afraid of that word spiritual. Many persons have only a hazy idea of what it means. They think of it as something which has to do with creeds and dogmas—a term inseparable from religious controversies and sectarian interpretations. That is a sad mistake. Properly, the word spiritual is applied to those longings and impulses in man which can be satisfied only by harmony, by beauty, by the joys of sympathetic and understanding companionship, by loving and being loved. It denotes human values that cannot be measured in dollars, weighed on any scales or analyzed in any laboratory, and yet they are the values without

*Defining
the
Spiritual*

which life is not worth living; they are values that go up when material values decline. The man who cultivates his appreciation for the best in music and art; who looks for the beauty in his world; who, around the ideal of service, organizes harmony in his life, and makes a point of seeking what is good in others and encouraging it to bear flower and fruit—that man is developing his spiritual life. He is reaching a plane on which he will be a happier, freer, and richer man—richer in that wealth which does not vanish when jobs are lost and banks fail.



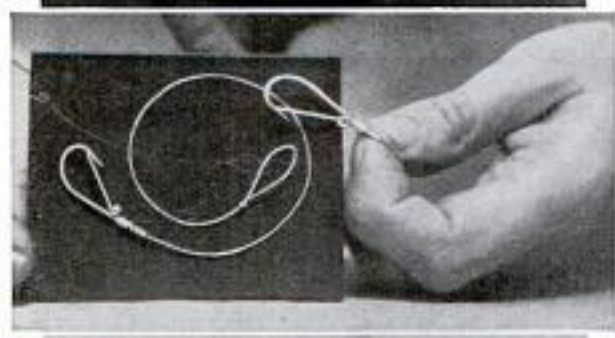
ONE of the most interesting developments of these unusually interesting days is the return of barter as a means of satisfying human needs for which ready money is unavailable. Many isolated instances of resort to this primitive method have been reported, but its most striking exemplification is to be found in a group of western states. It began in the autumn of 1931, in Utah, where a handful of businessmen—temporarily without a business—set themselves to work out a plan whereby idle labor in Salt Lake City could be exchanged for the products of Utah farms. The response exceeded all expectations, and presently similar exchanges for goods and service were being arranged among urban groups. Workers who had toiled on farms and had been paid in vegetables, fruit and grain, swapped their surplus for haircuts, dental care or medical attention. The movement spread to Idaho. In January last year, it was organized as the Natural Development association, with headquarters in Salt Lake City, and branches in Idaho, Wyoming and Arizona. To facilitate the process of barter, it has devised a form of scrip, representing the value of product or service which the holder exchanges for it. It is then exchangeable for whatever product or service of equal value the holder desires. When thus once exchanged it is destroyed. It cannot be hoarded or monopolized or used to earn interest. Here is a matter for thoughtful study.

Back to Barter

H. H. WINDSOR, Jr.

B2269
FISHING HOOK WITHOUT BARBS DOES NOT INJURE CATCH

Tearing which is caused by the barb of the ordinary fishhook is eliminated by using a barbless hook which is just as effec-



Fishhook Which Can Be Removed from the Mouth of the Catch without Tearing

running obliquely from the line attachment to just below the smooth point. The wire is formed into a small coil spring at the attached end, and this causes it to turn backward when the mouth of the fish slides over the point. As the fish tries to loosen itself, the blunt point of the wire forces itself against the catch, and the harder the fish pulls, the more pressure the wire exerts. Turning the wire down, or to the right or left, releases the hold so the fish can be slipped off the smooth point easily. Bait is also saved from injury with the hook which is practically weedless and can be easily removed if caught in clothing.

Names and addresses of manufacturers and dealers in articles described, and any details in our possession, will be furnished by our Bureau of Information upon request accompanied by return postage.

itive but does not cause injury. It looks like an ordinary hook except for a wire
and maker
R. B. Walford, 222
South St. Johnstown, Pa
 Copyrighted material



Blacksmith Who Hammers Out Metal Weather Vanes Instead of Horseshoes, and Examples of Some of Figures Made on His Anvil

BLACKSMITH SHOWS HIS SKILL BY MAKING IRON FIGURES

While the automobile converted many a blacksmith shop into a garage, one Hollywood smithy does business at the same old shop—but he does not make a living shoeing horses. Instead, he has built up a large clientele by fashioning fantastic figures of iron to serve as weather vanes for the gateways, towers and cupolas of California mansions. Some of the iron "statuettes" portray bullfighters, others are shaped like horses and still others depict oxcarriage and a host of similar subjects.

CORN FROST FORECAST IN JUNE BY AVERAGE TEMPERATURE

Whether their corn is likely to suffer from frost damage in the fall can be foretold for Iowa farmers a few weeks after the crop is planted. These forecasts are based on June temperatures. Charles D. Reed, of the U. S. weather bureau, has found that ninety-five per cent of Iowa's corn escapes frost damage when the June

mean temperature has been two or more degrees above the average of 69.4 degrees. But when the June temperature falls below sixty-seven, farmers may be sure their corn will be damaged seriously. Over a forty-three-year period, 1924 was the worst of five bad years, only thirty-three per cent of the corn being unattacked by frost. When the June temperature was normal, 69.4 or higher, corn not frosted amounted to 87.3 or more for the forty-three years.

B32269 AIR HUMIDIFIER FOR THE HOME

Moisture of air in the home now can be carefully regulated with a portable electric humidifier which operates automatically. In addition to maintaining the moisture content at a constant level, the humidifier also washes and purifies the air. Westinghouse Electric and Manufacturing company engineers who developed the humidifier claim it is economical to operate and requires little attention.



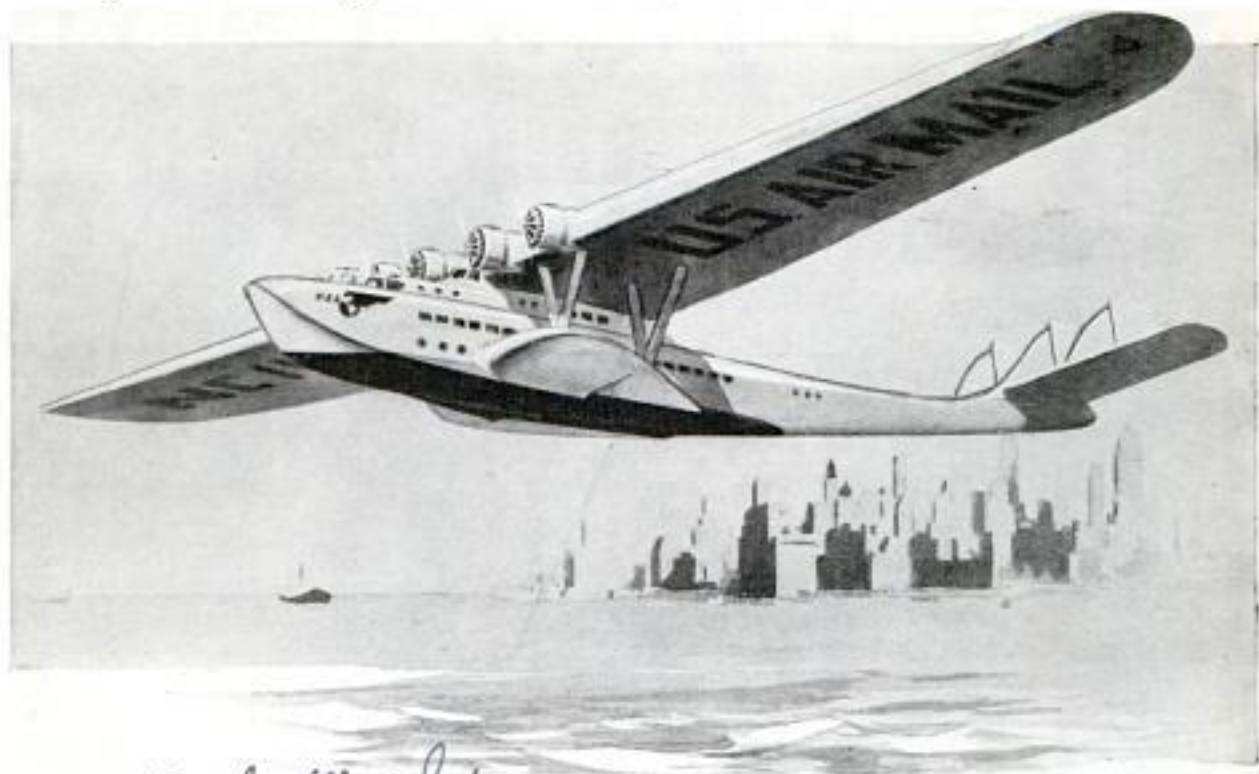
Portable Electric Humidifier Which Automatically Regulates Moisture Content of Air

Carl J. Pruffer

East Pittsburgh, Pa.

Des Moines, Iowa.

Fifty-Passenger Air Liners to Link Americas



Wed World

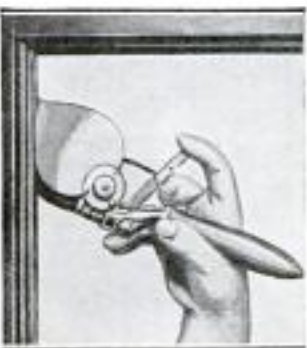
Giant Plane Intended for Regular Service between North and South America; Luxurious Equipment Will Be Installed for Comfort of Passengers; Design Calls for Several Motors

Fifty-passenger airplanes will be placed in regular service between North and South America. Involving revolutionary improvements, the giant liners are designed to span the longest water gap between the two continents. Air mail will be carried in addition to passengers. The ships were designed by Col. Charles A. Lindbergh.

Paul unless one is late or unless there are more than eighteen cars.

PAINTBRUSH GUARD PREVENTS SMEARING IN TRIMMING *B2140*

Painting window sashes, moldings or baseboards without smearing the color over an adjoining surface is made easy by using a guard which can be attached to any small brush. It consists of a heart-shaped celluloid disk whose point extends half an inch below the edge of the brush.



The disk is flexible and follows the movement of the bristles as pressure is applied. A spring keeps it in position at all times, and a lever allows it to be raised when not needed. This lever elevates

the disk when the brush is dipped in the paint, or it can be locked to keep the guard permanently out of place.

ONE ENGINE PULLS TWO TRAINS TO CUT OPERATING COSTS *B2188*

Rival trains running out of Chicago are being pulled by the same locomotive on the first leg of their trip to Seattle in order to cut operating costs for both railroads. Both trains use the same line between Chicago and St. Paul, but one is scheduled to leave fifteen minutes ahead of the other. The first train pulls out of the station, but instead of departing, it is backed up into the front of the second train, and the two units are drawn to St. Paul by the same engine. At St. Paul they are split and each train pursues its separate course to the coast. Eastbound trains are combined in similar manner at St.

Chicago Tribune 12/11/32

Empire Builder Great Northern North Coast Limited. Northern

Harold O. Johnson 4900 S Carpenter Chicago

How FAST



The Brain Is Not Always Right; Here Inaccuracies in Hearing Are Being Tested with a Sound Cage; the Girl Is Pointing to the Spot Where the Sound Seems to Originate; Actually It Is Coming from a Buzzer Mounted on the End of the Stick

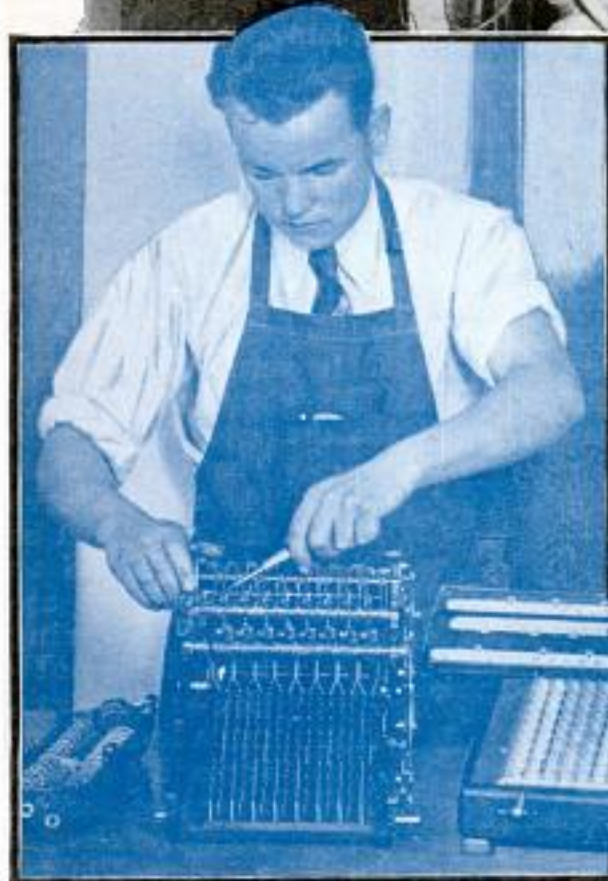
By
THOMAS E. STIMSON, JR.

*145 S Spring
 Los Angeles
 Calif*

THOSE who lead adventurous lives are often called upon to think fast and act accordingly. Split-second thinking means the difference between life and death to the test pilot who "sheds his wings" in the air. Lightninglike reactions enable racing drivers to escape disaster at 150 miles per hour. Immediate decisions save heavily loaded passenger ships from collision when they meet in a fog.

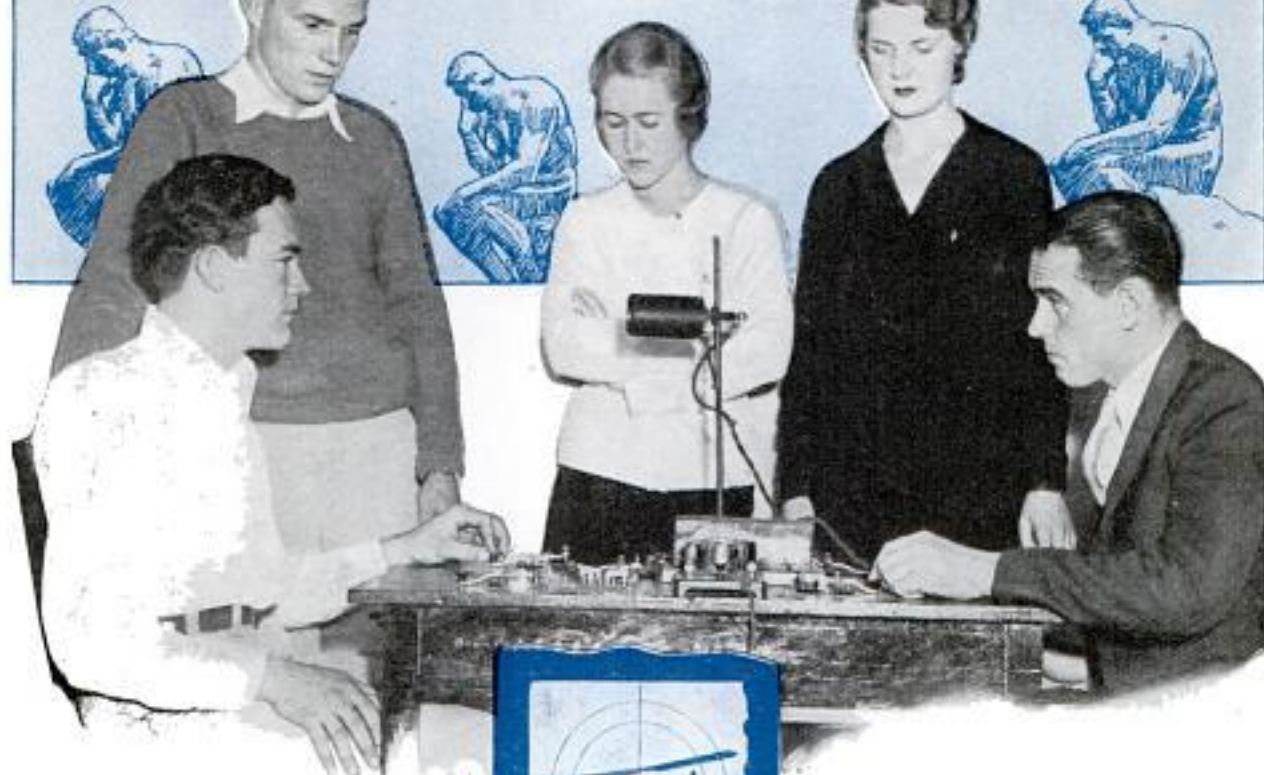
But situations that demand fast thinking are not reserved for those on whom insurance rates are high. Split seconds count everywhere. Nearly every one must think and act rapidly on occasion. Not only your own life but the lives of others may depend on how fast, and how well, you think in an emergency.

Psychologists have simulated



Adjusting Mechanical Brain of Calculating Machine Which Solves Problems Nearly Ten Times Faster than Human Brain

Can You THINK?



Above, Measuring Speed of Thinking; Man at Left Presses Key as Soon as He Sees Light Flash, and Time Interval Is Recorded

emergency conditions in the laboratory to discover just how fast thought travels. They use a "psychodometer," or time machine, that measures in hundredths of a second, and with this they have learned some surprising facts. At your best, you really don't think fast at all in view of modern conceptions of speed. The speed limit on thinking and acting is about 280 miles per hour.

Here's how they find out how fast you think and act at the University of Southern California. You sit at a table that contains colored lights, telegraph keys, batteries, and an electrically operated stop clock. Across the table, is Dr. Milton Metfessel, chairman of the department of psychology.

"Put your finger on the telegraph key," he instructs you,



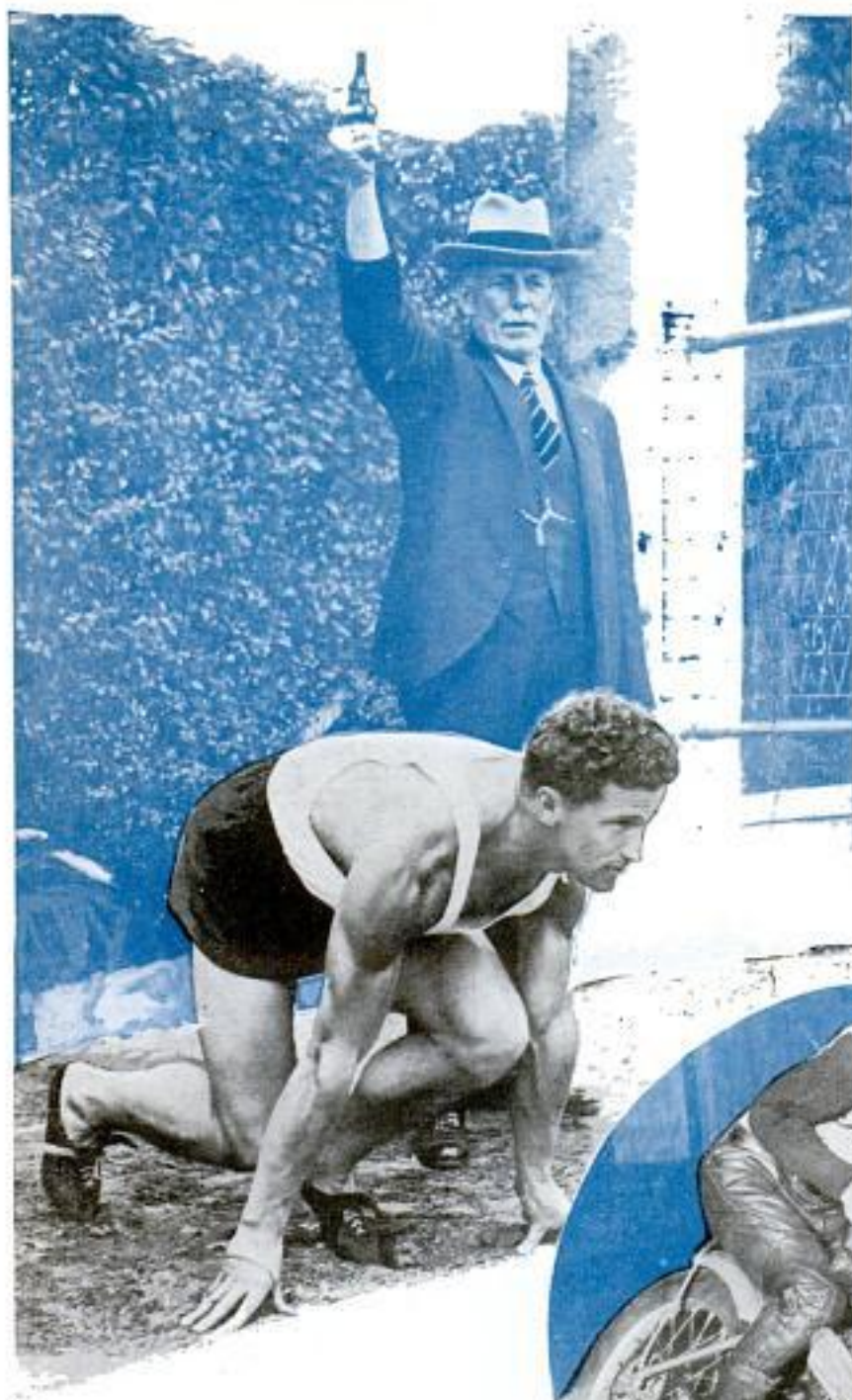
Left, Burst of "Shots" Fired at Plane with Photo Gun; Because of Time Lag in Thinking, Aerial Gunners Learn to Lead Their Targets

"and press it as soon as the white light flashes." His hand, hidden behind a board, rests on a key that flashes the light. Immediately, you press down. A look at the stop clock shows .29 second.

"That was slow," says Doctor Metfessel. "Concentrate on the movement of pressing the key, and not on waiting for the signal." You do, and this time the clock registers .13 second. By shifting your attention, the sensory currents moved through your body twice as fast. Sprint runners who are out of their holes ahead of the rest have learned that the secret of a fast start is to con-



The Two Lines. One for Each Hand, Represent the Fraction of Second Required to Press Two Keys After Signal Was Given



Above, Sprinters Concentrate on Motions of Starting, and Not on Signal; Right, Fast Thinking Allows Racer to Skid without Accident

concentrate on the action, not the signal.

From simple reaction, Doctor Metfessel graduates you to complicated reaction time in which two telegraph keys are used. "Press the left key with your left hand if you see a green light, and the right key with your right hand if you see a red one," he tells you. Suddenly the red light flashes,

and down goes your right hand. But the clock shows that you took nearly .45 of a second to select the correct hand and move it. Not until after a lot of practice are you able to reduce that time.

If it takes nearly half a second to choose between two colored lights, how is it that a good marksman can point and fire his gun without pausing to estimate the speed of his target, the speed of his shell, and allow for the wind and the time necessary to pull the trigger? "That is the result of training," says Doctor Metfessel. "The marksman knows the answers from past experience and he subcon-



sciously leads the target the right amount. If he consciously tried to estimate all the factors, the chances are he wouldn't think fast enough to score a hit. Spectacular snap shots at small targets are the result

of so much practice that the pointing of the gun is almost automatic.

"The same applies to driving an automobile. The beginner has to carefully estimate his own speed and the speeds of other cars, but with experience he weaves through heavy traffic apparently without time to think. He has learned to judge speeds so well that his brain needs less time

Right, Testing for Indirect Vision; Out of Corner of Eye Subject Tries to See Colored Mark Sliding along Curved Arm



Left, Tracing a Star by Its Reflected Image in Mirror; Insert Shows the First Crude Attempt



Right, Trap Shooter, by Practice, Aims and Fires in Less Than Second; Calculations Involved Would Require Several Minutes to Work on Paper

to reach the proper solution."

Here is an experiment that will show you how practice increases the speed of thinking. With a pencil, trace the outline of a six-pointed star while looking at its reflection in a mirror. Hold a piece of cardboard between your face and the star, and guide the pencil by the mirror image. It will take several minutes on your first attempt and you may run off the track a hundred times before you finish. Time your-



self, and try it ten times. You will be able to trace the star in half a minute when you have trained yourself.

A complicated thought process is involved in doing two mental tasks at the same time, and here again, experience produces speed. Starting backward from 150, count aloud "150, 149, 148," and so on.

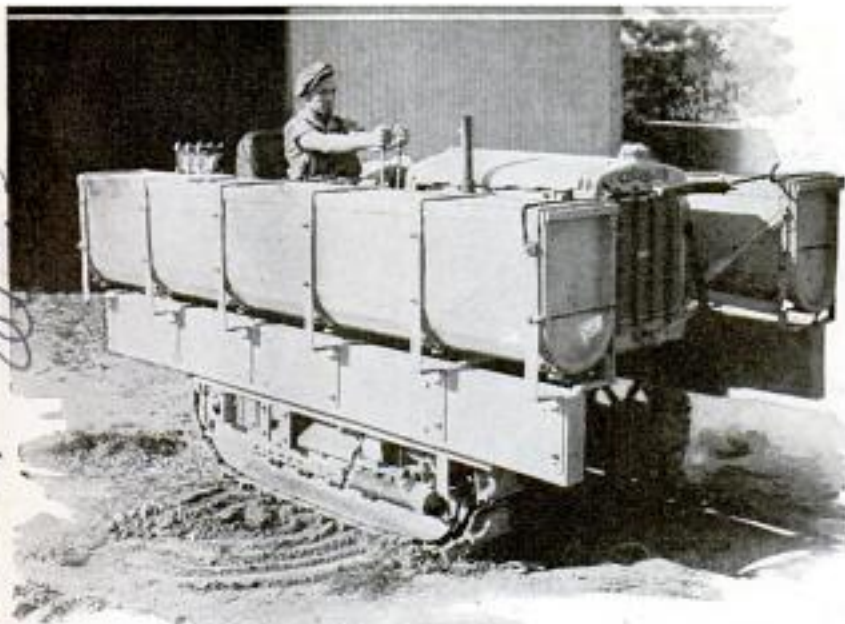
At the same time, write down on paper the letters that spell "George Washington." The experiment looks difficult but after several efforts you will be able to carry on both tasks without hesitation.

"Thinking is really a physical process," says Doctor Metfessel. "Reaction time is measured from the moment your senses receive a signal until the time you act. Most people respond quickest to audible signals, then to those they see, and touch signals bring the slowest reactions. Reaction

(Continued to page 120A)

B1785

Used by W.S.L. Miller, farmer, Wapakoneta, Ohio 6



Here Is How Spraying Equipment Is Mounted on a Tractor; the Outfit Is Easy to Operate, Being Capable of Making Sharp Turns

SPRAYING OUTFIT ON TRACTOR CAN MAKE SHORTER TURNS

Shorter turns for the spraying machine have been made possible by mounting two large tanks on a tractor. Two hundred and thirty gallons of spraying fluid may be carried in the tanks. If necessary, the tractor-sprayer can turn in a three-foot area, while old-style spraying outfits require about thirty feet.

ELECTRIC DETECTORS OF HEAT PROMISE NEW WONDERS

By detecting heat rays, which are invisible to man, sensitive instruments promise many wonders, in addition to holding great possibilities for practical application. Heat so feeble that unaided human sense could never feel it has taken photographs through clouds opaque to visible light. Mountains, scores of miles away from an airplane and invisible to the pilot, are pictured on special photographic plates. Delicate thermocouples, devices that measure heat differences by the flow of electric current, when attached to amplifying electron tubes, can feel the heat of factory smokestacks some six miles away. Such a device is used in a sextant that measures the position of the sun through thick clouds. In war, it might locate airplanes flying above clouds at night by feeling the heat of their exhausts. Heat detectors

see letter

Science Service.
see letter.

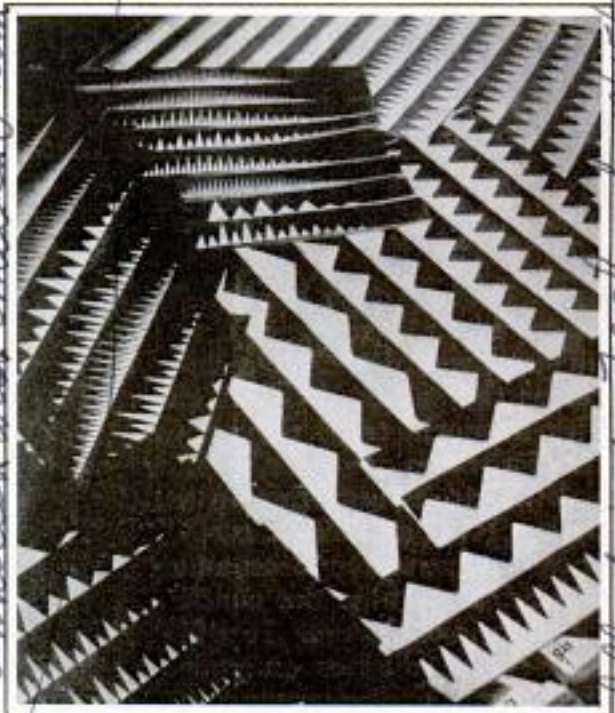
harnessed to telescopes promise to discover new heavenly bodies that emit heat but no visible light. In factories and homes, heat can be made to actuate remote control and safety devices. The detector of infra-red radiation, as heat is known to science, may become as important a robot as the "electric eye," or photoelectric cell.

SOUND PAINTED ON FILMS TO REDUCE TALKIE COSTS

By hand-painting sound pictures on motion-picture film, a German scientist hopes to reduce the production costs of talking pictures. Tests show that the tone characters painted on the edge of film give a natural reproduction of instrumental music, song or speech. The process is intended to replace the complex apparatus now used, cutting costs perhaps ninety per cent. Not only is the inventor able to record all natural sounds, but he can create tonal effects unknown to the human ear.

B1974

connected with Emulsion Film Co



Sound Looks Like This When Painted on Talking Picture Film; Production Costs Are Low

Rudolph Pfenninger, Munich, Germany

Illustration Technik, 10/15/32



Passengers on a Florida-Bound Train Enjoying Bathing Pool in a Recreation Car Fitted with Mechanical Horses, Punching Bags and Other Equipment for Entertainment

Wade W. Allen

BATHING POOL IN RAILROAD CAR ENTERTAINS PASSENGERS - ?

One railroad operating between New York and Florida has installed a recreation car on its southern run so passengers will not need to wait until they reach Miami to begin their sports. The club car is equipped with a small bathing pool, mechanical horses, a punching bag and other equipment for the entertainment of passengers who want exercise.

Pennsylvania?

370 17th St. B2164

WOODEN GUTTERS IN STREETS SERVE AS CURBSTONES

Offered as an inexpensive substitute for curbstones, fabricated wooden gutters have been introduced to improve streets and highways beside property that cannot afford to put in costly paving or curbs. A special set of saws cuts lumber forms into two sections which are jointed together into one solid watertight piece. These fabricated sections are built in lengths up to 200 feet. After sawing, the sections are

3701 N. 18th St.

*J. W. Ross Houston
Tacoma Wash.
3701 N. 18th St.*

treated with creosote oil which gives them a life of forty or more years, even in heavy clay soil. A metal fin, imbedded in one end of each section, fits into a groove in the opposite end of another section, making a tight joint.

B2038

DIAL WORKS MEASURING TAPE LIKE A TELEPHONE



Winding up a newly designed measuring tape is like operating a telephone. Both are worked by a dial. Winding mechanism of the fifty-foot tape is

controlled by a nine-hole dial, making it easy to draw the line back into its metal case.

Plans to use airplanes equipped with sirens to warn of hurricanes are being considered along the Texas gulf coast.

*The Lufkin Rule Co
Saginaw, Mich*

Citizens Train in Gas Masks for Air Attacks



Wide World

Grotesque in Costume, These Men Are Practicing Duties Assigned to Them in Case of Gas Attacks on Rome from the Air; Wheelbarrows, Shovels and Other Equipment Are Used in the Drills

Dressed in gas masks and protective suits, citizens of Rome, Italy, are learning how to resist the attacks of gas-bombing planes. In recent aerial maneuvers under the direction of Premier Mussolini, suburban citizens were garbed like visitors from another planet might be expected to look. At the sound of sirens, the city dons gas masks and flees to cover while the men inhabitants practice maneuvers to be used if Rome were attacked from the air.

COAL DUST MAY BE BENEFICIAL TO MINERS BREATHING IT

Instead of being a health menace, coal dust breathed by miners along with rock dust may be a positive benefit. This is the belief of Prof. J. B. S. Haldane, of Cambridge University, who explains coal dust seems to stimulate the expectorant activities of the lungs and throat so that this dust eventually is removed. Rock dust has no such action and normally would remain in the lungs, but when coal dust is mixed with it, the rock particles adhere to the coal and are removed when the latter is coughed up. Of all working conditions, bad air of one sort or another is the worst, far exceeding industrial accidents in its

final tolls, says Professor Haldane. Flyers who, at high altitudes, get too little air were warned that the symptoms of this condition are high spirits which may lead to continued exposure or foolhardy feats. British statistics indicate workers in trades exposed to mineral and metallic dust, cutlery grinding being an example, are much more liable than the average person to contract tuberculosis or pneumonia. Limestone workers and flour-mill employes do not seem to suffer ill effects, but those in dust-filled cotton mills and sand blasters do, and silica dust is always dangerous.

ELECTRIC LIGHT CLIPS ON PAD TO AID IN WRITING



Clipped on the pad of paper, a small electric light aids in writing, illuminating the paper much better than desk or reading lamp. The light also may be attached to a book.

B216/
Suena Service
12/2/32

Cambridge, England

No Haldane name

B2034
Miss Peter Jones,
Spaans Square,
London, S.W.6, England

B2178 under supervision of Fred J. Latschaw instructor

3606 Warbylts
Civ. Serv. Small
Manufact
Cnd. George Smedal Jr

MIDGET ICED CAR FOR SMALL RAIL SHIPMENTS

B2190

Permitting shipment of small consignments that now move by truck, midget refrigerator cars for railroad use have been produced. Only twenty-two feet long, the small cars have a capacity of 20,000 pounds, one-fifth the size of regulation refrigerator cars. This new car has only four wheels, half as many as the larger type, but travels at the same speed. Ten tons of meat loaded into one of the small cars is moved at carload rates, whereas a like quantity shipped in a big car would have to pay a higher less-than-carload rate. Construction is almost entirely of steel. The ice boxes at the ends have a capacity of 1,500 pounds of crushed ice each.



Filling Up the Six-Ounce Gas Tank for Another Trial of Model Racer; the Little Car Attains High Speed

Washington, Jr. High School Pasadena

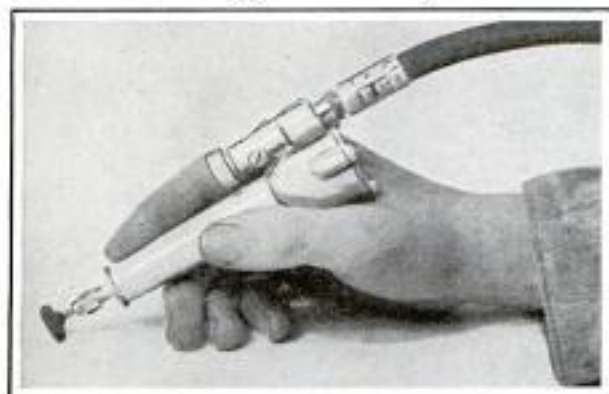
MODEL RACING CAR HAS SPEED OF FORTY MILES AN HOUR

Capable of doing forty miles an hour, a working model of Malcolm Campbell's famous racing car has been constructed by California schoolboys. The small auto has a two-cycle engine which runs a half mile on a tank capacity of six ounces of gasoline. The car is fifty-six inches long.

SMALL AIR-OPERATED GRINDER WEIGHS SEVEN OUNCES

B2182

Weighing only seven ounces, a midget air grinder with a speed of 40,000 revolutions a minute has been found particularly useful for the surface finishing of metals. It is employed in cutting out metal in places not easily accessible, and also at



Small Air Grinder for Metal Cutting; It Reaches into Corners Not Otherwise Accessible

any point in tool or die making where small amounts of metal must be removed to close tolerances. It comes complete with hose and connections.

Madison. Kip Corp.
200 Waukesha St
203 Madison, Wis

YOUNGEST CHILD FOUND BEST OF FAMILY IN TESTS

B2095

Taller and mentally brighter, the youngest child in the family is the best. Dr. Gordon Townsend Bowles, of Harvard University, reached this conclusion after 18,000 measurements, physical and mental, had been made of students and compared with measurements of American revolutionary soldiers and sailors, and Swiss, Japanese and Italian military men. Doctor Bowles says that the more advanced a student is physically, the more advanced he is likely to be mentally. His measurements show that the present Harvard men are the tallest in the world, excepting the Saraks of Africa. They are five feet ten inches, exceeding their fathers by an average of one and one-third inches. College girls outclass their mothers, weighing seven and a fourth pounds more and averaging one-tenth of an inch taller.

Henry Pat.
11/20/31

Cambridge, Mass

A 2438 Keystone View Co
219 & 44th. New York

COURAGE!

of Tidewater Oil Co
Bayonne, N.J.

by Commander
EDWARD ELLSBERG

SOMEWHERE in Pittsburgh, looking a little strange in unfamiliar surroundings, is a submarine's bell, a prized trophy symbolizing the victory of American divers in a bitter struggle with the sea for possession of the "S-51."

And that bell with its simple inscription; "U. S. S. 'S-51,' 1921," appropriately enough is the property, not of some museum, but of one outstanding diver, Francis Smith, whose cold courage at the bottom of the sea, after six years, still stands out in my memory as the high light in the first successful salvage of a large submarine lost in deep water in the open ocean.

In twenty-two fathoms of water, the smashed "S-51," victim of a collision, lay half buried in clay and sand, some fifteen miles to seaward from Block island. Straining at six anchors, spread out fanwise to moor her in position over the submarine, was the salvage ship "Falcon." Near by tossed the rest of the salvage flotilla, four more ships and a thousand seamen, ready at the flutter of a signal to run hawsers, tow pontoons or send over boats loaded with sailors to relieve the weary men struggling on the "Falcon's" crowded decks with diving gear.

The problem was difficult. On the bottom was the waterlogged submarine, a dead weight of 1,000 tons, with a huge

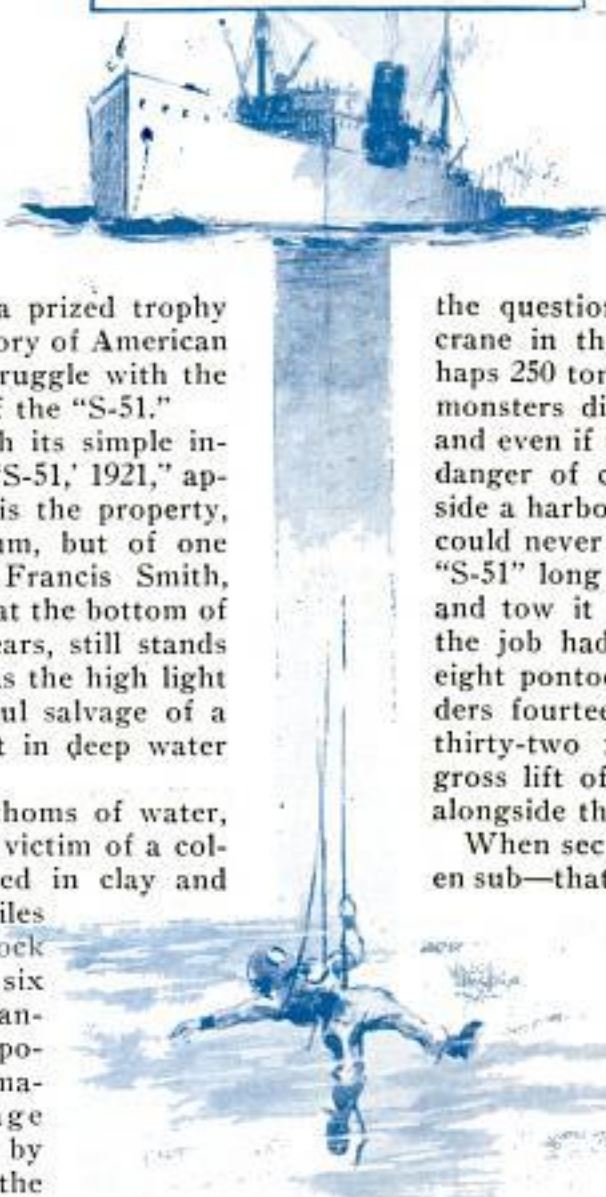
gash punched in her port side where she had been rammed. Ordinary lifting means were out of

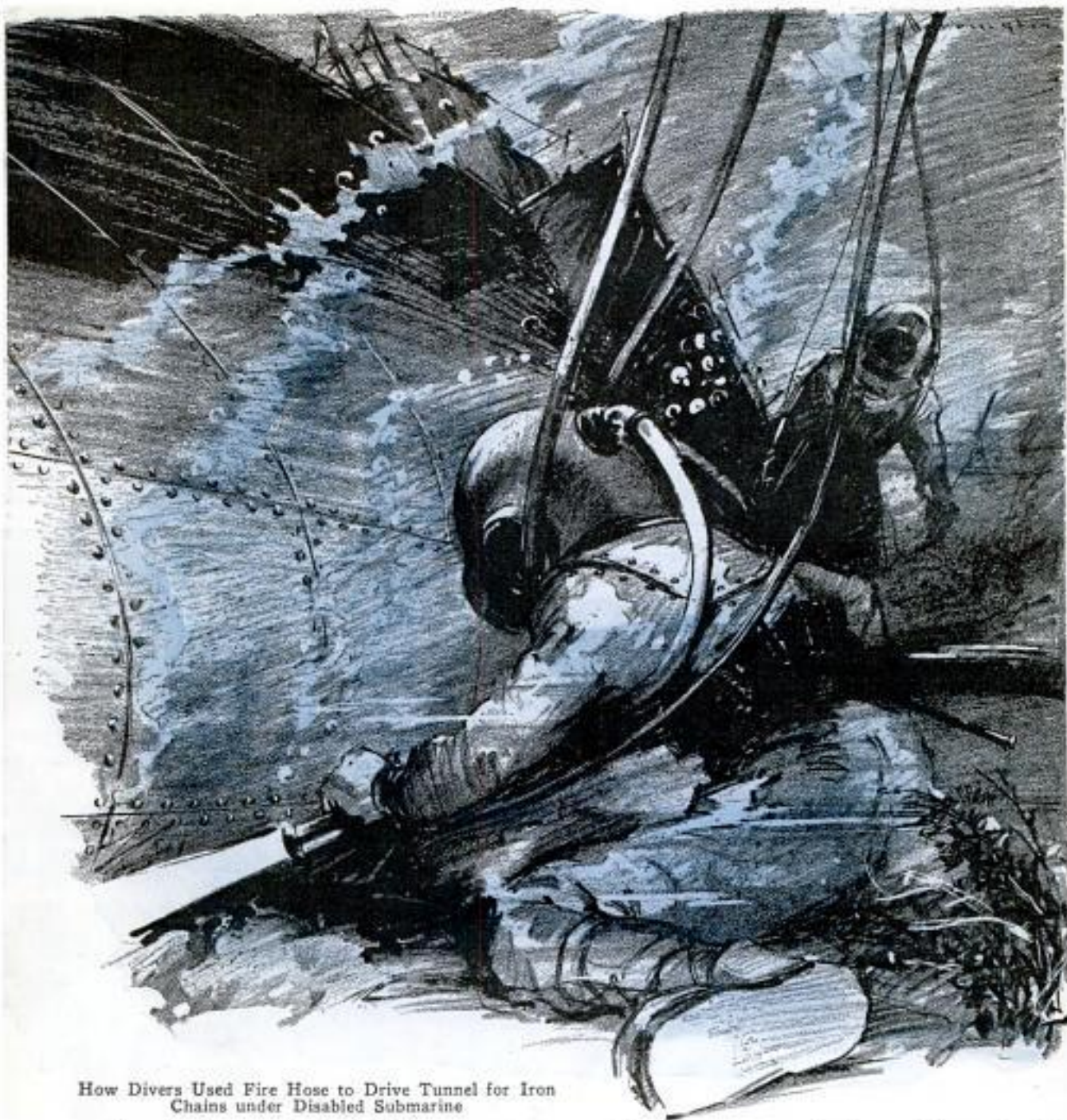
the question. The largest floating crane in the world might lift perhaps 250 tons, but four such floating monsters did not exist in America, and even if they had, because of the danger of capsizing if caught outside a harbor in heavy weather, they could never have been kept over the "S-51" long enough to make the lift and tow it into shallow water. So the job had to be done mainly by eight pontoons, gigantic steel cylinders fourteen feet in diameter and thirty-two feet long, each with a gross lift of 120 tons when secured alongside the sunken sub.

When secured alongside the sunken sub—that was the difficulty. There was nothing on the "S-51," or any American submarine then, strong enough to stand a dynamic pull of even half the lift of one pontoon. There were no lifting eyes; the shell plating of the submarine was fragile, the framing too thin to hold

a hook even if at the bottom of the sea the divers were to cut the necessary holes with that scientific paradox—the torch that burns steel under water.

A hundred and twenty tons is a tremendous pull; to transfer its lift to the submarine, each pontoon was fitted through hawsepipes with two battleship-





How Divers Used Fire Hose to Drive Tunnel for Iron Chains under Disabled Submarine

anchor chains, each chain link over a foot long, made of wrought iron two and a half inches thick. Somehow those chains, two from every pontoon, had to be secured to the "S-51."

Every solution was canvassed; only one offered any real chance. The chains must form a cradle in which the submarine could ride between the pontoons. But to form that cradle, those heavy chains must be got under the "S-51," and we faced the fact that, practically from stem to stern, it was buried six feet deep in the hard blue clay of the ocean floor.

So twenty-two fathoms beneath the wintry Atlantic waves, our little band of divers started to dig a tunnel under the submarine. Pick and shovel were out of the question; in a cumbersome diving rig, a man could not handle such tools; under the heavy pressure at that depth, his panting lungs and strained heart could not long withstand such exertion. So, when Bailey, gunner's mate, first-class, the first man to tackle that tunnel, slid down a line to the sand-covered bottom, he dragged with him, tied to his wrist, one end of a fire hose, its brass nozzle gleaming faintly



in the dim light of the ocean floor. With the pressure from that nozzle, Bailey was to wash a hole under the submarine through which we could haul the anchor chains for the cradle.

Laboriously dragging his hose to the spot alongside the hulk where he was to start, Bailey grasped the nozzle firmly, pointed it at the line where the steel plates of the submarine vanished in the clay, and sang out into the diving telephone: "On deck! Turn on the water!"

On the "Falcon," the telephone tender repeated the call and a boatswain's mate twisted a valve wide open. The limp canvas hose became hard as iron, then throbbed rhythmically against the rail as the pulsating fire pump drove the stream through. Tensely we watched the huge clusters of air bubbles, the exhaust from Bailey's helmet, froth the surface and wondered how Bailey was making out with his tunneling.

Soon enough we found out. A call rang in the telephone tender's ear:



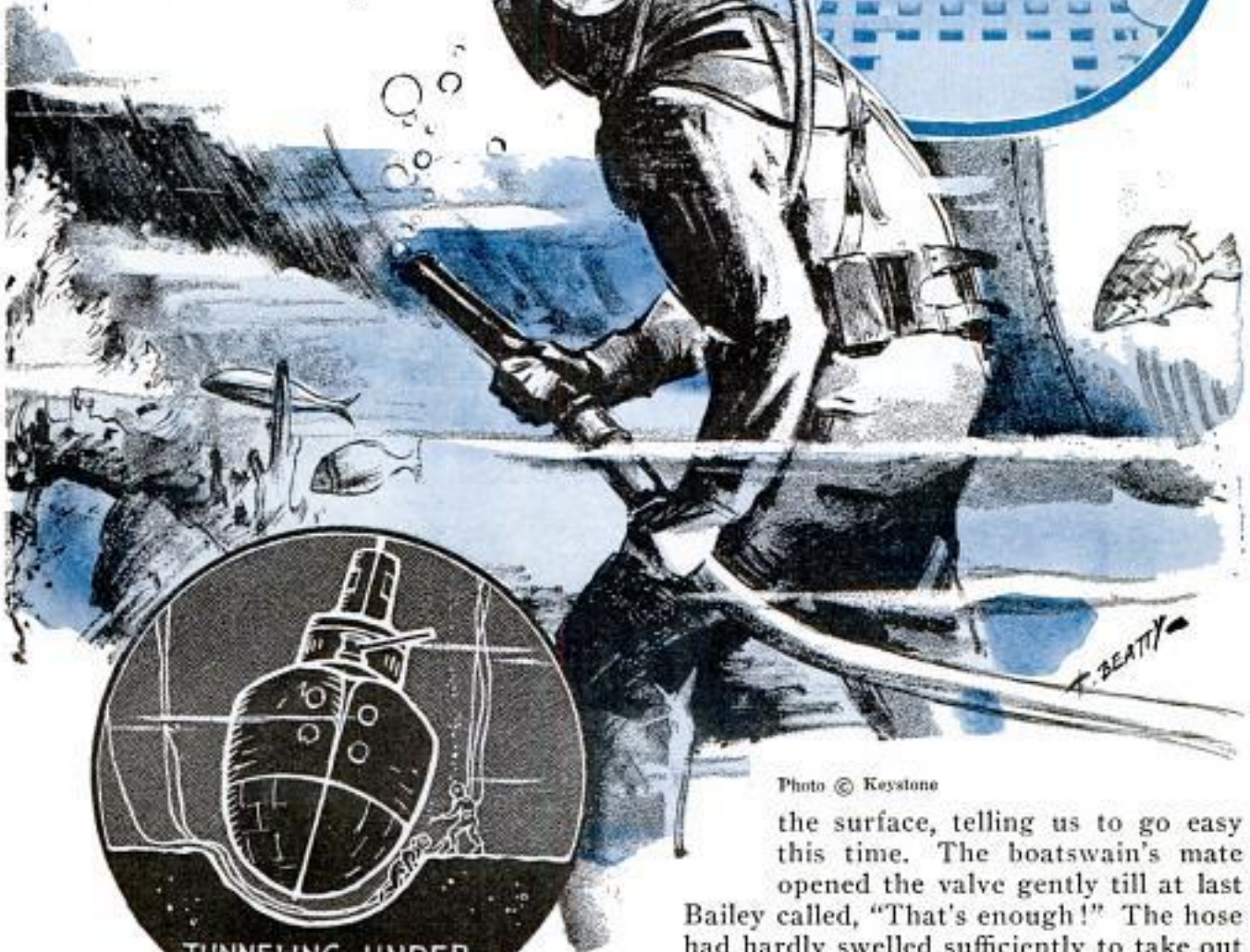
Photos © Kerstone
Top, at the Periscope in the Control Room of a Submarine; Bottom, Engine Room of a Modern British Sub

Q 24 38

"On deck there! Turn off the water! I'm about fifty feet from the sub and I don't know where the hose is!"

It was easy to visualize what had happened. A diver on the bottom, in spite of some 200 pounds of lead and copper ballast in his rig, has possibly not over forty pounds negative buoyancy when his suit is properly inflated for working. And in that lightened condition, the kick from the powerful stream rushing from the fire hose, had torn the nozzle from his hands and sent Bailey sprawling backward on the ocean bottom.

We shut off the water. Bailey groped about till he found the hose, dragged it back alongside the "S-51" and once more telephoned



TUNNELING UNDER SUBMARINE

Photo © Keystone

the surface, telling us to go easy this time. The boatswain's mate opened the valve gently till at last Bailey called, "That's enough!" The hose had hardly swelled sufficiently to take out the kinks, but that was as much pressure as Bailey could stand and still hang on to his nozzle. He worked an hour, then, leaving the hose below, we started him

Top, Emerging from Forehatch of a Submarine; Bottom, Diagram Showing Path of Tunnel

2438



There was nothing for it but to keep on. Day after day, one after another, our best divers struggled with that tunnel, taking their turns in the depths, to fight with the mud. With more experience, the men were able to handle a little more pressure, but the going was terribly slow. Because of time lost in changing divers, it was impossible to get more than six men down on the job on a good day. And because of our exposed position, days on which the ocean let us dive were few—hardly one day out of three was our average.

Other conditions were bad. The wash-



up, pausing at each stage in his ascent to allow him to "decompress." And so, for the next hour and a half, Bailey dangled in the icy water of the North Atlantic, swinging his arms, kicking out his lead-weighted feet to keep from freezing as he rose—a trying ordeal for a man after his exhausting period of work on the bottom, but the only safe way of avoiding the diver's most dreaded disease, "the bends."

At last Bailey was heaved in over the rail and explained the difficulties he had encountered. It was going to be a tough job. Under a layer of a few inches of close-packed sand, the bottom was very hard. With the reduced pressure, he found cutting the clay exceedingly difficult and doubted whether the hole he had started was more than six inches deep.



Photos © Keystone

In Circle, Undersea Boat Descending; Below, a Craft Similar in Type to One Above in the Navy Yard at Washington

B2056 made by City of Santa Barbara

Cut out by Greenich and then painted



This Figure Looks Like That of a Policeman, But Is Only a Dummy Warning Auto Drivers

LIFE-SIZED DUMMY POLICEMAN GUARDS SCHOOL ZONE

Warning motorists to drive slowly in school zones, life-sized dummy policemen are guarding the lives of children in Santa Barbara, Calif. The figures are constructed of plate steel and pipe bracings and painted in vivid natural colors. When set in the middle of the street near schools, they can be seen for many blocks, giving auto drivers plenty of time to slow up.

SHIVERING HELPS WARM BODY WHEN YOU'RE COLD B209

When the body is chilled, muscle spasm or shivering is nature's way of producing heat. Chilling of the surface of the body causes the muscles of blood vessels to contract. This forces the blood from smaller blood vessels to the larger. Since the latter must expand, the spasmodic contraction and expansion is the shiver. Dr. F. E. Harrington, in this explanation of why we shiver, says that deep breathing through the nose increases oxidation of the blood, producing heat.

Health Commissioner, Minneapolis, Minn. Copyrighted material

ing hoses, constantly surging to and fro in the seaway, fouled in the superstructure of the "S-51" and frequently were cut in half or torn apart when we tried to pull them free. Precious hours were lost replacing them. Divers lost their sense of direction and wasted nearly their whole dive trying to locate the tunnel entrance. Storms would drive us from the scene and for days at a time prevent diving altogether and we would come back to find that the sweep of the currents had completely filled our tunnel again with sand, and we had to wash that clear before we could drive ahead.

The clay was so heavy that, when cut, it would not stay in suspension in the water, but would settle in the tunnel around the diver, who had to stop and wash the sediment all the way out to the tunnel mouth before he could advance again. And finally, some of the divers, lying down in the tunnel, had their suits fill with water and were dragged up, half frozen and nearly drowned.

A desperate drive over several weeks advanced the tunnel till it reached sixteen feet under the port side—an average of almost a foot for each day's work. We were then two feet from the keel on the port side, under the deepest point of the "S-51." Francis Smith was taking his turn with the hose in the tunnel, worming his way along. Imagine his situation. In ice-cold water, utter solitude, total blackness, he was buried 135 feet below the heaving surface of the Atlantic. No sight, no sound, no sense of direction except the feel of the steel hull of the "S-51" against his back as he lay stretched out flat in a narrow hole scarcely larger than his body, not big enough for him to turn around in. Closely against his body pressed the throbbing hose while, ahead in his outstretched arms, he gripped the nozzle, burrowing deeper, all around him a black stream of freezing water heavy with clay and mud coursing backward.

Twenty minutes went by, then the telephone tender got a call from Smith. He could not make it out and passed the telephone headset to me. I heard Smith's voice saying, "I'm in a very bad position, Mr. Ellsberg. Send some one to help!"

Fortunately, Joe Eiben, another fine

(Continued to page 122A)

Hazelwood Ave. Mitchell,

Wrote Wild Heron Secretary

Manager Chamber of Commerce

301 Hazelwood Ave. San Francisco, Calif. Leonard Mitchell

002075



This Is How Heidelberg Castle in Germany Appears; the Model, Shown with the Builder beside It, Closely Resembles the Original Building; Even the Mountain Roads and Paths Are Reproduced; Note the Towers for the Defense of the Castle



Wide World

MODEL OF HEIDELBERG CASTLE - BUILT BY STUDENT

Faithfully reproduced in minute detail, a model of Heidelberg castle in Germany has been constructed by William Hacker, architectural student at Heidelberg university. Each part of the castle and its surroundings has been built to scale. It is expected that the model will be exhibited at the Century of Progress Exposition in Chicago this year.

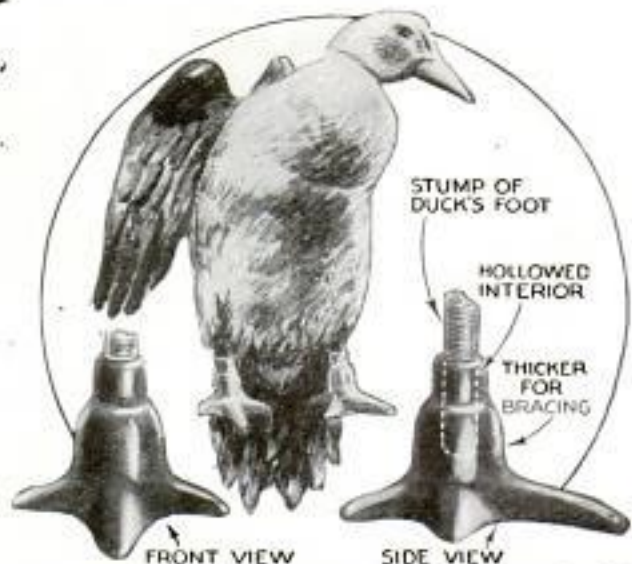
In addition, other precautions are taken to avoid heavy losses. Little trays over which the jeweler works are emptied into one large receptacle each night, sweepings from the floor are collected, and the rouge used for buffing and polishing is saved. The jeweler knows that between three and six grains of metal are removed from a ring every time it is polished or buffed, so he takes steps to catch every grain.

032084

DUCK GETS RUBBER FEET AFTER IT FROZE OWN

Artificial feet of rubber are serving a duck whose real feet were frozen off when it escaped from its pen in Michigan one winter night. The artificial pair was fashioned at a rubber plant, constructed so the stumps of

the duck's legs would fit into the upper part of the rubber set. After a period of hopping around, the duck has learned to use its new feet, walking and swimming with almost as much ease as do the hale ones in the flock.



How Artificial Feet Were Fitted to Stumps on Duck's Legs; the Bird Uses Them Easily

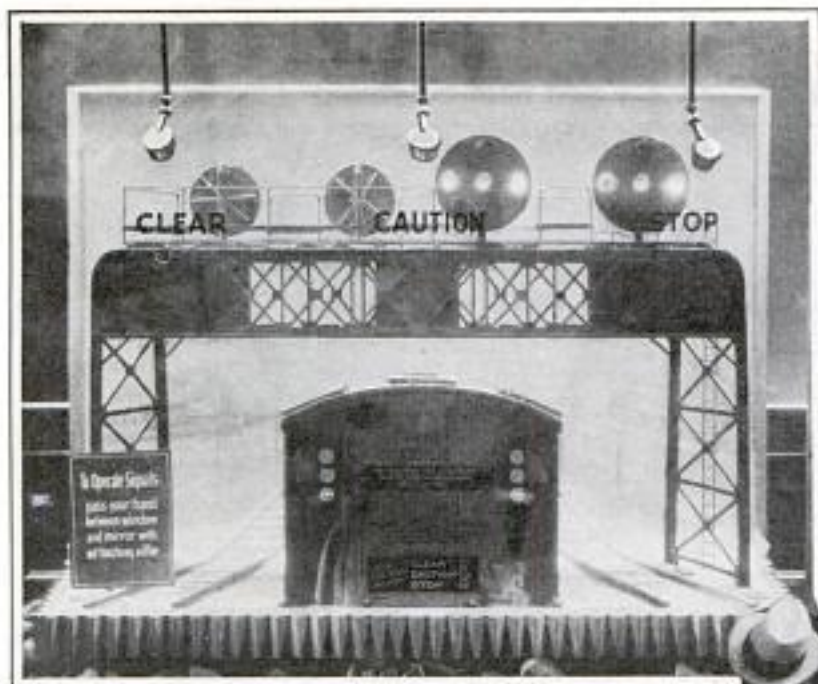
DIRTY WATER HAS HIGH VALUE IN JEWELER'S SHOP

Dirty water in the jeweler's workshop is valued highly. Every drop in which workers wash their hands and in which their overalls are laundered is saved. This is done because filings from gold and other precious metals are caught in the water. At regular intervals, this metal is salvaged by refining, resulting in savings of \$750 to \$1,000 a year in the average shop.

032112

Mr. Miss Elsie Duff
1260 Mackay St
Montreal, Canada

Merwyn Goldner
Secy. Corduroy Rubber Co
Grand Rapids, Mich



By Passing the Hand between the Window and the Small Disk-Shaped Device, as Shown at Right, the Passer-By May Change Railroad Signal; Left, How Lights Appear in "Stop" Position



Pennsylvania Railroad Office Adams and Clark, Chicago

HOW RAILROAD SIGNAL WORKS SHOWN BY ELECTRIC EYE

How automatic railroad signals operate is demonstrated in a show window by an arrangement that permits the public to turn the signals on and off. All the passer-by needs to do is to pass his hand between the window glass and one of three small devices suspended outside the window. These devices are photo-electric cells, better known as electric eyes, which are connected to the signal lights. Passing the hand between the window and the electric eye causes the "clear," "caution" or "stop" signal to flash on the railroad board, and in the artist's representation of an engine cab. This shows how passengers on this railroad, the Pennsylvania, are protected against accident.

half feet. More than 400,000 linear feet, or 125 miles, of welding will be required in the fabrication of the system and every foot of the jointures will be inspected by the X-ray which explores seams for defects. The film for the operation, if assembled end to end, would be more than four miles long.

SHOE HELPS AUTO OUT OF MUD BY GRIPPING TIRE

Supplying traction for the automobile stuck in loose sand, mud, ice or snow,



strips of iron that are placed to give the tire a firm footing are on the market. The strips have lugs on each side to give the tire a "toehold." The iron shoe is inserted in front of the wheel and power is applied slowly. No jumping or jerking is

necessary, and no injury to the tire is possible, it is claimed. Lugs are provided on the back of the shoe to prevent it from slipping in the mud.

X-RAY INSPECTS PIPE SECTIONS USED IN HOOVER DAM

X-rays are assuming a major engineering role at Hoover dam where they are being used to inspect the steel welds of the biggest pipes ever fabricated. These pipes will form the diversion tunnels and weigh about 50,000 tons. They are to line 14,500 feet of tunnel and their diameter ranges from thirty down to eight and one-

B2145 \$5.00 \$10.00 \$14.00 \$24.00

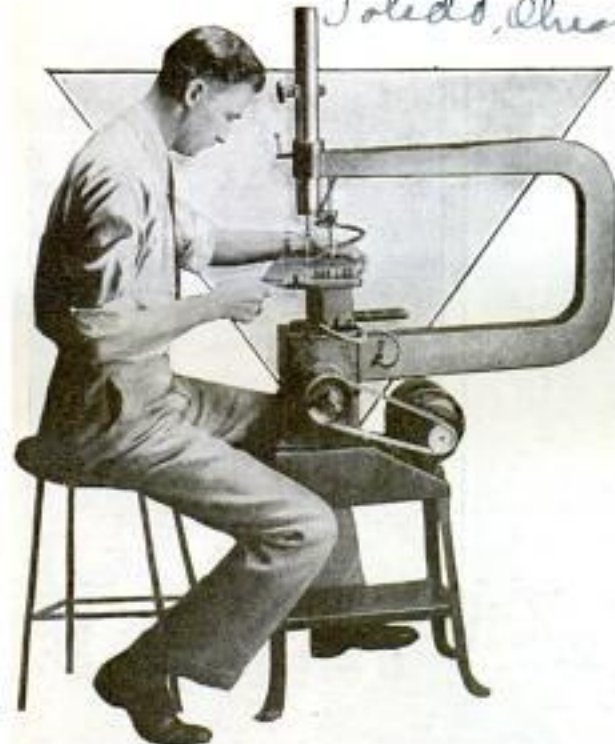
B2156

Kansas City Times 12/22/32

Isch. U. Club Tire Shoe Co 250 Pearl St. W. Grand Rapids Mich.

W.B. & J.E. Boice,
 B2212 1730 Norwood Ave
 402

POPULAR MECHANICS
 Toledo, Ohio
 Professor of Physics
 Regius Cambridge, Eng.



Small Round-Nosed Table Is Feature of This Jigsaw Which Has a Wide Range of Uses

JIGSAW WITH SMALL TABLE ALSO DOES BANDSAW JOBS

All classes of jigsaw work and practically any bandsaw job can be performed with an improved jigsaw that has a small round-nosed table for handling very small pieces. In addition, the saw is equipped with a larger table that can be installed quickly. The small table, mounted on a steel way, can be shoved back so blades can be inserted readily, avoiding strains and breakage. The throat is twenty-four inches deep and will take work up to five inches thick. There are two blower tubes, one above the work and the other below, to keep the lower vise and plunger clean. There is no possibility of oil dripping from the upper head on the work.

Brown of Cambridge University. He points out that such epidemics tend to break out in large cities as soon as carriers of the germs become sufficiently numerous. London's freedom from plague epidemics, he believes, has been due to the dominance of the brown rat which came to England on ships, bred rapidly and all but exterminated its natural enemy, the black rat. During recent years, however, there have been so many campaigns against rats in general that millions of the brown ones have been destroyed with the result that the black rats again are gaining headway. This, says Professor Brown, is an instance of the danger of interfering with the balance of nature until biology has supplied all the facts.

B2174
MODERN HOME LIKE A TEMPLE STANDS ON MOUNTAIN TOP

One of the most unusual homes in the south is built like a temple and stands on a lofty mountain overlooking Birmingham, Ala. It is a replica of the noted temple of the Vestal Virgins which once stood outside Rome. Surrounding the residence is a circular porch containing sixteen roof-high pillars. Inside are three rooms, one under the ground floor and another above it. Under the floor of the wide porch are a kitchen, breakfast room, bedroom and bath. The building is set in the midst of beautiful gardens.

Home near Birmingham Modeled after the Ancient Temple of the Vestal Virgins



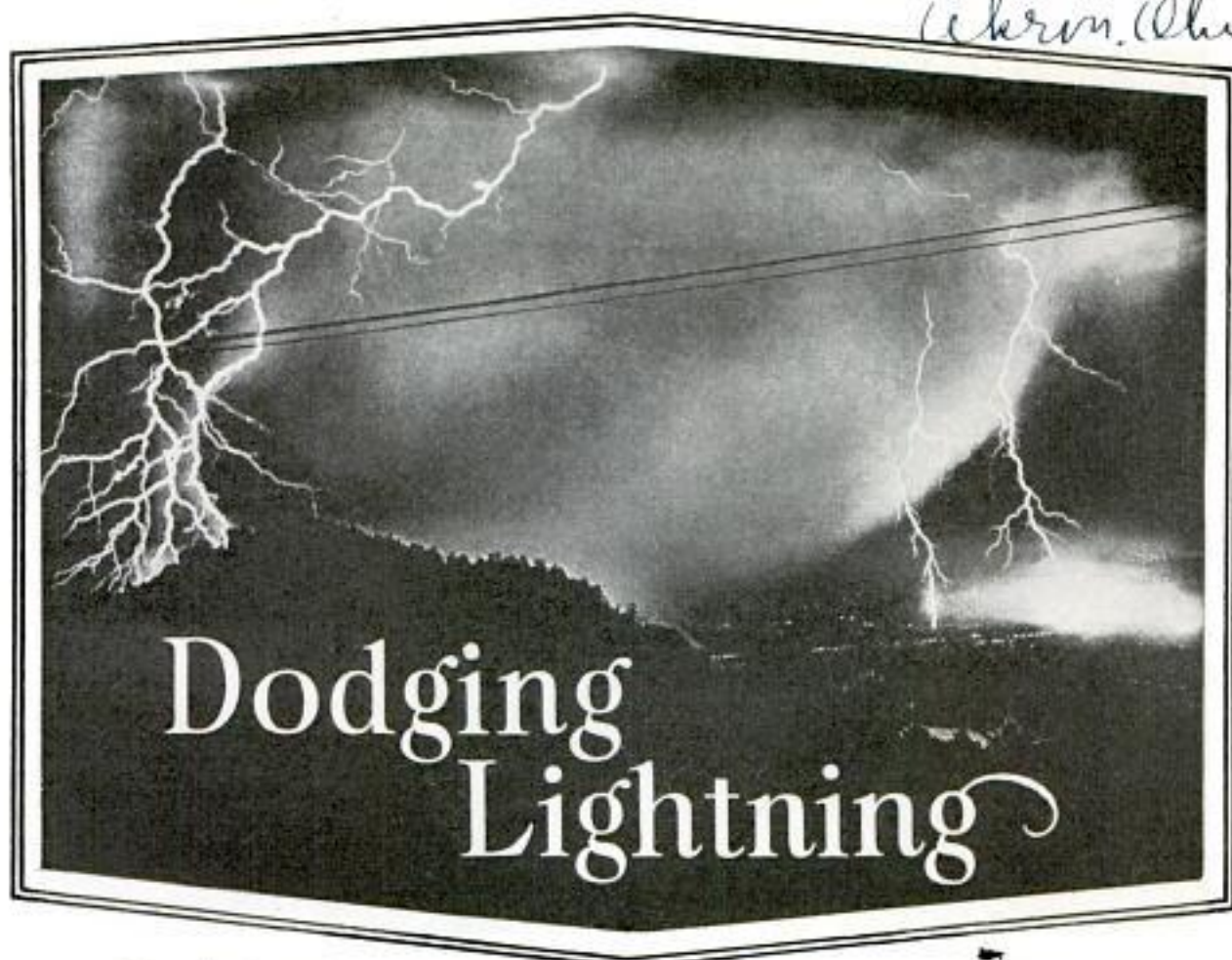
B225
BLACK RATS THREATEN BRITAIN WITH PLAGUE

Plague-carrying fleas live on rats, but black or dark rodents are a worse plague menace than brown ones, and the black variety is increasing in numbers in Great Britain. If they are allowed to multiply, a plague epidemic may follow, says Dr. W. Langdon

Owner, George B. Ward, Birmingham, Ala

Swine Service
 mail report 12/14/32

002167 Cmt. Walter & Burton
1032 Florida Ave
Colum. Ohio



Unusually Heavy Discharges of Streak Lightning Recorded by Camera Slightly Out of Focus

DANGER: 500,000,000 volts!" If you saw such a sign on a door, you would refrain from opening it. But the only place a warning of this kind would be necessary is in a thunderstorm which has no doors to be kept closed, but whose dangers nevertheless can be lessened or avoided entirely by the observance of a few simple precautions.

Most of the figures concerning lightning are subject to argument. However, the 500,000,000 volts is a value placed on a mile-long discharge of lightning after extensive studies in connection with electrical power lines. It was found that the probable potential of lightning at the beginning of the flash is around 100,000 volts per foot.

The destructive power of natural lightning is not entirely a matter of voltage. Amperes, indicating the quantity of electrical current, also enter the picture. A few years ago investigators credited lightning with having a current strength of 5,000 to 20,000 amperes. However, Arthur O. Austin, of the Ohio Insulator Co., at

Barberton, Ohio, believes that a single lightning discharge may have a current of 500,000 or more amperes.

Today, it is difficult to find a person who does not possess a deep-seated fear of lightning, although records show the chances of being struck by an automobile are more numerous than those of being hit by a thunderbolt. There are two kinds of lightning damage. One is the result of a direct hit, and the other is caused by an induced charge or release of a bound electrical charge from a body in the vicinity of a lightning flash.

Any tall, isolated object is likely to be struck. You become a "tall, isolated object" when walking across a barren field or plain, and in an electrical storm might make an excellent lightning rod. Although it probably would be uncomfortable, you might find it safer to lie down until the storm passed. One of the most famous tall objects in this country is the Washington monument, over 555 ft. high. It has been struck by lightning many times, but has been damaged little because of its

B21681
404



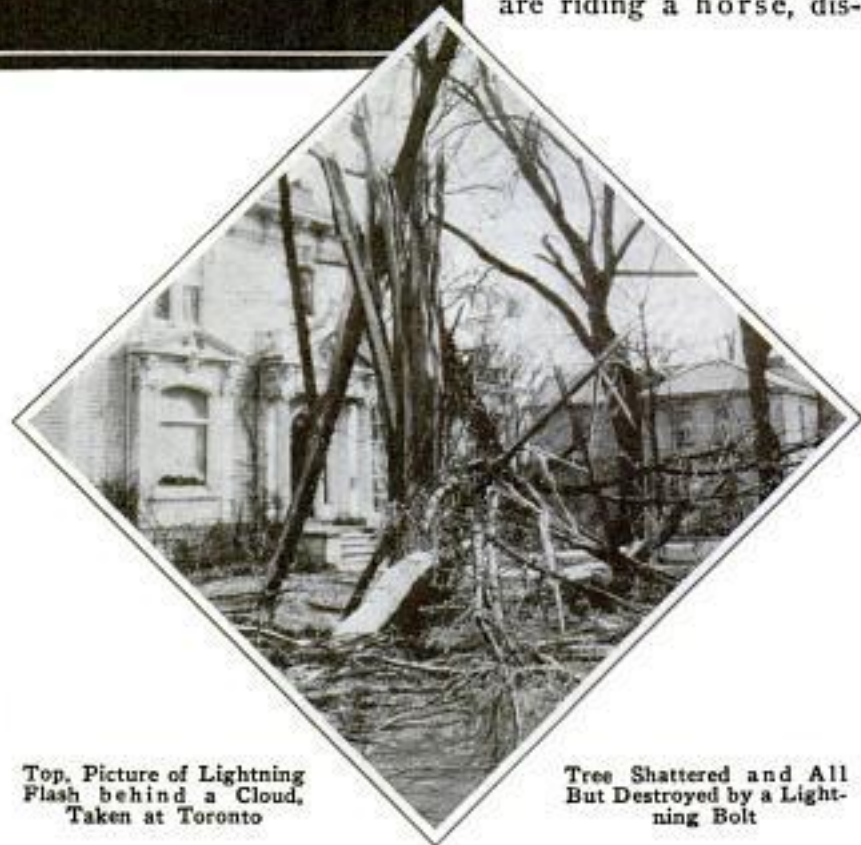
siderable area. Wire fences, hedges, streams and ponds are to be avoided. A metal fence is one of the most dangerous objects, because it can conduct a discharge to a point a considerable distance from where the bolt struck.

It is relatively safe in a forest, where most of the trees are of the same height, but you should avoid herds of cattle or crowds of people. It is also unwise to walk about with an umbrella in your hand, or work with any large metal object. If you are riding a horse, dis-

elaborate protective system. You cannot carry a lightning rod around with you, but in many cases you can find both shelter from the rain and protection against lightning.

Among the safest places are inside a house protected by lightning rods properly installed, in an all-metal building or one having a steel framework, inside a steel ocean liner, or even inside a giant airship with a metal frame. Such structures may be struck by lightning, but they absorb it or conduct the discharge harmlessly to the ground, often without your knowledge. Even though a building is only a shack, with not a lightning rod or other protective device within miles, it is preferable to the outdoors during an electrical storm, largely because of drier surroundings which lessen the chances of being harmed.

If you are caught outdoors, remember that isolated trees often are struck, and that the bolt spreads its effect over a con-



Top, Picture of Lightning Flash behind a Cloud, Taken at Toronto

Tree Shattered and All But Destroyed by a Lightning Bolt

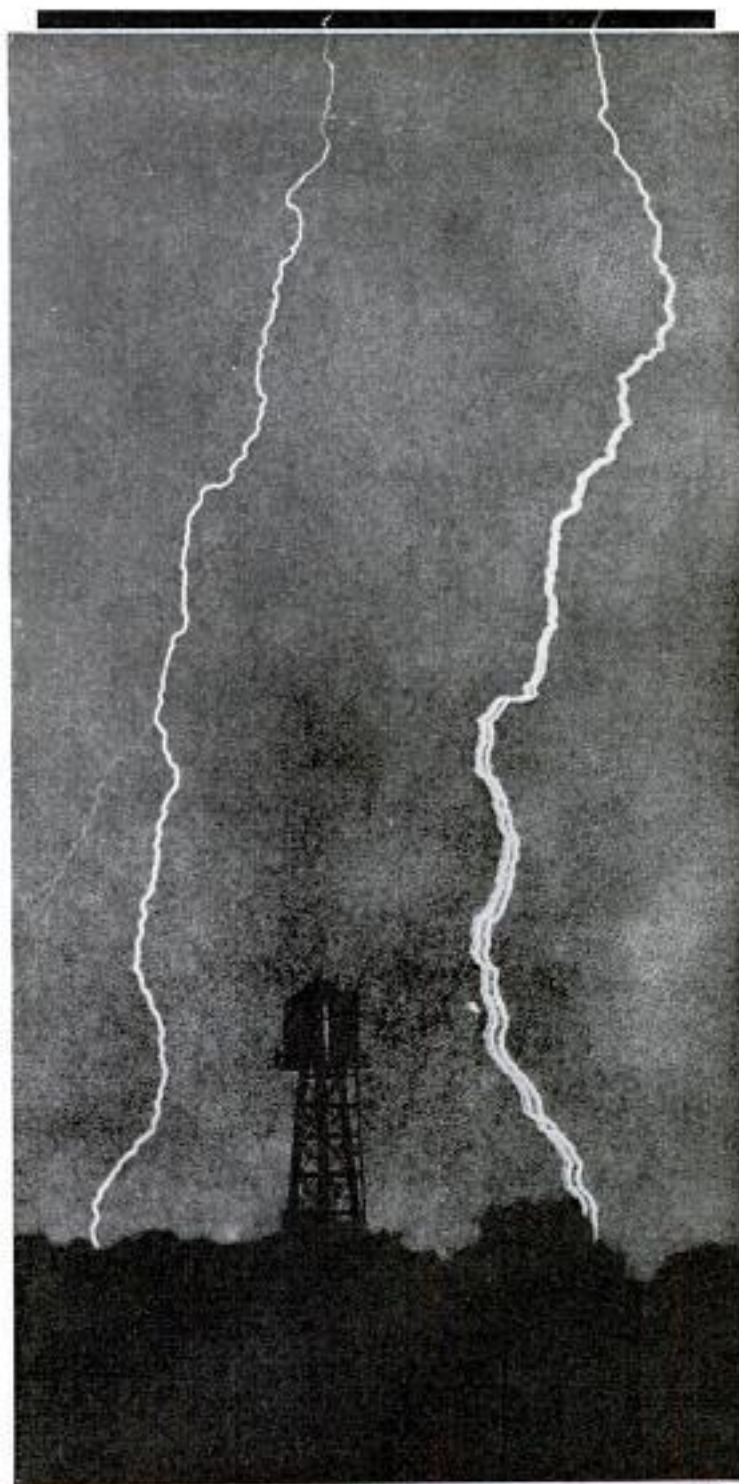
mount and move some distance from the animal. In an open field, it is safer to lie down than to remain standing. You should avoid high ground, and the edges of forests. The edge toward which the storm is moving is most dangerous. If you find a cave or underground chamber, you may be assured that it is a safe retreat. Sometimes you may be wise in lying in a ditch until lightning has ceased.

When indoors during an electrical storm, do not stand between large masses of metal, such as a rainspout and a stove, keep away from chimneys and stoves, and do not stand near a register, radiator or under a chandelier. Do not draw water from a faucet, or stand on a wet floor, and if in a section where overhead wires are used, postpone your telephoning until the storm is over.

This leaves little to do, so you might as well go to bed. In fact, it has been recommended that a metal bed is a fairly safe harbor in a thunderstorm because of the cage-like arrangement which screens out discharges, providing occupants refrain from touching the metal.

Extensive investigations carried out by Austin indicate that lightning can be a real hazard in flying, but that it is relatively simple to avoid most of its dangers. A well-bonded airplane or airship, particularly if the frame or entire structure is of metal, can be struck without suffering damage. A lightning rod will protect open cockpits and divert discharges away from passengers. The dangers from a direct hit are considered less than in the average dwelling. Perhaps the greatest hazards, Austin believes, result from temporary blinding of the pilot by a brilliant flash, or stunning by the intense mechanical shock or sound wave.

As for automobiles, no extensive research on the subject has been reported. An all-metal car probably would act as an effective shield for passengers who remained inside it, although the car could be struck severely enough to cause considerable damage. A traveling automobile is not unlike a person walking and rubber tires would provide ineffective insulation against a powerful lightning discharge. Probably the safest parking place would be in a woods, in a roadway cut with high banks on each side, on a city street, or in some other place where there



Note Doubling of Discharge at Right; during Interval between Flashes, Path of Stroke through Air Was Shifted by Wind

are enough other and taller objects, not too close, to divert possible thunderbolts.

The most common and probably the most destructive kind of bolt is streak lightning. Such streaks, visible as a single flash, may be made up of a number of individual discharges in rapid succession. Sometimes the wind blows the path of

(Continued to page 116A)

*Long-Well Lumber Sales Corp
R. A. Long Bldg
Kansas City Mo*

ical value in testing the strength of metals, in studying erosion and in biological research.



Safe Is Raised from Floor of Which It Is a Part While Two Guards Stand By; It Contains a Fortune in Jewelry

Wide World

INTERLOCKED-UNIT LUMBER SAVES BUILDING COST

Interlocking lumber is being manufactured for use in any type of house or other building. As contrasted with ready-cut home construction, this lumber comes to the building site ready for the carpenter to put into place in conformity with any desired plan. No two

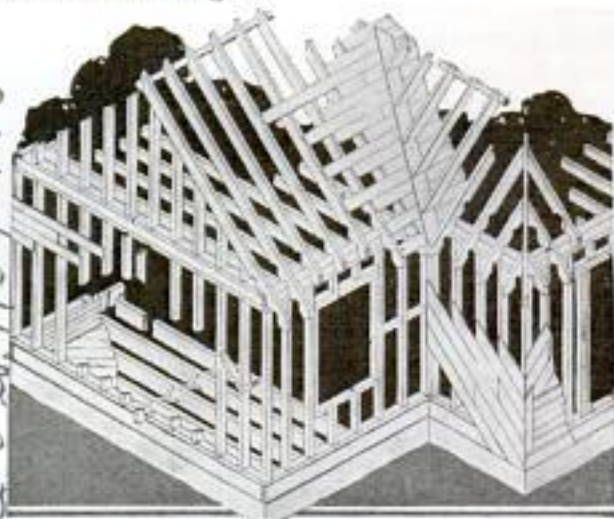
homes need be alike. The lumber is prepared along time-tried architectural lines, being simplified and standardized into a system of machined pieces that supply three-fourths of all necessary lumber ready for use. There are only ten basic framing members, only nine lengths of square-end board stock, only six lengths of diagonal-end sheathing, all precision-cut. There is but one grade of this material, the right one for the particular use. All framing, joist headers, joists, sills, studs and plates go together with a strong interlocking joint made possible by a dovetail. This lumber eliminates waste and saves freight.

SECRET SAFE BENEATH FLOOR IS RAISED WHEN WANTED

Special protection for valuable jewels is provided by a London shop which has a concrete safe that sinks into a well to form a part of the flooring during the day. The arrangement is not noticeable to customers. At night, the safe may be raised from its well for the deposit of precious gems and other valuables until the opening hour next day.

SOUND BURNS CENTER OF CORK IMMERSSED IN WATER

Sound energy produced by a tube is able to burn the interior of a cork immersed in water. The sound is made by a small, long nickel tube, straight and hollow, with one end closed like a drum by a nickel plate. This plate vibrates to make a screech when an electrical current is applied to the other end. By this means, sound energy is transformed into heat so fast that in about twenty-five seconds, the center of a cork in air or water is charred, and in two minutes, nothing is left except a thin outer shell. The cork, of course, is fastened to the drum of the tube. A finger, however, will "burn" with pure sound if held close to the tube in water. The tube's screech is powerful enough to kill frogs, smaller animals and bacteria immersed in liquid. The sound is painful to the human ear. The device is expected to be of prac-



How Interlocking Lumber May Be Used in Constructing Almost Any Type of Home

There is more ultraviolet in afternoon sunshine than in morning sunshine.

*Science News Letter
Nov. 5, 1932*

Messrs. Garrado Crown Jewellers

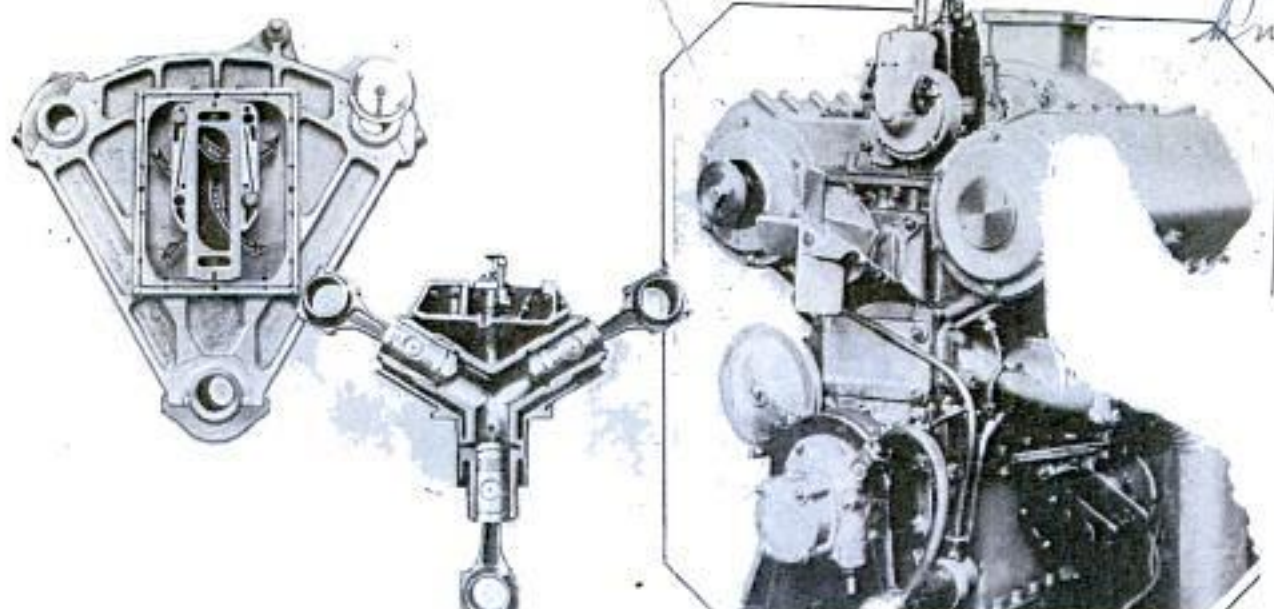
Chicago Tribune 11/26/32

*Newton Learies,
Univ. of Texas, Austin, Texas
in "Physics"*

see Feb 1934 - 175

B 206 2

407
No U.S. Agent
Known



Cross-Sections at Left Show How Three Pistons May Operate in One Cylinder; at Right Is a New Engine Employing This Principle; Simplicity of Manufacture and Economy in Space Are Outstanding Features

THREE PISTONS TO A CYLINDER IN SPACE-SAVING ENGINE

Three pistons to each cylinder of a new Diesel engine of German manufacture result in a saving of space, as well as in efficient operation. There are three crankshafts, of course, working together in a sort of a balanced triangle. There are no poppet or thimble valves, the admission and delivery of air to the cylinders being mechanically controlled through ports of ample area. The engine is said to be easy to manufacture, with a much smaller number of parts than the common type. Smoothness and high speed without increase in weight are among advantages claimed by the makers.

ELECTRIC TASTER TESTS FRUIT AND FOOD FOR ACID B 20 40

Fruit and vegetables, tea, coffee, and other food substances containing acid, can be tested by an electric palate developed by R. C. Hitchcock, of the Westinghouse Electric and Manufacturing company. By measuring the amount of electrical energy, the device detects the degree of acidity. For instance, a test of Florida grapefruit gave a reading of nine-millionths of an ampere, while Puerto Rico grapefruit read thirteen. This shows that the Florida product is sweeter than the other variety, since a very sour taste gives a high read-

ing. The taster is another application of the recording meter, which is so sensitive that it registers the action of one-millionth of an ampere, or about one-tenth the "wing power" of the house fly. So, electrical energy in fruit and some food substances may be recorded with accuracy. One application of the device is that of enabling samplers at orchards and fruit exchanges to select fruit and vegetables of the desired quality. Tests also have been made with the meter to determine acid condition of the mouth. The doctor of the future will only have to place the prongs of the instrument in the mouth.



How the Electric Taster Is Applied; the Prongs Are Thrust into the Fruit

East Pittsburgh, Pa

B2012

Musical Instrument Amplifier

POPULAR MECHANICS

408

Island Rapids Mill
300 W. Kalamazoo
Kalamazoo, Mich

by a guitar



This Device Enables Stringed Instruments to Hold Their Own, Increasing the Sound Twenty Times without Distortion; Photos Show How the Amplifier Is Attached to Three Instruments



News. Chester F. Beach C.E.
sold three Gibson musical in
Lubson, Mich. 11



AMPLIFIER FOR STRING MUSIC GIVES MELLOW TONES

Violins, cellos and other string instruments will be heard above the brass section of orchestras if a new system of amplification is adopted. The device captures the pulsations of electrons and amplifies them into tones, increasing the sound twenty times. Stringed instruments with the amplifier produce a sonorous, mellow tone without distortion. The amplifier unit, contained in a portable case, is attached to the instrument by wires. Ordinary house current will operate the unit.



Tonal quality may be regulated by raising or lowering the bridge of the instrument with a key.

B31700

ARTIFICIAL DRYING OF WHEAT TO SAVE FARMER MILLIONS

Practical methods of drying wheat artificially have been tested successfully by Canadian government scientists. Millions of dollars will be saved for the farmer by drying processes which are expected to reduce crop losses by more than one-fourth of the entire crop. Tough or wet grain may be dried without damage to the milling or baking quality of the wheat, according to the scientists.

B2235

TRAIN-SPEED CHANGES SHOWN BY TUBE OF MERCURY

Direct quantitative measurement of acceleration or deceleration of a train is shown by an instrument invented by an employe of the General Electric company,

Conk. James Montague
608 Harbour City Bldg
Toronto & Ont. Can.

Low. W. & Potter
 General Electric Co
 Schenectady, N.Y.
 POPULAR MECHANICS
 B 2099 H. W. Wakefield
 Brass Co 409
 Vermillion
 Ohio

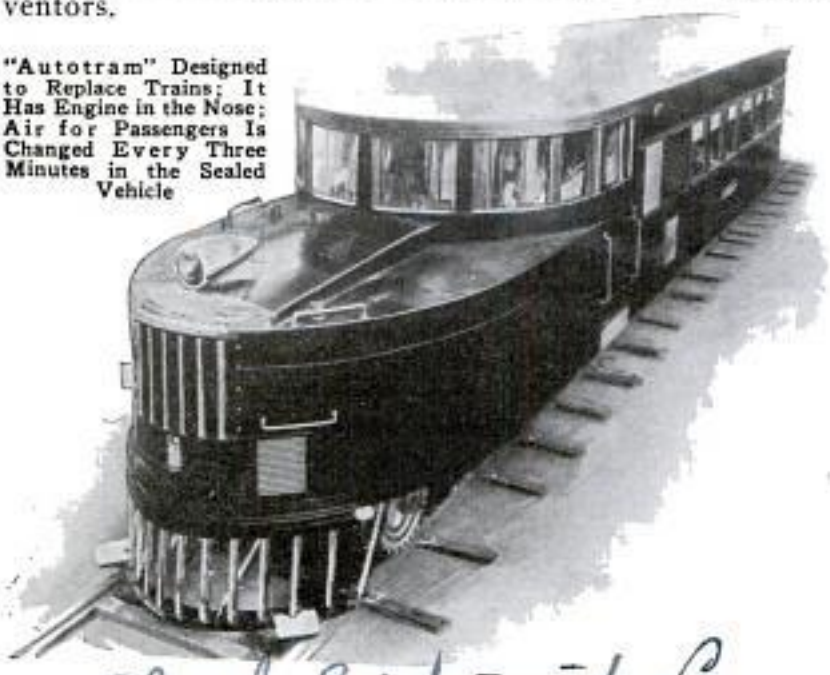
Science News Letter 12/19/32

which also tells the grade when a train is on a hill. It consists of a glass tube bent in the shape of a rectangle and partly filled with mercury. This is mounted on a flat base so it may be placed on a window sill, parallel to the vehicle's line of direction. The glass column at the rear is marked off in miles per hour per second above and below a central zero point. The front column is marked off in per cent of grade, above and below a zero. When the engine speeds up or slows down, the surge of the mercury up or down the tube gives a direct reading of acceleration or retardation. When the speed is uniform, the mercury remains in zero position.

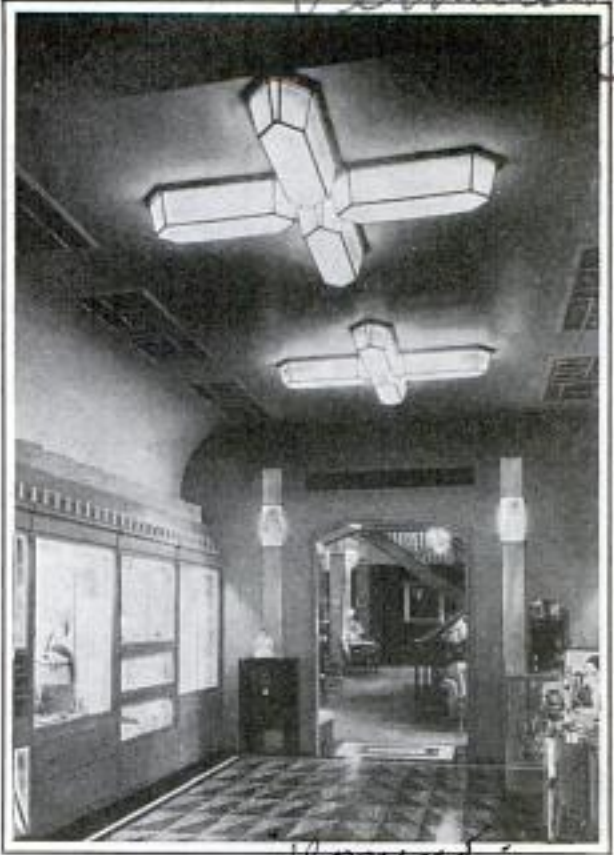
RAIL CAR SEALED AGAINST DIRT IS FAST AT LOW COST

Sealed to exclude dirt, heat or cold and noise, a streamlined rail car has been designed for speedy, safe and economical transportation. The car has its own engine in the nose of the torpedo-shaped aluminum vehicle. Capable of speeds around seventy miles per hour, the "autotram," as its makers call it, seats forty-two passengers. Ventilation is provided for the sealed passenger compartment by a system that changes the air every three minutes. The car is said to be heavy enough for rapid travel on main lines of railroads. Autotrams running at frequent intervals would replace the expensive multi-car train of today, according to the inventors.

"Autotram" Designed to Replace Trains; It Has Engine in the Nose; Air for Passengers Is Changed Every Three Minutes in the Sealed Vehicle



Clark Equipment Co
 Battle Creek, Mich



Interconnecting Lighting Units Which Form Decorative Designs for Walls or Ceiling

LIGHTING FIXTURES LIKE BOXES FIT AGAINST CEILING

Box-shaped lighting units which fit snugly against walls or ceilings are now being employed to produce decorative effects as well as illumination without shadows. The units are interconnectible, so any number may be arranged in an endless variety of patterns. Each box has two twin sockets accommodating lamps of from fifteen to 100 watts, and the units lend themselves readily to forming stars, triangles, squares or other figures, since they can be placed end to end or at angles like a set of dominoes.

Those wishing further information on anything described in our editorial pages can obtain it by addressing Bureau of Information; please inclose return postage.

B2021 Keystone View Co
219 E 44th
New York

The Ever-Open



Top, Police Photographer Making Picture of a Group as Contrasted with Old Method of Bust Picture at Right; Below, the Stand-Up Photograph

A HUMAN thigh lay on the roadway of the Williamsburg bridge. Why?

That was a mystery to the New York police—a mystery that grew more gruesome until its sudden, dramatic solution through new tricks of scientific detection never before employed, and until now, never fully revealed.

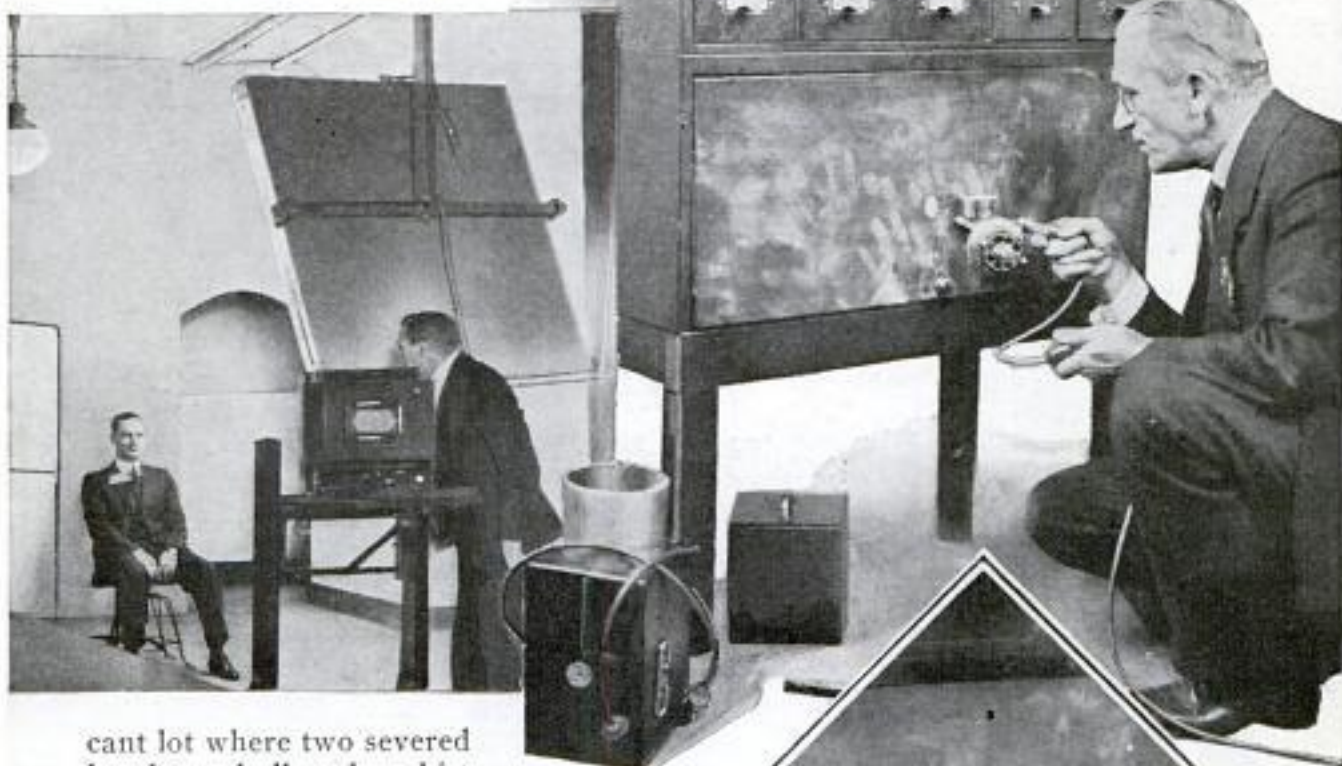
Was it murder? Not even that was certain, until science had spoken. The thigh had been cut from the body by a practiced hand. It might be merely a dissecting-room relic, dropped by pranking students. Dr. M. Edward Marten, medical examiner for Brooklyn and Queens, tested it for telltale preservatives or anesthetics. He found neither.

"This was no operation, but cold-blooded murder," he reported. "The murdered man was thirty to forty, five feet seven, 170 to 180 pounds, had brown hair, and was drinking just before he was killed."

Immediately those deductions of X-ray, microscope and test tube were startlingly confirmed. Other parts of the body were found, altogether twelve pieces, in Brooklyn, Queens and Manhattan. Shocked New York demanded the murderer be caught—but how?

The answer came from a Brooklyn va-

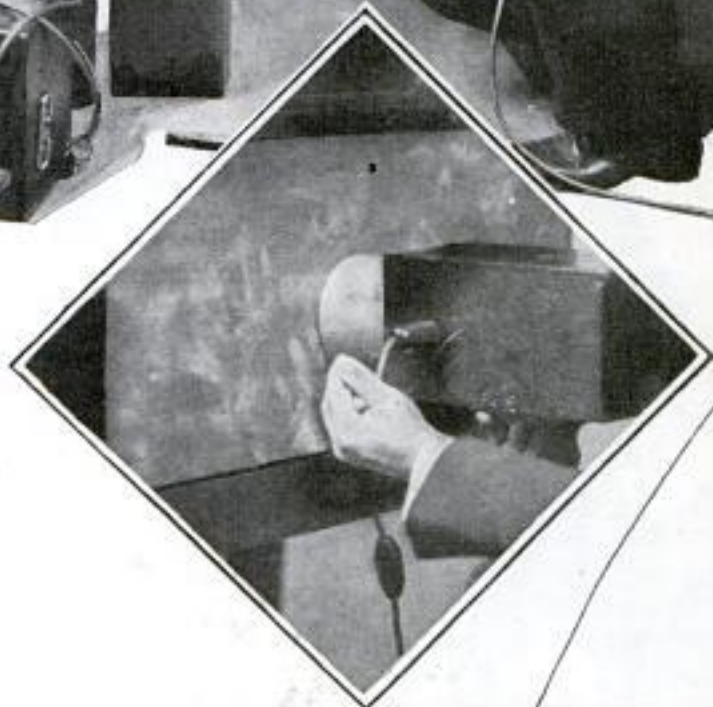
EYE



cant lot where two severed hands, a skull and a shirt were discovered, but all in such condition detectives despaired of finding clues. In his laboratory, Doctor Marten cleansed the shirt with strong soap, revealing laundry marks. Checking many laundries traced the shirt to a Brooklyn speakeasy proprietor, who had disappeared. He answered Doctor Marten's description, his wife had been accused of murdering a previous husband, and she said her second one had "gone to Europe."

Despite strong suspicions, the law's hands were tied. In New York state a positive identification of the body is necessary to convict for murder. The police turned to fingerprints. The husband had been in the army. They got his prints from U. S. detention headquarters in New York—but how prove these prints were from the hands found in the vacant lot?

The task seemed to defy science, for the tips of all eight fingers and one thumb were mummified. Even on the other thumb, the skin appeared so puckered it would never yield an impression fit to display to



Above, Applying Dust Powder with Electric Spray in Hunt for Fingerprints; Below, Photographing Dusted Fingerprint

a jury beside the clear, rolled print from Washington. Doctor Marten tried wax, kaolin powder mixed with linseed oil, glycerine and gelatine—all in vain. Then he soaked the thumb in preserving solution, anxiously awaiting results.

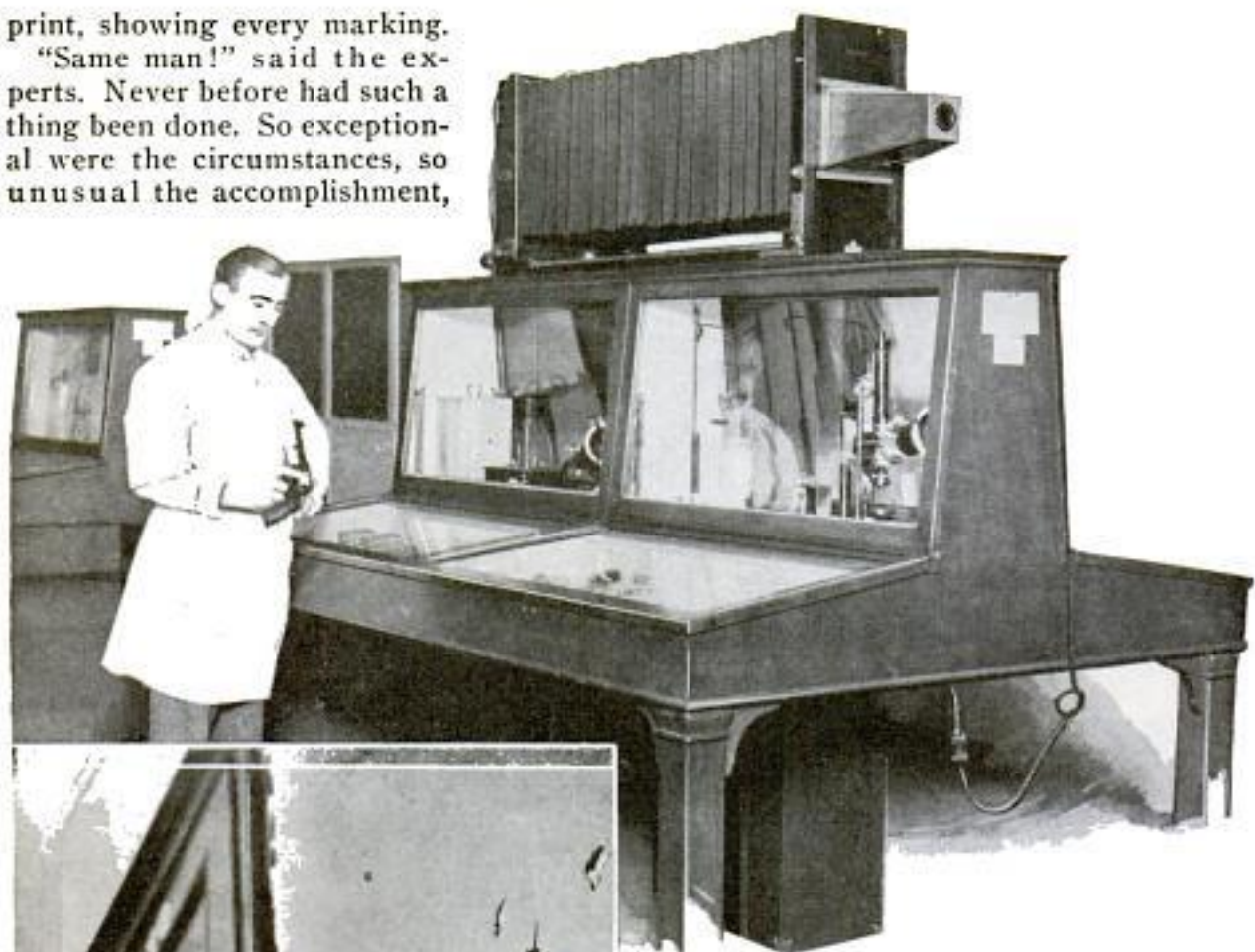
Slowly, amazingly, the thumb softened. Now, with hypodermic and salt solution, he inflated it to normal size, filling up the puckers. At last, breathlessly, he inked the thumb, rolled it upon paper and stood back to view the result—a complete, clear

White detective Monoran, New York Police Headquarters, New York

B2021

print, showing every marking.

"Same man!" said the experts. Never before had such a thing been done. So exceptional were the circumstances, so unusual the accomplishment,



that Doctor Marten extended himself to convince a jury. But first he called in a police photographer. "Make me big enlargements of both those prints," he said, "the thumb and the Washington print."

Upon these photographs were traced similarities that proved the speakeasy proprietor who had been in the army and the dead man were the same. The jury gave his bartender, an ex-butcher, thirty-five years for homicide, and his widow seven for fraud.

"Without those enlargements," said Doctor Marten, "we couldn't have done it."

That is often true in detective work. The camera's eye detects the essential clue to many a mystery. New ways are constantly discovered for photography to aid detectives in tracking down and convicting criminals. Now, their pictures are being broadcast around the world.

A few months ago, a well-dressed young foreigner walked into a New York steamship office. He said he was of wealthy family, and offered a \$2,000 check for passage home. He took the change, bowed and disappeared. The check came back.

Top, Microscopes and Special Camera Used to Photograph Bullets, Bullet Holes and Cartridges; Below, Photograph of Bullet-Riddled Apartment



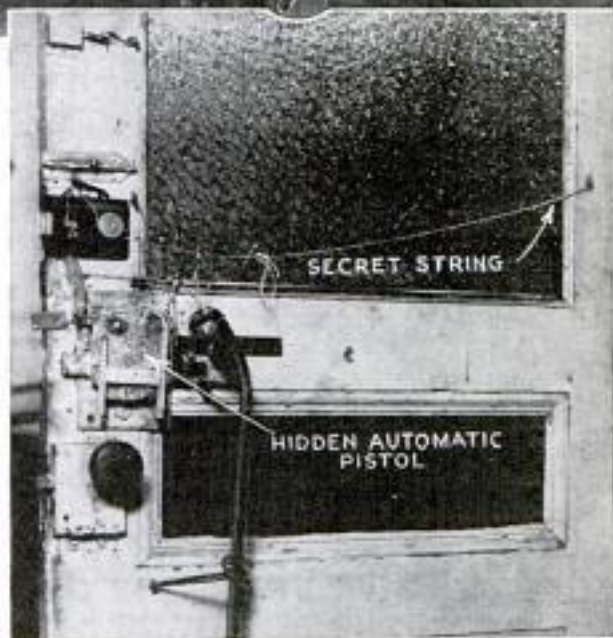
Top, Examining Bullet under Microscope; Below, Door Fitted with Pistol by Fanatic Inventor to Guard His Secrets; It Fired When Opened Unless String Was Pulled First

The man was caught, jumped bail, and was traced to San Francisco where he took ship for Hawaii. As the ship entered Pearl Harbor, he slipped silently to the rail and down a rope. He let go the rope and dropped—but not into the ocean. Strong arms gripped him and he was pressed to the floor of a motorboat that had dashed out from shore.

"Now let's see if he's the guy we want," said one of the occupants.

He flashed his light into the man's face, comparing the features with those of a photograph he held. Then the fugitive remembered that photograph—taken in the rogues' gallery at New York police headquarters—and now here it was in Honolulu. For the first time in history, the New York police had sent a "gallery" photograph by radio, to catch a fugitive.

Another surprising new use of photography in crime detection was demonstrated in court in connection with a stolen stock certificate. This certificate was shown to the jury, under ultraviolet light, which had never been done before. First the jurors saw the signature, black upon a spotless white background. Then beneath and around the signature, the paper seemed to become alive, to glow like a luminous watch dial, showing a previous

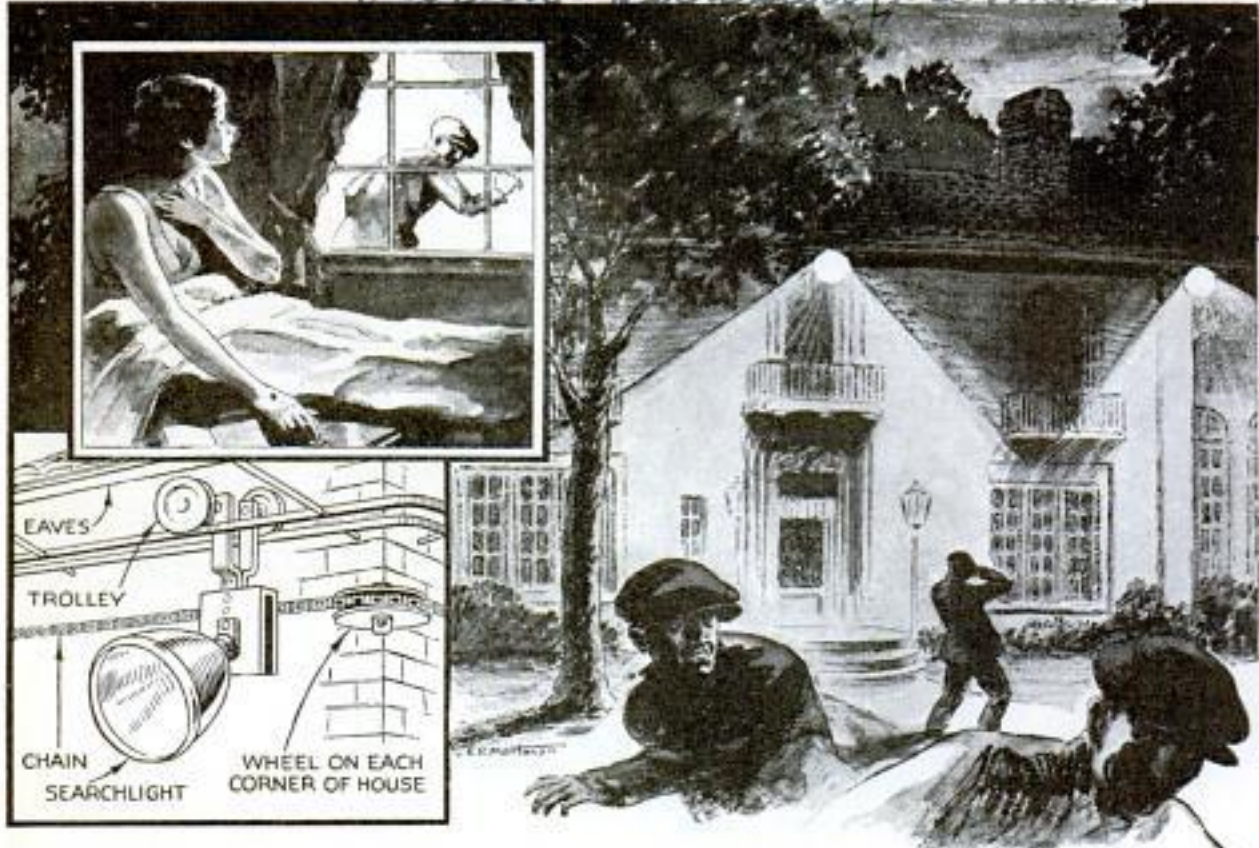


signature, underneath. Chemicals had removed all traces of it from the surface, but not from the fibers of the paper.

In another case, the claimants produced notes for \$70,000, all but one of which it was claimed were forgeries. In court, the jury was shown an enlarged photograph of the signature on this one note, then over it were laid one after another, similar photographs of the others—on tissue paper.

"What do you notice?" the jury was asked.

(Continued to page 125A)



Light Equipment Pictured at Lower Left Is Designed to Guard the Country Home against Thieves; Touching Button near the Bed, as Shown, Switches on Floodlights around the House

LIGHTS AROUND ROOF PROTECT HOME AGAINST THIEVES

Guarding the country home against thieves, a moving string of searchlights begins operation around the edge of the roof when a button is pressed. Control is located near the bed. The starter button sets in motion a motor that switches on the searchlights and operates the mechanism on which the lights move.

ELECTRIC DETECTOR FINDS OIL BY CURRENT RESISTANCE

An area of a mile or more is explored for oil-bearing strata in one operation with the aid of an electric detector which finds oil to a depth of 3,000 feet or more. The process consists of making two electrical contacts with the earth a mile or so apart. A heavily insulated copper cable is laid on the surface connecting the two contacts, and a potentiometer, ammeter and battery are interposed between them. Current passes through the cable and instruments, and the resistance through the earth and instruments is measured, the presence of oil-bearing strata being indi-

cated when the resistance is one or two ohms or more. By repeated tests it has been found possible not only to locate oil-bearing layers, but also to determine their approximate depth below the surface.

AUTO WHEEL EASILY REMOVED BY HYDRAULIC PULLER

Any type of automobile wheel can be removed quickly and easily with a portable hydraulic press



which exerts a pull of 100 tons. The puller eliminates all wedging, sledgeing and tapping methods and the resulting damage to parts. A pair of hands and one wrench are the only tools required

to operate the press, which consists of a screw, a chamber filled with plastic material used as a fluid, the hydraulic ram and a double-thread hub adapter, with holder and lock bolt. The fluid will not leak under pressures up to 200,000 pounds.

British Empire Sales, Morris & C. C. & Co. Ltd., 26, Finsbury Square.

P. U. University Ala B22

Prof Arthur Bander
Dept. of Physics and Electrical Engineering, Univ. of Alabama.

The Hall Mfg Co
1600 W. 12th St.
Toledo, Ohio.

FIFTY MILLION MILES COVERED BY AIR TRANSPORT LINE

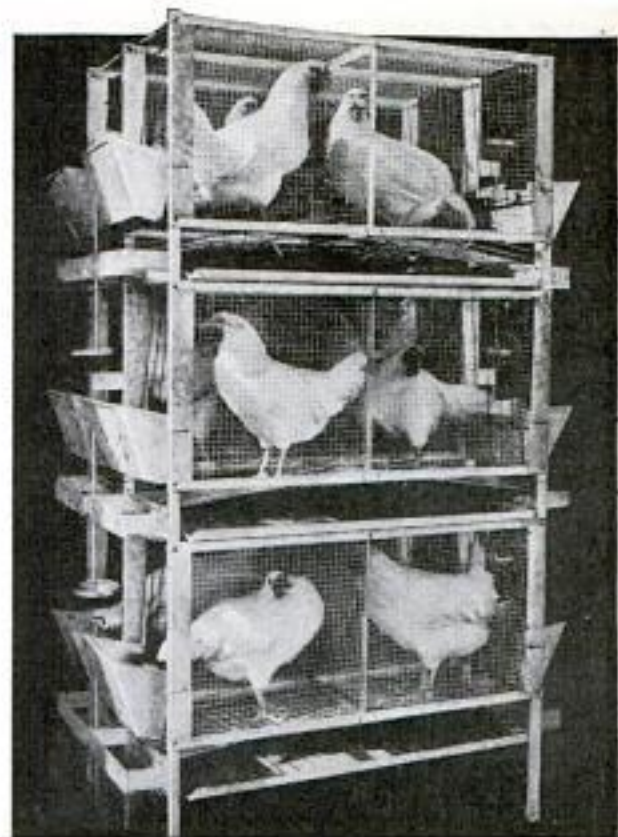
By completing 50,000,000 miles of flying; the United Air Lines recently became the first air-transport company to attain that mileage record. Another record was the completion of 23,000,000 miles of night flying, more than that recorded by eight European nations combined. The total mileage is equivalent to 210 trips from the earth to the moon. During the six years required to pile up this record, the company carried 10,000 tons of air mail, 275,000 passengers and several tons of express shipments. It is expected the next 50,000,000 miles will be flown within the coming three years.

ENVELOPE FEEDER AND HOLDER ATTACHES TO TYPEWRITER

Attached to most standard typewriters in less than fifteen minutes, an envelope feeder and stacker enables the operator to address from twenty-five to fifty envelopes, cards or circulars in about half the time required by ordinary methods. The turning of the typewriter roller brings up the envelope already addressed and stacks it, at the same time bringing the next one in position for typing. The main part of the attachment can be lifted off so the typewriter can be used for other purposes than addressing letters.



Envelope Feeder and Stacker for the Typewriter Which Saves Time in Addressing Letters



This Hen Pen, Built Apartment-House Style, Permits Keeping More Birds in Smaller Space

INDIVIDUAL CAGES KEEP HENS HEALTHY AND CLEAN

Individual cages for hens are arranged apartment-house style, with two, three or four floors or decks, in a poultry plant that keeps the birds healthy and clean. The cages are of metal with woven wire floors, individual feed hoppers and access to fresh running water. Eggs, when laid, roll down the slightly inclined floor into a metal tray where they cannot be broken. Since the cages are arranged in tiers, two to three times as many hens can be kept in a given space as in an ordinary hen house. Cod-liver oil is included in the ration of the fowls, so sunlight is of little importance. The hens never leave the cages.

SALMON OIL TWICE AS POTENT AS COD-LIVER PRODUCT

Twice as potent as cod-liver oil in fighting rickets, the widespread childhood disease, salmon oil can be extracted cheaply from waste of the salmon-canning industry. The oil contains twice as much vitamin D, which is necessary in preventing and curing rickets, as the cod-liver product. Rickets is a bone disease.

Dr. Martha M. Elliott
U. S. Children's Bureau
Dr. E. M. Nelson
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B2208
B2198
M. H. Arndt
235 Riverside Dr.
Drenton N.J.

B2210
Wald Gram 11/15

Filey
Main St
Minneapolis, Minn
11-15

B2209 Holey Infy Co
11-15 Main St. 28
416 Minneapolis, Minn

POPULAR MECHANICS

DISK SEEDER FOR SMALL FARM IS OPERATED BY HAND

\$12.50



Hand-Operated Disk Seeder for Small Farm or Garden; Note the Row Marker Which Can Be Swung to Either Side of the Seeder, and Is Adjustable

Light in weight and easy to operate, a disk seeder run by hand has been found an efficient implement for the home garden or small truck farm. The disks are so designed that only a small number are required to plant the different kinds of seeds, and the seeding is accurate because there is no clogging due to any complicated mechanism. The arrangement of the furrow opener beside the drivewheel keeps seeding at uniform depth over uneven ground, and this furrow opener is adjustable for depth. An unobstructed view of the seeds dropping into the ground is possible at all times, and a row marker, swung on a pivot, can be placed at either side of the seeder, and is also adjustable. The planting disk is locked to the drivewheel axle and is the only moving part; hence there are no delicate adjustments to make. Five disks of various sizes are furnished.

and Peru's navy comprises three cruisers, a destroyer, four gunboats and six submarines. Switzerland actually has a navy, despite the jokes about it. It consists of fast small vessels for patrol work on Lake Geneva. Austria now has no seaports and is without a navy, Finland started its new navy by borrowing a gunboat and Estonia with a single sloop. Holland's navy consists of twenty-four submarines, most of them on patrol duty in the East Indies. The sale of old battleships by great naval powers to smaller ones is nearly a thing of the past, because the small nation is demanding smaller, faster and more economical vessels. Old battleships now are used mostly as targets to give naval men an opportunity to study the vulnerable parts of such a craft under fire.

SINK CONTAINS EXTRA SECTION FOR RINSING DISHES

B2205

Germany is producing a washstand or kitchen sink containing a special compartment fitted with a hot-water faucet emitting a spray. This division is used in the sink for rinsing washed dishes. When employed as a washstand, it becomes a separate section for brushing the teeth. There is also the usual drainboard for the sink.



no 12 urgent demand

ONE-BOAT NAVIES

Many nations today have "navies" consisting of only one boat. Panama's naval establishment is one steam yacht, lightly armed, and it is now for sale. This craft is manned by two caretakers. Ecuador has one gunboat, manned by fifty-three officers and 264 men, Mexico has five gunboats

Sink with Compartment Fitted with Faucet Emitting a Fine Spray for Rinsing Dishes

Nautical Magazine
November, 1932

Erfo Fabrik Iserehste
Breda, Germany.

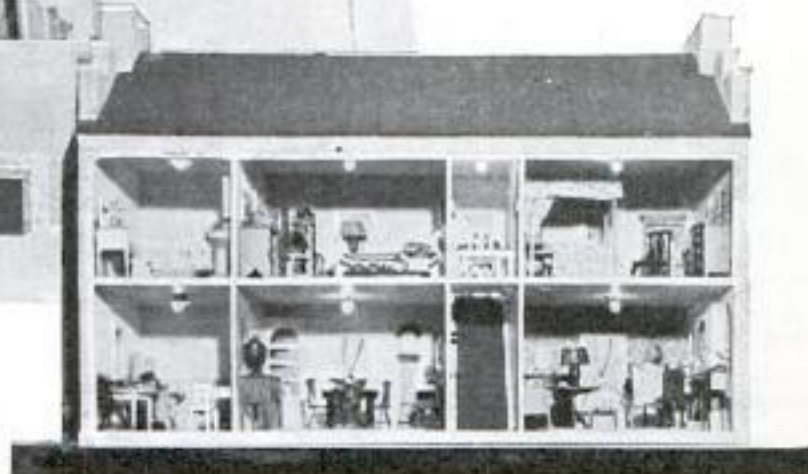
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B2131

DeLano and Aldrich
 126 E. 38th St New York City
 POPULAR MECHANICS 417

Doll Houses Are Now Designed by Architects

One New York firm of architects with too many expert draftsmen has found jobs



Examples of Doll Houses Designed and Constructed by Professional Architects; the Miniature Houses Are Planned and Built Like Real Homes and Each Is Equipped with Electric Lights While All Floors Are Carpeted

for the excess workers by creating a department devoted exclusively to the designing and making of doll houses. These miniature homes conform in nearly every respect to the exacting standards required in the planning of real houses, and since the draftsmen were experienced in building miniature models of homes to show clients, there were no special adjustments for them to make except to devote all their time to this work. The doll homes are constructed of three-ply pine board, to prevent warping, and finished on the outside with stucco, or with paper representing brick or clapboards. The sizes range from a two-foot cube to models four feet long, two and one-half feet high and twenty-eight inches deep. Certain standard models are always available for duplicating, but those desiring an individual design can order blueprints drawn up and submitted for approval. The architects do all the work except the actual cutting of the boards. This task is performed by boys of a craftsmen's school. Each room is pa-

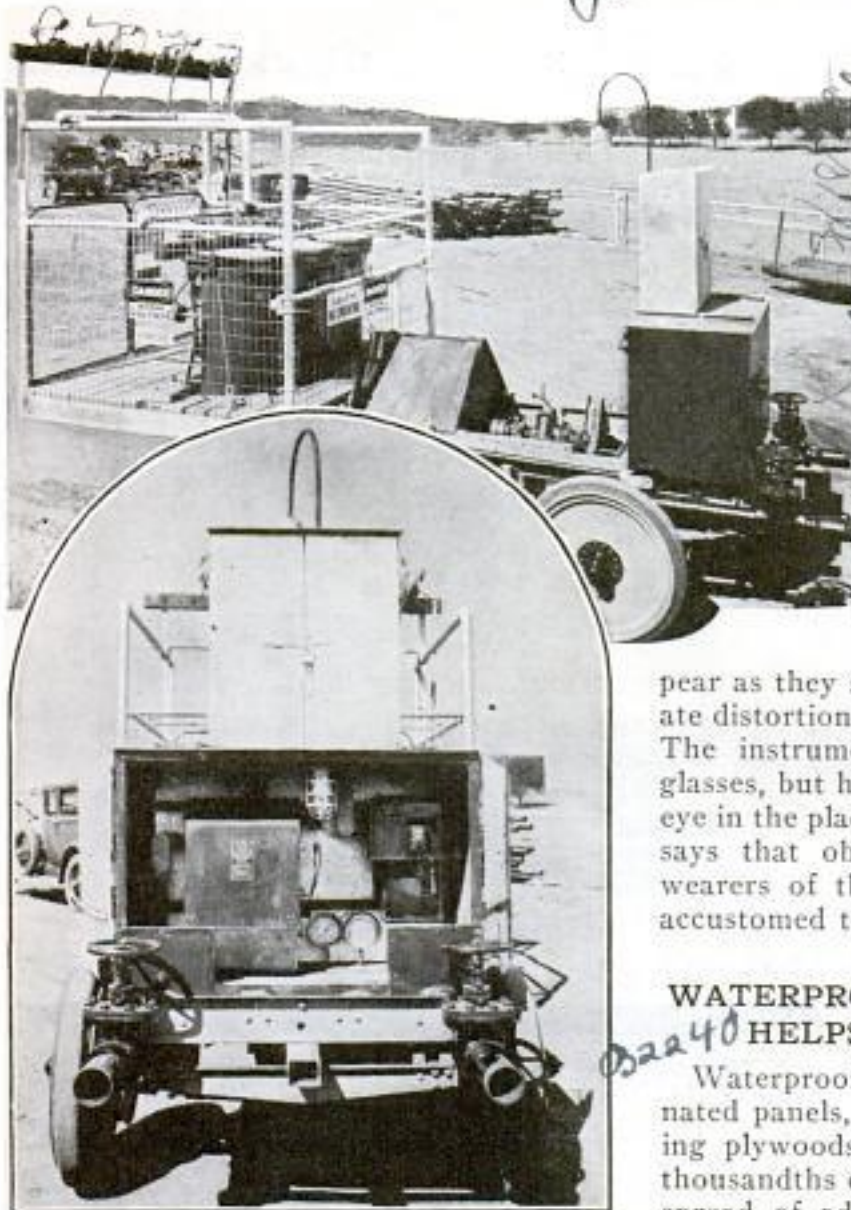
pered with a different design; walls, roofs and partitions are glued; celluloid is used for windows; woodwork is painted; electric wiring is installed, and floors are carpeted. The doll home is wired for current and a child has only to plug in an extension cord to light every room.

HANDY WRIST STRAP FOR TEES SAVES TIME OF GOLFER B32204



Golfers need no longer search through pockets or golf bags for tees if provided with wrist straps for carrying the pegs. The leather strap is worn like a wrist watch and not only supports the arm but has handy holders for four or five tees.

The New
 Box 136
 (A. Island)
 The New
 Riv. See Co.,
 Chatham Point
 Canada



Two Views of Portable Oil-Well Pump; It Is Moved as Easily as a Truck

OIL-WELL PUMPS ON WHEELS SAVE BUILDING EXPENSE

Portable oil pumps that can be moved with the ease of an automobile have been introduced as an economy measure in the Oklahoma field. By moving the pumps from well to well, the industry eliminates the expense of permanent pumping houses. The mobile units came into use when oil production was limited in an effort to improve market prices.

TELESCOPE GLASSES AID BLIND ONLY TWO PER CENT NORMAL

Persons whose eyesight is only two per cent of normal and who are considered almost totally blind, can be returned to

N.Y. Herald Tribune
12/19/32

normal occupations by use of telescopic glasses. While the principle has been known for a long time, its application to low vision has not been possible, due to distortion. Remote objects were made to appear closer to the observer, so persons wearing telescopic glasses could not use them satisfactorily while moving. They could read, but not pursue any occupation. In the new glasses, described by Dr. William Feinbloom, of New York, objects appear as they should, the result of deliberate distortion of a small part of the image.

132236
The American Academy of Optometry

The instruments are worn as ordinary glasses, but have three lenses before each eye in the place of one. Doctor Feinbloom says that objects will seem wider, but wearers of the new glasses will become accustomed to this.

WATERPROOF GLUE IN SHEETS HELPS APPLY VENEERS

Waterproof glue for building up laminated panels, applying veneers and bonding plywoods is supplied in sheets, five-thousandths of an inch thick, so the same spread of adhesive is obtained over the entire surface. The glue is used in a hot-plate press without adding water or moisture. The bond is not affected by termites, molds, atmospheric moisture or decay. Thin light veneers may be used with no chance of staining. Panels bonded with the glue may be placed in hot water and steamed without injury.



Glue in Sheets Is Useful for Bonding; It Is Applied by Hot-Plate Press

132240
Tego Ishrefitru, Inc
Seve Haute Truid Bldg
Tetre Haute, Indiana

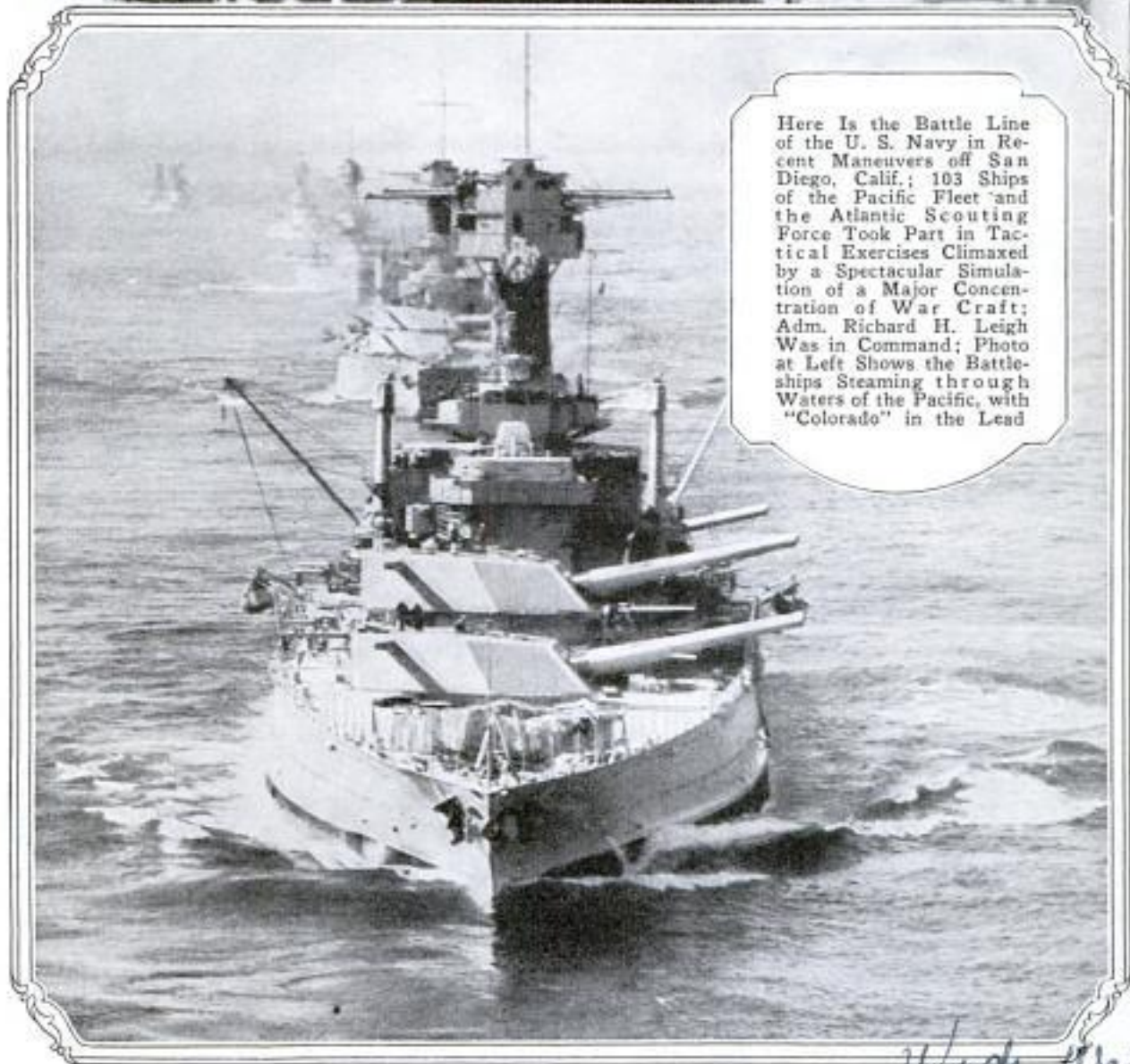
132245
Rec. sent. 12/29

Warships Leaving Base for Tactical Exercises

Sailors aboard U. S. Battleship Determine Wind Conditions by Checking the Flight of Gas-Filled Balloons



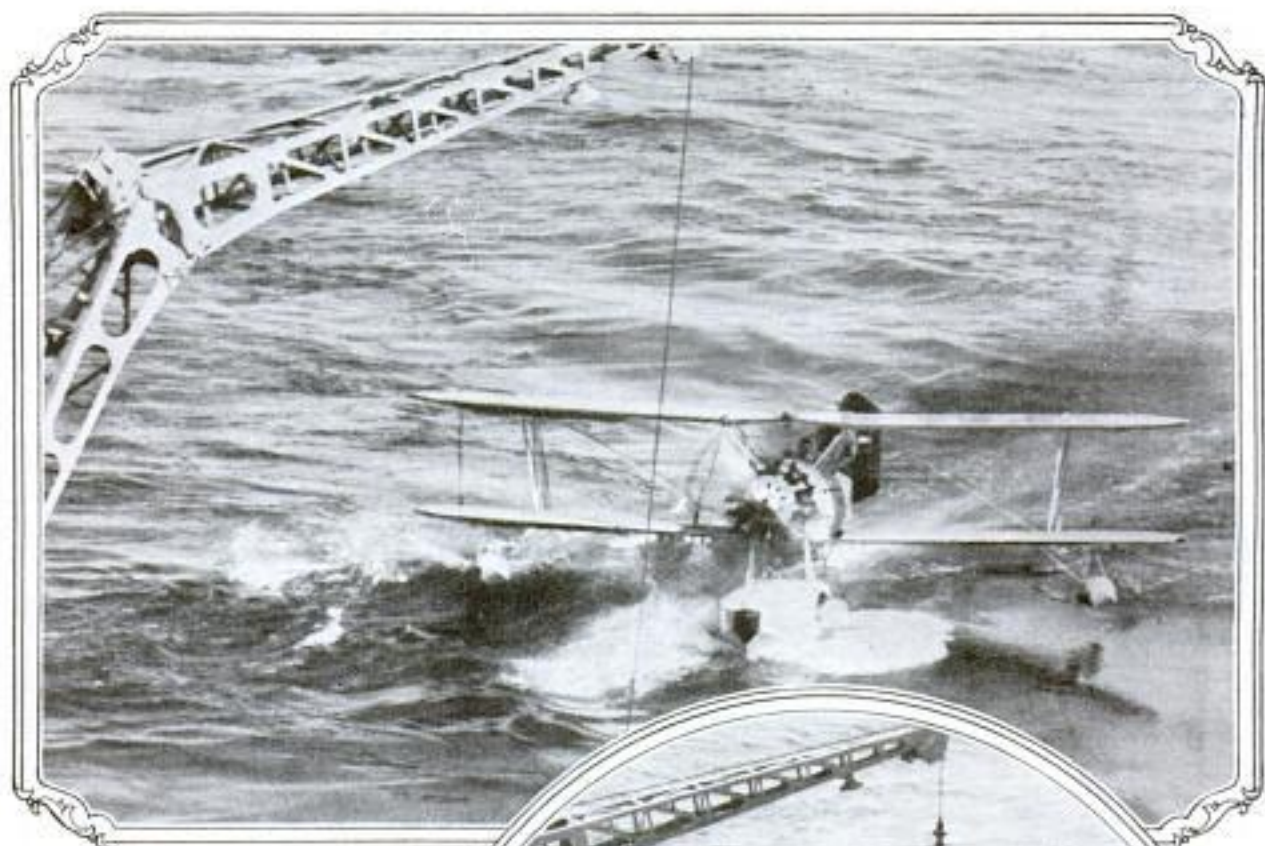
Here Is the Battle Line of the U. S. Navy in Recent Maneuvers off San Diego, Calif.; 103 Ships of the Pacific Fleet and the Atlantic Scouting Force Took Part in Tactical Exercises Climaxed by a Spectacular Simulation of a Major Concentration of War Craft; Adm. Richard H. Leigh Was in Command; Photo at Left Shows the Battleships Steaming through Waters of the Pacific, with "Colorado" in the Lead



Wick Worka

82063

When U. S. Fleet Puts to Sea for Maneuvers



Top, Observation Plane Is Shown Taxiting Up to the "West Virginia" to Be Hoisted on Board; Note the Crane in Position to Swing the Aircraft onto the Deck

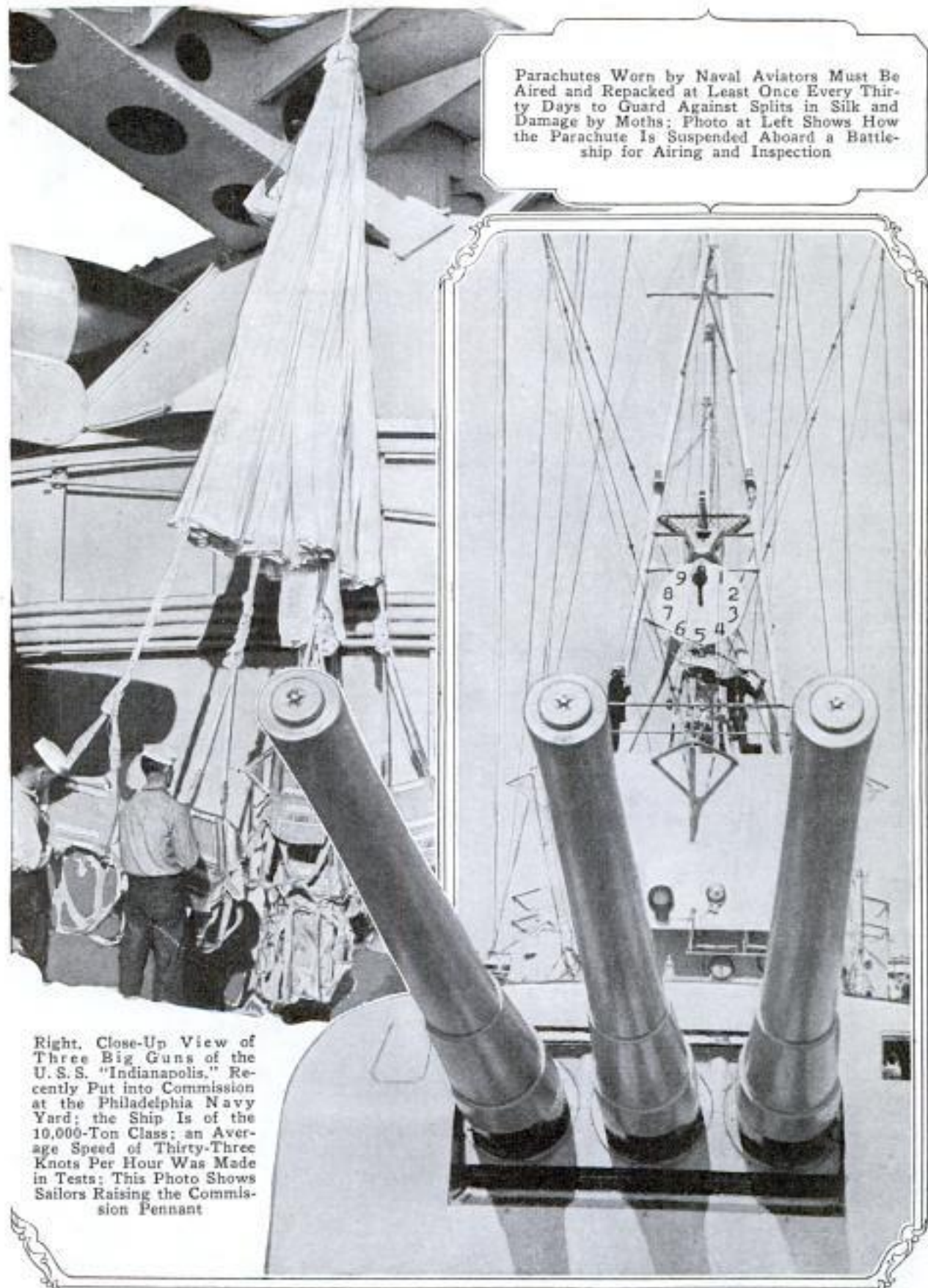


Left, Lieut. Comm. Charles Rosendahl Prepares for a Flight; His Plane Is on the Catapult. Ready for Take-Off; Above, a Plane Being Hoisted to the Deck of a Battleship after Taking Part in the Fleet Maneuvers



Wide World

Airing Chute and Guns of the "Indianapolis"



Parachutes Worn by Naval Aviators Must Be Aired and Repacked at Least Once Every Thirty Days to Guard Against Splits in Silk and Damage by Moths; Photo at Left Shows How the Parachute Is Suspended Aboard a Battleship for Airing and Inspection

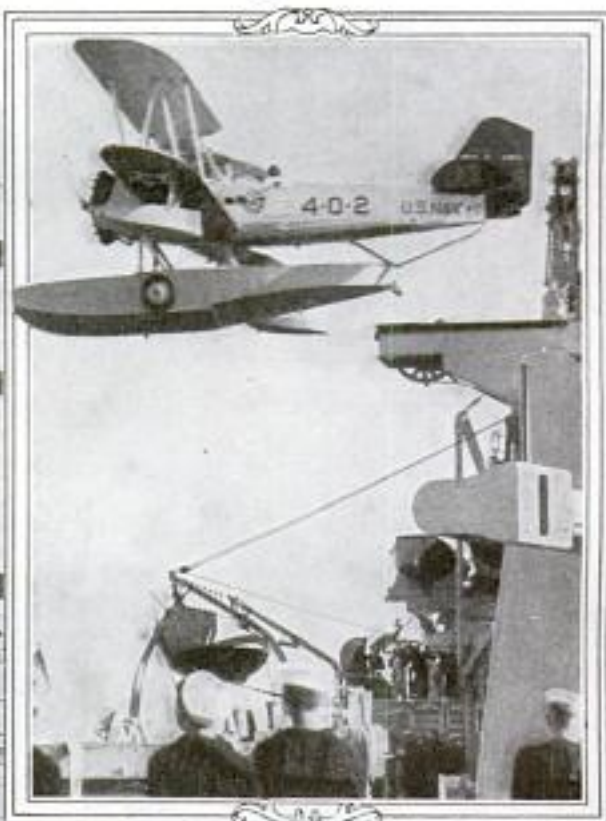
Right. Close-Up View of Three Big Guns of the U. S. S. "Indianapolis." Recently Put into Commission at the Philadelphia Navy Yard; the Ship Is of the 10,000-Ton Class; an Average Speed of Thirty-Three Knots Per Hour Was Made in Tests; This Photo Shows Sailors Raising the Commission Pennant

Wide World

Eyes of the Fleet as Seen During Maneuvers

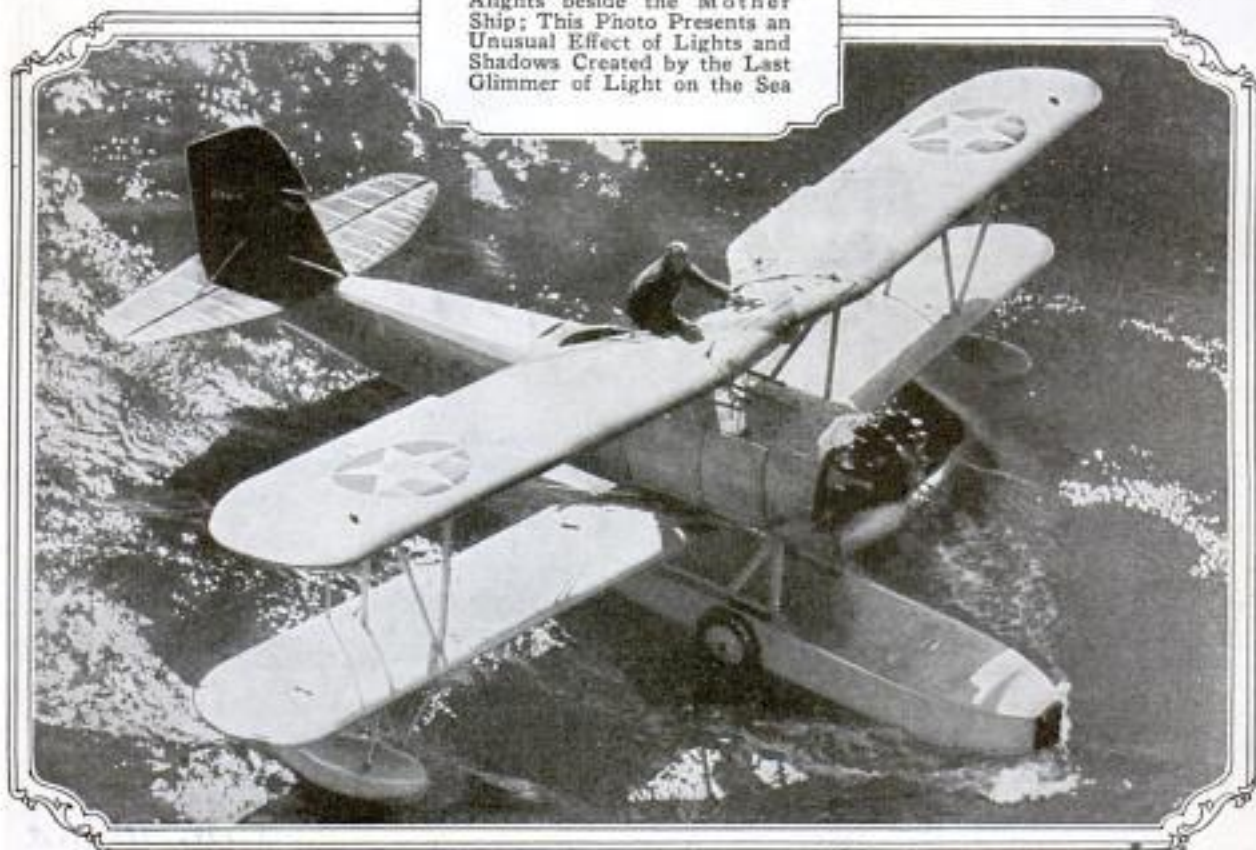


Back from an Observation Flight over the Fleet, This Plane Is Being Placed in Position on the Catapult in Readiness for Another Take-Off



One of the "Eyes of the Navy" Leaving the Deck to Fly to the Airplane Carrier for Refueling; This Photo Was Snapped Just as the Craft Was Catapulted

At Sundown, the Last Plane Alights beside the Mother Ship; This Photo Presents an Unusual Effect of Lights and Shadows Created by the Last Glimmer of Light on the Sea



Wide World

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St. London W1 England

Science Service mail 12/22/32

HAYSTACKS SET AFIRE BY GAS FROM FERMENTATION

032264

How haystacks catch fire through spontaneous ignition, causing a loss to American farmers of approximately \$20,000,000 a year, is explained by Dr. C. A. Browne of the U. S. department of agriculture. The first thing that happens is the conversion of part of the starch and cellulose in the hay into sugar, which then ferments. Buried deep in the stack, beyond reach of outer air, the fermentation takes place under oxygen-deficient conditions and does not proceed to the normal end. Instead of the complete chemical breakdown into carbon dioxide and water, the fermenting process produces complex gases rich in carbon and hydrogen but lacking in oxygen. At the same time, the surrounding layer of hay acts as a heat insulator, driving the stack's temperature higher. If a little oxygen reaches the gases, they absorb it, generating still more heat. If they are kept blanketed in until a large supply of air suddenly is admitted, the gases are apt to react with the oxygen so energetically as to produce flame, setting fire to the dry hay.



Apparatus Like a Stereopticon in Which Slides Are Manipulated to Correct Eye Defects

PICTURE SLIDES HELP CORRECT DEFECTS IN VISION

Children with crossed eyes and some other defects in vision are being treated with an apparatus resembling a stereopticon which induces them to take eye exercises by providing amusement. The instrument is known as a synoptophore and accommodates picture slides which the child manipulates in an effort to get a lion in a cage or a butterfly in a net, and in so doing, unconsciously exercises his eyes.

HEAT ADDS TO BEAUTY OF PINE BY IMPROVING FINISH

032071

Intense heat increases the beauty of southern-pine products by improving the finish. A special treatment brings out clearly the grain, the hard part standing



Samples of Pine after a Special Heat Treatment That Emphasizes the Grain

TERRAPINS ARE STORED IN BOX FOR WINTER'S SLEEP

What to do with her terrapin pets during the winter months was solved by an Ontario woman. Small wooden boxes were lined with cotton, the terrapins were laid in rows on the cotton and covered with another cotton layer. On top of this was placed a second row of turtles, and so on, until the box was filled. The box was covered with a blanket and stored in the cellar. There the terrapins sleep through the winter.

(Russia is experimenting with making shoe soles of viscose.

out distinctly from the soft. For furniture, the pine can be given a satiny smooth finish that takes stains or varnishes.

Frost Lumber Industries
Shreveport, La

Science News Letter Nov. 12, 1922

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Hospital
New York City
5th Ave and
105 St

Science News 11/29/32

B32233 Cont. H. S. Wilkins, Esq
Colombiere, 29 Dean Road
424 Besley Heath, nr. Loughborough
POPULAR MECHANICS

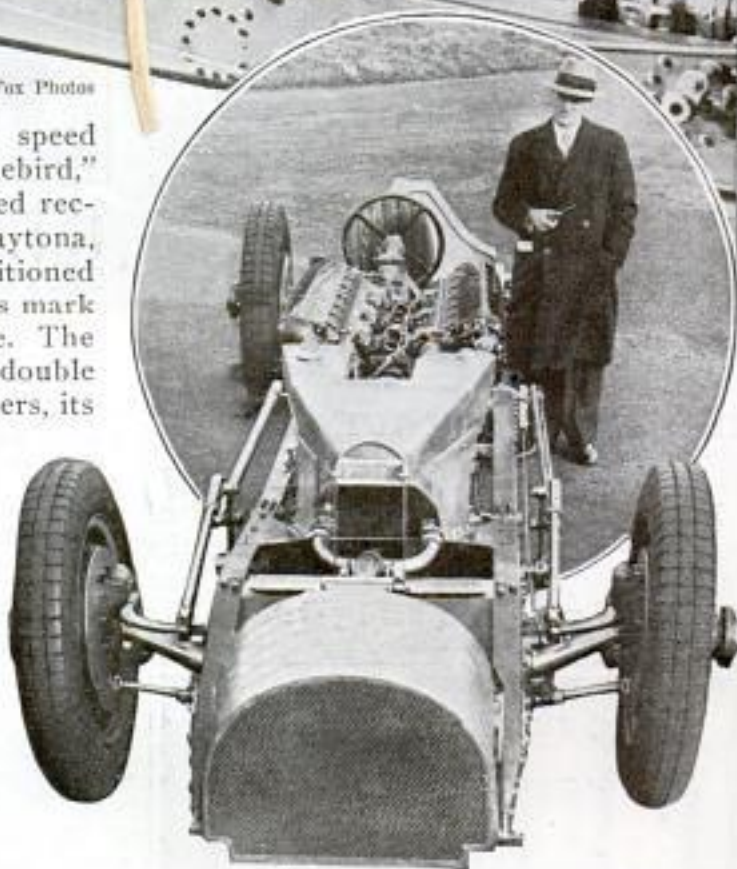
Race for Higher Speeds on Land and in Air



Two Views of the Rebuilt "Bluebird" in Which Sir Malcolm Campbell Hopes to Set New Speed Record; the Car Has a Double Bank of Twelve Cylinders and Develops 2,500 Horsepower

© Fox Photos

Sir Malcolm Campbell, British speed king, is after new records. His "Bluebird," in which he established a land-speed record of 253.9 miles an hour at Daytona, Fla., has been rebuilt and reconditioned in preparation for an assault on this mark of more than four miles a minute. The "Bluebird" is now equipped with a double bank of twelve supercharged cylinders, its Rolls-Royce engine developing 2,500 horsepower, compared with 1,400 generated by the previous power plant. The engine is very similar to that of the seaplane which won the Schneider cup air race, and the car has also been changed in other respects. There are six carburetors, a duplex steering gear, a huge offset gear box, and a vacuum motor brake. Every bolt, nut and particle of steel has been carefully inspected because this car travels faster than thought, and the driver has no time to think if something goes wrong. A nerve impulse speeds to the brain at 180 feet a second, it has been estimated, but the "Bluebird" has already exceeded this speed twice over. While Sir Malcolm plans his attack on his own land-speed record, both American and European aeronautical engineers are experimenting with stratosphere planes and rocket ships intended for speeds of from 2,000 to 3,600 miles an hour. Such speeds are possible, it



© Sport and General

is believed, many miles above the earth, where air resistance is at a minimum and atmospheric conditions are constant. The problem facing designers of such ships in rarefied regions is to produce an air screw which will revolve in such a thin atmosphere. Of course, superchargers would be used, and passengers would need to travel in hermetically sealed gondolas. German rocket-plane makers say rocket machines with a speed of 3,600 miles an hour are

B2242

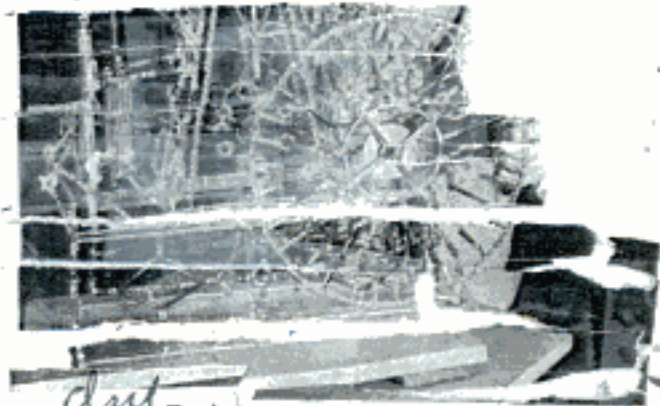
Referring to
Alfred Prather

POPULAR MECHANICS
1625 E. Madison
Seattle Wash.

well within the bounds of possibility, but they have not been able to solve the problem of controlling the rate of combustion by throttle. Until this is solved, rocket planes and rocket cars are likely to be perilous and impracticable. Marine engineers believe the ocean liner has nearly reached its limit of speed. Fifty years ago, ocean greyhounds crossed the Atlantic in seven days. In 1932 the "Bremen" crossed in four days, seventeen hours and eight minutes. Locomotives actually are traveling no faster than in 1905. Their speed is limited by the tracks, but it is predicted that the future railroad will be a monorail that the high trains will run at higher speeds.



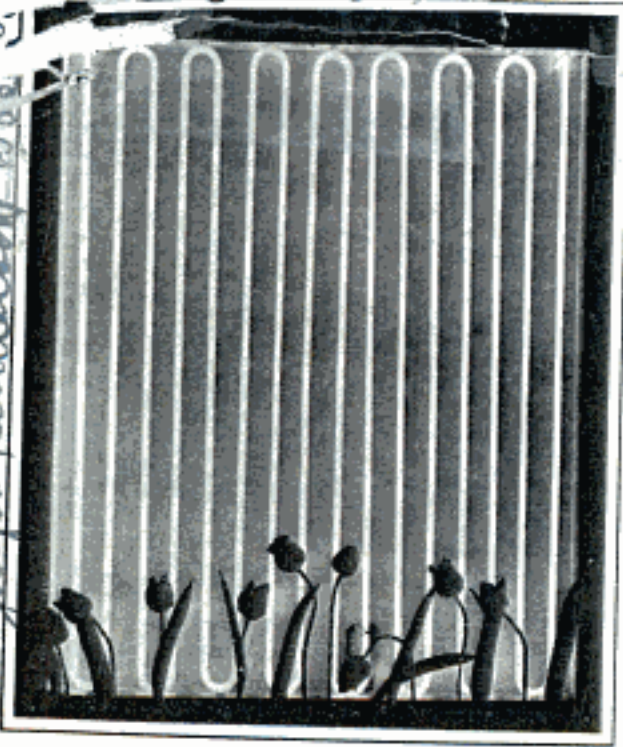
man



LIGHT OF SUN REPRODUCED BY CARBON-DIOXIDE GAS

Artificial daylight for home, factory and illumination has been developed by using carbon-dioxide gas in a clear-glass tube as the carrier for electrical current. This man-made sunlight is less expensive and more practical than fluorescent lamps even when used with present lighting frequencies. It is practical in a wide range of applications, it is claimed, from floorlamps to tubes eighty feet long into existing outlets.

Julite



Carbon-Dioxide Gas Is Used in This Glass Tube for Producing a Light Like That of the Sun

Developed by Island Rodenck
B.C. Beck and Osgood
Packard

Glass Steam Engine, Which Contains 1,700 Parts and Develops Surprising Power for Its Size

STEAM ENGINE MADE OF GLASS HAS HUNDREDS OF PARTS

Running like a full-size engine, a model constructed entirely of glass has been made by a California glass blower after two years of labor. It is modeled after the walking-beam engine used in ferryboats and side-wheel river-steamers, even pistons, bearings, cylinders and rods being made of glass. It has 1,700 parts made of fifteen colors of glass and generates a surprising amount of power for its size.

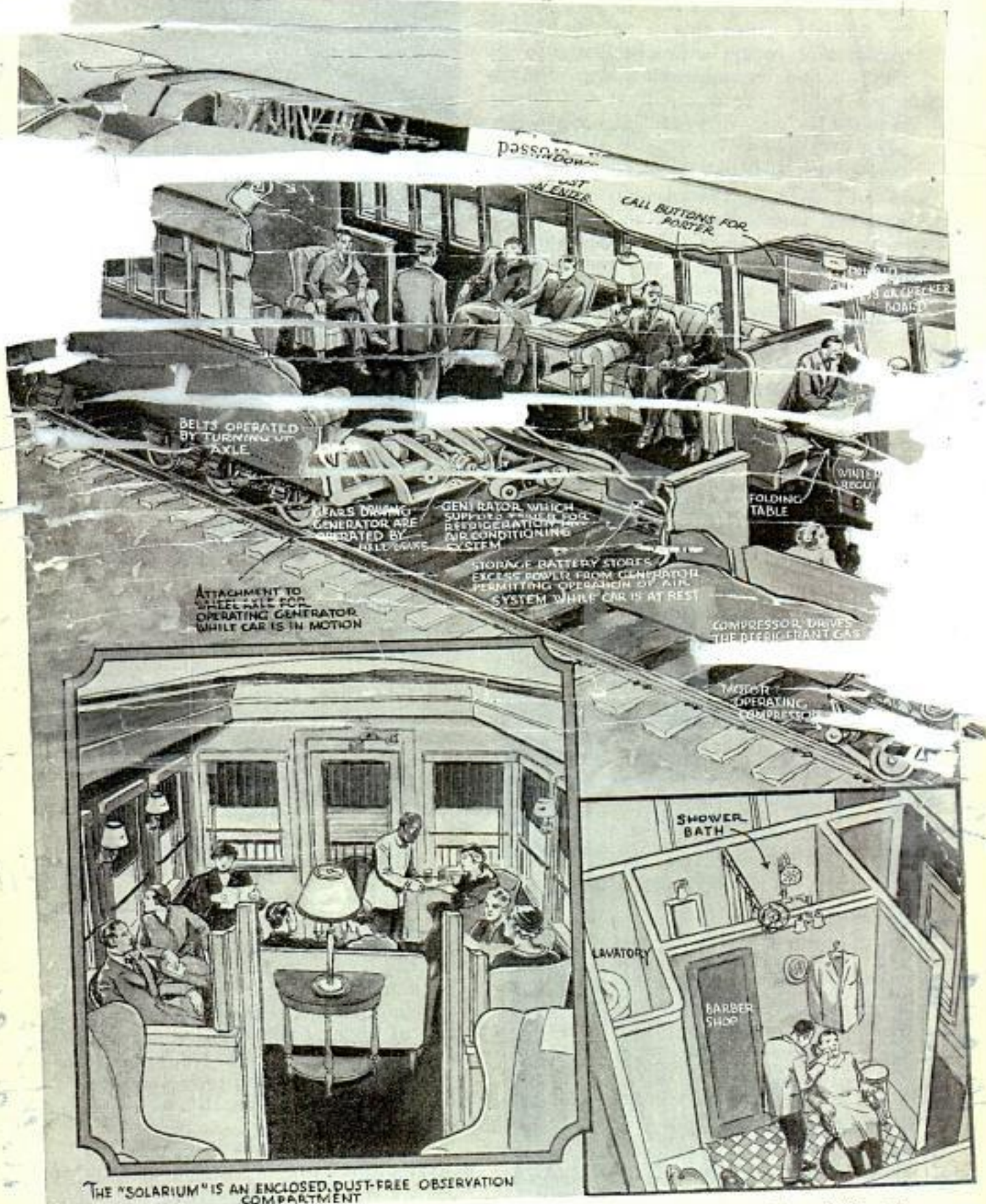
MOUNTAIN NINETY MILES AWAY SEEN FROM SWISS LAKE

From the shores of Lake Neuchatel, Switzerland, situated 1,400 feet above sea level, Mont Blanc, about ninety miles distant, can be plainly seen in clear weather. The mountain is nearly 16,000 feet high. From mountains in the district at elevations of about 6,000 feet, Alpine ranges can be seen, for 125 miles from the Hoch-Sentis in Appenzell canton, Switzerland, 8,215 feet high, to Mont Blanc in south-east France.

Eskimo and Indian women in isolated parts of Alaska buy the latest styles in clothes from a flying merchant who carries a stock of dresses to them by airplane.

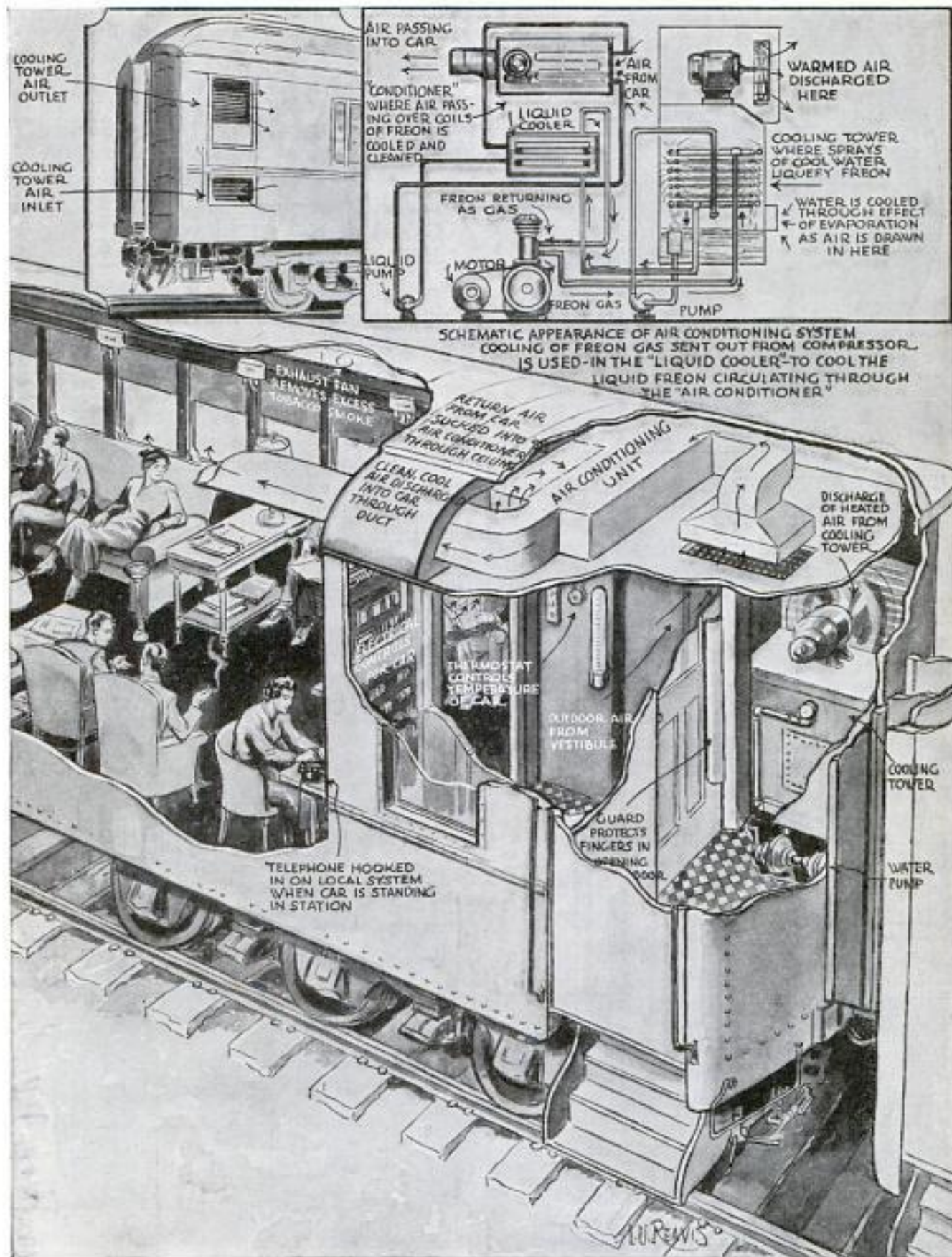
John
Christopher
7055
Columbus

Modern Rail Car Offers Comforts of Home



Top, Cross Section of Luxurious Observation-Lounge Railway Car with Sunroom, Barber Shop, Buffet, and Other Features; Note Arrangement for Generating Power to Clean, Cool and Circulate Air in Coach

Air Control Banishes Train Smoke and Dust



SCHMATIC APPEARANCE OF AIR CONDITIONING SYSTEM. COOLING OF FREON GAS SENT OUT FROM COMPRESSOR, IS USED IN THE "LIQUID COOLER" TO COOL THE LIQUID FREON CIRCULATING THROUGH THE "AIR CONDITIONER"

Drawings Show Air-Control System in Modern Railway Car; Top, Right, Apparatus for Cooling and Cleaning Air by Means of Freon, a Refrigerant; Note That All Windows in the Car Are Kept Closed



New Type Which Is Said to Be Easy for Blind Persons to Learn to Read

TYPE EASY FOR BLIND TO READ USED IN PRINTING

Type that is easier for the blind to read than the Braille has been developed for use in a new publication intended for sightless readers. Designated as "moon type," it is simple and more easily learned by the aged blind. J. Robert Atkinson, blind operator of the Braille Institute of America, is working toward early production of the new publication. The Braille Institute now publishes two monthly magazines printed in Braille. Both carry world news, articles on travel, exploration, science and invention, bits of humor and occasionally a short story.

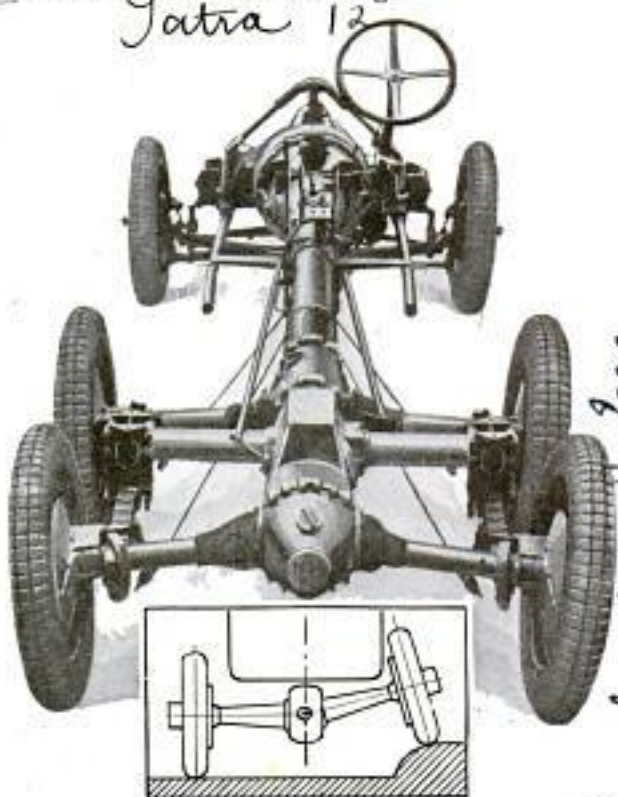
INSECTICIDE FROM U. S. WEED IS HARMLESS TO MAN

Discovery that the devil's shoestring, a common weed in the eastern half of the United States, contains "rotenone," a powerful insecticide, is regarded as significant for farmers, both as potential growers of the plant and as users of the poison. Rotenone is harmless to man. It formerly was found only in tropical plants. The devil's shoestring bears the botanical name *Gracca Virginiana*, and also is known as the wild pea. The weed grows from New England to Minnesota and as far south as Florida. It thrives on poor, sandy soil. The poison is found in the root. Cultiva-

tion of the weed is expected to make the United States independent of foreign sources of insecticide containing rotenone. Spray material, containing about five per cent of the poisonous matter, has sold recently for \$10 per gallon. One gallon of the material is diluted to make about 800 gallons of spray, which is highly effective in greenhouses, at truck farms and for combating parasites on animals.

B2229
AUTO HAS NO AXLES OR FRAME BUT CONQUERS BAD ROADS

Smooth riding on rough roads is one advantage of an automobile that has neither axles nor frame. The wheels are independently sprung, while a tube, connecting the rear wheels to the engine and front wheels, replaces the frame. The driveshaft is inside this tube. A top speed of eighty miles per hour is claimed. The body is not upholstered, springs being considered unnecessary because the independent spring system gives comfortable riding at high speed over bumpy roads. The rear wheels are mounted on cantilever springs, while the front wheels are on transverse springs, the purpose being to keep the tires in constant contact with the road to avoid skidding.



Insert Shows How Frame and Axleless Auto Goes over a Bump in the Road

Capt. St. Fitzmaurice,
 Lt. Col. H. J. 1229, High
 St. St. John's Wood, Eng

Los Angeles, Calif

U.S. Dept. Agriculture
 12/21/32
 Mr. E. P. Clark Insecticide
 Div. Bureau of Chemistry
 and Sals.

London, N.W. 1, Eng

aterial

B218 7 Assigned by Senator Emerson
L Richards

Atlantic City, N.J.

World's Largest Organ Has Seven Manuals

Atlantic City's seven-acre municipal auditorium now boasts the world's largest pipe organ, a mammoth instrument containing 32,882 tubes and costing nearly \$400,000. Three years were required to build the organ, some of the tubes weighing a ton each, while others were so large they had to be built in the chambers prepared to receive them. The auditorium, seating 41,000 persons, called for volume and intensity of tone never before required, the farthest portions being 500 feet from the organ. Although the building is equipped with a public-address system, the organ was constructed to provide adequate volume without amplification, and the resulting distortion of sound. To do this, it was found necessary to provide a tone about six times more powerful than any other existing pipe organ, and this has been accomplished despite



Console of Great Pipe Organ in Atlantic City Auditorium; the Organist Controls Seven Manuals and One Set of Pedals

claims that no pipes could be made strong enough to withstand the terrific pressure needed. Tuning the great organ was found a difficult process, because each one of the more than 32,000 pipes had to be tested over and over again, and only one man could work at this task at a time. The largest of the wood pipes is nearly sixty feet long and the biggest metal one has a length of nearly thirty-five feet. The organist controls seven manuals and one set of pedals, which is equal to playing eight separate instruments at the same time. No organ with seven manuals has ever before been built, and there are few with five manuals, four being the average size of theater organs. The instrument is disposed in eight locations about the auditorium, and there are two consoles, one

at each end of the stage on rotating platforms. The two consoles permit playing of the organ by two artists and enable its operation from different locations.

Chromatex
**COLORED-RUBBER FLOOR MATS
 BRIGHTEN AUTO INTERIOR**

B32222

Colored-rubber floor mats now are being offered to brighten the interior of the automobile. The color is impregnated in the rubber and will not wear away. The most popular combination is a brown mat mottled with silver, which matches nearly any color of upholstery used in modern cars. The mats are produced in five sizes, with and without felt backing. They can be tailored to fit the car with the aid of special mat-cutting tools.

B. F. Goodrich
 Akron, Ohio

Making Home Tasks



Baby Is Protected from Cold, Yet Exposed to Health-Giving Rays of the Sun in Solarium Above; It Fits in Window; Safety Rail around Back Keeps Child from Falling Out; a Special Glass Admits Ultra-violet Light That Supplies Vitamin D, Helping Prevent Rickets; Sun Baths Should Be Given under Doctor's Directions



Liquid Shoe Polish Is Applied Easily When the Can Is Fitted with Applicator, as Shown Above; Shears for Thinning Hair, Shown Below, Make Uniform Cutting Possible



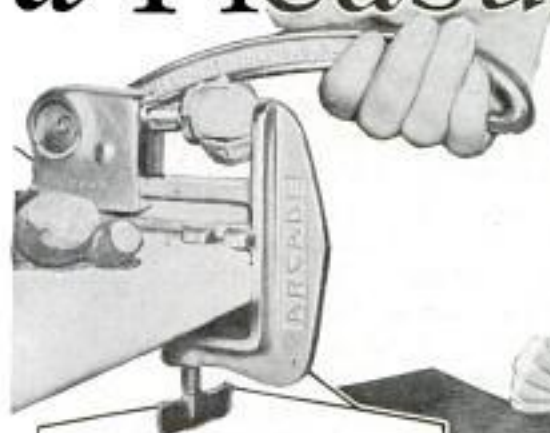
Noodles May Be Made in Six Minutes with Automatic Device at Left; Screwing Down Cover Forces Noodles through Perforations into Cooking Pan



Square Egg Poacher Above Steam-Poaches Eggs to Fit the Toast; the Aluminum Pan Also May Be Used for Frying or Baking; at Right, Oven Built into Radiator Is Handy for Keeping Foods Warm or for Taking Chill from Dishes; in This Way, the Housewife May Make Double Use of Heat Used in Warming the Home



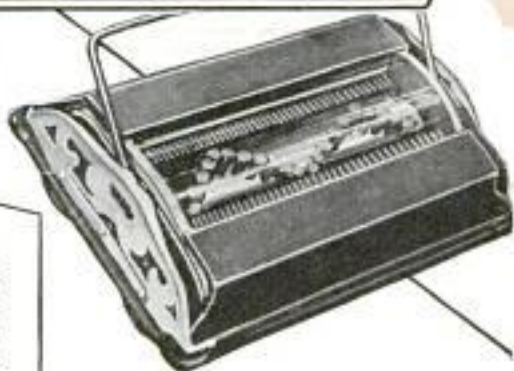
a Pleasure



Nutcracker That Clamps on Table, as Above, Is Adjustable to Any Size Nut; It Cracks Only the Shell; Right, Six-Sided Pillow Affords Six Separate Positions for Resting; Three Different Heights Are Provided; Angles Support the Back, Shoulders and Head; Pillow Does Not Slip



Carpet Sweeper at Right Has Open Face so Operator Can See When Dust Pans Need Emptying; Pressing a Button Empties the Pan



Left, Perforated False Bottom for Cooking Utensil Prevents Food from Burning or Sticking; Right, Dealer Places Hand before Each of Four Players When Handle Is Turned; Made of Non-Breakable Metal, the Dealer Can Be Supplied in Several Colors



Cont. Day Plain
R. 3407, Munitions Bldg

432
B2180



ably the Only Memorial to a Telegraph Pole Line; It Stands near Washington, D. C.

MONUMENT TO TELEGRAPH LINE MARKS HIGHWAY

Marking Telegraph road about twenty miles south of Washington, D. C., a wrought-iron tablet stands as a monument to a telegraph line. An inscription on the tablet tells readers that the telegraph line was part of the Washington-New Orleans Telegraph Company's system back in 1847. The monument is near Mount Vernon, the home of George Washington.

B2044 **CITY DWELLER GROWING DEAF BECAUSE OF NOISE**

City dwellers are growing deaf rapidly, losing the finer shades of hearing, and, unless noise abatement is put into effect soon, they will be some day able to hear only loud and harsh sounds, like those produced by subway and elevated trains, street cars and automobile trucks. Dr. William Braid White, acoustical engineer of the American Steel and Wire Co., has found that daily riders of the subway trains are losing their sense of hearing, insofar as the finer tones are concerned. Subway trains produce more noise than any other feature of the modern city, Doc-

tor White's tests show, while the commercial truck in poor condition adds greatly to the din of street travel. Flat wheels on subway and elevated trains and street cars increase the din. In order to save future generations from partial deafness, Doctor White says, sound insulation must be used. By insulating tracks from concrete, by lining subway-tunnel walls with sound-absorbing materials and by keeping rolling stock in better condition, transportation companies might be able to reduce subway noises by as much as seventy per cent. The trackless trolley, with its rubber tires, is meeting the demand for quiet street cars. Introduction of the rubber-tired coach on American railroads is another step toward silent travel, eliminating the rumbling and pounding of heavy train wheels on steel rails. Liberal use of rubber and sound-absorbing materials will help save the future citizen's sense of hearing, yet the cost need not be high. For instance, blast furnace slag which has been discarded as waste for many years has been converted into an excellent sound-insulation product that resembles cotton. Compressed into various shapes, it can be applied wherever a noise absorbent is required. Business offices are being constructed with sound-proof walls, doors, windows and ceilings and fitted with equipment that is practically noiseless, contributing to the general movement to protect the nation's ears.

SOLDERING-IRON STAND SAVES BY REGULATING HEAT

B2226

Economy in power consumption by the soldering iron is attained in a stand that regulates the heat. There are two cradles, one to keep the iron at the minimum soldering temperature for immediate use and the other applying the entire voltage of the power line. This eliminates overheating and consequent pitting and corrosion of the tip. Use of the stand is said to make it possible for the tip of the iron to remain well tinned for weeks.



2088 La Salle Chicago - In Laboratories
1731 Belmont Ave Chicago

B2137

Denver Post 12/7/32

RUBBER MODEL OF HOOVER DAM FOR PRESSURE TEST

Pressure that may be expected at Hoover dam will be tested long before the great project is completed. A rubber model, constructed of a mixture of pure rubber and lead oxide, has been built in the laboratories of the University of Colorado to test the static pressure of water against the dam and against the wall of the canyon in which the project is located. A scale of one inch to fifteen feet is followed, the model being about four feet high. Forty-two thousand pounds of rubber slabs, each an inch thick, were used in the model. The mixture closely resembles concrete in weight and resistance to pressure.

Boulder Colo B2061 BUILDING LIKE BIG BROWN JUG HOUSES FILLING STATION

To advertise his business, a Virginia filling-station owner has constructed a huge replica of a "little brown jug" in the form of a building. He also conducts a small store in the two-story jug.



Two-Story Brown Jug in Virginia Which Houses a Filling Station and a Small Store

Owner - A. E. Hughes
East Ocean Drive
Virginia



\$ 7.00

Here's How the Twin Sail Is Used by the Skater; It is Adapted to Tacking into the Wind and Sailing Before It; the Frame Folds

FOLDING SAIL FOR THE SKATER IS CARRIED EASILY

Tacking into the wind or sailing before it is made easy for the skater by a double sail that can be folded for carrying. There are two canvas sails that give thirty-two square feet of wind surface, about all a boy can hold in a strong breeze. The frame is eleven and one-half feet long.

HENS LAY MORE IF FED IODINE IN SMALL QUANTITIES B2171

Iodine causes increased egg production when administered to hens in small quantities. In an experiment in Germany, an increase of four per cent in yield resulted from feeding hens a daily ration of two milligrams of potassium iodide. Instead of the usual amount of iodine found in the eggs, from four to seven milligrams, the eggs obtained in the experiment contained from 300 to 400 milligrams. In addition, the percentage of hatched eggs increased to eighty-eight to ninety-two per cent, as compared with seventy-six to eighty-four per cent for hens given no iodine. Most of the iodine in the eggs was concentrated in the yolk. That iodated eggs may figure in the new therapeutics in Germany is indicated by the experiment.

reported by
Consulting General
W. L. Sprue
Hamburg

Wolverine Novelty Co
122 N. College Ave
Hartford, Pa

Dept of Commerce
12/2/32

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B2086 Cmt George F. Paul.
 537 S. Dearborn
 Chicago



Here Are Some of the Masks Which Are Finding Favor for Decorating the Home, as Shown Here, and for Party Use

LIFELIKE MASK IS LATEST FAD FOR HOME OR PARTY

Lifelike masks, fashion's latest fad, are used for decorating the home or to take the place of portraits. In addition, they may be used at parties, a normally shy person finding a new personality behind a new face. An English singer, Gladys Marloe, produces such masks as a hobby.

SUPER-STEEL SOUGHT IN TESTS WITH EXTREME COLD

How to produce super-steel is sought in experiments with the effect of extreme cold on the metal. Dr. Alexander Goetz, of California, is using a temperature of 272 degrees below centigrade, within one degree of the point where all heat vanishes, in an attempt to stop the movement of electrons within steel by chilling. If the electrons can be halted, or "put to sleep," as Doctor Goetz says, the revelation of the secrets of steel can be expected when the temperature is slowly increased and the electrons resume their dance. Heat only stimulates the electronic movement, making it more difficult for scientists to study the crystal structure and to produce improved metals. Advances made in this new line of study cause research workers to believe that it may be possible to pro-

duce steel perhaps a hundred times stronger than the best metal of today. Doctor Goetz uses liquefied helium to obtain extremely low temperatures.

B2098
AUTO FOR RAIL OR ROAD HAS TWO WHEEL SETS

Travel on rails or roads is possible with an automobile equipped with two sets of wheels, one having the conventional rubber tires and the other set being of metal with flanges like those used on railroad cars. The change from one set of wheels to the other is made by a power take-off controlled by a lever from the driver's seat. The wheels, being eccentrically mounted on the axles, can be raised or lowered at will and the car can be driven onto

and off of a railroad track at any point where crossing planks have been placed. In one form, the car is equipped with a chain drive, but in another there is a shaft drive so arranged that it is in gear with whichever set of wheels are on the ground or rails. The time needed to change from road to rail travel is said to be less than fifteen seconds.



Auto with Flanged and Rubber Wheels Which Can Be Lowered and Raised for Rail or Highway Travel

Nelson Roadrailer Co
 Sanpoint, Okla. material

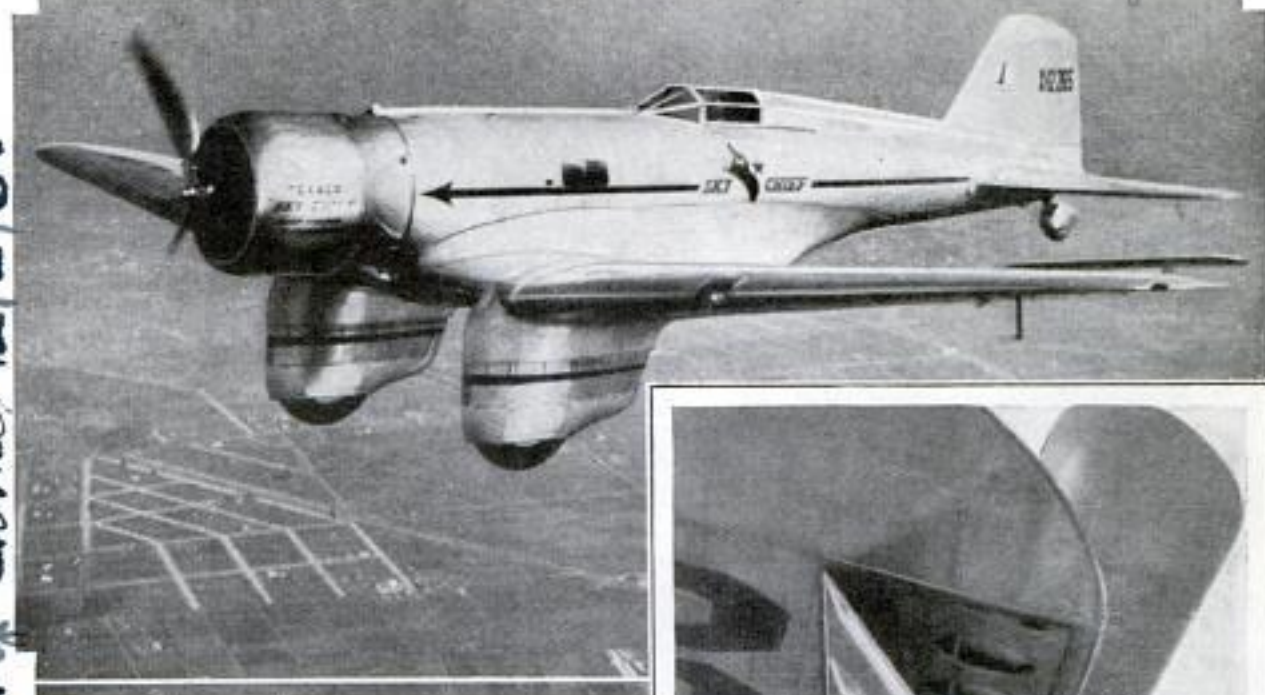
California Institute of Technology Pasadena

Indianapolis Star
 11/27/32

B2157 Built by Jack Northrup

announced at Los Angeles Municipal Airport

NY Times 12/2/51



Frank Hawks' Latest Ship Intended for High Altitudes; Right, Wing Flaps to Reduce Landing Speed

AIR-CONTROLLED 'ROBOT PILOT' RELIEVES HUMAN FLYER

One of the features of the big all-metal, low-wing monoplane recently completed for Lieut. Comm. Frank Hawks, noted speed flyer, is an air-controlled "robot pilot" designed to relieve the regular pilot during long flights. The plane is intended to travel at high speeds at altitudes possibly 20,000 feet above the earth and is the nearest thing to a practical stratosphere plane now in the air. The ship has a gasoline capacity of over 600 gallons, sufficient to send it on a non-stop flight of 3,000 miles. Its weight, loaded for a take-off, is 7,200 pounds, the wing span is forty-eight feet and it is thirty feet long. It has a fourteen-cylinder motor of 700 horsepower and wing flaps to be lowered for a quick landing, slowing the ship's speed



enough to reduce landing distance to a third of the normal. Wings, fuselage and control surfaces are covered with riveted aluminum, and it is hoped the craft can hurdle the nation without a stop for refueling at a speed of more than 200 miles an hour.

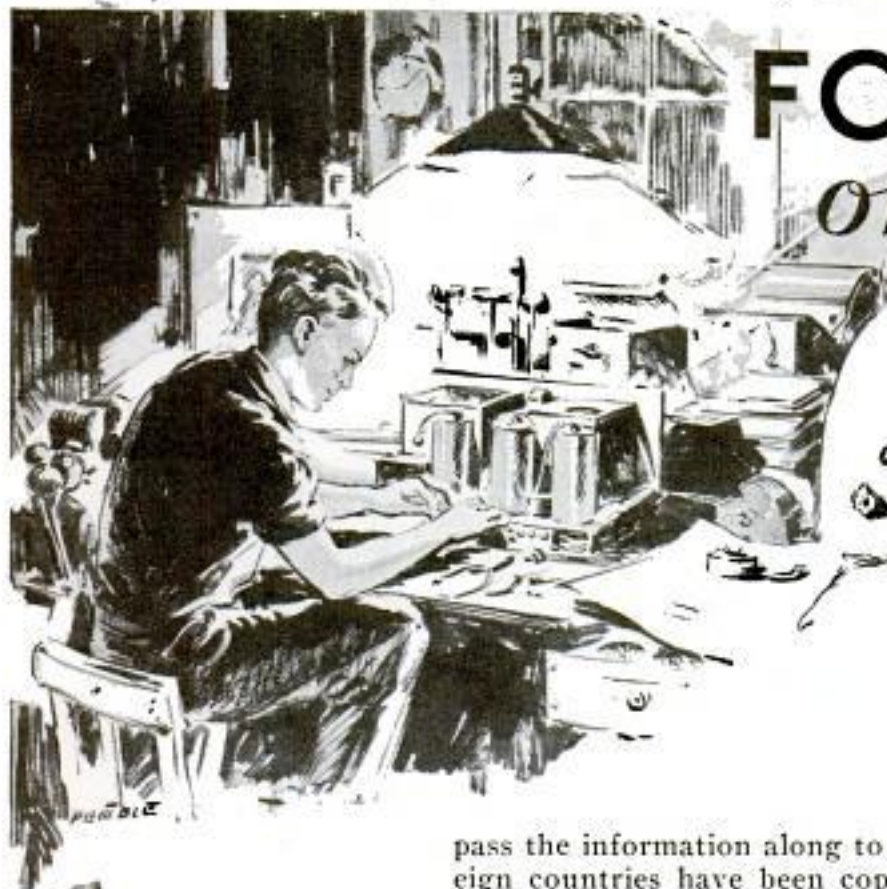
PLANTS WHICH FORM PEBBLES FOUND IN STREAM BEDS

B2133

Plants which strain minerals out of running water and build the deposits into pebbles have been found near Washington by the geological survey. The plants are so tiny that, if placed in a row like shrubbery, about 200,000 of them would

be required to fill one inch of space. They are a variety of the blue-green algae, believed to have been among the earliest living things on earth. Like larger plants, the algae have the power of building up carbohydrates out of carbon dioxide and water with the aid of chlorophyll, the green coloring matter in leaves. Sunlight also enters into the process.

NY Herald Tribune. 11/27/52



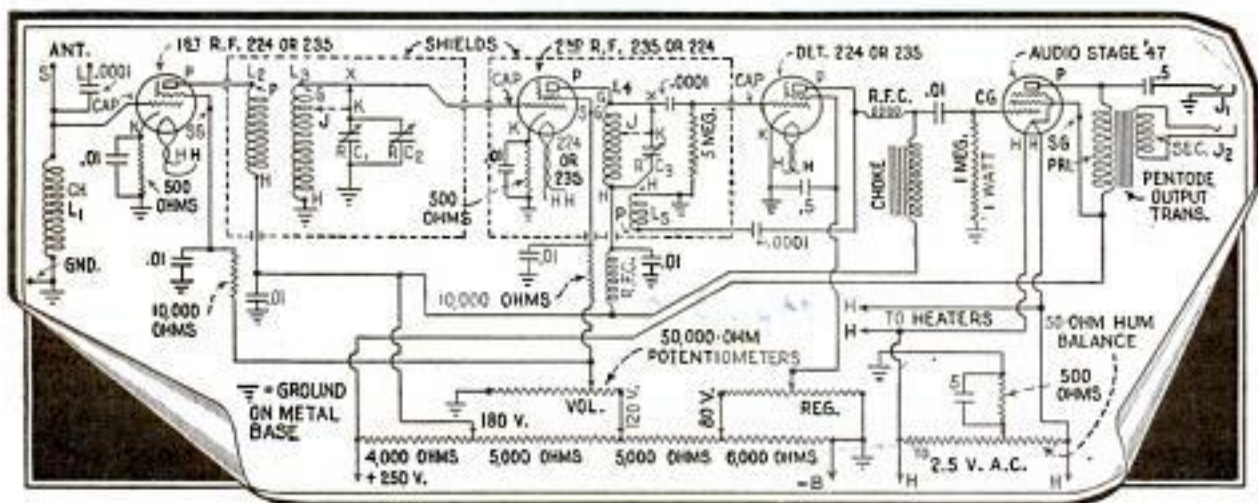
FOREIGN *on a Ten-*

PART I

BEING an amateur and also interested in short-wave reception in general, I desired a DX receiver that would be selective and have plenty of volume. I built the set described in this article, and the results have been so satisfactory that I am glad to

pass the information along to others. Signals from foreign countries have been copied using only a ten-foot antenna, but maximum results are obtained by using a doublet system which will be described in a future article. On such an antenna, signals from all over the world have been received with loud-speaker volume.

The wiring diagrams show the component parts of the receiver, and it will be noted that it is a four-tube layout. It consists of one untuned and one tuned r.f. stage, detector and one stage of audio amplification. Type '24 tubes are used for the r.f. stages and detector, and a '47 tube for the audio amplifier. Type '35 tubes may be used in the r.f. and detector stages, without change, but very little difference was noticed between them and the '24 tubes. For single-dial control, the two condensers C_1 and C_3 were ganged on a common bake-



S-W SIGNALS

Foot Antenna

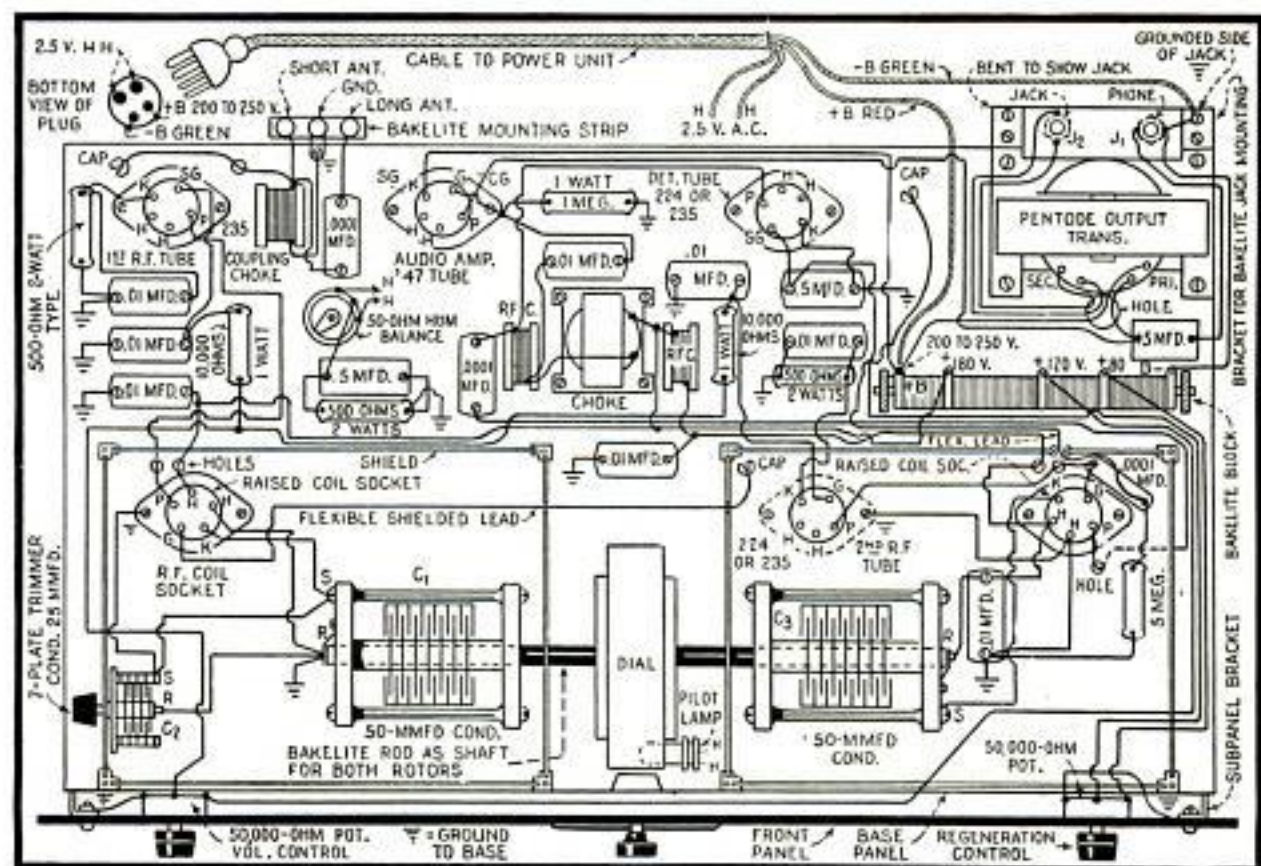
By HARRY D. PICKETT
Constant Frequency Monitoring Station
Grand Island, Nebraska

lite shaft. The condensers in the model were General Radio type 568-K, having removable bakelite shafts, but any condensers of similar description may be used. Contrary to general belief, the two ganged stages are easily made to match.

The various photos show the layout of the receiver, and the simplified wiring diagram shows all parts in their relative positions. Most of the fixed condensers, resistors and connections are underneath the base. The coupling choke, for the audio stage, is also under the base and consists of an audio transformer with the primary and

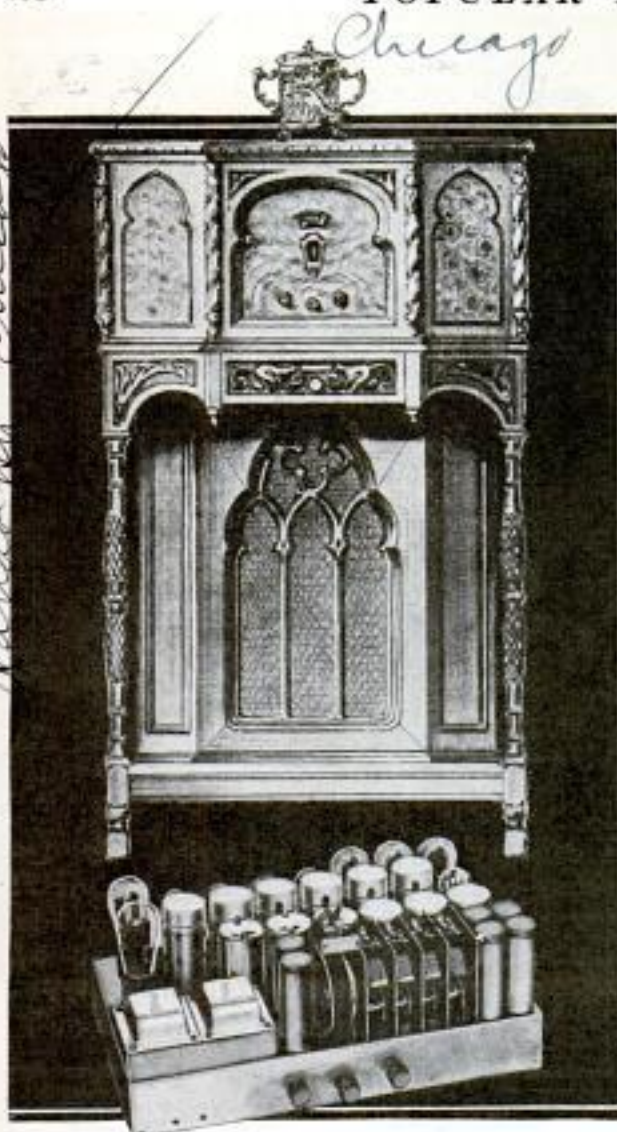
secondary connected in series. The antenna-coupling choke L_1 consists of 75 turns of No. 28 or 30 d.s.c. wire on a 1-in. hard-rubber or bakelite rod. The r.f. chokes are the usual short-wave types,

(Continued to page 136A)



Chicago

Taken over by
Radio Co. 691 W
Randolph Chicago



Sixteen-Tube Superheterodyne with Chassis Removed to Show Tube Arrangement

Receiver Employs Sixteen Tubes and Two Speakers

The unusual number of tubes and speakers in this superheterodyne receiver are not the only features that make it quite different from the usual broadcast set. It also employs two powerful amplifiers, one using four tubes for deep bass, and two tubes in the second amplifier for the treble speaker. It is claimed that this receiver will bring in signals from low-powered stations over great distances, and that the volume, tone and selectivity are all that could be desired. Two degrees of sensitivity are provided, one for ordinary use and the other for extreme distance, especially on very weak signals. A color control is employed for changing pitch. All power units are oversize to insure maximum results. The cabinet is 48½ in. high and 29½ in. in width.

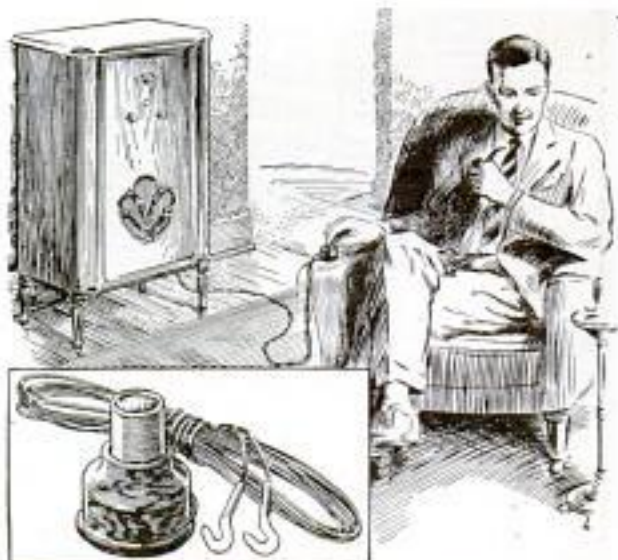
Electric Clock as Radio Control

An ordinary electric clock may be altered to turn on an a.c. radio receiver at any predetermined time. The buzzer, which is operated by the a.c. supply line, is disconnected and the leads from the switch, formerly connected to the buzzer, are attached to a screw-type wall plug into which the receiver is plugged. Next, a small toggle switch, which may be mounted at any convenient point, is connected across the switch in the clock. If you wish to turn on the receiver at 7:00 o'clock, the alarm is set and the toggle switch is thrown to the on-position. The receiver is tuned to the station desired and the volume control adjusted. Then the toggle switch is turned to the off-position, thus cutting out the receiver until it is automatically started at the time selected.

B3126

Push-Button Fades Out Program

Easily attached to any receiver, this small control enables the operator to temporarily fade out the announcer or program without leaving his chair. This fading is desirable if the phone rings or if the operator wishes to converse with persons in the room or call someone in an adjoining room. The push-button resistance unit is attached to a long flexible cord terminating in two flat brass hooks which are slipped over the antenna and ground binding posts. The regular leads to these posts are not disturbed, and the set operates as usual.



Push-Button Remote Control for Hushing Radio Receiver for Short Periods

Alden H. G.
715 Center St.
Brookton, Mass

RADIO LOG is also A GAME



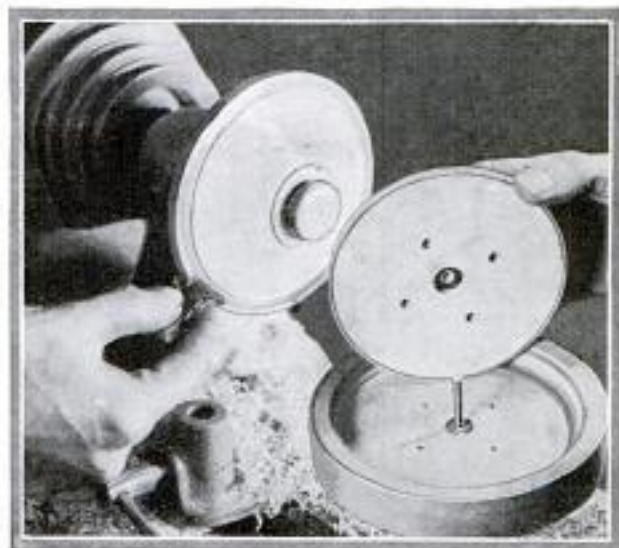
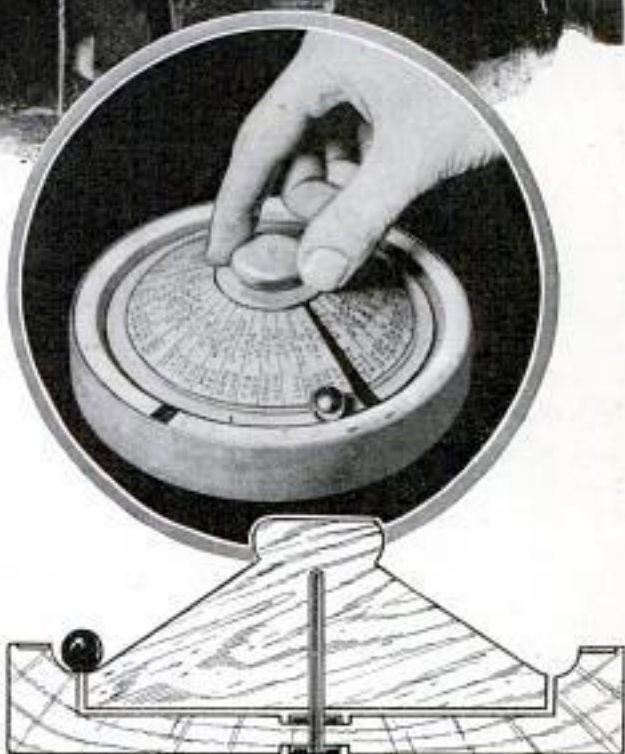
HERE is a useful radio log that not only aids you in locating your favorite programs quickly, but also serves as a game that may be played with several variations. The log consists of a disk mounted so that it can be spun around inside a saucerlike housing.

The rotating disk is divided into sectors approximately 10 degrees wide. In each sector is inscribed a radio station's call letters, distance from the receiver, location and wavelength. Around the rim is a ring of white paper on which the dial settings for your particular receiver are written. One sector and a corresponding rectangle on the paper ring are painted black. To record or determine a dial setting, turn the disk until the black marks coincide, and write in or read off the setting opposite the desired station.

When calibrating the log, make up a list of the broadcasting stations that you desire to tune in and arrange these in sequence according to their wavelength or frequency in kilocycles. The mileage for each station may be obtained from a map or can be secured from one of the distance charts appearing in the call books.

When used as a game, the log is provided with a steel ball or marble which can roll around the trough formed at the junction of the disk edge and the rim of the housing. Spinning the disk makes the ball

(Continued to page 140A)



Economy

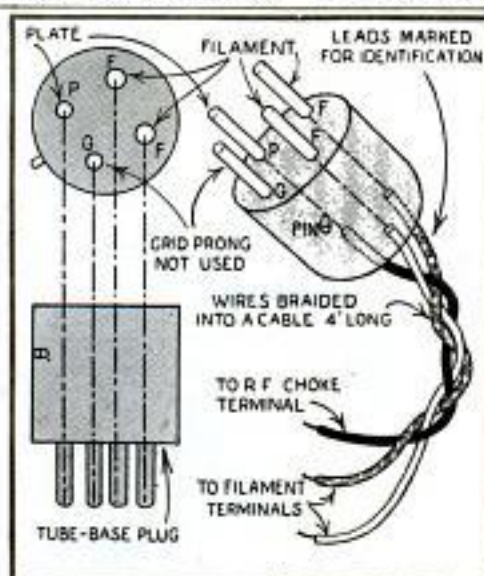
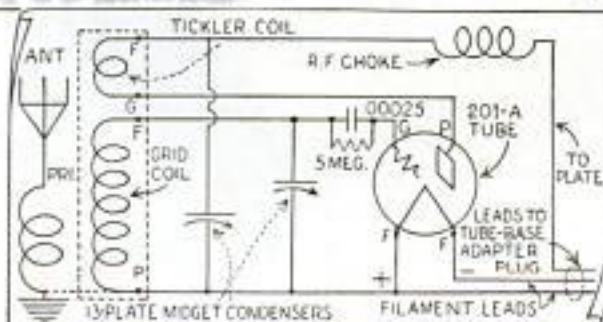
SHORT-WAVE... Converter

PART II



THE optional connection in Fig. 3 of the a.c. short-wave converter, described in the February issue, may be used in case of excessive hum or hand-capacity interference. A vernier dial is required for the tuning condenser as this setting is rather critical for short-wave reception, but an ordinary dial or a knob will do for the regeneration control at the right, this setting being best found by feel and practice.

To operate the converter, the antenna and ground connections are shifted from the receiver to the converter, and in some cases it will be found necessary to use a ground on both. The 227 detector tube is removed from the a.c. set and transferred to the converter; the adapter plug is then plugged into the set-detector socket. It is well to practice tuning with one of the larger converter coils first. The receiver is now turned on, and the regeneration control is adjusted until a whistle is heard. Vary this control until the whis-



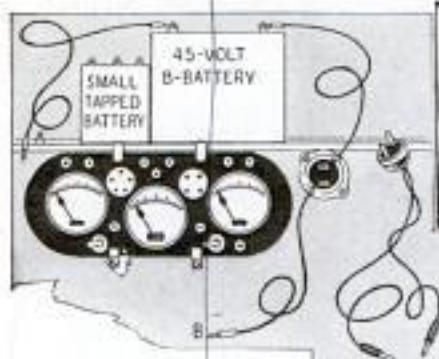
tle, or oscillation, stops. The most sensitive spot is just before the set begins to oscillate. Should oscillation prove unruly, move the primary coil up and down over the plug-in coil until the best position is found. The vernier-tuning dial is then slowly rotated over the range covered by the plug-in coil.

In using this converter, or adapter, with a battery-operated receiver, a few minor changes in the wiring and parts are necessary. A four-prong socket is substituted for the five-prong

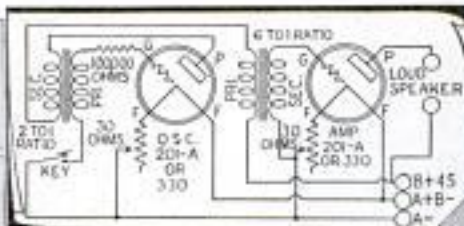
(Continued to page 142A)



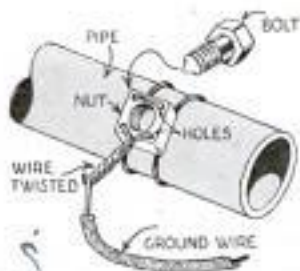
Easy Solutions for Everyday Radio Problems



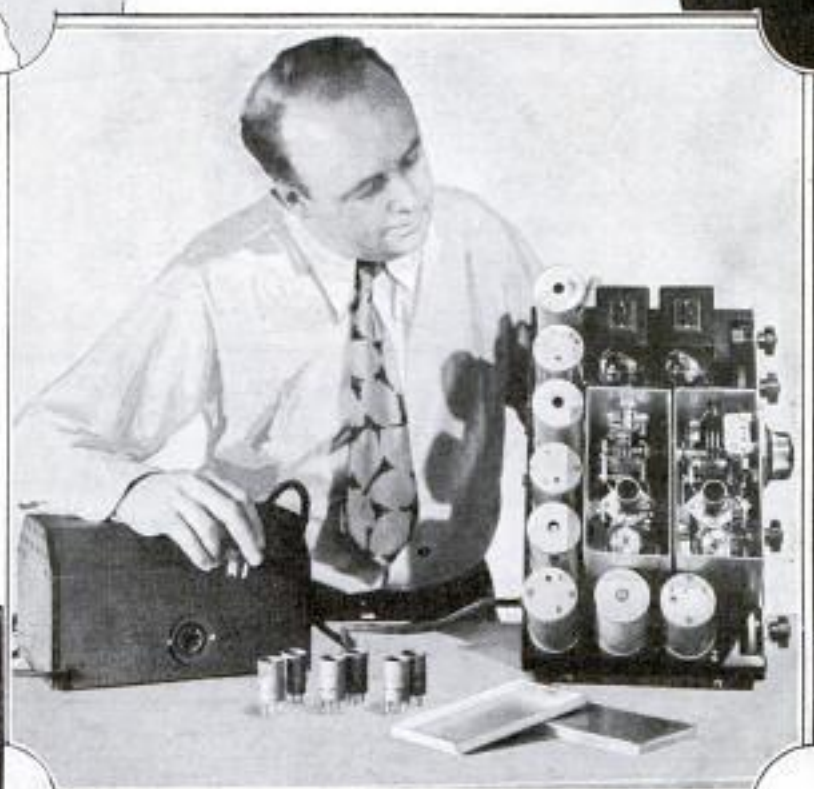
Portable Set Tester, Having Tip Jacks, May Be Mounted above the Bench with Clips to Make Meters Available for All Testing Purposes



Code-Practice Set for Scout Use Has Sufficient Signal Output for Loud Speaker or Several Headphones; It Consists of an Oscillator and Amplifier Made from Discarded Parts



Large Nut and Pointed Bolt Make Good Ground Clamp When Nut Is Drilled and Wired to Water Pipe as Shown



Above, an 8-Tube A.C. Ultra-Short-Wave Superheterodyne Now Available for Listening In on High-Frequency Experimental Broadcasts in the Wave Bands below 10 Meters; Four Pairs of Small Plug-In Coils Cover the Range between 40,000 and 80,000 Kilocycles; the Single Audio Stage Employs Two '47 Pentodes in Push-Pull



Clamps for Forming Shields and Receiver Bases; Light Aluminum or Eraydo Sheets Are Easily Bent as Shown

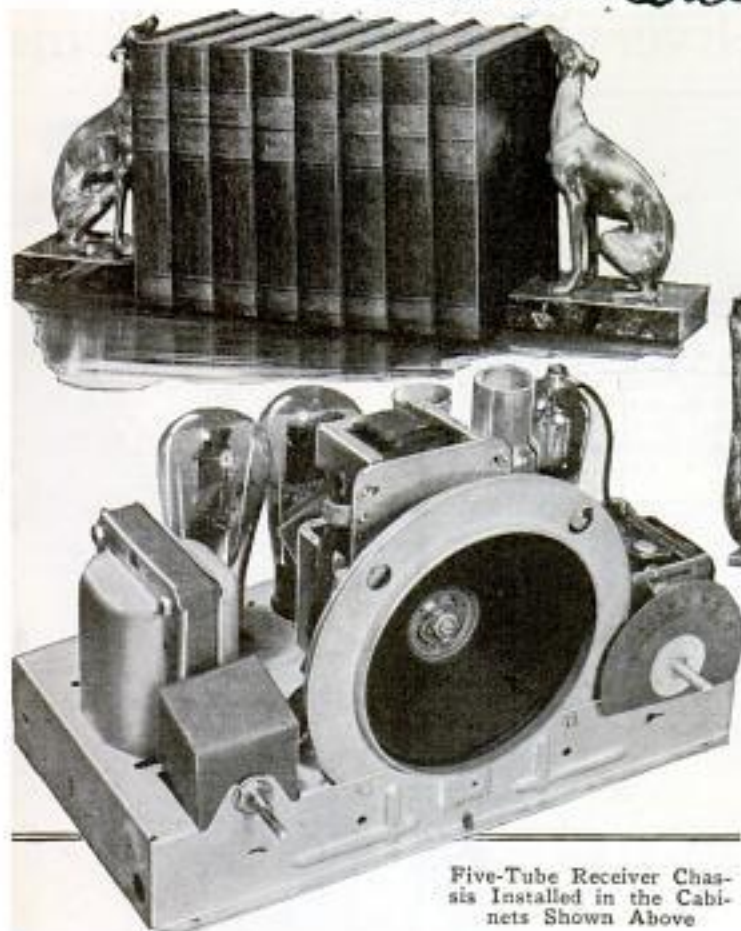


Upper Left, Lightweight Amateur Transmitting Condenser, with Isolantite Insulation; Above, Soldering the Lead-In to the Antenna; the Wire Should Be Scraped Bright and the Joint Well Heated before Applying the Solder



National Company, Inc. 61 Sherman St. Malden, Mass.

National Company, Inc.
61 Sherman St. Malden, Mass.



Five-Tube Receiver Chassis Installed in the Cabinets Shown Above

Radio Receivers of Unusual Design

The bookcase model represents a set of antique leather-bound volumes. The backs of the books are mounted on two swinging doors which, when opened, reveal the



switches and dials. The receiver is operated in the same manner as a conventional table-type set. The jewel-case receiver contains the same type of chassis in a solid-oak chest of old Italian design. When not in use, it appears as a chest for valuable papers, a jewel box or cigar humidor. The five-

tube superheterodyne chassis, shown below, uses the new heater-type tubes with combined volume control and on-off switch. The illuminated hair-line shadow dial at the right is provided with a vernier drive.

3244 Auto Radio-Tube Tester

Although especially designed for auto-radio tubes, this tester is flexible enough to check any broadcast type. The portable utility meter is a combination volt, ohm and ammeter. All voltages are based on 1,000 ohms' resistance per volt; as an ohm-

meter the range is from 0 to 1,000 and from 100 to 100,000. The ammeter range covers all readings necessary for testing. By inserting a rectifying plug, all voltages and currents may be changed to read a.c.



Radio-Tube Tester, and Right, Utility Meter for Auto-Radio Receivers

Condenser as Emergency Water Heater

An old aluminum-plate variable condenser will make an emergency water heater. It is connected in series with the 110-volt a.c. line and suspended in the water by a cord, the rotor plates being adjusted to draw about 600 watts.

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; material lists are always available without charge upon receipt of return postage.

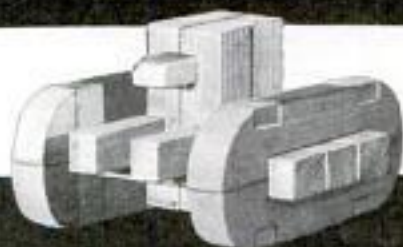
Galvia Mfg Co
847 W Harrison
Chicago



Two Oriental BLOCK PUZZLES

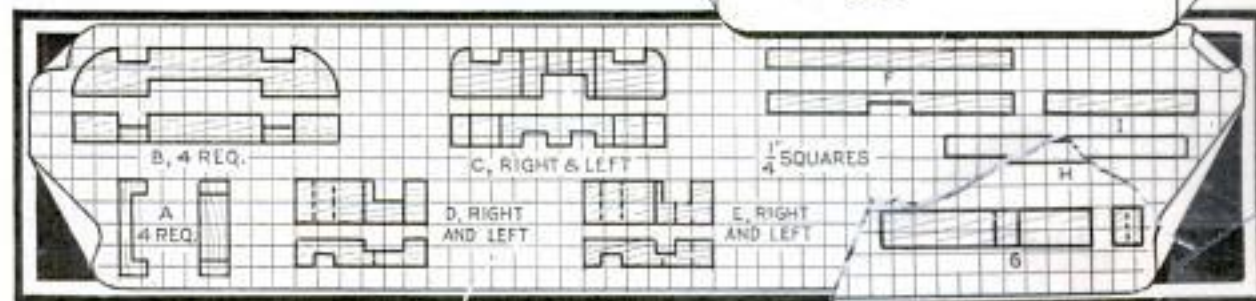
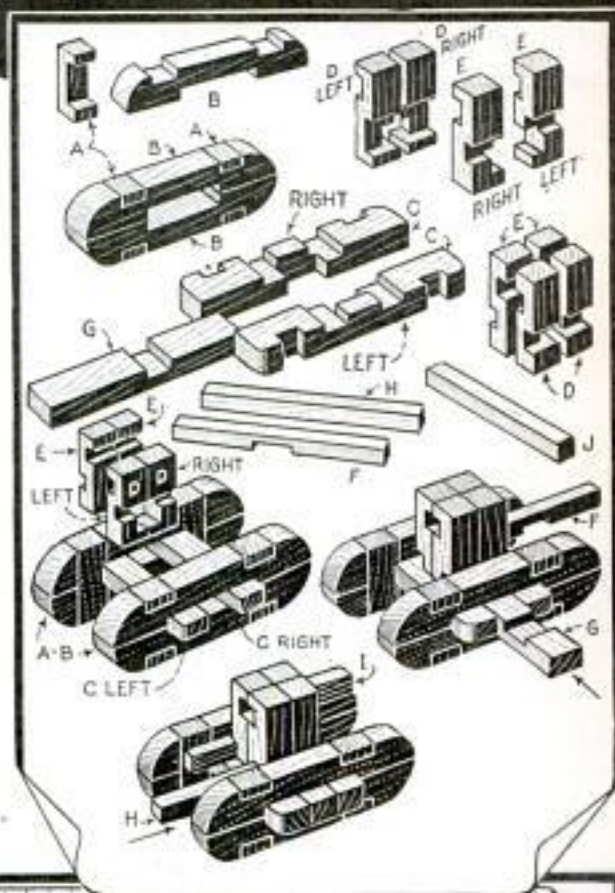


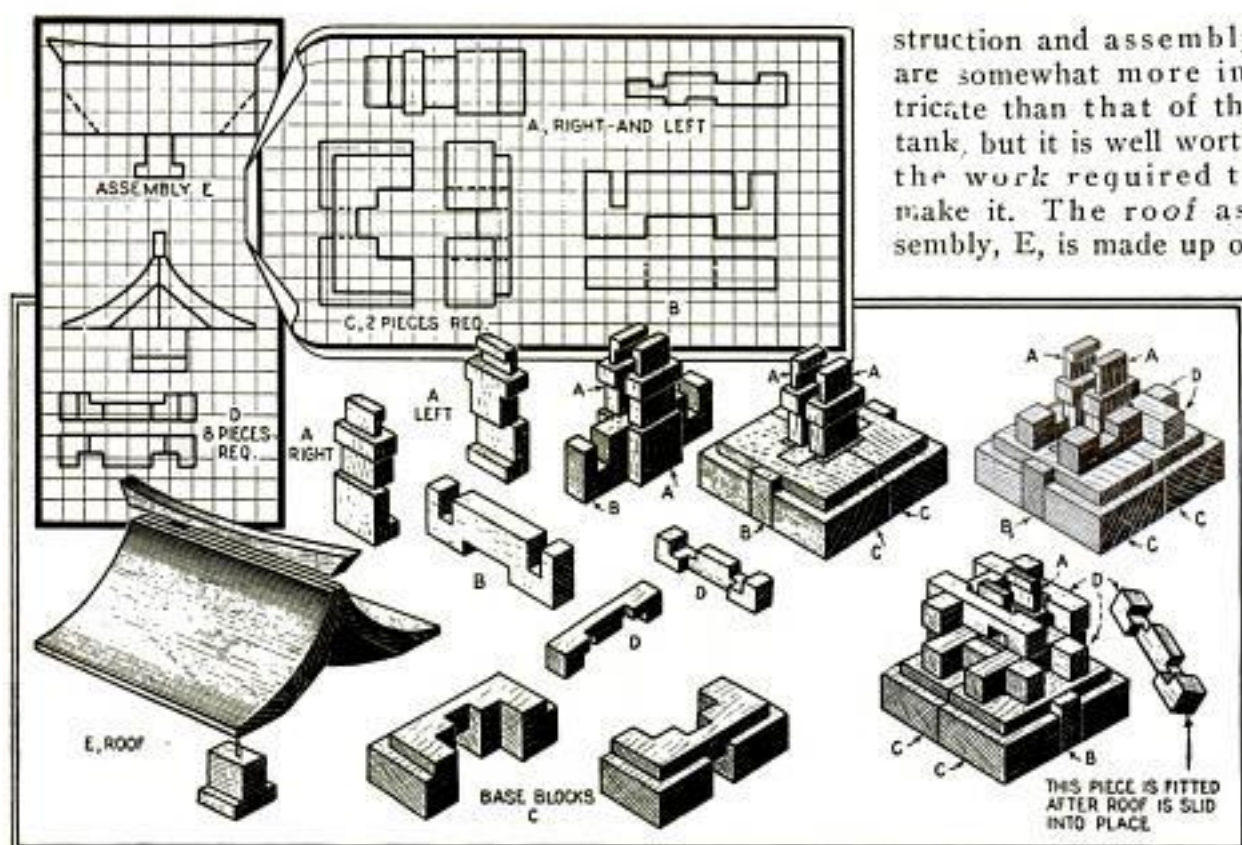
By
HI SIBLEY



ANYONE can make these two fascinating puzzles. Close-grained hardwood, such as maple, is best to use, and a fine-toothed hacksaw blade and sharp jack-knife are the only tools required to make the cuts, the accuracy of which is highly important. Although, as dimensioned, both puzzles can almost be hidden in the hand, it is a simple matter to make them larger in the same proportions. In fact, the amateur will find the larger size easier to cut out with precision.

The size and shape of the twenty pieces required for the war tank are given in the detailed drawing. The treads are each made up of four pieces. The crossmembers which hold the treads together are identical except that one is right and the other left. Likewise there are two D's and two E's, each pair being right and left.





struction and assembly are somewhat more intricate than that of the tank, but it is well worth the work required to make it. The roof assembly, E, is made up of

First assemble the two tractor treads. Next insert C left and C right, following with D left and D right. The E's can now be set in place, permitting F to be pushed into the square hole formed by the assembled blocks. When the notch in F is exactly between the two C's, the crossmember G can be pushed into position. H and I can then be put in, finishing the tank.

The tiny Shinto shrine is a remarkably realistic model of the picturesque temples along the byways of old Japan. Its con-

four pieces, glued together, forming one unit in the puzzle. The only uprights, A, must be made right and left. There is only one piece, B, but there are eight D's all identical. In assembling, first fit B between A left and A right, following with the two base blocks C. Next fit three of the pieces D together and slide over A, after which a fourth piece D is fitted in. Then slide three assembled pieces of D over the tops of the two A's, push the roof into place and fit the last piece of D.

Metal Polish in Cake Form

Good metal polishes can be made in solid cake form by mixing abrasives and polishing powders with plaster of paris in the proportions of 1 part of plaster to 1½ parts (by volume) of the abrasives or powders. Fine emery powder, tripoli, crocus, rottenstone or dry jewelers' rouge may be used. After thoroughly mixing the abrasive and the plaster, sprinkle the mixture into an equal quantity of water and stir until a smooth paste is formed. Small cardboard boxes make convenient molds and permanent containers for the cakes. If a variety of grades of the polish are kept on hand, it is a good idea to add a small amount of ink or package dye to

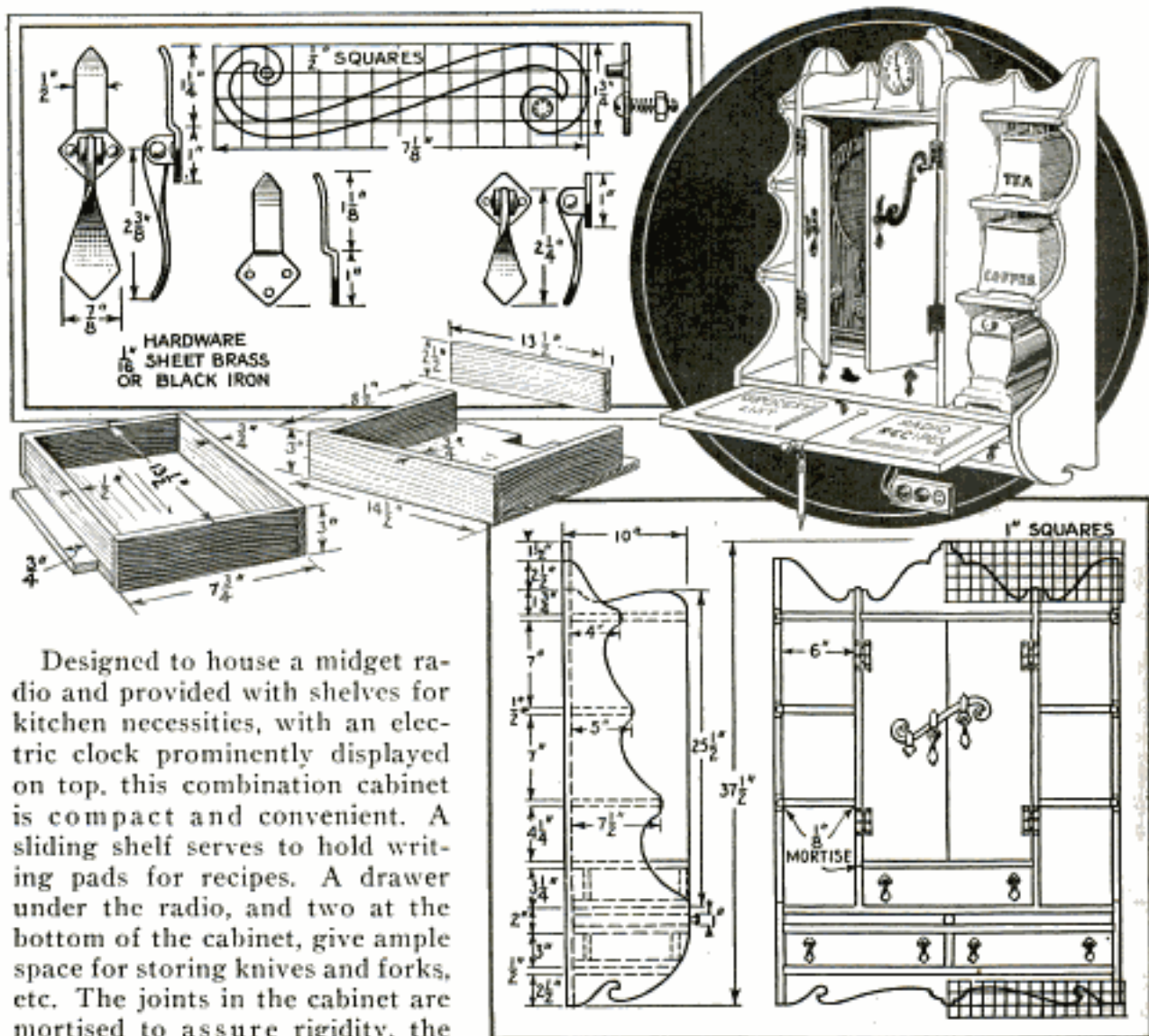
color the cakes differently to distinguish the various grades at a glance.

Lamp Reflectors from Sugar Scoops



Reflectors made in this way are neat and have a workmanlike appearance.

Combination Kitchen Cabinet Houses Radio



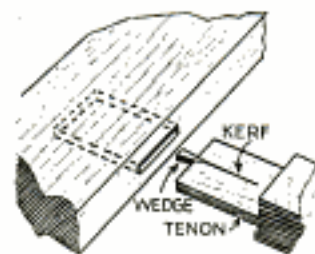
Designed to house a midget radio and provided with shelves for kitchen necessities, with an electric clock prominently displayed on top, this combination cabinet is compact and convenient. A sliding shelf serves to hold writing pads for recipes. A drawer under the radio, and two at the bottom of the cabinet, give ample space for storing knives and forks, etc. The joints in the cabinet are mortised to assure rigidity, the outside edges of the mortises on the shelves being covered with small wooden buttons to improve the appearance. Two doors are fitted, for closing the radio compartment. Wiring for the radio and the clock is run behind the cabinet. You can make the hardware for the doors and drawers from sheet brass or black iron. The metal may be given a hammered finish before the pieces are cut to shape.

Flashlight Used to Obtain Sharp Focus

In order to obtain a sharply focused image on the ground glass of a camera when the room is too dark to see the object clearly, have someone hold a flashlight pointed directly at the camera, and focus on the glowing filament in the lamp. A flashlight without a magnifying lens will

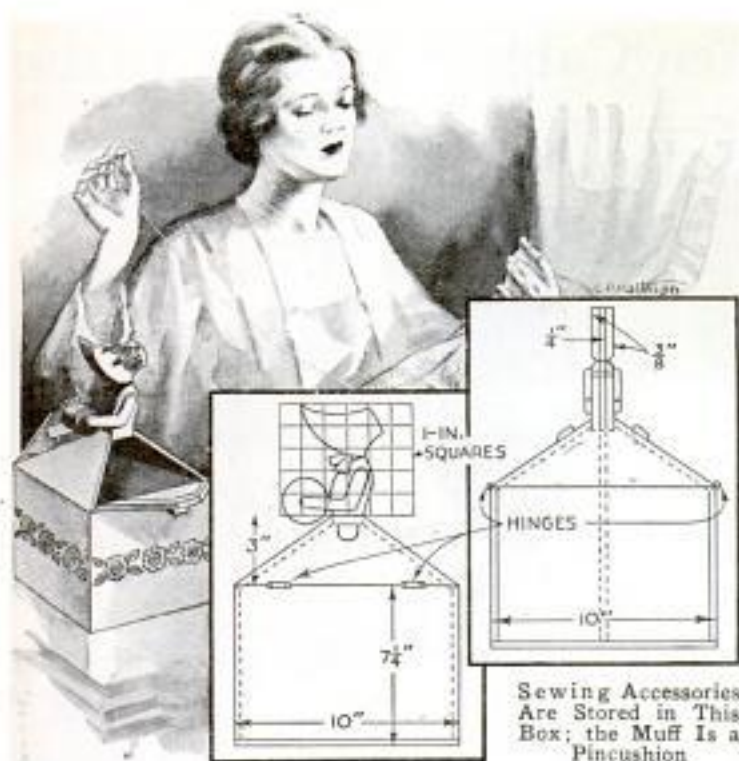
be found best for this purpose. The light will also help in getting the camera properly set for the exposure.

Mortise-and-Tenon Joint Improved with Wedge



joints together. When the tenon is driven into the mortise, the wedge is forced into the kerf, which makes a tight joint.

Mortise-and-tenon joints in wood frames can be strengthened by kerfing the centers of the tenons and then inserting small wedges before gluing the



Prim Maiden Holds Your Sewing

This decorative sewing box provides a pincushion, inside pockets for needles and scissors, and a partitioned section for holding spools of thread and work. First make the box and then fit in the partition, part of which extends above the box to form the figure. Two pieces of $\frac{3}{8}$ -in. stock are glued to the partition to complete the figure. A little carving will produce a more realistic effect. Two sides of the cover are glued to the figure, holding a muff that serves as a pincushion, while the other two are hinged to the box and fitted with a needle cushion and a pocket to hold a pair of scissors. Small tabs are attached to the hinged covers for easy opening.—B. Livings, Batavia, Ill.

Old Steering Column and Wheel Make Good Reduction Gears

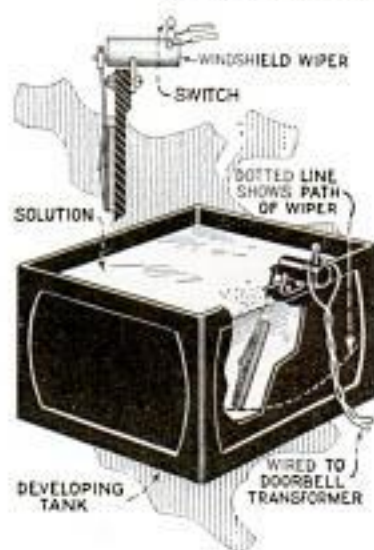
For occasional use, an old auto steering gear from a model-T Ford can be used as a reduction gear for light motor-driven tools. A pulley is substituted for the steering wheel and the shaft is cut off at the other end of the gear housing and a pulley mounted on the shaft. It will be necessary to make a frame for mounting the gear assembly, and to provide a bushing for the projecting end of the steering shaft.—W. W. Wilkins, Hornell, N. Y.

Starch Prolongs Life of Flat Paint

An inexpensive method of preserving the beauty of flat-finished walls is to apply a coat of starch, the solution consisting of $\frac{1}{2}$ lb. of good starch in $\frac{1}{2}$ pt. of cold water, which is stirred into 1 gal. of boiling water. When the solution is thoroughly cooked, stir in 1 gal. of cold water and allow the mixture to cool, after which lumps may be removed by straining through a piece of wire screen or a loosely woven cloth. Apply the solution with a calcimine brush. Commencing with the ceiling, coat a strip, 2 or 3 ft. wide, the entire length of the room. While this strip is still wet, it should be stippled or tapped lightly with a stippling brush. If the latter is not available, a soft-bristled

scrubbing brush will serve the purpose. The work should be done as rapidly as possible, coating a second strip before the first becomes dry so that the edges will be wet to avoid noticeable laps. Walls prepared in this manner are easily cleaned with warm water, after which the starching process may be repeated.

Windshield Wiper Agitates Photo Developing Solutions



An old electric windshield wiper can be used as an automatic agitator for photographic developing solutions. Wipers of this type can be obtained from most junk yards, and when mounted on the edge

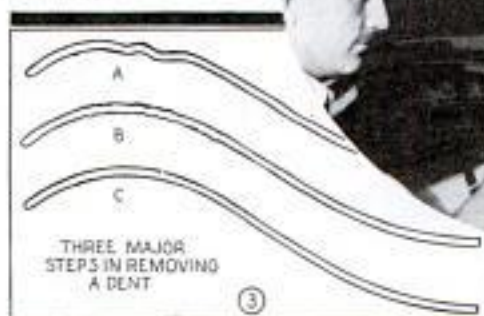
of the tank, will keep the developing fluid thoroughly stirred. The wiper can be operated by a 6-volt storage battery, which will last a long time.

TOP and BODY REPAIRS for your Car

By ROBERT GREGG

FENDERS have one thing in common—they are almost certain to be bent or dented sooner or later. Where the damage is of a minor nature, the necessary repair can usually be made in the owner's private garage. Do not, however, attempt to straighten a nasty buckle with ordinary shop tools; neither is it advisable to attempt to straighten metal pieces where the surface has been badly torn.

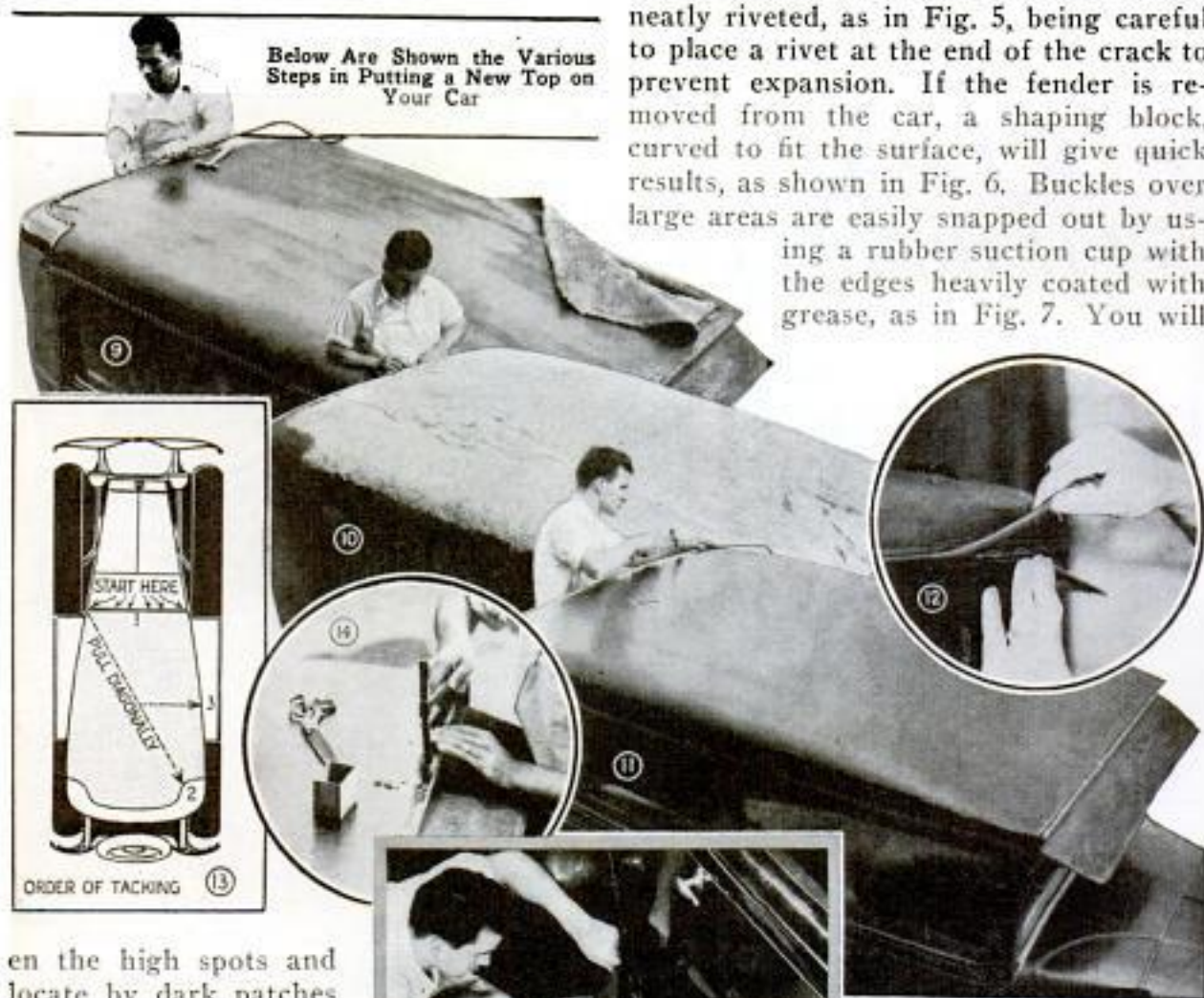
Fig. 3 shows the three major steps in remov-



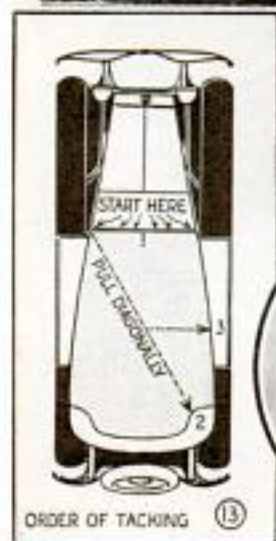
ing a dent from sheet metal. First, the metal is roughly worked back to shape with a heavy wooden mallet, as shown in Fig. 1. A hand anvil of some sort should always be used underneath, to support the edges of the bent surface. The hammer blows should be many and light, rather than few and heavy, and each blow should be more or less drawn instead of being allowed to land "dead-on." After approximate reshaping has been accomplished, the metal-finishing hammers should be called into play. These should be light, easily

handled, and should have very nearly flat striking faces. All of the smaller pits are worked out with these hammers to bring the surface to as nearly perfect a sweep as possible. As you approach the finish, check constantly with a sanding disk or sandpaper, as shown in Fig. 8. This will bright-

Below Are Shown the Various Steps in Putting a New Top on Your Car



neatly riveted, as in Fig. 5, being careful to place a rivet at the end of the crack to prevent expansion. If the fender is removed from the car, a shaping block, curved to fit the surface, will give quick results, as shown in Fig. 6. Buckles over large areas are easily snapped out by using a rubber suction cup with the edges heavily coated with grease, as in Fig. 7. You will



en the high spots and locate by dark patches the areas yet to be hammered.

Very often, the job will need filling after your best hammering. Use solder or any other metal filler, applying this, if solder, directly to the clean metal, and, if metal filler, over a suitable priming coat. In either case, the filled portion is filed smooth, as shown in Fig. 2, and burnished to a perfect surface with suitable abrasives. Whatever the filler, it must be given a priming coat of metal glaze and the surface carefully cleaned with gasoline before the new paint is applied.

Many minor repairs can be made without breaking the paint surface. Edge kinks can be quickly taken out with wide-nosed pliers or with wood blocks drawn up tightly by clamps, as in Fig. 4. Small tears can be reinforced with a metal plate and



realize, of course, that this method is not to be applied when the surface is actually bent; it serves only for buckles where the whole surface has been pushed inward. Where body dents cannot be removed in this manner, it is usually necessary to remove the upholstery in order to

get at and properly do the work.

With topping selling as low as \$1.50 per yard, it becomes very inexpensive and simple to put a new "lid" on your car. The first step, of course, consists in the removal of the old leather. This is usually accomplished by removing the metal coping bands at front and rear and the drip bands along the sides, as shown in Fig. 9. In the most common type, the leather strip inclosed in the drip bands is removed by merely pulling it out, as in Fig. 13, ex-

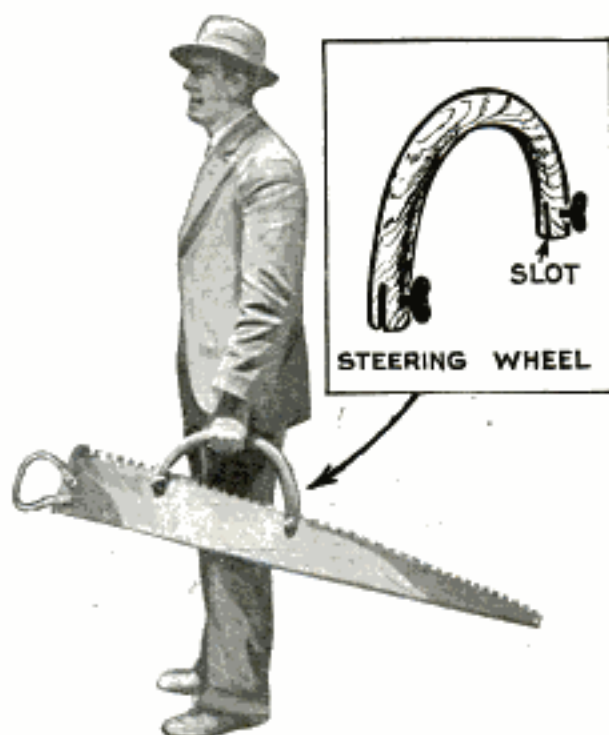
posing the nails that hold the metal in place. Under the top cover, you will find a layer of cotton batting. If this is in good condition, leave it on; if not, purchase a new strip. Above all, do not break the surface, but apply the cotton in one smooth continuous piece. Ordinarily, this will come flush with the wood or metal framework, but if these members are in a roughened condition, it is best to feather the cotton out to the extreme nailing edge. In applying the new leather, start at the front, tacking completely along the forward edge. Pull the top lightly in a diagonal direction, as shown in Fig. 12, and tack at one of the rear corners. Then insert a few tacks in the side and proceed with the other corner and side. Working in this manner you will get a perfectly smooth top with a minimum of fitting. The rest of the job is simply a matter of replacing the metal bands. These should be repainted after being applied in order to cover the nail heads.

Fitting a new running board is quite simple if you note how the various pieces are assembled as you take the original off. In the average case, it is a matter of new wood and a strip of rubber covering. For a neat job, which will also preserve the wood below, the rubber should be cemented into place, as in Fig. 15, using linoleum cement. Do not trim the rubber to the exact size, but make it about $\frac{1}{8}$ in. short all around. The slight opening will be covered by the metal trim, and the rubber is then given room to expand.

Rubber Band Holds Sample on Side of Small-Parts Container



To locate a nail or screw of the proper size at a glance, one workshop owner snaps a rubber band around each container and slips a sample of the contents under the rubber as shown. This simple method is a timesaver, and the sample is quickly changed if desired.



Crosscut Saws Carried by Detachable Handle Made from Steering Wheel and Two Thumb screws

Large Saw Carried by Handle Made from Steering Wheel

For carrying large crosscut saws, a handle is easily made from one-half of an old steering wheel. The spokes are removed, the wheel is cut in two and the ends are slotted to fit over the saw blade. Thumb screws fitting into holes tapped in the end of the handle clamp it to the saw firmly.

Cement for Anchoring Rods in Stone

Iron rods, screws or bolts may be securely anchored in recesses cut in stone or marble if the end to be imbedded is first bent or roughened, and then surrounded with a hard, quick-setting cement made by mixing plaster of paris, 7 oz., with iron filings, 1 oz. After the plaster and filings have been thoroughly mixed, add water to produce a thick paste and quickly tamp it in place. Do not prepare more of the cement than is needed, as it sets rapidly. If the hole in the stone is undercut, added strength will be obtained. After the cement has set, the surface may be scraped smooth and painted with water glass to produce a glossy and water-resistant finish.

By peeling onions under running water, they will not affect the eyes.



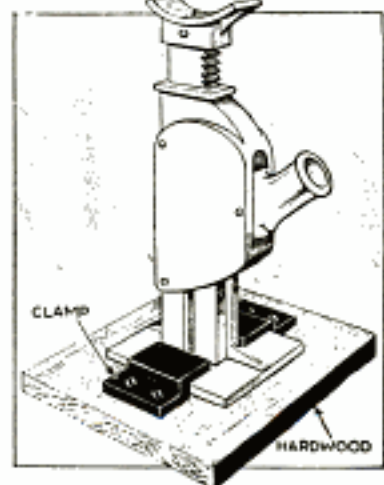
Improvised Nozzle for Wetting Ashes and Coal or for Sprinkling Requiring a Gentle Spray

Sprinkling Nozzle Made from Pipe

Made by drilling several small holes in a length of pipe, this nozzle is handy for sprinkling ashes in a furnace pit. One end of the pipe is fitted with a cap and the other end, which is clamped in the end of a garden hose, with a gas cock. A handle is shaped from flat iron and is screwed to the nozzle, a wooden piece, properly shaped, being screwed to the iron. The outfit will also serve for watering tender growths that require a gentler spray than that from a garden sprinkler.

Removable Wooden Base for Auto Jack

This hardwood base will keep your auto jack from sinking into soft ground when raising the car. It also provides a means of holding the jack upright when pushing it under the car. Metal clamps are screwed to the base to hold the jack. C. Willey, Penacook, N. H.

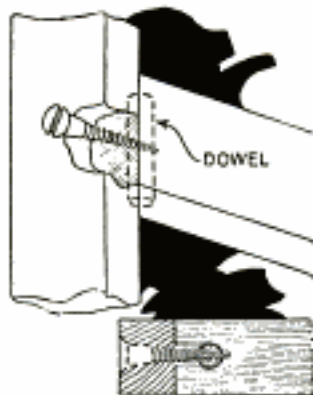


Making Pewter for Casting

Pewter that is suitable for casting purposes, for making hammered ornaments and for reproducing antiques can be made of copper, 1.5 per cent, antimony, 7.8 per cent, and tin, 90.7 per cent (by weight). Inferior grades of pewter sometimes contain lead, but this metal should be avoided, especially if the ware to be produced is for table service, as the lead is poisonous. First melt the copper, which will require a temperature of about 2,000° F. However, the quantity is so small that it may be melted with either a forge or an oxygen torch, such as is used in garages for repairing storage batteries. Place the copper in a crucible and cover it with borax. Then apply heat until the metal is molten, after which the heat source is removed and the antimony is stirred in with an iron rod as fast as it can be dissolved without giving off dense fumes. After the antimony has been alloyed with the copper, the mixture can be remelted on a gas stove and the tin slowly stirred in to complete the alloy, which is then poured into shallow molds to cool. Ditches dug in the ground will serve for this purpose. Pewter made by this formula is malleable, easy to work, and takes a fine polish.

Dowel Helps Hold Screw in End of Board

To hold a screw when it is driven into the end of a board with the grain, a hardwood dowel can be driven into a hole drilled across the grain as shown. The dowel provides a grip for the threads of the screw so it will not pull out.—Truman Greenwalt, Litchfield, Illinois.



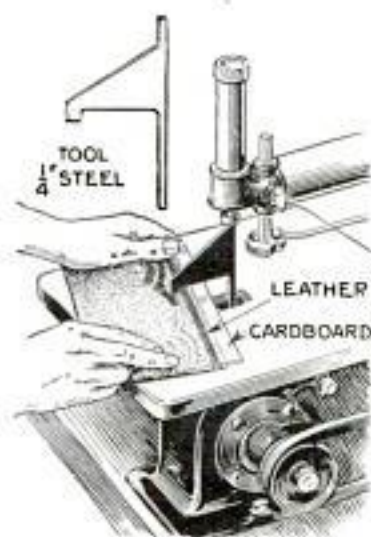
☞ To clean tarnished silver rub it with a soft cloth dipped in dry powdered magnesia, after which it is polished in the usual way; if it is badly tarnished, the magnesia should be applied first wet and then dry.

Imitation Stone for Molding

Imitation stone suitable for molding ornaments, such as book ends, clocks, etc., can be made by thoroughly mixing finely powdered chalk with water glass. The resulting paste may be colored with dyes or paint pigments. If two batches are mixed separately at the same time, they may be colored differently and a mottled design produced in the finished product by imperfectly mixing the batches in the molds. This compound may also be used for repairing marble. It will adhere to glass, wood or stone.

Attachment for Tooling Leather on Scroll saw

After a little practice, you will be able to do a good job of leather tooling by using this device on a scroll saw. The attachment is made of $\frac{1}{4}$ -in. steel, cut to the shape shown and substituted for the blade in the saw. A design can be filed in the lip of the tool, which is the part that



makes the impression in the leather, or homemade stamps can be clamped to it. In use, the leather is placed over a sheet of heavy cardboard and passed under the tool, which rapidly impresses the design into the surface. If a uniform design is desired, it may be necessary to

clamp a guide to the saw bedplate.

Oil Protects Piano against Dampness

Periodic application of a thin, non-gumming oil will prevent a piano from being damaged by dampness. The oil can be applied with a cloth, coating all of the strings and exposed metal parts. If the oil has a tendency to gum after a while, it can be removed with a cloth saturated in gasoline.



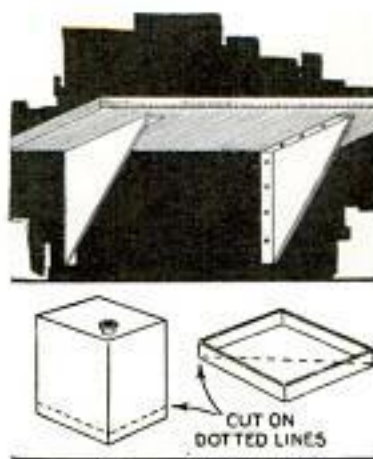
This Adjustable Arm Holds Electric Lamp Directly above Work on Any Part of Bench

Pivoted Arm Supports Adjustable Bench Lamp

Three pieces of 1-in. stock, pivoted together and mounted on the wall above your workbench, provide an adjustable arm to support a lamp over any part of the bench. The arm is attached to the wall by means of a wooden bracket and two metal braces, while a slot in the end of the arm holds the lampcord.—K. F. Keith, Pensacola, Fla.

Bottom of Square Can Cut to Form Shelf Brackets

Rigid shelf brackets are easily made from the bottom of a square tin can. It is cut in two about $\frac{1}{2}$ in. from the bottom, which is then cut across diagonally. The brackets are attached to the wall and shelf with screws driven through holes in the sides.



Chemical Experiments in SPONTANEOUS



GLOVES PROTECT HANDS FROM SPARKS AND SPATTERING ACIDS



WOOD BLOCKS DRILLED TO HOLD TEST TUBES



ALCOHOL LAMP IGNITED WITH OZONE

By CLYDE A. CROWLEY

OZONE, or active oxygen, chlorine, a water purifier, and carbon dioxide, the gas used in soda water and some fire extinguishers, may be easily generated and used by the amateur chemist to perform a number of interesting experiments. Although some of the gases generated are irritating and toxic, no inconvenience will result if the work is carried on before an open window, so that the small quantities of such gases produced will blow away from you and outdoors. Also, gloves should be worn to protect the hands from sparks and spattering acids.

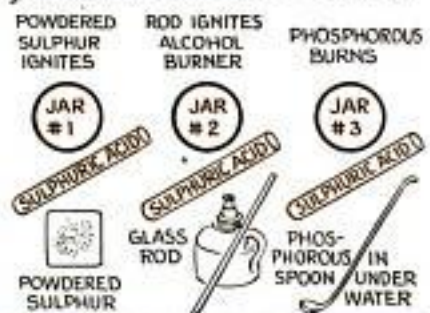
The set-up for this series of experiments is shown in the center detail, eight open-mouthed pint jars being arranged on the work table. A teaspoonful of potassium permanganate is placed into each of these. Then seven test tubes are set in small wooden holders as shown in a detail at the top of the page. Put $\frac{1}{4}$ oz. of concentrated sulphuric acid in each tube



SULPHUR BURNS SPONTANEOUSLY IN OZONE. GLOVES SHOULD BE WORN & SULPHUR DROPPED FROM A PEN KNIFE

and place one of them before each of the eight jars, except the seventh. Before this one, a test tube containing $\frac{1}{4}$ oz. of concentrated hydrochloric acid is placed. At some distance from the jars and tubes, have in readiness for the demonstration a small quantity of flowers of sulphur, a glass rod and a small piece of phosphorus (caution—keep under water and do not touch). The piece of

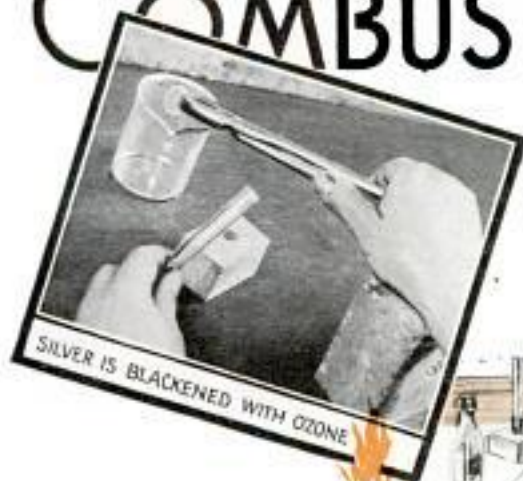
ARRANGEMENT OF JARS,



MODERN WARFARE CAUSES A DEFICIENCY OF OZONE IN THE AIR



COMBUSTION *with* OZONE *and other* Gases



SILVER IS BLACKENED WITH OZONE



phosphorus should be about one-half the size of a pea. Also have at hand $\frac{1}{2}$ oz. of denatured alcohol, a polished silver coin, a long wood splinter, a small bottle of turpentine, 2 oz. of hydrogen peroxide and a few oxalic-acid crystals.

Everything is now ready. Pour the acid from the test tube into jar No. 1. Then immediately sprinkle a little sulphur from the point of a knife

TURPENTINE TAKES FIRE IN CHLORINE GAS. OXYGEN INCREASES THE INTENSITY WHILE CARBON DIOXIDE PUTS OUT THE FIRE



into the jar. Due to the ozone, it will take fire and burn with a popping sound and the smell of sulphur dioxide. Set an unlighted alcohol burner on the table. Pour the contents of the second test tube into jar No. 2. Dip the glass rod into the bottle and immediately touch it to the wick of the burner. The burner will light because of the action of the ozone on the alcohol. A few drops of ether or acetone in a tin lid may be ignited in the same manner. Empty the third test tube into

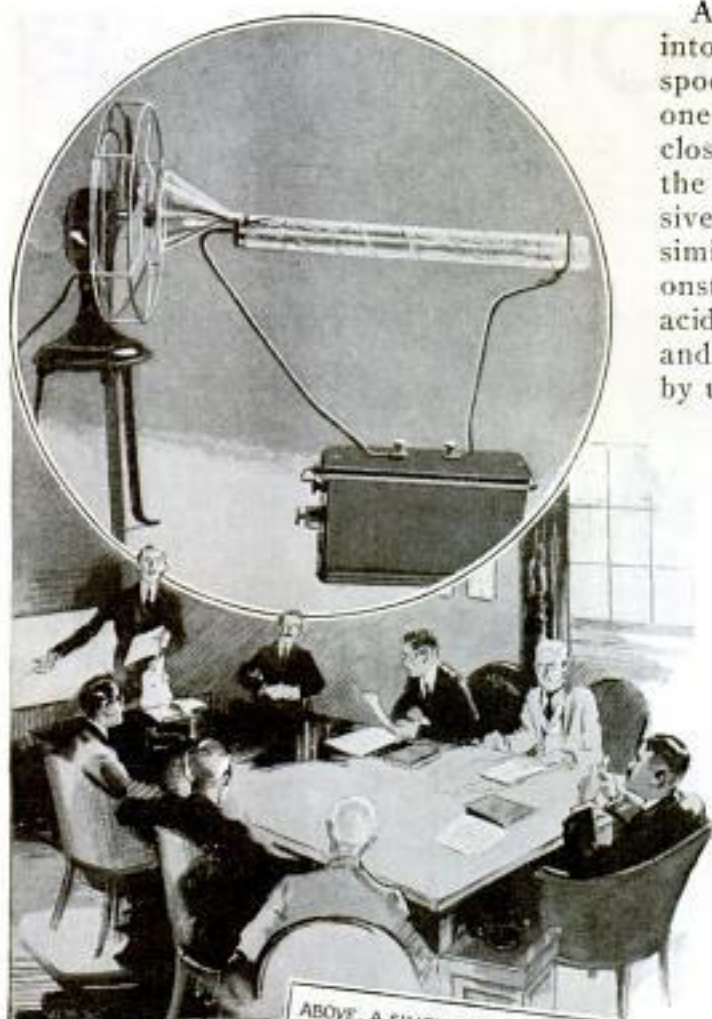
bottle No. 3 and cautiously drop in the small piece of phosphorus from a spoon. Be very careful with phosphorus. It would be well to have the jar for this experiment in a pan of water as a precaution. The ozone will ignite the phosphorus, and it will burn with great brilliance. Work near a window so that the irritating fumes may escape. Be sure all of the phosphorus burns, as it is dangerous and will take fire in the air after a little time.

TEST TUBES AND CHEMICALS

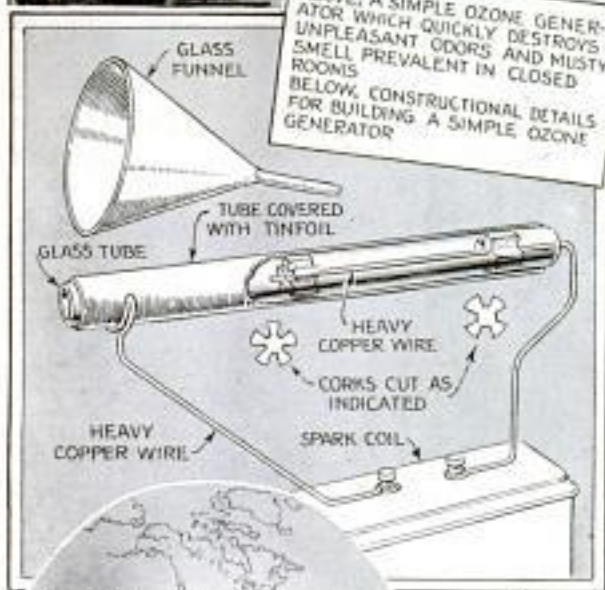
ALCOHOL, ACETONE OR ETHER BURST INTO FLAME	SILVER COIN BLACKENED	WOOD SPLINTER DIPPED IN TURPENTINE BURNS IN CHLORINE	OXYGEN INCREASES BRILLIANCY	FLAME EXTINGUISHED BY CARBON DIOXIDE
JAR #4	JAR #5	JAR #6	JAR #7	JAR #8
SULPHURIC ACID	SULPHURIC ACID	HYDROCHLORIC ACID	SULPHURIC ACID	SULPHURIC ACID
SPOON HELD WITH PLIERS	POLISHED SILVER COIN	WOOD SPLINTER	HYDROGEN PEROXIDE	OXALIC-ACID SOLUTION



LIGHTNING MAKES OZONE, WHICH ACCOUNTS FOR INVIGORATING EFFECTS OF A THUNDER STORM



ABOVE, A SIMPLE OZONE GENERATOR WHICH QUICKLY DESTROYS UNPLEASANT ODORS AND MUSTY SMELL PREVALENT IN CLOSED ROOMS
BELOW, CONSTRUCTIONAL DETAILS FOR BUILDING A SIMPLE OZONE GENERATOR



OZONE IS GENERATED IN THE OUTER LAYER OF THE EARTH'S ATMOSPHERE BY ULTRA-VIOLET RAYS FROM THE SUN

After you have emptied the test tube into bottle No. 4, cautiously pour a tea-spoonful of alcohol into the jar. Stand to one side and do not get the alcohol bottle close to the jar. The alcohol dropped in the latter will take fire with almost explosive violence. Ether or acetone will act similarly. Be very careful with these demonstrations to avoid burns and spattering acid. Sulphuric acid will burn cloth, wood and also your hands. It can be neutralized by using ordinary baking soda.

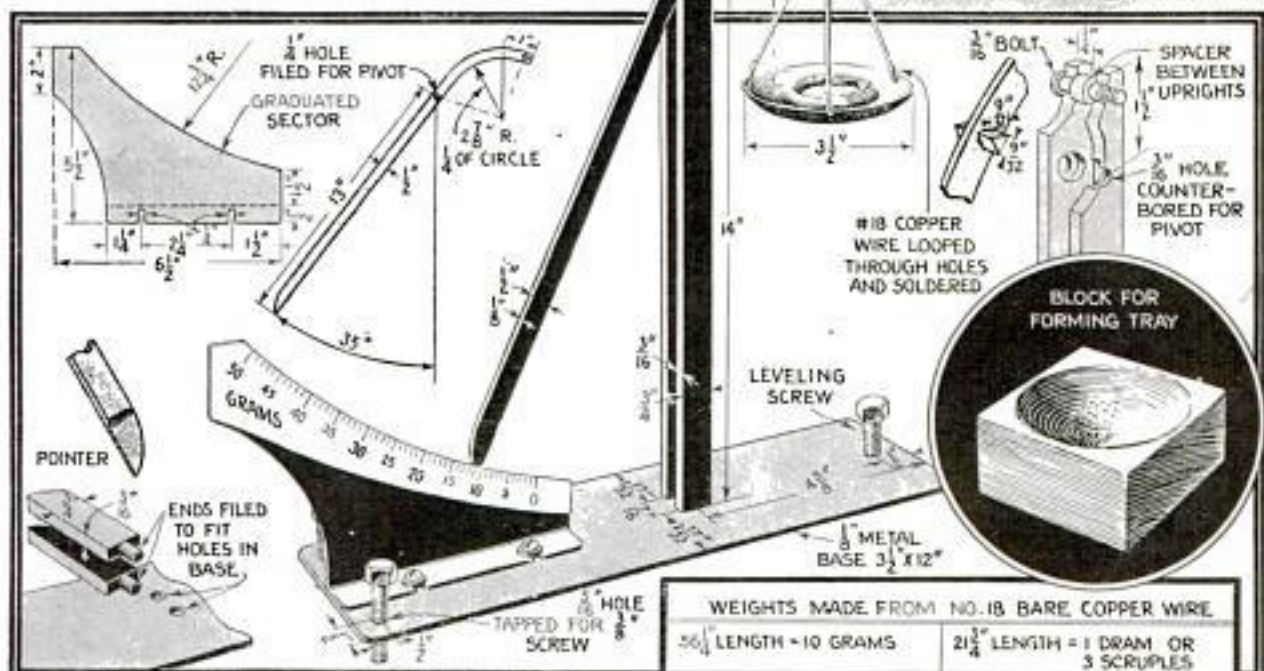
The fifth jar will be used to make a test for ozone. Pour in the acid and hold a clean polished silver coin in it with a pair of pliers. The ozone will turn the coin black. Next empty the last three test tubes into the corresponding jars. To the seventh jar also add 2 oz. of hydrogen peroxide, and to the eighth, a spoonful of moistened oxalic-acid crystals. Quickly immerse one end of the wood splinter in the bottle of turpentine. Now plunge the turpentine-soaked end of the splinter into the sixth jar. It will take fire spontaneously because of the chemical action of chlorine (poison), which is generated here, on the turpentine. Remove the splinter

and, while it is still burning, insert it into the seventh jar. It will burn with increased intensity because of the oxygen which is being generated in this jar. While the splinter is burning vigorously, plunge it into the last jar, and the fire will be almost instantly smothered as the carbon dioxide, generated in the last jar, is a fire extinguisher.

Ozone is a form of oxygen which is unusually active. It causes the spontaneous combustion of phosphorus, alcohol, ether and numerous other substances when it is concentrated. Its odor is noticeable in the air after a thunder shower. Lightning produces it from oxygen. For homes and offices, it is frequently produced in small quantities by electric-spark apparatus, to eliminate objectionable odors and to purify the air. The simple apparatus illustrated, together with a supply of oxygen, will enable you to ozonize a large room very quickly. This ozone generator, if set in the draft of an electric fan, will convert part of the oxygen from the air into ozone.

Sensitive Lab Balance to Weigh Chemicals

This simple, rugged but sensitive balance can be built from odds and ends available to any chemical experimenter or photographer. When completed, it may be calibrated with measured lengths of copper wire. The base is a steel plate fitted with three leveling screws. By turning the one under the pan, you can bring the pointer to the zero mark on the scale. The other screws are used for leveling across the width of the base so that the pivot on the swinging pointer arm will work freely. The latter is pivoted between two uprights, attached to the base as indicated. The pivot is made from a piece of a three-cornered file, two sides of which are ground smooth to form a knife-edge that



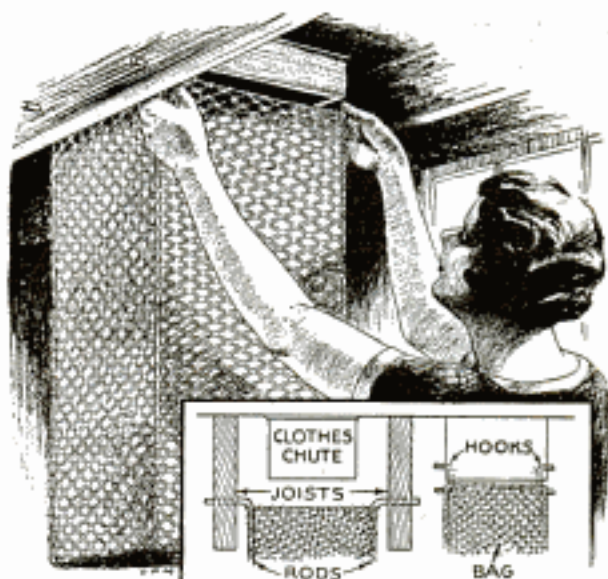
turns in counterbored holes in the uprights. The tray is suspended from the end of the pointer by means of copper wires as shown. In forming the tray, a concave depression is turned in a wooden block on the lathe and a copper disk is then forced into it by hammering gently. The graduated arc is also cut from a piece of copper, and the lower edge is bent at right angles to enable screwing it to the base, while a piece of plain white paper is glued to the arc with rubber cement for recording the calibration. If suitable weights are not available for calibrating the balance, fairly accurate ones can be

WEIGHTS MADE FROM NO. 18 BARE COPPER WIRE	
56 1/4" LENGTH = 10 GRAMS	21 3/4" LENGTH = 1 DRAM OR 3 SCRUPLES
7 1/4" LENGTH = 20 GRAINS 1 SCRUPLE	14 1/2" LENGTH = 8 DRAMS OR 1 OZ

made from coiled lengths of No. 18 bare copper wire, using lengths as given in the table. Additional weight can be made by using fractional parts of these data.

Salt peter Deodorizes Glue

A small quantity of salt peter added to melted glue will kill the odor. This will not harm the glue but will improve its drying qualities. Eliminating the odor is especially desirable when your shop is in a basement so that the glue fumes are likely to get into the rooms above.



Soiled-Clothes Bag Stretched over U-Shaped Rods Catches Clothes at Bottom of Chute

Bag Hung under Clothes Chute Keeps Basement Tidy

Attached to the bottom of a clothes chute, a bag will keep soiled clothes off the floor. Two iron rods are bent to a U-shape to fit inside of the bag, the ends being bent at right angles to fit into holes drilled through the floor joists on opposite sides of the chute. The bag is tied to the rods, which hold it open. For chutes that do not terminate between joists, the ends of the rods are bent to fit holes punched in opposite sides of the chute. Removal and attachment of the bag is done by springing the ends of the rods together.—H. C. Thomas, Royal Oak, Mich.

Coil Compression Spring Quickly Made into Tension Spring



When occasion demands, a coil compression spring can be quickly converted into a tension spring. To do this, double two lengths of wire, forming a loop in the center of each one. Then insert them into the spring from opposite ends and bend the ends of the wires over the edges of the spring. In this way,

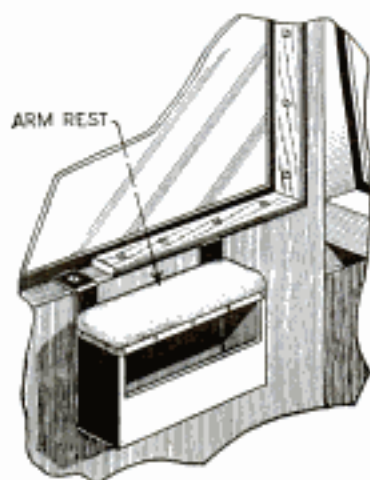
any pull exerted on the looped ends of the wire is transmitted to the opposite ends of the spring.—C. M. Wilcox, Torrington, Connecticut.

Easy Method of Making Patterns with Plaster of Paris

When only a few castings are required, a pattern can be quickly made from plaster of paris. Mix the plaster and pour it into cardboard molds of the approximate shape of the desired casting. If the pattern is complicated, the plaster may be poured in two sections with the last one in contact with the first. When the plaster sets, the two parts will adhere. After the pattern has been cast in the rough, it may be carved to shape and rendered less susceptible to moisture absorption by painting the surface with a solution made by dissolving barium chloride in water. A coat of shellac finishes the job.

Cigar Box Serves as Tool Pocket on Car Door

To provide a convenient storage place in a closed car for a few light tools, a fabric-covered cigar box can be attached to the left front door. The upper half of one side of the box is removed for accessibility to the tools, and the box is attached to the door by means of strap-metal hooks. The box is covered with fabric to match the interior of the car. If desired, it can be attached on the door in a position to serve the additional purpose of an arm rest, in which case the top should be padded.—C. H. Landon, Fort Worth, Tex.

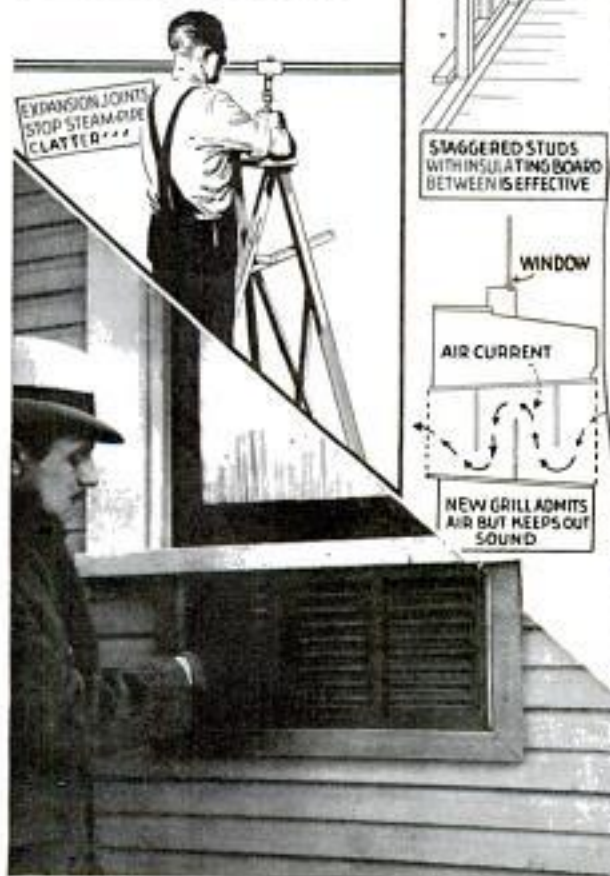


After photographic films have been washed, following the hypo bath, wipe them with a wad of wet cotton to remove foreign matter; this will increase the brilliancy of the prints.

Building Quiet into the HOME

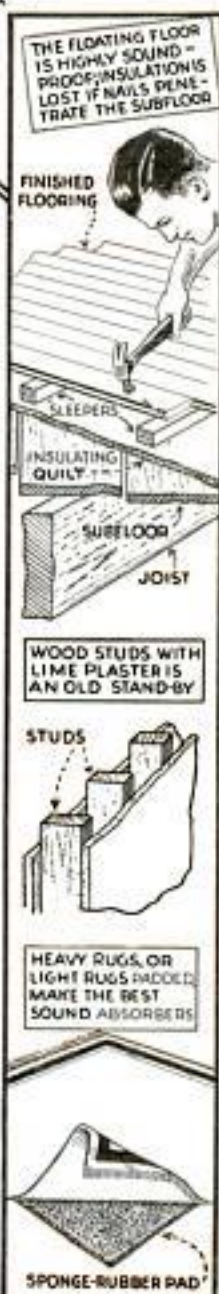
LABORATORY tests have shown that a noise intensity above 45 units (a trolley car makes 60) constitutes a steady drain on the nervous system. Couple this with the fact that noises are often irritating, embarrassing, disturbing to sleep and conducive to fatigue, and you have a real case in favor of the quiet home.

One of the most notorious noise transmitters is the average warm-air ventilator. Retiring at night, you are wide awake hours



later listening to a jumble of conversation in the living room below and transmitted to your bedroom via this vent. The new product called "glass wool" offers a simple and sure remedy for this situation. Pads of the wool neatly fitted in the vent will allow a perfect circulation of filtered air but it lets no normal sound pass the barrier.

If you live in an apartment house, the matter of soundproof floors and walls is indeed important. The family next door can have their fun, and you can have your sleep, if the walls are built of staggered studding, with insulating board between the studs and lime plaster on either side. The two dead-air spaces and the sound-absorbing qualities of the insulating board and the plaster make this type of construction as near



Friedrich & Dimmock
Hillsdale, N.J.
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perfect as possible. Protection against noise from above or below is insured through fireproof construction or the familiar "floating floor." Floors built on this principle must be carefully laid, as a nail or two penetrating through the quilt and into the subfloor will spoil the whole unit.

A new type of grill solves the problem of ample ventilation in sleeping rooms without the open window and the resultant disturbing noises. The construction, as shown in one of the details, admits air, but turns back most of the sound by means of baffleplates fashioned from highly absorbent insulation board. Besides offering burglar protection, this unit enables you to keep the window open during rainstorms in hot weather.

Inside the home, there are many things, little but important, that can be done to minimize noise. Leads on water systems should be coupled with steam hose to prevent the motor rumble from spreading over the entire house. The clatter and thump resulting from expanding steam pipes can be overcome by installing suitable expansion joints. Sound, when once present, can only be eliminated by absorption. The average home is made more quiet by the judicious use of heavy drapes, mohair upholstery, thick or padded rugs,

and other sound-absorbing items. Keeping the noise out of the house in the first place is largely accomplished by insulation at doors and windows. Storm sash, carefully fitted in felt channels, makes a dead-air space between itself and the window which is quite effective. In a similar manner, new window construction features double glass which not only keeps the heat in but also shuts unwelcome sound out. These units depend on some air-conditioning plant as they are effective only when permanently fitted.

An Adjustable Door Hook



Where a hook and a screweye are used on large double doors to keep them closed, the difficulty often experienced in fastening and releasing them, can be overcome by making the hook adjustable. To do this, thread the end of the hook for a wingnut and fasten it to one door by means of a piece of flat iron which has a hole drilled in the free end to take the hook. In use, the wingnut is turned up

tightly as soon as the hook is fastened. A few turns to the left makes it easy to release the hook from the eye.

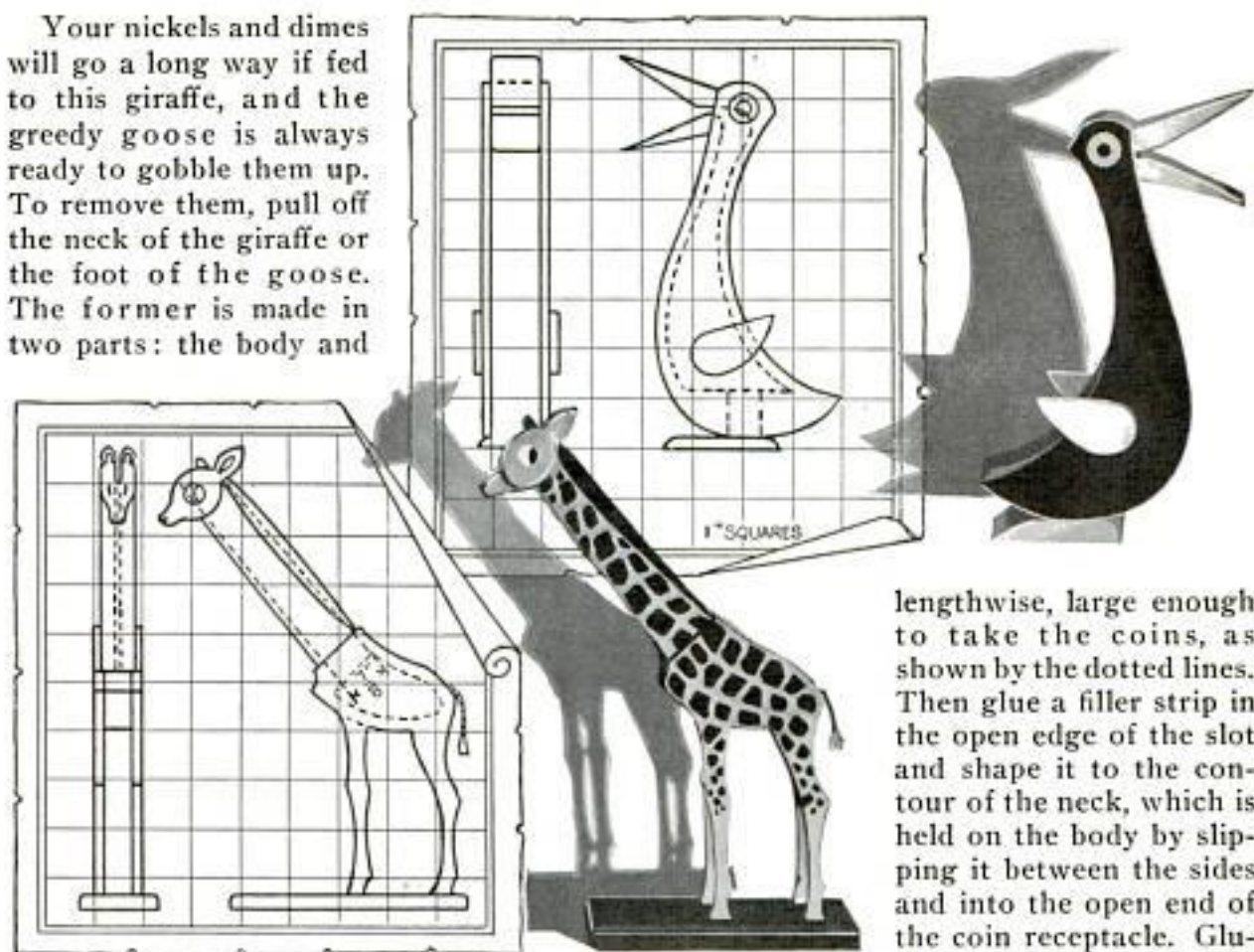
Tilting Head for Camera Tripod

A tilting head for a camera tripod can be made by bending a length of flat iron at right angles, one end of the piece being screwed to the tripod and the other drilled to take a bolt for attachment of the camera. The illustrated head has been found more efficient for use in stellar photography than the regular tilting head, as it allows the camera to be set at a greater angle.



Animal Banks Hold Your Nickels and Dimes

Your nickels and dimes will go a long way if fed to this giraffe, and the greedy goose is always ready to gobble them up. To remove them, pull off the neck of the giraffe or the foot of the goose. The former is made in two parts: the body and



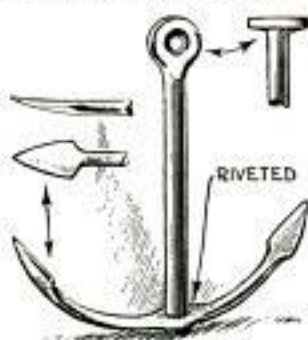
lengthwise, large enough to take the coins, as shown by the dotted lines. Then glue a filler strip in the open edge of the slot and shape it to the contour of the neck, which is held on the body by slipping it between the sides and into the open end of the coin receptacle. Gluing the bank to a suitable

base completes it. In making the giraffe the procedure is about the same except that the slot is cut horizontally in the neck, and the foot is removable instead of the neck. To finish the job, cut out and glue on the wings and the eyes, the latter being small gummed reinforcements such as used in loose-leaf note books.

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Model-Ship Anchor Made from Nails

Anchors for model ships can be made from nails. Cut one to a length suitable for the shank, the head end of which is flattened and drilled for the chain. Round the other end of the shank and rivet it into a hole drilled through the center of another nail, the



ends of which have first been flattened and pointed as shown.—Joseph Minarovich, Berwyn, Ill.

Colored Water Paint

Water paint in any color can be made by thoroughly mixing powdered chalk, 5½ lb., casein, 6 oz., and borax, 1 oz., after which dry paint color is added, and the mixture diluted to a brushing consistency with water. Although mixed with water, the paint is almost waterproof after it has set.

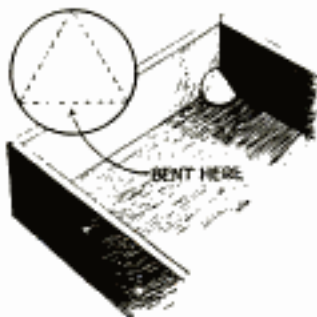


Corners of Small Buildings with Rotted Sills Raised with Jack Exerting Double Leverage

Double Leverage Helps in Raising Small Building

When jacking up a corner of a small building or porch, the double-acting lever arrangement will be helpful, especially if the floor sills have rotted. First put a pry plank under the corner of the building. Then set a jack on the plank, and place a length of 2 by 4-in. stock between the jack and the roof joist as indicated in the drawing. In this way, the jack pushes down on the pry plank and up on the two-by-four, which relieves some of the strain on the rotted floor sills.—Joseph Minarovich, Berwyn, Ill.

Can Tops Improve Drawer Corners



Tops from tin cans, snugly fitted and tacked in the corners of drawers, will help keep dirt from collecting where it is difficult to remove. This also prevents

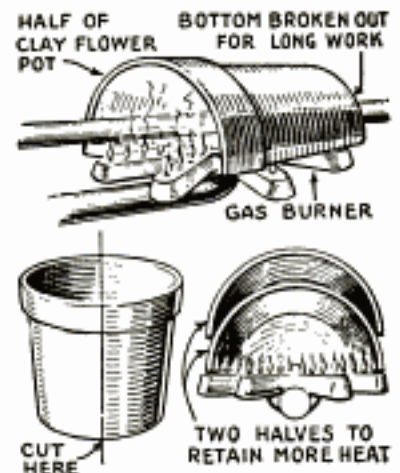
small parts in a drawer from becoming caught in the corners.—Marshall South, Carlsbad, Calif.

How to Install a New Valve Spring Without Removing Engine Head

Here is a simple way to install a new valve spring without removing the engine head: Solder a tire-valve stem into the base of a two-piece spark plug and substitute it for the regular plug. Then set the piston on the compression stroke and apply compressed air to the cylinder through the tire valve. This holds the valve down while compressing the spring to remove the retaining pin, after which the air is released and the valve is pushed up to change the spring. When this has been done, the air is again applied to hold the valve down while inserting the pin.—Raymond Kilbourne, Hudson, Ohio.

Half of Flowerpot Used in Heating Work on Gas Stove

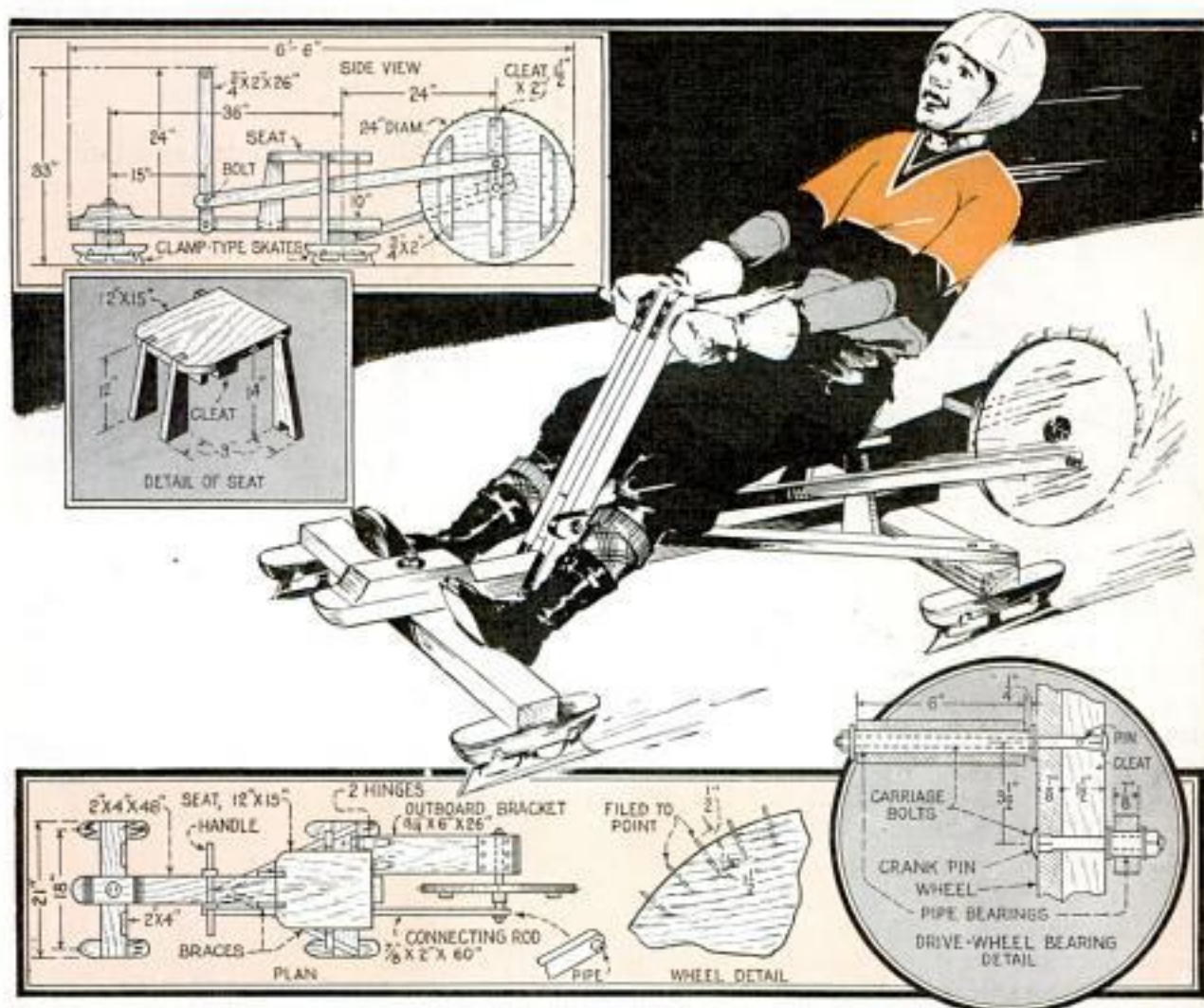
When heating iron on a gas stove, half of a clay flowerpot will be found useful in confining the heat around the work. After sawing the pot in half, which can be done with a hacksaw, it is placed on the burner over the work as shown. By using the two halves, one above the other, the heat radiation will be reduced to a minimum.—Joe Chinclar, St. Louis, Mo.



Cutting Narrow Strips of Glass

To cut narrow strips of glass without breaking them, place the scored piece of glass between a door and jamb so that the narrow strip is held securely. By gently pressing on the larger piece it is possible to break off narrow strips in this way.—R. D. Amory, Harmon, N. Y.

Spiked Wheel Drives This "Arctic Outboard"



Here is a speedy ice scooter that you can make without visiting all the junk yards in the county trying to find a suitable crankshaft. The drivewheel is built up of wood; the axle is a bolt and the crank pin another bolt, while short pipes serve as bearings. All the rest, as you will note in the perspective drawing, is the simplest kind of carpentry. The runners are skates, which can be unclamped when you want to use them on your feet. The 24-in. wheel is easily built up of boards, about $\frac{7}{8}$ -in. thick, and can be cut with a keyhole saw if you have no better equipment. It is held together with three cleats. In boring the hole for the axle bolt, care must be taken to get it true. A good plan is first to drill a small pilot hole for the bit to be used later. When the wheel is completed, support the axle on a bench or box and test it for balance. The heavier side can be lightened by trimming away part

of one or two cleats. The spurs are simply spikes with the heads cut off and the ends filed to a point. Before driving them into the wood, holes slightly smaller than the diameter of the spikes are drilled about $1\frac{1}{2}$ in. deep and 2 in. apart. The height of the seat and its distance from the front should be adjusted to suit the user. The stroke can also be adjusted. To make it shorter, set the connecting-rod bolt higher on the handlebar, and to make it longer, place the rod lower.

Window Shade Protects Clothing When Greasing Car

An old window shade is useful to spread on a floor for protecting the clothing while greasing parts underneath a car. The fabric resists oil and moisture, and the shade is easily rolled up and stored until needed again.

Adjustable Holder to Polish Shoes



This Polishing Outfit Attaches to a Wall and Is Adjustable to Different Sizes of Shoes

Fastened to the wall at a convenient height, this adjustable shoe holder has been found entirely practical for polishing. It consists of a slotted strip of flat iron screwed to a toe piece and fastened to a heel block with a bolt and wingnut, making the latter adjustable for various sizes of shoes. A thumbscrew is used to hold this "shoe tree" on a wooden frame, which may be attached to the wall with a shelf bracket. A strap provided on the lower part of the frame, as indicated, is slipped around the shoe and is buckled on the opposite side. In the absence of a thumbscrew of the type shown, you may use a large screw eye and washer.—Leonard Mitchell, San Francisco, Calif.

Guard Prevents Extinguishing Gas Flame When Pots Boil Over

To keep a gas flame from being extinguished when a pot boils over on the stove, a sheet-metal guard may be provided.



This is bent a trifle narrower than the part on which it fits, so that the slight spring of the metal will hold it on securely. It fits over one arm of the

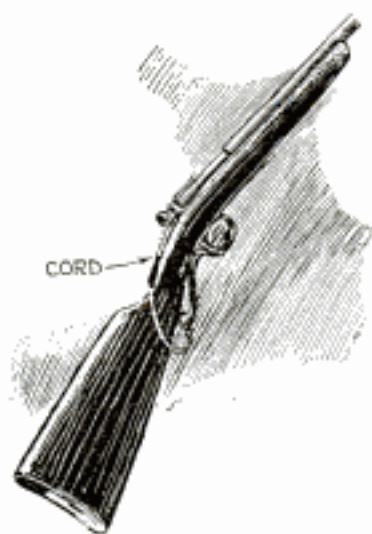
burner and covers three or four holes. In this way, there is no danger from gas fumes as the burner is relighted by the flame under the guard as soon as the pot stops boiling over.

Repairing Glass Graduates and Other Chemical Apparatus

Broken bases on glass graduates can be repaired with plaster of paris so they will stand upright. To do this, prop up the graduate in a can lid, and then pack the lid full of the plaster. When this sets, make a saturated solution of barium hydrate in water and pour a little of it over the plaster base to render it less absorbent of moisture.

Cord Aids in Cocking Rifle

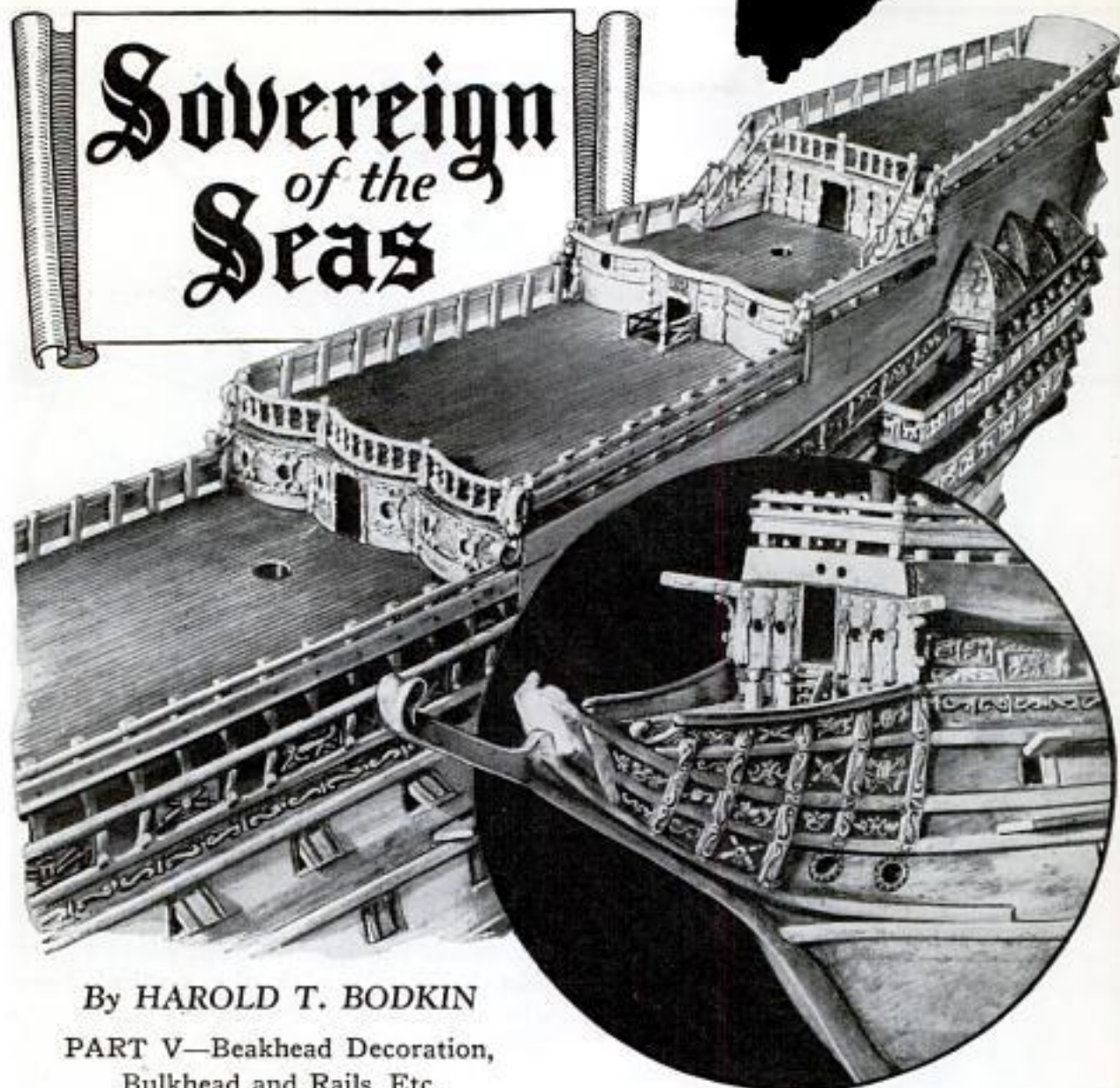
Rifles of the bolt-action type are easily cocked when wearing gloves, if a cord is knotted at one end and tied to the cocking piece at the rear of the bolt. The cord is grasped without interfering with the operation of the rifle. It also adds to the safety of the user, as the cocking piece is not likely to slip out of the finger, which would discharge the gun.



Black Oxidized Finish for Iron

Instrument parts, screws, and other items of iron and steel, can be colored evenly by black oxidizing. To make the solution for this purpose, dissolve copper nitrate, 1 oz., in water, 4 oz. First clean the work and heat it with a blowtorch or over a gas burner to a low heat, and immediately dip it into the solution. A greenish oxidized coating of copper will form on the surface. To turn this black, hold the work over the burner and carefully heat it until the desired depth of black has been produced.

Sovereign *of the* Seas

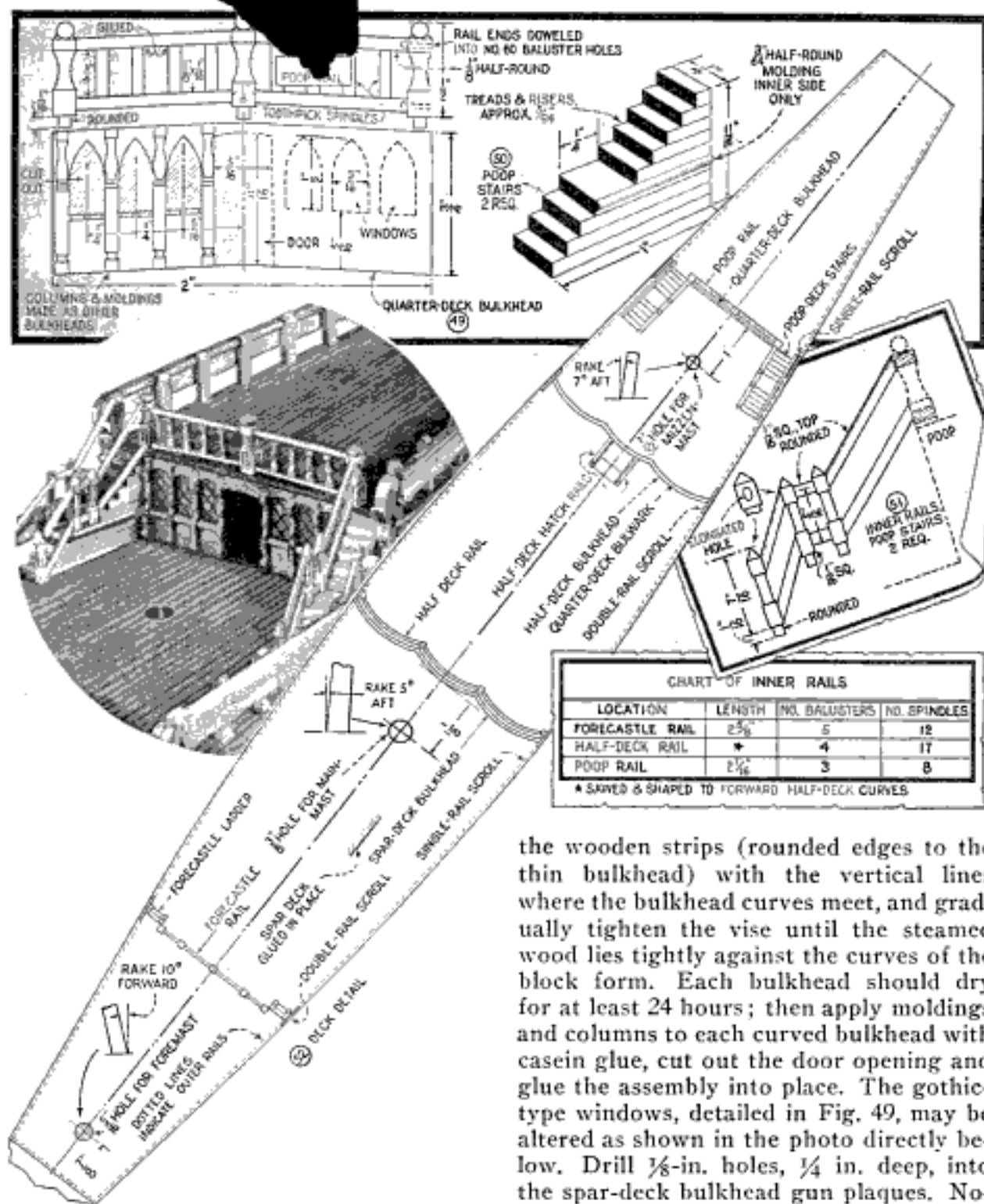


By HAROLD T. BODKIN

PART V—Beakhead Decoration,
Bulkhead and Rails, Etc.

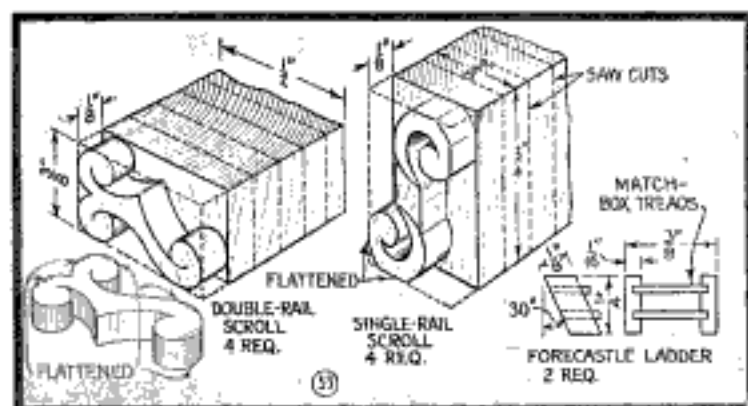
TO provide panels for the carvings on the beakhead, six maple uprights, $\frac{1}{8}$ in. wide and $\frac{3}{16}$ in. thick, are half-lapped into the beakhead wales and are attached with toothpick dowels and glue as shown in Fig. 58. Wale No. 3 is extended forward to meet the upward curve of wale No. 4. When these units are dry and sanded flush with the wales, carvings A are fitted into the panels, as was done on the hull. It is necessary to trim very closely to the carving designs to do this; in some cases, parts of the design itself must be cut away. In the smallest panels and on the vertical strips, carvings B may be used. Two gunport wreaths, with ribbands cut off, should be glued into place centrally between wales Nos. 5 and 6 and on the

center lines of the after, short uprights. When dry, $\frac{3}{16}$ -in. holes are drilled upward and backward into the hull through the wreath centers, into which anchor hawsers will be run later. See Fig. 58. Three bulkheads are required for the after ends of the spar, half and quarter decks as in Fig. 52. These are detailed respectively in Figs. 49, 54 and 57. Except for length, the moldings and columns are all the same. The round columns can be turned from toothpicks and their contours formed with a small round file. When shaped, the columns are split in halves with a razor blade and glued to the bulkheads. The bulkheads proper can be made from thin wooden trays such as are used as lard containers. Cut the half-deck and quarter-



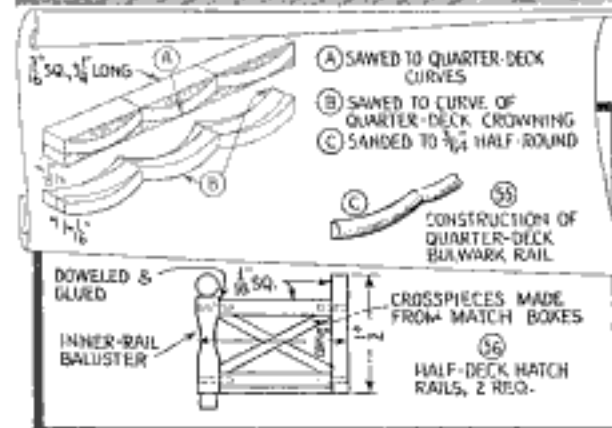
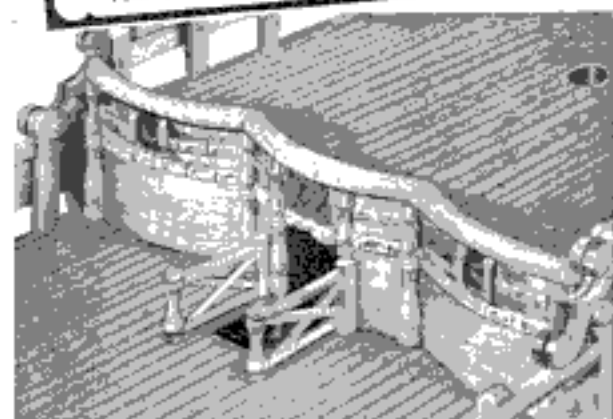
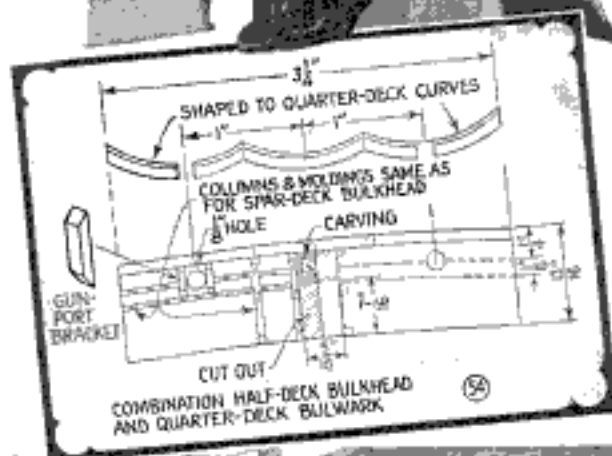
deck forward curves from two pieces of soft wood about 1 in. thick. Also, cut pieces of the same width from the trays, about 1/4 in. longer than the finished length of each curved bulkhead. Steam these pieces for about 20 minutes, then bow them and cleat the outer ends to the ends of the curved block. Round one long edge of two 1/8-in. hardwood strips, 2 in. long. Then, put the block in a vise, aline

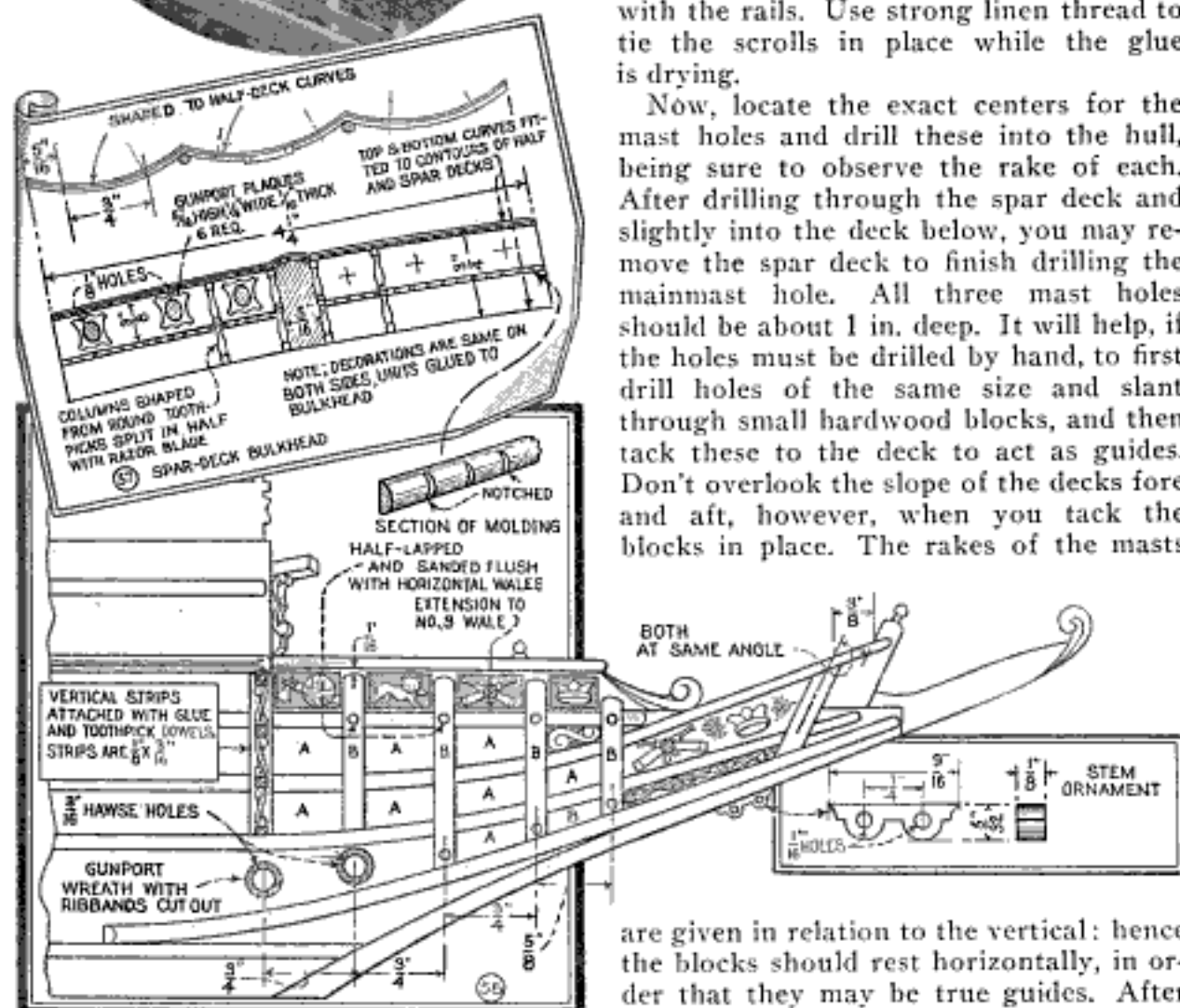
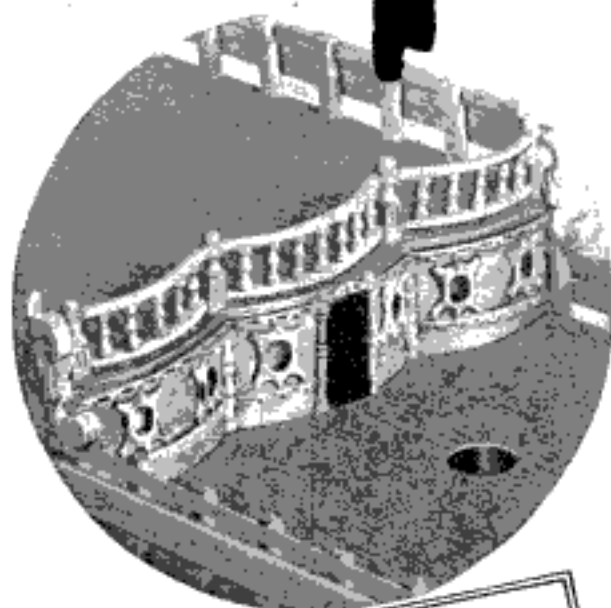
the wooden strips (rounded edges to the thin bulkhead) with the vertical lines where the bulkhead curves meet, and gradually tighten the vise until the steamed wood lies tightly against the curves of the block form. Each bulkhead should dry for at least 24 hours; then apply moldings and columns to each curved bulkhead with casein glue, cut out the door opening and glue the assembly into place. The gothic-type windows, detailed in Fig. 49, may be altered as shown in the photo directly below. Drill 1/8-in. holes, 1/4 in. deep, into the spar-deck bulkhead gun plaques. Notice that the half-deck bulkhead extends high enough to form a forward bulwark for the quarter deck, and that its top is finished off with a half-round rail, made as in Fig. 55. The quarter-deck bulkhead is simply a flat piece of the same thin wood, decorated similarly to those just described. However, before gluing this one in place, cover the window openings from the back side with book-mending tissue tape, available at stationery stores. This



is first ruled on the back side with India ink into $\frac{3}{4}$ -in. diamond panes and touched up lightly with red, blue and purple oil or water colors to simulate leaded stained glass. The exposed forward side should be covered with very thin orange shellac to age and protect the windows against dampness.

You can finish off the quarter-deck bulkhead by making and placing the two poop stairs, Figs. 50 and 52. Use $\frac{3}{4}$ -in. hardwood strips, $\frac{1}{4}$ in. wide, gluing them together to form steps, and then cutting each assembly to proper size. Note the molding on the inner side. Glue and pin it in place, the forward end of each slanting outward parallel to the outer rail. The inside stair rails are detailed in Fig. 51. Round the ends of the horizontal rails and glue them into the holes of the balusters. Instead of regular balusters to support the outside stair rails at the landings, use $\frac{1}{8}$ -in. square hardwood sticks, pointed at the upper ends. The horizontal outside stair rails are matched for angles with the inside rails and their free ends are joined with the quarter and poop-deck rails. The half-deck hatch requires two rails, made as in Fig. 56. The two balusters are like those used for the other inside rails described below. Horizontal rails, $\frac{1}{8}$ in. square, the top ones slightly rounded, are joined to each baluster by means of glue and dowels to a third stick, baluster-high, that is glued and pinned vertically against the half-deck bulkhead. The center cross-pieces are made from safety-match boxes and glued in place as shown. Balusters for the forecastle, half and poop-deck rails are turned and filed to shape the same as the columns used for the bulkheads, 14 being required. They are equally spaced along each rail as speci-





figured in the chart of inner rails. Being straight, the forecastle and poop-deck rails are joined with $\frac{3}{16}$ -in. half-round maple rails, doweled at each end and glued into holes in the balusters, as in Fig. 48. The curved half-deck rails should be sawed and sanded to shape, as the quarter-deck rail,

and doweled at the ends and glued into the baluster holes. Spindles between the balusters are made from toothpicks, glued equidistantly between the upper and lower horizontal rails, the number required being specified in the chart. First assemble these rails on separate blocks, and install them on the ship after the glue has set, the doweled lower ends of the balusters being glued into holes drilled into the decks. Single and double scrolls, made as in Fig. 53, are used to join the free ends of the outside rails, their locations being indicated in Fig. 52. Glue their flattened areas to the tops and ends of the outside rails in a straight fore-and-aft alignment with the rails. Use strong linen thread to tie the scrolls in place while the glue is drying.

Now, locate the exact centers for the mast holes and drill these into the hull, being sure to observe the rake of each. After drilling through the spar deck and slightly into the deck below, you may remove the spar deck to finish drilling the mainmast hole. All three mast holes should be about 1 in. deep. It will help, if the holes must be drilled by hand, to first drill holes of the same size and slant through small hardwood blocks, and then tack these to the deck to act as guides. Don't overlook the slope of the decks fore and aft, however, when you tack the blocks in place. The rakes of the masts

are given in relation to the vertical: hence the blocks should rest horizontally, in order that they may be true guides. After drilling the mainmast hole, you can glue the spar deck permanently in place.

Two forecastle ladders, Fig. 53, are made the same as the beakhead ladder and are attached as shown in Fig. 52. Glue these in position. Also, pin and glue the stem ornament to the underside of the stem, as in Fig. 58.

Adjustable Bed Chair Is Real Convenience



This adjustable bed chair is light to handle and will be found a real convenience while reading in a reclining position. The frame is made of hardwood and the back is paneled with $\frac{1}{4}$ -in. plywood, while the two parts of the frame are hinged together by means of large stovebolts. Adjustment is obtained by two pivoted support arms fitted at the lower ends with $\frac{3}{4}$ -in. hardwood pins that fit notches cut in the base. Four positions are obtainable, and if desired, more can be had by cutting additional notches.—Edwin M. Love, Arcadia, California.

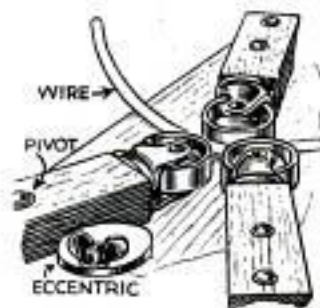
Renewing Old Camera Bellows

When the bellows on my camera become so worn that they admit light and ruin the film, I renew them with rubber enamel at small cost. With the bellows drawn full length and cleaned of foreign

matter, three coats of rubber enamel are applied externally, allowing each coat to dry completely before applying the next. The bellows should not be folded before they are dry or they may stick. The rubber enamel does not crack and it gives the bellows the appearance of being new, besides being effective in making them light-proof. Removal of the back part of the camera and lens board will facilitate painting and allows the paint to dry quickly.—A. P. D'Ambra, Lawrence, Kan.

Heavy Wire Bent with This Jig

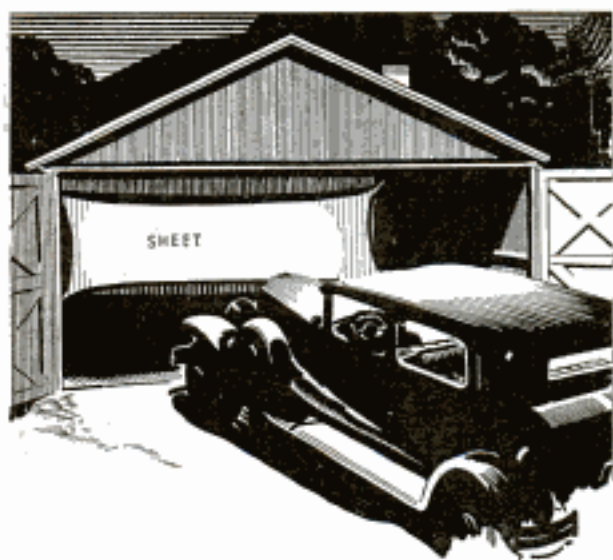
Three casters can be rigged up for the purpose of bending heavy wire and light rod. They are set in the ends of hardwood cleats, two of which are



of which are screwed rigidly to a base, while the third is pivoted and its position controlled by means of an eccentric. Moving the latter to

push the pivoted caster to the left increases the sharpness of the bend in the work.

read. April 1934-137a
1/4 pt. 50 cent
 Steel Gate Mfg Co St Louis Mo
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Sheet across Rear Wall of Dimly Lighted Garage Helps Driver Judge Distance When Parking Car

White Sheet Helps Park Car in Dark Garage

Stretched across the rear wall, a white sheet will aid in parking a car in a dimly lighted garage. The sheet plainly indicates the wall and enables the driver to judge the distance with greater accuracy.

How to Produce an Imitation of Metal Inlay

Good imitations of delicate inlay metal work can be produced with thin sheets of various-colored metals, such as copper, brass, etc. First solder the sheets together to make a flat composite sheet slightly larger than the size wanted. If it is made several times larger than necessary, the sheet may be folded and soldered to make a thicker piece, which is easier to work.

Before soldering, thoroughly clean the work by boiling it in sal soda, and then paint the surface with a saturated solution of borax, being careful not to touch the cleaned metal with the hands. Next sprinkle finely powdered solder over the surfaces of the sheets and stack them on a sheet-iron plate supported over a large gas burner. Place another plate on top of the pile and light the burner, playing a blowtorch on the pile to produce even heating at the start. When the solder starts to flow, carefully add weights to the pile to press the sheets into perfect contact and allow them to sweat together, after which the fire is turned out and the pile is allowed to cool slightly while still weighted. When cool, hammer the back side of the composite sheet with evenly spaced blows to produce deep dents, which should come through to the top side. The next step is to file the top surface smooth and level, thus exposing the lower layers of the colored metals in rings. Another method of producing an inlaid effect is to drill into the top of the composite sheet with a large tapered drill. Then turn the sheet upside down on a smooth metal surface and hammer the back of the drilled surface until the top is level. Any holes left may be filled with soft copper or brass trimmings soldered in place, after which they are filed smooth. To produce an imitation of wood grain on the work, either cut a V-shaped groove in the front of the sheet, and hammer from the back, or hammer a deep groove in the back, and file the resulting raised line on the front level.



Craftmats and Blueprints on

"SOVEREIGN OF THE SEAS"

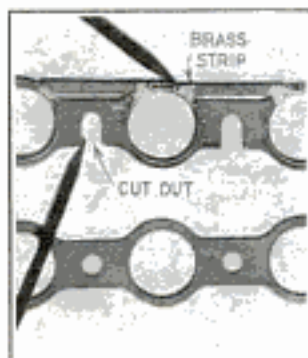
A Craftmat enabling you to form all the hull carvings for this ship model, and some special compound for parting the moldings from the matrix, will be sent upon receipt of 50 cents. Six blueprints are now available on this model at 25 cents each. Also prints on 350 other practical and interesting projects. Free list sent upon request. A sample print sent for 10 cents. Address Blueprint Dept.

Old Truck Wheel Makes Theft-Proof Lock for Air Hose

Filling-station owners can prevent theft of their water or air hose by coiling them inside an old brake drum of a large motor truck. Holes are drilled around the edge of the drum, which is then turned upside down and bolted to the floor or anchored to the ground over the outlet for the hose. A steel lid is hinged to the open side of the drum and a hasp and a padlock are provided.—Claude E. Johnson, Romance, Ark.

Installing Manifold Gaskets

By cutting out the lower part of the bolt holes in a manifold gasket as shown, it can be installed without removing the manifold assembly from the engine. Before doing this, thin strips of brass or copper should be soldered to the top of the



gasket as shown in the upper detail, to keep it in line and to prevent leakage, which often results when a gasket is bent out of shape during the installation.—C. Edward Packer, Chicago.

Glass Frosted by Grinding

Glass may be frosted by rubbing the surface with a cloth bag filled with emery powder. Use a fine grade of emery for this purpose and keep the surface of the glass wet. In order to measure the progress, wash the glass with clear water and then rub it dry with a soft cloth.

Wooden Handles Improve Crocks

When small crocks are used as acid containers, they are more easily manipulated if provided with wooden handles as shown in the photo. A small hole is drilled in each end of the handle to take a wire, which is wrapped around the crock.



Shadows in Photographic Copy Work Are Avoided by Attaching Specimen to Clear Plate Glass

Shadows Avoided in Photographic Copy Work

By using the method indicated in the illustration, it is easy to avoid shadows in photographic copy work. The object to be photographed is fastened to a plate of clear glass, which is placed in front of the background, and the exposure is then made in the usual way. This method is useful for the collector who keeps permanent records by copying biological specimens.—Jos. M. Creamer, Astoria, New York.

Slot in Sawhorse Helps Hold Work

When handsawing a number of pieces of wood of about the same width, a slot cut in the sawhorse, as shown, will enable you to steady the work with your knee, and leave one hand free to hold the end of the work and keep it from splitting as it is sawed off. Two cleats, spaced the proper distance apart and nailed to the top of the horse, will serve the same purpose, and will be better where only a few pieces are to be sawed.



HOMEMADE CRIB and

THESE two items for your baby, a crib with a sliding side and a folding play yard, can be made from standard stock available almost anywhere.

First the crib: The corner posts are $1\frac{1}{4}$ -in. square and the rails are made of $\frac{3}{8}$ by $1\frac{1}{4}$ -in. stock. The two ends and sides are built up separately, $\frac{1}{2}$ -in. maple dowel rod being glued into the upper and lower crosspieces. The ends and one side may be joined with either dowels, glued in as indicated, or with screws. Brass or iron rod, $\frac{3}{8}$ in. in diameter, is used to make guides to allow one side to be dropped. The top of the rods is bent at right angles, after which the end is drilled and tapped for a screw with which they are securely attached to the upper end of the corner posts. Holes are drilled near the ends of the upper and lower rails of the sliding side, to receive the guides, which are held to the bottom of the corner posts by angle brackets. A spring-brass stop, attached to the posts, keeps the side up. To lower it, these stops are merely pressed in with

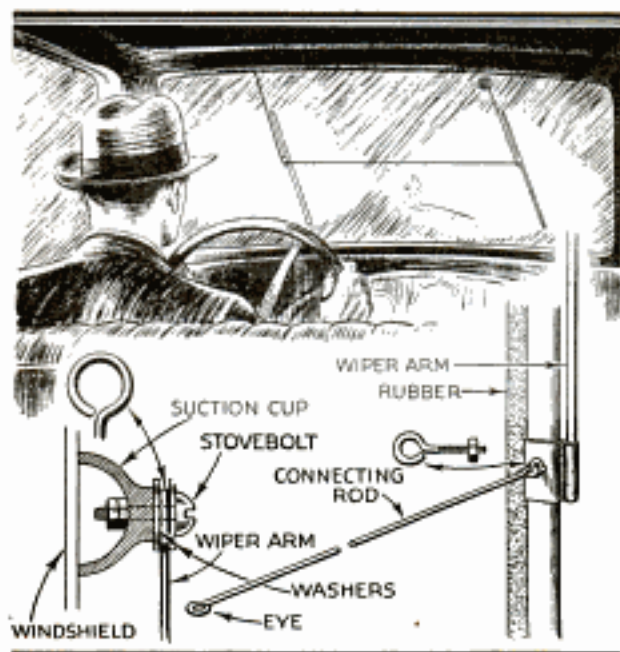


PLAY YARD *for the* BABY

the fingers. Rigidity is obtained by bolting a wooden or angle-iron frame to angle brackets screwed to the lower rails of the ends. The spring and mattress are then laid on the frame, although, if you like, the spring can be incorporated in the frame by tacking on strips cut from inner tubes and weaving them together as below at the right.

Maple dowel rods are also used in making up the sides of the play yard. Two of the sides are cut in half and the halves then hinged together on the outside, while simple latches are used to lock them together. Narrow butt hinges are also used at the corners on the inside, to fasten all sides together, and the two-piece floor is hinged to the lower rails of two sides, so the whole yard can be folded. Three cross-pieces support the $\frac{3}{8}$ -in. floor, while finger holes make it easy to lift.





Extra Wiper, Held on Windshield by Suction Cup, Is Operated by Regular Wiper

Twin Wipers for Your Windshield

By using a rubber suction cup and an extra wiper, you can also keep a portion on the right-hand side of the windshield clear. An eye is formed on the end of the wiper arm for pivoting it to a small bolt on the suction cup. A length of wire connects both wipers as indicated.

Portrait Attachment on Box Camera



Recently I desired to take some close-ups of a game table but had only a box camera available, and my portrait-lens attachment did not fit it. To overcome the difficulty, I made a lens holder from thin spring brass and pivoted it to the front of the camera, concentric with the camera lens. When not in use, the holder can be pushed down parallel to the bottom end, where it does not interfere with the regular use of the camera.—Jas. H. Rodgers, Toronto, Can.

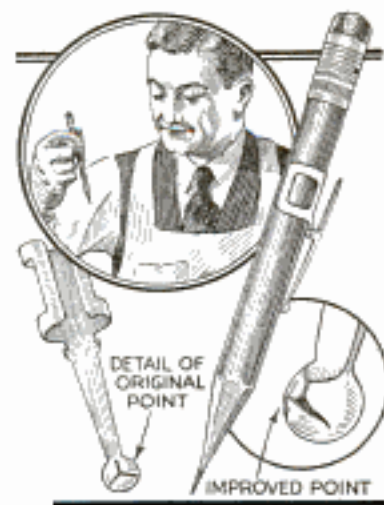
☞ To relieve strain on your eyes when darning hose, use a small electric lamp as a darning egg; when the lamp is lighted, the work is easily seen.

Holes in Screen Frame Stop Leaks around Casement Windows

After fitting my new home with casement windows that opened into the rooms, I discovered that water leaked under the windows during a hard rain. This was caused by the water collecting between the screen frames and the windows until it backed up and ran over the sill. To eliminate this trouble, I drilled a number of small holes through the bottom member of the screen frame flush with the top of the sill, which permits the water to run out as fast as it enters.—Leslie M. Miles, Wausau, Wis.

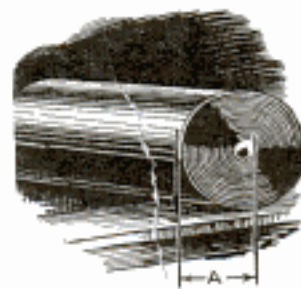
Improving Your Pencil Clip

Pencil clips of the type illustrated can be altered to hold more securely by bending out one of the three sections, pressed together to form the knob on the end of the clip, as shown in the lower circular inset. The point engages with the cloth on the pocket so that the clip cannot be pulled off easily. This alteration, however, can only be made on a clip having a pivoted arm.

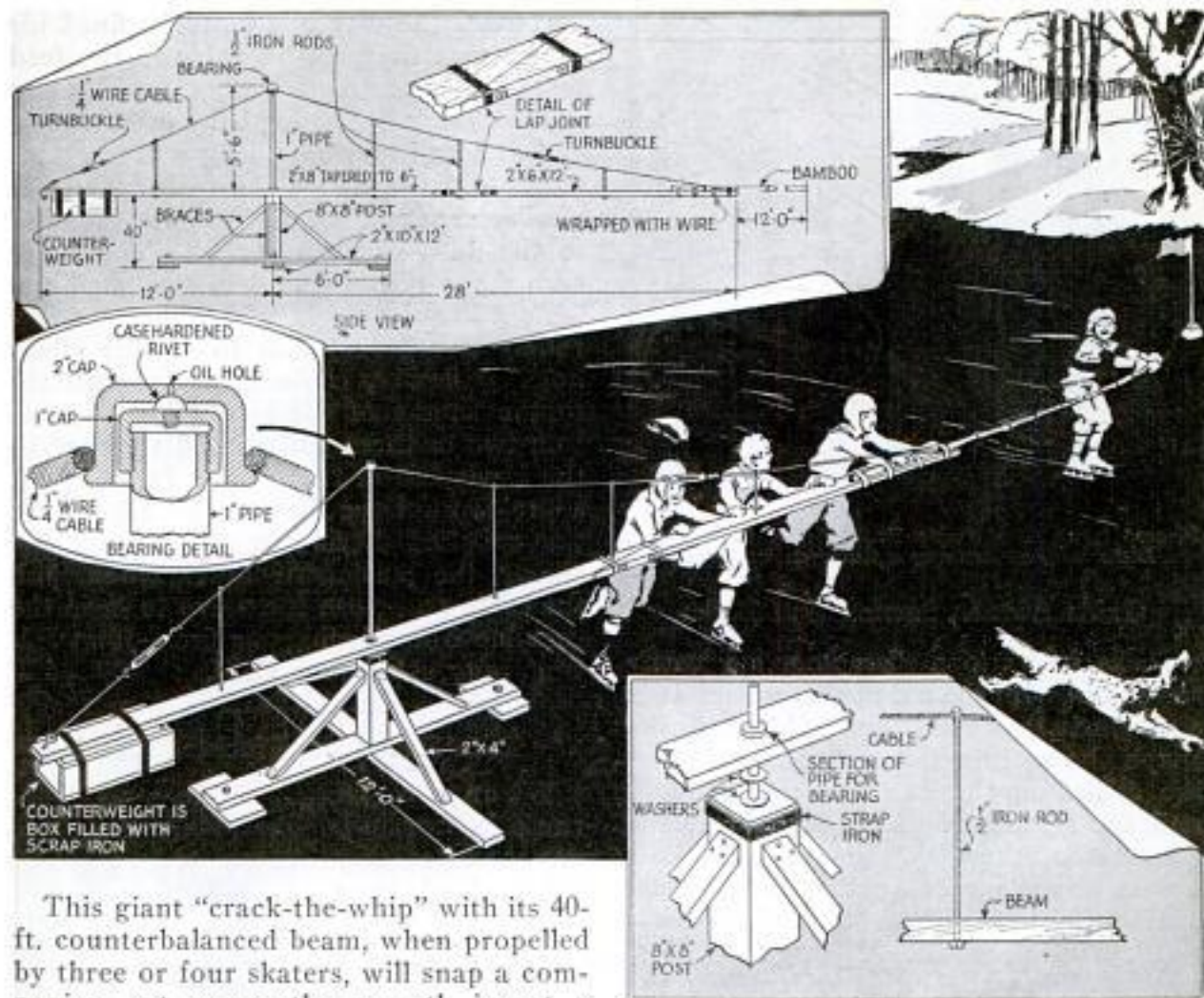


Measuring the Length of Material in Rolls

Lengths of rolled material such as cloth, paper, cable, rope belting, etc., can quickly be determined by measuring the radius of the end section. To do this, multiply the number of turns of material by the distance A across the end of the roll, and multiply the product by .2618. This will give you the length in feet of the material.—W. F. Schaphorst, Newark, N. J.



"Crack-the-Whip" Hurls Skaters Across Ice

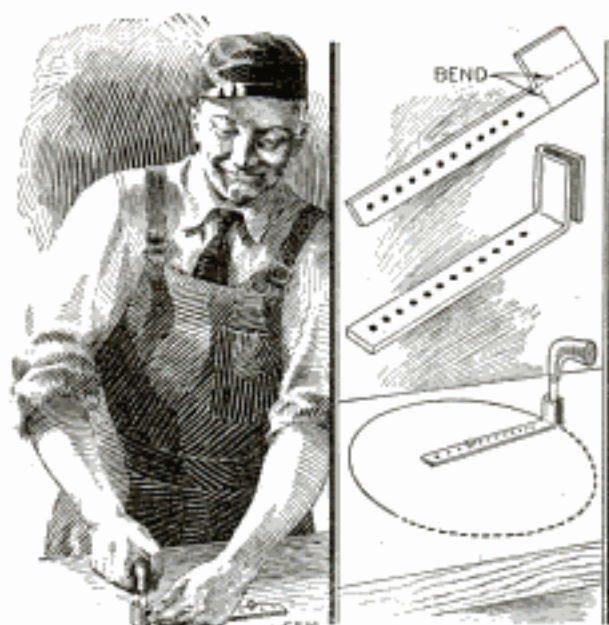


This giant "crack-the-whip" with its 40-ft. counterbalanced beam, when propelled by three or four skaters, will snap a companion out across the smooth ice at a breath-taking speed. Construction is clearly illustrated in the drawings. First make the axle support of an 8 by 8-in. post, braced on two planks 2 by 10 in. by 12 ft. A 1-in. galvanized iron pipe, 6½ ft. long, is set about 12 in. into the wood post, which is bound at the top with strap iron. For the beam, use 2-in. yellow pine. The section carrying the axle-bearing should be 24 ft. long and tapered from 8 to 6 in. in width. It is lap-jointed and bolted at the narrow end to another tapered plank. A 1½-in. bamboo pole extends 12 ft. beyond the end of the pine beam, and is fastened with friction tape and a wrapping of wire. The object of using bamboo here is twofold: to give snappy action and also to minimize the danger in accidentally striking a skater or bystander. The beam is trussed with a cable fastened to a revolving cap on top of the pipe axle. Two turnbuckles keep the cable tight. The re-

volving cap is slightly countersunk to ride on a case-hardened rivet head, and an oil hole is provided for lubrication. It is important that the axle be perfectly perpendicular to prevent wearing or rolling. A suitable weight at the short end, such as a box filled with scrap iron or sand, or a sandbag will serve as a counterweight, which can be securely bolted or wired in position as shown.

It is a good idea to fence off an area around the circle described by the end of the beam, with a wide opening marked by a red flag so that the skater will know just when to let go of the beam and start on his flight across the ice.

☐ For printing photos, flexible masks that are more durable than black-paper masks, can be made from light-struck film by fully exposing it to daylight and then developing and drying it.



Pivoted Sheet-Metal Guide Enables You to Saw Out Disks without Scribing a Circle on the Work

Guide Aids in Sawing Out Disks

Disks of various diameters are easily sawed out with the aid of this guide. It is a piece of sheet metal, cut and bent to the shape shown in the detail. Several holes are drilled in the guide to take a pivot nail, the setting of which determines the diameter of the disk. In use, a keyhole saw is placed in the guide, which is held against the back of the saw and guides it as the work proceeds. Although the illustration shows the guide wider than the saw blade, it should take only about two-thirds of the blade, to prevent the metal from getting in contact with the teeth, which would dull them. Also, the guide should be a sliding fit on the blade; if the guide is too wide, the edge of the disk will not be a uniform curve.

Tack Holds Paintbrush on Side of Can above Bottom



When it is desirable to leave a brush in a paint can temporarily, a tack can be used to keep the bristles from resting on the bottom of the can. Drive the tack into the brush handle a little above the bristles and then hang the brush on the edge with the bristles in the paint.—C. E. Packer, Chicago.

Safety Device Shuts Off Gasoline in Case of Fire

Here is the way one motorist fixed his car so that the shut-off valve in the feed line would be automatically closed if a fire should break out around the motor. One end of a coil tension spring was attached to the radiator above the motor, and the clevis end of an old brake rod was fastened to the dash with an eyebolt. The other end of the spring was then stretched and fastened to the clevis, with a pin made by rolling a celluloid film to fit the clevis hole. A flexible cable was next fastened to the handle of the shut-off valve, run over two or three pulleys and attached to the clevis end of the spring. In this way, a fire around the motor would burn off the celluloid clevis pin and release the spring, the tension of which would pull the cable and close the valve to keep the gasoline from feeding the fire.—John Edwin Hogg, Alhambra, Calif.

Coin Rack from Block of Wood

When a coin rack is needed, one can be quickly improvised from a block of wood. Holes of suitable sizes are drilled at an angle in the block, and then a section is removed by a saw cut through the center of the holes.—A. H. Waychoff, Phoenix, Ariz.



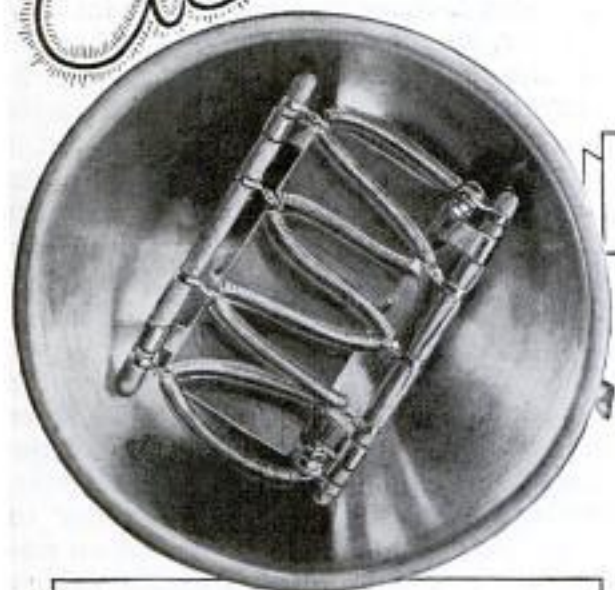
Annealing Hammered Brass or Copper

Brass or copper that has become hard and brittle from being hammered, can be annealed by heating it to a dull red and then quickly plunging it into cold water. When hammering these metals, it is best to anneal the work frequently to prevent breakage.

☞ A few tablespoonfuls of vinegar put in the first rinsing water for the home laundry will help remove the soap and lessen the work.

Electric

RADIANT COOKER *is Homemade*

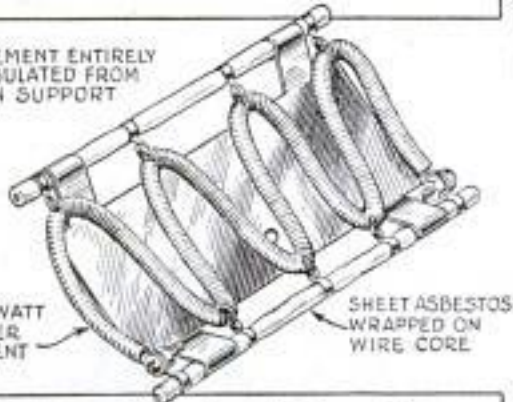


Inverting Lower Pan
Makes Removal of
Dishes Easier



Reflector and Heating-Coil Unit; the Latter Is Adjustable for Height Suitable to Cook Various Foods

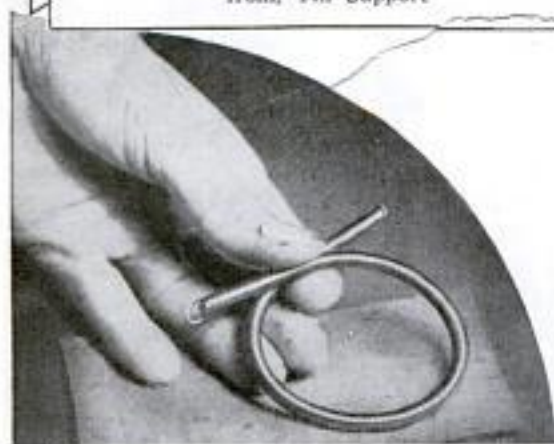
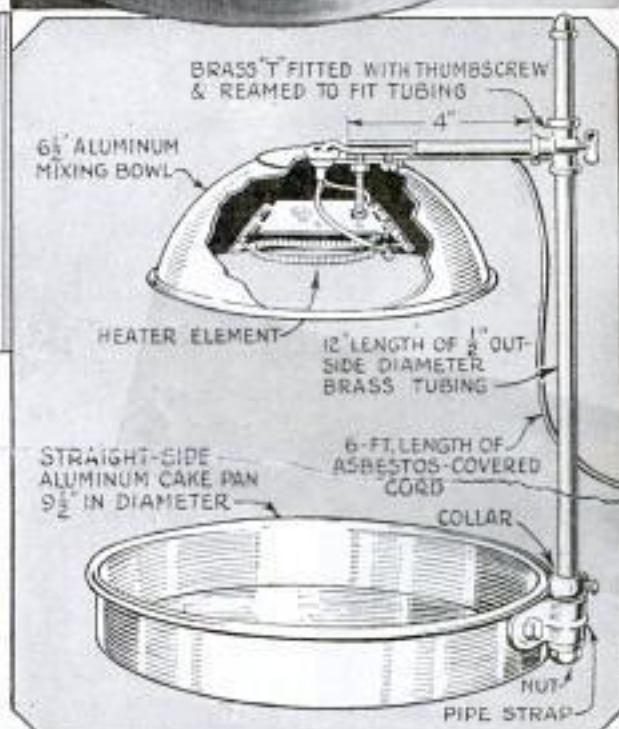
ELEMENT ENTIRELY
INSULATED FROM
TIN SUPPORT



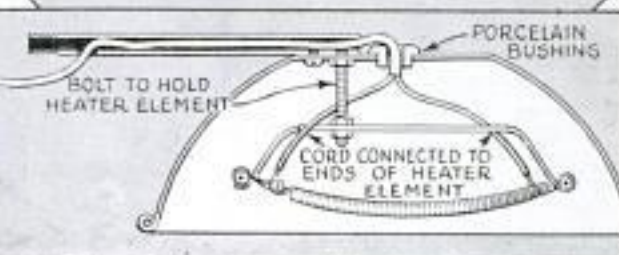
550-WATT
HEATER
ELEMENT

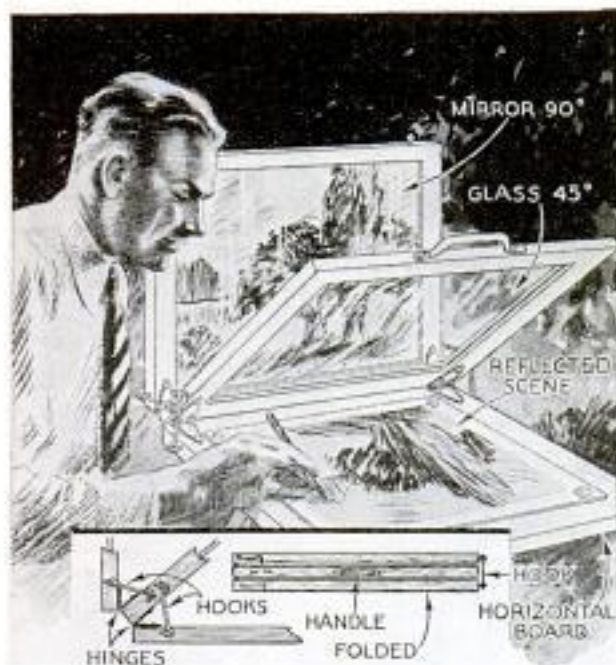
SHEET ASBESTOS
WRAPPED ON
WIRE CORE

Resistance Wire, from Ordinary Heater
Element, Is Supported by, but Insulated
from, Tin Support



Right Detail Shows How the Heating
Unit Is Wired and Supported in Reflector





Outdoor Scenes Reflected by Mirror Easily Traced by Looking through Glass in This Device

Device for Copying by Reflection

Outdoor scenes may be copied by reflection with this portable device, which folds up and is fitted with a handle for carrying. Two frames, one to hold a mirror and the other a clear glass, are hinged together, and the assembly is then hinged to a base. Hooks are provided to hold the mirror at a 90° angle and the glass at a 45° angle when in use. The copying paper is placed under the glass. The object reflected by the mirror can be seen on the paper by looking through the glass from the top.

Spokeshave Made of Pipe

Serviceable spoke and drawshaves are easily made from wristpins or pieces of



steel pipe by grinding cutting lips on them. Wristpins are hard and more difficult to grind, but they hold an edge better than pipes. If the former are used, wooden handles should be driven into the ends for grips.

Filling Toy Balloons with Hydrogen

To fill toy balloons with hydrogen, get a wide-mouthed gallon bottle, and a tight-fitting rubber stopper in which two holes are drilled. Bend two pieces of glass tubing to an L-shape and insert them into the stopper, so that one reaches the bottom of the bottle and the other extends above the stopper. Slip the balloon over the end of the shorter tube and fasten it there with a rubber band. To the other tube, attach a piece of rubber hose. Next remove the stopper and pour about 1 oz. of hydrochloric acid into the bottle. Then drop in a few scraps of zinc, which will cause the formation of hydrogen gas. Quickly insert the stopper and allow the gas to generate for a few minutes to force out the air. Then slip the hose onto the faucet and carefully turn on the water, gradually filling the bottle in order to force the gas into the balloon but no water. Remove the balloon with the rubber band intact on its stem, which will close the latter and prevent loss of the gas. The stopper should be removed from the bottle and its contents washed away in the sink, saving the remaining zinc for future generation of gas.

Screw Holds Large Pot on Shelf

To eliminate the possibility of having a large flowerpot slip off a narrow window shelf, drive a wood-screw into the shelf, letting it project above the surface as shown. Then set the pot in position with the head end of the screw entering through the hole in the bottom of the pot.



Three windshield-wiper blades, mounted in a groove in a smooth handle, make a squeegee for applying kodak prints to ferrotype plates and for removing surplus water from films.



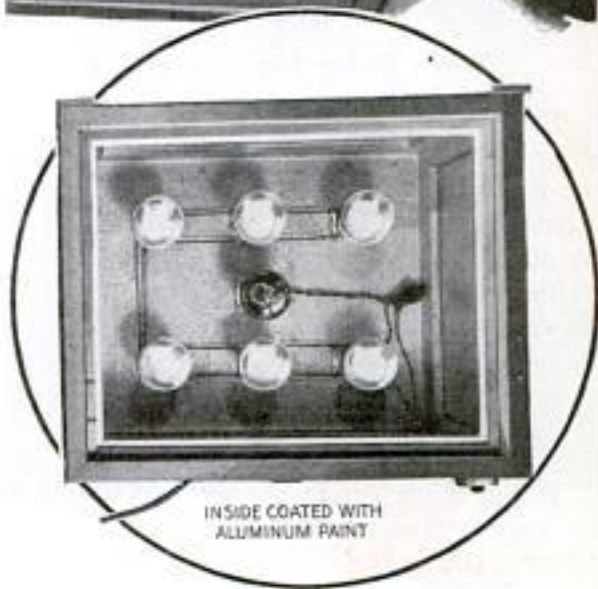
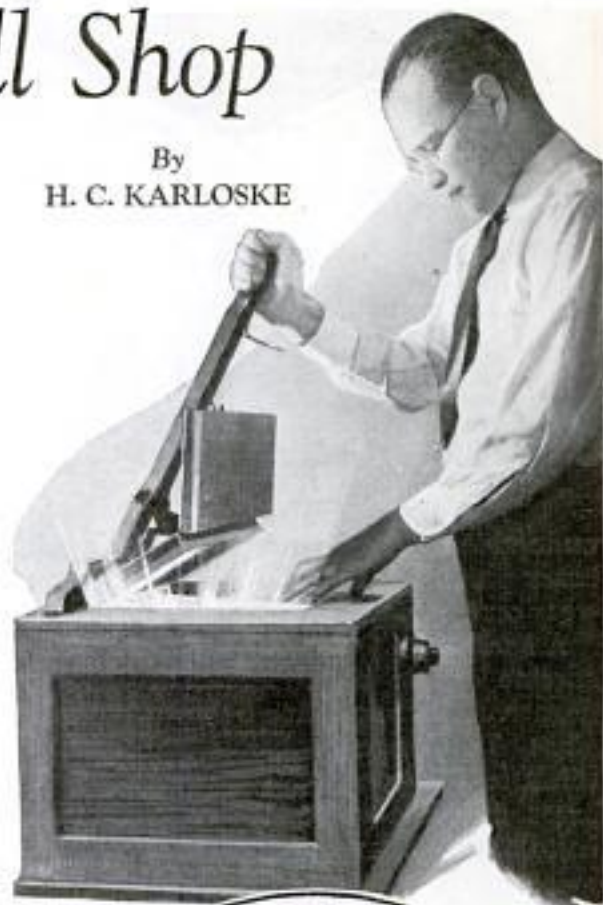
Rapid PHOTO PRINTER *for the Small Shop*

HERE is a photo printer that is of suitable size for commercial work in the small shop, and can be made with ordinary tools from material that is readily obtainable.

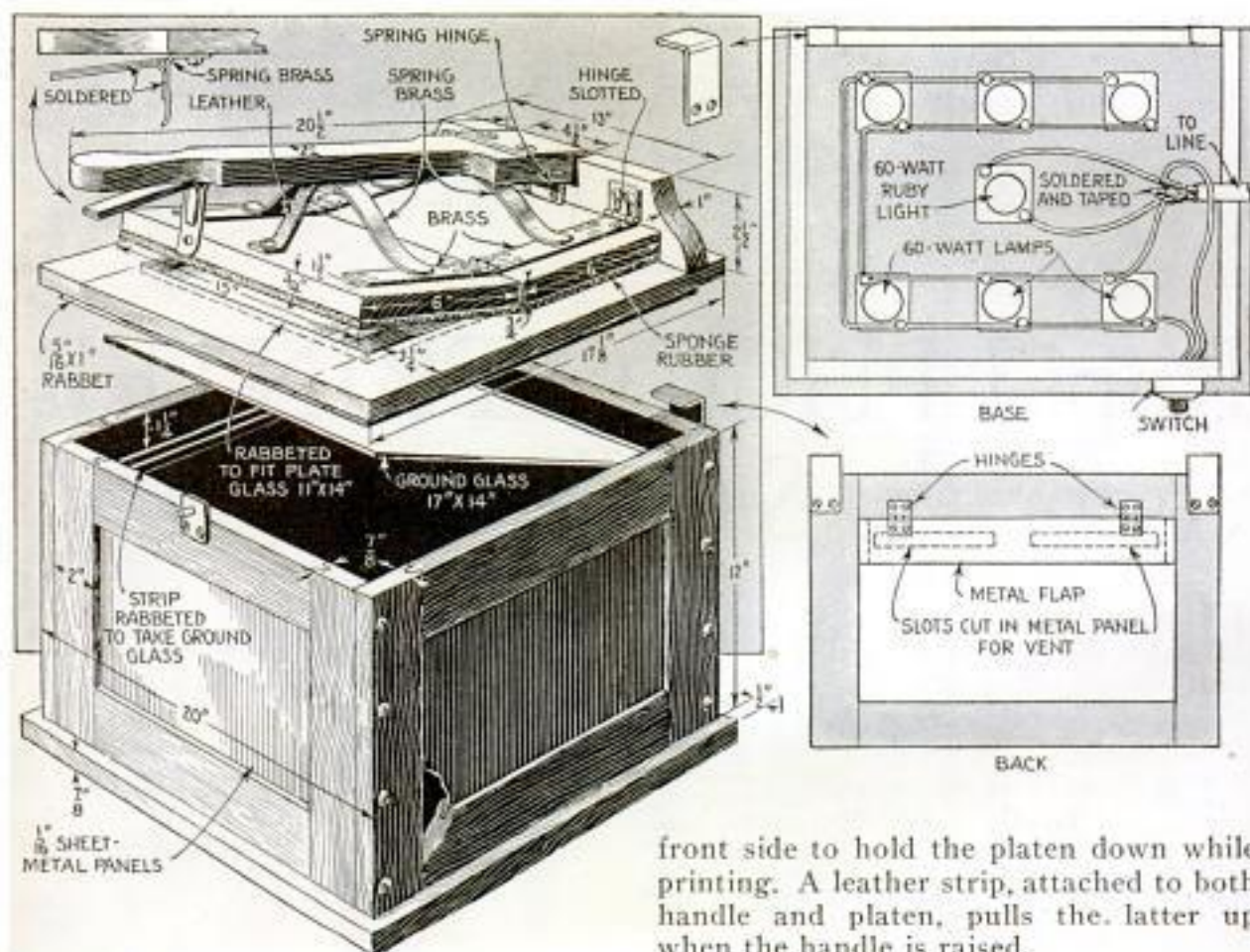
Four frames, with mortise-and-tenon joints, are paneled with sheet metal and screwed to a base of $\frac{7}{8}$ -in. stock to form the box. Rabbed strips are screwed to the sides, $1\frac{1}{4}$ in. from the top, to support a ground glass, which diffuses the light from electric lamps mounted on the base. Two vent slots are cut in the rear panel near the top, to allow heat to escape, a metal flap being hinged to the frame to cover the vents when desired. The frame of the lid is mitered and rabbeted on the underside of the outer edge to fit the top of the box. The frame is also rabbeted at the top of the inner edge to take a piece of plate glass, which should be flush with the top of the lid to support the negatives when printing. Metal brackets, instead of hinges, are screwed to the back of the box so that they project above it to hold the lid in position.

Two pieces of 1-in. wood, hinged together, make up the platen, which is also hinged to a horizontal piece across the back part of the lid. The screw holes in the hinges attached to this piece are slotted to permit the platen to adjust itself automatically to various thicknesses of paper and negatives. A handle, to raise and lower the platen, is cut to the shape shown, and is hinged to the rear piece with a spring screen-door hinge to keep the platen up when it is released. Spring-
brass pressure springs are screwed to the

By
H. C. KARLOSKE



INSIDE COATED WITH
ALUMINUM PAINT



underside of the handle to bear against brass plates on the platen, which prevent wear on the wood.

A sponge-rubber pad is glued to the underside of the platen to assure that the negative and paper are held firmly on the glass. If sponge rubber is not available, thick felt may be substituted. A spring-brass clip is fastened to the end of the handle to engage with a catch on the

front side to hold the platen down while printing. A leather strip, attached to both handle and platen, pulls the latter up when the handle is raised.

The inside of the box is coated with aluminum paint, after which sockets for six 60-watt lamps and one ruby lamp are mounted on the bottom. The ruby lamp is wired directly to the supply line, while the other lamps are wired in parallel and are controlled with a snap switch on the side, these lamps also being connected to the supply line as indicated in the upper right-hand detail.

Paint Filler for Old Walls

Small indentations caused by thick coats of paint peeling from interior walls may be filled with the pigment from flat paint after the surplus oil has been poured off. A putty knife is a good tool for this work. After the filler has dried, it may be sanded flush with the surrounding surface.

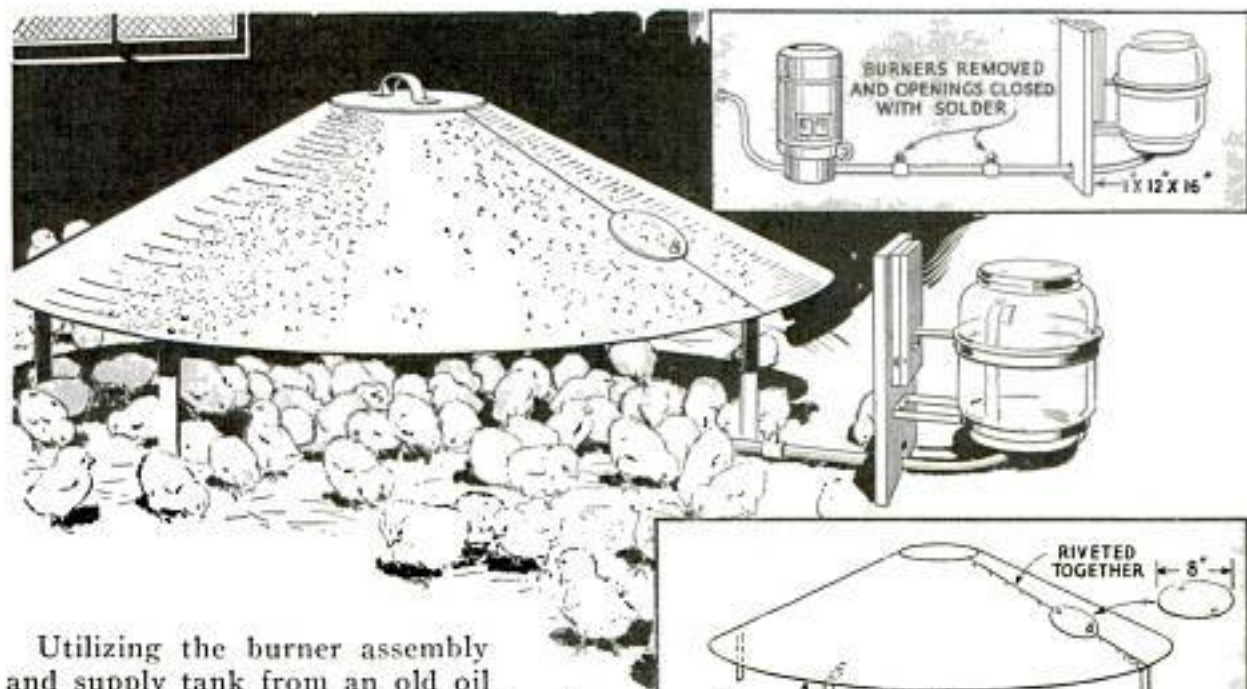
Belting Arrangement for Motor Fitted with Two Pulleys

When an electric motor is fitted with two pulleys on one end of the shaft as shown, the belt drives should be in oppo-

site directions, in order to equalize the strain and prevent excess wear on the shaft bearing. This, of course, causes one belt to run with the slack side on top, but the saving on the bearing will compensate for this inconvenience. If possible, an additional bearing should be installed at the end of the shaft to reduce the strain on the motor bearing.—W. F. Schaphorst, Newark, N. J.



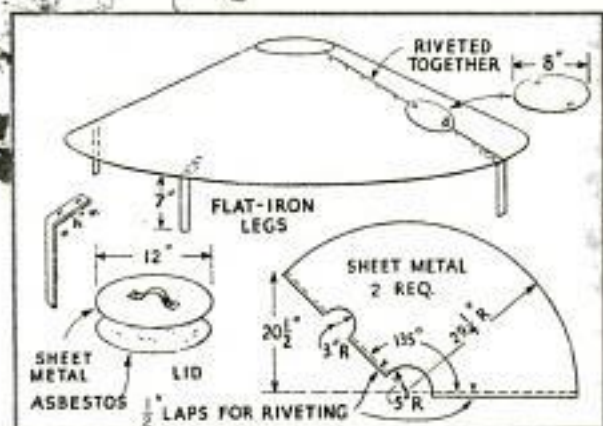
Chicken Brooder Made from Old Oil Stove



Utilizing the burner assembly and supply tank from an old oil stove, a poultry raiser made a brooder that operated for thirty hours on 1 gal. of kerosene under normal weather conditions. Two of the burners were removed, and the outlet holes in the feed line were plugged with solder. A board was provided to support the supply tank and to hold the assembly upright. The hoverer, which is supported on flat-iron legs, was made from two pieces of sheet metal cut to the size and shape shown, and riveted together. Adjustment of the flame is done through an opening in the side of the hoverer, while a hole in the top enables removal of the burner for cleaning. A lid, having an asbestos covering on the underside to help reduce heat dissipation, is fitted over the hole in the top. In use, the burner is set on the floor under the hoverer, and the flame is adjusted to provide the correct heat. Care should be taken to raise the burner above the floor so the chicks cannot touch the burner shield.—Karl Willitts, Mt. Sterling, Iowa.

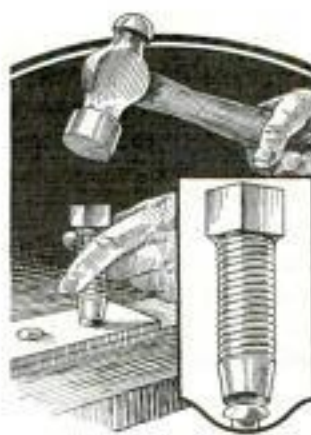
Steam-Engine Governor Controls Gasoline Motor

An old steam-engine governor will be found useful for controlling a gasoline engine when it is used for stationary work. All that is necessary is to remove the steam valve and connect the governor



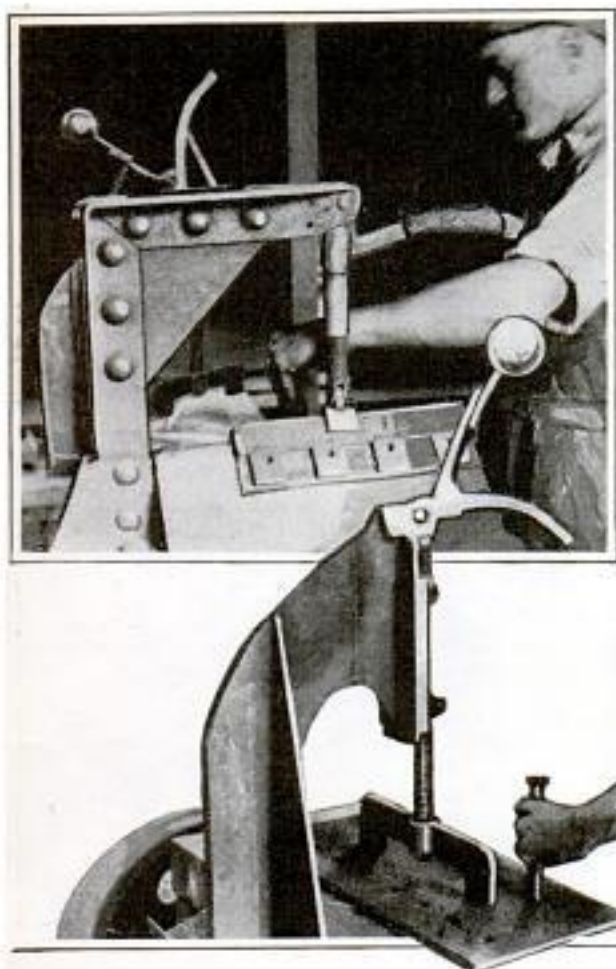
hand-control lever to the butterfly-valve lever on the carburetor with a rod, forked at each end and drilled so that connections can be made. The governor may be mounted on a bracket so that it can be driven by the fan belt, or at some other part of the machine and driven by a small belt from the power take-off provided on the motor when used on stationary work.

Setscrew Makes Good Rivet Set



A setscrew with concave head will serve as a rivet set, the end being the right shape to make a neat head on the rivet. By keeping various sizes of these setscrews on hand, you will have one to fit almost any job.

Clamp Holds Metal Templates on Punch-Press Table



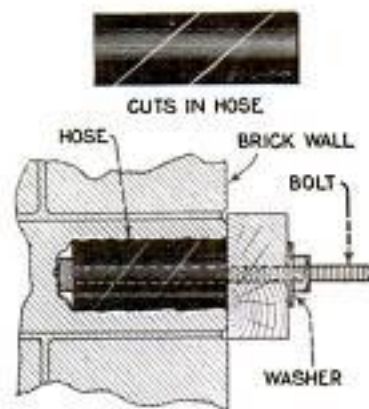
Homemade Clamps for Holding Flat and Angular Templates in Position When Center-Punching or Laying Out Work

In center-punching holes or laying out work on angle iron, the clamp shown in the upper photo will be found useful for holding a template in place. The base of the clamp is a 14 by 22-in. section of $\frac{3}{4}$ -in. iron plate, to which is bolted an upright member of angle iron, 16 in. high. A horizontal arm, 14 in. long, made up of angle iron and $\frac{1}{4}$ -in. iron plate, holds a loosely riveted handle of $\frac{1}{4}$ -in. plate, crooked near the end and riveted in a fork of the arm. A 5-in. length of $1\frac{1}{2}$ -in. pipe, threaded inside and with a gash milled in the top end, is loosely riveted to the elbow of the handle, reinforcing of light metal being welded to the upper part of the pipe to strengthen it. Into the lower end, a 5-in. length of screw bar is threaded for adjustment of height. The lower end of this bar also has a fork, into which a $1\frac{3}{4}$ -in. length of $1\frac{1}{2}$ by $1\frac{1}{2}$ -in. angle iron is loosely hinged by a welded boss. This

section of angle iron grasps the template when the handle is pulled forward. An 8 by 4-in. section of $\frac{1}{4}$ -in. iron plate, held to either side of the base plate by $\frac{1}{2}$ -in. bolts in two slotted holes, is used to gauge the width of the angles being laid out. The clamp shown in the lower photo is used to prevent slipping of metal templates on the flat plate. It consists of an overhanging arm, 16 in. high, made by welding $\frac{1}{2}$ -in. iron plate between two lengths of 4 by 4-in. angle iron, the whole being welded to one edge of a steel bench. An 8-in. piece of 3 by 3-in. tee is butt-welded to the end of the arm. Over the flanges of this tee, is fitted a vertical slide, made by welding two 8-in. lengths of 1 by 1-in. angle iron to the edges of a 3 by 8-in. piece of $\frac{1}{2}$ -in. iron plate. To the face of this plate is welded a large nut, in which is inserted a 10-in. length of 1-in. screw bolt, the lower end passing through a 12-in. length of $\frac{3}{4}$ -in. bar iron, forged to grip the template at each end, and held to the screw bolt by a $\frac{1}{2}$ -in. stud. A triple-hinged handle, with two 10-in. prongs, one of which bears a heavy metal ball to hold it down when in place, is attached to a forked boss welded to the slide plate at the top.

An Emergency Expansion Bolt

An expansion bolt can be improvised from a bolt and a piece of $\frac{1}{2}$ -in. garden hose. First divide the hose into three sections, by diagonal cuts as shown. Then slip the hose over the bolt and insert it into the hole in the wall and through the work. As the nut is drawn up, the hose sections expand and hold the bolt. If the bolt is used where there is vibration, lead or iron pipe should be substituted for the hose.—J. E. Noble, Toronto, Ont., Canada.



Water rings on hardwood or stained wood, can be removed by rubbing with spirits of camphor then polishing with oil.

Chemical Garden Grown in Glass Jar

Beautiful crystal gardens may be grown in fish bowls or glass jars using a small lump of soft coal or coke and a tablespoonful each of salt, water and bluing. First clean the jar and lay the coal on the bottom. Then mix the bluing, water and salt and pour the mixture over the coal. In two or three days, large white crystals will form, and in a week or ten days, they will climb to the top of the jar and hang over the edge. A teaspoonful each of salt and water should be added every other day to replace crystallization and evaporation losses. To make the display more interesting, several jars can be started at the same time, and a few drops of mercurochrome, colored inks or aniline dyes used to give each jar a different color. Varied colors can also be produced in one large jar by the same process.

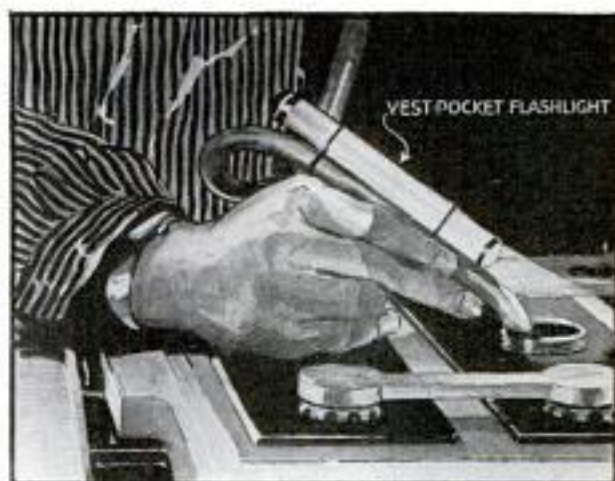
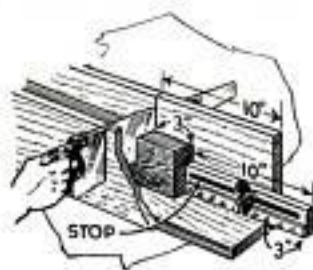
Fine Teeth at Heel of Blade Improve Handsaw

Filed at the heel end of the blade, small teeth will enable you to start a handsaw without making a ragged edge at the beginning of a cut. The points of the first 24 teeth are ground off so that a notch can be filed in the center of each one to make two fine teeth. Making a few short strokes with these teeth will start a clean, even cut.



Graduated Stop on the Miter Box

A graduated stop on your miter box will facilitate the work of sawing a number of short pieces of equal length. The stop is simply a slotted block held on the inside of the box by means of a bolt and a wingnut as shown. A scale is marked on the lower edge of the block, the edge of the box bottom being used as an indicator.



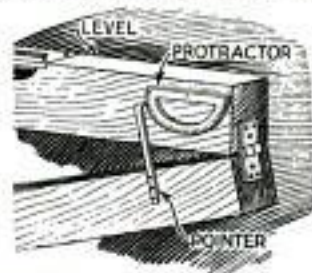
Small Flashlight Fastened to End of Water-Bottle Hose Provides Light for Filling Storage Batteries

Small Flashlight Aids in Filling Storage Batteries

In order to provide illumination for replenishing the water in auto storage batteries, install a fountain-pen flashlight on the end of the water-bottle hose as shown. Two rubber bands hold the flashlight in place, so that it can be turned on and off with ease.

Clinometer Improvised from Level

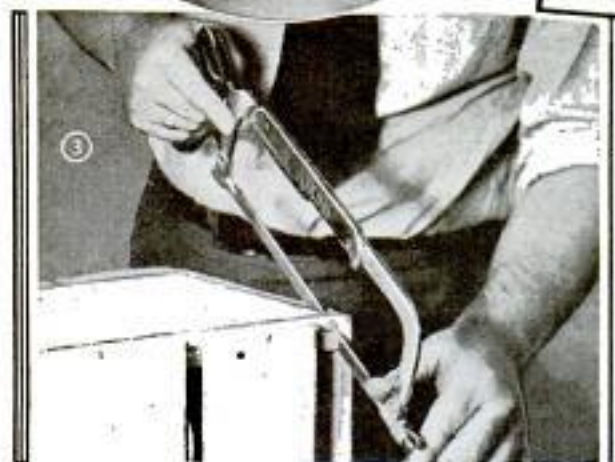
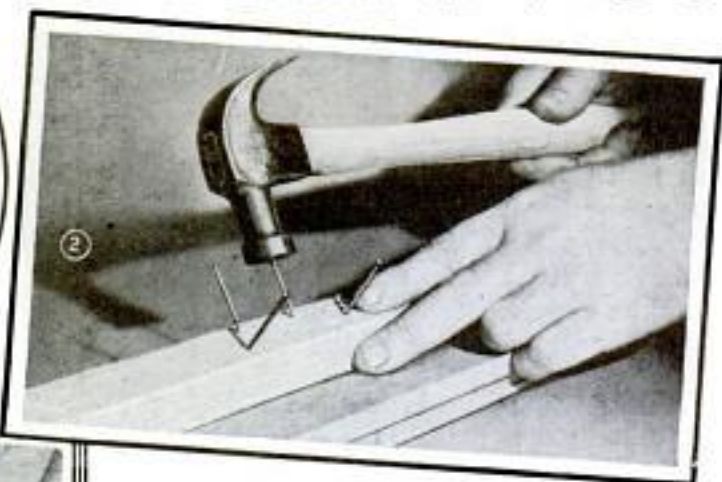
For measuring the deviation from horizontal of an object, a clinometer can be improvised from a spirit level. A piece of hardwood is hinged to the end of the level as shown. A small protractor is screwed to the side of the level and a pointer is fastened to the hinged piece so that it reads zero when the parts of the tool are closed. —Leonard Mitchell, San Francisco, California.



Strengthening Plaster Casts

Plaster-of-paris articles may be given considerable strength by adding sawdust, hair or other such substances to the mixture. For greatest strength, reinforce the casting by placing coarse galvanized screen in the mold before pouring the plaster. The screen is bound together with wire and suspended so that the edges do not project beyond the plaster.

The MECHANICS



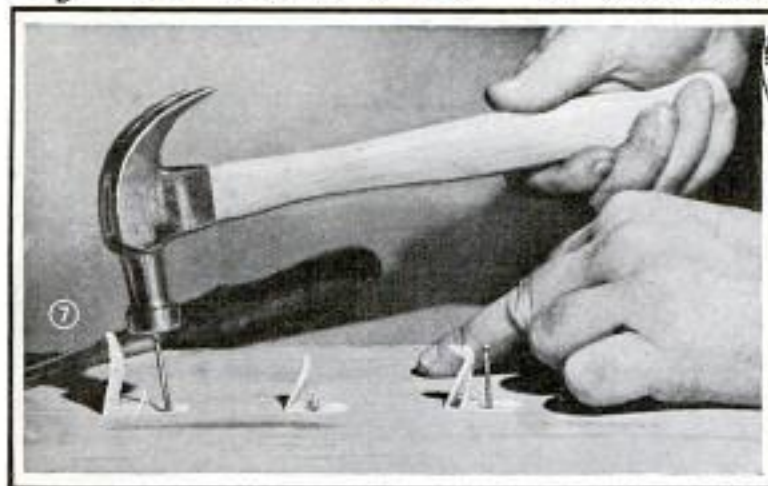
THE technique of driving a nail differs with the type of work. In hardwood, the resistance of the wood to the point of the nail is so great that a heavy blow with the hammer causes the nail to vibrate and bend. The remedy is a series of light blows struck squarely on the nail held between the thumb and forefinger, or with a pair of pliers as in Fig. 5. With very fine work in hardwood, it is better to drill a pilot hole as in Fig. 9, the diameter of the hole being slightly smaller than the nail.

Interlocking or cross-nailing is effective where two pieces of stock are to be joined with a flat joint which must hold under some strain. The nails are driven diagonally so that in entering the wood the points cross and interlock the grain. This method of nailing is shown in Fig. 2.

Often it is necessary or convenient to renail old work by driving the nails back into the original holes. In this case, the nails hold much better if dipped in thin glue, as in Fig. 1. They must be driven immediately before the glue sets. Crates nailed with three-directional corners are difficult to take apart without damage. One way of doing this is shown in Fig. 3, where the joints are pried apart and the nails cut off with a hacksaw.

In many instances a blunt nail will enter the wood with little risk of splitting or otherwise damaging the work. The end of the nail is filed square across to remove the four bevels that form the point and a small hole is drilled a short distance into

of USING NAILS



the blunt end. This is followed with a drill of larger diameter than the nail, which reams the end and forms a cutting edge that severs the fibers of the wood as it is driven. A nail altered in this way drives neatly and holds fully as well in close-grained wood as does the ordinary nail.

Masonry nails are especially made for fastening light ornamental ironwork, and similar objects, to masonry walls. The body of the nail is made in the form of a long spiral, which causes it to turn when driven, thus locking it securely without chipping or otherwise damaging the wall. Two-headed nails are now made for various purposes, chief among which is the erection of temporary scaffolding. The nail is formed with one head slightly below the other and, in use, is driven in to the first head, leaving the second exposed for easy removal without damaging the material into which it is driven.

Often it is desirable to wedge a dowel which is driven with the end exposed. This may be done effectively as in Fig. 6, by driving a small nail in the center. The nail expands the dowel and wedges it more firmly in place. To deflect a nail in a given direction while it is being driven, the point is filed to a long bevel as in Fig. 4.

When necessary to conceal the heads of nails, a chip is raised from the surface of the work as in Fig. 7. The nail is then driven in the recess and the chip glued back in place. Fig. 6 shows a quick meth-



od of starting a nail in a place impossible to reach with both hands. The nail is held with the head against the socket of the hammer head, and a single blow will set and hold it in place.



RAFTER-FRAMING TABLE

Saves Time

By
L. K. JULSON

THIS table, which may be cut out or duplicated in larger size, is a great help to carpenters for quickly determining the dimensions of all plumb and seat cuts, covering practically all lengths and pitches from one to three-fourths. Cut out the cover and the numbered disks, gluing the latter to a thin cardboard of the same size to stiffen them so that the numerals will be arranged in the order illustrated. The apertures of the cover are then cut out,



SIDE CUT OF JACK
USE ON TONGUE
& 12 ON BLADE. CUT ON BLADE

LENGTH OF HIP
PER 12" RUN OF COMMON RAFTER

HEXAGONS - 16 $\frac{5}{8}$ / 9 $\frac{5}{8}$ CUT ON 9 $\frac{5}{8}$
OCTAGONS - 18 / 7 $\frac{1}{2}$ CUT ON 7 $\frac{1}{2}$

POPULAR MECHANICS MAGAZINE

BRASS PAPER FASTENER

CUT ON FACE
ROOF BOARDS AT
HIP OR VALLEY CUT ON TOP NO.

RISE OF INCHES
PER 12" RUN OF COMMON RAFTER

POPULAR MECHANICS MAGAZINE

SEAT & PLUMB CUTS ON HIP OR VALLEY
USE RISE OF COMMON RAFTER & 17

FOLDED HERE

GLUED TO OPPOSITE TAB

SIDE CUT OF
HIP OR VALLEY
USE 12 ON BLADE. CUT ON BLADE

BEVEL ON HIP
CUT ON TOP NUMBER

MITER
CUT OF
ROOF BOARDS AT H OR V CUT
ON TOP NO.

LENGTH OF
COMMON RAFTER
PER 12-INCH RUN

THIN CARDBOARD

GLUED TO OPPOSITE TAB

PARTS ARE CUT OUT ALONG HEAVY LINES AND ASSEMBLED

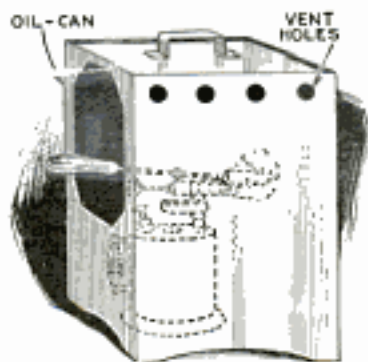
BRASS PAPER FASTENER

THIN CARDBOARD

and the tab at the edge glued down. A paper fastener or small rivet is inserted through the center to serve as a pivot.

In use, let us assume that the rise of the rafter is to be 6 in. per running horizontal foot. Set the disk to bring the numeral 6 behind the opening, reading "rise of inches per 12" run of common rafter." All the other dimensions can then be read from the other windows. The length of the rafter will be 13.42 in. for each running foot, while the length of the hip or valley rafter will be 18 in. per running foot of the common rafter. The side cut on the jack rafter is obtained by using $10\frac{3}{4}$ and 12 on the steel square and marking for a cut on the leg set at 12. The side cut of the hip or valley rafters is $11\frac{5}{8}$ and 12 on the square, similarly marking on the leg set at 12. The amount to "back off" the hip is determined by using 6 and 18 on the square, cutting on 6. The cut across the face of the roof boards at the hip or valley is 12 and $13\frac{3}{16}$, cut on 12, and the miter cut is 6 and $13\frac{3}{16}$, cut on 6. The same cuts hold true for hip or valley shingles and for hopper bins, of the square flaring type, having the same pitch. The plumb and seat cuts of the hip and valley rafters are obtained by using 6 and 17. Cutting on 6 gives the plumb cut, and on 17 the seat cut.

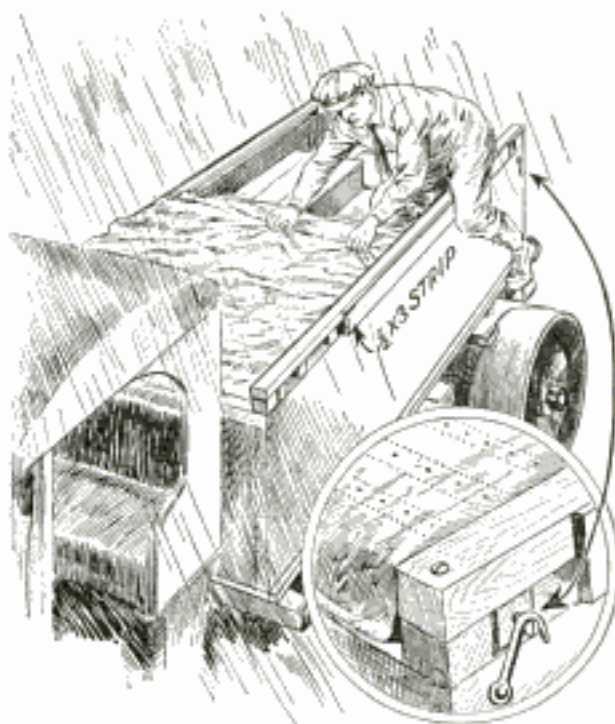
Windshield for the Blowtorch



When using a blowtorch out of doors on a windy day, a shield made from an oilcan will prevent the flame from being blown out. The bottom of

the can is removed, and a hole is cut in the side to admit the soldering copper. Small vent holes are also cut in the sides near the top.

There's a simple trick in replacing the housing gaskets on the rear axle of a model-A Ford. After the studs have been removed, tear the gasket in two, elevate the jack and insert the top side first. Then lower and insert the bottom side.



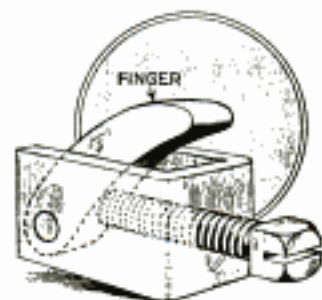
Tarpaulin Nailed to Sliding Wood Strips Provides Quick-Acting Cover for Truck Bodies

Hardwood Strips Sliding in Grooves Hold Tarpaulin on Truck

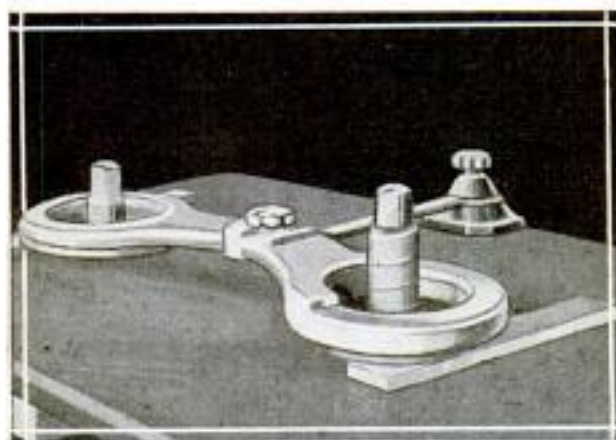
Tacked to transversal 1 by 1-in. hardwood strips, which slide on the sides of the truck body, this tarpaulin is quickly pulled over to cover the load. The sides are fitted with guide rails the same length as the body and raised above the sides by 1-in. blocks at each end, the transversal strips sliding in the openings. A wooden strip is nailed on the outside to cover the openings and keep the sliding strips in place. Large hooks at the end of the body fasten over screws driven into each end of the rear strip to hold the tarpaulin when stretched over the truck.

Jack Blocks for Use on Planers

Small jack blocks to keep work from springing under a cut made with a planer or shaper, are easily made. A U-shaped piece of steel is drilled and tapped at the end for an adjusting screw, which raises or lowers a steel finger pivoted near the open end. If desired, the head of the screw may be squared and a wrench used for turning it.



Shaper Head Serves as Spindle Sander



A Tight-Fitting Sandpaper-Covered Wooden Sleeve on Shaper Spindle Forms Efficient Spindle Sander

It's an easy matter to improvise a spindle sander on a shaper head. Turn down a block of hardwood to fit the spindle snugly, and twist a piece of sandpaper spirally around the cylinder thus formed, tacking the paper to the wood at the ends only, so that the tacks will not come in contact with the work. A guard for a two-headed shaper can be quickly made from a piece of 1-in. wood having a large hole bored at either end to fit over the spindles. The guard should also be made of hardwood, and, if desired, a reinforcing piece may be glued over it, with the grain running at right angles, which will greatly strengthen the rings formed at the ends.

Quickly Detached Extension Rod for a Drill

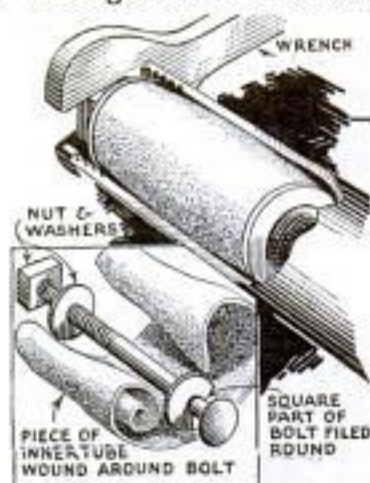


An extension rod for drills, that holds them securely and works on a different principle than most extension rods, is shown in the drawing. First, the drill shank is turned down to fit a hole drilled in the end of the rod. This hole is slightly oval, leaving a crescent-shaped space into which a small pin is fitted. In use, the pin is forced toward the narrow end of the slot where it wedges the drill shank securely. The hole is formed as follows:

First, prick-punch the exact center of the rod and scribe a circle the diameter of a hole to be drilled later. Prick-punch a second center on one side, the distance between the two punch marks being equal to the widest part of the crescent portion. Then drill a hole centered on the second punch mark, doing this on a drillpress and being careful that the rod is held vertical so that the hole will be parallel to the side. To complete the rod, it is chucked in the lathe and the center-scribed portion of the rod is bored out, which results in an oblong hole.

Plug for Water Pipe Is Made from Bolt and Inner Tube

Recently I had to plug the end of a broken water pipe, and having no plug available, one was quickly improvised from a bolt, two washers and a piece of an old inner tube. Enough of the rubber was wound around the bolt, between the washers, to fill the pipe. I then inserted the improvised plug in the pipe and drew up the nut, which caused the rubber to bulge and tightly seal the end of the pipe.—Geo. M. Shera, Oxford, Ohio.



Symptoms and Causes of Trouble in Car Differentials

The following symptoms will aid in determining trouble that may develop in the differential of a car. Bumpy, jerky noises and grating sounds usually indicate a broken gear or bearing, which should be immediately replaced. If the rear wheels fail to move when the clutch is engaged, look for a broken key or drive pinion, a broken thrust bearing behind the drive pinion, or possibly a broken universal joint, propeller or axle shaft. If the axle grinds when turning, the differential gears and bearings probably are badly worn.

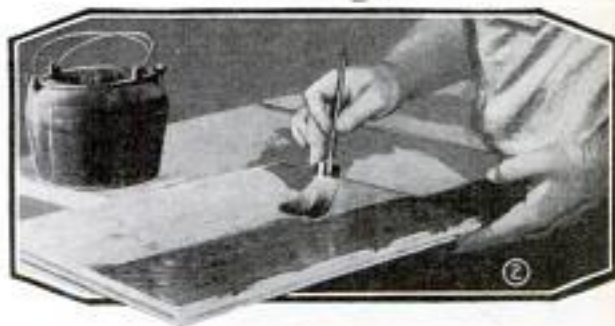
HAND VENEERING



By W. CLYDE LAMMEY

VENEERING consists essentially of gluing a sheet of thin stock to a core of thicker and cheaper wood. To do this, you will need a press that exerts a uniform pressure over a large surface. A simple one for flat work, which has a maximum capacity for work measuring 18 by 40 in., is shown in Fig. 5. A caul or press board is made from $1\frac{3}{16}$ -in. hardwood, to which are screwed the same number of hardwood bars as there are sections of the press. The lower edges of the bars are rounded about $\frac{1}{8}$ in. from the edge to the center. Work should always be supported on a bottom board as shown. When veneering work not exceeding 12 by 20 in., the press may be made as in Fig. 7. The top jaw of each section is planed to the same curvature as the bars on the caul shown in Fig. 5.

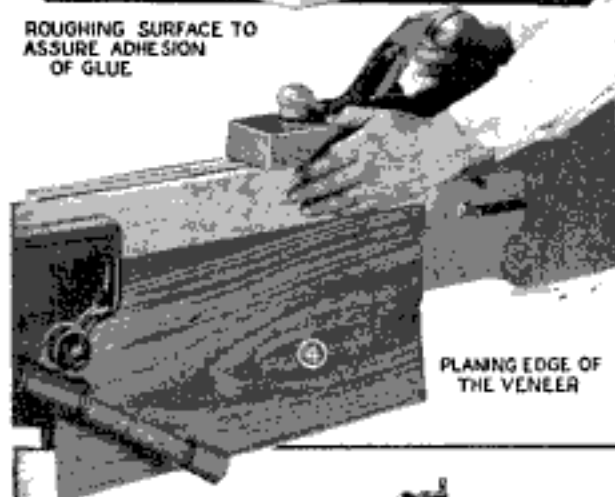
Although, in some work, it is necessary to build up a core from solid stock by doweling together a number of strips to make the required width, plywood can generally be used. Birch plywood is, per-



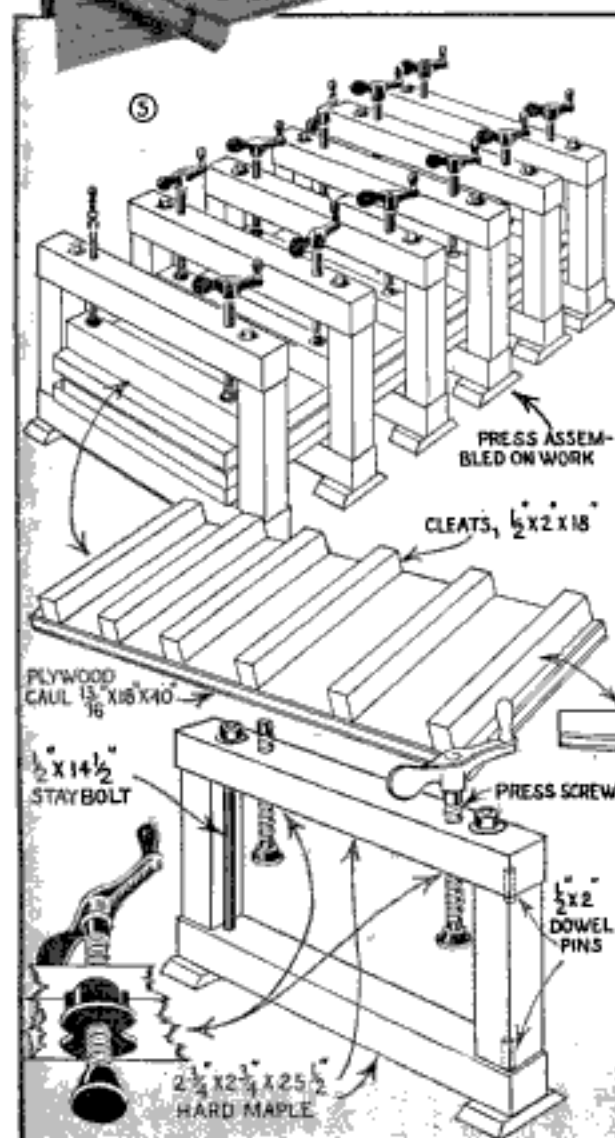
haps, the best, though white pine and fir will serve. The core stock should always be cut at least $\frac{1}{2}$ in. larger each way than the finished size, to allow for trimming. If the veneer is of darker wood than the core, the exposed edges should be built out with narrow strips of the same kind of wood as the veneer. The strips should be of the same thickness as the core stock and are edge-glued to the core, as in Fig. 10. After being cut to the rough size, the face of the core should be roughened as in Fig. 3, to give the glue a better key. This can be done with a hacksaw held with the blade inclined slightly opposite to the direction of the stroke. The sur-



ROUGHING SURFACE TO ASSURE ADHESION OF GLUE



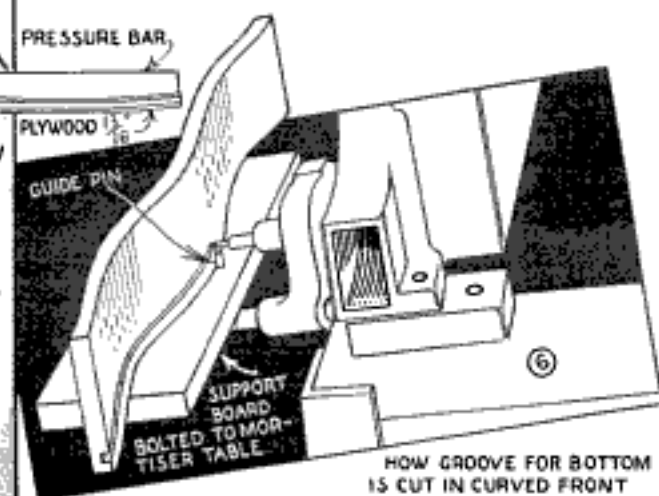
PLANING EDGE OF THE VENEER

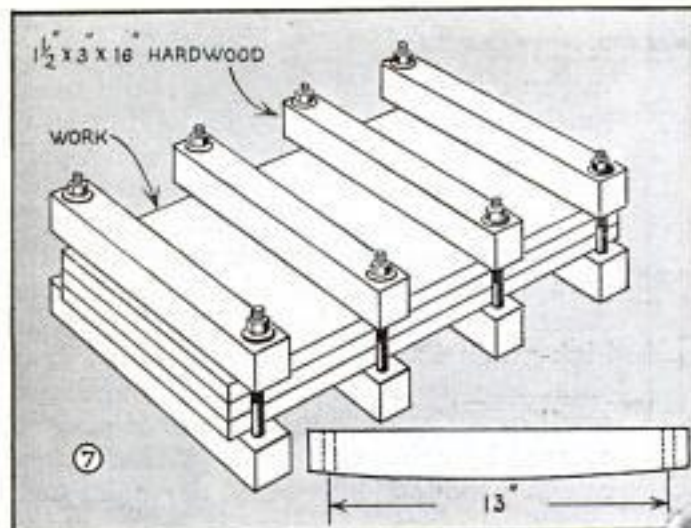


face is worked over uniformly and care should be taken not to form any depressions or to round the edges.

Waterproof casein glue is best for laying veneer. A half-and-half solution of water and casein powder is too stiff and rubbery for veneer work, and it is best to measure the equal amounts and then add a small quantity of water. After a thorough stirring, the glue must be used at once, for it rapidly loses its adhesive qualities. Before mixing and applying the glue to the surface, the veneer sheet is cut to the size of the core, which may be done with a sharp knife, as in Fig. 8, and the press is assembled on a level floor with the bottom board in place. A piece of heavy wrapping paper, cut to the same size as the veneer sheet, is also provided. The glue is spread evenly on the core with a brush, and the veneer is laid in place with the paper on top and the pressure board or caul over this, after which the assembly is quickly placed in the press and the screws tightened until you are sure the veneer does not tend to slide out of place. Then tighten the screws uniformly until the veneer is drawn down to the core at the edges. The work should be left in the press from 8 to 12 hours.

If it is necessary to build up a core of solid stock, the latter should be ripped into strips not more than 3 in. wide and doweled together, with the grain crossing on adjacent pieces as in Fig. 10. It is best to face both sides of the built-up core. In facing a wide board, the veneer should always be laid on the heart side, for in the drying this side tends to become convex. Fig. 11 details a method of forming the core for the curved type of drawer front.



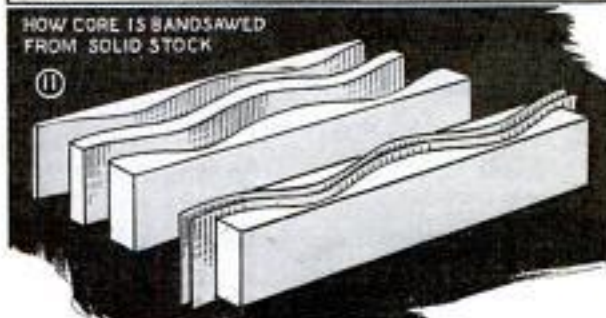
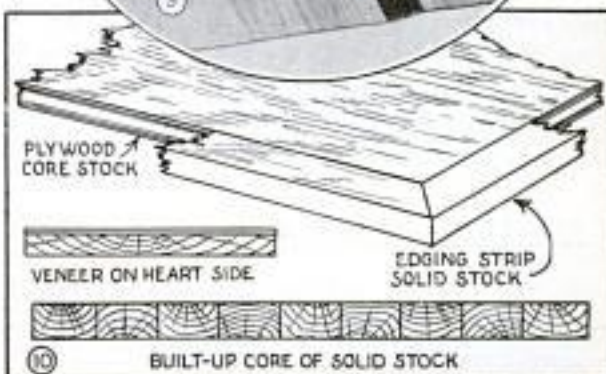
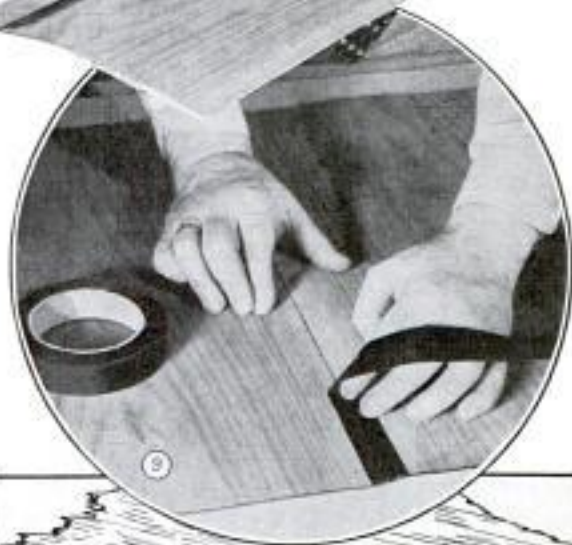


The waste pieces are used as cauls when veneering both sides of the core in one operation. The surfaces are veneered just as they come from the saw, the cut having been made uniform. A method of grooving the curved drawer front to take the bottom panel is indicated in Fig. 6.

Veneers of the finer woods often come in narrow strips, and if the core is wider than these, a sheet of veneer must be built up so that the grain matches as nearly as possible. The edges to be joined are planed true by clamping two strips between narrow pieces of waste stock, as in Fig. 4, and running a sharp jointer plane lightly over the edges until they are flush with the top edges of the guides. Another method of cutting a true edge is indicated in Fig. 1, the veneer being fastened to a piece of waste stock with tape, laid over the joint lengthwise and also laid crosswise as in Fig. 9. In pressing the built-up sheet, the taped side should be uppermost so that, in removing it from the press, the tape can be taken off by sponging or sanding.

Sand Prevents Greasy Floor around Oil Pump

To keep the floor around an oil pump from becoming greasy, place an old auto casing around the base of the pump and fill the encircled space with clean sand. In this way, the oil is absorbed so that it will not spread. When saturated, the sand is, of course, replaced.



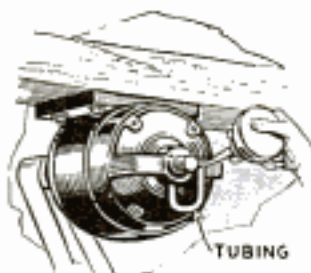


Rubber Sink Plungers Hold Toolbox and Steady Worker When Repairing Slate Roof

Rubber Suction Cups Hold Toolbox on Slate Roof

When repairing a slate roof, two rubber suction cups, such as those used for cleaning drain pipes, will be found of advantage to hold a light toolbox on the roof. The cups are fitted with short handles, which fit into pipe straps nailed to the lower edge of the box. Adjustment to keep the box level is obtained by drilling several holes in the cup handles to take pins for the pipe straps to rest on. The worker may also use one of the cups to steady himself on the roof. A sponge is kept in a can of water for moistening the cups to make them adhere.—James H. Brundage, Katonah, N. Y.

Lubricating Inverted Electric Motors



Electric motors that are mounted in an inverted position can be properly lubricated with a U-shaped copper tube, which is substituted for the regular oiler cap. The free end of the tube should be about $\frac{1}{8}$ in. above the bottom of the shaft so that the right amount of oil will be fed into the bearing.

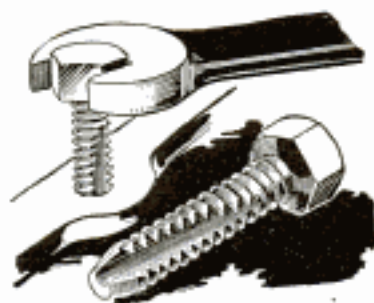
Electric motors that are mounted in an inverted position can be properly lubricated with a U-shaped copper tube, which is substituted for the regular oiler cap. The free end of the tube should be about $\frac{1}{8}$ in. above the bottom of the shaft so that the right amount of oil will be fed into the bearing.

A Durable Metal Paint

Highly resistant paint for protecting metal surfaces against corrosion, or for use as a base upon which to apply other finishes, may be made by dissolving flowers of sulphur, 1 oz., in 9 oz. of turpentine oil. Cautiously heat the turpentine to aid the solution of sulphur. Turpentine is inflammable and for this reason the vapors should be removed by ventilation. After the sulphur has dissolved, stir in high-grade linseed-oil varnish, 5 oz. The paint may be colored black by adding a small quantity of lampblack, or it may be colored by using zinc white. Other colors can be produced by adding dry paint pigments. Before adding the pigment, it should be mixed with enough paint to form a paste.

Tap Improved from Bolt to Repair Worn Threads

For repairing worn or battered threads, a tap can be improvised from a bolt or stud. It is grooved at the end as shown, and then screwed into the threads. Holes can be threaded with it if the work is not too hard.—E. Tilghman, Wilkes-Barre, Pa.



Adjusting Valve Tappets

Much time may be saved in adjusting automobile valve tappets by using the following system: First determine the firing order of the engine, which may be found on the manifold, or in the instruction book. Crank the engine until the intake valve on the first cylinder has just reached the point of closing, then give it an additional half turn. The valves on this cylinder are now adjusted to proper clearance and the engine is cranked to the next cylinder. This will require only one-half turn on a four-cylinder engine, one-third on a six-cylinder engine, and one-fourth of a turn on an eight-cylinder engine. Only two revolutions of the crank are thus required to complete the job.

Uses for Steel Balls in the Machine Shop

REDUCING FRICTION OF HEAVY PLATES WHEN SLID OVER MACHINE TABLE

HOW BALLS ARE USED TO MOVE A TIGHT PIN, DIFFICULT TO REACH

DETERMINING RELATIVE HARDNESS BY IMPRESSING BALL INTO WORK AND PIECE OF KNOWN HARDNESS

BALL CENTERS BETTER THAN CONE CENTERS FOR PIVOTS

REMOVING A DENT FROM TUBING

STEEL BALL FORCED THROUGH TUBE INCREASES ITS DIAMETER

CUTTING SEMI-SPHERICAL CAVITY WITH TOOL MADE FROM BALL GROUND AND WELDED TO ROD

CROSS SECTION OF RING HAVING V-GROOVE

TO FIND DISTANCE X USE CALIPER TO MEASURE DISTANCE Y AND THEN SUBTRACT DIAMETER OF BALL

IMPROVED BALL END ON MICROMETER, TUBING BEING USED TO HOLD BALL

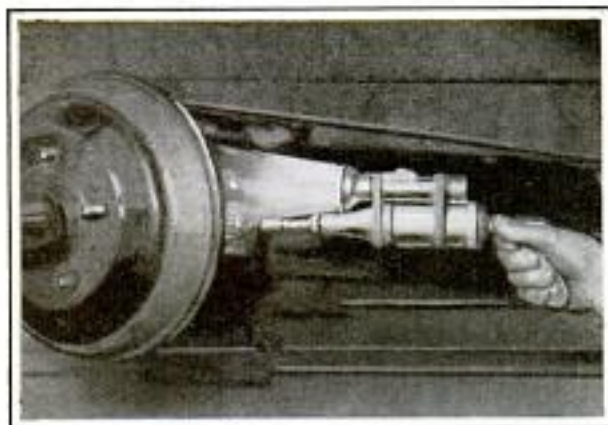
TO FIND DISTANCE X, FIRST MEASURE DISTANCE Y AND ADD HALF OF BALL DIAMETER

SAME TOOL AS ABOVE TO CUT SPHERICAL GROOVE ON SHAPER

CUTTING A GROOVE ON THE LATHE

TEMPORARY METHOD OF REDUCING END PLAY OF GRINDER SHAFT

Labels in diagrams include: WORK, TABLE, VISE, PIN, DENT, CLAMP, HACKSAW BLADE, BALL.



Flashlight Taped to Grease Gun Throws Light Beam on the Grease Nipples

Flashlight Attached to Grease Gun

Here is a handy method of throwing a light beam where it is most needed when greasing a car, and yet have both hands free to operate the grease gun. A flashlight is taped to the gun as shown, and when it is turned on throws the light on the grease nipples.

Lacquer Brushes Kept from Drying

Where lacquers are used intermittently, as in manual training schools, the brushes can be prevented from drying out by keep-



ing the paint in glass fruit jars and hanging the brushes from the lid so that the bristles are covered by the liquid. You simply solder a hook on the underside of each lid and suspend the brushes from screweyes as shown. It may be necessary to shorten the

brush handles to keep the bristles from resting on the bottom of the jar.

Steam Pockets Eliminated in Engine Cooling System

An internal-combustion engine operating with the cooling system near the boiling point sometimes gives trouble because of the formation of a steam pocket in the water-outlet pipe. This creates a back pressure against which the ordinary centrifugal pump cannot force the water, and an entire stoppage of the circulation soon occurs. There are several remedies to over-

come this trouble, some of which are: forcing a greater-volume of water through the cooling jackets by either speeding up the pump or providing a greater head; increasing the size of the outlet pipe to handle the increased volume at this point due to the heating of the water, or removing the steam pocket and straightening the outlet pipe so that it extends upward.

Tool Provides Tension for Winding Wire in Lathe

This tool can be set to hold wire at the right tension when winding it over a mandrel in a lathe. It consists of a piece of iron having at one end two fixed pins and



between them a metal disk or eccentric, while the other end is shaped to fit in the lathe toolpost. When wire is pulled between the disk and pins a tension is produced, which can be adjusted

by turning the eccentric closer to one of the pins.

Ridges Hold Cylinder-Head Gasket

An engine that causes trouble by persistently burning out the cylinder-head gasket at one point, may be repaired by chiseling several small ridges in the block and the head at the point where the burn-out occurs. The sharp ridges, which should be continuous across the area where the trouble is located, will hold almost any gasket.

Locating Noisy Tappets

Noisy tappets on overhead-valve motors can be located by placing small pieces of cloth between the rocker arms and the push rods. By removing the pieces, one at a time, you can quickly detect which tappet is causing the noise.—Robert P. Shaw, Jr., Kansas City, Mo.



1913

Dutch-Foot COFFEE TABLE You Can Build

By R. O. BUCK
Lane Technical High School, Chicago

DUTCH tables of this sort were very popular during the early eighteenth century in nearly all of the thirteen colonies, so are quite in keeping with the present vogue for colonial furniture.

Walnut and maple are the two woods most suitable. It will probably be necessary to glue up stock in order to get a wide enough piece for the oval top. Care must be taken, when selecting pieces, to get them well matched in grain and color, especially in case of large figured woods such as walnut. After the pieces are glued up, they should be clamped securely with bar clamps and handscrews as shown in Fig. 1. Be sure that the handscrews draw the pieces tight against the faces of the bar clamps to insure that the top will be flat. When the glue is dry, plane the top true and smooth and saw it to shape, a paper pattern being used to mark out the oval. After the top surface is finished, the edges should be rounded slightly, Fig. 2.

The legs of the table are raked equally in both directions so that the angle at the ends of the apron pieces, composing the frame, are all cut on the same slant. These pieces should be made in pairs to assure their being exactly the same length and slant. The legs, which are fairly slender when finished, require a full 1½-in. square section of stock. The actual or first centers are laid out in the usual way by drawing diagonal lines across each end and

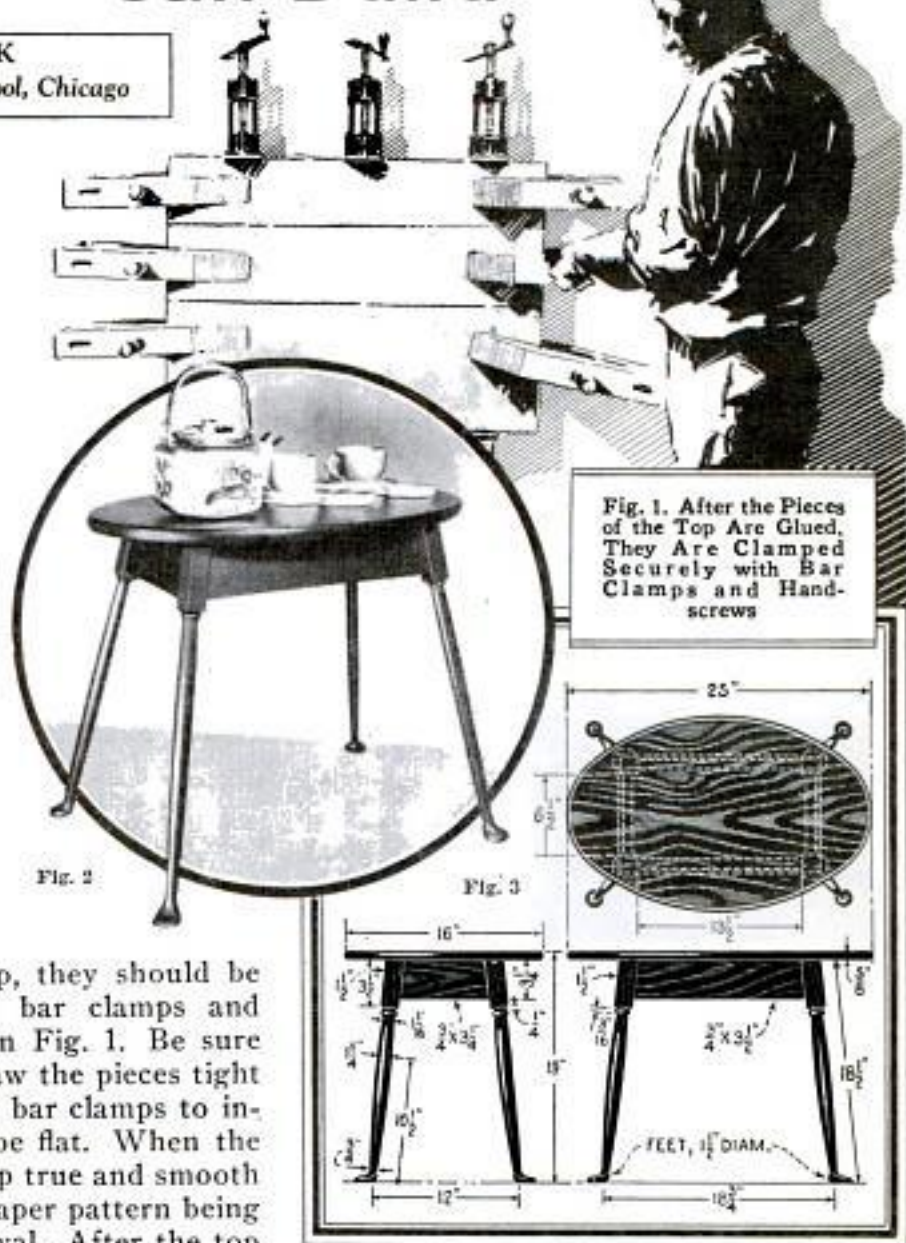
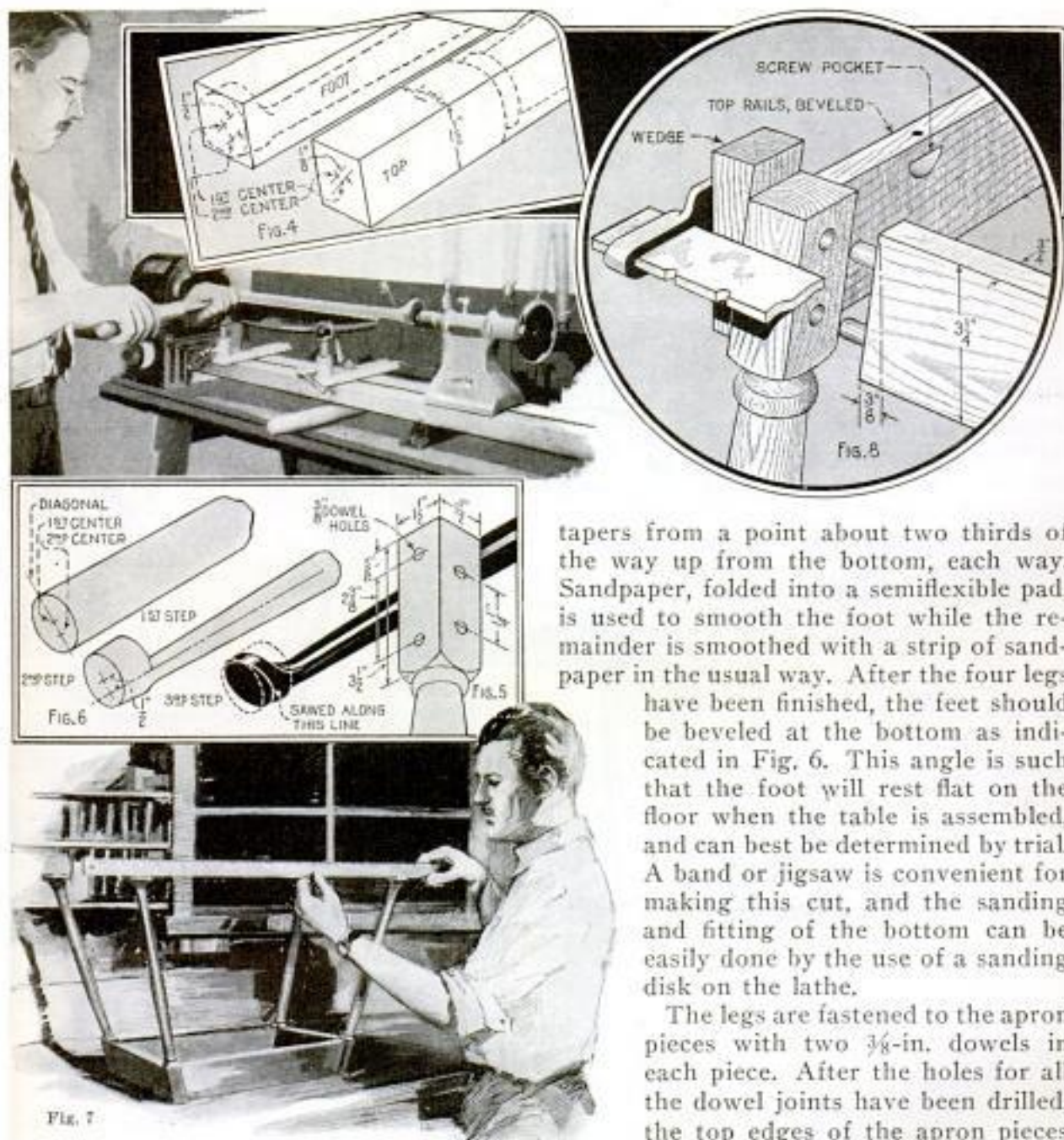


Fig. 1. After the Pieces of the Top Are Glued, They Are Clamped Securely with Bar Clamps and Handscrews

Fig. 2

Fig. 3

marking their intersection with a punch. The off-center punch marks are spaced ½ in. below the first center on the foot end and ⅛ in. above the center on the top, measuring along a diagonal line in each case, as shown in Fig. 4. The upper 3½ in. of the legs are left square for doweling the apron pieces to them. The stock is mounted in the lathe, using the first centers, for turning the entire length, with the exception of the squared portion. The work is then removed from the lathe and



tapers from a point about two thirds of the way up from the bottom, each way. Sandpaper, folded into a semiflexible pad, is used to smooth the foot while the remainder is smoothed with a strip of sandpaper in the usual way. After the four legs have been finished, the feet should be beveled at the bottom as indicated in Fig. 6. This angle is such that the foot will rest flat on the floor when the table is assembled, and can best be determined by trial. A band or jigsaw is convenient for making this cut, and the sanding and fitting of the bottom can be easily done by the use of a sanding disk on the lathe.

The legs are fastened to the apron pieces with two $\frac{3}{8}$ -in. dowels in each piece. After the holes for all the dowel joints have been drilled, the top edges of the apron pieces should be beveled to the same angle as the slant of the legs, the low side of the bevel coming to the outside. The frame should be fitted up and clamped by the use of bar clamps and wedges as in Fig. 8, to be sure that it will pull up true. While the frame is assembled, the tops of the legs should be marked for slant to be planed after the frame is taken apart. Six screw pockets, to fasten the top onto the frame, should also be made at this time. The gluing of the leg-and-apron assembly is next. Be sure that the legs line up with each other by checking across the top with a yardstick or straightedge, as shown in Fig. 7, before the glue sets.

remounted between the second or off-center marks. Be sure that the work is securely mounted, for it has considerable throw until it has been turned down again. Care must also be taken to set the toolrest far enough out so that it clears the work when it is revolved by hand. If your lathe has variable speeds, use the slowest one. In any case, use a sharp gouge and take very light cuts until the bulk of the stock has been removed. The part which forms the foot is not turned down, but is left the original diameter. Figs. 5 and 6 show how the foot and upper part of the leg are formed. The leg

Filtering Corrosive Chemicals

Corrosive chemicals that attack filter paper may be easily filtered through a glass funnel, which has been filled with finely powdered glass. Larger pieces of glass, or a tuft of glass wool should be placed in the base of the funnel to prevent the fine powder from passing through. A tuft of cotton may be pressed into a funnel to filter non-corrosive chemicals. This filtering method is quicker than with use of paper, and is usually as satisfactory if the precipitate is not to be saved.

Adjustable Crank Controls Leverage on Hoist

By fitting a hand-operated hoist with this adjustable crank, you can vary the leverage to suit the weight of the load. The grip is removed from the crank and is fitted to a length of flat iron of the same size as the crank. Both the crank and the new piece are then slotted for clamping bolts to permit increase or decrease of the leverage.



Extension on Hacksaw Frame to Make Deep Cuts

Having some work that was too deep for my hacksaw, I made the illustrated extension. Two pieces of flat iron were pivoted to the frame and holes were drilled in them to take the pins in the adjusting bolt and the handle. The lower ends were fitted with pins for holding a saw blade.—A. H. Waychoff, Phoenix, Ariz.



Strings Warn of Low Door

Suspended from the ceiling, a row of strings can be used to warn persons of a low doorway. The strings should be hung so that they will just strike the head of a person who is about two inches shorter



Row of Strings Suspended from Ceiling Warns Persons of a Low Doorway

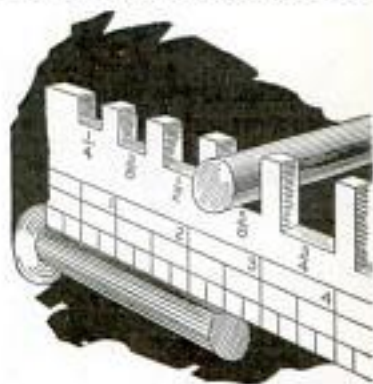
than the doorway. In this way, anyone who is tall enough to strike his head will be warned in ample time to "duck."—Leonard Mitchell, San Francisco, Calif.

Tar Paper Keeps Shop Floors Clean

Ordinary tar paper will make a good covering for shop and factory floors that are likely to become covered with glue or other liquids difficult to remove. The use of the paper is especially of value in book-binderies and around soda fountains as it can be replaced at a low cost. Furthermore, it will not curl up at the ends and is very easily cleaned.

Scale for Sorting Rivets

Sorting rivets and small bolts is simplified by the use of the illustrated gauge and scale. It is made from a piece of steel, which has one side slotted for measuring diameters, while the other side is graduated for measuring lengths. The scale is easily made, and it is well worth while in shops where all sizes of screws and small bolts are thrown together.



Can You Solve these Puzzles?



By SAM LOYD

Brooklyn Daily Eagle
153 Halsey St.
A BRICK weighs as much as nine-tenths of a brick and eight-tenths of a pound. Half a hod and half a brick weigh twenty-six pounds less than three-quarters of a hod and three-quarters of a brick. How many bricks does the workman's hod hold?



AFTER hitting a homerun, the baseball player rounded the bases in half a minute. He made the first three-quarters of the journey in four seconds less time than was consumed in going the last three-quarters. From home plate to first base was covered two seconds quicker than from second to third. His time from third to home was one second slower than the run from first to second. How long did it take the player to reach first after hitting the ball?

JOHAN SMART lost \$324 on the first race, and one-third of what he had

left on the second race. Then he lost one-quarter of his cash in hand on the third race. At this stage of the game, John staked the remainder on a 4-to-1 shot, the bookmaker laying four times the amount of Smart's bet and the winner to take all. The horse won, sending John home with his original amount of capital. How much cash did John Smart take to the track that day?

Answers to Last Month's Puzzles

Mrs. Smith invested 42 cents for 1 lb. of chicken and 1 lb. of goose. If she were to spend that amount on Mrs. Brown's plan, equally between the two kinds of fowl, she would get $2\frac{1}{4}$ lb. of chicken and $1\frac{1}{8}$ lb. of goose; a total of $2\frac{3}{4}$ lb. Since 42 cents will produce a difference of $\frac{1}{4}$ lb. between the two methods, it is plain that 48 times 42 cents, or \$20.16, must be invested to gain the 2 lb. mentioned by Mrs. Brown. Spending \$10.08 for chickens and the same for geese, Mrs. Smith would receive 42 lb. of one and 56 lb. of the other. Instead

she invested the money in equal quantities and received but 96 lb.

Sorting out the eighteen shots on the target into three scores that total alike, we find: No. 1, 25, 20, 20, 3, 2, 1; No. 2, 25, 20, 10, 10, 5, 1; No. 3, 50, 10, 5, 3, 2, 1. Since Tom's first two shots totaled 22, we identify him as maker of score No. 1, the only one to furnish two numbers totaling 22. Harry is identified as maker of No. 3 from the fact that his first shot scored 3; and that gives him the distinction of having made the bull's-eye.

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Repair men agree that more than 60% of all repairs are due to Oil Failure—the breaking down of shoddy oils and substitutes under heat and speed. Bonded Pennzoil dealers guard you from this danger and expense. They are bonded to give you genuine Pennzoil—the *Tough-Film* oil that ends Oil Failure and cuts operating costs.

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—for two reasons. First—it's refined from 100% pure Pennsylvania crude. It's "oilier oil" from the very start. Second—it's double-refined for toughness by Pennzoil's own perfected refining process.

The result is a longer-lasting, "oilier" *Tough-Film* oil that cuts operating costs in three ways. It cuts repair bills. It saves on gasoline. And it saves on oil—every filling lasts hundreds of miles longer.

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*The dealer who displays
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sells an imitation when
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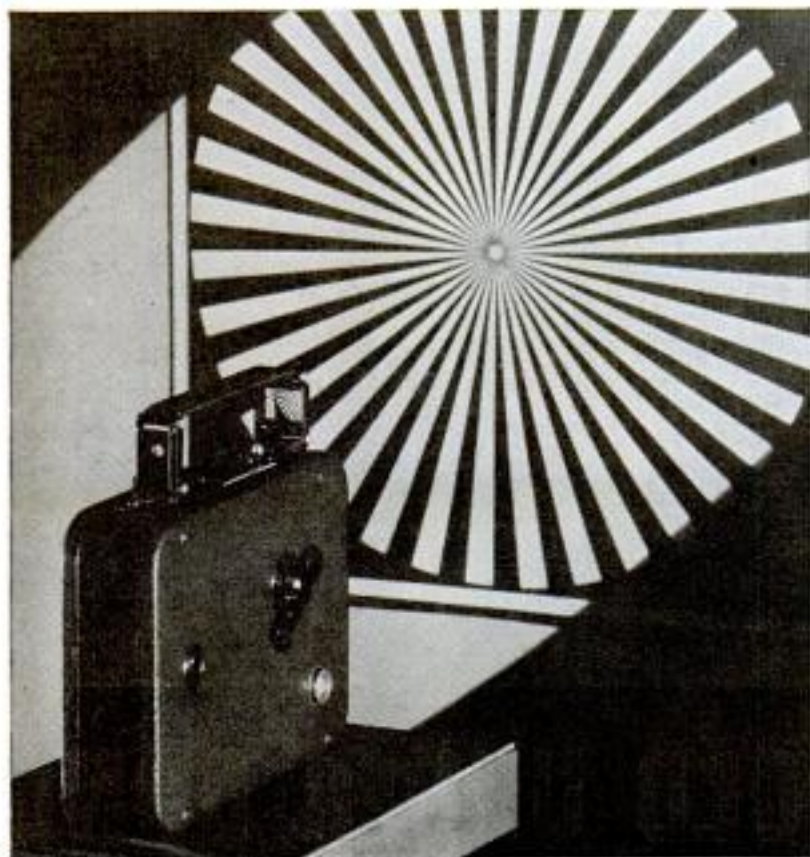
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EASTMAN NEWS BULLETIN FOR THE

MARCH, 1933, PUBLISHED BY

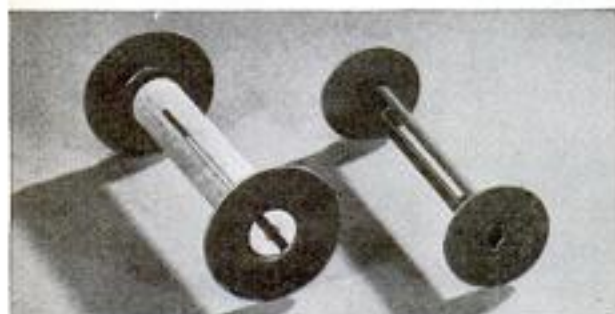


A SEVERE MOVIE CAMERA TEST. Every Ciné-Kodak Eight must be able to photograph the radial chart shown at the left and produce a movie that shows accurate focus, steady operation, and sharp definition. A test film of each camera is kept on file at the factory. Although this new camera sells for only \$29.50 it is a masterpiece of precise design and takes fine, clear movies—20 to 30 scenes on a \$2.25 film. About ten cents a shot.



FOUR FOCAL LENGTHS FROM ONE REGULAR LENS. The Kodak Recomar shown above uses inexpensive supplementary lenses (\$3.50 each) with its regular $f.4.5$ lens for copying, telephoto, and wide angle work.

A BUILT-IN EXPOSURE GUIDE simplifies the use of the fast $f.4.5$ lens of the Kodak Six-16 shown at the right. Indicator attached to iris diaphragm shows, on the dial below the lens, the correct shutter speed for any stop opening and light—a great convenience. The Kodak Six-16 takes pictures $2\frac{1}{2} \times 4\frac{1}{4}$ —price, \$30. Kodak Six-20 ($2\frac{1}{4} \times 3\frac{1}{4}$) with $f.4.5$ lens—\$28. At Kodak dealers'.



NEW FILM SPOOL REDUCES CAMERA SIZE. A slender metal film spool replacing the old type wood cored spool adds to the compactness of the new Kodak Six-16, making it the world's smallest camera for its picture size.



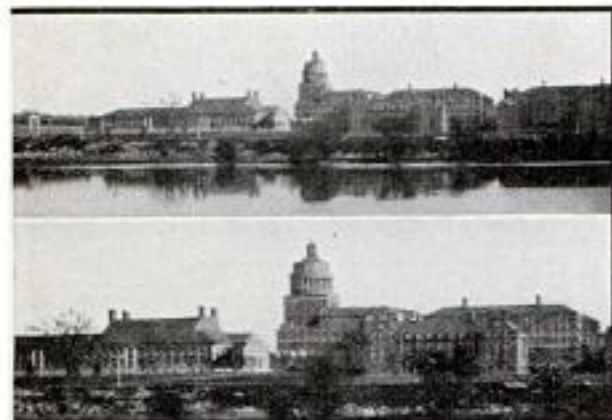
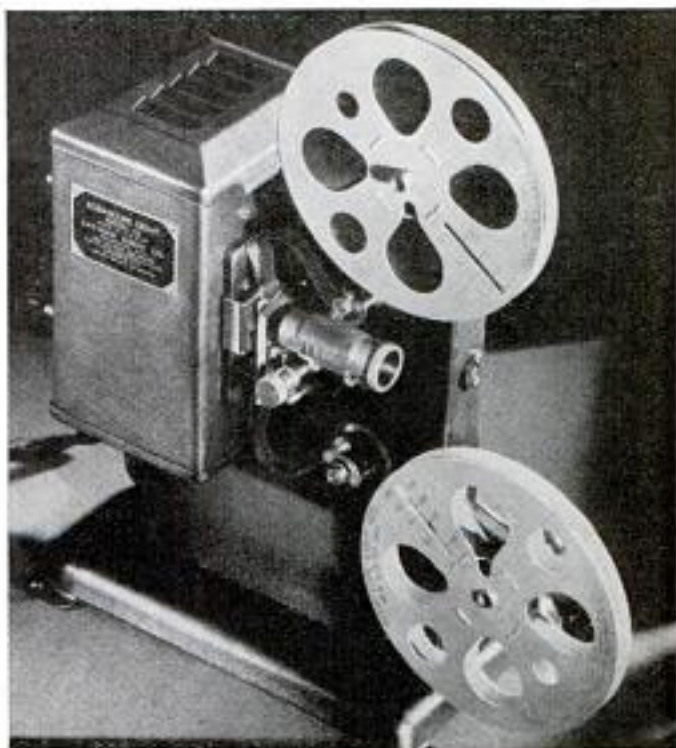
WHAT A DIFFERENCE COLOR MAKES. With this Kodak Transparent Oil Color Outfit you can give your prints and enlargements the beauty of delicate, rich coloring. Comprehensive instruction book makes their use simple. Complete outfit, including fifteen colors, \$3.75. At your Kodak dealer's.

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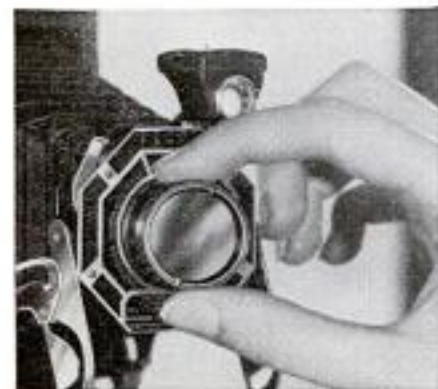
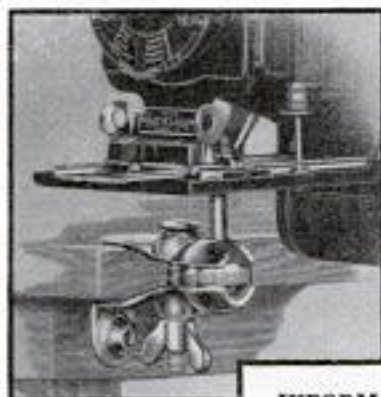
KODASCOPE EIGHT. The Kodascope Eight is beautifully made to project clear, steady home movies from the new inexpensive Ciné-Kodak Eight film, only 8 mm. ($\frac{3}{10}$ inch) wide. With Kodak Cinegraphs—inexpensive reels of sport, comedy, drama, and travel subjects—it enables anyone to show professionally made movies at home at low cost. Model 25 shown at right, \$34.50. Other Kodascope Eight models, \$22.50 and \$75.



Pictures made with the Kodak Recomar showing enlarging effect of supplementary lens "B" compared to regular lens alone. The Recomar takes film packs, cut film, or plates, thus permitting the use of negative materials of any color sensitivity. Two sizes: $2\frac{1}{4} \times 3\frac{1}{4}$ at \$40; $3\frac{1}{4} \times 4\frac{1}{4}$ at \$48.

MINIATURE PRECISION CAMERA. Hardly larger than your hand, Kodak Pupille (below) carries an $f.2$ Schneider Xenon lens five times as fast as an $f.4.5$ —takes pictures in almost any light. Its critically sharp negatives, $1\frac{3}{16} \times 1\frac{9}{16}$, may be greatly enlarged. With Compur Shutter, \$75. Write for booklet.

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THE OPTIPOD. A handy pocket-size device that clamps to chairs, shelves, tables, etc., to solidly support your camera. Also fits on tripod to give you an adjustable tripod head. Price, \$1.25. At Kodak dealers'.

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P.M.—3-33

Eastman Kodak Company, Rochester, N. Y. Please send me literature regarding items mentioned in your March Bulletin, as checked below.

Ciné-Kodak Eight Recomar
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BOOKLET

DODGING LIGHTNING

B2167 (Continued from page 405)

these discharges to one side so that two or more parallel streaks of identical form are observed, or recorded with a camera.

Much of the lightning that jumps about does so between or inside clouds, rather than between cloud and earth. A cumulus thunderhead may be a mile high, yet lightning jumps between top and bottom with apparent ease.

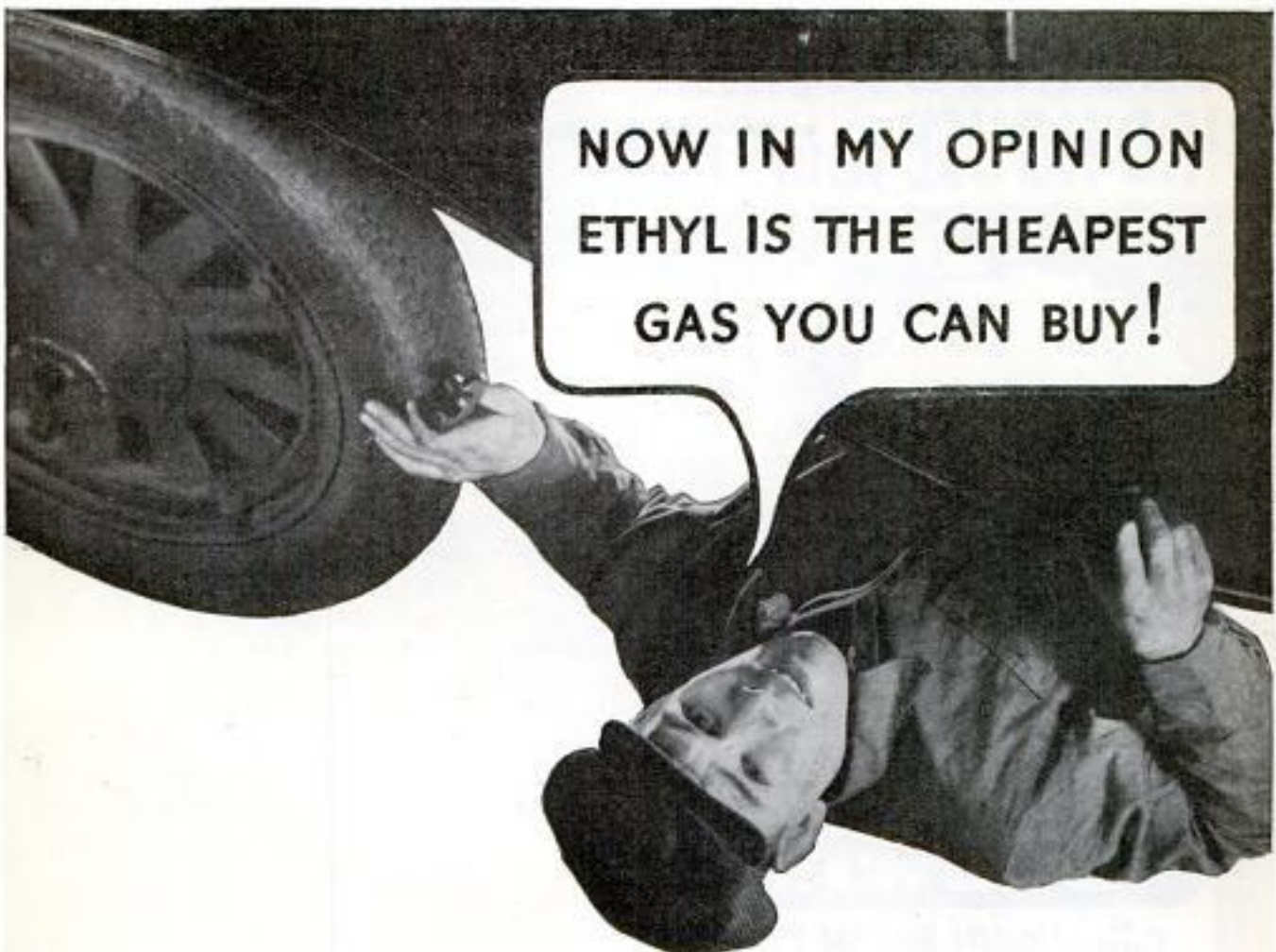
Ball lightning, in which a flash apparently enters a window or other opening, or merely comes through the air outdoors and pauses to wrap itself into a ball which rolls leisurely along until it disappears with an explosion, has been reported so many times that it undoubtedly exists. However, no lightning authority has had opportunity to study this phenomenon at close range. Some believe that it might be a slow-traveling brush discharge of considerable brilliancy, which is followed by a stroke of ordinary lightning.

As for the zigzagging lightning flash that still is popular with artists, it doesn't exist in nature. Most discharges travel a writhing or twisting path, which may look zigzaggy when seen from the side. In the laboratory, artificial lightning can be made to travel a jagged route by stringing fine wires about to create a starting path. In this way, the discharge can be made to write its name, or form other symbols.

A lightning flash is considered extremely powerful, but in reality the actual electrical power is relatively small. Austin believes that it takes an unusually large discharge to dissipate five to twenty-five kilowatts of electrical energy—about the quantity that passes through your house meter in a week. The difference between the lightning power and that which you use for illumination is that the former does its work in a few millionths of a second, while the latter takes several days. It has been calculated that the total amount of electricity wasted by a thunderstorm over a large city would be worth \$25,000 or more if it could be harnessed and used.

Indirectly, natural lightning is more useful than you may believe. It is the greatest fertilizer manufacturer known. When a discharge occurs through the air, gases of the atmosphere are broken up and recombined into new compounds. Among

(Continued to page 118A)

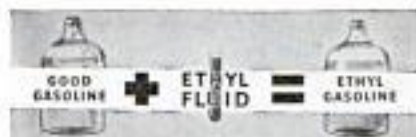


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There is a tag attached to every "Irwin" Bluwin Bit. Send this tag to The Irwin Auger Bit Company, Wilmington, Ohio, with your name and address and receive free of charge a complete set of working drawings of the Bob Becker Wren and Martin house pictured above. "Irwin" Bluwin Bits for sale in all sizes by your hardware dealer, or write direct.

THE IRWIN AUGER BIT COMPANY
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IRWIN
WOOD BORING TOOLS
CUTS TRUE—CLEAR THRU

DODGING LIGHTNING

(Continued from page 116A)

these are ozone and various nitrogen compounds. The ammonia and oxides of nitrogen are carried to the earth with the rain and act as fertilizers or combine with other substances to form fertilizers.

Perhaps the most useless product of an electrical storm is thunder. The noise of thunder is now considered as being caused partially by a sudden, violent explosion. This explosion results in part from the expansion of atmospheric gases by heat, and partly by the breaking down of gas particles and the formation of new gases. Thunder seldom is heard more than a dozen miles from the discharge, although a cannon can be heard much farther.

Thunder can act roughly as a distance gauge for lightning flashes. It requires approximately five seconds for sound to travel a mile, while the light of a discharge travels practically instantaneously. Therefore, thunder reaching an observer ten seconds after the flash that caused it, indicates that the flash was two miles away.

From the radio listener's point of view, a more useless thunderstorm product is static. A thunderstorm is a huge broadcasting station that does not obey government restrictions as to wavelength and power. However, static may, in the future, be put to work on a world-wide scale as a weather prophet. It may be possible for a weather man, at some central point such as Washington, to tune in storms all over the globe, and accurately chart their strength and direction for the benefit of operators of ships, aircraft, power stations, and others.

There is a vast field open to amateur radio fans in the study of weather static. It has been suggested that, if a few thousand amateurs would listen faithfully to the whisperings of static, and report their findings to a central point, a reliable method of weather forecasting might result.

For example, when a listener heard a noise that sounded like dried peas rolling down a roof, he would know that a rainstorm was near. A peculiar rustling sound would warn him of a snowstorm. Doubtless the list of definite static noises could be prolonged to include almost every weather activity, so that a trained listener might tell with startling accuracy what kind of weather was taking place a thousand miles away.

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The Ideal Lawnmower Sharpener is a model of simplicity. It grinds the blades of a lawnmower with amazing speed and accuracy without removing wheels or ratchets. It employs the same method of sharpening as used by the lawnmower manufacturers themselves. To get a perfect job it is absolutely necessary to sharpen a dull lawnmower on a grinding wheel, the method used by the Ideal Sharpener. It takes only about fifteen minutes to put a lawnmower in perfect condition and you get from \$1.00 to \$1.50 per mower.

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When a lawnmower is sharpened on the Ideal Sharpener it cuts just like the day it came out of the factory. The blades are ground to fit the straight blade thus assuring a perfect cutting edge. Ideal sharpened mowers stay sharp longer because the correct method of sharpening (grinding the blades) is used.

Special Attachments Make It An All Around Machine

Not only can the Ideal Sharpener be used for sharpening lawnmowers, but attachments can be furnished which convert it into a year 'round machine sharpening skates, grass shears, hedge shears, sickles, scythes, gumming saws, etc.

Now Is the Time to Start

The time to get started is now. It pays to get your Ideal Sharpener installed early. It is not a bit too early to solicit lawnmower sharpening business.

NEW PEERLESS JR. SHARPENER

Just out this year. Grinds all makes of Power Mowers, Tractor Units and Putting Green Mowers, as well as Hand Lawnmowers. Make additional money sharpening for Golf Clubs, Parks, Cemeteries, Schools and Private Estates.

NEW, LOWER PRICES

This year we are offering not only a still better line of Mower Sharpeners but at new, lower prices. Write for prices and new free catalog today.



YOU CAN DO WHAT THESE MEN HAVE DONE

John Del Zoppo, Hollywood, Cal., writes: "We are running an average of 35 to 50 sharpening jobs per day, all of which are done on the Ideal Sharpener." Glenn R. Knick, Troy, Ohio, writes: "From the first of April to the middle of May I sharpened 140 mowers." J. W. Bures, Cuyahoga Falls, Ohio, writes: "I am building through satisfaction a wonderful future business and have the promise of over 100 mowers already for next year." Niles C. Race, Rochester, N. Y., writes: "I have to date sharpened 785 mowers at \$1.00 apiece. I started in my cellar but the place was not large enough so I had to rent a place a week after I got my Ideal." Wm. Seduski, Watervliet, N. Y., writes: "The Ideal Sharpener is a wonder. No one can turn out a bad job on it." Thomas West, Lynn, Mass., writes: "I do not know of another machine that will do better work or turn out \$100 quicker or easier than the Ideal Sharpener." W. C. Fink, Pittsburgh, Pa., writes: "I turned out 604 jobs and my standard price is and always has been \$2.00 per mower."

NO TRAINING NECESSARY No training is necessary to do a good job on the Ideal Sharpener. Just attach it to a light socket or to line shaft or gasoline engine and start to sharpen. There are hundreds of dull lawnmowers in your vicinity waiting to be sharpened.

MAKE \$40 TO \$50 PER WEEK Any one who will earnestly go into the lawnmower sharpening business can make from \$40 to \$50 per week their first season. Many men have made more than this in their spare time alone. And the Ideal Sharpener does such excellent work that each year your business will increase because once you secure a customer he will not only tell his friends about your service but will himself come back again and again.

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032101
HOW FAST CAN YOU THINK?

(Continued from page 389)

time varies from one-tenth of a second to five seconds, depending upon the complexity of a situation."

The discovery that time lag occurs, even in a simple reaction, is leading to the belief that timers at athletic events are crediting sprinters with records beyond their ability and that, with the use of electrical timing devices, the 100-yard dash will be run in slower time. The explanation is that at the beginning of a race at least one tenth of a second, equal to three feet of track, elapses before the timer standing at the finish line starts his clock. There is no lag at the finish to offset the loss, since the timer unconsciously leads the runner and clicks the watch at the exact instant the tape is crossed.

You really think faster than the psychodometer tests indicate, for a little time is required for the operation of the muscles. Photographic records, made in connection with a high-frequency galvanometer, show that in taking .13 second to press a key in response to a signal, one-third of that time is used to actuate the muscles after the sensory current from the brain has reached the fingers.

The difference between a fast and a slow thinker may amount to only a few hundredths of a second, says Doctor Metfessel, and, contrary to expectations, the fast thinker does not always benefit by his speed. It is more important that a few hundredths of a second be spent in reaching the right decision than jumping to the first conclusion. At one time the army chose its pursuit pilots from among those who showed the fastest reaction time, but now the first requirement is that every member of a squadron think at about the same speed. A pilot who thinks faster or slower than the rest of the group may endanger others as well as himself when maneuvering in close formation.

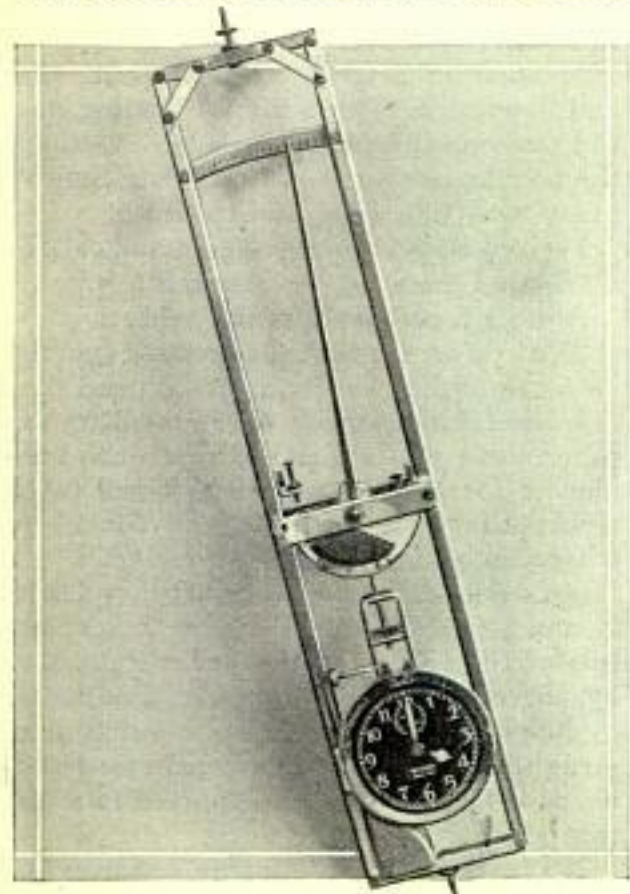
"Now and then someone relates how his 'sixth sense' saved him from danger," says Doctor Metfessel. "He suddenly receives a hunch to move away from a building, and an instant later the wall tumbles down. Or it may be that in walking down a dark street a mental danger signal warns him to turn just as the thug springs at him. In each case, he moves just in the nick of time to save himself."

Wm. Thomas D. Schoolcraft,
Lullay Ore

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CROOKED OIL-WELL DRILLING PREVENTED BY INDICATOR

Preventing crooked drilling of oil wells, an angle indicator shows the drift of the



When Well Is Being Drilled at an Angle, This Indicator Reveals the Degree of Deviation

hole, enabling operators to keep boring tools straight. Crooked holes are the cause of increased friction between drill tools and the sides of the well, excessive wear on drilling lines, twisting off of drill pipe, collapsing of casing and other expensive damage. The angle indicator, designed for daily surveys, is lowered into the well. If the hole is crooked, one of two weights will swing over, causing a pointer to show the exact angle at which the well varies from vertical. The pointer locks into position, and when the indicator is withdrawn, the operator gets information that will enable him to correct the drilling machinery.

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COURAGE!

(Continued from page 399)

diver, was already on the bottom, working aft on the other side of the submarine. I ordered him to climb over the boat to the tunnel and help Smith.

Meanwhile I tried to figure out what had happened. The fire hose leading over the rail was throbbing violently. Perhaps the nozzle, having torn itself from Smith's grasp, was thrashing him to death.

I seized Smith's phone again and called: "Shall I turn off the water?"

Almost a scream was the reply:

"No! For God's sake keep it going! The tunnel has caved in behind me!"

I felt faint. Hastily we coupled up another hose and slid it down to the submarine for Eiben's use. But it had taken weeks of work to drive the tunnel to where Smith lay buried in the mud!

On deck, we looked at each other silently and gazed hopelessly at the other vessels of the salvage squadron tossing near by. Five ships and 1,000 men standing by as helpless to lend a hand to that man struggling for his life only 135 feet below us, as if he had been transported to a distant star!

No further messages came, but over the telephone, I listened to Smith gasping for breath as he struggled in the mud and the darkness. The sailors clustered silently round me, waiting for Eiben to arrive at the tunnel.

Eiben clambered up the starboard side of the submarine, cut loose the hose we had lowered, dragged it forward with him and slid over the port side to the bottom, then started to look for the tunnel. After what seemed to us an age, he reported that he had found it.

More minutes went by while, on deck, we waited with leaden hearts. Then a startling thing happened. Over Smith's phone, I heard Smith talking through the water at the bottom of the sea to Eiben:

"I'm all right now, Joe. Had a little accident. You go on back to your own job."

Though he could not turn round, Smith had managed to pass the nozzle back between his legs, and guiding it with his feet, he had washed his way out backward through the cave-in!

On deck, the tenders waited for the signal from Smith to start him on his slow

(Continued to page 124A)

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COURAGE!

(Continued from page 122A)

rise to the surface. On the bottom, Eiben made sure Smith's lines were all clear, then clumsily climbed back over the submarine to the job he had so hastily left. Smith, alone again, sat down on the ocean floor a few minutes to rest, then, instead of signaling to rise, picked up his hose, crawled back into the tunnel and for half an hour more continued to work!

Months later, through a silent crowd of hundreds of thousands of people, the "S-51," still the coffin of its dead crew, passed down the East river toward the Brooklyn navy yard, borne between pontoons in a cradle of chains passed through that tunnel and through other tunnels. But we who had struggled off Block island, knew it was the faith of men like Smith, not the pontoons, which had lifted the submarine. And in recognition of that victory and cold courage over the sea, the bell of the "S-51," proud symbol of our success, went to Francis Smith.

NEW SOURCES AND USES OF POWER

(Continued from page 379)

and bound in a steel frame well reinforced. When laid under a concrete floor, these mats absorb the vibration of machinery. Where heavy machines deliver terrific impacts against a floor, the engineers have made a spring device, which, when placed beneath the legs of the machine, also reduces vibratory motion.

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Coin-operated typewriters have been installed in German post offices. Use of the machine is obtained by depositing three cents, and for three cents more paper, envelope and carbon copy may be procured. The typewriter is installed on a small table to which a chair is attached.

*Reported by Consul
John H. Green
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THE EVER-OPEN EYE

(Continued from page 413)

"All the signatures are exactly the same," they replied.

"Right," said the expert. "And that never happens. No man's signature is ever exactly the same twice. Tracing is the clumsiest form of forgery."

The same expert has shown up faked documents by photographing by transmitted light, which once showed that a will dated 1925 was written on paper watermarked 1928. New York detective bureau provides that among the very first on the scene of murders shall be the photographer, and until he comes, nothing must be disturbed. The twenty-three police photographers are always ready to jump into special automobiles, equipped with as many as twenty-five cameras of all sorts, with flashlights, flares and floodlights.

An eerie trade is theirs, plied usually at night, in small dark rooms, bullet-marked, blood-spattered and somewhere a silent form, contorted in sudden death, that must not be disturbed until photographed from every angle. For this there is a special camera with a fine lens, a tilting head and a 180-degree range, which can be raised upon a tripod so that it can photograph from above not only the body of a victim, but the whole floor with all the clues in place. They are important, and murders have even been solved because the camera showed up bloodstains the human eye missed.

The police photographer photographs each clue separately. He does this not only to help the detective find the criminal, but to aid the district attorney to convict him when he is found. Even bullet holes are photographed because photos are so valuable at trials that defense lawyers sometimes produce their own, occasionally retouched or distorted.

Photographs of bullets or cartridges often play an important part in scientific detection, for the firing pin or breech shield of a revolver makes marks on the end of a cartridge case that are individual and telltale to an expert. For instance, there was the case of a mother found shot to death in her apartment. In her son's room, was a newspaper clipping, describing the recent death of another woman, killed by a stray revolver shot. Had he

(Continued to page 128A)

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THE EVER-OPEN EYE

(Continued from page 125A)

killed his own mother, trying to conceal this crime? There was a bullet hole in the window, and photographs of both sides of the glass indicated the shot was fired from outside.

Detectives trained upon the bullet hole a powerful flashlight with a 700-foot range. Peering eagerly out the window, they followed this beam to the roof of a tenement house on the next street. There, careful search produced a single empty shell from an automatic pistol, of the caliber of the bullet found in the woman's heart, and also a pistol belonging to a youth living in the tenement. Markings on its hammer matched the cartridge case, when both were photographed. The youth said he had been trying the gun on the roof and the dead woman's son was released.

Instead of freeing a suspect, photographs convicted one in another case. It started with a serious fire in the store of a small merchant, who claimed considerable insurance. Detectives found his whole store wired for burglar alarms except the most likely spot, just inside and just outside the entrance.

"See," he said excitedly, "here, outside the door, they sawed a hole down through the floor, crawled under the door, and sawed another hole up through the floor."

But the detectives laughed at him, because the sawed places showed both holes were sawed from the top down. Police preserved in film the story of the cuts. The jury looked at the photographs, and convicted the storekeeper of arson.

The camera also helped obtain a conviction for a vehicle homicide—a fatal automobile accident caused by criminal negligence. Photographs were taken of skid marks made on the pavement by the offending driver. With these photographs, and accurate data on what the car should have done if properly handled, experts of the vehicle homicide squad were able to give great aid to the district attorney.

Such a squad is summoned to the scene of every accident where anyone is killed or seriously injured. The members carry decelerometers, pedal pressure gauges, air gauges, mercury gauges and load meters. They take photographs showing the condition and position of cars, type and con-

(Continued to page 130A)

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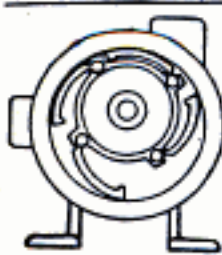
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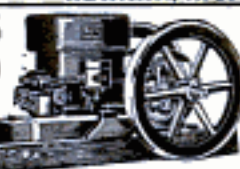
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THE EVER-OPEN EYE

(Continued from page 128A)

dition of tires and skid marks, to check with tables established by their own tests. Once a squad photographed skid marks indicating an accident, when no car was in sight. It had skidded into the East river bearing two men to death. Another time, tire-mark photographs at a fatal-accident scene pointed to a sedan that was minus a door handle. The driver denied guilt and claimed the break an old one, until chemical tests showed it a new one, and an X-ray photograph disclosed the handle itself in the throat of the dead man.

Each police photographer is an expert fingerprinter. He finds latent prints, practically invisible, on weapons, doorknobs, woodwork and other surfaces. Incredible though it seems, he can get a print from a wet window pane. He carries dusting powders and occasionally uses transfer tissues that absorb the print. New York police headquarters now indexes fingerprints of a million persons all over the world.

An important aid to identification is the famous rogues' gallery with photographs of 108,000 New York criminals and 15,000 from the rest of the world. The New York police recently found two improvements that have had an amazing effect on criminal identification.

In addition to full-face and profile pictures, suspects now are snapped full-length beside a standard marked in feet and inches. "That's the 'stand-up,'" a police official explained. "It's a new idea, to show the whole person, not just his face, head and shoulders. We realize now that people are recognized, not by their faces alone, but by figure, posture, clothing, which our bust pictures didn't show."

Suspects arrested in groups now are also photographed together on the theory that a man who would not be recognized alone, may be recognized if viewed with people with whom he has been seen before. Already, by these means, identifications of persons accused of crimes have increased from two per cent to seven per cent.

Now, the police are hoping the camera will help them thwart one of the criminal's oldest tricks—recanting a confession, claiming the police forced it by third-degree methods. The new plan is not only to write down the confession, but to make a sound movie of it.

DAREDEVIL TELLS SECRETS OF SAFETY

(Continued from page 349)

the wheel hard over. The result is a tendency to swing the rear end of the car around. Then anything may happen.

"Let the car float back. Don't jam the brakes. Just take it easy and guide the wheels back on the road at a friendly angle, holding the steering wheel firmly. The same treatment applies to crossing the ridges often left in the center of a gravel road by scraping.

In turning corners, particularly on slippery pavement, free wheeling reduces the tendency to skid, he points out.

"If you're gunning it," he says, "the rear wheels lose traction; if you suddenly release the throttle and let the rear wheels work against the motor, you are, in effect, applying the rear brakes. Wheels rolling freely always have more traction than wheels under power or braked by engine pile-up.

"On emergency stops—that is, full brake-pressure stops—you can halt your car more quickly in free wheeling or with the clutch out than you can if the motor is locked to the drive. We used to think that the motor helped you stop, and it does in slow deceleration. In a quick stop, however, unless your motor is disconnected from the drive, you have to slow it down as well as the car."

Ab has his own technique in holding the steering wheel. The left hand rests at the "ten o'clock" position while the right grasps the rim at about "four o'clock." The left hand does most of the guiding while the right serves as a sort of locking grip. In driving, he holds his right elbow close to the body for rigidity and lets the rim slide through the fingers of his right hand. Then, if a tire blows or a road obstruction tends to jerk the wheel, down clamps that right hand for steadiness.

If you're going on a long drive at night, eat sparingly in advance, Ab cautions. You will be more alert and less troubled by sleepiness.

What is the test of a good driver? The attitude of his friends, Ab believes.

"If your friends get thrills and chills riding with you, there's something wrong with your driving," he says. "If you really know how to handle a car, they won't be conscious of your expertness."



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FISH CAUGHT BY BLACKJACKING WITH HEAVY STONES

When your favorite bait fails, try chasing your fish and hitting it with a stone. This idea was used with much success in collecting specimens by an expedition to Honduras from the Field Museum of Natural History. The water of a stream was shallow so a seine could not be used to collect the many specimens wanted. A dip net also was useless since the fish took refuge under rocks. An Indian girl solved the problem for the collectors by showing how her people caught fish in this river. She selected the most promising rocks under which fish might hide, took a stone as large as she could lift and threw it down with great force on such a rock. The concussion stunned the fish under the rock which seemed to lie with their backs against it. The rock was turned over at once or the girl groped under it to capture the stunned creatures before they recovered. Similar methods later proved successful when the expedition wanted fish for the frying pan.

Schmidt
Karl P. Schmidt
Zoological staff

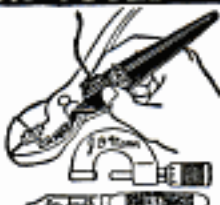
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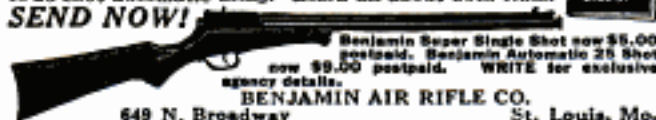
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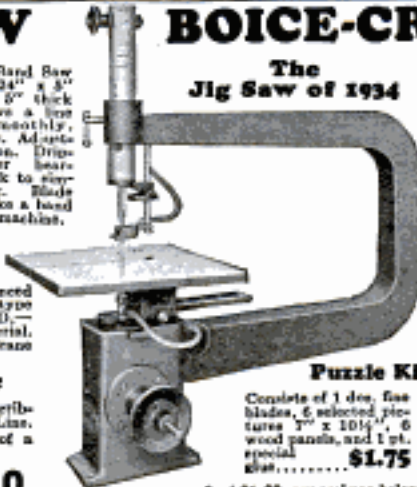
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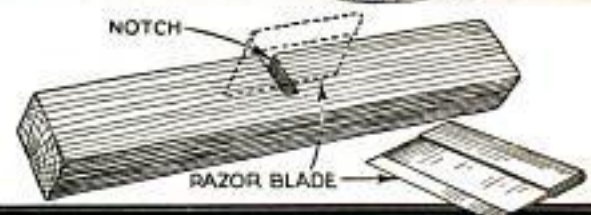
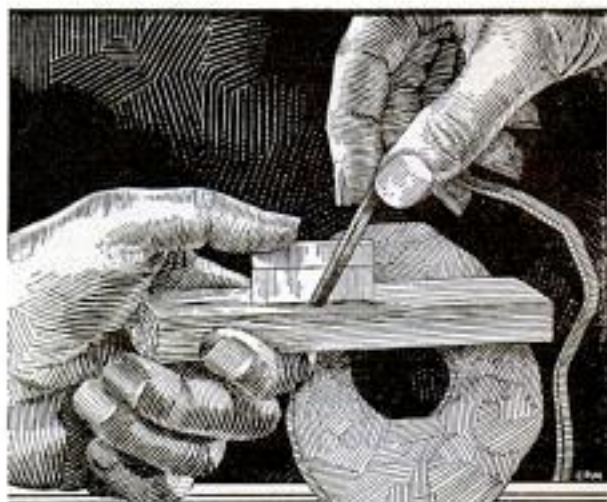


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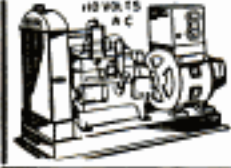


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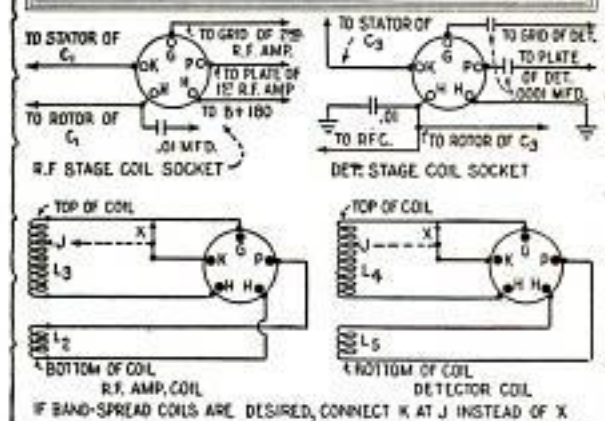
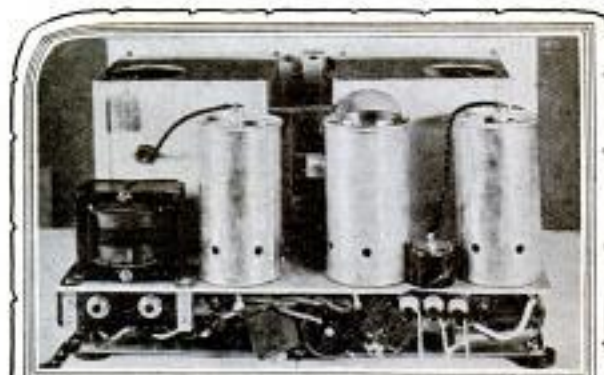
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**FOREIGN S-W SIGNALS ON A
TEN-FOOT ANTENNA**

(Continued from page 437)

made by a number of different manufacturers. The grid and plate leads should be kept as short and far apart as possible. The variable condenser C_2 is a 25-mmfd. midget type.

The aluminum front panel is 1/8 by 8 by 14 in., and the base panel, of the same material, is 8 by 13 in. Two subpanel brack-



ets, 6 3/4 in. long and 2 1/2 in. high, support the base plate, leaving space back of the front panel to clear the volume and regeneration-control potentiometers. Two standard aluminum shield boxes, 5 by 5 by 5 in., with bottom plates removed, are screwed directly to the base as shown. The r.f.-coil socket in the shield at the left and the detector-coil socket in the shield at the right are both raised about 1 in. above the base by means of brass or fiber bushings and long machine screws. The trimmer-condenser (C_2) knob extends through the side of the shield at the left. The plug-in coils are inserted through 2 5/16-in. holes cut in the tops of the shield cans. Two output jacks are provided, J_1 for phones or a high-impedance speaker, and J_2 for a dynamic speaker. These are

(Continued to page 138A)



"AB" JENKINS' THOUGHTS WHILE
DRIVING HIS PIERCE-ARROW FOR 24 HOURS
AT 112 M. P. H. AVERAGE

500 miles in four hours and twenty minutes . . . boy that's faster than the Indianapolis 500 mile record . . . everything's running sweet too . . . ten hours and not a bit tired . . . eleven hours . . . I've made over 1200 miles . . . nothing can stop me now . . . spark plugs might . . . what little things decide success or failure . . . but these Champions won't fail me . . . they never have . . . twelve hours . . . time is flying with me . . . no wonder every important race for the last ten years has been won by Champions . . . their new patented extra range is certainly being proved as never before . . . believe me I won't begrudge them credit . . . fourteen hours now . . . black as ink too . . . some strain to follow those markers . . . interesting to think that a



great piece of engineering mechanism like this car should depend on its little spark plugs . . . Champion may be proud of all their world's records, but they'll have to thank us for this chance to show their stamina . . . there comes the sun, and it's over twenty two hours . . . I should be tired but I'm too happy to feel it . . . twenty three . . . the home stretch and NOW twenty four hours . . . yea boy, good for you Pierce-Arrow! . . . good for you Ab old boy! . . . and good for you gallant Champion Spark Plugs. Gosh I'm deaf . . . what did he say . . . 2710 miles in 24 hours at 112.91 miles per hour . . . the world's greatest performance beyond a doubt . . . Champion Spark Plug Company, Toledo, Ohio; Windsor, Ontario.



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Dept- 3643 Station A Milwaukee, Wis.**FOREIGN S-W SIGNALS ON A
TEN-FOOT ANTENNA**

(Continued from page 136A)

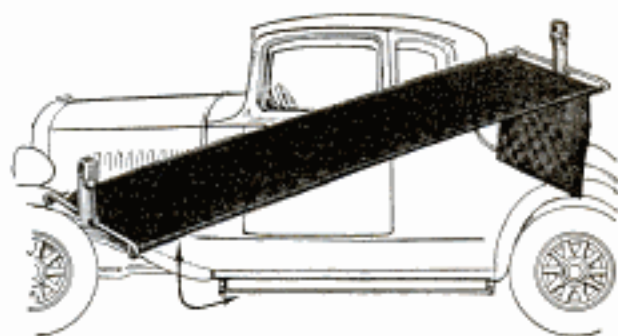
open-circuit jacks; the output transformer is a regular pentode type.

The coil-socket circuit connections together with the corresponding plug-in coil connections are shown in the diagrams below the rear-view photo of the receiver.

Enlarged wiring and layout diagrams will be available after Part II of this article has appeared in the next issue. The 20,000-ohm voltage divider is of the adjustable-tap type and is mounted under the base by means of two small bakelite blocks.

Using ordinary coils, the 40-meter band covers about 15 divisions on the dial, and the 20-meter band about 10 divisions. Directions are given on the coil diagram for band spreading if desired. Standard plug-in coil forms are used, and the coils are all wound in the same direction with No. 26 d.s.c. wire. For 20 meters, coils L₃ and L₄ have 5 turns and tap J is made at 2½ turns. For 40 meters, these coils are 10 turns each and the J-tap is at the fourth turn. For 80 meters, each of these coils has 20 turns and the J-tap is at the fifteenth turn. Coils L₂ and L₅ have 4 turns each, for both 20 and 40 meters. For 80 meters, coil L₂ has 16 turns and L₅ six.**Antenna Fits under Running Board**

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RADIO LOG IS ALSO A GAME

(Continued from page 439)

roll around and finally come to a stop opposite some station. The distance, in miles, that the station is from the player determines the score. The player who "tunes in" the greatest number of miles in a given number of spins is the winner. A variation would be to have the player try to tune in the station on the receiver that is indicated by his spin of the log. If the player can tune in this station, he scores the mileage indicated; if not, it counts that much against him.



Writing Dial Setting on Ring While Black Markers Are in Line

The disk is turned out first, and a hole is bored part way through it to receive the center pin upon which it spins. The housing is then turned, using the disk as a pattern to determine the size of the center depression. The shape is indicated in the sectional diagram, and the dimensions may be varied to suit the builder. Those of the sample log are: disk, 1½ in. thick and 4¾ in. in diameter; the housing, 1 in. thick and 6½ in. in diameter. There is about ⅛-in. clearance all around and under the disk.

Maple or birch may be used for the parts, and all turning is done on a faceplate. Sand the surfaces smooth on the lathe, apply oil filler and let the work dry. Polishing is done by holding a cloth against the wood as it is rotated. The steel peg is made by sawing the head from a bolt. A coat of clear lacquer and a felt disk glued to the base complete the log.

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ECONOMY SHORT-WAVE CONVERTER

(Continued from page 440)

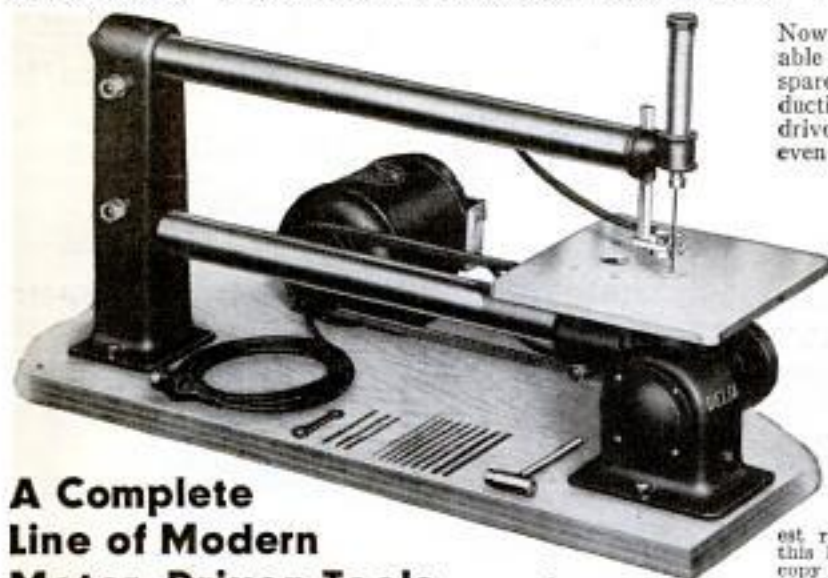
type and the .005-mfd. fixed condenser is no longer required. The adapter plug is also changed to a four-prong variety and wired as shown. A detailed description of the connections may be useful to those not familiar with schematic diagrams.

The G-post on the tube socket is connected to one side of the 5-megohm grid-leak and .00025-mfd. fixed condenser. The coil-socket and variable midget-condenser connections are the same as shown in Part I. The two filament posts on the tube socket are connected to the corresponding leads to the large prongs on the adapter plug. The grid return, which was connected to K of the 227-tube in the a.c. layout, is now connected to the positive side of the filament at the tube socket and directly to the midget rotors and P on coil socket. If a type 200-A detector tube is used in your receiver, instead of a type 201-A, this grid return should be connected to the negative side of the filament.

The short-wave plug-in coils described in Part I are not changed in any manner. Although four-prong adapter plugs are available, they are easily made from the base of a discarded four-prong tube. The glass bulb may be broken or melted from the base. The solder is removed from the prongs and the base cleared to take the three cabled leads. The P-lead of the adapter plug is connected to one side of the r.f. choke, which is an 85-millihenry type, and the other side of the choke is connected to the F-post on the coil socket. Enlarged layout and wiring diagrams, covering both the a.c. and d.c. short-wave converters, are available. This battery-operated converter is connected and tuned in exactly the same manner as the a.c. unit previously described. If the battery receiver is a superheterodyne, the adapter plug is inserted in the second detector socket. A small cabinet may be used to house the converter which can be placed at any convenient point near the receiver.

☛ To lower the tone of a receiver, connect a .001-mfd. mica-type fixed condenser across the secondary of the last audio transformer; a small single-pole switch may be used to cut the condenser in or out as desired.

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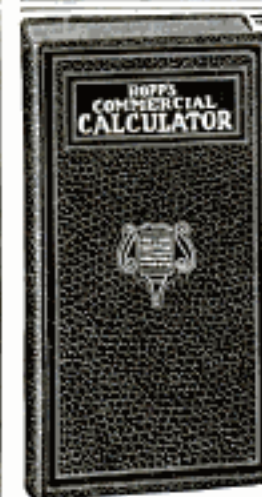
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HAMMER BLOW TOOL CO., 606 Third St., Wausau, Wis.

51

MILES ON A GALLON of GASOLINE WINS ECONOMY CONTEST

49 MILES Takes 2nd Place *Winning Cars Equipped With* **WHIRLWIND GAS SAVERS**

Automobile owners who have been worrying about gasoline expense will be interested in an amazing test recently conducted by a Texas Motor Car Company. Twenty-three cars were entered in a mileage economy test, the winning car running 51 miles on a gallon of gas, the second car 49 miles on a gallon. When official test records were published it was found the two winning cars were both equipped with Whirlwind gas savers.

"Peak" Contest Mileages

The amazing results obtained in this mileage contest are naturally greater than those obtained in ordinary driving. Careful throttling, most economical speeds—no traffic hold-ups—and no waste of power thru quick stops, help to bring about these "peak" mileages.

A Test On Your Car

More power, faster pick-up, less carbon, quicker starting, and increased mileage is what users say in telling of their experience with the Whirlwind. Every motorist owes it to himself to test the Whirlwind to prove the results on his own car.

FITS ALL CARS

In just a few minutes the Whirlwind can be installed on any make of car, truck or tractor. It's actually less work than changing your oil or putting water in the battery. No drilling, tapping or changes of any kind necessary. It is guaranteed to work perfectly on any make of car, truck or tractor, large or small, new model or old model. The more you drive the more you save.

GUARANTEE

No matter what kind of a car you have or how big a gas eater it is the Whirlwind will save you money. While we do not claim to produce 49 to 51 miles on ordinary driving, we do guarantee that the Whirlwind will save its cost within 30 days or the trial will cost you nothing. We invite you to test it at our risk. You are to be the sole judge.

How Whirlwinds Save Gasoline

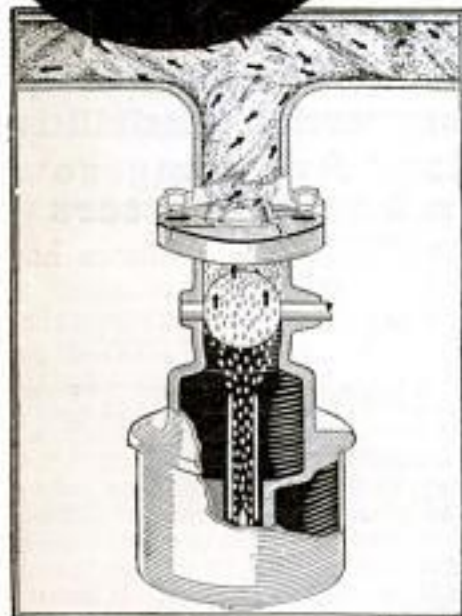
The principle of the Whirlwind is to slightly compress the partly vaporized gasoline as it passes thru the raised venturi. Extra air enters from four air inlets at such a tangent as to pick up the unvaporized gasoline particles, whirling them into action. The turbulence created breaks them into a vaporized gas, giving better, smoother power, quicker starting, cutting gasoline waste and carbon formation.

Car owners all over the world are amazed at the results of their tests. "I have more speed, power, and increased mileage," writes Henry Bomberger. "Hills I used to take in second I now make in high." Anton Wetsch: "I wouldn't take the Whirlwind off my car for any money. I am certainly convinced." W. B. Fountain: "My mileage has increased greatly. My car has plenty of pick-up and starts like a whip."

SALESMEN AND DISTRIBUTORS WANTED To Make Up To \$100 A Week and More

Whirlwind men are making big profits taking care of local business for this fast selling device that car owners cannot afford to be without. Good territory is still open. Free sample offer to workers. Full particulars sent on request. Just check the coupon.

WHIRLWIND MFG. COMPANY
Dept. 915-A, Station C Milwaukee, Wis.



Mrs. C. P. Blalock,
contest winner

FREE OFFER COUPON

WHIRLWIND MANUFACTURING CO.,
Dept. 915-A, Station C, Milwaukee, Wis.

Gentlemen: You may send me full particulars of your Whirlwind Carbureting device and tell me how I can get one Free. This does not obligate me in any way whatever.

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UNDER new plan others sell for you. This is the method employed by O. J. Riley, pictured above. Already Riley has more than 100 retail stores selling his product and he enjoys a big weekly income. Send for Free Book and learn how you can duplicate the success of Winther, Riley and 50 others.

If you are looking for a steady weekly income of from \$50 to \$200 a week—depending only upon your own willingness to work—here are the facts about a most astonishing new business that you can start at home on a very small investment. Read.

GERHARDT WINTHER (whose picture is above) lost his job as a Baker. Couldn't find a thing. Savings dwindled. Faced with Charity—or worse. Suddenly he came up smiling in an astonishing new business, that swept him up to prosperity—overnight! Made money from the first day. Now after being in business only 90 days he writes: "When others talk about Depression I can laugh. I make more now every week than I ever made before, my self-confidence has been restored, I can stay at home and take in as high as \$125 a week from my wholesale and retail business. What a business! What a break!"

Winther's is not one isolated example—an exception—No! He is one of fifty! For while this money-making business is so new that the public hardly knows about it, already over fifty men have started it in different parts of the country. And in spite of the times, they're making money—some only \$50 or \$60 a week, but others up to as high as \$150 and even more. And this astonishing, ready-made business in which I can now start a few more men is so profitable that it is possible to make as much as \$48.40 a day, doing a wholesale business only and letting others do your selling for you.

What's the Secret?

This new business is so simple that you may be inclined to dismiss it with a wave of the hand. But thoughtful men who can analyze its possibilities will see in it a source of real money. It's the Potato Chip Business. But that isn't all. A strange discovery about potatoes has enabled us to build a machine that makes a *New Kind of Chip*—not like any other potato chip you ever saw or tasted. Even the old-fashioned kind of potato chip has made fortunes for hundreds of men. But now with this new chip, the possibilities are unlimited. It is different in appearance, different in taste, and in addition it has one astounding new

quality that sets it entirely apart from anything ever offered before—it is "MINERALIZED."

Nine Vital Minerals

Not many people know this, but Department of Agriculture figures show that raw potatoes contain **NINE VITAL HEALTH-GIVING MINERALS**. They're as good for you as Orange Juice. They also contain a rare Vitamin and an abundance of Mineral Proteins. BUT—by the old process of cooking, all of these vital minerals were removed. The old kind of potato chip was but a tasteless pulp—worthless as a mineral food! Now, with this revolutionary new invention I have found a way to **RETAIN** all nine minerals, a way to **RETAIN** the Mineral Proteins. And you'd be absolutely amazed to discover the difference these minerals make in the taste. One sample is enough for any storekeeper. The minerals give **VITA-SEALD** Chips a tang and a "Come-Back-For-More" Taste that you can't describe. You'd have to taste the chips themselves. Another thing: As an accident I also discovered how to get 33% more chips out of the same quantity of potatoes. So the margin of profit—already big—was increased by my invention. With the use of my machine you can get

\$10.85 Profit from \$1.95

Cooked the new way, \$1.95 worth of raw materials makes \$12.80 worth of finished products at retail prices netting \$10.85 profit! And the **VITA-SEALD** machine operates with such incredible speed that \$12.80 worth of chips is only one hour's maximum output! The profit on the same hour's work, if chips are sold at wholesale, is \$6.05. Working 8 hours a day and doing only a wholesale business you can actually net \$48.40 a day on a capacity business. And that requires no retail selling. Even if you did only half this well you would be making \$24 a day profit—or \$144 a week.

No Experience Needed

With the **VITA-SEALD** machine as a basis of operation you can start your business in the kitchen—basement—anywhere. For a space 52 x 20 inches is all it occupies. No cooking skill is required—no special experience of any kind. I am the originator of **VITA-SEALD**. I have over 10 years experience in the potato chip business and I can and will show you exactly what to do

to start making money—good money—the very first week—show you how to make every grocery, lunch room, cigar stand, hotel and restaurant pay you a steady, ever-growing profit. And your total investment is so small you can get it back the first few weeks you are in business.

16-Page Book FREE

The facts presented here are a bare outline. Limited space permits no more. But if you are interested in this startling business that can bring you a big income at once—in any locality—that can make you independently wealthy in a few short years, you are urged to write for my 16-page illustrated book that presents all the facts in full detail. Immediate action is imperative. This is among the first of my public announcements. Yet, already, over 50 men are on the way to big money. Hundreds of others have written for information. So it will pay you to get this information without a moment's unnecessary delay. No salesman will call on you. And a request for information doesn't place you under the slightest obligation. Send the coupon—or better still, a wire—today, to A. H. Adams, President,

Vita-Seald Potato Chip Co.
 500 N. Dearborn, Dept. S-515, Chicago, Ill.

A. H. ADAMS, President,
Vita-Seald Potato Chip Co.,
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Please rush free book that describes your new Vita-Seald invention and that tells how earnings of \$50 to \$200 a week are easily possible.

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