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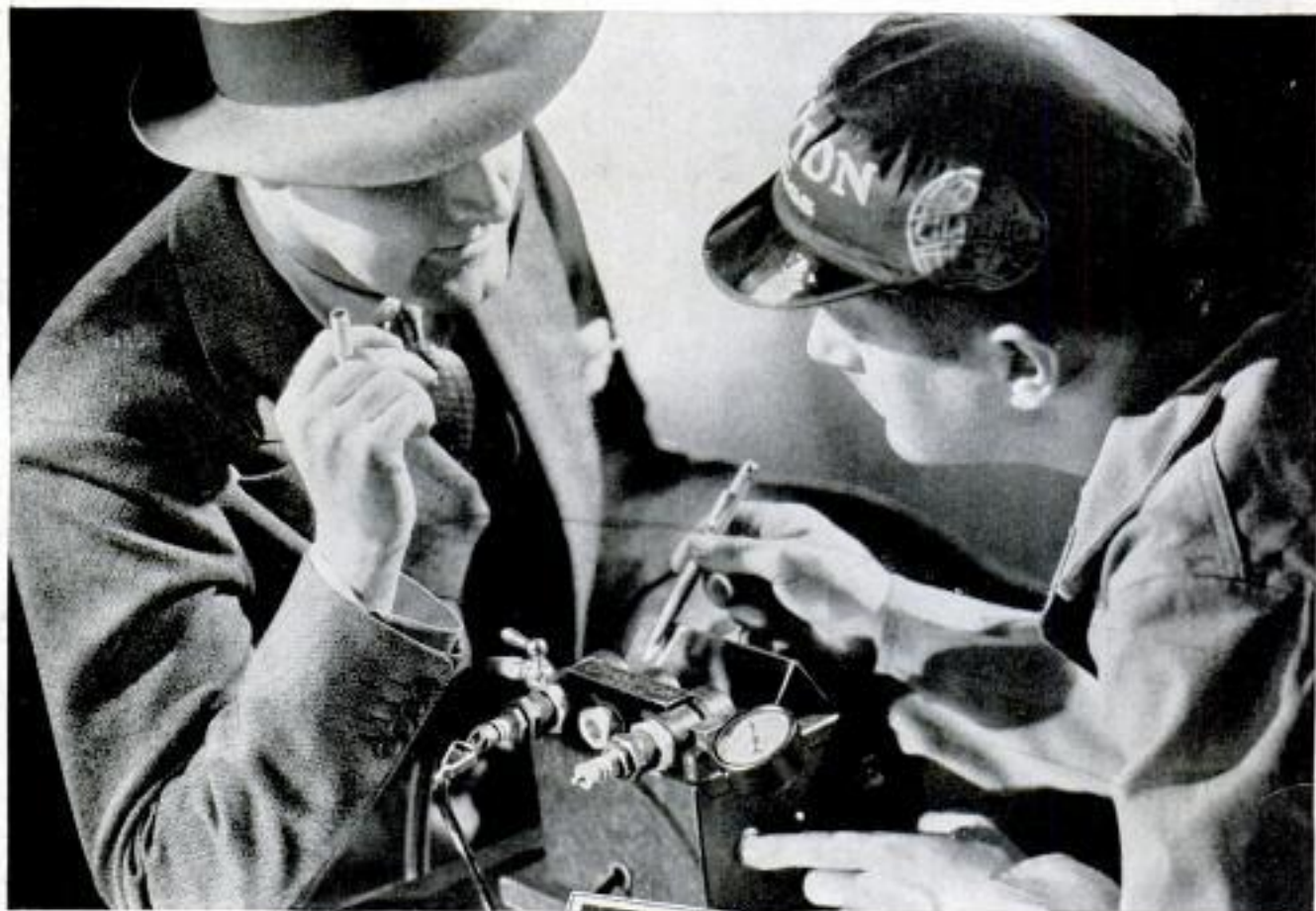
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Landscaping Your Yard
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Get Set FOR ANOTHER 10,000 MILES WITH CHAMPION EXTRA RANGE SPARK PLUGS



"Champion National Change Week is your reminder to get set for another 10,000 miles. Just look at these plugs of yours in this Tester as compared to Champion Extra Range Spark Plugs • See how your old plugs flicker and stop sparking. That weak spark means wasted gasoline. That's why it pays to change spark plugs every 10,000 miles. It also insures better performance • Now see how this new Champion stands the gaff.



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Some difference, eh? • See that peculiarly shaped insulator? It's patented and is the reason why Champions have the widest driving range known. It means extra power, extra speed and absolute dependability. You ought to have a set of these new Champions, even if you hadn't gone over 10,000 miles. Okay, it won't take me five minutes to install a set" • Champion Spark Plug Company, Toledo, Ohio; Windsor, Ontario.

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SPARK PLUGS

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Men and women succeed alike—no super-salesmanship—no skill—no canvassing. E. Weiler, California, starts with 10 pounds, uses profits to build up to 30 pounds, then 60 pounds, then places standing order for 150 pounds EVERY THREE DAYS! **ALL PAID FOR OUT OF PROFITS!** One of the largest bakery chain systems in the U. S. bids for exclusive rights in 200 cities, but we had already allowed exclusive rights to others, except in 9 cities which they grab eagerly. Buy 150 pounds at a clip for each store! J. F. Knudson, living in a small New York city, wires, "RUSH ONE HUNDRED TWENTY POUNDS. OUR TRADE WILL REQUIRE UPWARD OF FIVE HUNDRED POUNDS MONTHLY." Large Pacific Coast concern wires, "INCREASE STANDING ORDER TO ONE HUNDRED FIFTY POUNDS WEEKLY. SHIP TODAY SURE THIRTY POUNDS ADDITIONAL EXPRESS." Long distance calls, telegrams flooding in from everywhere—we've had our plant working twenty-four hours a day to meet the demand! No hard times for MAGIC CHEESE CHIPS!

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until you have sold yourself on the possibilities. You must sell yourself first before we permit you to invest, and our novel plan enables you to decide without cost! Then you can start with \$8.50 investment, put back the enormous profits, building up without another penny investment if you wish!

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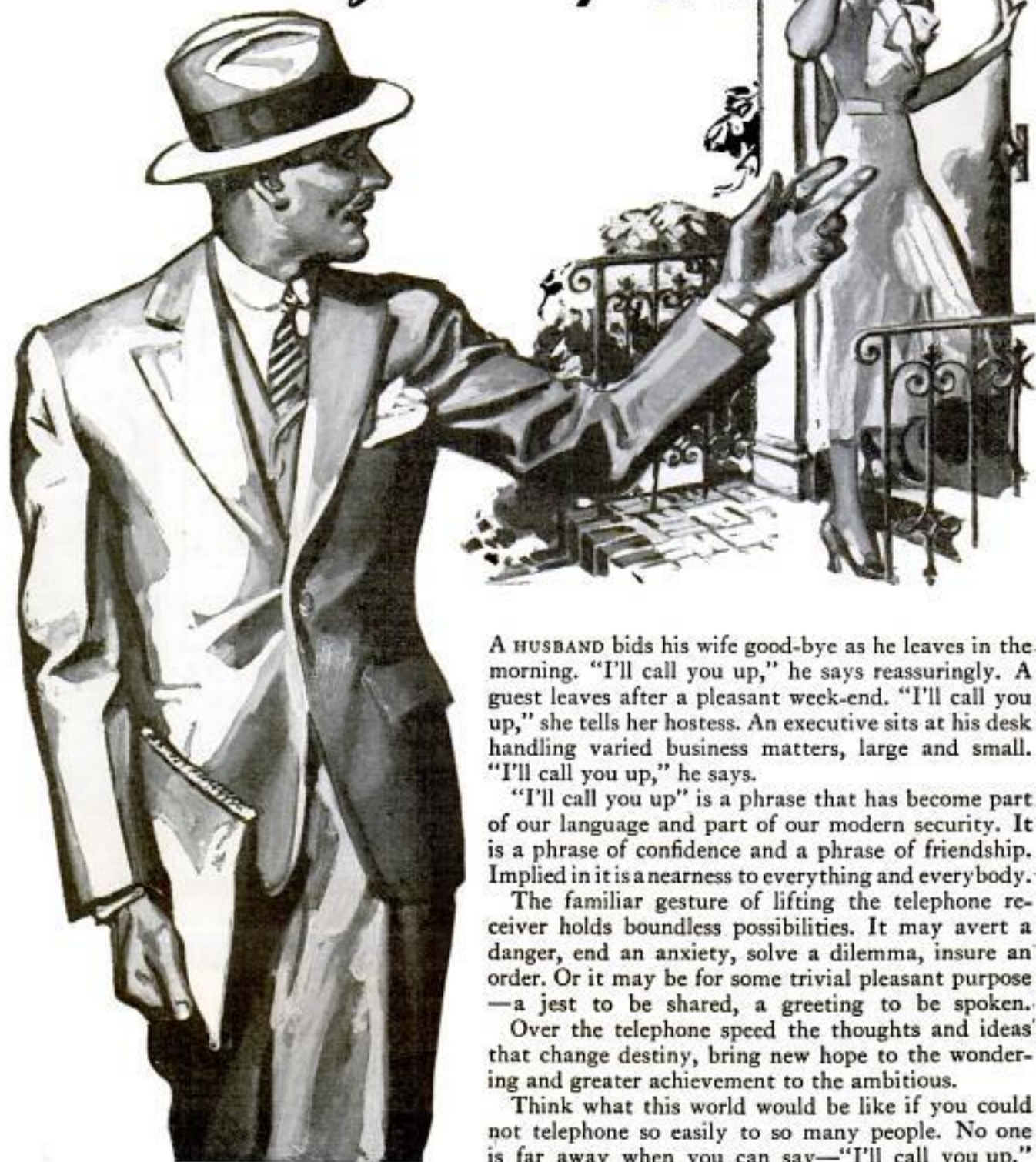
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"I'll call you up!"



A HUSBAND bids his wife good-bye as he leaves in the morning. "I'll call you up," he says reassuringly. A guest leaves after a pleasant week-end. "I'll call you up," she tells her hostess. An executive sits at his desk handling varied business matters, large and small. "I'll call you up," he says.

"I'll call you up" is a phrase that has become part of our language and part of our modern security. It is a phrase of confidence and a phrase of friendship. Implied in it is a nearness to everything and everybody.

The familiar gesture of lifting the telephone receiver holds boundless possibilities. It may avert a danger, end an anxiety, solve a dilemma, insure an order. Or it may be for some trivial pleasant purpose—a jest to be shared, a greeting to be spoken.

Over the telephone speed the thoughts and ideas that change destiny, bring new hope to the wondering and greater achievement to the ambitious.

Think what this world would be like if you could not telephone so easily to so many people. No one is far away when you can say—"I'll call you up."

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Insulation, heat reflecting for refrigerator 847

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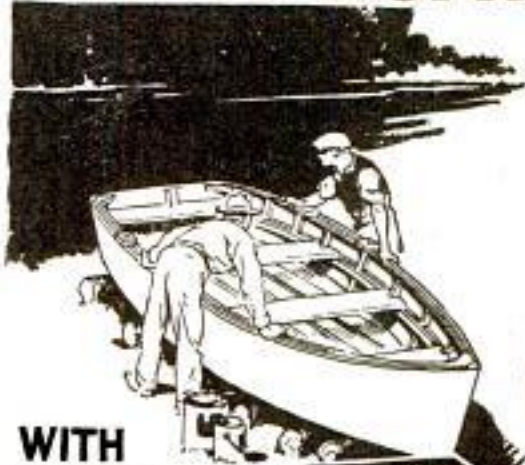
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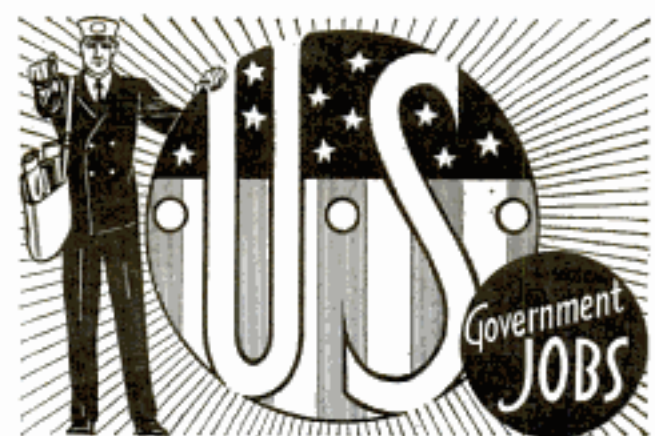
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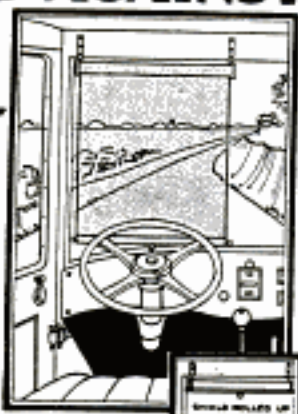
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GET Profit and pleasure in collecting old coins. Send 10c for large illustrated coin catalog. You'll be delighted with it. Send for it right now. B. Max Mehl, Numismatist, Mehl Bldg., Dept. P, Fort Worth, Tex. Largest Rare Coin Firm in the U. S.

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OUR New 32-page bargain book is now ready. Send for a free copy, and note bargains such as 3 1/4 x 5 1/4 Graflex with 1c Tessar f:4.5 lens at \$14.50. A 3 1/4 x 5 1/4 Eastman Special with f:8.3 lens in Optino at \$24.50. A 2 1/4 x 3 1/4 ser. II Eastman with f:7.7 lens, \$12.50. A 1 3/8 x 2 3/8 ser. III Eastman with f:8.3 lens at \$9.95. Victor hand operated 16mm. movie with f:3.5 at \$12.50. A 2 1/4 x 3 1/4 Zeiss Cocarette with Tessar f:4.5 at \$22.50. or a 3 1/4 x 5 1/4 Auto Graflex with f:4.5 Vebstigmat at \$39.50. Central Camera Co., Dept. PM-6G, 230 South Wabash Ave., Chicago, Ill.

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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, 3601 Michigan Avenue, Chicago.

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"SCHEMER," Alliance, Ohio, prints big winners. Subscriber reports \$10,000 from one; another \$25,000 from three. Special: four months only 25c.

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ATLANTIC Formulas produce highest quality—moderately priced—fast selling products. Expert analytical chemists. Twenty years experience. Atlantean Research Laboratory, 1501 Euclid, Cleveland.

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1100 SELECT Formulas, 36th anniversary offer, free materials for specialties worth \$47.00. Valuable selling systems, all free! Stamp brings amazing offer!! Miller, Chemist, 1766FP, Tampa, Florida.

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150% PROFIT Selling Drake's Sea-Bat, ball bearing bait with movable fins. Every fisherman buys. Free details. Sells \$1.25. Sample 50c coin. Harry F. Drake, 900 South 20th St., Milwaukee, Wis.

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

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AGENTS, Salesmen, men, women, \$2500.00 year, no selling or canvassing, just distribute a few of our "silent salesmen"; they work for you. Automatic Key Holder Co., 5345-N Huntington Dr., Los Angeles, Calif.

300% PROFIT Selling new "20-in-1" kitchen utensil. Retail 25c. Costs you \$1.00 a dozen. Sample 10c. New Method Co., Desk P.M.-6, Bradford, Pa.

MEN Or women! Look after local coffee and tea route. Call on homes with 399 highest quality necessities. Spare or full time. No investment. Permanent. Good starting pay. Rapid promotion. Blair Laboratories, Dept. D-6, Lynchburg, Va.

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

MEN With cars: Sensational combination spark plug and automatic carbon remover. 150% profit. Three million sold. Carbox Chemical Co., 25 E. Lake, Chicago.

SELL Haling hi-mileage carburetors. Liberal commissions. Haling Co., Rochester, Minn.

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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, Mass.

SELL Pico. Every car owner a prospect. It's different. Quicker. Harmless. Good profit. Repeat sales. Send \$1.00 for three. Pico Cleaner Co., Pittsburgh (2), Penna.

MEN With cars wanted for local tea and coffee routes. No experience required. Must be satisfied to make \$27.50 weekly at start. Canvassers need not apply. Write Albert Mills, Route Mgr., 3867 Monmouth, Cincinnati, Ohio.

EXCLUSIVE District organizing distributors, sales executives, local distributors. Fastest selling product ever distributed. Store distribution products. Consumer distribution products. New selling plan has proven whirlwind success. Permanent. Write Kleenray Magic Self-applying Shoe Dressings Dept., Clark-Dunn Mfg. Co., St. Louis, Missouri.

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AGENTS For Hanslick: Powdered hand-soap. Approved Good Housekeeping. Everybody a customer. Fine opportunity. Sample free. Solar Products, J-2144 So. Troy, 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. Shef D. Mfg., Union City, N. J.

DISTRIBUTORS—Capable organizing women crews. New remarkable necessity. Women buy on sight. Sensational profits. No competition. Tekshon, Dept. KC, 17, 79 Fifth Avenue, New York.

AMAZING Bargains! Mean huge profit! Broadcloth shirts 27c; socks 4 1/2c; ties 5c; lingerie 11c; ladies silk hose 25c; shaving, dental creams 5c; blades 1c. Valmore, 303 Fourth Avenue, New York.

\$772.61 CLEARED By Gerhart of Pa. from one idea. Dime brings 36 pages of opportunities, ideas, etc., and distributors proposition. Pruitt Press, A. Elburn, Ill.

CASH Paid for butterflies, insects. See Singular Display Advertisement on page 10A.

REPLATE Brass worn-out bath fixtures, reflectors, spoons, forks, etc., with pure silver. U-Kan-Plate polish, 8 ounce bottle \$1, one ounce bottle 20c. Satisfaction guaranteed. Agents wanted. Dept. A, U-Kan-Plate Company, Philadelphia.

PROFITS On your own goods. Make, sell them yourself. Formulas, sales secrets, leads. Valuable information free. Gibson Chemist, 4700 No. Racine, Chicago.

MAKE Your own products—Big profits—Fast sellers. Superior formulas. Electro-Thermo, Peoria, Ill.

FREE—45 Pages surprising literature describes guaranteed home business plans. No peddling or outfits. Schantz, 3044B Charles, Omaha.

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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., 353 Broadway, New York.

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AGENTS, Handy combination tool, sells for quarter, on easy demonstration, large profits, every home and auto owner a prospect, samples 25c. E. Unfried, West Orange, New Jersey.

SUEDE Raincoats, jackets. Lowest ever priced. Selling fast. Commission advanced. Experience unnecessary. Outfit free. Good-year, 712-P Roosevelt, Chicago.

YOU Are wanted to resilver mirrors at home. Profitable business plating autoparts, tableware, etc. Write Sorinkle, Plater, 128, Marion, Ind.

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SILVER Plate brass auto parts, faucets, etc. Guaranteed. 75c. Agents wanted. Dixon Mfg. Co., 912 West 43, Kansas City, Missouri.

SURE Fire quick sellers. Hurry—Get real surprise. Needed in every home. Particulars free. Mission Factory, P. 2328W Pico, Los Angeles.

BIG Money taking orders. Shirts, ties, underwear, dresses, hosiery, raincoats, coveralls, pants, uniforms, play suits. Outfit free! Nimrod Co., Dept. 65, 4822-28 Lincoln Ave., Chicago.

WE Start you without a dollar. Summer drinks, food products, household necessities. Experience unnecessary. Carnation Co., P.O. St. Louis, Mo.

GO Into business for yourself. See DeVore's Ad. page 124A.

GUARANTEED Hosiery. Men's, dozen 80c-\$1.60; ladies' fine-fashioned, dozen \$1.65-\$2.50. Catalog free. Superior Hosiery, Dept. 21, New Haven, Conn.

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

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

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

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FAST Mail seller—Free sample. Plans. Circulars furnished. Sewagen, 2523 West Pico, Los Angeles, Calif.

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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.

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

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

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.

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PERMANIZE Wants salesmen and agents. Attractive display. Quick repeat seller. Big profits. Permo Co., 362 Gas & Electric Bldg., Denver, Colo.

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"HOW To Write for the Talkies" tells what producers want—short stories, new ideas, plots, etc. Written by successful playwright—(author of Flight, etc.) Sent free; just ask for it. May open your eyes and the way to big earnings. V.M., one of our people, an amateur, received \$3000. Why not try your hand? Send your name today. Daniel O'Malley Co., Suite 31-B, 20 West 66th Street, New York.

BUNIONS Actually reduced without pain. Booklet free. Eugene Eaton, D104, Bandon, Oregon.

TATTOOING OUTFITS

TATTOOING Outfits, removers, free catalog. Chicago Tattoo Supply House, 431 South State, Chicago.

MISCELLANEOUS

PRINTING Process makes distinctive letterheads, photographs, at home. Puzzle, samples 10¢. Lyne, 2245 South 51st, Lincoln, Nebraska.

CASH Paid for butterflies, insects. See Singular Display Advertisement on page 10A.

MISSING Heirs to money. Authentic list. 20¢. International Agency, Cincinnati.

GOOD Income plating auto parts, reflectors, mirrors by new method. Outfits furnished; free particulars. Gunnell Co., Ave. M, Decatur, Ill.

BEAUTIFUL Memorial grave markers; low price and lasting; booklet free. Seart-Bonney, 367 So. Main, Providence, R. I.

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YOU Are wanted to resilver mirrors at home. Profitable business plating autotarts, tableware, etc. Write Sprinkle, Plater, 228, Marlon, Ind.

AMATEUR Cartoonists—Earn \$25.00 week, spare time, copying cartoons for advertisers. S-M Syndicate, Arroyo, Wis.

TATTOOING Outfits, supplies. Free illustrated list. "Waters," 963 Putnam, Detroit.

CUTS Anybody can make. Zinc etching process \$1.25. Specimens, particulars for stamp. J. C. Day, Winfall, Ind.

OUTDOOR Sports for everyone—Enjoy them all year round with aid of book published by Popular Mechanics. This veritable encyclopedia not only furnishes hundreds of ideas for new and popular sports for every season of the year, but also gives complete instruction for making the necessary equipment at very small cost. 350 pages and 650 illustrations. Send today as book is full of thrills and excitement for winter sport enthusiasts. Mailed postpaid anywhere for \$2, or will be sent C. O. D. to any address in U. S. Simply pay postman when delivered. Popular Mechanics Press, Room 802, 200 East Ontario St., Chicago.

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THE VENTRILO

A little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Anyone can use it. Never fails. A 16 page course on Ventriloquism, the Ventrilo, and Supplementary Catalog. ALL FOR ONLY 10 CENTS POSTPAID.



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180 Jokes and Riddles, 24 Magic Tricks, 54 Fooling Games, 71 Truities, 15 Card Tricks, 4 Fairy Tales, 50 Money-making Hoaxes, 10 Funny Riddles, 2 Mosaics, 21 Puzzles and Problems, 6 Quizzes, 200 Tricks for Checkers and Chess, Dominoes, Fox and Goose, 9 Man Morris, Spanish Prison Puzzle, Game of Anagrams, etc. ALL FOR 15¢ POSTPAID.

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A CRYSTAL set has them all beat for simplicity and clearness of tone. Absolutely no noise and no distortion—no batteries to buy—no tubes to wear out—no maintenance expense. Comes with a speaker; lasts indefinitely, requires no lead and clear. Guaranteed to work equal to the most expensive Crystal Set you can buy. Receiving radius of over 25 miles, or under favorable conditions up to 100 miles. Receiver only, \$1.00. Or all complete with Phone and Aerial Kit ONLY \$2.95 postpaid.

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REVOLVER STYLE

Prices 50c and \$1



Well made and effective—modelled on latest type of revolver. Fires 22 cal. Blank Cartridges. Price 50c. Larger size and superior quality, \$1.00. Blank Cartridges 50c per 100. Holster (Cowboy type) for Blank Cartridge Pistol, \$50c. Shipped by Express only. Not prepaid.

X-RAY TUBE

A little instrument producing crystal clear pictures and stencils. With it you can apparently see the bones of your fingers, the lead in a lead pencil, the ink on a piece of paper, and many other similar things. Price 10c.

Toy Maker Book

Tells how to make a Piebald Camera, a Canon, model Railroad, a Telephone, Reorganizer, Telegraph Instrument, Box Kite, Talking Machine, Nicotinic Electric Motor, Electric Door Bell, Water Wheel, Paddle Boat, a pair of Kites, Bird House, etc. Price 10c.

300 TRICKS

An excellent book containing nearly 300 tricks that anyone can do. Tricks with cards, coins, handkerchiefs, eggs, bottles, string, etc. Also Second Sight, Shadowgraphy, etc. 10c.

125 CARD TRICKS

and sleight of hand. The latest and best card tricks performed by celebrated magicians, with exposure of card tricks used by professional gamblers. 25c p.

HYPNOTISM

New book, just out, tells how to hypnotize. Explains all about Hypnotism—how to hypnotize, how to produce sleep, how to awaken a subject, how to hypnotize animals, hypnotism in disease, etc. ONLY 10c postpaid.

Electric Telegraph Set 15c

A private Electric Telegraph Set of your own. Lots of fun sending messages to your friends. Get two sets, book them up for THE WAY MESSAGES are sent (including sending and receiving). No trouble at all to operate. Works on any dry battery.



The Boy Electrician 10c

Add 10¢ for 64 page book all about electricity written especially for boys. Tells how to make batteries, dynamos, motors, magnets, telegraph apparatus, telephones, radio, electric bells, alarm, code, electric organ. PRICE 10c postpaid.

FORTUNE TELLING BY CARDS

64-page book tells how. Gives the meaning of each and every card, how to deal and lay them out. Everything explained in simple language. PRICE 10c postpaid.



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Very striking, quiet and unobtrusive. Silver finish; skill and crossbones design. Two brilliant, flashing green sparkles in the eyes. Makes being good luck. Only 25c.

MAKE YOUR OWN RADIO

Enjoy the concerts, baseball games, market reports, latest news, etc. This copyrighted book "EFFICIENT RADIO SETS" shows how to make and operate inexpensive Radio Sets, the materials for which can be purchased for a mere trifle. Also tells how to build a short-wave Receiver for bringing in foreign stations, police calls, ships at sea, etc., 15c. JOHNSON SMITH & CO.

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Dept. 841

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A copy of our NEW CATALOG mailed on receipt of 10c, or the De Luxe Edition with cloth binding 25c. Bigger and better than ever. Only book of its kind in existence. Nearly 200 pages of all the latest tricks in magic, the newest novelties, parties, games, sporting goods, rubber stamps, unusual and interesting books, certificates in arts and science, etc., unprepared, ready by Cash, Money Order, Check or remittance. Canadian money, stamps and Postal Notes accepted if 20% is added for Exchange.

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LATEST CATALOG

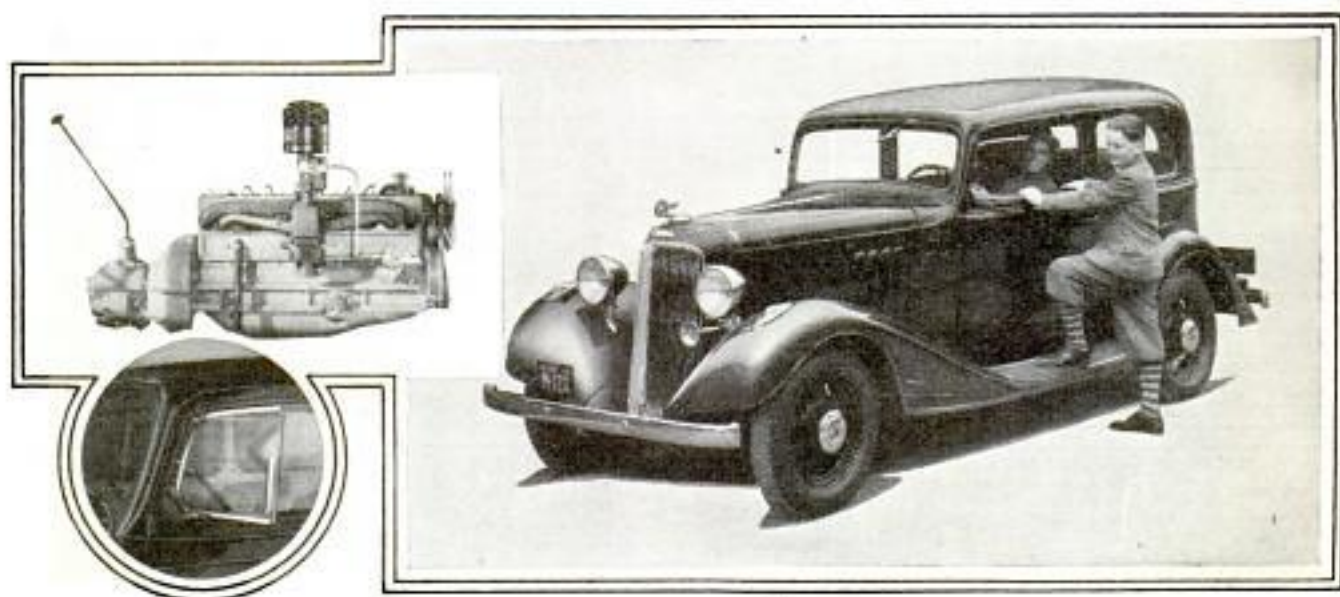
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JOHNSON SMITH & CO. RACINE, WIS.



Balanced Features *Engineered and Built* to give you **BALANCED VALUE**

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Modern engineering is so highly developed that it is possible to emphasize any of these characteristics to an abnormal degree, and in this way give a car extraordinary speed, for example. In doing so, however, some other quality or qualities must necessarily be sacrificed. Most cars, therefore, are really engineering compromises, with the emphasis placed upon this or that characteristic as the manufacturing objective demands.

Pontiac is the car of Balanced Value, because it was deliberately designed and built to give you all the characteristics of a really fine car, so balanced and related to

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"What Do You Mean—Balanced Value"

This little booklet tells the engineering story of Pontiac's Balanced Features in terms of Owner Values. It is free. You can get a copy from the nearest Pontiac dealer—or write direct to Pontiac, Room 15-265, General Motors Bldg., Detroit, Mich. Be sure to read it. It will give you the basis for becoming a more critical judge of motor car character—and a better buyer.

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Vol. 59

JUNE, 1933

No. 6

0579

The Glass Home of TOMORROW



Walls of This House Are of Glass and Support No Weight; the Frame Consists of a Steel Mast Set in Concrete from Which Arms Radiate to Support Second Floor and Roof

IF people who live in glass houses should not throw stones, then home owners of the future must settle arguments some other way. For they are likely to reside in tubes of glass if the "House of Tomorrow," exhibited at Chicago's Century of Progress, serves as a model for future builders.

For this house, designed by George Fred Keck, Chicago architect, looks more like a glorified fish bowl without the water than like a present-day home. In comparison with the average house, this structure is as remarkable for the ordinary

features it lacks as for the extraordinary ones it possesses.

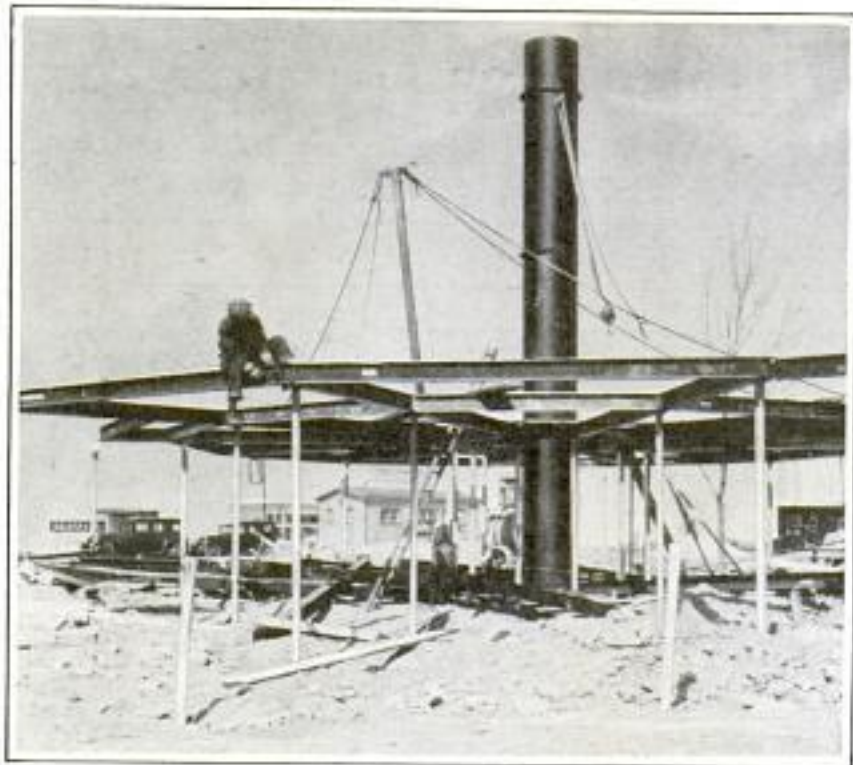
There is not a square or rectangular room, there are no supporting walls, there is no basement, there are no windows in the ordinary sense, living rooms are not on the ground floor, there are no closets and the usual electric-light brackets are missing.

Structurally, the house consists of a central mast of steel anchored to a concrete slab which forms the floor of the first story. At the height of the second and third stories, steel girders radiate

612 N. Michigan Ave. Interior designed by
A. René Ray & Norma

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CS 79



Part of Frame for the Glass House; Note the Central Mast and the Radiating Steel Arms from Which the Glass Walls Will Hang

central-unit and air-conditioning system, and the roofs are terraces to be lived on and enjoyed. The center mast carries heating and ventilating ducts, wiring, water and sewer pipes, and around it a spiral staircase winds to the roof. Interior partitions are of carrara glass and floors are of a gypsum composition covered with blocks of wood.

The ground floor contains an airplane hangar and garage, heating and cooling equipment, a workroom, laundry, recreation room and entrance hall. The second or living floor has a combination living and dining room, kitchen, two sleeping rooms, bath and

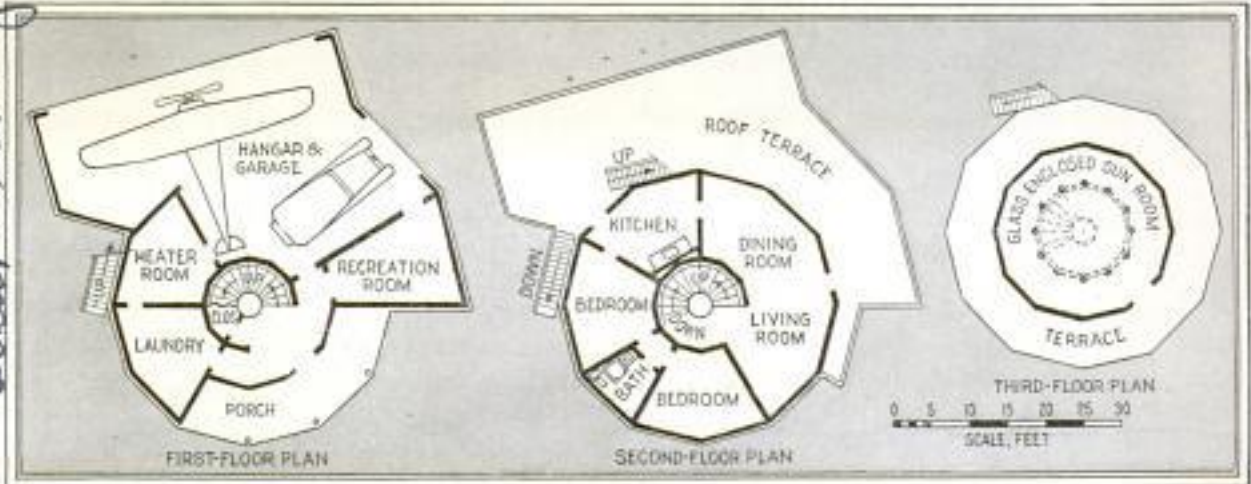
from this central mast like the spokes of a wheel, and these cantilever girders support the second floor and roof. The house is twelve-sided, virtually circular, and outer walls are of glass set in metal frames hung from these girders, so the walls support no weight.

The frame is exposed, forming part of the decoration, and heating ducts also are used for ornamentation. Movable wardrobes, easily cleaned, replace closets, walls serve to admit light by day, indirect lighting is provided at night, and heating, cooling and ventilating are controlled by a

terraces. The third floor has a glass-enclosed lounge with terraces, but can be altered to provide additional bedrooms. The structure is actually streamlined, since the circular shape reduces wind pressure, making it possible to decrease structural strength. The shape also gives maximum interior floor space with a minimum amount of exterior wall area.

Its fixtures are as modern as the architecture. Doors open automatically as one approaches, or at a spoken command, kitchen equipment is electric and mostly automatic, radio is available throughout

2nd floor made of walnut blocks
 other - brooklyn rubber tile
 Larry
 ramp



Floor Plans for the Glass House; Note the Airplane Hangar and Garage on the First Floor, the Circular Arrangement of Rooms and the Stairway Winding around the Central Mast

C 557 Inv. Vergil
Rigsby,
Veach, Texas

by remote control, a bedroom equipped as a nursery has double walls of glass with an aquarium occupying the space between, and all furniture is designed for simplicity and maximum comfort.

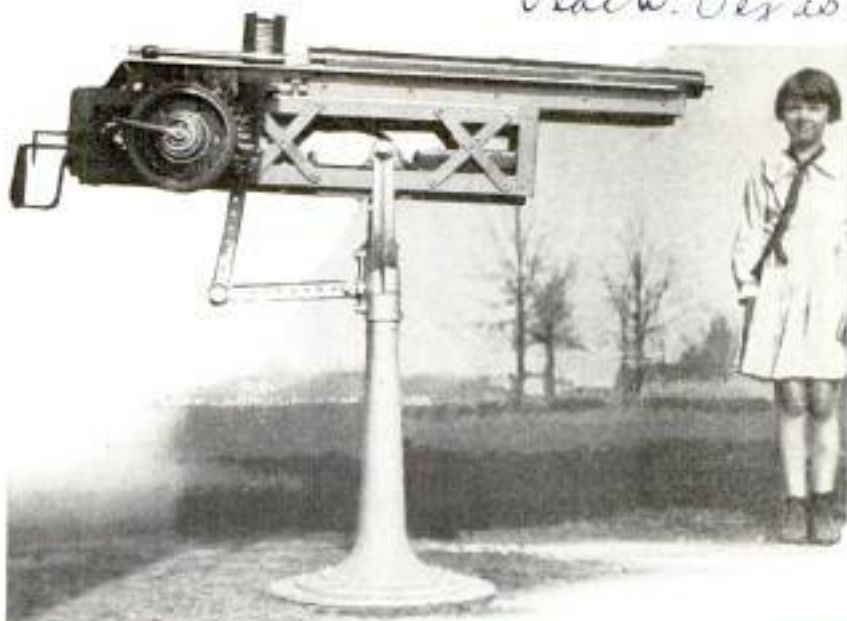
It is a housekeeper's paradise, since there are no corners for dirt to collect, walls, floors and ceilings can be washed, and as there are no open windows and all air is cleaned, the only dirt likely to find its way inside must come through the doors when open.

"This house is not designed to be tricky or different but to determine if better conditions for living can be found," says Mr. Keck. "Cost is not an object because the house is custom-built, like most homes today, and it was not built to a price. Of course, if the ideas are sound, large-scale production would greatly lower costs.

"Probably the most important function of this 'laboratory' house is to determine how people react to such revolutionary ideas. We do not argue that all homes as now built are wrong, for man can adapt himself to a set arrangement of rooms and feel comfortable. But does the house of yesterday, built to meet the requirements of transitional styles, also meet the requirements of 1933?

"Heretofore, appliances and conveniences, as developed, have been installed in the traditional house with little change in the exterior. This is an attempt to catch up with improvements and progress. This house is highly fire-resistant, it does not shrink or settle unevenly, has a minimum upkeep cost, and is easy to keep clean and sanitary.

"It is entirely possible that it will be ridiculed as absurd and impractical, as was the first automobile or the first airplane. But whether the world's fair visitors laugh or not, they will at least see the possibilities of new building materials and of old materials applied to new purposes."



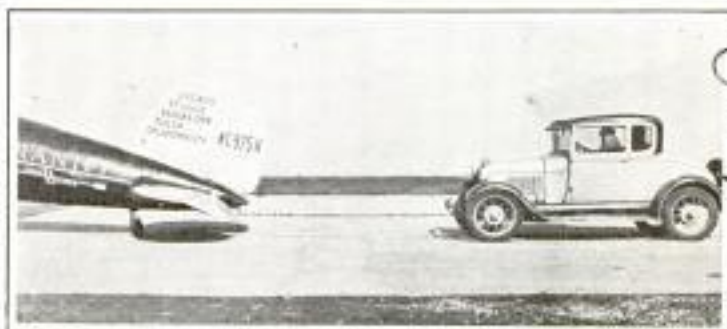
Steel Bullets Are Discharged Noiselessly through Barrel of This New Machine Gun; Electromagnets Provide the Propelling Power

SILENT MACHINE GUN IS "FIRED" BY ELECTROMAGNETS

Discharged by electromagnetic action, a new machine gun is noiseless. It shoots steel bullets without the use of explosive materials. Seventeen electromagnets actually "pull" the bullets through the thirty-two-inch barrel with such force that they are projected at high speed. A timing gear, similar to those on automobiles, is used to electrify the magnets as the shells are fed automatically into the gun.

AUTO HELPS TO ANCHOR PLANE TAXIING ON WINDY DAY

When an airplane is taxied about the grounds of Chicago airports on windy days, a small auto or truck serves as an anchor to prevent the plane from nosing over. The automobile, which is not in gear, is pulled by a cable attached to the tail of the plane, with the driver steering.



Small Auto Connected to Plane by Cable Acts as Drag Anchor to Hold Nose of the Ship into the Wind While Taxiing

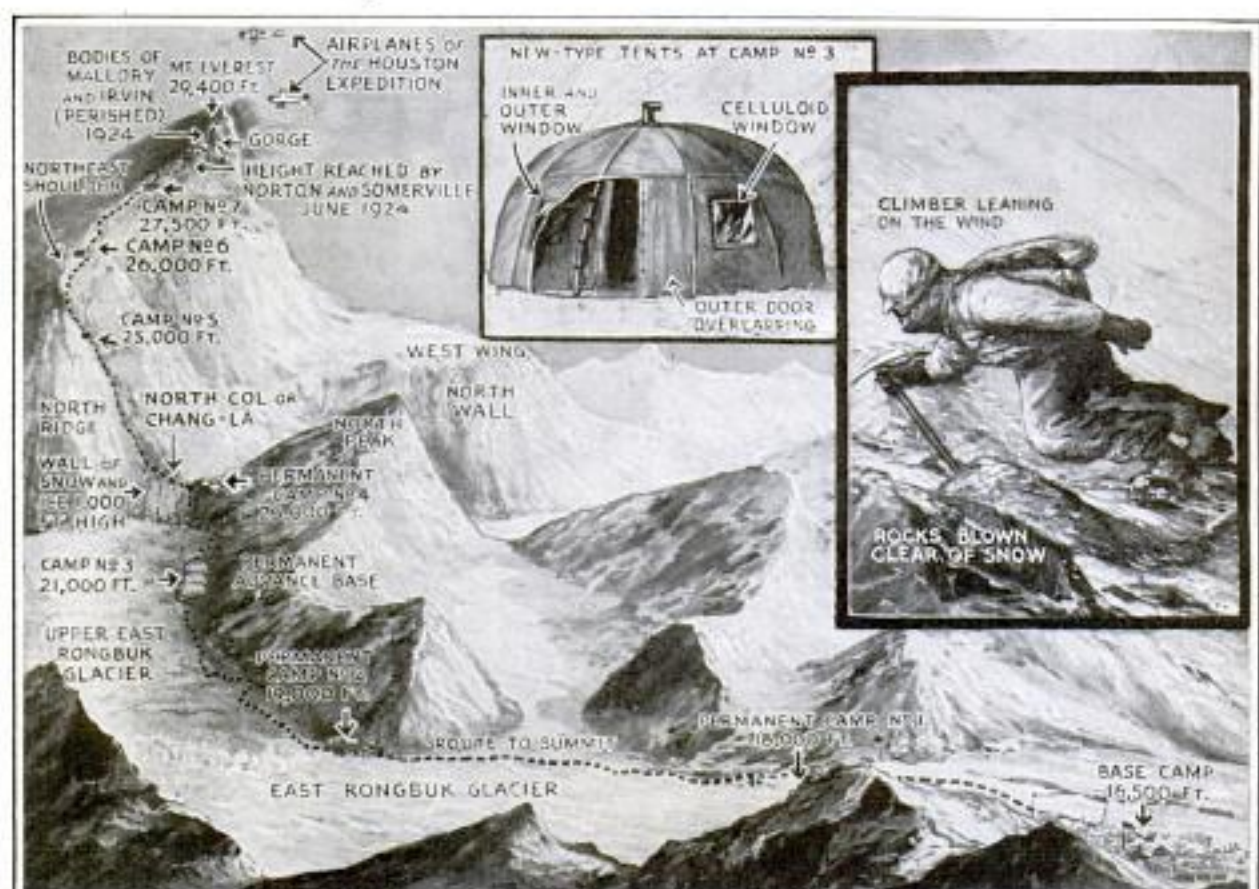
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CX 83

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C483 Emb. Ls. H. Davis
"Timbers" Hillside Road
Ewell, Surrey, England

C247 E. Vernon Hill
121 N. Clark St
Chicago 821

POPULAR MECHANICS

MEN DEFY ELEMENTS IN FIGHT TO CONQUER MOUNT EVEREST

Fourteen picked British climbers, aided by seventy native porters, are making an assault on Mount Everest, the highest peak in the world, which has defied all previous efforts of climbers although two British planes recently flew over it. The expedition established its base on a glacier about fourteen miles from the 29,400-foot peak. After becoming acclimated at this base camp at an altitude of 16,500 feet, the explorers moved forward to establish three other ice camps further up the slope. Each of these camps has tiny tents designed to withstand the ice, snow and wind, and each has a deposit of stores and equipment carried step by step up the mountain by climbers and porters. Beyond the third camp, at an elevation of 21,000 feet, the climbers will scale a wall of ice 1,000 feet high with ropes to make another base, and from there will push forward to the 26,000-foot level where every step means the taking of eight or nine breaths, due to the rarefied atmosphere. Only two climbers and two porters can work at one time here, the climbers cutting the steps in the ice for the porters to follow. In addition to the cold, the party must fight a wind so strong that they can actually "lean" against it at seemingly impossible angles. At the seventh camp at 27,500 feet, a tent will be pitched and preparations will be made for the final dash of about 1,900 feet to the summit. Here a slip may mean a drop of 2,000 feet. The dash to the top must be so timed that the climbers can return to their nearest base by nightfall because certain death awaits them if they are caught without tent or sleeping bags. They will watch for the bodies of two explorers who perished in 1924 when near the summit. The explorers wear wind and weather proof suits interlined with silk and wool but weighing only three and one-half pounds. Helmets of the same material have a sunproof lining to guard against sunstroke. Under their jackets is carried oxygen breathing apparatus weighing about thirteen pounds and their feet are incased in thick climbing boots. Ice ax and climbing rope complete the outfit of these men who look like submarine divers as they battle to reach the highest point in the world.

H. Fleck, J. Avery
Row, Broad St London
W.C. Eng



Testing the Draft with Cigar Smoke; Inset, Small Gauge Which Shows Condition of Chimney

DRAFT TESTED BY CIGAR SMOKE IN CHIMNEY GAUGE

Cigar smoke is used in testing the draft and pressure in boilers, furnaces, chimneys and air ducts with a glass-tube gauge. Smoke is blown into the gauge at the upper end, which is then closed with the finger. The tip of the other end is inserted into an opening in the chimney or air duct and a small stream of the air current passes into the instrument. As the air rushes in, a dividing line forms between the incoming current and the cigar smoke. Calibrations on the gauge make possible a reading at the dividing line, showing the draft without making calculations.

C476

REMOVABLE ROCK-DRILL BIT SAVES TIME AND MONEY



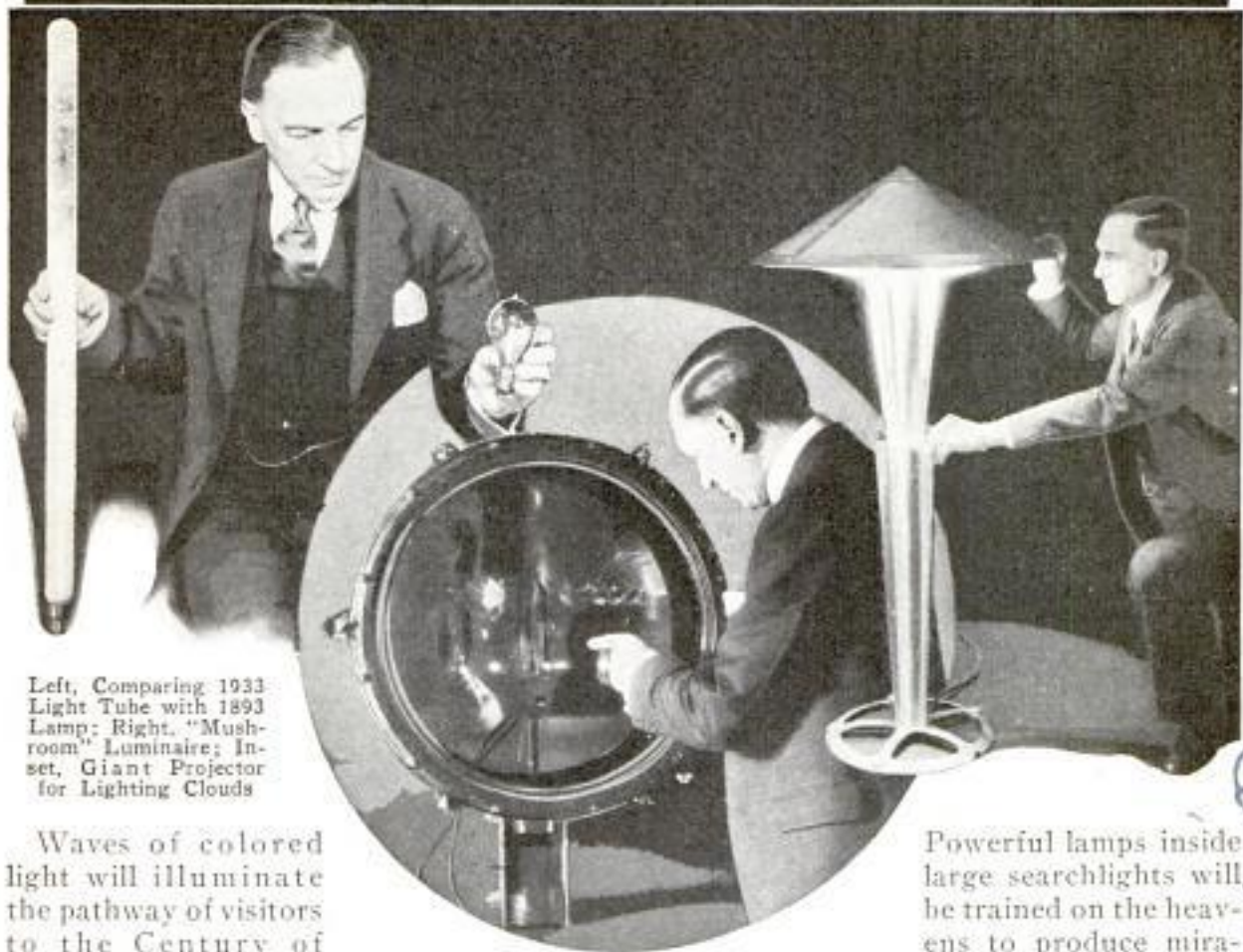
Time and money in blasting operations can be saved by using a removable bit for the rock drill. The bit, which is attached to the end of the drill steel, is so inexpensive that it is economical to

throw it away when it has become dull. Made from high-grade alloy of high-carbon steel, carefully heat-treated, the bit gives longer service than the conventional type which must be resharpened.

The Timbers Roller Bearing Co
(137 1/2 St. Louis), Canton, Ohio

C 535

Latest Lighting Magic for the World's Fair



Left, Comparing 1933 Light Tube with 1893 Lamp; Right, "Mushroom" Luminaire; Inset, Giant Projector for Lighting Clouds

Waves of colored light will illuminate the pathway of visitors to the Century of Progress exposition, the result of months of work by America's wizards of electricity. A sensation of mystery will be experienced as you walk about in a shallow sea of light rays colored like the rainbow, and as you see strange designs painted on the night clouds by hidden projectors. That aura of color around your feet will be produced by "mushroom" luminaires, more than 2,000 of them, spaced some eighty feet apart through the exposition grounds. The luminaire consists of a short aluminum stem on which is mounted an inverted cone of translucent micarta. Concealed under the cone is a set of refracting prisms surrounding an electric lamp. The height from the ground to the lower edge of the cone is forty-five inches while the cone is thirty inches in diameter, resembling a mushroom. The light directed by the re-

Powerful lamps inside large searchlights will be trained on the heavens to produce miracles of colored illumination on the sky and on great clouds of steam released at intervals. A third wonder is the tubular lamp at the entrance and gateways of the grounds. This lamp is a far cry from the original "stopper" lamp made by George Westinghouse for the Chicago World's Fair of 1893. All lighting effects for the Century of Progress exposition are designed and constructed by the Westinghouse Electric and Manufacturing company and the General Electric company under the supervision of a joint committee.

Dark Pittsburgh, Pa.

Schenectady, NY C 590
**PROGRAMS FOR DARK THEATER
 READ AGAINST FOOTLIGHTS**

Programs that can be read in a darkened theater have been produced in London. These programs are printed on black paper to prevent the reader from casting the glare of his eyes on the page.

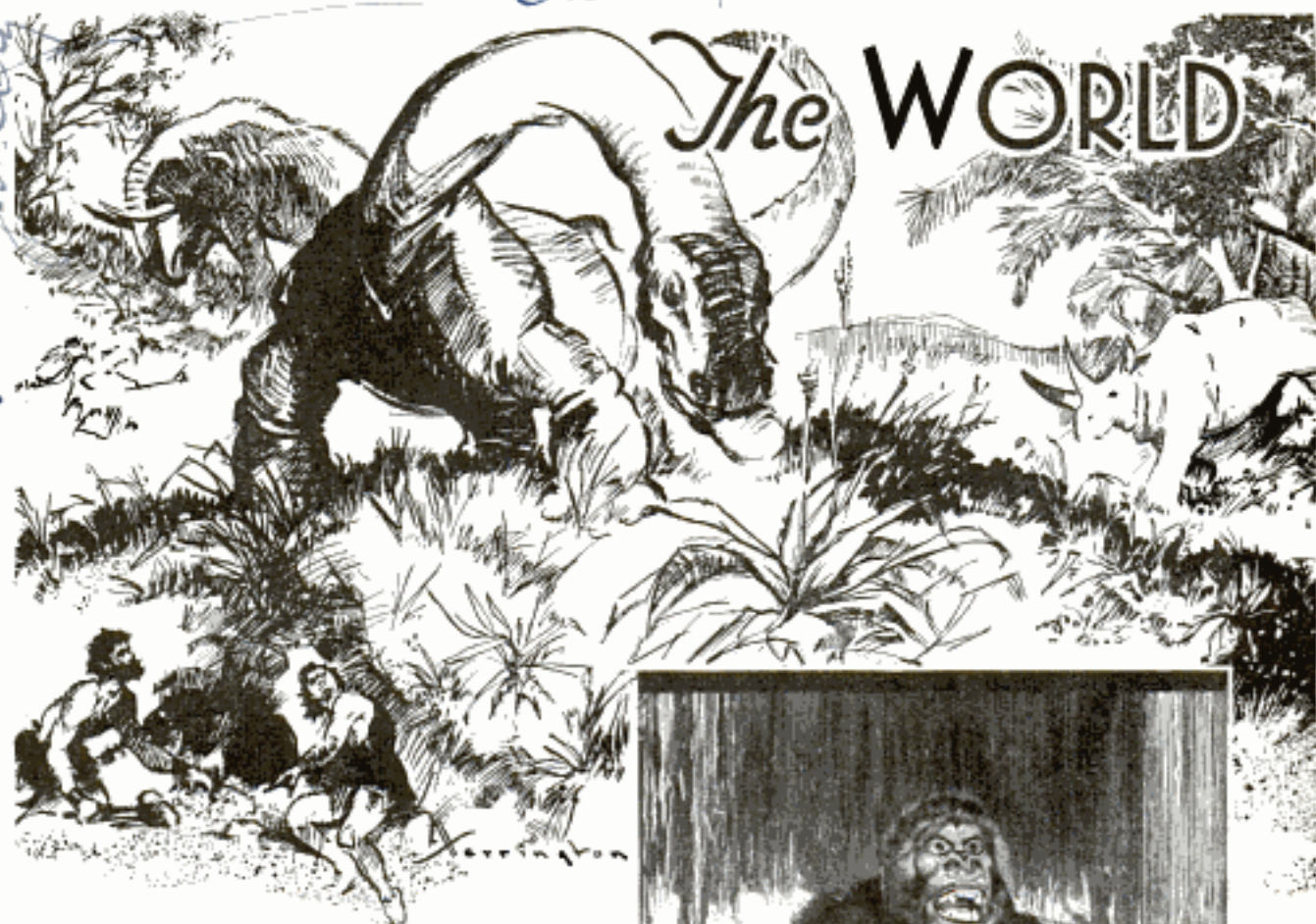
I wish to point out that glasses are manufactured by "Arbeitsgemeinschaft Schropp, Weiss, Werenzy, Berlin-Wilmersdorf, Kalischer Str. 22.

*Mr. George Hawthorne
 City Wash. Washington
 James. L. C.*

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C 561 Messmore & Damon
1108 S. Michigan Ave
Chicago

Head office 404 W.
27 St. New York City



By H. W. MAGEE

WHAT would you do if you met a fifty-foot dinosaur such as roamed the jungles ten thousand centuries ago?

Books on good manners are silent on how to acknowledge an introduction to a dinosaur, although most people would probably consider the advice, "Run, do not walk, to the nearest exit," to be very sensible, and would hasten to act on it. Unfortunately, dinosaur etiquette dictates that you do otherwise.

When meeting a dinosaur face to face, you act the same as when introduced to a lady—you tip your hat. The only difference is this. If you don't tip your hat to the lady, she will overlook the discourtesy. But if you don't tip your hat to the dinosaur—if he happens to be one of the world's fair dinosaurs—he doesn't overlook it. He makes a sound between a roar and a grunt, arches a twenty-foot neck in a sweeping curve and snatches the offending chapeau from your head. He holds it out of reach until you apologize, then with a wide-toothed grin, claps it back on your pate.

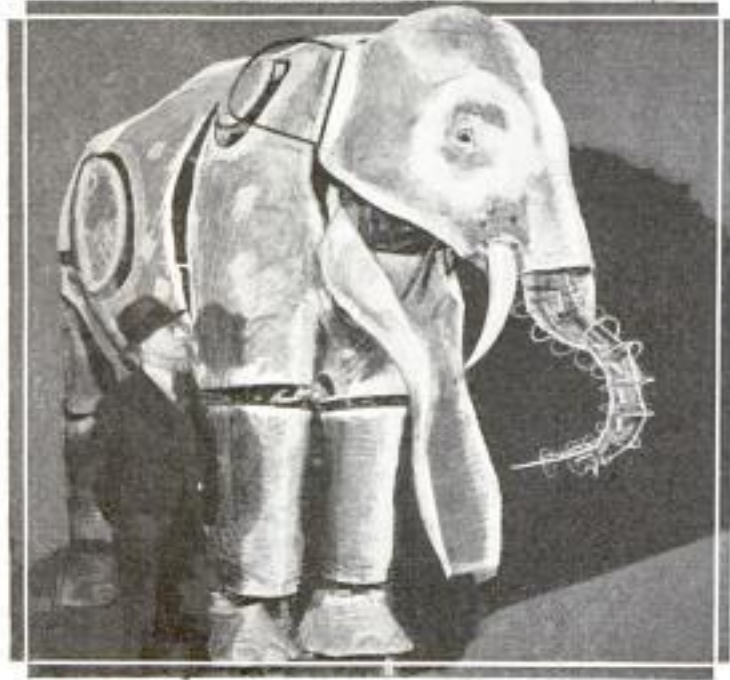


All Photos Courtesy Messmore and Damon
Nine-Foot Mechanical Gorilla Which Will Be Part of
Exhibit in the Prehistoric Zoo

The dinosaur which insists on good manners, and scores of other creatures which trod this earth a million years ago, will be awaiting you if you visit Chicago's Century of Progress. Perhaps you consider a prehistoric zoo a bit incongruous among the fair's modernistic structures and scientific exhibits depicting the dra-

e561

a MILLION Years Ago



Above, Two of Prehistoric Reptiles, and Diagram Showing Motors; Below, Partly Completed Figure of Shovel-Jawed Elephant

matic story of man's achievements. As a matter of fact, these colossal creatures are as modern as the airplane because each animal, while apparently alive, is entirely mechanical.

This glimpse into a vanished world has been created by Messmore and Damon, producers of animated mechanical displays, and shows how the ingenuity of man, in the last few years, has succeeded in reproducing, by purely mechanical means, the lifelike appearance, movements and sounds of living creatures—animals he has never seen in the flesh. For each giant specimen in this display looks alive, acts alive and sounds alive, although actually it consists of nothing more than a steel frame, some mechanical joints, a flexible covering, quantities of papier-mache, a coat of natural hair and an interior filled with a maze of motors, cams and gears operated from a hidden switchboard by remote control.

Which explains why you better remove your hat when you meet the mechanical dinosaur. For the

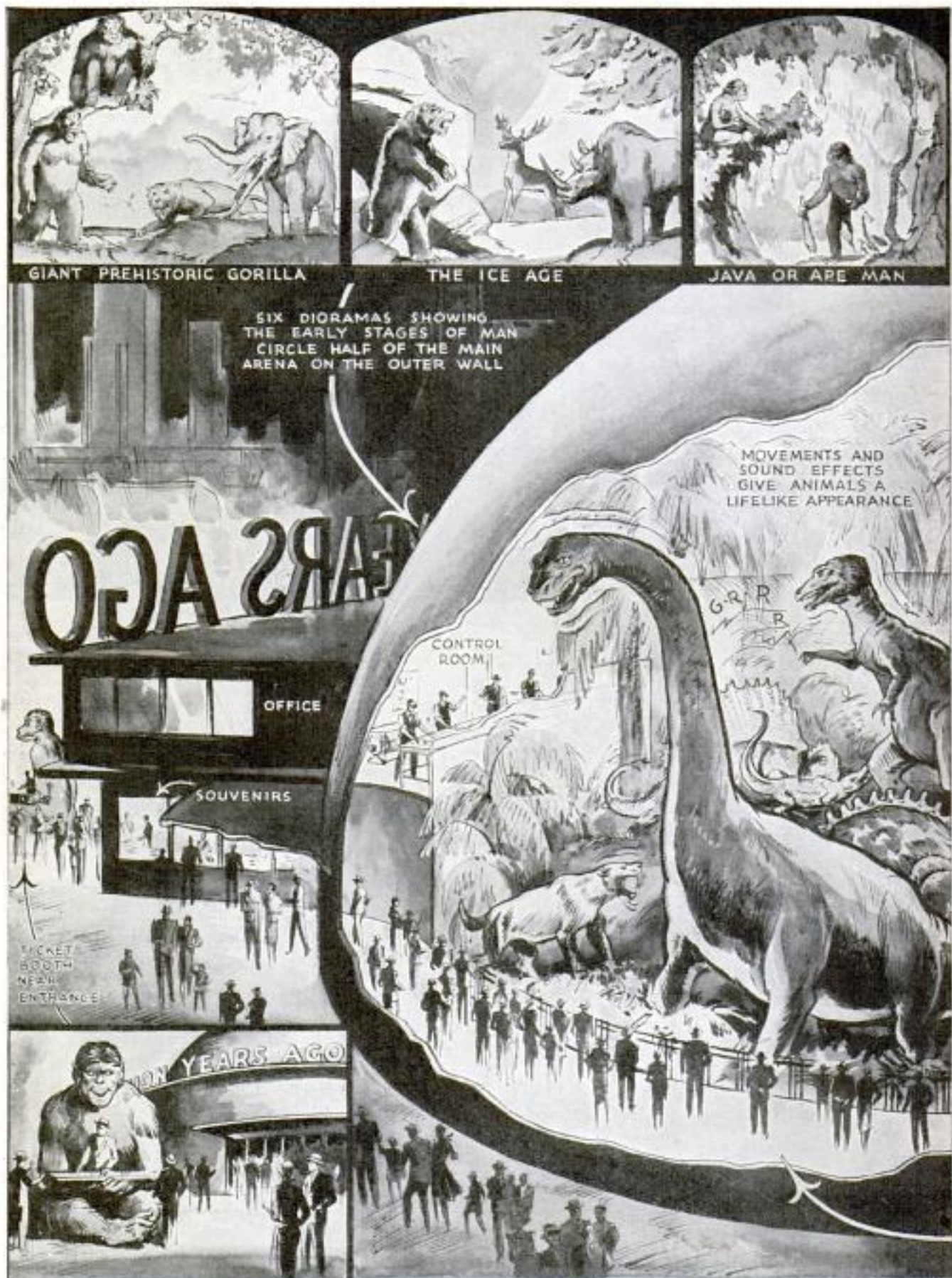
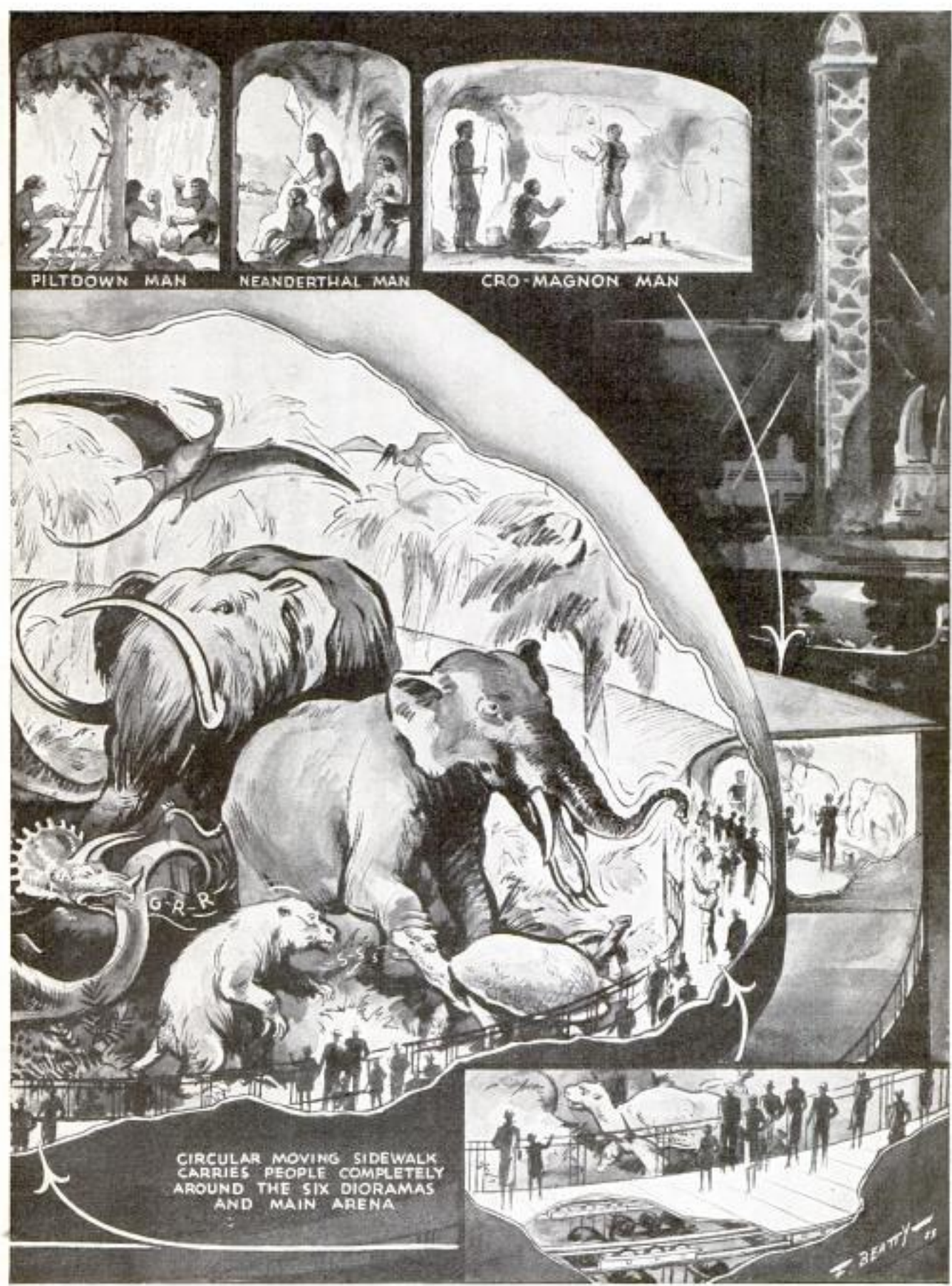


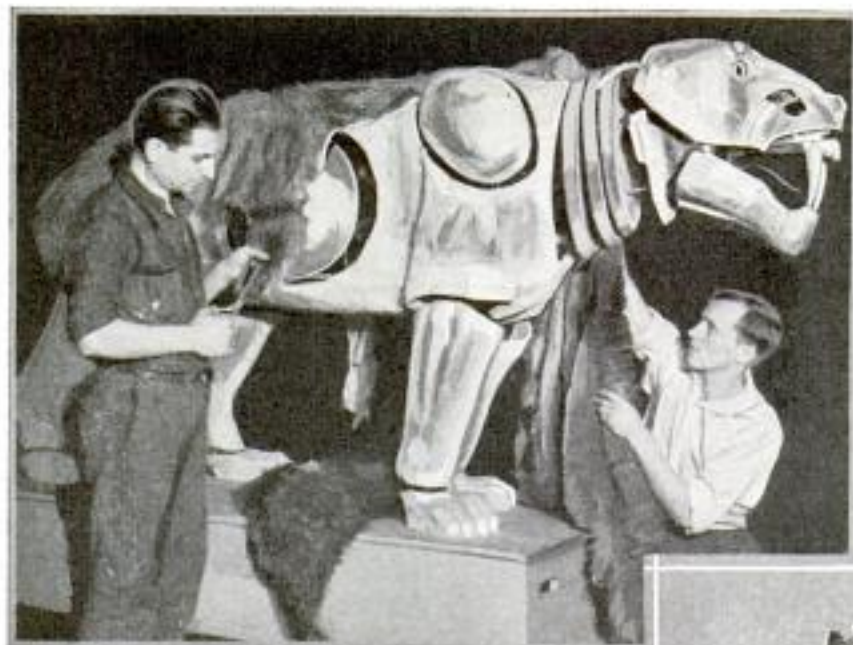
Diagram Showing Operation of Exhibit Depicting World a Million Years Ago; Spectators Will Be Carried through the Dome-Shaped Structure on a Moving Concourse or Sidewalk

2861



CIRCULAR MOVING SIDEWALK
 CARRIES PEOPLE COMPLETELY
 AROUND THE SIX DIORAMAS
 AND MAIN ARENA

Dioramas with Mechanical Figures in Action Show the Various Ages of Man, and in a Pit Are Grouped Huge Prehistoric Beasts and Reptiles Actuated by Motors; Note Control Room



Working on Saber-Tooth Tiger; Right, Frame and Motors for Ground Sloth; Below, the Exhibit Building.

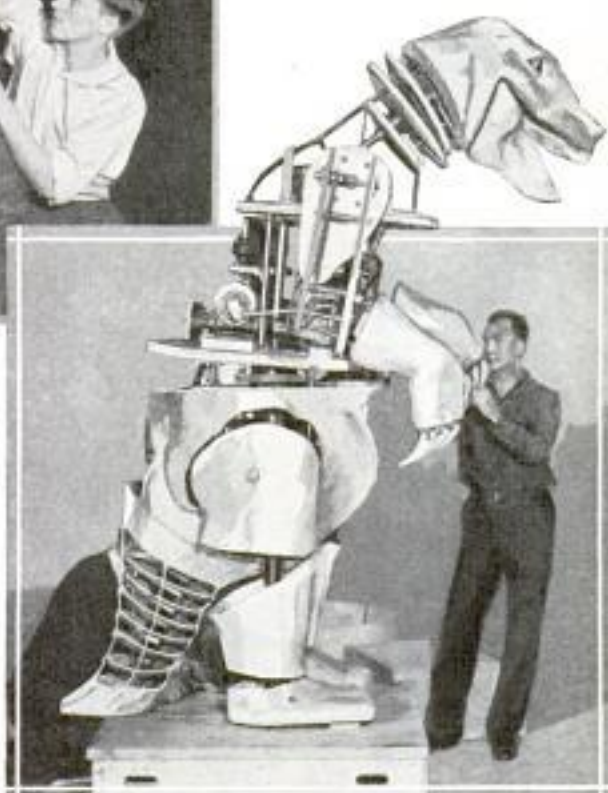
hidden man manipulating the switchboard controlling this animal is likely to see your gaze of astonishment and give you an added thrill. He presses a button and the beast's eyes blink in anger. He presses another and the cruel mouth twitches. Still another button actuates the neck and a fourth turns on the sound as the snake-like head swoops toward your hat.

This animated zoological history of an ancient world in sound and motion is housed in a huge hemisphere nearly 100 feet in diameter and more than fifty feet high. Across the vaulted dome stars twinkle, clouds move or the sun shines as the lighting effects are manipulated. In the great amphitheater beneath, jungle beasts run by motors thrash about in the swamps. Each creature is the result of painstaking research and study of fossils of such animals.

But you do not stalk through this man-made jungle hunting man-made animals. You are brought to the animals without moving a step. You walk through the entrance, step on a moving concourse which circles the structure, and are carried past the display.

This moving platform, accommodating 700 persons, carries you into a tunnel and turns back time. To your left looms a great diorama. In the foreground a vi-

cious nine-foot gorilla sways his body, works his arms, opens and closes his hands, moves stomach and chest, turns his head and opens and closes mouth and eyes. Inside the gorilla are six motors with reversible switches



giving a combination of more than 100 individual motions. A baby gorilla in a tree swings back and forth while a prehistoric baby elephant near by moves head, eyes, trunk, tail and jaws and breathes as well. In the background a tiger is seen.

Another diorama shows a prehistoric winter scene with an electrically operated cave bear, a woolly rhino and an animated deer, each in lifelike movements.

C 561

C 344 Merano Esst Hb
Langestrass, 92
829
Bremen Germany

Four other dioramas are arranged as a series of tableaux showing man's evolution from the cave man to the Cro-Magnon, depicting families in their natural habitat, three or four figures with synchronized motion and sound in each setting.

You are carried from the tunnel and gaze into a pit on the sleeping jungle. Gradually the stars overhead fade and hidden lights reflect the coming of dawn. The jungle stirs. A bird twitters. Huge beasts begin to move, then come to life.

The bulk of these animals dwarfs the largest ones today. The dinosaur consists of a heavy steel frame on which the mechanical parts and motors are mounted and over which the flexible covering is stretched. There are fourteen motors offering more than 140 movement combinations. But all you see is a fascinating giant moving great jaws and beady eyes, waving a snakelike neck, thrashing a powerful tail or licking lips with a red tongue.

A shovel-jawed elephant, nine and one-half feet tall, is equipped with ten motors. Near by the ground sloth, nine feet tall, struggles to extricate itself from the asphalt pit into which it is sinking as it faces the fierce saber-tooth tiger about to spring. The tiger has six motors for its "insides" and moves legs, shoulders, tail, eyes, ears and lips, swaying and snarling as it prepares to attack.

A hairy mammoth, fourteen feet tall and nearly twenty feet long, has sixteen motors with double-throw switches. There is also a giant turtle, a vicious flying reptile and the eighteen-foot triceratops, each equipped with motors to control actions and sound. In one corner two prehistoric reptiles are seen in deadly conflict.

Four men in a hidden control room work the switches which govern the motors. Banks of control boards are located in front of them, and they walk back and forth pressing buttons much as one might operate the keyboard of a musical instrument. If you look like a prospect for a thrill, they press a few buttons and a prehistoric jungle giant has your hat. But if you are a good actor, perhaps you can deceive the dinosaur. Just appear sophisticated when you look at him. Try to hide your fright. Perhaps Old Man dinosaur—and his control man—will pick out some other victim.



no H. Sagen Bremen

Examination of Fabrics Is Made Easier by This Magnifying Glass with Its Own Light Source

MAGNIFYING GLASS HAS LIGHT TO AID INSPECTION

By combining a small electric lamp with a magnifying glass, a German inventor has produced an instrument that provides its own illumination where and when desired. The light source is a small battery-fed bulb that can be removed from the handle. It is turned on and off by a rotating contact ring. The glass has a magnifying power of ten, which can be doubled by screwing a micro-attachment to the upper lens. The battery may be discarded and the bulb lighted by connecting to an electric outlet.

C 481

MAGNETIC PIN "CUSHION" MAKES CONVENIENT HOLDER



Pins, paper clips and other similar objects are kept where they are easy to reach by using a magnetic pin "cushion" consisting of a stand on which a horizontal magnet is mounted. The pins

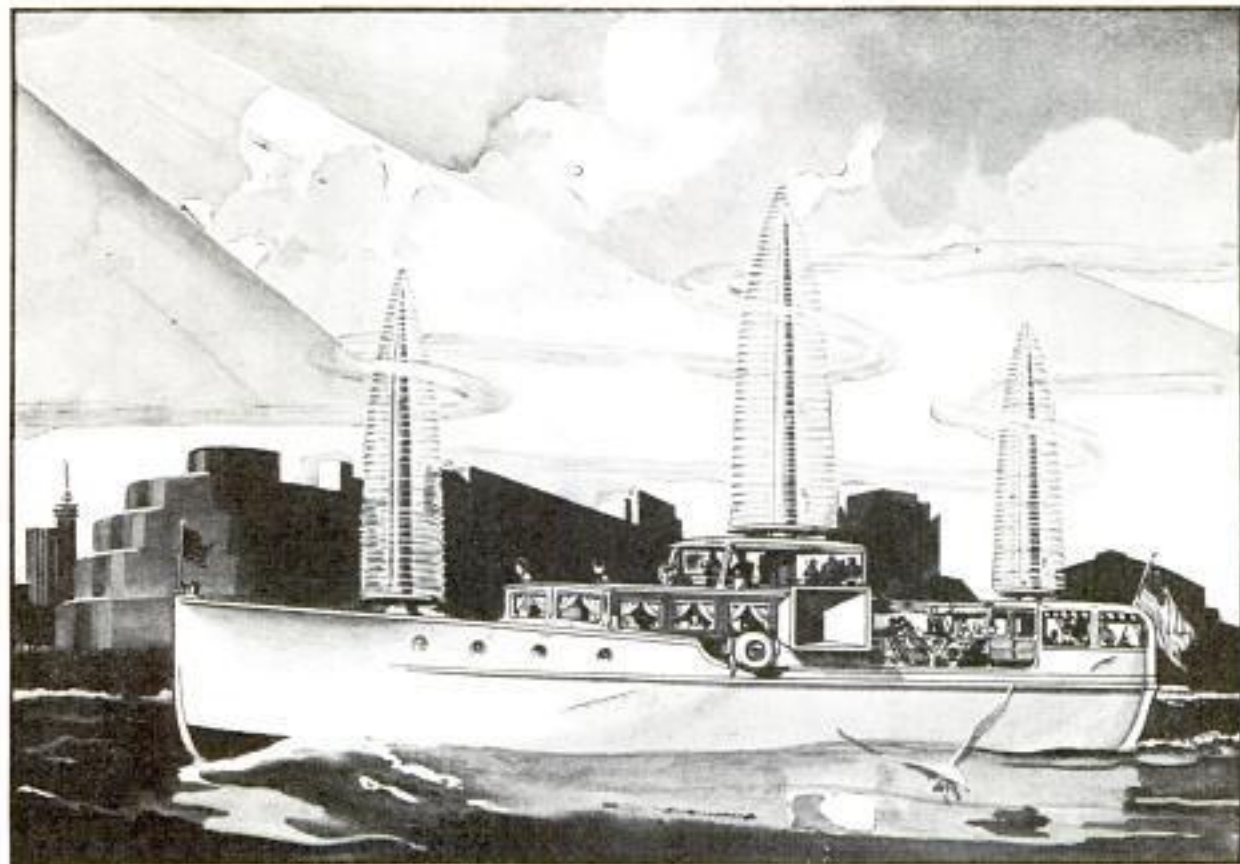
are held on the magnet in more convenient form for handling than if in a tray.

Paul M. Cooper
8 Princess Road

London, N. 4, England
no H. Sagen Bremen

C 471

Revolving Wings Replace Sails on Rotor Boat



Aluminum Rotors on This Craft Are Shown in Operation; Three of the Rotors Are Mounted on the Boat to Give It Four Times the Power Produced by Regulation Sails

Visitors to Chicago's World's Fair will see a boat without sails using the wind for driving power. This craft is a seventy-foot cabin-cruiser type of motor boat, but instead of a motor it is to be propelled by three upright revolving wings or rotors. Laurence J. Lesh, the inventor, claims his boat is different from other rotor ships since his craft depends entirely on the wind for power, whereas others have had the revolving rotors driven by gasoline motors. The rotors of the world's fair boat rise about twenty-five feet above the deck. It is claimed these wings will produce about four times the propelling power of regulation sails. At night colored lights will be played on the rotors and produce a scintillating effect visible for several miles. The boat has been equipped with a system of loud speakers, short-wave radio apparatus and all facilities for broadcasting, and will be used as a floating auxiliary to the public-address system in reporting boat races and other water sports to the crowds on shore. By reversing the direc-

tion of rotation, the boat can back up as fast as it can go forward, and the rotors act as stabilizers in rough water.

COIN-IN-SLOT BOOK DISPENSER IS AUTOMATIC LIBRARY



Books are dispensed automatically by a coin-in-the-slot machine that offers a choice of 300 volumes. The book desired is placed nearest the slot by twirling a knob. Then the coin is inserted, and a flip of the wrist brings out the volume. A five-cent piece is used in this machine, which may be adapted to other coins as well.

1543 E 57th Chicago

Frank Corp. 303
4th Ave. New York

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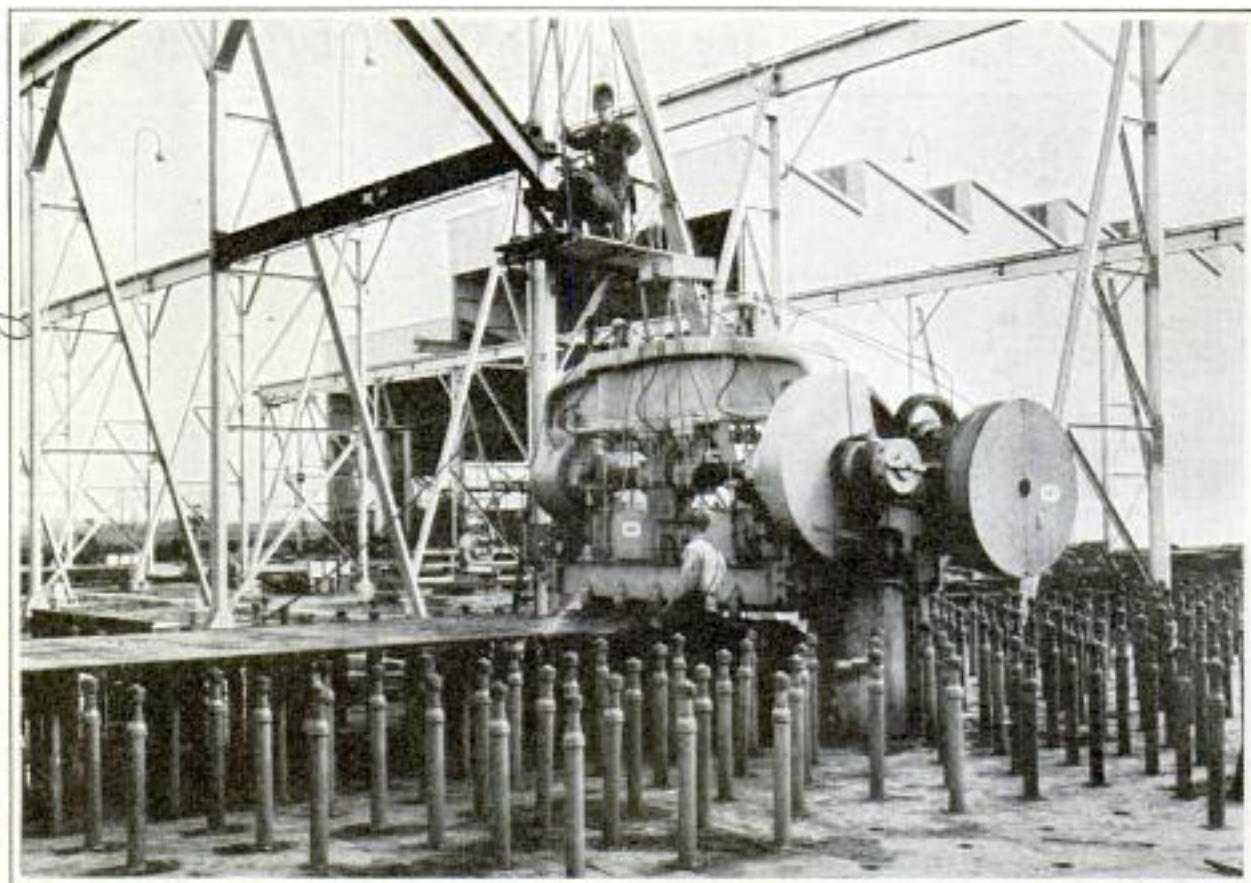
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C 567

at Consolidated Steel Corp Ltd
Los Angeles, Calif
POPULAR MECHANICS

832

Cont. Allen P. Childs, Box 4673,
Kansas City, Mo.



These Posts, Resembling Tenpins to Some Extent, Have Steel Balls Set in the Top; Steel Plates Weighing 10,000 Pounds Can Be Handled Easily by Moving on Top of the Balls; the Machine Cuts Plates

FIVE-TON PLATE EASY TO MOVE ON BALL-TIPPED POSTS

Steel plates weighing ten thousand pounds are handled easily when supported on upright standards tipped with hardened steel balls. One large steel ball in each standard, which resembles a bowling pin, is supported by sixty-five smaller steel balls. These balls roll against one another as the giant plate is swung around at the slightest exertion by workmen. This method of handling is used with a shearing machine which cuts the plates into various shapes. A crane lifts the plates onto several of the ball-tipped posts.

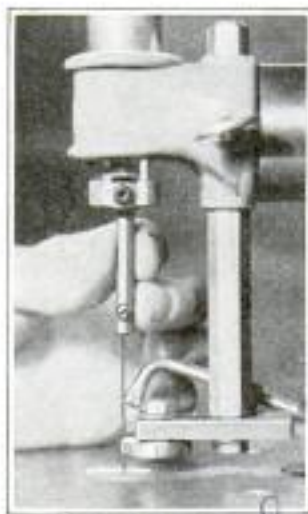
ILLINIUM ONE OF 'RARE EARTHS' FOUND RADIOACTIVE

Illinium, known as element sixty-one, has been isolated by Maurice Curie, nephew of Madame Pierre Curie, codiscoverer of radium and polonium, and M. Takvorian of the Radium Institute of Paris. The element was discovered by Prof. B. S. Hopkins, of the University of Illinois, in 1926. It belongs to a group of chemical

elements known as "rare earths" that are metallic oxides. All very similar in chemical properties, these elements were named rare earths because of their resemblance to substances at one time known as "earths," such as lime, magnesia and the like. Isolation revealed that illinium has certain radioactive properties.

C 571

HOLDER FOR JIGSAW BLADES—GIVES INCREASED USE



More service from jigsaw blades is obtained through the use of a holder or extension device. Usually the blade breaks at the bottom. Then it can be fitted into the holder so that the length will be the same as before the break, and work can be continued.

W. James
6/29/32

Announced in Paris by Prof. L. Urbain, before Academy of Sciences at Sorbonne.

H.A. Salter
1037 P.H. St.
Menasha, Wis.
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C 302. dms. dr. dng. Adolf K. Robertach

make Robertach works Berlin N. C. 833
Krautschott St. 9/22
Esermang

Airplane Has Paddle Wings But No "Prop"

Paddlelike wings are expected to enable a new German plane to fly forward or backward and straight up or down, all without the aid of a propeller. The wings, revolving about a central axis, may be tilted to take advantage of the wind. Thus, the plane will be able to make vertical descents with the engine stopped and to land in a place only five times the length of the plane. A 1,000-horsepower motor will turn the paddles fast enough in a dead calm to keep the ship hovering in the air, as well as facilitate landing in a small space.



Paddle Wings Replace the Conventional Wings and Propeller on This Plane That Is Expected to Fly Backward or Forward and to Hover in the Air

There are no tuning adjustments on the transmitter. A seventy-foot antenna is used. The set was developed in the laboratory of the radio department of the forest service at Vancouver, Wash. Foresters carrying this set would be able to report fires more quickly and to call for more fire-fighting forces and equipment.

TWO-WAY MIDGET RADIO SET AIDS U. S. FORESTERS

C 380

Development of a midget radio transmitter and receiver that weighs only fourteen pounds gives the United States forest service a new weapon in fighting forest fires. The transmitter has a range of ten miles, while the receiver picks up signals for a distance of 300 miles. The set is equipped for voice or code transmission.

MINERAL TELLING EARTH'S AGE HELPS GEOLOGISTS

C 464

Bentonite, a peculiar, compact, fine-grained mineral which served as nature's timekeeper when the continents were being formed, helps geologists to determine the age of a particular rock series and to estimate the age of the earth. The mineral is derived from the alteration of volcanic ash. Showered from active volcanoes, this ash fell over a wide territory, forming a blanket that divided existing formations from those that were deposited later. Thus, when a geologist finds a deposit of bentonite, he knows that he has a time card with which he can measure the relative ages of rocks over expansive areas. Bentonite also is of commercial value, being used in the manufacture of paints, fertilizer, paper, and the like, as well as in the refining of crude oil. It also is employed in antiphlogistine and as a filler in phonograph records, textiles and other commodities. Most commercial bentonite comes from the western states.



Forester with Two-Way Radio Is Shown Tuning His Set to Report to Headquarters; Note Set's Size

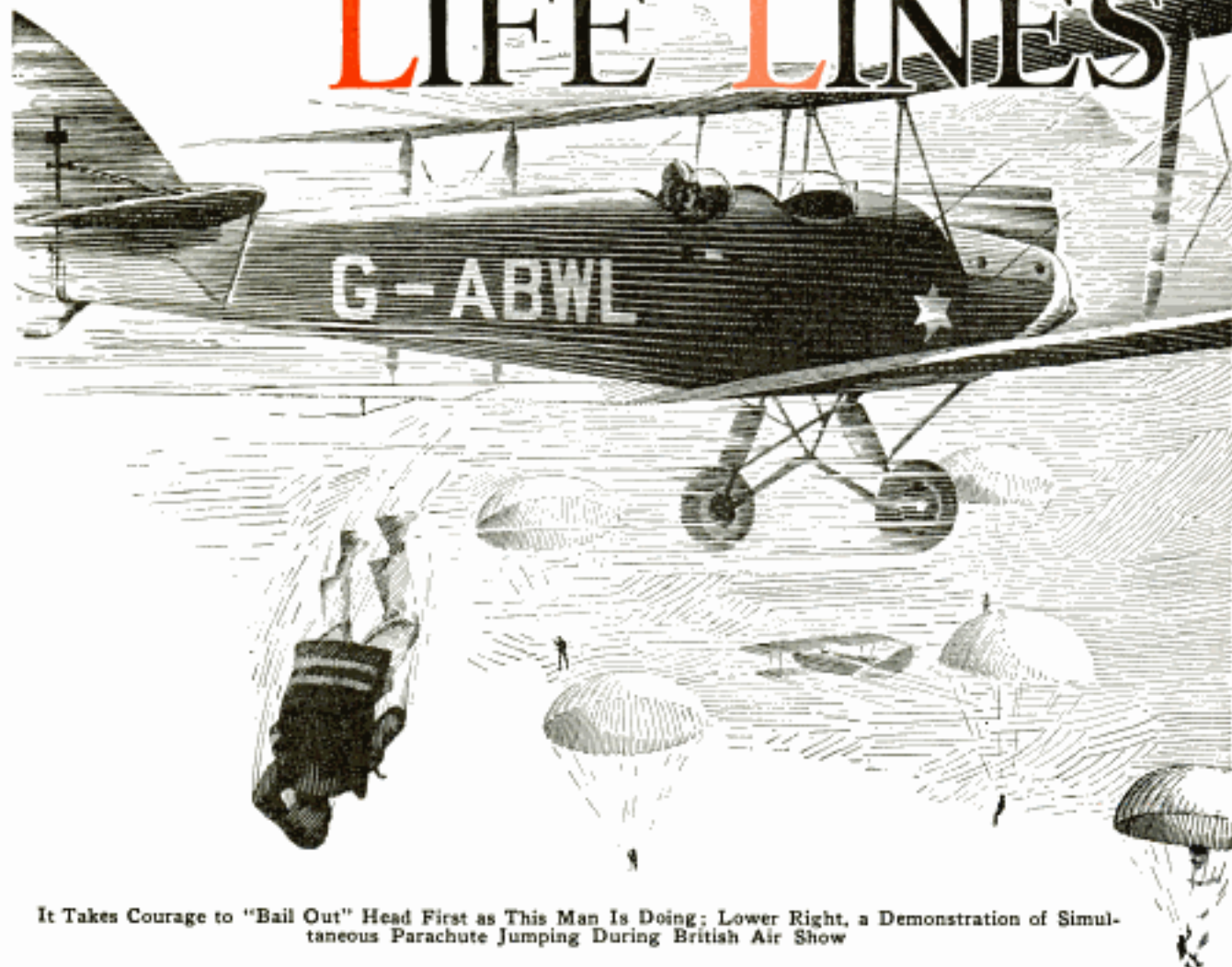
Radios kept at Vancouver, Wash.

Compressed Air Magazine March 1933 P. 4074

Emb. H. Miller Bor 11, Station C

No U.S. agent known
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further information from
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LIFE LINES



It Takes Courage to "Bail Out" Head First as This Man Is Doing; Lower Right, a Demonstration of Simultaneous Parachute Jumping During British Air Show

IN a bundle of thin silk, weighing less than eighteen pounds, is concentrated the power to abandon a disabled or burning aircraft and, at the slow rate of sixteen feet per second, safely float down to a landing. With that same bundle of thin silk, if necessary, you can hurtle downward at tremendous speed, then check that speed and float safely and easily to earth.

To this extent has science, assisted by death-defying parachute jumpers, developed the modern "life line" of the air. Yet, directly over your head, science is still exploring a physical world that is as remote to most of us as the frozen waste of the Antarctic. It is a world in which death is the immediate sentence meted out to any explorer who makes an error, but which nevertheless is rapidly being made safe for all who travel by air.

All of the fantastic legends about the world immediately over our heads have been disproved within the last decade and

a half. Yet, while science could disprove them in theory, it remained for the daredevil parachute jumper to prove that science was correct.

Do you still believe that if a person jumps from a high building, he will die before his body touches the ground? That if a man jumped out of an airplane from a great height, the air would be too thin to support his body beneath a parachute? That if a man jumped out of an airplane, unless he quickly opened his parachute, he would suffocate—being unable to breathe because of the terrific rush of wind? That the tremendous speed at which a man falls before opening his chute would cause such friction that his clothes would start to burn?

These were some of the theories in which even veteran pilots believed until lately and which had to be disproved before they would consent to become "umbrella pilots" and save their lives with life



Top, Parachute Pack Designed as Seat Cushion; Below, Left, Guiding Descent by Pulling Shroud Lines; Right, a "Pull-Off" Jump from a Plane

lines of the air. Although the parachute has been known and used long before the invention of the airplane—going back nearly a century and a half to the early days of ballooning—its use as an aerial life preserver is strictly a modern development. Even during the world war, the parachute was considered by the battle pilots as more of a hindrance than a help and worthy only of the observers in the lighter-than-air "rubber cows" who were helplessly open

to attack while directing artillery fire. As late as 1919, there was not a parachute factory in America, fatal crashes were frequent, and it was vital that these pilots, army, navy and civilian, be protected.

So science, in one of the infrequent times it has had to do so, asked men to risk their lives to disprove many of the theories of the world above the ground. Into this battle leaped many daring jumpers who have won undying niches in aviation history—men like James M. Russell,



Above, Packing a Parachute; Insert, Folding the Pilot Chute; Right, Showing How Two Parachutes Can Be Used Simultaneously

the young inventor of the "Lobe" chute which was to dispense with the pilot chute; A. Leo Stevens who devised the rip cord; Charles Broadwick who was the first to use a parachute pack on the jumper's back; Leslie Irvin, inventor of the Irvin air chute, and many others.

One after another the false theories were disproved. Capt. A. W. Stevens, aerial photographer, "bailed out" at 26,500 feet and came easily down to earth. Floyd Smith made a "pull-off" jump from a naval plane at 100 feet and James Russell dived, head foremost, from 200 feet, his chute opening and letting him down without injury. Aviation Machinist's Mate Whitby fell 4,400 feet in thirty seconds before opening his chute, and Spud Manning, national delayed-opening parachute-jump champion, dove from an airplane more than two and a half miles up and didn't pull his rip cord until near the ground.

While Whitby effectively shattered the "death myth," he also discovered that, after falling a few thousand feet, a body was liable to spin and cause the shroud lines to wind up when the rip cord was

pulled, so the wind could not enter the chute. In addition, black spots began to appear before his eyes, and it was conceivable that after a long fall a spinning jumper might lose consciousness.

Spud Manning, however, did not spin and the secret of how he prevented it has not yet been revealed. Science is now at work trying to solve the problem in a variety of ways, including the use of a small canvas rudder or stabilizer to be attached to the legs of the jumper.

In October, 1922, the parachute first proved its worth as

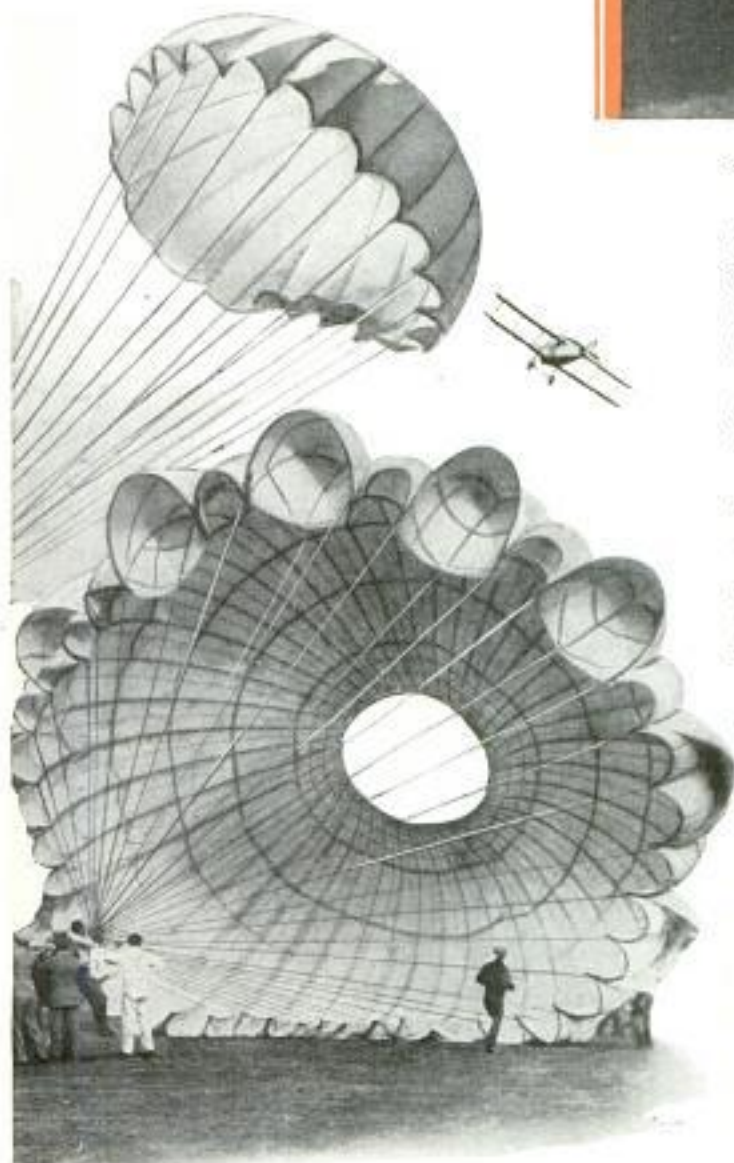


a life saver when Lieut. Harold Harris, flying 2,500 feet above McCook field, bailed out head first after a wing buckled. Hurtling downward, he frantically reached for the rip cord but grasped only a leg strap. After falling more than 2,200 feet, he finally located it and pulled. Less than 300 feet from the ground, his chute opened and he landed uninjured.

That memorable occasion marked the formation of the renowned Caterpillar club, which, since that time, has added to its roster the names of scores of members who have been forced to jump or crash. The momentary confusion which marked Lieutenant Harris' jump and the fact that



Above, Correct Method of "Bailing Out"; Left, Giant Parachute Designed to Lower an Airplane



the rip cord, when pulled, became detachable, was seized upon by the first few members of the Caterpillar club as a test of calmness and presence of mind when bailing out. To bring back the rip cord, after a forced jump, became the determination of every man forced to bail out.

The ability to direct the parachute's course to some extent has been utilized by many jumpers. Joe Crane, national spot-jump champion, can land in the middle of a hundred-foot circle from a height of 2,500 feet with considerable accuracy.

"A chute is sideslipped or glided by grasping a handful of shroud lines on the side toward which you want to go and pulling the edge of the chute down," states Mr. Crane. "This pull spills air from under the air chute to the high side and results in a material increase in the angle of glide to the lower side. As the rate of descent is increased while side slipping, it is not attempted close to ground except as an emergency."

One of the grim jokes told to aviators used to be, "If this parachute doesn't work, bring it back and I'll give you an-

(Continued to page 116A)

*Prof. R. Morris Shreve,
Purdue University
West Lafayette, Ind.*



His Hands Tied above His Head, This Airman Operates His Plane with Foot and Knee Controls

PILOT FLIES WITH HANDS OFF CONTROLS AND THROTTLE

His hands tied above his head, Johnny Crowell, of Charlotte, N. C., operates an airplane, taking off, landing and maneuvering it in the air. The stunt flyer manipulates controls and throttle with his feet and knees, never using his hands. A foot-operated throttle, his own invention, aids the pilot in his "hands-off" flights.

KEYS ARE EJECTED FROM CASE BY SPRING ARM

Keys may be ejected easily from a new metal container by a spring arm. Pressing downward with the thumb unlocks the key, which is then flipped from the handle by the spring, ready for use. To put the key back, it is folded into the handle



where it automatically locks itself. Identification marks on the handle are used to designate a particular key, for instance, No. 1, house key, No. 2, garage key, No. 3, office key, etc. At night,

the keys are identified by passing the fingers over the raised marks.

*Andy Capper
Racine, Wis*

STONE MADE FROM WASTE USED FOR BUILDING

Man-made stone, put together from waste products of limestone quarries and shale beds, provides a building material of wide application. Synthetic stone is being made from finely ground shale and pulverized limestone, but the process can be adapted to marble, granite or slate deposits. For durability, attractiveness and economy, the man-made stone compares favorably with its natural rivals. The pulverized material, thoroughly mixed in proper proportion, is compressed in a polished steel form under a pressure of 2,500 pounds to the square inch. After drying, the mold is steamed

to produce the necessary chemical action. This pressed block is ready for immediate use or it may be polished just as other stones are. The process takes less than half a day. Coloring mineral added to the mixture will result in a wide range of beautiful stones.

SWATTER INVISIBLE TO FLIES DOES NOT MAR FURNITURE

Swatters which do not give flies even a sporting chance are made of transparent material which is virtually invisible as it descends on the victims. The swatters are easy to keep clean, have the resiliency of a whip, are practically unbreakable and will not mar furniture.



CORNSTALKS OF GREAT VALUE AS BY-PRODUCTS SOURCE

As a source of many by-products, cornstalks, cotton stalks and straw, now discarded by the American farmer, are of great value. In the opinion of scientists of the United States bureau of standards, one hundred million tons of pure cellulose, six million tons of sugars and large quantities of other products are available.

*American Chemical Society
Mill Bldg.
Washington, D.C.*

*American Chemical Society
Mill Bldg. Washington, D.C.*

*Parsons Novelty Co.
Western Ave and 35th
Chicago*

P. S. Muehler
Chicago

tities of gums and lignin could be produced from the three hundred million tons thrown away as farm waste. While the manufacture of cellulose from stalks and straw is not yet commercially successful, the research is in its early stages. Cellulose, besides being the chief constituent of paper and rayon, is used in making explosives, cellophane, photographic films, lacquers and adhesives. Farm waste, washed, cooked and treated, may be reduced to a pulp that contains ninety-five to ninety-eight per cent "alpha cellulose." Further cooking under pressure with dilute acid makes possible the extraction of certain sugars that may find important use in resins, solvents and medicine.

recherches nationales Automobile - See also Schaff
recherches nationales Automobile - See also Schaff
recherches nationales Automobile - See also Schaff

C370

AUTO WITH AIR-COOLED MOTOR PROVIDES EXTRA ROOM

Four air-cooled horizontal cylinders, set opposite each other, eliminate the need of water-cooling jackets in a light car recently exhibited in Germany. This arrangement also offers more room for passengers, since the body can be made larger because so much space is saved in mounting the motor on a tubular frame. Another feature is a very low center of gravity and little vibration. All axles are independently sprung, and the body is streamlined and accommodates four passengers.

at Berlin



German Car with Extra Room for Passengers by Reason of Its Air-Cooled Motor, Shown Below

Wilkins



Top, Lamp of Unusual Appearance Gives Efficient Light; Bottom, Construction to Prevent Glare

LAMP FOR ELIMINATING GLARE GIVES EFFICIENT LIGHT

Glare is eliminated and more efficient light is produced by a scientifically designed electric lamp that combines indirect illumination with controlled spread of the glow. The bulb is concealed and surrounded by a parabolic reflector that directs the light to a "ceiling" or upper reflector which is self-contained in the lamp shade. Thus, the ceiling is brought to the light source instead of permitting the light to spread to the ceiling, as is the practice in most indirect-lighting units. The upper reflector directs the illumination to the place where it is most needed, giving off a white, mellow glow which is glareless and evenly distributed. The reflector is made of a special alloy that takes a high polish but is not plated. Regardless of the shade color, the light is always white. Standard household bulbs are used, the wattage depending on the lamp model. By test, a sixty-watt lamp gives three times more illumination than the ordinary table lamp of equal power. A flexible cord is furnished with the lamp.

C 330.
840

Designer, Fred W. Islaro and
Associates, 30 N Dearborn
POPULAR MECHANICS
Chicago

Steam to Unfold Fort Dearborn Massacre

Producer - Black Partridge Pageants, Inc.
30 N. Dearborn, Chicago



Steam Fading from Silver Frame in Building on Century of Progress Midway Opposite Old Ft. Dearborn Will Disclose Two Paintings Shown at Right Center; Upper Scene Represents Massacre of U. S. Soldiers and Settlers at Ft. Dearborn, 121 Years Ago; Lower, Night After, with Indian Moving across Sand Dune as the Fort Burns; Indian's Figure Is Jointed and Operated on Rollers; Steam from Pipes near Front of Frame Gives Curtain Effect; 700 Lights and Thirty Electric Fans Produce Various Effects; Phonograph Record Tells Story of Massacre

Top, Fred R. Glass at Work on Fifty-One-Foot Scene; Note Life-Size Figures; This Is One of Three to Be Shown in Silver Frame at End of Exhibition Hall Draped in Black



Left, How Two Scenes Blend as Massacre; These Descend as "Night After" Picture Rises behind Steam Curtain for the Finale; Pipes, Lights and Curved Back of Frame Effect of Distance

E. J. Coulson Prof. Rev. E. Remington

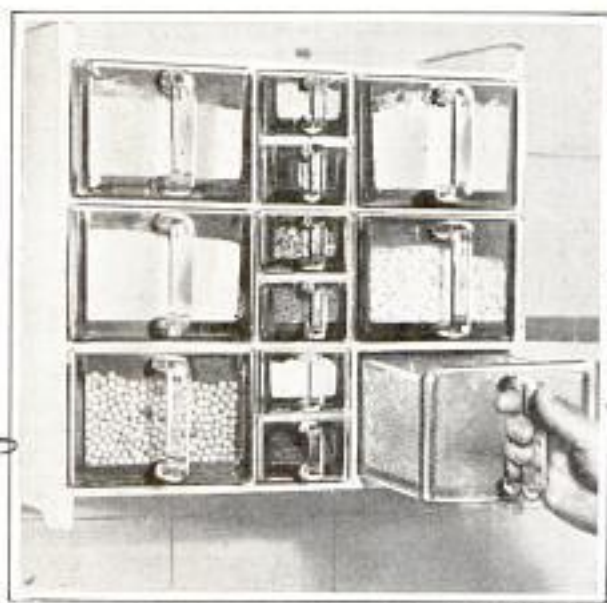
American Chemical Society, with study Washington

OYSTERS HELP COMBAT GOITER BY ADDING IODINE TO DIET

Two servings of oysters a week will combat goiter by supplying a large part of the iodine necessary for the human system. Accepting the daily requirement of the adult as forty-five micrograms per day, two servings of oysters would give thirty-seven per cent of the weekly iodine need, the remainder to be made up from the balance of the diet. In a survey by the United States bureau of fisheries and the South Carolina food research commission, it was found that oysters are easily digested and that they contain significant quantities of vitamins A, B, C, D and G, in addition to being rich in other minerals necessary to the diet. They are low in calorific content, being particularly adapted for consumption during hot weather and as a protective food in a reducing diet. Canned oysters may be used with safety. Other foods with iodine content include red salmon, milk, spinach, potatoes, carrots, lettuce, ox liver, eggs, apples, green beans, butter and beef.

CUPBOARD DRAWERS OF GLASS MAKE CONTENTS VISIBLE

Easy cleaning and visibility of contents are two features of glass drawers for the kitchen cabinet or the cupboard. The drawers are all-glass, even to handles, and are fitted closely in the cabinet frame.



Contents of Cabinet or Cupboard Are Visible When These Drawers, Made of Glass, Are Used

No U.S. agent known

J. Week & Co. Aflingen-Baden Germany

C407 Showing Cross-Section of New Insulating Material; Glazed Surface Reflects the Heat; Air Pockets in the Material Block the Passage of Heat Not Thrown Off by the Surface



INSULATION TO REFLECT HEAT IN COOLING REFRIGERATOR

Heat is reflected by a new form of insulation for refrigerators and ice boxes. A glazed surface reflects heat waves just as a mirror reflects light rays. In addition, thousands of small air pockets in the insulation material bar the passage of heat that is not reflected by the surface. The material is made of corrugated fiber by an inexpensive process. It also is adaptable to the building field.

Electrol Paper Products Corp 5800 Blommine, Detroit, Mich

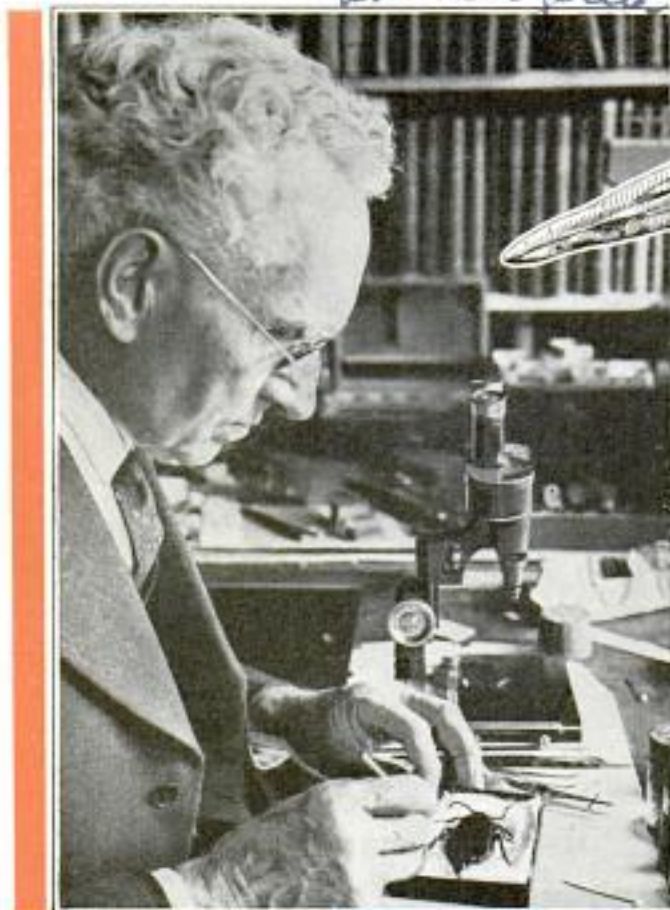
PLANE FUEL MADE FROM COAL TESTED IN GREAT BRITAIN C492

One of the British air squadrons is using gasoline made from coal in its planes as an experiment. The gasoline is a by-product of an industry making a smokeless fuel and is said to be cheaper than the oil from coal produced by a hydrogenation process. It is claimed this fuel has the highest anti-knock values of any on the British market, that it requires no additional chemicals and has a negligible gum content.

Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information is on file and will be furnished by our Bureau of Information upon request accompanied by return postage.

Reported to Commerce Dept by Trade Commissioner James G. Symmes, London, Eng

Call Carl. Thos. E. Stinson Jr.
145 1/2 Spring St
Los Angeles Calif



The **MYSTERY** of

CAN animals really "talk" to each other? Do they have languages that convey rudimentary feelings and possibly more abstract thoughts? Do coyotes, for example, carry on conversations when they howl or are they merely making a noise?

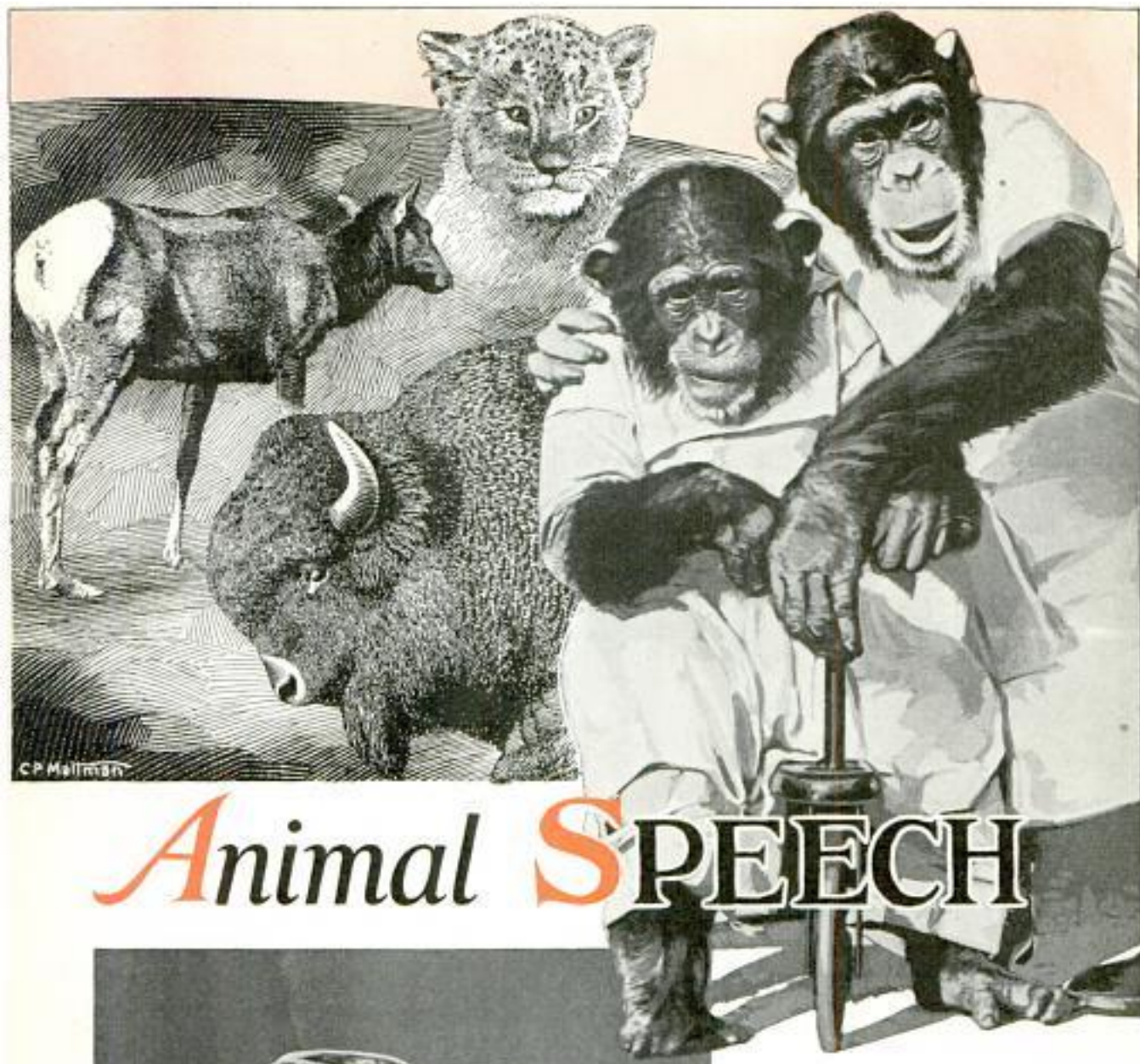
One warning "quack" will cause a flock of ducks to disperse. Dogs seem to express their emotions with their voices. Close observation shows that nearly every species of animal is able to make sounds, and that many of these sounds have definite meanings.

But vocal signals do not account for all the information animals relay to one another. Wolves have a silent telegraph system that warns when a member of the pack has been poisoned. Crows spread the word of a good meal without a sound, and there appears to be no audible signal to cause all members of a flock of sparrows to take flight at the same instant.

The reason, says Ernest Thompson Seton, an authority on animals, is that animals can talk in half a dozen different ways. In the wilds, the voice is of secondary importance, for it is too apt to attract enemies. Instead, some animals have adopted deaf-and-dumb sign languages. Others talk with odors. Keen eyesight enables some species to receive messages from incredible distances. Rabbits, which are almost completely dumb, thump their hind feet on the ground to communicate with each other.

"One of the most communicative of all animals is the American antelope," says Mr. Seton. "At the same time, it is one of the most silent. When the antelope is alarmed, it snorts or whistles. When it is curious it barks. It bleats to call its young. This is the extent of its vocabulary.

"For long-distance communication the animal depends upon its heliograph. On the antelope's hind quarters are large



Animal SPEECH



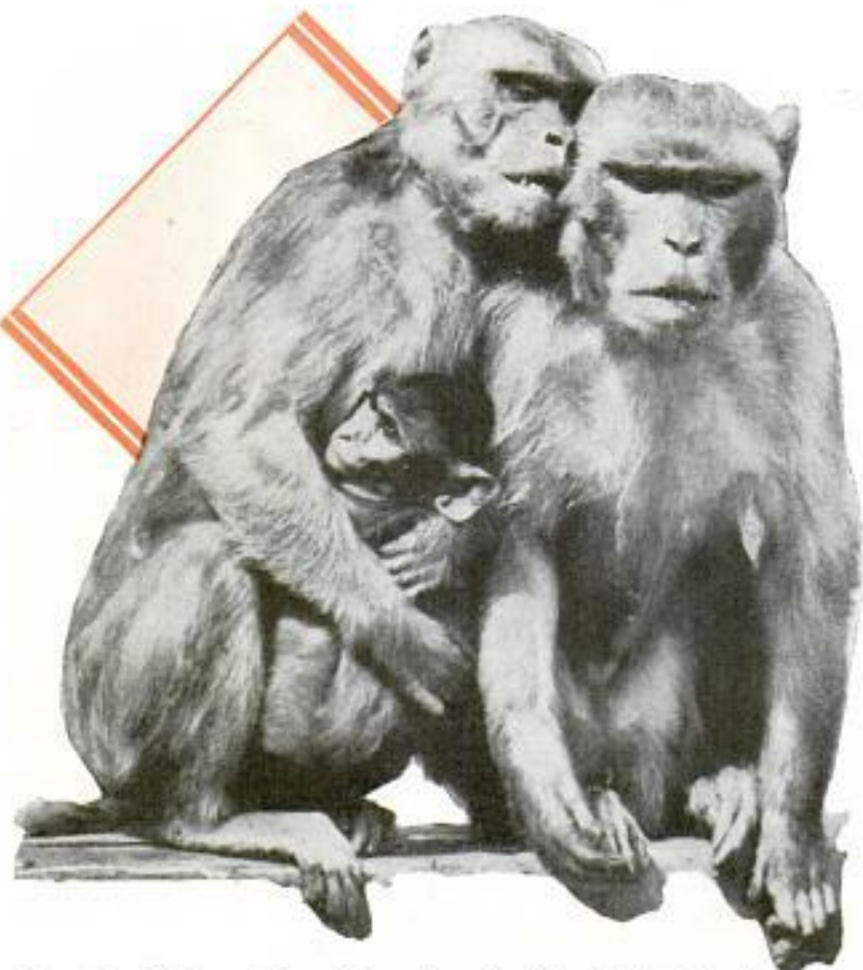
Opposite Page, Preparing Beetle for Microscopic Examination of Its Ears; Top, Learning to Ride a Tricycle; Below, a Giant Tropical Beetle

patches of white hair. When it is frightened the hair becomes erect and flashes in the sun like a dishpan. The winking white spots can be seen farther than the outline of the animal. Elk and a few other species also use such heliographs to spread warnings.

"It also has numerous glands from which

odors are released. Each has a different meaning. A musky odor is released from the white spots on the crupper when the animal operates its heliograph. The odor is a duplicate danger signal for the animals that did not see the flashes. Another gland on the back releases a personal odor by which one antelope can distinguish its friends from strangers. Glands on the feet leave odor trails when the animal moves. Other glands on the legs operate when the animal lies down."

Research is leading zoologists to the conclusion that nearly every species of animal uses an odor language. Just how complex the languages are and how many



Chattering Monkeys Utter Many Sounds with Definite Meanings; the Mother, Above, Probably Is Telling Papa That Baby Has Cut a Tooth

different meanings they convey can only be guessed, for in most cases the odors are too faint to be detected by the human nose.

"Every wolf seems to have an individual odor that can be recognized by others as easily as a face," says Mr. Seton. "The odor proclaims the age and sex of the animal, its physical condition, whether it is hungry or gorged, and whether it is frightened or at peace with the world."

Entomologists suspect that odors are also an important means of communication among insects. None of the insects have typical vocal organs, but lately ears are being found, sometimes on the legs, sometimes on the abdomen, and in some cases at the ends of the antennæ. Now entomologists are wondering whether insects produce sounds that are above or below the range of human ears.

Ants unquestionably have an elaborate language, but just how the messages are conveyed remains a mystery. Some suggest that the ants use an odor language,

while other authorities are convinced that they transmit their messages in a complicated signal code. A feeler tapping on the head might mean "follow me," while a tap on the body might mean "help me carry this load."

Monkeys are the chatterboxes of the wilds. Since they are nearly immune from attack, they talk more frequently than other animals. Apes have vocal organs that closely approach those of the human species and they are well equipped to utter the complex sounds that make up a language.

Observers find a striking resemblance between monkey talk and the primary emotional language in which man expresses his feelings during babyhood. The actions and facial expressions that accompany primate speech make it easy for casual

onlookers to understand the meaning of many of the sounds. Tone alone classifies expressions of vituperation, hatred and indignation. Chimpanzees laugh with joy, scream with anger and whine to express resentment.



Chimpanzees and orang-utans are the most intelligent of the primates and have

developed the most complex languages. A few chimps have been taught to call their owners by name, and others appear to understand when their own sounds are uttered by a human. The chimpanzee language consists of at least several dozen words. Exerpts from this chimpanzee dictionary are: gak—hunger; gho—greeting; ho-oh—alarm; who-ah—satisfaction; ah-oh-ah—apprehension; ai—pain; ooh—pleading; ka h-ka h (whispered)—sorry.

One of the big differences between human and animal speech is that humans must learn a language before they can use it, while, with the lower animals, the knowledge of the meaning of sounds appears to be instinctive. Birds seem to understand the calls of the parents even before they are hatched. A chick hammering away at its shell immediately ceases work when a parent utters a warning note, and remains quiet until a reassuring call signals that the danger has passed.

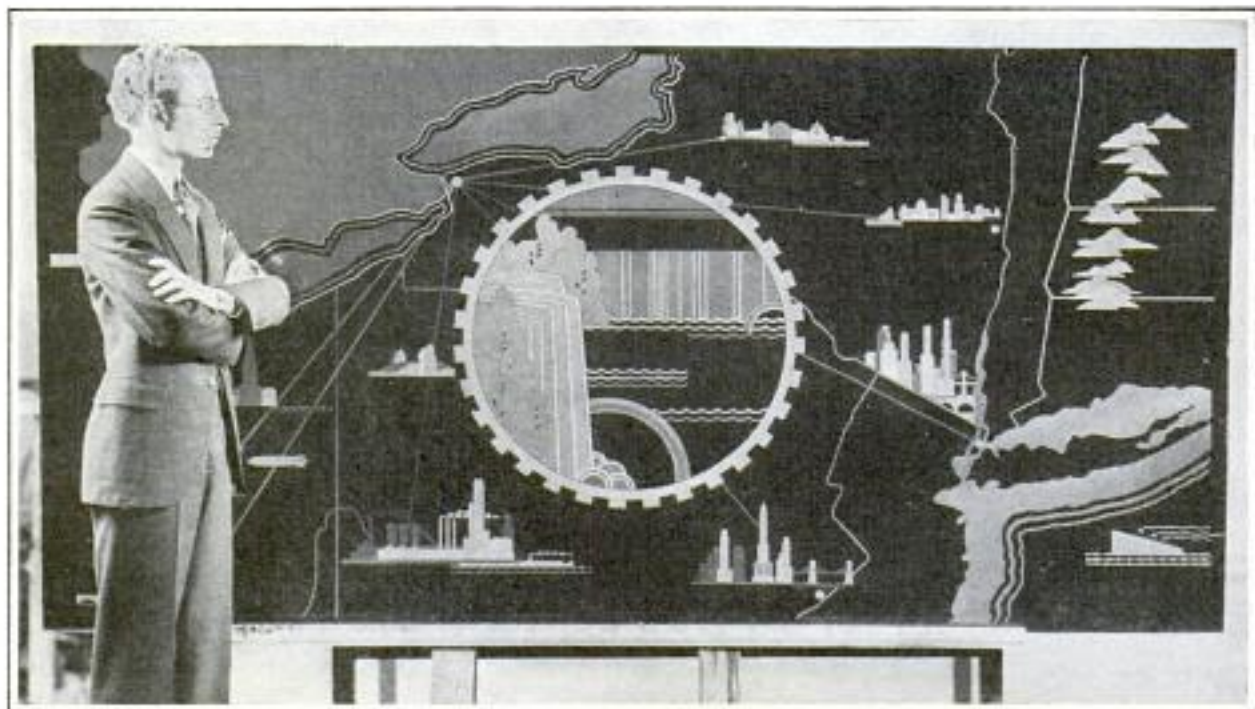
"Bird languages are made up of four fundamental sounds," says Howard Hill, zoologist at the Los Angeles museum. "One note is a danger call, another a mating call, and a third a food call. A 'follow me' call is used by the hens to lead their

(Continued to page 124A)



The Gibbon Monkey, the Deer, the Sloth Bear, the Antelope and the Tiger Each Has Its Own Method of Communicating with Its Own Kind; Sound, Sight and Smell All Play a Part in Animal "Talk," Many Animals Supplementing Vocal Noises with Odors or Visible Signals

Growth of Electrical Network Told by Mural



Mural Shows How the Use of Alternating Current Has Spread Throughout the Nation; in the Center Is a Representation of Niagara Falls, with Connecting Power Lines to New York and Other Cities

Constructed of a gleaming-black material, called "micarta," inlaid with sheet aluminum dyed in desired colors and cut to shape, a mural designed by the Westinghouse Electric and Manufacturing company tells how the use of alternating current has spread. The mural will be exhibited at the Century of Progress exposition. Niagara Falls, which was harnessed in 1893 by George Westinghouse as the world's first large-scale, alternating-current, water-power development, is the

central theme. Surrounding this scene is a large gear wheel symbolic of tremendous power and industry. The background is a map showing sections of several states, conveying the idea of distance. Different cities are represented by characteristics peculiar to them, as New York by its skyscrapers and Pittsburgh by its mills. Westinghouse engineers point out that the mural is most appropriate, since ninety-five per cent of the electricity generated today is alternating current.

LEAKING TIRE VALVES LOCATED BY BUBBLES IN TUBE

Leaking tire valves can be located quickly with a tube which applies the old principle of the water-bubble test—wetting a finger, placing it over a valve and watching for a bubble. The leak detector consists of a transparent tube partly filled with water into which a flexible rubber chuck with a hollow brass-tube insert is threaded. The



chuck is placed over the valve stem and the leaking air flows through the tube and into the water where bubbles betray the faulty valve. A clip is attached to the detector so it may be carried in the pocket.

AMERICA IN LONG WARM SPELL WEATHER RECORDS SHOW

During the past twenty-five years, America has enjoyed the longest warm spell since the Revolutionary war. This is the tale told by the weather charts on which a red line has been rising steadily since 1908, tracing the course of this extended warmth. The winter of 1931-1932 was the

c440
Still Mfg Co. 687 E
2nd St. Cleveland, Ohio

c491
U.S. Weather Bureau

New York Times
3/27/33

C438 Earl Mfg Co
5430 Loomis St
Chicago 847

POPULAR MECHANICS

warmest in more than 100 years east of the Rocky mountains. Last winter was not quite so warm, which may or may not indicate that colder weather is in prospect for the next quarter of a century. The red temperature line on the long-time weather charts, going back 150 years, rises three times above the straight line representing the long-time normal, and dips below it twice. The first warm spell came at the beginning of the nineteenth century, the second about seventy-five years later, and we are still enjoying the third. The long warm and cold periods, of course, are broken by minor fluctuations in the opposite direction. Summers grew colder from about 1875 to 1912, but since then have been warmer.



This Model Speedboat Really Runs, Driven by the Small Engine Shown; Note How the Hatch Cover May Be Lifted to Reach Battery and Coil

Model \$25.00
Coil \$2.50
Battery 60¢

Wood complete - \$85.00
/ Kit \$12.75
/ things \$10.75

MIDGET ENGINE IN MODEL BOAT OPERATES ON GASOLINE

Powered by a midget gasoline engine, a model speedboat now on the market has a speed of fifteen to twenty-five miles an hour. The boat is thirty-six inches long and eleven inches wide. It is made of mahogany. The rudder is set by a dial and fastened with a thumbscrew. Batteries and coil are placed under the hatch, while the gas tank is concealed under the foredeck. A direct drive connects the engine to the propeller. The engine is two-cycle, with a heat-treated alloy cylinder.

TABLE WITH ADJUSTABLE LEGS FITS BED OR DIVAN

Adjustable legs on a small table make it adaptable for use in connection with bed or divan. It can be used for card playing, tilted bookrest, bed table or a play table for children. If the legs on one side are shortened, that end of the table can be placed across the lap of a person sitting in the bed or on a divan. Or the table can be tilted for use on the bed.

C409

American Chemical Society with Odby

RED SPIDER KILLED BY POISON IN NEW INSECTICIDE C496

Control of the red spider, an insect pest causing large crop losses in the south and west, is promised with the development of an insecticide based on selenium, an element closely related to sulphur. The common red spider feeds on nearly 200 varieties of plants and it is estimated that its damage to the cotton crop alone is \$2,000,000 a year. The insects multiply rapidly and are immune to the toxic power of the common contact insecticides. G. B. Gnadinger, a research chemist, conducted many experiments on the spiders with sulphides, but he found that while the solution might kill the spiders, it either had no effect on the eggs or was too caustic for the plants. Oil concentrations strong enough to affect the spiders also frequently damage tender plants. Selenium appeared to destroy both the spiders and the eggs without damage to the plant.



Table for Reading or Card Playing Has Adjustable Legs, as Shown, for Bed or Divan

68 Post St. Ph. 504

Dr. Wm. Grouse
Z. Leming
Bay. of...
Lafayette

Dr. W. Gnadinger,
Mc Laughlin, Pyramed
1 King Co. 1915-3th Ave. S.E.

Muncieapolis. Minn.

Universal Products Co., Chicago

310. Michigan Co

way to the level of the liner's deck, regardless of the height above the water of the entrance to the boat.

© 508

"OILED" GASOLINE ADDS POWER AND CUTS FUEL COSTS

"Oiled" gasoline, containing minute amount of lubricating oil, has been found to step up motor power and decrease fuel costs in automobile tests over 10,000,000 miles of roads. This report was made recently by Dr. Gustav Egloff, research oil chemist, who listed among the results of road trials gains of from four to eight per cent in gasoline mileage, increases in crank-case oil mileage up to 100 per cent, and reduced carbon formation. Gasoline thus treated also prevented freezing of piston rings and sticky valves, made for less valve grinding and lowered the "run-in" time on engines after overhauling. The oil industry is now at work trying to find satisfactory substances which can be added to gasoline for "top lubrication," as the process of oiling it is known. Lubrication of gasoline had its beginning as a process used primarily to tune up new motors during the first 1,000 miles of operation. It is the reverse of the old principle which allowed a minimum of lubricating oil to reach the combustion cylinders during operation. Dr. Egloff explains that a large number of substances have been tried for top lubrication, including graphite suspensions, mixtures of castor oil and nitrated or chlorinated

oil not recommended

American Chemical Society, 500 N. Dearborn St., Chicago, Ill.

Pyral Co. La Crosse

suggested



Interior and Exterior Views of Mechanical Gangway on Rails Which Can Be Moved from One Ship to Another

GANGWAY TRAVELS ON TRACKS FROM SHIP TO SHIP

Traveling mechanical gangways, electrically operated, can be moved from one ship to another on double-rail tracks at the new docks at Cherbourg, France. A traveling runway which is a part of the gangway carries the baggage of passengers on an endless track, and electric derricks raise or lower a section of the gang-

way to the level of the liner's deck, regardless of the height above the water of the entrance to the boat. Dr. Egloff explains that a large number of substances have been tried for top lubrication, including graphite suspensions, mixtures of castor oil and nitrated or chlorinated compounds, and mixtures of animal or vegetable oils. He says a more successful method constitutes the addition of an oxidized material to lubricating oil or partial oxidation of the lubricating oil itself. The adhesion of this type of lubricant to the metal surface of the cylinder is said to be extraordinary.

With modern machines, 4,000 men could harvest the United States wheat crop.

cont. Wilkins

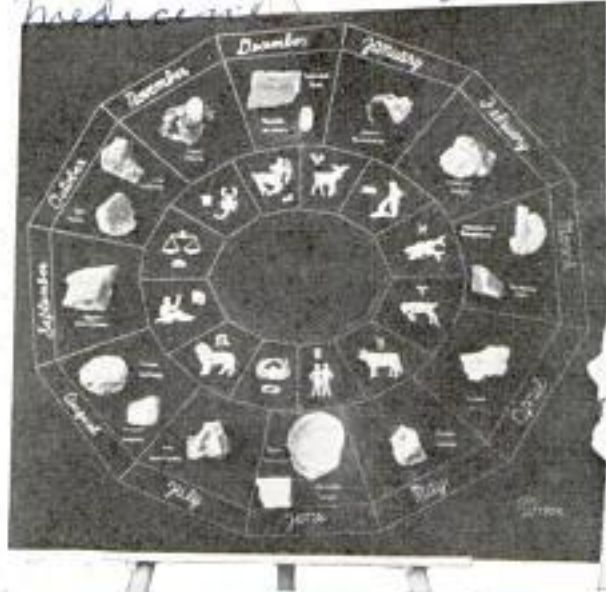
C 378

Dr. Herbert S. Linn
Prof. J. Dermatology and
Radiology, University of Oklahoma School of
Medicine

**MOUTH GENERATES
ELECTRICITY
LIKE A CELL**

Science News Letter 4/8/37

When teeth are repaired or replaced with different kinds of metals, electricity may be generated in the mouth just as in the cell of an electric battery. Tests show that human saliva is a good electrolyte and that every mouth containing plates, bridges, crowns or fillings of dissimilar metals becomes a complete galvanic battery. If all dental materials were made of the same or similar metals, there would be no trouble. But the difference between gold and certain other common dental metals is quite large. When two such dissimilar metals are used in the same mouth, they may act as opposite poles of an electric battery. The resulting current generated is sufficient to cause pain in the mouth.



Minerals Representing Each Month Are Shown on Chart Which Aids Students; Note Signs of Zodiac Drawn on the Inner Circle

**CHART OF MINERALS TEACHES
IN INTERESTING WAY**

More interest in the study of minerals is created by charts bearing samples of various rocks and stones, in addition to notes telling where the minerals are found. One chart, on a black-velvet background, shows the months of the year, the signs of the zodiac and the birthstone for each month. The crude mineral from which each birthstone is taken also is exhibited. Another chart shows a cross section of the earth and gives geological data.

Prepared by Miss Anne
Confort, at Academy of Natural
Sciences, Philadelphia, Pa

**REVOLVING BODY OF FISH LURE
CAN BE REGULATED**

J. B. B. Industries, Inc.
Manufacturers, etc.



Resembling a fast-moving minnow, the entire body of a new fish lure revolves. The speed is governed by the angle of the fins back of the first hooks. At average trolling speed in lake water, the bait turns 300 times in each foot of travel. The number of revolutions can be reduced by pressing the fins in toward the body of the bait. Hooks form a barrage around the bait, an arrangement that is said to increase the number of catches. If the outer shell should be stripped off, the hooks would still remain tied together to a steel wire running through the center of the bait.

**MIDGET SAFE SET INTO FLOOR
IS HIDDEN FROM ROBBERS**

Measuring only nine by eleven inches, a metal safe is available for installation in a concrete box in the floor of home or office as a protection against robbery. The top of the safe is flush with the floor and may be concealed by a small rug or waste basket. A set of double doors adds to its security. Neither door can be left unlocked. Currency and papers can be dropped through a slot in the inner door.

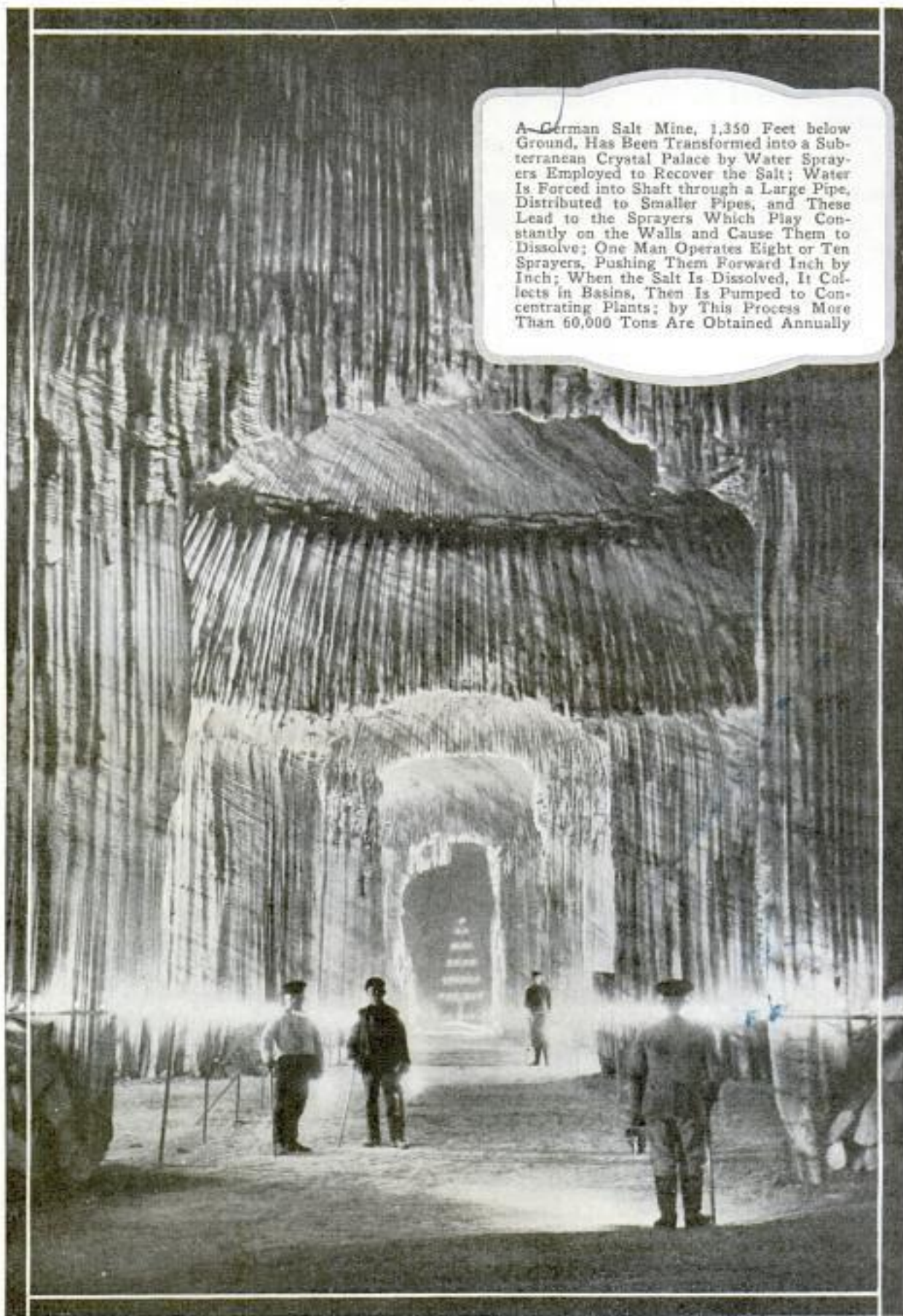


Sales: Empire Trading
Corp. 120 N. Dearborn
Chicago

F. M. A. Floor Safe Co.
1957 S. Los Angeles St.
Los Angeles, Calif.

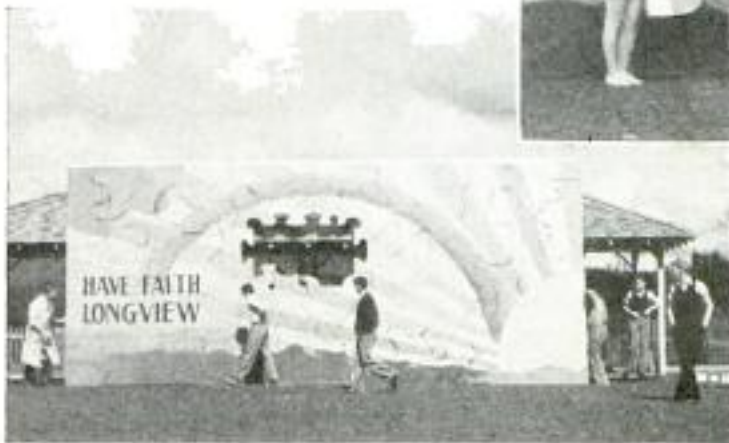
Sprayers Turn Salt Mine into Crystal Palace

A German Salt Mine, 1,350 Feet below Ground, Has Been Transformed into a Subterranean Crystal Palace by Water Sprayers Employed to Recover the Salt; Water Is Forced into Shaft through a Large Pipe, Distributed to Smaller Pipes, and These Lead to the Sprayers Which Play Constantly on the Walls and Cause Them to Dissolve; One Man Operates Eight or Ten Sprayers, Pushing Them Forward Inch by Inch; When the Salt Is Dissolved, It Collects in Basins, Then Is Pumped to Concentrating Plants; by This Process More Than 60,000 Tons Are Obtained Annually



**GIANT JIGSAW PUZZLE
THIRTY FEET LONG** *C 500*

Built of canvas and firwood veneer, a giant jigsaw puzzle, thirty feet long and twelve feet wide, contains 253 pieces, some of which are three feet long. When the puzzle is put together, it shows the "Sun of Prosperity" rising, while the "Rainbow of Accomplishment" gleams across the arch



Two Views of Giant Jigsaw Puzzle; Top, Note Size of Pieces Compared to That of the Bathing Girls

of the sky. Students of the manual training department of a Longview, Wash., school, constructed the model from which the puzzle was made.

C 267

**MODEL RANGE FOR ARTILLERY
TEACHES YOUNG OFFICERS**

Field-artillery tactics are being taught young officers of the United States reserve corps by means of a miniature range. How to adjust the range of field guns for firing at any part of the terrain model can



Officer at Right Is Shown Adjusting Sights by Which Field Artillery Might Be Fired at Some Part of the Terrain Model

be demonstrated. The board was constructed by members of the 79th division, United States reserve corps.

**MORE WOOD-GAS USED
TO RUN GERMAN
VEHICLES** *C 582*

Wood gas as a fuel for motor vehicles is being adopted by an increasing number of trucks and busses in Germany. About 300 vehicles are equipped with the generators. The gas can be used in tractors and motorboats. Operation of motor cars with the fuel is in experimental stages. On trucks, the generator is generally placed on one side of or behind the driver's seat, while on busses it is suspended from the rear of the body. The wood content of one generator is between 150 and 175 pounds, sufficient to operate the vehicle thirty-five to fifty-five miles. An additional 400 pounds of wood can be carried on the roof of the driver's compartment. The generator can be refilled while the truck or bus is under way. Considerable saving in operating expenses is shown on test runs.

CA cellophane roll film for lantern slides may be made from thin commercial wrapping cellophane by the use of carbon paper typing or pen drawings.

*French - Societe des
Escozennes, 40, Rue
Marbeuf, Paris, France*

*Report of Vice Consul C. J. Javadzchi
Berlin, Germany; Automobile
Club, Dept. of Commerce
Paris, France*

Press memo 4/4/23

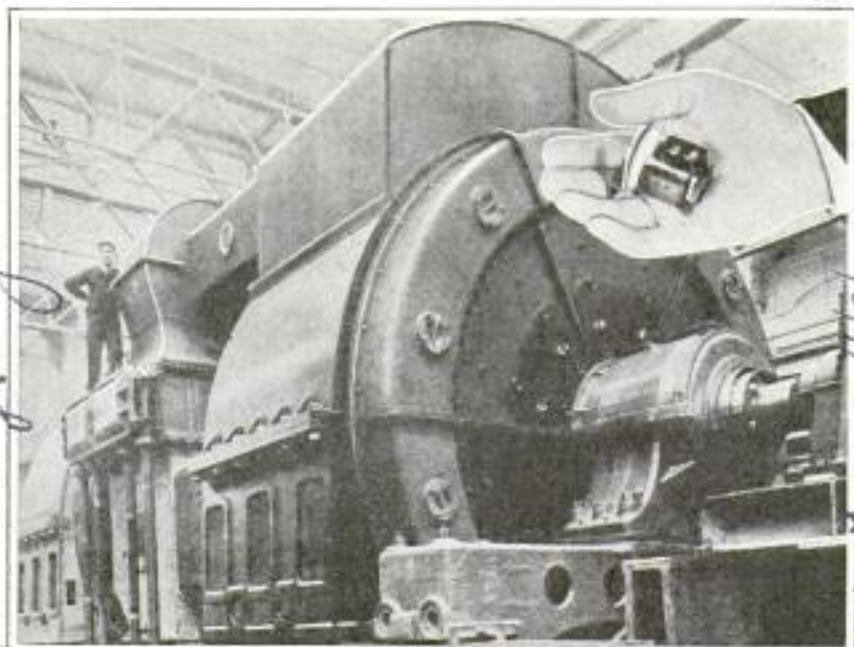
Wicks Walla

see April 1922 576
Copyrighted material
Societe des Escozennes

C580

Ukrainian Estate
Ascania Nova

R.B. Reid
News Bureau,
Schenectady, N.Y.



One of the 40,000-Horsepower Motors for the French Liner, "Normandie," and a Tiny One Used in Very Delicate Electric Meters

STRANGE ANIMALS BRED IN RUSSIA FOR FARMS

In an effort to produce hybrid animals that will be useful to the farmer, the Soviet government has established an experimental station and zoological park. Houses, pens and inclosures for ostriches, antelopes, zebras and wild horses have been erected and scientists are engaged in cross-breeding. Experiments in acclimatization are being conducted in the hope of adapting useful wild and domestic animals found in other parts of Russia

James G. Jones

MITES AND GIANTS IN MOTORS MADE IN SAME PLANT

Four enormous motors, each rated at 40,000 horsepower, were built by the General Electric company to propel the 75,000-ton French liner, "Normandie," at a speed of thirty knots. Engineers claim these are the most powerful motors ever constructed. The airplane carriers, "Saratoga" and "Lexington," which have the largest motors of any American vessels, are each equipped with eight rated at 22,500 horsepower each. In the same plant in which these huge motors were turned out, tiny ones, rated at thirty-three-hundred-millionths of a horsepower, are made.

to the rigors of the northern steppes. Exotic horned animals, including bantengs, zebus and bisons, have been crossed with native cattle. The hybrids thus produced are said to be good beef and dairy animals, highly resistant to infectious diseases. One project is the adaptation of the African ostrich to conditions in Russia.

TELESCOPING CANE IS "TRIPOD" FOR MOVIE CAMERA

Amateur movie makers who consider ordinary tripods too bulky to carry about now can use a lightweight walking stick as a tripod. The handle of this cane is equipped with a removable head screw which fits into the tripod socket of the camera and locks on the handle but has a slotted ring permitting the camera to be turned. When not used as a tripod, the camera attachment can be removed entirely. The shaft of the stick is hollow and contains a telescoping section which, when extended, gives an over-all length of about five feet.



Camera Cane

TONGS FOR ICE OR SUGAR CUBES ARE USEFUL AT TABLE



Tongs for handling ice cubes, sugar cubes, pickles or olives at the table are available. Made of chromiumed steel, they are kept clean easily. The cubes are picked up as usual and are released by pressing the button at the end of the tongs.

C544 \$1.00

Henry Paulson & Co.
370 S. Wabash Chicago

Victor Animatograph Corp. Hasenpfl. Ill. Inc.

Union Terminal
Passenger Station

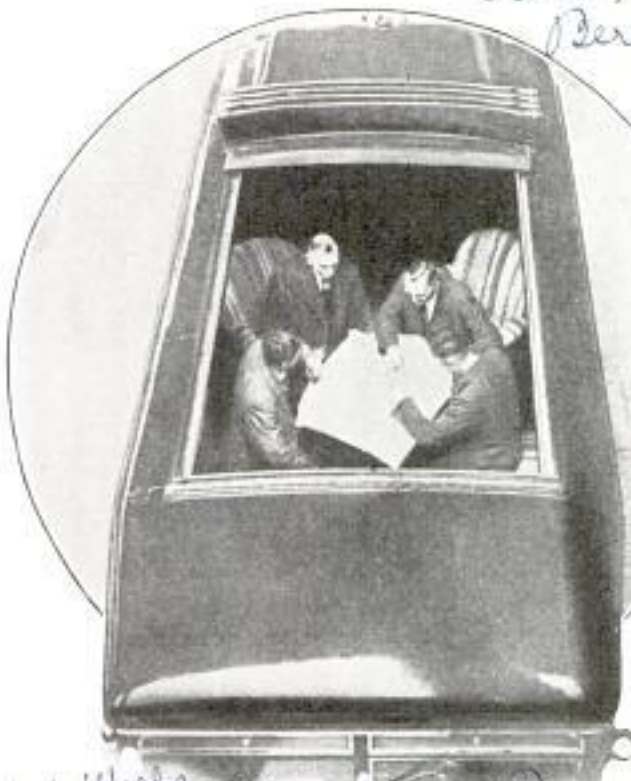
POPULAR MECHANICS

C308 Mercedes Automobil
asmb. H. N. 17,
Winter den Linden
50-51,
Berlin
Germany

**NO-FUSE STREET LIGHTS
USED AT RAIL
TERMINAL** C466

For the first time in the history of modern street lighting, fuses have been discarded in lighting standards at Cincinnati's new \$41,000,000 railway terminal. In their place, small no-fuse circuit breakers open automatically when the electric current in the line rises to dangerous heights. Instead of replacing burned-out fuses with new ones, attendants merely open a small door in the base of the light standard and slip a switch, just as they would turn on a light at home. In adapting no-fuse breakers to street lighting, engineers borrowed a discovery made by Dr. Joseph Slepian, of the Westinghouse Electric and Manufacturing company. Standards at the Cincinnati terminal were manufactured by Westinghouse. Octagonal in shape, the standards have a granite finish and are twenty-five feet high. The centers of the poles are hollow. One 2,000-watt lamp is used in each, with special glass and refractors to give maximum illumination.

East Pittsburgh, Pa



Wed. World Mercedes-Benz

Here is a View of Weekend Car: Looking Down into Compartment, We See Several Business Men Holding a Conference

**TWO-ROOM MOTOR BUNGALOW
HAS ROLL-AWAY ROOF**

For the weekend trip, a two-room bungalow on wheels has been developed in Europe. The vehicle, which is driven by a fifty-five-horsepower Diesel motor, has a kitchen and a living room, which also may be used for sleeping purposes. The roof of the car can be rolled back.

James H. Maguire, 608 Harbor Com. Bldg., Montreal

C577

**COOLING BY HUMIDITY CONTROL
SAVES PRODUCE SHIPMENTS**

Cooling railway refrigerator cars by humidity control instead of temperature control is expected to result in large savings of shipments of meat, butter, poultry and eggs. This method of refrigeration is said to prevent frozen or chilled products from "sweating" when they are removed from the refrigerator. This often spoils the produce. The new system controls the humidity so that it is equal to or less than the humidity of the surroundings to which the produce goes.



New Lighting Standards; Inset, View of Door Removed from No-Fuse Compartment in Base

When freshly cut, mahogany wood is not dark, but light red or pink.

Mr. L. E. Howlett Canadian National Research Laboratories

Stam, Canada

C 472 Ernie C. Schurmacher
22 E 69th St
New York City

HOW FAST CAN YOU



Above, Western Air Transport; Right, Fast Northrup Ship; Below, "De-Icers" on the Tail

IN the realm of air, few spectacular feats remain for man to perform. He has used the airplane to girdle the world, achieve the dangerous outside loop, climb into the stratosphere and fly over both Poles. All of these accomplishments have indicated the modern airplane's potential carrying power, speed and endurance.

To what extent can you, yourself, utilize the aerial seven-league boots which science is preparing for you? How soon will it be possible for you to leave one coast for a weekend visit on the other? How fast can you fly safely?

Science has just won one great battle as the preliminary skirmish to a still greater one. It has made you accept the transport airplane as commonplace. There has never been any fear of the commonplace and that is exactly what the airplane has become in the past four years. The commercial use of the airplane has involved the overcoming of a human inhibition as old as the human race. That science has converted you to this use, however, is shown by the fact that during 1932 the record number of 48,000,000 commercial air-miles were flown in America, with 534,000 passengers being carried.

Today, having converted you to the use of the airplane, science is engaged in the imposing task of making that use possible

at still lower cost, at greater speed and with absolute safety. Already it has made great strides in this direction.

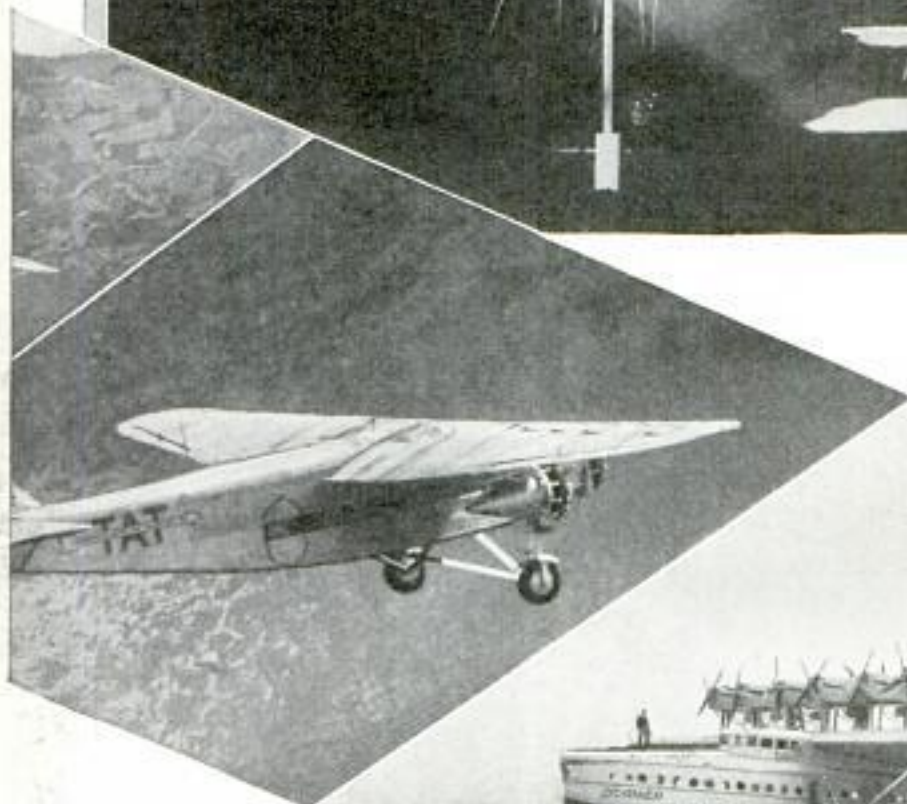
From 1920 to 1927, the average cruising speed of commercial airplanes was a maximum of 100 miles per hour. From 1928 to 1932 it averaged between 115 and 120 miles per hour. And the summer of 1933 is certain to witness a new average of at least

C472

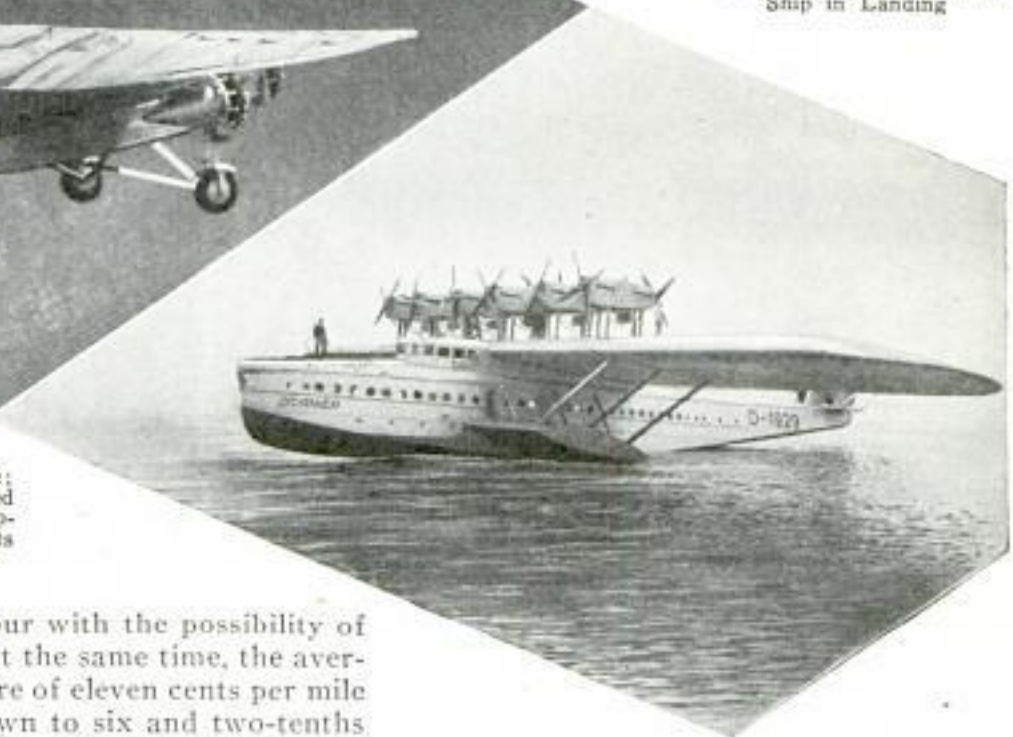
FLY SAFELY?



New and Improved Safety Devices Keep Step with the Development of Air-Transport Speed; Here a Powerful Light Aids a Ship in Landing



A Contrast in Size; Large Multimotored Planes Are Not Popular as Transports in This Country



150 miles per hour with the possibility of reaching 200! At the same time, the average passenger fare of eleven cents per mile in 1928 went down to six and two-tenths cents in 1932 with even a lower average expected in 1933!

"The scientist and the aircraft engineer, in spite of the mechanical perfection of the airplane, have just started their jobs," states Richard W. Robbins, president of Transcontinental and Western Air, Inc. "They are not concerned only with further refinements of their present handiwork, but are faced with the responsibility

of meeting the demands of a people who ask that they make further contributions to the elimination of time from distance."

How is this problem of greater speed with safety to be solved? One method which suggested itself to foreign scientists was by flying through the stratosphere. The great aeronautical expert, Dr. Junkers, built the "Ju 49," a "stratosphere trans-

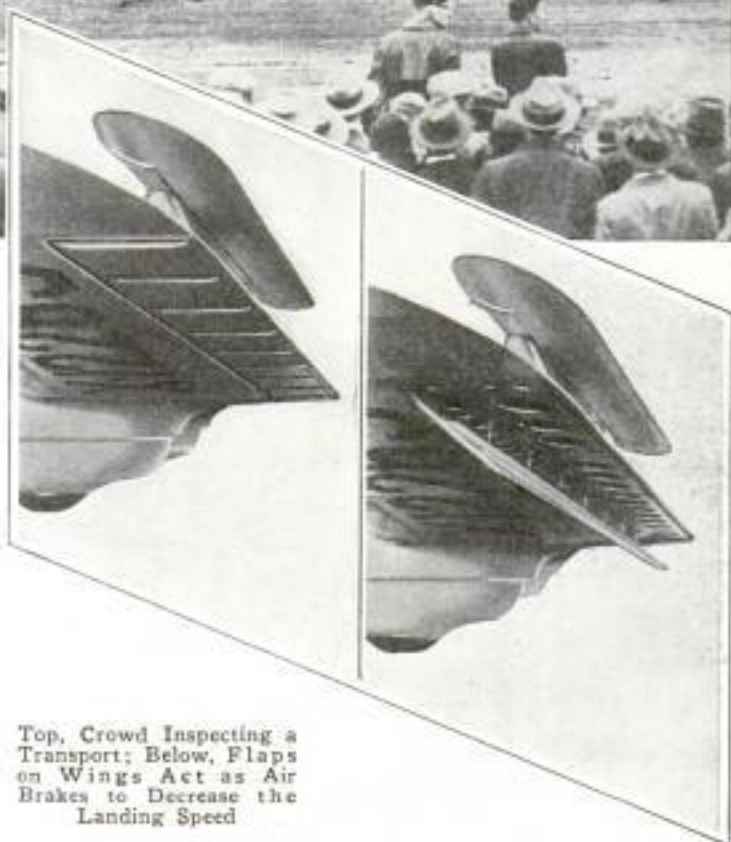


port plane," to experiment with the idea that speed might be increased by rising to the strata where the less-dense atmosphere offered less resistance, for where the air is only a quarter as dense as at sea level, the airplane will travel twice as fast.

Two major problems, however, confronted Doctor Junkers and other foreign scientists. One was to perfect an engine that would function in thin air. The other was to perfect an air-tight cabin in which sea-level pressure might be maintained with an adequate supply of oxygen provided, for in a transport plane it would be impractical to furnish passengers with oxygen respirators.

While foreign scientists finally perfected a cabin that would be proof against leakage despite the greater pressure from within and the effects of ice-cold atmosphere outside and normal temperature within, American aeronautical experts were making strides in achieving greater transport speed without resorting to stratospheric heights. Recent advancements in these efforts have been so great that Mr. Robbins makes this prediction:

"We do not believe we will have to wait for the development of stratosphere flying to operate planes from coast to coast and from Canada to the Gulf of Mexico be-



Top, Crowd Inspecting a Transport; Below, Flaps on Wings Act as Air Brakes to Decrease the Landing Speed

tween dusk and dawn. It will come about in the next few years through a refinement of our present airplanes with more effective employment of motive power, new streamlining principles and safer landing characteristics.

"Overnight facilities to travel by airplane extend about 1,400 miles from the principal trade centers of the country. In this overnight zone, no business time is lost. Planes now under construction assure the clipping off of six additional hours in 1933, which will add another 1,000 miles to this zone."

Air-line passengers, then, soon will be able to fly along the nation's skyways at almost four miles a minute. Several air-

craft companies are building transport craft with speed performance approaching the four-mile-a-minute figure, and, during the year, these new planes will make their debut.

One of these aeronautical experts, Zantford D. Granville, is building a new transport plane to carry eight passengers and 800 pounds of mail and express and to attain a top speed of more than 225 miles an hour. It is a development of the world's fastest land airplane, the tiny "Gee Bee," created by the same designer.

"Dusk-to-dawn service from coast to coast is much nearer the actual truth than

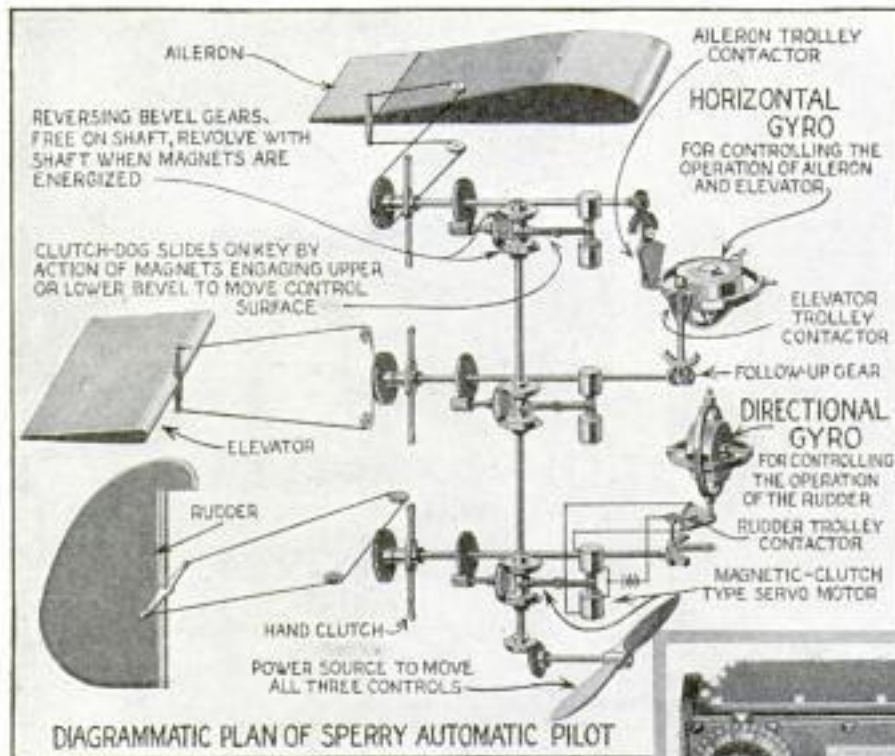


Above, Nearly Every City Now Has a Modern Airport Capable of Handling Air Traffic Twenty-Four Hours a Day; Below, Looking Down on a Mountain from a Transport

most people believe. In my opinion a cruising speed of well over 200 miles per hour will be in use on some of the scheduled passenger runs before the end of the year," states Mr. Granville.

"Faster transport flight seems to be purely a matter of design for better streamlining, for least-possible resistance and the increase of available horsepower in single-engine units. Developments of this nature are already completed or under way which will, in my opinion, make unusual cruising speed an everyday performance in the very near future."

How safe will you be winging your way across the continent at still greater speed? Science is already actively engaged on this problem. With speed swinging in



an upward curve, the average passenger hazard on American airlines in 1932 was one-third the average of that of the four previous years.

Safety devices to correct any hazard incurred by extra speed are being devised even as rapidly as the extra speed itself is being developed. One of the drawbacks to fast planes—high-landing speed of seventy-five miles an hour—recently has been overcome by the invention of “wing brakes,” split trailing edge flaps, simple in construction, yet the most effective means of increasing lift and drag for slow landings, in some cases permitting a fast plane to land in one-third the distance it would require without them.

Another device being installed on transport planes, “de-icers,” prevents the formation of ice on the wings, a hazard that is being totally eliminated. These de-icers, known as “airplane boots,” are attached to the leading edges of the wings and of the tail surfaces. In cold, wet air where ice is liable to form, they are inflated and deflated rapidly by means of compressed air, the pulsations effectively preventing formation of ice.

Blind flying, in case of fog or other obstructions to the vision, is well past the experimental stage, so much so, in fact, that many pilots are required to take a course in blind flying. Experiments are

now under way designed to permit transport planes to actually be landed “blind,” without the pilot seeing the ground, by means of a radio device known as the “bent beam,” some of which have already been installed.

Still another safety device is the “robot pilot,” devised to relieve the transport pilot of the strain of actual driving while aloft. On



Sperry Automatic Pilot on Instrument Panel, and Sketch Showing How It Controls the Plane

long runs, the robot pilot permits the human pilot to simply watch the dials while the plane is maintained on an even compass-directed flight at a constant altitude.

When the pilot who is operating the transport plane encounters fog, he has but to set the gyroscopes in motion, and the work is then taken over by the automatic pilot which functions twice as fast as the human pilot in making corrections, for tiny electric “fingers” feel the most minute deviation from the course and correct it before the human knows what is happening.

In spite of these many safety devices, the pilotless plane is highly improbable for some time to come. While the development of the automatic pilot, for example, has reached a high stage of perfection, aeronautical experts reject the idea of using it to replace even the copilot.

Contrary to expectations of a few years

ago, the type of plane which will speed you safely through the air in the future will not be a huge, many-motored affair. The tendency now is toward speedy single-motored passenger planes, and greater speed will bring still lower fares. It has been proved, for example, that while high speed costs money in some directions, it saves it in others. A plane that travels 1,500 miles in ten hours can be operated at less per mile than a plane that travels only 1,000 miles in ten hours, and which costs less for each hour it is in the air.

Looking further into the future, science is preparing for even double the speed of 1933. States Dr. Gustav Egloff, Chicago scientist:

"Motors have driven airplanes in excess of 400 miles an hour, motor cars more than 250 miles and speedboats more than 120. Common cruising speeds for modern motor cars are now about sixty-five miles an hour. Ten years ago their average was thirty-five. An immense amount of research is going on to anticipate lubrication needs of the future, when more than double the speeds of those now in practice are attained."

During the next few years, in perfecting new safety devices, and obtaining even greater speed, undoubtedly pilots and research engineers will continue to be killed in their quest. These risks and fatalities are stoically accepted as all in the day's work by the aeronautical engineers and scientists. Their research has progressed to a point where passenger traffic on America's airlines increased 210 per cent from 1929 to 1932 at a time when railroad traffic fell off forty-six per cent; to a point where American transport planes in 1932 flew one-third more miles than all of the rest of the world put together; to a point where safe, fast economical air transportation for the average man is assured, and to a point where your own use of 200-mile-per-hour aerial seven-league boots is veritably just around the corner!



© Fox Photos
Making Drums for the Use of the British Army; the Men Are Stretching Vellum on the Drum Hoops, Preparatory to Installing the Heads

ONE FAMILY PRODUCES DRUMS FOR ENTIRE BRITISH ARMY

Army pageantry would be incomplete without the crash of drums, and many of the drums of war are beautifully made and have painted on them the regimental crest or other insignia. Most of the drums for the British army for the past sixty years have been produced by a family of specialists in this work residing on the edge of the estate of the Prince of Wales. These men are adept at stretching vellum and obtaining the proper tension.

ACCURATE SHAPER FOR WHEEL OF WRENCH GRINDER C 523



Corrugated or ridged gripping surfaces for pliers and wrenches are usually formed with a grinding wheel, and to make accurate ridges, it is essential that the wheel be kept in good condition.

For this purpose a grinder is now offered with a precision wheel shaper which keeps the shape accurate at all times.

Nearly forty per cent of the people in the United States owe their living to industries that did not exist forty years ago.

*The Burlington Separator Co.
Box 304 Burlington Iowa*

*Messrs. Kennington, Lane, & Co.
Burlington*



These Young Jack Tars Can Do Everything on This Craft Except Sail Away; the Boat Rests on Land and Is Used in Training Sea Scouts

DRY-LAND SHIP AIDS TRAINING OF ENGLISH SEA SCOUTS

Training in various branches of naval work is given one group of English sea scouts on a dry-land ship. If the young sailors fall overboard, they land on the school lawn instead of in the water. The craft is fifty feet long and equipped with mast and rigging.

GOLD DEMAND OFFERS MARKET FOR OLD JEWELRY

One effect of the heavy demand for gold in this and other countries has been to bring old jewelry out of hiding. Trinkets of all kinds, including hundreds which have been passed down from generation

to generation, are finding a ready market and pocketbooks are being filled with the proceeds from keepsakes and knick-knacks of gold. Stores which buy nothing but old gold are springing up and canvassers are being sent from house to house in some sections to offer cash for the metal. It is estimated that every family has at least two dollars worth of gold jewelry in the house. By international agreement gold is valued at \$20.67 an ounce, and jewelers pay for it in the form of old jewelry at the rate of four cents per carat per pennyweight, or \$19.20 per ounce for twenty-four carat pure gold. One method of testing the percentage of gold in an article is to place a drop of nitric acid on it. Nitric acid on gold bubbles brown, on brass the same acid turns green. The darker the brown, the smaller the percentage of gold. The canvasser makes a rough guess at the weight unless he carries jewelers' scales.

His guess must be fairly accurate, however, for small trinkets weigh little, and if he pays too much the refiner does not make good the loss. The jeweler and refiner use the same method, but have accurate equipment. When using the acid test, they scrape an old gold watch on a testing stone. This leaves some gold markings on the stone. Alongside they scrape a gold needle, one of a set stamped accurately with its gold content. They pick the needle nearest the possible gold content, then apply the acid to both markings, and a comparison of color tells the value of the ornament. For gold of a higher content than fourteen per cent, a drop of muriatic acid is added to the nitric acid, the combination giving a more accurate result. No gold ornament is worthless.

at Cambridge Wells England.

Cont James Montague, 608
Harbour Commission Bldg.
200 Front St. Wash. D.C.

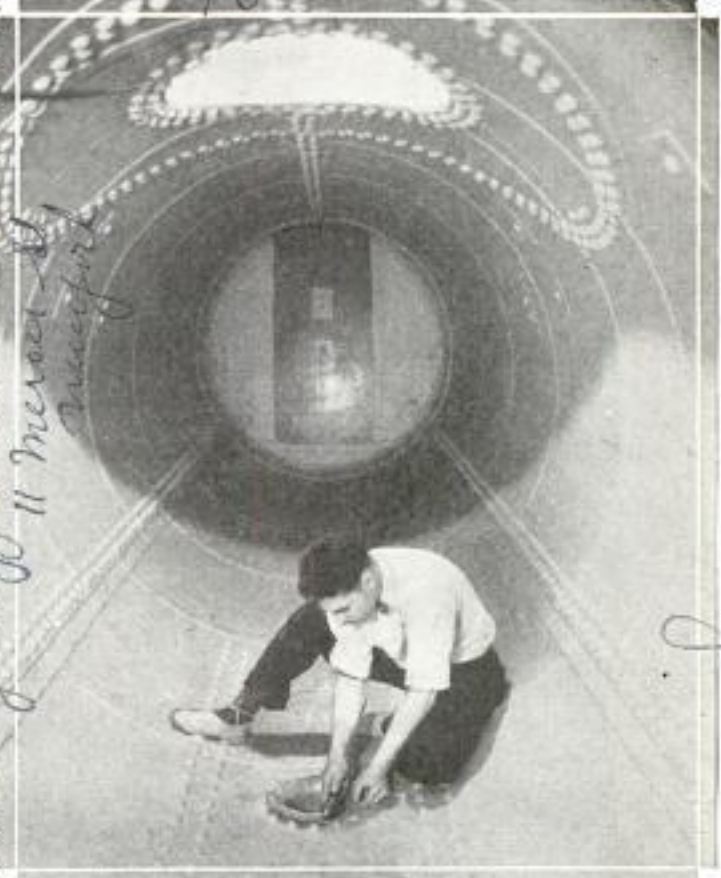
C195 General American

**HYDRAULIC PLANE BRAKE
WORKS LIKE AUTO
CLUTCH**

C482

Designed for airplanes but adaptable to autos, a new hydraulic brake has been found highly efficient in tests. The rating is ninety-seven per cent, as compared to about thirty-five per cent efficiency for average mechanical brakes. It is simple in construction, consisting of a series of alternate bronze and steel disks, which can be pressed together by an oil-operated piston controlled by the brake pedal. Practically all wear is borne by the bronze plates, which are easily replaced. This brake has 350 inches of braking surface, compared to seventy-two for a hand-type brake of comparable size. An oil pressure of 150 pounds operates the mechanism, instead of 600 or more for other types. Greater smoothness, reserve power and instantaneous release are some advantages. Of importance in airplane service is the fact that the brake is housed in the outside hub flange where heat is carried away without damaging the tire. No special landing-gear design is used.

Rubber lining suggested American Hand Rubber



Placing Acid-Proof Rubber Lining inside a Tank Car; the Rubber Is Shaped by Hand over Rounded Rivet Heads

Tank Car Corp
230 S. Clark
Chicago

**TANK CAR LINED WITH RUBBER
CARRIES ACID SAFELY**

Because hydrochloric acid eats through steel and other metals, twelve-gallon carboys of glass have long been used in transporting it. Recently, however, rubber-lined tank cars have been employed to carry 8,000 gallons at a time. The interior of the tank is sandblasted smooth and three coats of liquid cement are applied. Then acid-proof rubber, one-fourth inch thick, is cut to measure and laid on the metal. The rubber is shaped by hand over each rounded rivet head, after which all openings are closed and steam pressure applied to cure the rubber lining.

My Journal Volume 4/1/33



Increased Efficiency Is Claimed for New Airplane Brakes; Photos Show Simple Construction

**ICE UMBRELLA FOR PROPELLER
PROTECTS PLANE C 569**

Overcoming the last ice peril of flying, an umbrella that fits in front of the propeller prevents formation of ice on the hub and blades. The first development in protection of planes from ice was an "overshoe" that fitted on the wings.

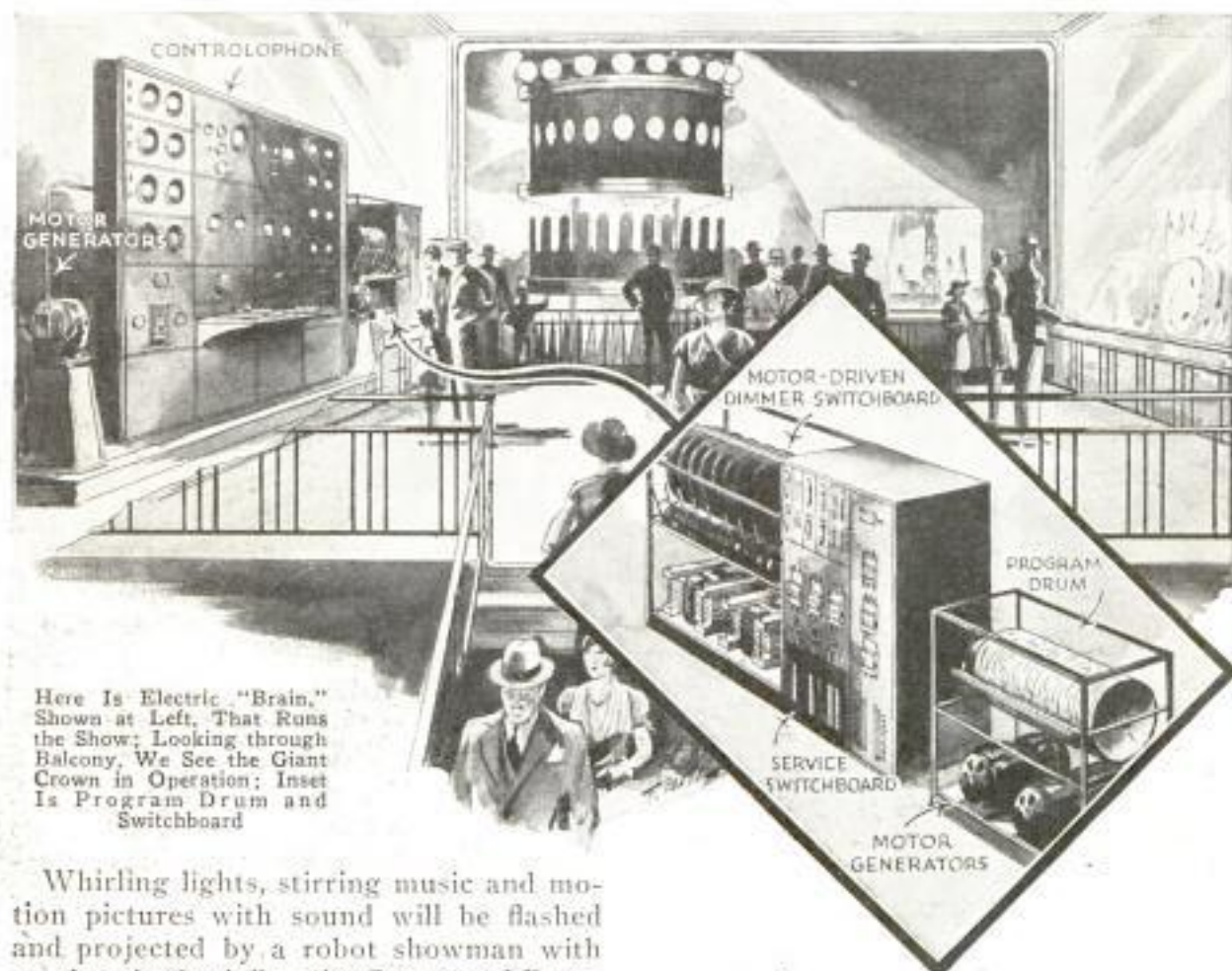
Report by Dr. William Scott
and Dr. W. C. Free, Cornell
with assist. Daniel S. ...

Robot Showman Flashes Lights and Talkies



Artist's Representation of Twenty-Eight-Ton Crown That Will Give an Entire Show; Insets Show Some of the Interior Construction of the Robot

Electric 'Brain' Runs Projectors in Big Crown

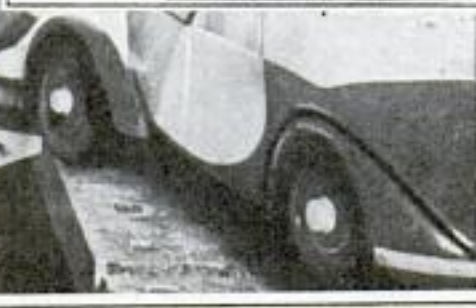
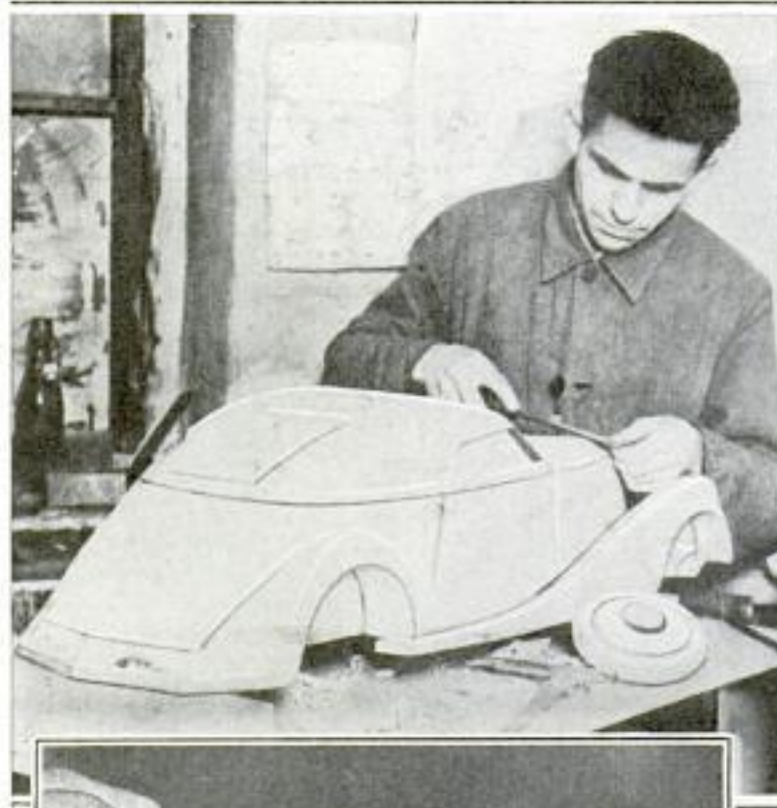


Here is Electric "Brain," Shown at Left, That Runs the Show; Looking through Balcony, We See the Giant Crown in Operation; Inset Is Program Drum and Switchboard

Whirling lights, stirring music and motion pictures with sound will be flashed and projected by a robot showman with an electric "brain" at the Century of Progress exposition. Under the great dome of the Travel and Transport building, a giant red crown will house the projection room and equipment for telling the story of oil with film, sound and huge electric lamps. On the balcony overlooking this marvel will be the electric brain which directs the show. Constructed of steel, a base supporting the twenty-eight-ton crown will rise forty feet above the floor. The upper part of the base will be divided into three sections, each containing an electric bulb of ten kilowatts power. Through stenciled designs, the giant lights will cast colored light patterns on the canvas-covered sides of the domed structure. In the base of the crown will be twenty-four lights, alternating with twenty-four loud speakers from which will come voices and music. Within the crown will be four movie projectors to project on separate screens. Outside the crown and rising to the cross at the top, crown jewels of light will glow. The exhibit, built for the Standard Oil

company of Indiana, will be controlled by an electric brain, called the "controlophone." This device gives each mechanical and electrical actor in the show his cue by means of motors, a program drum and a large switchboard. As the program drum turns, irregular ridges on the outside of the cylinder trip small mercury switches, causing the electrical switchboard to operate. Thus, each light comes on at the right time, each voice is heard at the proper moment and the movie projectors are started. The show opens with especially composed music. As this overture closes, movie projectors throw on the screens a whirling pattern of light which resolves itself into the word "oil," seeming to burst in the spectator's face. Then talking pictures tell the story of oil's uses from early times to the present and show hundreds of ways in which oil smooths the way for world commerce. Except for operators in the projection booth, the exhibit will be entirely automatic.

C 485



Below, Shaping an Auto-Body Model in Dough Preliminary to Creating Tiny Replica of Design for a New Car

AUTO MODELS MADE OF DOUGH IN CREATING NEW DESIGNS

In creating new automobile bodies, designers work with small models which are first formed with a sort of kneading dough. This dough is carefully shaped until the design is symmetrical and meets the specifications, then the dough model is used in creating a tiny metal replica of the car. After that it is a relatively simple matter to enlarge the size of the model to the requirements for a real automobile.

SUN TO BE COOLER TWO YEARS SAYS WEATHER OBSERVER

For two years the average radiation of the sun into space, from which the earth obtains the heat and light which make life

possible, will be below normal. That is the forecast of Dr. Charles G. Abbot, who has made an intensive study of the relationship between the sun's "weather" and that on the earth. While this relationship is believed to be very intimate, it is so complex that it is not possible to make valid deductions from one to the other. So, Doctor Abbot points out, the

prediction has nothing to do with the earth's temperatures. Two years ago he forecast that the solar radiation would be above normal and the sun, as he predicted, has given out considerably more heat than normally. The fact that there will be a consistent lowering of solar radiation hardly can help having an effect on temperatures on earth. This does not mean, however, that there will be two cold years. Complex as is the sun's weather, the weather on earth is vastly more intricate. It is affected by mountains, deserts, vegetation, oceans, ocean currents, snow, clouds, humidity and winds. If Doctor Abbot can forecast accurately the influence of solar radiation on the earth's temperatures, he will have solved a problem, one that now prevents the meteorologist from reaching valid long-range forecasts.

Secretary Smithsonian
Institution Washington
D.C.

German idea.

C 543

My Times
3/29/33

B3 2192
Edgar Nelson
153 Kearny St.
San Francisco 865
Calif

**WEATHER IS BIGGEST FACTOR
IN EARTH'S LIFE** c 620

There is no such thing as bad weather. It is nothing more than a superstition created by people who do not like rainy days, according to Dr. James H. Scarr, meteorologist of the New York office of the U. S. weather bureau. Weather is the perfectly harmonious operation of natural laws, Doctor Scarr says, and instead of there being bad weather, it is just a different kind of good weather. Without the rain, and its accompanying clouds, there would be no rivers, lakes, vegetables, in fact, no life. Doctor Scarr calls weather the greatest physical influence in the world.

**GREEN-RUBBER TENNIS COURTS
HAVE EFFECT OF LAWN** c 397

Green rubber is being manufactured in a porous compound for surfacing tennis courts, imitating lawn tennis grounds and giving a restful effect. The material is supplied in bulk to be broken up, sieved over a prepared bed and rolled until it is smooth and even. With white playing lines inlaid, the court requires little attention. While the rubber-coated court is classified as hard-surfaced, it has much of the springiness of natural turf.



Top, Tennis Court Laid Out; Bottom, How the Surface of Green Rubber Is Applied



Grill of Scroll-sawed Wood Has Surfacing Treatment to Make It Appear Like Metal

**WOOD IS FINISHED LIKE METAL
BY SURFACING PROCESS**

Wood or wallboard can be given a metallic appearance by a surfacing process which enables a rustic iron, or other metal, decorative appearance to be applied to scroll-sawed wood. Without close examination, such a partition appears to be of heavy metal, although it is so light that a child can lift it. Even hinges can be made convincing by making them of paper and treating them with the metallizing process. All kinds of signs, plaques, shields and partitions can be made in this manner.

HOW PLANE IS LANDED ON ICE c 507

Pilots at Selfridge field have developed a new technique for landing their fast pursuit ships on the ice in winter flying. These planes are equipped with skis and on smooth ice sometimes coast for hundreds of yards. To prevent this, the ships are landed in the usual manner, then the rudders are operated to cause them to skid around until they are sliding backward. A burst of the motor then stops such a ship within a few feet. Of course, this maneuver is never attempted except when the ice is smooth.

Yellowstone national park was once at the bottom of an arm of the ocean.

Taken over by - Simppler Hard Courts, Ltd.
1370 Victoria St.
London, Westminster S.W. 11
No. 1 agent for
England

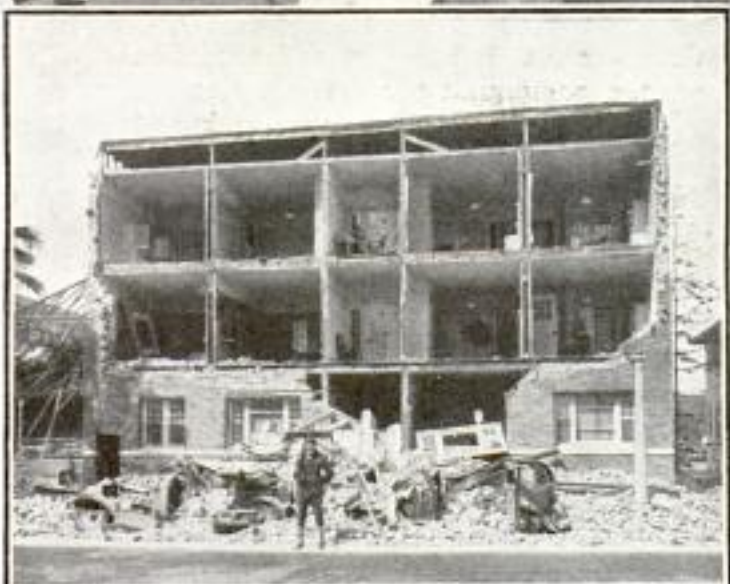
Com. H. W. Ferguson
Randolph Field
1933

Porcher Hard Courts, Ltd.
Burlington Road, Leighton
Bourne, Bedfordshire, Eng.

C 435

2739 Argemone Ave.
Los Angeles, Calif.

Five Seconds' THOUGHT



By JOSEPH D. MOUNTAIN

WHAT would you do if an earthquake suddenly rocked the floor under your feet? Or a tornado sucked at your home with black funnel lips? Or a typhoon hurled its rending fury against your ship? Or a rip tide dragged you to sea?

If you allowed your natural instincts of terror to grip you, panic would either paralyze you or throw you into foolishly dangerous action. You might even die of "heart fright." In the recent California earthquake, twelve persons succumbed to heart failure produced by terror.

Panic, or ignorance of what to do, which is a breeder of panic, swells the lists of dead in every disaster. Nowhere is mob instinct more self-destructive. Some years ago the "Eastland," a Great Lakes excursion boat, carried her jammed hundreds to one side of the deck, and the great ship rolled over into the Chicago river.

The life guards at Santa Monica beach, California, say that practically all the

Above, Emergency Wireless Station Set Up by Navy Sending Out News of California Earthquake; Below, House Wrecked by Quake; Note That Damage Was Outside

drownings from rip tides are the result of panic. The ordinary swimmer, unless so frightened that he threshes away his strength in fighting the tide, can safely ride that tide and then gain the beach.

In the southern California earthquake, the majority of deaths resulted from the first panic that a catastrophe always produces. Most of those killed and injured were crushed by falling masonry as they rushed into the streets. The appalling list of casualties was many times greater than it would have been had each person thought for five seconds. That brief flash of clear thinking at the beginning of any catastrophe is the safest insurance against

may SAVE your LIFE!



Above, Red-Cross Relief Station in Quake Zone; Below, Guarding Property and Refugees after the Southern California Earthquake

death or injury. Psychologists have discovered that panic spreads in unorganized groups, in which no one has a feeling of group responsibility. Reason rather than instinct rules in bodies controlled by some authority. Unless, then, you are a part of a disciplined body, such as police, army or navy, it is safer, in a disaster, to remain by yourself than to rush to your neighbors.

In spite of the dangers from falling stones, people flocked into the business district of Los Angeles on the night of the earthquake. Police combated this herd instinct to the best of their ability, but despite their efforts, three unnecessary deaths were caused in Los Angeles by panic. As soon as organized authority, the police, had closed the theaters and cabarets and calmed the panic-stricken crowds, no more deaths and few injuries occurred. Although large contingents of the army and navy were stationed in the Long Beach area, there were only two casualties in the service. This can only be attributed to the fact that reason, and not instinct, prevailed.

C935



the instinct of panic, remained in his shop and escaped without a scratch.

Two doctors, by coolness of thought, saved not only their lives but

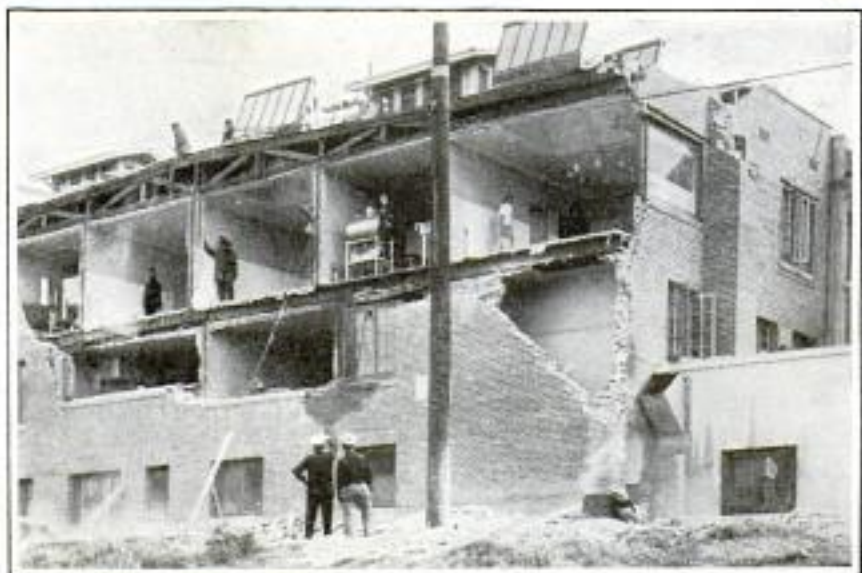
In less than three hours after the temblor had shaken down their houses and offices, while the people huddled in stark panic at the repeated shocks, the relief agencies were mobilized and in control of the situation. And so effective was organized effort that in forty hours the news was sent out that no more doctors or nurses were needed. Although some of the water mains burst, the fire department, reinforced by Los Angeles companies, effectively prevented the spread of fire and terror. For two days following the quake the army air corps reserve kept observation planes patrolling the devastated area for fires. Organizations where thought, rather than instinct, ruled, extended a strong arm to the panic-stricken and unorganized victims.

A few seconds of thought saved many lives. A butcher in Long Beach had two customers at the moment of the shock. Both were gripped with panic and fled, the woman out of the front door straight into a raining mass of bricks that crushed her, and the man out the back door into other falling stones that broke his back. The butcher, whose reason overcame



Top, Preparing Food for Refugees in the Army's Portable Kitchens; Right, Part of a Long Beach High School Damaged by the Temblor

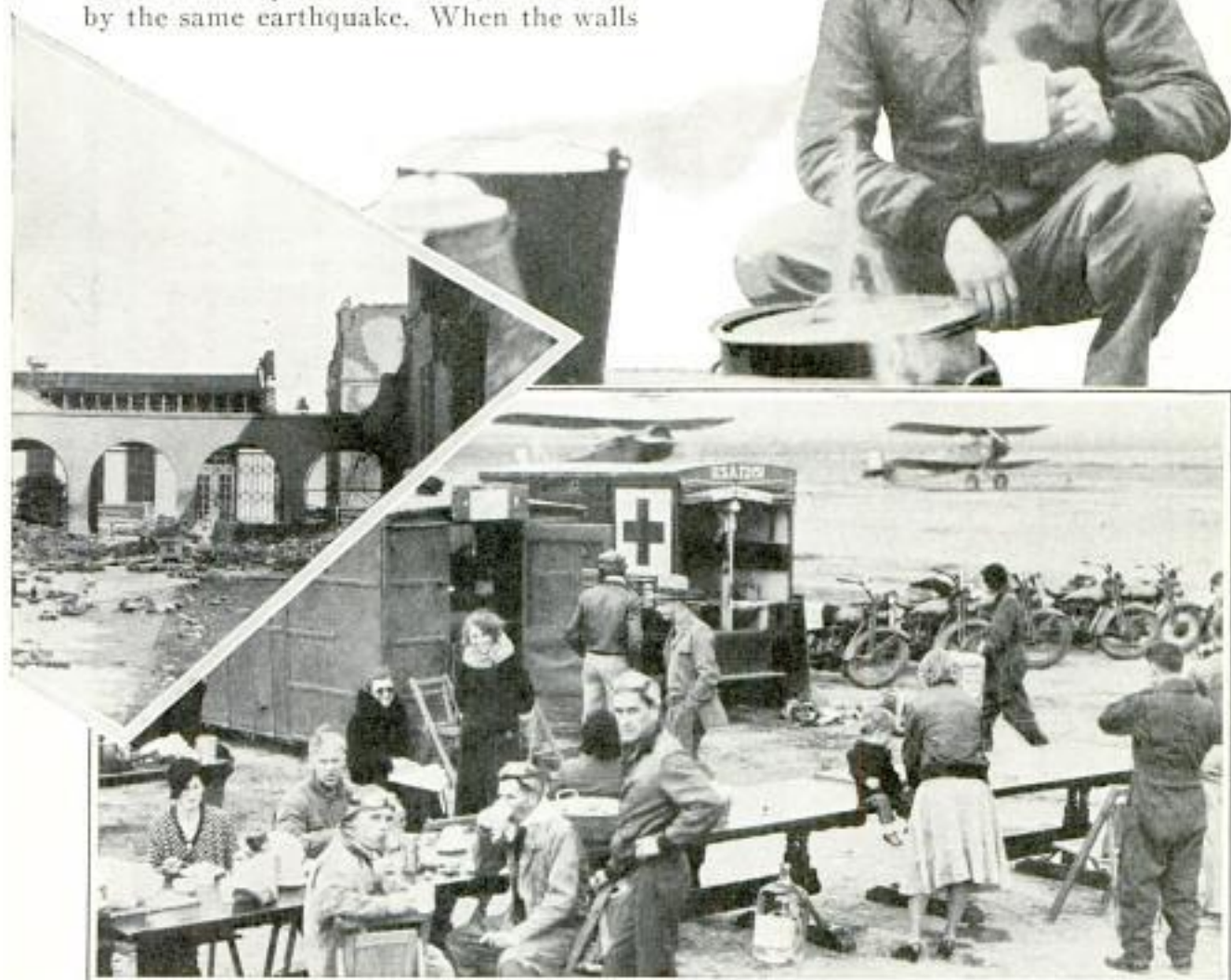
the lives of their patients in the Seaside hospital at Long Beach. One was attending a maternity case. Suddenly the room shook. In the confused terror of the next few moments, the doctor pushed the delivery table out of danger and probably saved the life of both mother and child.



Long Beach Hospital Wrecked by Quake; Two Doctors Performing Operations Here During Quake Saved Their Patients' Lives by Their Calmness

In the same hospital another doctor was performing an operation upon a small boy. As the walls crashed about the operating room the doctor stilled the panic, pushed the table into a safe corner and successfully completed the operation.

Five seconds of thought may save your life just as it saved the lives of many patrons of the Lynwood theater, demolished by the same earthquake. When the walls



Above, One of Pilots Who Patrolled the Quake Area Watching for New Fires or Damage; Below, Pilots of Army Air Corps Reserve Getting Lunch between Patrol Flights of Devastated Area

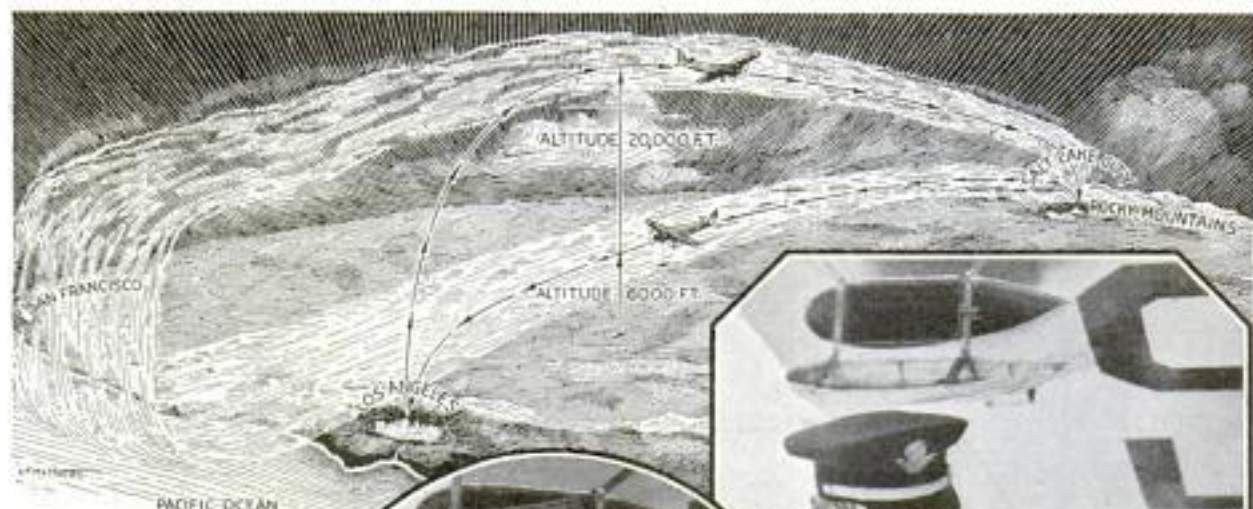
began wavering, the people sprang from their seats to stampede the door. The owner, by instant presence of mind averted the rush, and cleared the theater in an orderly way. Not a patron was injured.

Not long ago, a ship off Burma, jammed with Chinese coolie passengers, with Chinese for a crew, was caught in a typhoon. The crew deserted their posts and the British tar who wore the captain's stripes, found his ship being pounded to pieces. He quieted his excited mates, armed them with revolvers, and drove the Chinese back

to their posts. With order restored he brought his ship through the typhoon.

If you would save your life in any disaster, think five clear seconds, avoid a feeling of consternation, and act with reason, not with instinct. Then when panic grips the crowd, act to prevent a self-destructive hubbub. Although more than a hundred were killed in southern California's catastrophe, thousands were saved by quick, intelligent, reasoned action by soldiers, sailors, marines, and other organized bodies trained to orderly thought and action.

Circular Air Current Speeds Planes in West



Top, How Same Wind Helps Planes Going in Opposite Directions; Bottom, Two Views of Instrument Used in Seeking Secret of the Phenomenon



For several years pilots for Western Air Express, flying between Salt Lake City and Los Angeles, have been puzzled by a strange phenomenon which added to the speed of their ships. They noticed that planes from Los Angeles often encountered tail winds at high altitudes while ships headed in the opposite direction had tail winds at lower altitudes at the same time. The phenomenon was noted so frequently that the pilots were convinced it was not a mere atmospheric freak, so the meteorological department of the air line brought the facts to the attention of the research departments of the California Institute of Technology and Scripps Institute of Oceanology. Today the three organizations are carrying on experiments to determine whether Utah, the northwestern tip of Arizona, Nevada and southern California constitute one of the three known "closed-circulation" areas in the world. Such an area is one in which a cold influx of air travels to a warmer section, usually an ocean, where it is warmed and then rises to high altitudes to return to its source. It is believed the cool air from

the Utah plateau sweeps across the Great American desert at altitudes below 6,000 feet, and upon reaching the ocean rises above 20,000 feet, then returns to the plateau region, descending upon cooling and repeating the process. Norway and Greenland are the only other known places with closed-circulation areas. If the theory is proved true for the Pacific coast, the results will be of great benefit to southern California agriculture, since it is claimed weather can be forecast much further in advance. Aviation will also be aided through a more accurate forecasting of tail winds, although this benefit may be offset somewhat by inability of present types of ships to fly at altitudes over 20,000 feet. To check the theory, a German instrument, the "aerometeorograph," which automatically records humidity, atmospheric pressure and temperature, is carried on the wing of each Western Air plane.

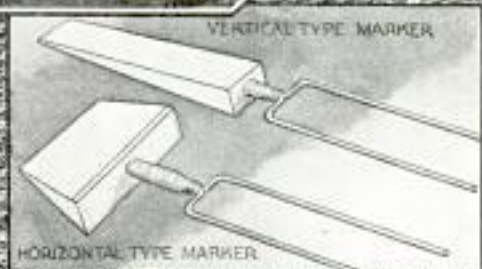
*C 215 Spencer Leys Co
19 Hoat St
Buffalo, N.Y.*

A revolving drum inside each instrument is covered with metallic paper which records the movement of actuating pens. Inside the streamlined box are human hairs which take the atmosphere's moisture content, two metallic strips with different rates of expansion and contraction to take the pressure, and a simple barograph to record pressure.

C 457

FLEXIBLE MARKER FOR GARDEN

Nursery row markers mounted on flexible springs can be left in position when cultivating as they are not damaged when struck by cultivators or other implements. The wooden marker is attached to a rustproof spring base which in turn is fastened to two prongs. Even if run over by a wagon wheel the marker springs back to the erect position. The faces of both horizontal and vertical types are beveled, making the lettering easy to read from a standing position.

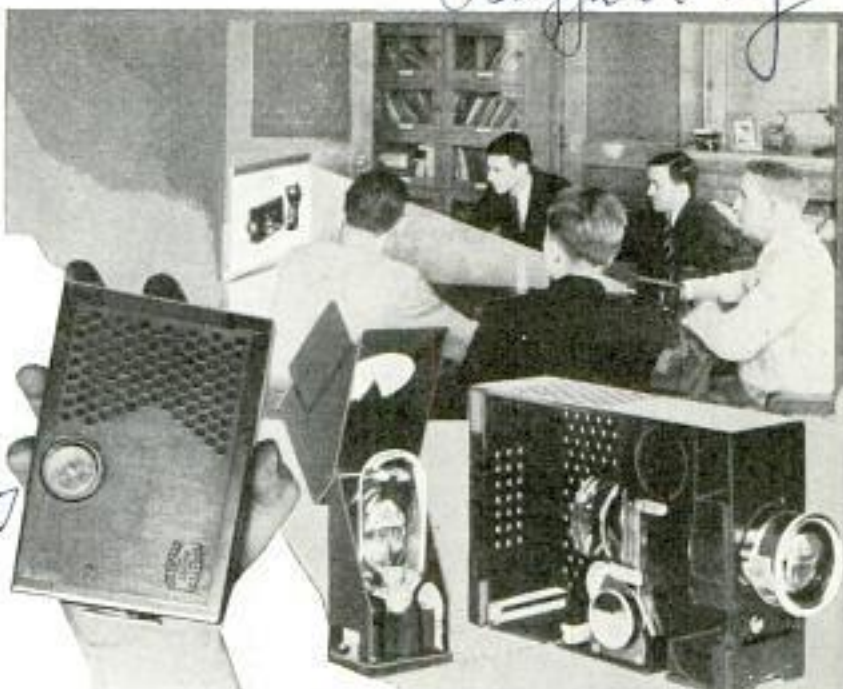


ONIONS

PEAS

When This Marker Is Struck by Cultivator, It Bends and Then Springs Back into Position

*Mark. N. Tell
6641 Bramble
Cincinnati, Ohio*



Left, Small Projector Fits Palm of Hand; Right, Close-Up of Open Projector; Top, the Device Flashing Slides on a Screen

MIDGET FILM-SLIDE PROJECTOR FITS IN PALM OF HAND

Small enough to fit into the palm of your hand, a midget projector for film slides has been produced. It resembles a small cigar box and weighs only twenty ounces. The lens is flush with the case when not in use, being pulled out when the projector is to be operated. A fifty-watt lamp slips into place on grooves, while access to the lamp or other parts is easy, one side of the case being removable. A focus-adjusting wheel makes possible the projection of very sharp images.

SKIN IS SPRINKLED LIKE SALT IN NEWEST GRAFTING

C 875

Skin is sprinkled on a wound like salt from a shaker in the latest method of grafting. This process has been developed by research workers of the University of Cincinnati college of medicine. The skin, ready for grafting, is ground and put into a modified shaker, then sprinkled over the spot where new skin is desired. The powdered skin grows and spreads and the method corresponds to sowing seed rather than transplanting a tree. Apparently it makes no difference whether or not the skin falls "right side up." Heretofore, it has been the practice to cut layers of skin and fit them over the damaged area.

Cincinnati, Ohio

Chicago Ill. 9/11/33

SOUND BEACONS MARK AIRPORT FOR PLANE LANDING IN FOG



How Sound Beam Guides Airplane to Earth; Note Three-Horn Arrangement on the Sender

Blind landings in fog will be made easier by the use of sonic marker beacons that designate the boundaries of an airport. Three high-pitched whistles, mounted in megaphones, send out fan-shaped beams of sound. The signals are coded by interrupting the air supply, thus giving the pilot additional information and halving the air consumption of the beacon. The device, developed by Chester W. Rice of the General Electric company, may be mounted on a truck for portability or permanently located on the landing-field boundary. Clear reception of the signals without the aid of listening equipment was recorded at 800 feet in a cabin plane in one test. With listening equipment, the signals were distinct at 2,000 feet. When two beacons are used, the signals can be so arranged that they would combine to form a single note when the plane is equidistant from the boundaries.

An aviator is guided to the airport by the radio-beacon system from a distance of five to ten miles. Selecting an altitude of 2,000 feet, he is held by the radio beacon on a line over the center of the field. When he comes within 500 feet of the boundary, he hears the first of the sonic marker beacons. Then he passes into the middle zone and hears the second beacon. Circling, and coming back twice more at 1,000 feet and then 500, he gets an idea of the size of the field, and is able to land by approaching at an altitude of 250 feet.

WASTE PAPER MADE LIKE NEW c427 BY DE-INKING PROCESS

Waste paper can be turned into newsprint and other forms of reclaimed paper by a de-inking process that is being used on a commercial basis. The process makes possible the removal of carbon ink, either black or in colors, and rotogravure ink from ground-wood waste paper and the conversion of that paper back into newsprint. Tests of pulp manufactured from old paper de-inked show that it meets all requirements of the United States bureau of standards of newsprint pulp. No cooking is required and shrinkage is said to be relatively small.

CARRIER FOR STORAGE BATTERY c465 GRIPS POSTS FIRMLY

Storage batteries of the latest type can be carried easily by means of a new device that grips the posts firmly. In using the carrier, the chucks are dropped over the posts. Lifting the strap causes them to take hold immediately. Six equal contacts on the posts prevent damage to the soft lead, in addition to providing a safe grip. The chucks can be released from the battery posts only by lifting the inner shell with the fingers.

The carrier is made of aluminum bronze with a strap of two-ply rubber-covered belting. The rollers are hardened steel.



The Sagitt Co. Inc.
Rockford, Ill.

Schemes by New York

Made by Paul Bigot, noted C459
architect



Wide World

Large Pieces of Plaster Are Fitted Together Like a Jigsaw Puzzle in Constructing This Model of Ancient Rome; Famous Buildings and Streets Are Shown in Relief

JIGSAW MODEL OF OLD ROME THIRTY-FIVE FEET LONG

Consisting of about 100 sections, a plaster relief model of ancient Rome has been presented to the Pennsylvania museum of art. The model, which is put together like a jigsaw puzzle, is thirty-five feet long and twenty-one feet wide.

piece to the edge of the rumble seat. The canvas cover is pulled up and forward to attach to four snaps on the rear of the auto top. A window in the curtain offers the driver full use of his rear-vision mirror with the rumble top in place, and side curtains complete the job. It is claimed

RUMBLE SEAT TOP ON ROLLERS SUPPORTED BY LAZY TONGS

C469

For the auto rumble seat a "window-curtain" top is now offered which is wound, when not in use, on a roller like a curtain roller, and which is lifted into place on a pair of lazy tongs. Brackets into which the tongs collapse are bolted near the rear fenders. Tops of the tongs are connected by a bar over which the canvas cover slides. A bracket for holding the roller on which the canvas is wound also extends between the two. To set up, the bar is pulled up, thus extending the tongs. A metal piece keeps the tongs from collapsing and further rigidity is obtained by securing a second metal



Canvas Top Is Shown in Place, Buttoned to Auto Top and Supported by Tongs

the top can be raised into position in about half a minute.

Rumble Roller Weather Top Co. Lowell Mass
Sidney Ostroff 65 Middlesex St.

• • • STUNTS with



This Little Girl Is Admonishing You to "Speak No Evil, See No Evil, Hear No Evil"; It Is Easy to Make a Triple Exposure Like This, Giving You a Three-in-One Picture

CAMERAS are much too well behaved. The average amateur photographer's instrument leads a prim and faithful life, photographing what appears before the lens and in truth performing a very important function—giving pleasure in the form of gay picture records of past events.

The only complaint might be that this same average camera doesn't do all it can do. Even the simplest camera is really a versatile device, capable of effects and tricks to provide entertainment for the photographer who decides to go exploring with the familiar instrument that lies in the table drawer of so many homes—exploring without even leaving the premises. The camera that

goes in for a career of intelligent misbehavior offers a brand-new set of picture possibilities.

For instance, most anybody can photograph living people—but imagination is required to photograph ghosts. Students of the supernatural have long debated whether or not spirits can be caught by a camera. Well, there's a chance for the amateur photographer. He may not photograph genuine, air-floating spirits, but his friends won't be able to prove that the ghostly figure in his picture was not a spook, but only a well-executed photographic trick.

Triplets don't come in many families, yet the prankishly minded photographer



Right, the Set-Up for Making a Realistic Bear Picture, Using Nothing but a Toy and a Few Props; Left, the Result; in Center Is a Similar Set-Up for an Elephant Picture

your CAMERA . . .

can produce three of a kind in a picture from any family.

Hollywood regales the public with hair-raising railroad wrecks in scenes that never happen. The home photographer can do the same thing if he has a toy train, a camera and a flair for getting effects with hand and lens.

How?

Ghost photography is simple enough, like many worthwhile tricks. Here's the scheme. When the door rattled downstairs last night, maybe it was the wind—or maybe it was the visitor shown in an accompanying picture. If the photographer was hiding close by, he had no trouble in photographing what went on. He need not tell that he made a double exposure.

First he photographed the door, just as if he were "shooting" that and nothing else. Then, without moving the camera or winding the film, he dressed a confederate in a sheet. This entirely material ghost took up his position at the door, and the picture was snapped again—this time with the shutter set for only half the exposure time required to make the photograph of the door. You see it is just as easy to make a double exposure by meaning to as



This One Was Easy; the Camera Was Set on the Ground, Pointing Up, and the Girls Were Bending Over, Looking Down at the Lens

it is by forgetting to wind the film. If double exposure on one film can create specters out of nowhere, it shouldn't be difficult by the same means to do all kinds of tricks with living people. Is there a baby daughter who is so charming that you would like to have three of her? The kodak will produce the three—in one picture.

First hang up or find a plain, dark background, preferably black, and without any markings to distinguish one part from any other part. If the background is a dark



Perhaps the Eye of the Camera Never Lies, but You Would Not Know It from These Pictures; Anything from a Yacht to an Auto Wreck Can Be Made with Table-Top Photography



volved. Each placing of the child in the finder should avoid overlapping the space representing an adjoining image.

The result—obviously, triplets having their picture taken. If the background is dark and plain, the area of the background in front of which the brightly dressed child stood for the first exposure will not obliterate the figure on the film when the little girl moved over for the second and third exposures.

There is hardly any limit to the number of tricks that can be done by double exposure or multiple exposure, when photographs are taken against the kind of background described. If the placings of the



Top, an Animal Shadow and the Inventor; Center and Right, Examples of Unusual Camera Angles

cloth, it should hang entirely free from wrinkles. Dress the child in fairly bright clothes—white or light blue, by choice. Then comes the exposure in this case, not double exposure but triple exposure.

Focus the camera, which must be on a tripod or some other firm support. Have the child stand in front of the background in such a position as to appear toward one side of the finder. Then snap the shutter. Without winding on the film, and with care not to move the camera, direct the child to the center of the finder, and snap the shutter again. Repeat the same procedure for the other side of the picture. Each exposure should be of the proper length of time to take the picture if no "funny business" were in-



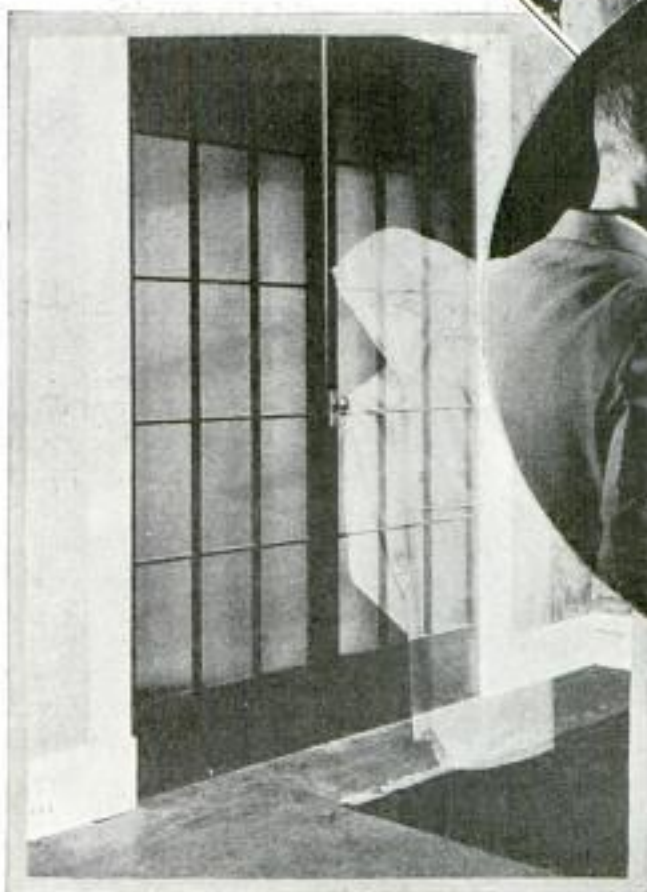
subject are carefully measured, it is perfectly possible to show one's best friend offering himself a cigaret; or to show him squaring off for a boxing bout with the other half of his "dual personality."

A mirror is the important "property" in another type of camera stunt that is less



Above, with the Subject Facing a Wing Mirror, a Picture Can Be Made Offering Back and Front and Two Side Views

Above and at Left, a Mirror Gives the Effect of Double Exposure, and also Gets Away from an Appearance of Posing for a Picture



In Circle, This Clever Double Exposure Shows the Man Boxing with Himself; Left, a Ghost Picture, Made by Photographing the Door Separately, Then Without Moving the Camera or Winding Film, Making Second Exposure with the "Ghost" in Position



Above, Semi-Silhouette Which Won \$3,000 in Kodak International Competition; Left, Examples of Silhouette and Table-Top Photography; Below, Set-Up for Silhouette

deceptive than interesting. The subject of a mirror photograph appears in the picture twice, as in a double exposure, but the sense of wonder on the part of persons seeing the picture gives way to admiration for an attractive and ingenious portrait. This sort of photograph gets naturally away from stiff, "posed" portraiture, and it is refreshing to see—when the camera has been placed in the proper position at one side—a profile of the subject along with a front-face view in the mirror.

Is this difficult? No more difficult than any amateur camera portrait. Only one unusual thing must be kept in mind. In calculating the distance for focusing on the image in the mirror, remember to add the distance between the mirror and the subject's face to the distance between the mirror and the camera's lens. It is easy to understand that the light rays are making a round trip, and that merely the distance from the camera to the mirror is not the correct focal distance. But when it is desirable to have both images in focus—the one in the mirror and the one in front—"stop down" the

c 411

c 424 *Dr. Hans Olesert*
*Engineer at**Cologne - Braunsfeld*
Esernang

lens to increase the depth of focus and set the pointer on the focusing scale between the proper distances for the two images.

A variation of the mirror type of portrait is one in which the subject faces a wing mirror. The mirror wings then add, to the back and front views, two side faces in the same picture.

Remember what fun it was, in childhood, to cast animal shadows on a wall by holding the hands in strange ways in front of a light? Well, there is even more entertainment in doing the same thing for the camera, because then the shadows will "keep." The stunt can be done indoors, with some such light source as the photoflood or a photoflash lamp, or it can be done out-of-doors in bright sunlight if the sun is shining from one side. No special technique of the camera is required to make such a photograph. At the choice of the photographer, the picture may include either just the shadows on a light wall or both the shadows and the person whose hands are making them.

What about some queer "camera angles?"

Pictures taken from near the feet looking toward the head can give very much distorted perspective, with rather shocking results. But a more elaborate trick in unusual angles is done with the camera set on the ground, pointing upward when the sun is not in a position to shine into the lens. A group of five or six persons should surround it in a circle, joining their arms, bending over, and looking down. A "self-timer" attached to the instrument clicks the shutter at the right moment. The picture quite baffles attempts to guess the position in space occupied by the circle of subjects, a human rosette seeming to stand nowhere.

One precaution is necessary in taking this picture. The group should stand on a

(Continued to page 118A)



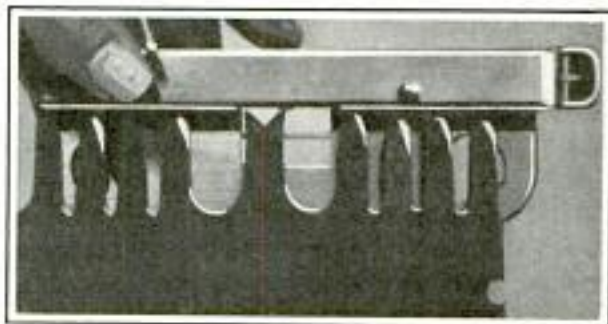
Water Containers for Desert Regions Divided into Sections; It Is Claimed This Form of Construction Decreases Evaporation

WATER RESERVOIR FOR DESERT LESSENS EVAPORATION

Water reservoirs intended particularly for desert or arid regions, where evaporation is very rapid, conserve whatever water may be available by the shape of the tanks themselves. The circular containers are divided into sections, and it is claimed this arrangement decreases evaporation.

GAUGE SETS CROSSCUT SAWS FOR EFFICIENT OPERATION

Perfect adjustment of crosscut saws can be made with a combination set and raker gauge that simplifies saw-filing. The device is provided with a graduated scale system which indicates errors in adjustments to the thousandth part of an inch. Different adjustments for various kinds of saws and woods are possible.



Gauge That Helps to File Crosscut Saw Accurately; Marked Figures Prevent Eyestrain

W. A. J. Inghrid
R. B. H. Canada
Milner

C 479. d. w. Frank E. Beer,
2709 Waverly Drive
Los Angeles, Calif.

Herald Lechenberg
of Vienna and
Hella Woerle,
Stuttgart, Germany

880

POPULAR MECHANICS



Aluminum Alloy Canoe Eighteen Feet Long and Weighing Only Thirty-Five Pounds; It Is Intended to Carry a Load of 700 Pounds

BIG ALUMINUM CANOE WEIGHS ONLY THIRTY-FIVE POUNDS

Weighing only thirty-five pounds, an eighteen-foot canoe made of aluminum alloy has other advantages besides lightness. Its speed in the water is increased because of less "skin friction" and it is exceptionally sturdy. The boat is intended for a 700-pound load but actually will float 1,000 pounds.

THREE-HUNDREDTHS OF A CENT

4 AUTO'S COST PER MINUTE
Your automobile costs you .03 of a cent per minute or more each time it is halted by traffic lights. In addition, such delays cost you one-third of a cent and each of your guests a similar amount. If you and four guests are stopped one minute, the stop light has caused a loss of nearly two cents. These are figures compiled by S. Johannesson, New Jersey highway engineer, and based on a car costing \$900. If it doesn't last six years, the price of traffic stops goes up. If the \$900 car is operated twenty-four hours a day the year round, .03 of a cent is the minute by minute expense for interest, insurance, license, ga-

rage, taxes and depreciation a year. Gasoline burned is not included. If you don't drive your car that much, you have to charge more than .03 of a cent a minute at the stop lights.

533 BOMBAY TO BERLIN BY AUTO IN FIVE WEEKS

Back-tracking part of the route taken by the armies of Alexander the Great, two German motorists recently made an automobile trip between Bombay and Berlin, 8,000 miles, in thirty-five days. For the first time, an auto crossed the Persian salt desert, the Dasht-I-Lut, hitherto traversed only by camel caravans. In Asiatic Turkey, between Beirut and the Bosphorus, the adventurers were held to twenty-three miles per day by winter rains. On the other hand, they made 500 miles a day in the Syrian desert. Sixteen hundred miles of the trip were over roadless deserts, while for 2,000 miles, mule tracks formed the only trails.

401 METAL CORNERS HOLD PUZZLE FOR JIGSAW FANS



Sta. Put
Metal corners for holding the borders of jigsaw puzzles have been produced. The corners are in the form of right angles with sides long enough to be margin rules for the average-size rectangular puzzle. They are heavy enough to prevent disarrangement of puzzles after a border has been put together. In addition, the corners enable fans to work the puzzles at a slight angle.

Two rows of corn at a time are worked by a combination picking-and-husking machine that replaces several men.

Copyright 1911
Mrs. Abbott Midway
Chemical Co.
1911
Copyright 1911
Midway
Chicago, Ill.

see Oct. 1931 - 529
June 1931 - 928

Chicago Daily News
3/20/35

Lawyer Paul 2/26/33

Manufacture *c272*
does not want
name given!

COMPRESSED WOOD IS STRONG AS METAL

c434
Soft woods can be compressed into a product as hard as hardwood and as strong as certain metals. One process flattens the cellular structure, forcing out the air. In this form the wood is used for making light pulleys that will stand up under 2,000 revolutions per minute. Another compressed wood is that produced by rolling strips of fir through heavy steel rollers. The result is a wood having all the characteristics of fine hardwood, capable of taking a high polish. This material is finding use as flooring.

AILING FEET TREATED BY ROBOT *c408*

Doctors' methods of manipulating the feet to correct maladjustments are used by a new mechanical device. Operated by shifting the weight of the body at regular intervals to the foot under treatment, the orthopedic robot is said to help straighten bent toes and to force small bones of the instep into a natural position. Adjustable metal straps pull bent toes into position while a hard wooden knob rises under the instep, producing the arch. For strengthening weak ankles, both feet are placed in heel sockets and the weight of the body is shifted from one foot to the other. As the sockets are suspended on springs, the ankles are bent and straightened alternately.



Army Gunners Aiming at Dummy Airplane on Cable; Small Model Is Used to Give Effect of Distance from the Ground

CARDBOARD PLANES TEST AIM OF ANTI-AIRCRAFT GUNNERS

Cardboard airplanes attached to ropes suspended from a tall pylon are used to test the marksmanship of anti-aircraft gunners in Germany. Movements of the dummy planes are controlled by a "pilot" on a platform midway between the base and the top of the pylon. Gunners are given the impression of height by small-scale construction of the planes.

LARGER TIRES FOR AIRPLANES TO ABSORB HEAVY IMPACT *c511*

Sixty-pound tires, carrying only twenty-five pounds of air, have sufficient strength to take up an emergency impact of thirty-six and one-half tons, or nearly six times the weight of the United Air Lines' fast transports to which they are fitted. Larger and softer than any ever used by this company, the tires have a tread of fifteen inches. Low-pressure tires, together with special shock absorbers, are big factors in smooth landings and take-offs.



Here's How Toes Are Straightened by Mechanical Device; Other Foot Ailments Also Are Treated

Foot normalizer
Dr. J. J. Pullman
215 Warner Bros. Mountain Blvd
411 W. 7th St. Los Angeles, Calif

C 354 Cont. Thos. E. Stinson, Jr.
145 S. Spring St
Los Angeles, Calif.

Trick SHOTS with



Apparently Unarmed, This Detective Reveals Himself a Regular Walking Arsenal

THE day's news contains many interesting episodes in the see-saw war against crime. One recent story told of a furious running battle through city streets. Red flashes winked from the back of a speeding sedan as the occupants fired on the police. Half a block behind, an officer leaned from the side of the patrol car, steadied himself, and raised his gun. Then the bandit car swerved toward the curb. A chance shot had punctured a rear tire.

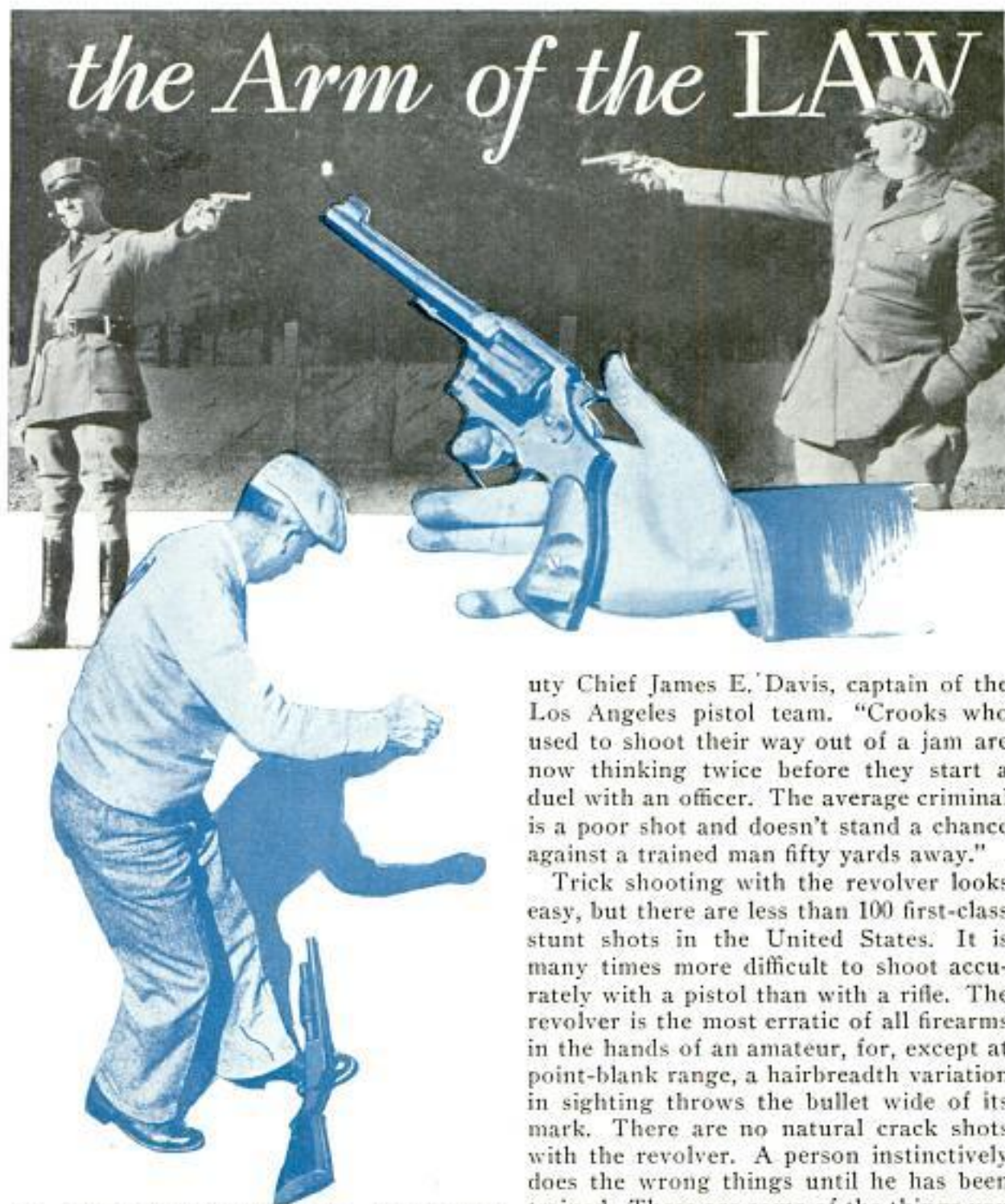
But was it a chance shot? You would say so the first time a tire is shot from under a runaway car. But you begin to wonder when you read other stories of spectacular shooting, for police are getting their men too regularly to put it down to luck. The truth is that the long-barreled service revolver in the hands of the police is finally outshooting the guns of gangland. The arm of the law has grown to be 150 feet long—the ef-

fective range of a revolver slug.

At the pistol range of the Los Angeles police department an officer casually raises his gun and puts five fast shots into the black heart of a target twenty-five yards away. Then he fishes a mirror from his pocket and turns his back. Sighting by the reflection he fires shot after



Above, Breaking Clay Targets, One of the Methods of Making the Police Good Marksmen When Firing at Moving Objects; Left, Small Automatic Strapped to Arm—Sometimes Gives the Under-Cover Man the "Last Word" in an Argument at Close Quarters



Top, Officers Shooting Cigars from Each Other's Mouths at Ten Paces; Right, Fingergrips Cut into Revolver Butt to Insure Holding It Steady; Below, Raising Shotgun with Foot to Aim at Clay Pigeon

shot into the bull's-eye. A brother officer steps on the range and lights a cigaret. The sharpshooter takes careful aim and dusts the ashes off the end.

"Hippodrome shooting is the best training for the time when an officer's life depends on getting his gun out in a hurry and scoring with the first shot," says Dep-

uty Chief James E. Davis, captain of the Los Angeles pistol team. "Crooks who used to shoot their way out of a jam are now thinking twice before they start a duel with an officer. The average criminal is a poor shot and doesn't stand a chance against a trained man fifty yards away."

Trick shooting with the revolver looks easy, but there are less than 100 first-class stunt shots in the United States. It is many times more difficult to shoot accurately with a pistol than with a rifle. The revolver is the most erratic of all firearms in the hands of an amateur, for, except at point-blank range, a hairbreadth variation in sighting throws the bullet wide of its mark. There are no natural crack shots with the revolver. A person instinctively does the wrong things until he has been trained. These are some of the things you learn from Chief Davis. Then he demonstrates what can be done with the weapon.

An officer who knows his chief's marksmanship holds a calling card edgewise between his fingers. Davis fires. The card, sliced in two, flutters to the ground. Holding a gun in each hand, Davis aims at two targets twenty feet apart. Firing both guns simultaneously, he hits each. He holds a gun upside down and makes hits at twenty-five yards. He punches the muzzle of



Top, Testing Trigger Pull; Circle, Handcuff Which Locks Itself When Slapped on Wrist; Below, Shooting at Target Which Comes into View Suddenly

the gun through a cardboard blind, lines up the target with his left eye, and runs up another string of bits. He blindfolds his eyes with a handkerchief and raises the gun. At a quiet word from an officer standing at his shoulder he fires and makes another "ten." Then someone tosses clay targets into the air and Davis pops them in approved trapshooting style.

"Stunt shooting is the post-graduate course on the pistol range," Davis says. "Accurate mirror shooting is hard because the natural tendency is to move the gun opposite to the direction your eyes tell you. Practice makes it simple. Shooting with the gun held upside down is easier when you make sure that the barrel is level with the ground. The trick in hitting two targets at the same time is in lining up the sights of one gun and holding it steady while you line up the sights of the other. Running up a good score while blindfolded is simple after you have really learned to shoot. The man behind you tells you where to point the gun, and when the sights are level, he tells you to fire. Slicing a calling card in two can only be done ten or fifteen feet away. It is only a question of

holding a perfectly steady aim.

"Trick shooting has a real value in police work. That an officer can hit a target nine times out of ten on the practice range is no indication he will shoot effectively in action. But the control over his gun he acquires in practicing trick shots gives him judgment and balance that stand by him in an emergency. A trained shooter instinctively takes a correct firing pose before pulling the trigger."

Not long ago an ex-convict killed a Los Angeles policeman from ambush. The ensuing manhunt narrowed down to one building, and two officers were



sent to get the man. He unexpectedly walked out the front door with another ex-convict as the officers arrived. On the command to throw up their hands, the two started shooting. One of the officers shot twice, wrecking a convict's gun with the first shot and killing him with the second. The other policeman shot once and killed his man. Neither officer was touched.

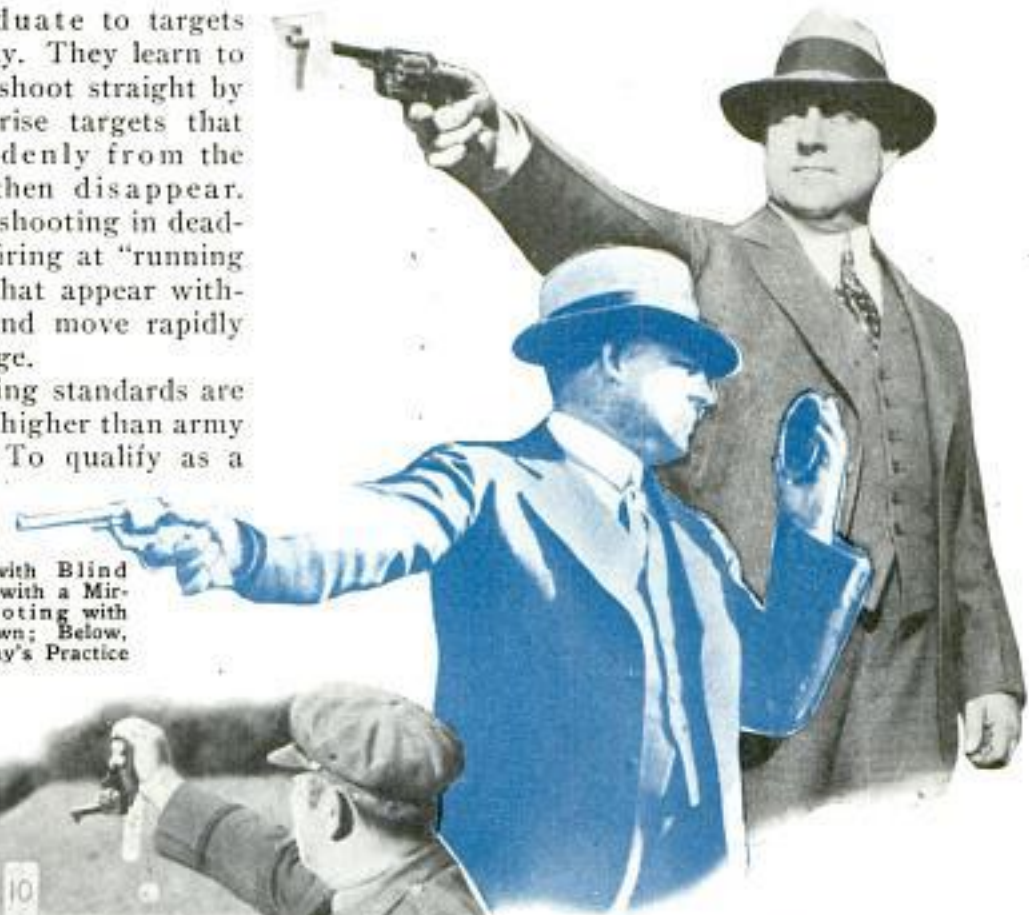
"Policemen must shoot straighter than soldiers," Chief Davis says. "A soldier can afford to throw away a few rounds of ammunition, but a stray bullet from an officer's gun might hit an innocent person."

To keep in trim, officers are required to practice every month. They begin by shooting at targets twenty-five yards away

and then graduate to targets fifty yards away. They learn to draw fast and shoot straight by firing on surprise targets that spring up suddenly from the ground and then disappear. They simulate shooting in deadly earnest by firing at "running man" targets that appear without warning and move rapidly across the range.

Police shooting standards are thirty per cent higher than army requirements. To qualify as a

Right, Aiming with Blind Front Sight and with a Mirror; Center, Shooting with Gun Upside Down; Below, Result of One Day's Practice



shooters make 320 points or better, and experts are required to score 360 points.

Police prefer the large .45-caliber revolver to other weapons because of the great shocking and stunning power of the bullet. The blow struck by the heavy slug is so great that a man hit in a leg or arm is usually knocked down. The bullet of the lighter .38-caliber gun carries accurately for a greater distance, but its disabling effect is less.

An officer in uniform usually carries his gun on the right hip where it is always ready for use. Undercover men may pack a gun under the coat in a shoulder holster. Occasionally a detective carries a small automatic, strapped low on his left arm. Nearly every good marksman has a pet weapon, and few of them will use a regulation revolver as it comes from the factory. One shooter roughens the thumb grip on the hammer, another reduces the trigger pressure to a weak two and a half or three-pound pull,

(Continued to page 118A)

marksman, an officer must run up a score of 280 points out of a possible 400 on the standard American revolver target at twenty-five yards. Scores are based on ten rounds of slow fire, ten rounds' time fire, ten rounds' rapid fire, and ten rounds' at a man-shaped silhouette target. Sharp-

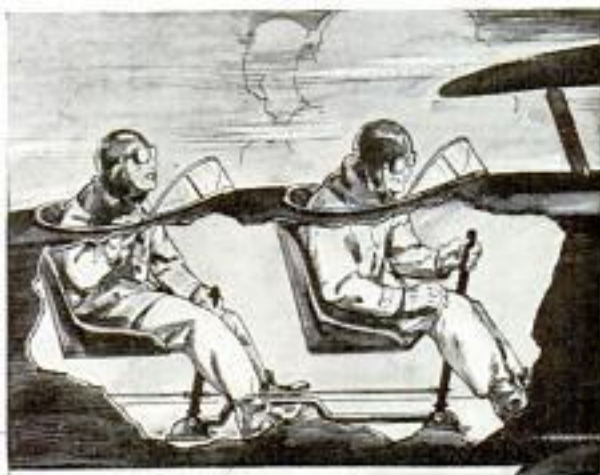
Prof. Wilhelm Hildebrandt
University of Duisburg,
Germany

RAT-BITE FEVER USED TO TREAT
BRAIN AND SPINE AILMENTS

Treatment of persons suffering from brain and spine diseases with rat-bite fever is advocated by a German professor. He has discovered that this method is the least dangerous and most effective for neuralgic and psychical ailments. Blood taken from fever-stricken mice and rats is injected into patients suffering from paralysis, serious disturbances of the motoric nerve system and other diseases of the brain and nerves. This serum contains a germ that produces extremely high fever. The fever, in turn, effects relief and possibly a cure. The professor says that the fever he produced is common in Japan.

SHORT STICK STOPS "FREEZING"
TO AIRPLANE CONTROLS

For training student pilots, a very simple change will make it impossible for them to "freeze" to the stick in a two-seater with dual controls. All that is necessary is to cut off the student's stick until it is only two-thirds the length of the instructor's control. With the longer lever arm of his control, the instructor can break the student's grip if the latter becomes frightened and freezes to the stick.



Instructor with Long Control Stick Can Wrest Control of Plane from Student with Short Stick

H. F. Wilbur, Jr. Lt.
H. W. Ferguson
Randolph Field, Texas

Clerey Instrument Corp
608-5th Ave
New York City



This Reading Glass Is Adjustable, Enabling the User to Read Entire Page at a Time

MAGNIFYING GLASS FOR TABLE
HAS ADJUSTABLE LENS

Fitted into a stand that rests on a table or desk, a new type of magnifying glass has its lens attached to an adjustable arm that may be set for focusing and for position. This leaves both hands free for working under the glass. An average-size book may be placed under the magnifier, enabling the reader to complete a full page without moving the book or the glass. Pages may be turned without disturbing the adjustment. The lens is six inches in diameter.

LOOKING INSIDE SOLID MATTER
WINS DISCOVERER A PRIZE

Discovery of a new method for looking into the invisible fine structure of solid matter has won for Frank H. Spedding, thirty-year-old scientist, the youthful genius prize of the American Chemical society. Doctor Spedding uses light which can be reflected or otherwise emitted by solids, such as rocks and minerals, to reveal what scientists call their "lattice" structure. This lattice is the spacing of atoms in the solid, including the spinning and other antics of these tiny particles. He reads the message of these beams after they have passed through a spectroscope.

San Diego Union
March 27, 1933

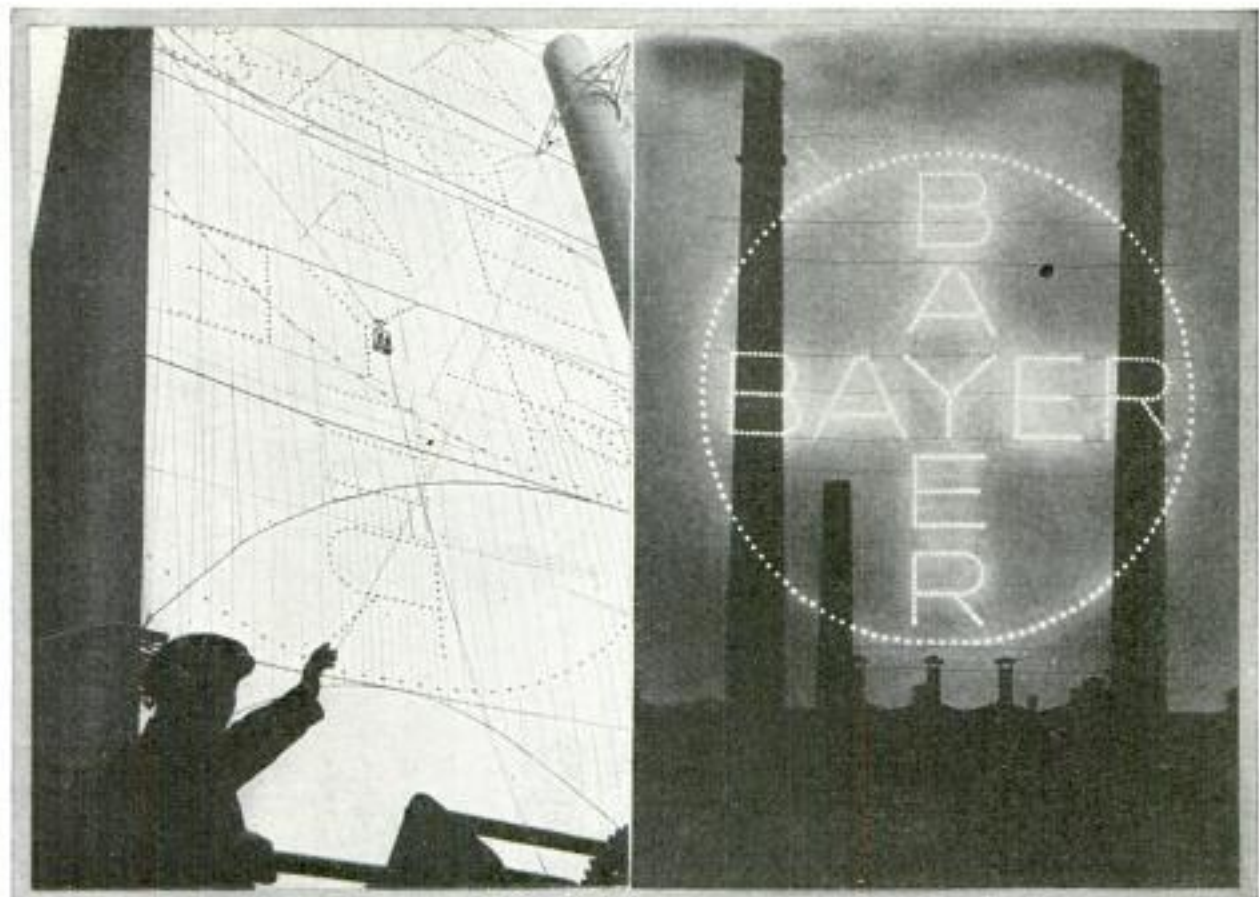
Ph. U., University of California
Berkeley, Calif

San Diego Union
3/27/33

C 518

C 519

C 403
Cont. H. J. Paul



Looking Up at Gigantic Electric Sign Suspended between Two Chimneys 400 Feet High; at Left, Note Cage in Center of the Sign; Right, How Sign Appears Lighted at Night

TRAVELING CAGE ON GIANT SIGN USED BY SERVICE MEN

When a giant electric sign in Germany is serviced, workmen use a traveling cage to reach various parts of the nine letters,

each of which is forty feet high. A feature of the sign is a circle, 225 feet in diameter and formed by 2,000 electric lights. The letters can be read at a distance of several miles. Twin chimneys, 400 feet high, are used for suspending the sign.

VACUUM-FILLER FOUNTAIN PEN HOLDS MORE INK

Twice as much ink can be carried in a new vacuum-filler fountain pen as in an ordinary pen of the same size. The vacuum filler eliminates rubber sac, piston, valves and packing, giving more space for ink. In addition, the pen will not leak. Pressing a button while the pen



point is held in ink is the filling operation. The point writes two ways, extra fine on the upper side and fine, medium or broad on the under side.

SYNTHETIC MUSK IS PRODUCED FROM COAL AND PLANT OILS

Odorous substances that will take the place of natural musk can be produced from coal-tar or vegetable oils. Natural musk, which is used in the manufacture of perfumes, is obtained from a gland in the male musk deer. Since these animals, found in central Asia, are difficult to shoot, the supply of musk has been limited.

(The orange tree is a native of Asia.)

Parker Pen Co
Ganesville, Wis

J. W. Hill and
W. H. Carothers,
& J. du Pont de Nemours & Co. Wilmington, Del.

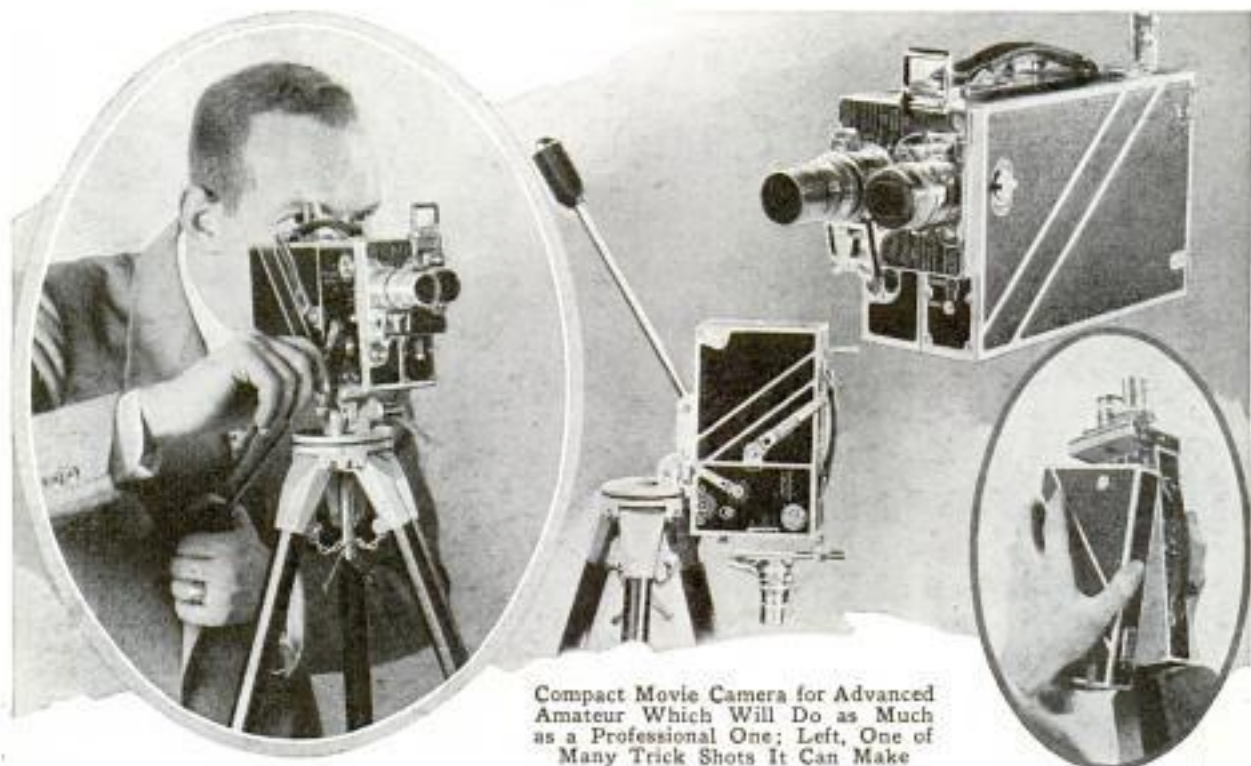
C 270

\$7.50

W. J. James 3/2/33

C 517

Movie Camera De Luxe Makes Trick Shots



Compact Movie Camera for Advanced Amateur Which Will Do as Much as a Professional One; Left, One of Many Trick Shots It Can Make



laboratory technicians. Virtually any trick shot or stunt possible with a professional camera can be duplicated just as easily with this adaptable amateur instrument. For instance, it is a simple matter to show

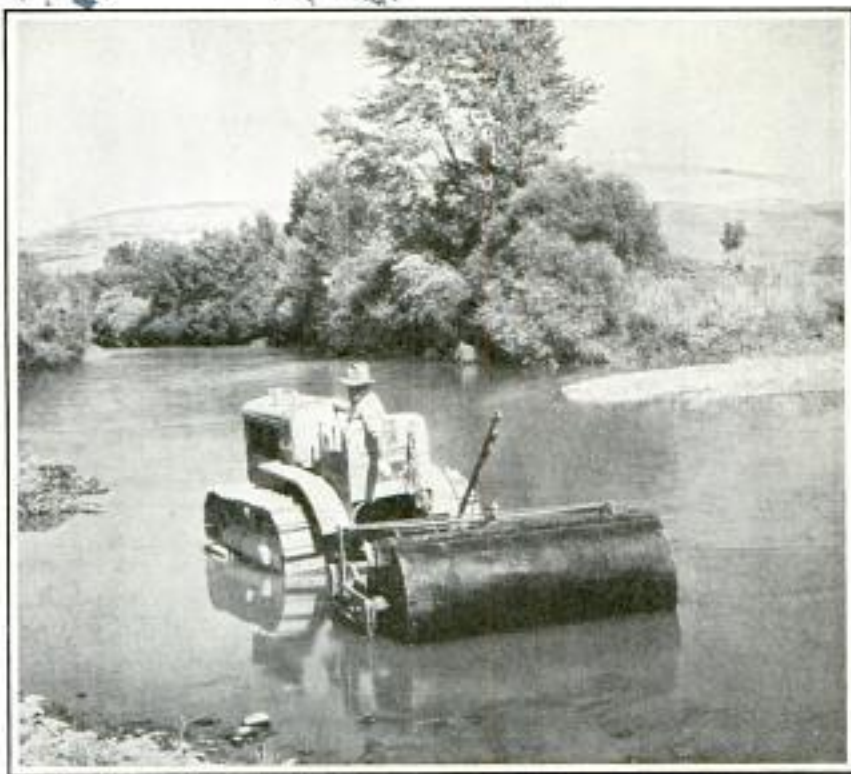
Believing that many years of amateur movie making have created a demand for a sixteen-millimeter camera of extreme versatility, the Eastman Kodak company has produced a compact camera with as wide a range of ability as professional equipment. It is custom-built and custom-equipped to meet special requirements and is intended particularly for advanced amateurs, or such groups as motion-picture clubs and

a person appearing three times in the same scene, a man's legs suddenly walking out from under him, or the speeding up of street traffic to a dizzy pace. Important innovations incorporated in this camera include two individual shafts, one moving the film eight frames to each turn of the crank for winding back the film or hand cranking, the other a one-frame shaft for trick work or synchronization with laboratory equipment. By means of a variable shutter lever, the camera can be operated with the shutter open to various stages or the shutter can be opened or closed with the camera running. The 100-foot or 200-foot removable film chambers are interchangeable, and a reflex finder shows the exact field and focus that will appear on the film. Fades can be made by using the variable shutter, two fades can be caused to overlap by using the shutter and winding back the film, the same winding back with the addition of a half-mask enables double exposures, and the positively acting mechanism for making single pictures permits animation. Besides the half-masks which blank out one side of the film, there are also circular and oval ones to make interesting picture shapes, and endless stunts are possible by a com-

combination of masks, fading and reversing. About forty feet of film can be shot at a winding of the spring motor, but hand cranking permits an exposure to be continued after an audible signal warns that the spring is nearly run down. A turret head accommodates two lenses, and lenses are quickly interchangeable in it. In addition to the reflex finder, there is a direct view finder. Speed of the film can be regulated from eight to sixty-four frames per second, a cushioned stopping mechanism being provided for the high speeds. There are two film meters, one indicating the amount of film left unexposed, the other intended as a guide in winding back. Several safety features greatly simplify operation. An aperture-closing shutter prevents fogging when a film chamber is removed and the reflex-finder button closes automatically when the camera is started. Connections are provided for attaching an electric drive or remote control to the one-frame shaft. With this camera it is possible to show a man offering himself a cigaret and lighting it, using double exposure and half-masks; Niagara Falls can be slowed down or speeded up by manipulating the film-speed adjustments, or a long shot of a building can be turned into a close-up by photographing it, then turning the lens turret to bring a long-focus lens into position. By operating the single-frame release at regular intervals, all sorts of animated pictures can be made with dolls and toy animals.

TRACTOR HELPS GOLD PANNERS BY DREDGING STREAMS

Gold miners working small streams usually do panning in the sand and gravel near shore, although the best pay dirt may be found in the middle of the stream where the current is stronger and the dirt



Using a Tractor and Scraper to Drag Sand and Gravel from Center of Stream to Shore, Where It Is Easy for Gold Panners to Work

has been washed away. Ordinarily the water in the middle is too deep, or the current is too swift, for panning. One Oregon stream, however, is being worked with a tractor and scraper which drags the sand and gravel ashore where it is easy of access. Such a dredging system is practicable wherever the water is not too deep for the tractor to operate.

"DRIPLESS" KNIFE FOR ORANGES MAKES PEELING EASY

Oranges can be peeled without dripping juice on hands or clothing with a new kind of knife. A ridged slot in the center of the knife is used to cut a number of grooves in the skin. The remaining sections of the peeling are removed with the front edge.



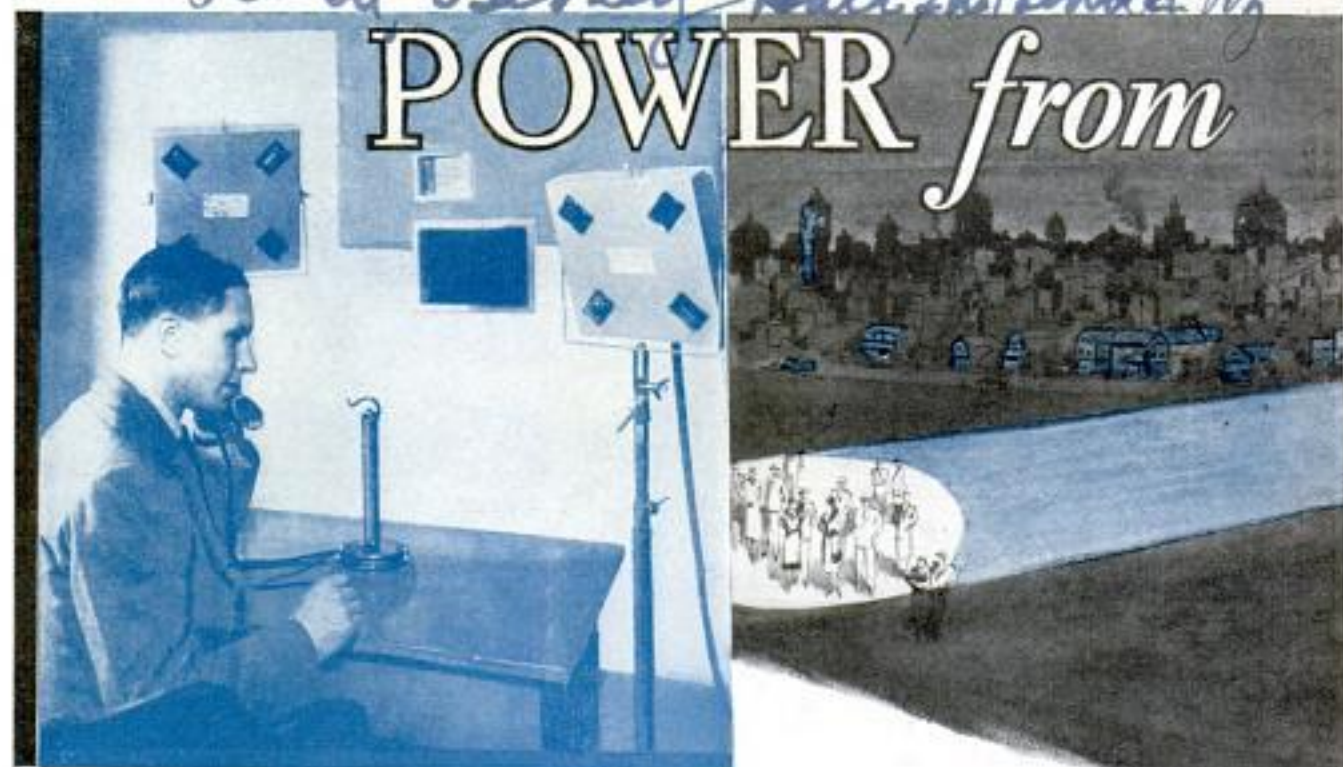
Knife Cuts Grooves in Orange Skin to Make Removal Easy; Note Ridged Slot in Blade

0287
 Mr. Carlton Isoat
 c/o General Delivery
 The Dalles, Ore.

*Novelty Mfg. Co.
 1265 - 17th St. N. E.
 Emeryville, Calif.*

C 306

Harold T. Wilkins, Esq.
 Colchester, 29. O'Beach
 Road Berley Heath, London E17



Using "Black Light," the Invisible Infra-Red Rays from the Spectrum of Sunshine, for Two-Way Television by Telephone; Each Person Sits in Darkness

IS the twentieth century destined to be known as the age of the life ray?

Recent discoveries by scientists in American and European laboratories, suggest that we are on the threshold of tremendous achievements and that man's coming control of cosmic forces will dim all that science has done in the past century and a half.

A strange experience befell Professor Piccard, when he recently ascended over ten miles into the stratosphere in the sealed gondola of his balloon. The professor was peering at the earth far below, which showed as a blur of mountain tops, streaked with hairlines and ribbons,—rivers and channels. Suddenly, he and his observer heard faint pattering on the roof of the gondola. It was not rain because they were far above the region of clouds.

"The pattering was caused by cosmic rays which are nearly twenty-three times more powerful than the short gamma rays of radium, themselves the shortest and most powerful rays known to science," explained Professor Piccard. "One can dream of the day when it will be possible to produce on earth a similar energy that will open up an immense field of practical possibilities."

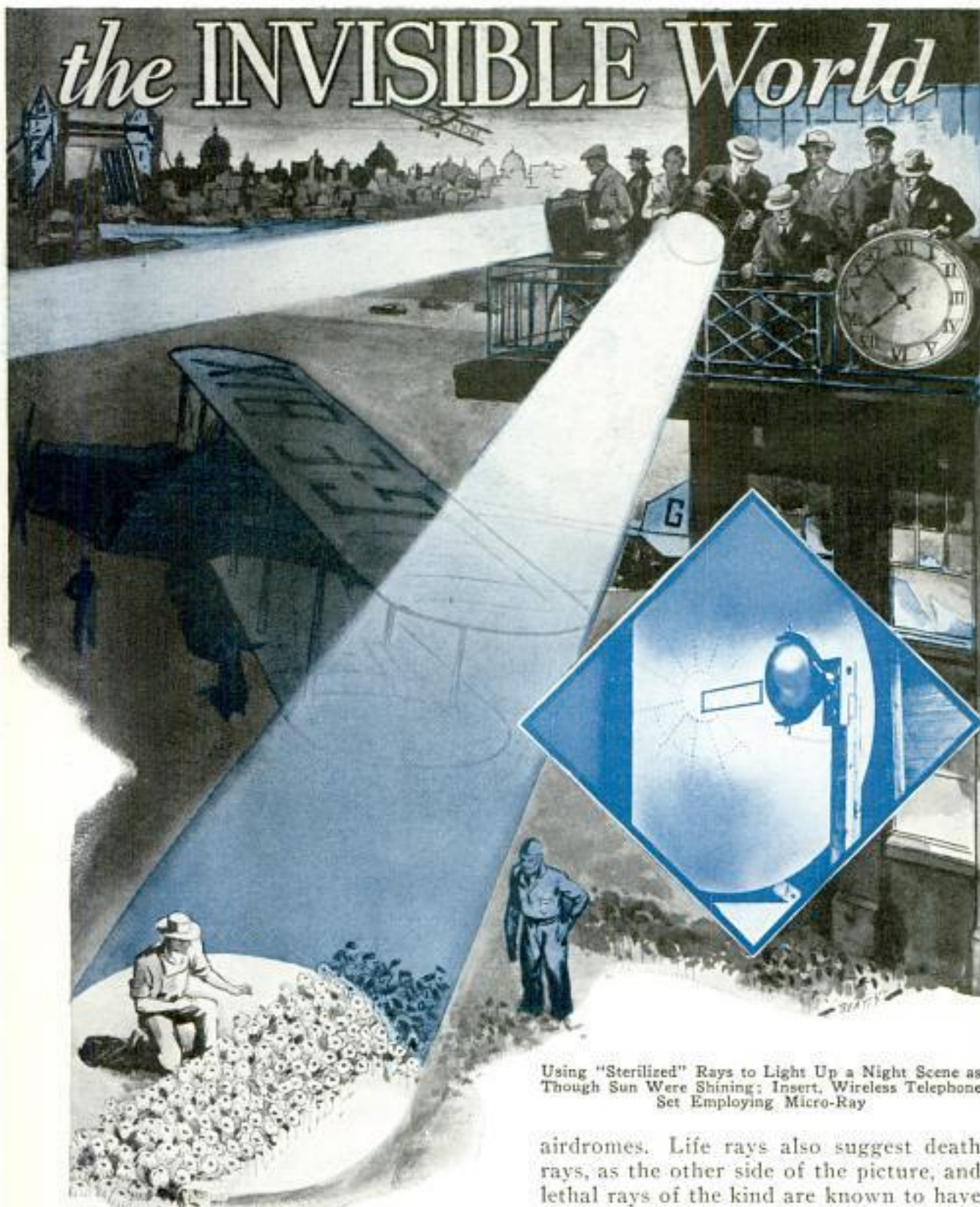
Sir James Jeans, well-known British astronomer and physicist, says, on the other hand, that these cosmic rays are breaking up millions of atoms in us, every second of our lives. "They may be essential to life, or they may be killing us," he adds.

London recently witnessed a remarkable demonstration of newly "sterilized" rays—the healing and beneficial rays in sunshine from which the lethal energies have been eliminated.

Standing on the roof of a clubhouse one dark and foggy night, A. E. Batchelor, radiological investigator, swept a projector in a wide arc. Soon, in the dense blackness, about 500 yards away, spectators saw etched against the ray a group of fifteen persons—every detail of their features and clothing in natural colors, as if a bright sun were shining. The beam passed on to a flower garden and in about fifteen minutes flowers which ordinarily close at night, had opened their petals.

The secret lies in the fact that the light was really an extract of the most beneficial part of sunlight. With the lethal octaves of the rays removed, the light, when used by medical experts, has almost immediate curative powers. Various ailments have yielded in a surprising manner to the

the INVISIBLE World

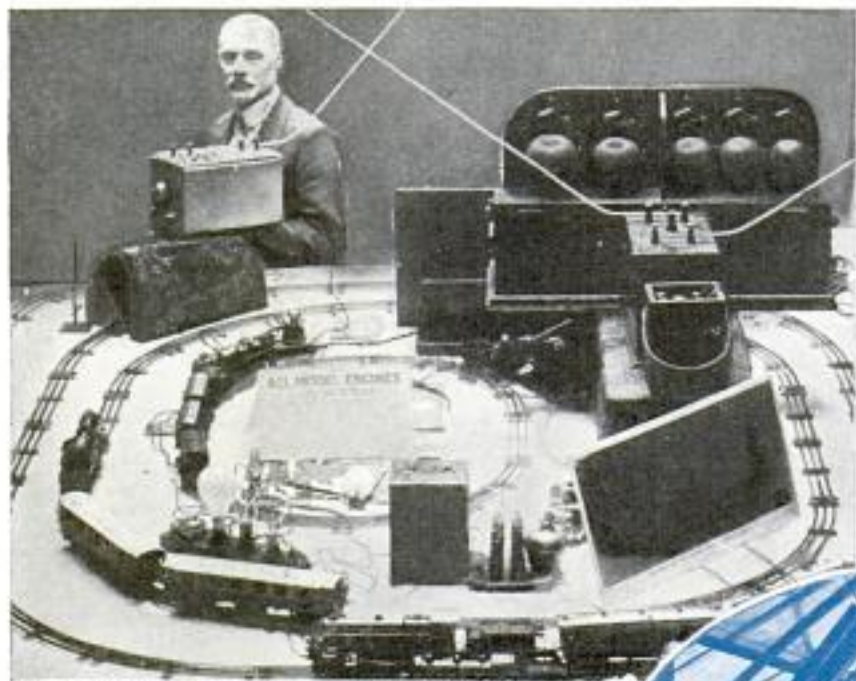


Using "Sterilized" Rays to Light Up a Night Scene as Though Sun Were Shining; Insert, Wireless Telephone Set Employing Micro-Ray

power of these rays. The light can be used also for dispersing fog in railroad operations, in anti-fog lighthouses and warning buoys around coasts, aboard liners and freight steamers, for speeding up transport by sea and land, and as landing-lamps on

airdromes. Life rays also suggest death rays, as the other side of the picture, and lethal rays of the kind are known to have been used by certain air departments in the European war, when they were employed to stop, suddenly and unaccountably, hostile airplanes in transit across frontiers to bomb cities. The full story of their use in the war has yet to be revealed. A few weeks ago a Berlin chemist explod-

C 386



Above, Demonstrating How Train Can Be Stopped by Ray Which Operates Vacuum Brake; Right, Patient on Pivoted Platform Taking Sunlight Treatment

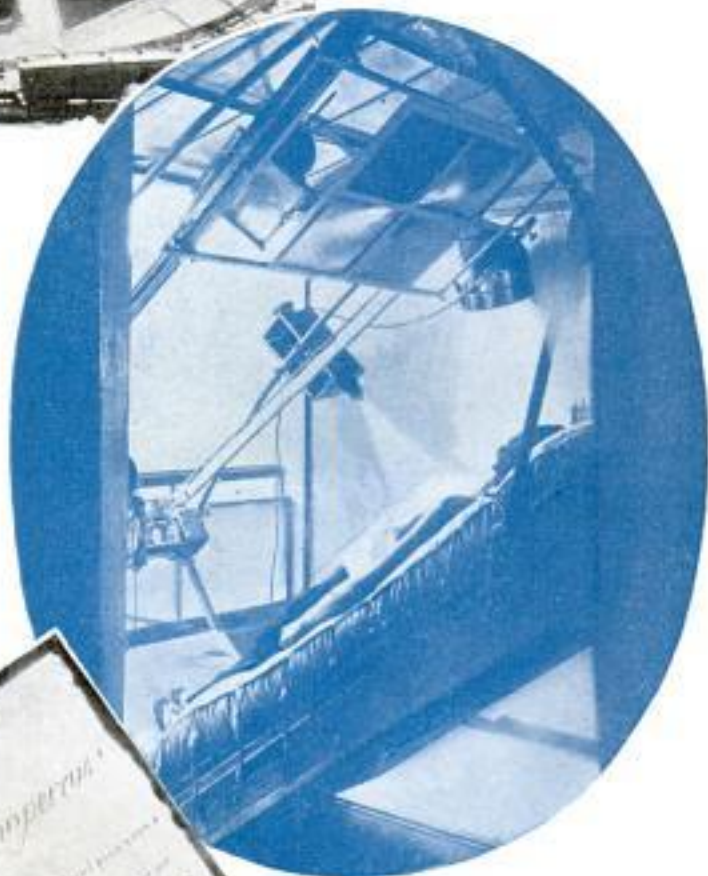
light, letting the light out first on one side and then the other, at such a rate that the iris has no time to expand or contract sufficiently to be able to see. The muscles of the eye become completely unbalanced.

An American inventor is trying to make an instrument for taking a reading of the sun through a periscope, so that it will not be necessary for the submarine to

ed a small mine by the use of such rays projected from an apparatus located 250 yards distant.

The British war department is experimenting with another ingenious device for using light rays to stop air raids. A projector is used which is said to render such attacks practically harmless to the defenders, but dangerous if not fatal to the attackers. A British inventor also has a light intended to blind attacking pilots.

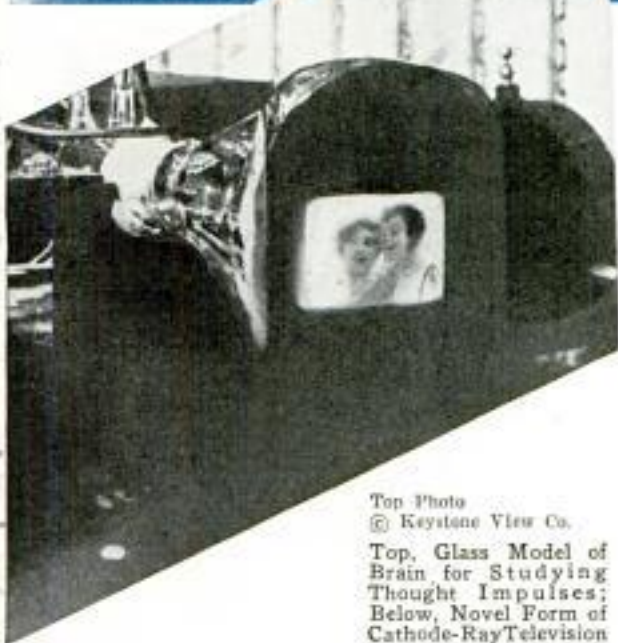
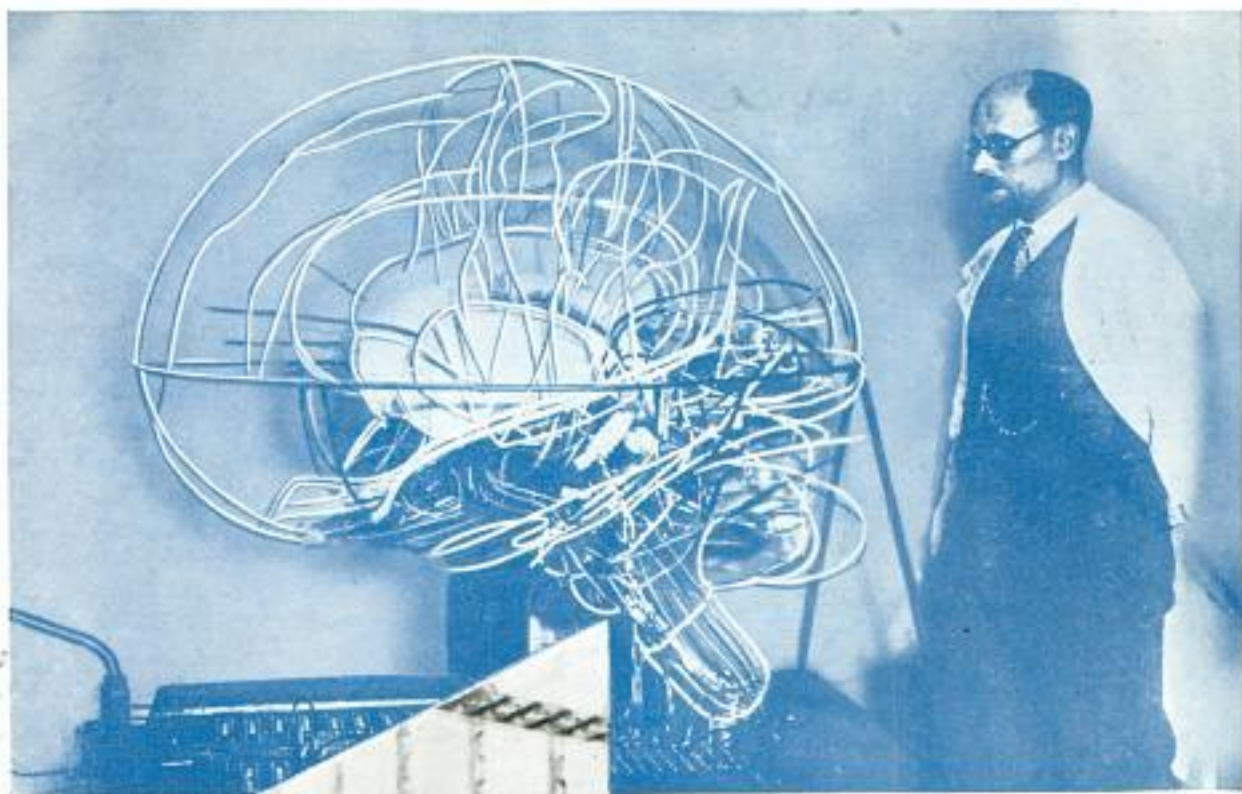
The secret lies in a disk rotated in front of the search-



Left, Piece of Old Parchment as It Appeared to Naked Eye; Right, Invisible Light Photo, Showing It to Be a Valuable Document

come to the surface in wartime. He is working on some application of an unseen ray in sunshine. Already, he has invented devices, using infra-red light, whereby he can find an airplane flying at a height of four miles in fog or darkness.

Revolving beams of invisible infra-red light are shortly to be operated from lighthouses around the British coasts, so dangerous to navigation in the fall and winter. A system of lights, in the shape of dots and dashes in code, will be flashed



Top Photo
© Keystone View Co.
Top, Glass Model of
Brain for Studying
Thought Impulses;
Below, Novel Form of
Cathode-Ray Television

and recent experiments seem to prove that living tissues are the seat of radiations which can produce effects at a distance," he says. "There is proof that chemical reactions in living tissues are indeed accompanied by radiations, and what is happening in one cell affects neighboring cells."

French scientists have recently suggested that our body-cells are minute radio sets—disease being the oscillations of these sets, which upset their neighboring cell-sets. It has been found that flies give out what are known as mitogenetic rays which powerfully affect other flies near them.

A Russian scientist says these mitotic rays are ultra-violet and can be used to stimulate human muscular growth. He believes that there are men and women from whom issues some ray which influences the mental and muscular development of people living near them, and that there may come a time, in the future, when people may sheath their rooms in lead, or some other metal, to annul the effects of these human-ray projectors.

Life rays, in the form of electrical impulses are being used to cure diseases, kill harmful germs, and restore the apparently dead. It is possible to induce by this method an artificial fever to overcome in-

(Continued to page 124A)

onto a sensitized screen carried on the liner, to warn it of rocks and shoals. In the case of airdromes, a series of concentric beams of invisible light will indicate the location to descending airplanes.

Startling discoveries concerning "life rays" have been made recently by British scientists. Sir Frederick Gowland Hopkins, president of the Royal Society, says there is evidence that a life ray exists which helps to build up the human body.

"Life in some way makes use of atomic energy, the basis of which is electricity,

c 376

The Central Hyg Co
4. Bloomsbury Place
London, W.C.1

894

POPULAR MECHANICS

ROOM HEATED BY WALL PAPER APPLIED ON CEILING



How Paper Containing Heating Element Is Applied to Ceiling: It Plugs into Electrical Outlet

Electrical heating for single rooms can be installed by means of paper that is applied to the ceiling. The heating elements are formed by copper and nickel alloy imbedded in a sheet of reinforced, damp-resisting fabric, which provides insulation. These sheets are supplied in rolls that can be cut into required lengths and applied to the ceiling plaster like wall paper. A lining paper then is placed over the sheets, with calcimine, paint or other decorative materials over all. Flexible connecting tails are attached at convenient points. Rheostat control gives even temperatures at minimum current consumption.

SYNTHETIC CAMPHOR IS MADE FROM RAW TURPENTINE

Synthetic camphor is being produced from turpentine. This method, described by Prof. John J. Ritter of New York University, may aid in establishing the camphor industry in this country. Based on a new principle in camphor synthesis, the process is said to be more direct than ex-

isting methods, makes a high-grade product at low cost and passes through intermediate stages never before employed. Aside from turpentine, the only materials actually used are sulphuric acid, common salt and soda ash. It is claimed that manufacture of laminated safety glass is likely to create a large demand for camphor, of which 10,000,000 pounds are now imported annually. Among other products in which camphor is used are explosives, celluloid, lacquers and motion-picture film. Paradoxically, camphor is not found in mothballs, despite the smell, for mothballs usually are composed of naphthalene, a coal tar distillate. For many years chemists have known that ordinary turpentine oil consists largely of a material closely related to camphor, and chemists abroad succeeded years ago in converting it commercially into camphor, identical with that obtained from the camphor tree. About one-half of the imported camphor is produced from American turpentine in foreign chemical factories. Numerous attempts to produce the commodity in this country have failed, chiefly because the complexity of existing methods rendered its production economically impractical.

c450

RUBBER REPAIRED BY WELDING UNDER AIR PRESSURE

Automobile tubes, hot-water bottles and other rubber goods may be repaired by welding a new piece of rubber into the fractured or torn part. A new vulcanizer for this work is operated by air pressure. The device consists of an aluminum plate electrically heated from a convenient wall plug. One hundred pounds of pressure may be applied, then the current is turned on and the cure completed. Use of air insures equalized pressure on the part to be repaired.



Elevators which travel in a curved arc are being built for ascent around the bulging sides of naval dirigibles.

Gabriel Pneumatic Vulcanizer 14078
40 N. Chestnut St. Phila

No. 11 Agent Bureau

American Chemical Society
Mills Bldg. Wash. D.C.

14078
c450
Gabriel Pneumatic

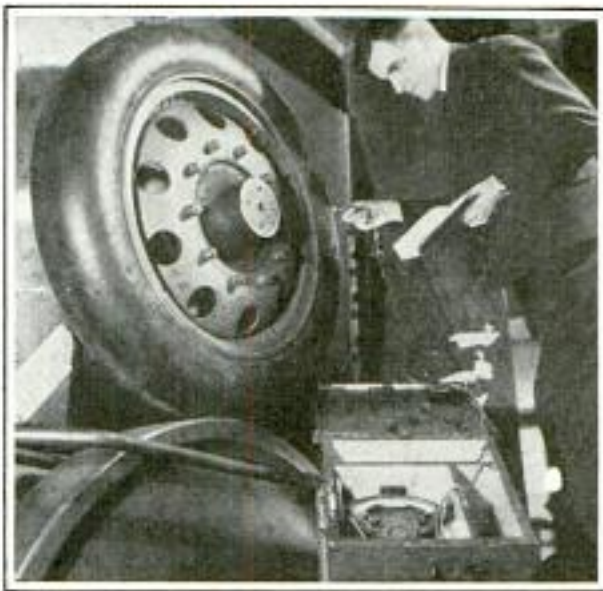
C. 442. at Dunlop Co., Birmingham England.
 AR MECHANICS

Makers of JIG-Aid board
 Modern Sign Studio,
 19 S. 7th St.,
 Minneapolis, Minn.

1 to Limit in Armored Fort

Cond. Wellman

...n an
 ...ch a
 ...above
 ...test of materials.
 ...wards the watchers from frag-
 ...ents when tires burst, sending pieces of
 soft rubber through quarter-inch armor
 plate. When the tire reaches high speed
 on a massive electrically propelled fly-
 wheel, there is a tremendous roar that
 shakes the whole experimental building.
 Inside the "armored fort," the tempera-
 ture of the whirling tire rises about forty
 degrees centigrade every minute, while a
 vortex of air is set in motion. The wire
 coil of each bead on the tire must resist a
 centrifugal force of seven tons and a side-
 wall tension of 1,250 pounds per square
 inch. So great is the centrifugal force that
 it pulls a tire one inch wider at 250 miles
 per hour than when the tire is at rest. In
 a test for Malcolm Campbell, who recent-
 ly drove his "Bluebird" racing car to a
 new world's record, a tire was rotated at
 350 miles per hour. The temperature rose
 beyond the boiling point of water in three
 minutes and the tire burst soon after,
 fragments piercing the armor-plate shield.



How Big Tires Used on Racing Automobiles Are Test-
 ed; Sometimes They Burst under High Speed

It was found that a special Egyptian cot-
 ton absorbed less power when it was wo-
 ven and flexed, resulting in a tire that
 would be cooler at high speeds. Inner
 tubes of equal thickness all around were
 produced, since uneven spots would have
 caused overheating when Sir Malcolm sent
 his racer along the beach at Daytona, Fla.

C. 402

BOARD FOR JIGSAW PUZZLES HAS ADHESIVE SURFACE

Jigsaw puzzles may be assembled at an
 angle on a board which has an adhesive
 surface. When the puzzle pieces are in

position, a slight pressure fixes them firm-
 ly in the adhesive so that they cannot fall
 off, even if the board is inclined. The
 adhesive material, which is sensitive to
 weight only, may be washed with soft
 soap and water. It does not stick to the
 puzzle pieces after they have been re-
 moved from the board.

Jig Aid

Working a Jigsaw Puzzle in Upright
 Position Is Easy with This Board; It
 Has Adhesive Surface That Holds
 Each Piece in Place



LADY-BUGS SPAN U. S. IN PLANE TO BATTLE FRUIT PESTS C 576

To help citrus growers fight fruit-tree
 pests, 20,000 live lady-bugs recently were
 shipped by airplane across the United
 States from Sacramento, Calif., to Orlan-
 do, Fla. The total shipment weighed only
 two pounds.

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 re-
 quest accompanied by return postage.

Modern Sign Studio
 19 S. 7th St.
 Minneapolis, Minn.

United Air Lines

Wilhelm Heidemann, Lieut. Chapman
 Cologne, Germany.

C 3.
 896

POPULAR MECHANICS

No U. S. Patent known



Cabinet for Producing Talkies in the Home; Note Moving Pictures Appearing in Lower Section

TALKING FILMS FOR THE HOME PROJECTED IN CABINET

Talking-film apparatus for the home has been developed, incased in a cabinet much like the phonograph or radio. Celluloid films are not used, being replaced by rolls of specially prepared paper. The film is illuminated from the front and projected by means of concave mirrors.

C 352. HANDY TESTER FOR AUTO COILS QUICKLY SHOWS CONDITION

Cable and Coil Tester



Quick testing of auto coils and cables without removing them from the car is easy with a recently developed instrument. Actual operating conditions are revealed by the tester, which is about the size of a cigar box. The mechanism is contained

in a bakelite case, provided with a small window through which a dial can be seen

moving. Tabulations on the side explain the condition of the coils according to the position of the dial pointer.

C 506 FIRE DEPARTMENT AIDS PLANE MAKE SAFE LANDING

When a test pilot at Duncan field, Texas, took off with an overhauled plane recently, he discovered that the brakes on his landing wheels had locked and faced the problem of landing with locked wheels. Realizing that he could not come down safely on a hard, dry airdrome, he dropped a note overside requesting that the fire department be called to flood a strip across the flying field. The firemen prepared a long strip of slippery mud and the pilot brought his ship down upright.

C 433 GYRO SHARPENER FOR PENCILS IS OPERATED EASILY

Pencils are sharpened easily in the gyro device that is operated in the hands. It can be carried from one part of the home, office or school-room to another for use, not being designed for attachment to desk or wall. The sharpener is held in the palm of one hand while the pencil is placed in proper position. Then the hand holding the pencil is rotated, turning the cover and sharpening the pencil. A few turns produce a satisfactory point.



C 463

COBRA VENOM FIGHTS CANCER IN TESTS ON "INCURABLES"

Serum made from the venom of the black cobra has been used in treating "incurable" cancer in recent tests, with unusual results. Considerable relief was afforded patients, and the disease was checked in some of several hundred test cases. Scientists do not claim a cure. The venom is injected in a process originated by Dr. Adolph Monac-Lesser.

at Salt Peter Hospital in Paris

*United American Bosch Corp
 Springfield, Mass*

*W. H. Ferguson
 Lieut. Fire Dept. N. W. Ferguson*

*54 Altas. America Co. Haven
 54 Grand St. New York*

C. F. Williams

Resand Chomach 802 Oakland

Miss Cornelia
Durwelly
~~Board of Health~~
Ann Arbor, Mich

C295 Com. James Montague
608 Harbor Com. Bldg
Toronto Ont. 2
897

POPULAR MECHANICS

SALTS EFFECTIVE
IN TREATING
RINGWORM

494

Ringworm and other widespread and aggravating skin ailments respond favorably to applications of salts of synthetic fatty acids. Fungus infections, mixed infections both deep-seated and surface in character, clear up quickly. Laboratory tests show that twenty-percent concentration of the salts kills even the most stubborn of fungi, while a twelve-percent concentration of the salts in water destroys bacteria in ten minutes. The salts are produced by the oxidation of petroleum hydrocarbons. They are non-irritating and penetrate the skin more effectively than many other bactericides.

Letter recd 11/11/37



Canoes Used by Canadian Fire Rangers Lashed to a Small Rail Car on Which the Boats Are Often Carried on Long Overland Trips

Canada

SMALL RAIL CAR HAULS BOATS
FOR THE FIRE RANGERS

Canadian fire rangers use small rail cars for transportation of their canoes and themselves when speed is essential and rail lines are available. The canoes are lashed to the cars and the rangers use the railway tracks until they reach streams near the fire zone. Hunters also are using the canoe cars to save time in reaching game territory.

SMALL-SIZE AIRPLANE MOTOR
PRODUCES HIGH POWER

C341

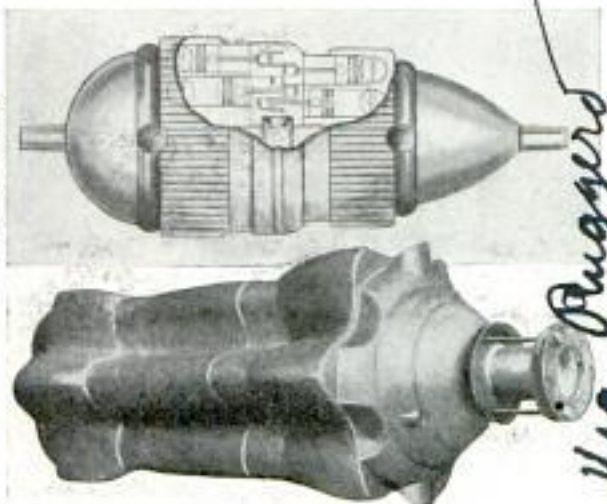
Streamlined and so compact that it saves much space, a twenty-four cylinder motor for airplanes, automobiles or boats has been produced. The cylinders are small and the motor runs at high speed. It is rated at 600 horsepower. Mountings are provided for fore and aft propellers. The construction is said to be simple, but follows modern engineering principles.

C444

RAT-CATCHING CATS ARE BRED
AS PLAGUE PROTECTION

Selective breeding of rat-catching cats is the best way to keep down rodents and one of the best protections against bubonic plague. This is the opinion of Dr. Adrien Loir, medical officer of the port of Le Havre, France, where a constant watch is maintained to prevent the entrance to the country from docking ships plague-stricken rats. Doctor Loir discovered that not all cats will catch rats. Some, he reported, establish a neutrality pact with the rodents, and may be seen in the streets with the rats, each ignoring the other. To remedy this situation, Doctor Loir has founded the Rat-Catching Cat club of Normandy, the chief object of which is the breeding of cats with an unflinching and intense craving for hunting and killing all rats.

Guido Tallini



Via Ruggers

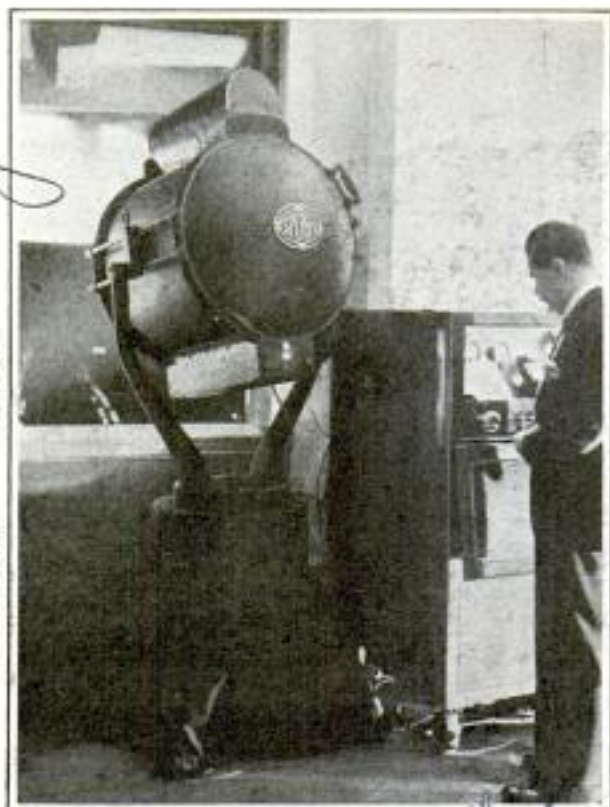
Compact Engine for Airplanes, Autos and Boats; Top, Phantom View, and, Bottom, Housing

Mr. Guido Tallini
Via Ruggers, Bologna 199
Italy

Science News Letter
10/18/35

C/81

Columbia Broadcasting Co
495 Madison Ave New York



Projector Sending Out Music on Light Beam; Program Was Received and Broadcast by Radio

MUSIC IS BROADCAST ON BEAM OF "COLD LIGHT"

Transmission of music on a beam of "cold light" for broadcasting on a nationwide radio network has been accomplished. The entertainers were in the observation tower of a New York skyscraper, while the receiving point was in a radio broadcasting studio a half-mile distant. The test was the first use of a light ray for a scheduled broadcast picked up as an "out of the studio" presentation. A mercury induction bulb, five inches long and an inch in diameter, made the pick-up possible. Inside the lamp is a thimbleful of mercury. When a high-frequency electric current excites the mercury, it glows with intense brilliancy but with little heat. Hence the name "cold light." The microphone used by the entertainers caused the light, cradled in a searchlight projector, to go out as a beam toward the broadcast studio, carrying the musical vibrations through space. A photo-electric cell, or "electric

eye," at the receiving end gathered the rays from the air and converted the light back into electricity for broadcasting to the nation. Experts say that transmission of programs without loss of quality over distances of forty to fifty miles would be possible in clear weather. Anyone with a light cell, amplifier and loud speaker could take music from such a beam at all points where the light was visible. Wires or radio sets would be unnecessary for reception. The mercury lamp works as well in daylight as in darkness and is expected to find extensive application for communication over limited distances. The light can be made invisible to the human eye and still work successfully. A peculiarity of the beam transmission is that no interference is caused by rays criss-crossing.

B2173 GARAGE DOOR AS STORE FRONT LIFTS UP TO CEILING

Operated by a system of counterweights which raise it to the ceiling, a disappearing garage door, which also is being used as a store front, now is available. It can be moved by one person, and when used for a shop, the door is formed of glass sections. When lowered, it serves as a display window, and when raised, offers easy access for arranging displays.



Disappearing Garage Door Which Forms an Attractive Shop Window When Lowered; It Can Be Raised by One Person

Hall Mfg Co
Cedar Rapids, Iowa

Vertical text on the right side of the page, possibly a page number or reference code, including "B2173" and "Garage Door".

C 371
1124 South St
Vicksburg, Miss

Com. Harrison Pally Ass
Engineer, U. S. Waterways
Experiment Station, Vicksburg
Miss

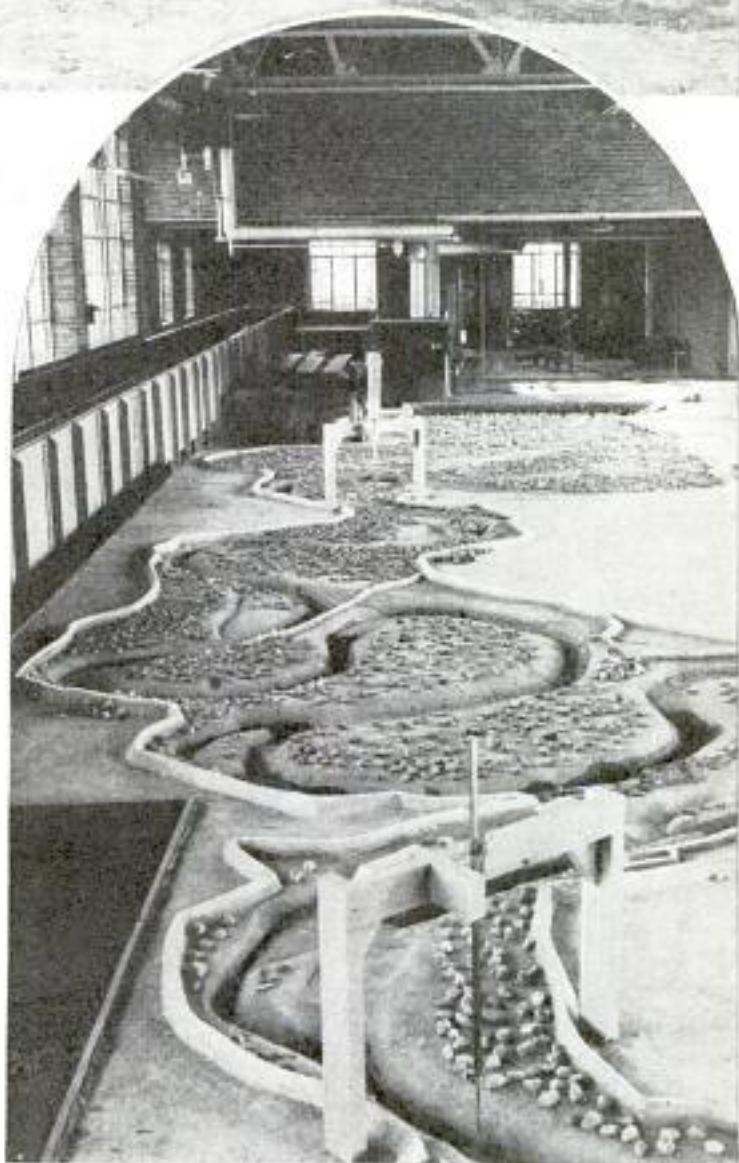
Taming Ol' Man River



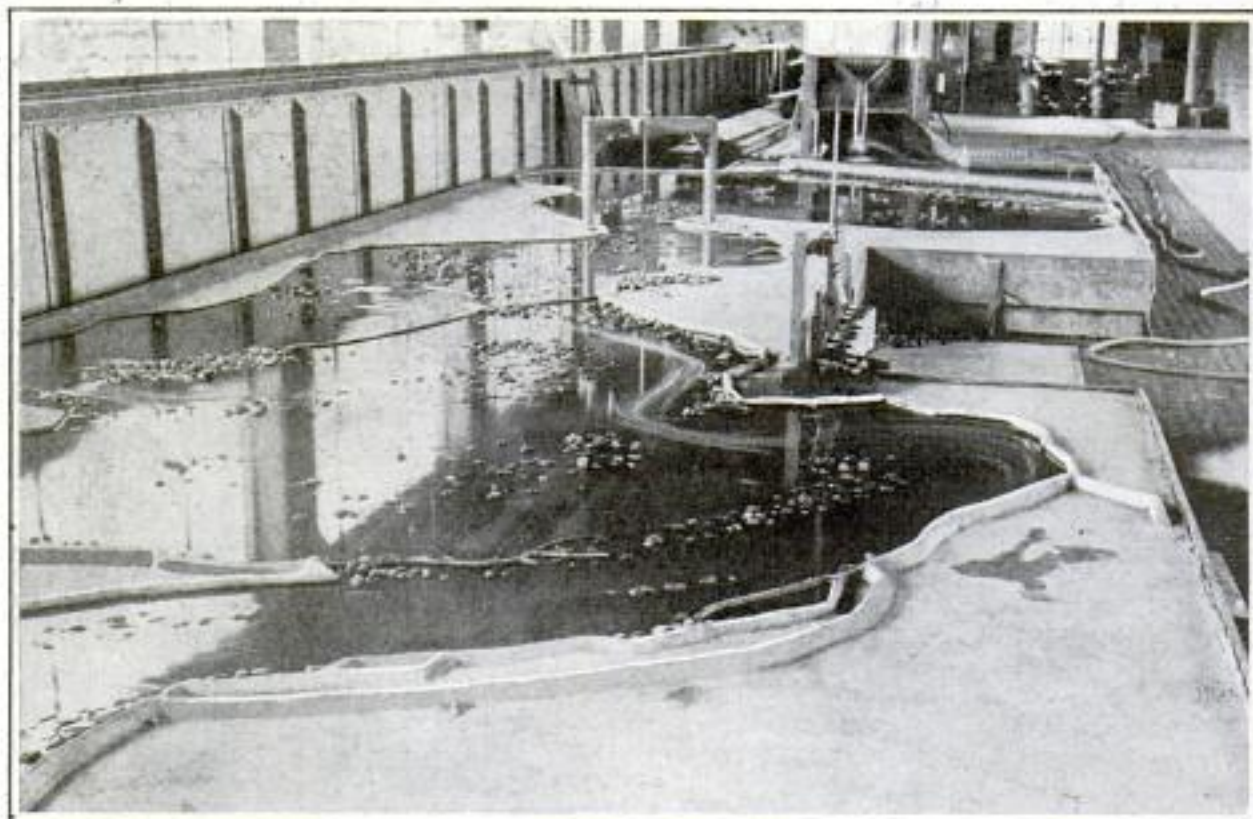
NESTLED among the peaceful hills of Mississippi, four miles from Vicksburg, is a laboratory for scientific research unique among all others. It is the U. S. Waterways Experiment station. In this quiet valley, with all the facilities of modern ingenuity, a determined band of engineers and scientists is engaged in ferreting out the secrets of nature and applying them for the practical purposes of harnessing our rivers and streams through flood-control measures, and improving them for navigation purposes.

The Waterways Experiment station is the only institution in the United States devoted entirely to the study of rivers and harbors. Hydraulic laboratories have been in successful operation in most of the important European countries for many years. In them, it has long been the custom to work out in miniature, on small-scale models, practical methods for improving their rivers and harbors.

The practice of solving complex hydraulic problems by the laboratory method has developed in the United States, until recently, in a somewhat different fashion. Gen-



Above, an Outdoor Model; Below, an Indoor Model Representing a Forty-Five-Mile Stretch of the Mississippi



Model of Section of Mississippi in Operation at Flood Stage; the White Lines Are the Paths of Surface Floats and Point the Directions of Currents in the Model

erally, these laboratories have been of a temporary nature, erected to serve a specific need and dismantled at the completion of the task. The present laboratory is the first permanent institution in this country which concerns itself entirely with problems relating to the rectification of rivers and harbors.

Hydraulic laboratory practice has its basis in what is commonly called "the law of similitude." As applied to hydraulic models, it means that if a small-scale model of a waterway be constructed to dimensions proportional to those in nature, under similar conditions the model will manifest similar phenomena. This concept of similarity between a small model and its prototype in nature is not of recent origin. It was staged in a very complete form by the great scientist, Sir Isaac Newton, about 250 years ago.

Suppose the U. S. Corps of Engineers are considering plans for flood-protection works in a certain locality on the lower Mississippi river. The construction of these works may involve the expenditure of hundreds of thousands of dollars; the effects which they will produce will be far-reaching and diverse. Such a multiplicity of interrelated forces is brought to bear

that a complete theoretical analysis of the situation is impossible. Before the advent of hydraulic laboratory practice, all such works were built on a basis of past experience, and frequently there was no precedent for guidance.

Now, the hydraulic laboratory is a crucible in which the river and harbor engineer may test the practicability of his every plan before it is put into execution. He submits his problem to the experts at the U. S. Waterways Experiment station. From the data of recent surveys and accurate maps of the locality they construct a small-scale model of the territory affected by the proposed works. In size it may be one-five-hundredth, or even one-five-thousandth of the original in nature. But whatever the scale, the model will represent with fidelity every significant feature that exists in the original. All linear measurements are made accurately, and even trees and underbrush are represented.

In this model, then, there are constructed in miniature the features which are being proposed for installation in the natural river; water is passed through it in quantities and to heights corresponding proportionally to its size with the original, and the effects and results which fol-

C 371

C 163 American Sealing Co, Evansville, Indiana
Rafida huch 901

POPULAR MECHANICS

low can be reliably considered as accurate predictions of what would occur should the plan be tried in nature on a full-size scale.

In transferring model results to terms of nature, it has been found that the models can be relied upon to faithfully indicate resulting water-surface elevations, slopes, velocities, eddies, boils, current directions, and quantities of discharge. Many other phenomena observed in the models may be considered indicative of what may be actually expected in nature, such as the scouring of river banks, and the transportation or deposition of sedimentary material, which are of such great significance on alluvial rivers and at entrances to harbors.

The plant of the U. S. Waterways Experiment station is centered about one main laboratory building. The central portion is given over to a main experimental hall, wherein the models are constructed and operated. The building is flanked by two wings containing office space for research and design. There is also a photographic laboratory, a soils physics laboratory, a carpenter shop, and a warehouse. Water for the operation of the models is obtained from an artificial reservoir made by impounding the natural rainfall runoff by means of an earthen dam. Many of the large models are constructed outdoors.

The problems brought to the laboratory are as varied as the situations which arise to vex the rivers and harbors engineers. Experiments are undertaken also for other engineer districts. Experiments at present relate to problems concerning the Illinois river, the Ohio river, the Great Lakes, harbors on the Gulf of Mexico, the canals of Lake Okechobee in Florida, as well as the Mississippi river.

Some of the recommended solutions have already been put into effect with satisfactory results. Recent channel shortening on the Mississippi river, effected by cutting across the long necks of land, have been the direct outgrowth of laboratory study. Here the engineers were enabled to predict with confidence the beneficial results for flood control and navigation improvement. American engineers in this laboratory have a tool enabling them to go forward in subordinating the forces of nature to the welfare of mankind.



Sheet-Metal Blackboard Which Retains Its Black Color and Does Not Break or Chip Off

BLACKBOARDS MADE OF METAL WITH ENAMELED SURFACES

Blackboards now are being made of sheet metal coated with a black enamel which is fused into the metal in furnaces. By a special process, the sheen of the vitreous enamel is removed, and when panels are placed next to each other, metal fingers on the ends of the boards insure a smooth joint. The metal boards are harder than slate, retain the black color, do not break or chip and are considerably lighter in weight.

EASY-TO-INSTALL FAN PULLEY FITS SMALL AUTO

Quick installation is one feature of an improved fan-belt pulley for late-model Ford automobiles. The pulley, which is made in two parts, can be installed in



thirty minutes by breaking the old pulley, sliding a sleeve on the crankshaft and putting on the new. The original nut on the crankshaft holds the pulley securely.

To install some types of pulleys, the radiator has to be removed, the motor bolts loosened and the motor raised above the frame, almost a three-hour job.

A. J. Morrison
Cherryville, N.C.
Copyrighted Material

J. Morrow, Middletown, Ohio

C. M. O.

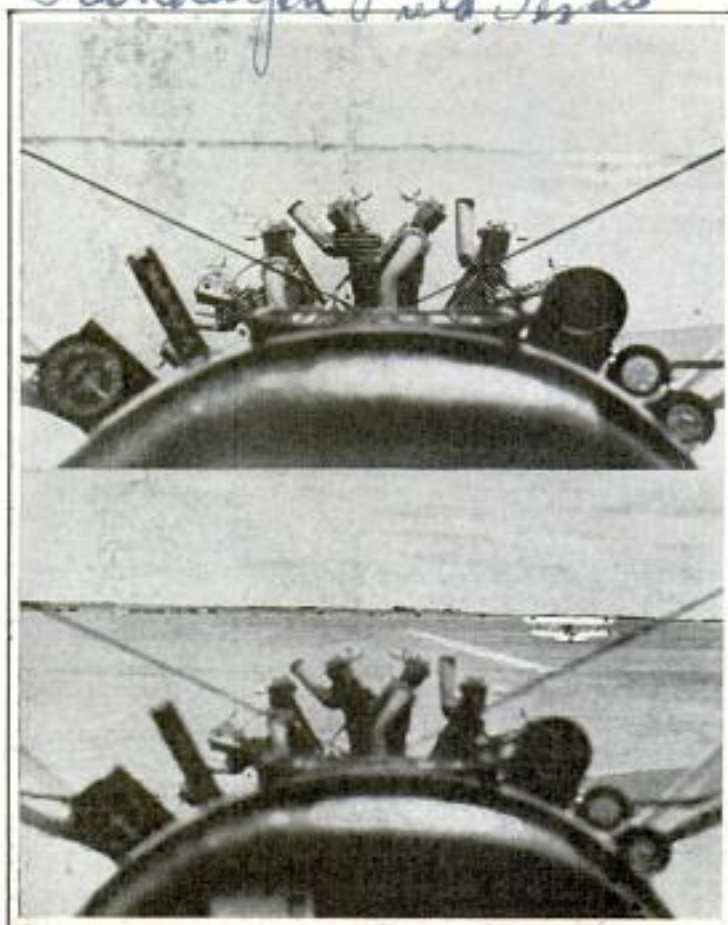
c10 Capt. H. W. Wilbur,
/s/ Lieut. H. W. Ferguson

My Name
3/19/33

902

POPULAR MECHANICS

Randolph Field, Texas



Pilot Focusing Eyes on Nose of Ship While Landing. Like Photo Above, May Have Accident; Below, Proper Focus

PILOTS MUST GAZE FAR AHEAD WHEN LANDING PLANES

In landing an airplane or taking off, it is important that the pilot's eyes be focused properly. If he watches the nose of his ship while landing, the ground and objects in his path are blurred. By looking far ahead of the nose, however, he sees clearly what is in his path, and the nose of the ship, while blurred, is also still within the cone of vision.

c453

SOAPLIKE FOAM PUTS OUT FIRE BETTER THAN WATER

Foam resembling soap suds has been found effective in extinguishing fires in the oil fields. Anyone knows the hopelessness of trying to put out an oil tank blaze with water. Instead of mixing, the oil simply floats on the water and, supplied with oxygen from the air, not only burns on but carries the fire elsewhere. So a blanket of froth that smothers the flames is substituted for water. Two foam solutions are pumped separately through twin

pipes to mixing chambers. One solution consists of water and aluminum sulphate and the other of sodium bicarbonate, liquid foaming extract and water. When the two liquids mix, there is a rapid effervescence. The bubbles that rise are filled with carbon-dioxide gas, one of the most effective fire extinguishers known. The foam floats on liquids and sticks to walls and ceilings. When a dry wooden wall is coated with the suds, the fire cannot be ignited again until the foam breaks down. Recently, British fire chiefs conducted successful tests with foam, looking to possible adaptation of suds to fire fighting in other places.

c291

COFFEE COOKER WAKES YOU WHEN DRINK IS READY

Coffee is made automatically, the bedroom light is turned on, and the sleeper awakened by an electric device. A clock that is set before you go to bed, turns

on the current under a boiler full of water in the left side of the cooking cabinet. When the water boils, it forces its way through a small pipe into a pot containing fresh coffee. This causes a tilting platform to move downward on the coffeepot side, moving a switch that shuts off the boiler current, turns on the room light and rings an alarm bell. The amount of water admitted to the pot is controlled by a sliding weight on the platform.



Clock on Cabinet Turns on Light and Rings Alarm When Coffee Is Ready

J. P. York, 2430
Grand River Ave. Detroit Mich.
Copyrighted material

*Prof Florence Walker
Chemistry Department
New Jersey College for Women*

C 396

**DIGESTIVE ACTION AT ITS BEST
JUST AFTER DINNER** *C 497*

Digestive action reaches its height just after dinner, it has been established in experiments at a New Jersey college. Just before breakfast is the period of least activity. The starch digestive power of saliva secreted by different individuals at the same time of day and by the same individual at different times in the day was compared under rigidly controlled conditions. The study revealed that saliva secreted a half-hour after meals is decidedly more active than that collected immediately before. There is an enormous decline in activity during the night.

North Brasserie #234

**EFFECT OF RAISED LETTERING
PRODUCED ON FLAT SIGNS**

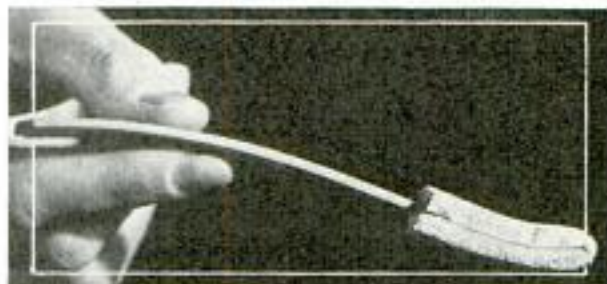
Bearing the appearance of lettering in relief, a new kind of sign has a flat surface throughout. Control of lights and shadows and minor tones makes letters, designs, figures, illustrations and silhouettes appear raised, though they actually are as flat as the surface on which they are produced. By a special process, the signs can have a semi-transparent appearance. When used with electric lights behind them, forming a box-type illuminated sign, the effect of relief lettering is increased. The signs may be obtained on paper, wood, metal and other materials,



These Letters Appear Raised, but Are Flat; Used with or without Electricity

and can be placed between glass. Any colors can be supplied, although white letters on black background probably are most striking. The letters appear to be made of some different material and might be compared with opal, marble or snow-frosted ice.

*Herbert C. Hearne
95 Maple Hill St
Springfield Mass*



Toothbrush That Has Rubber Instead of Bristles; Curved Handle Facilitates Brushing and Massaging

**TOOTHBRUSH FOR LIMITED USE
CHEAP ENOUGH TO DISCARD**

So inexpensive that it can be used once and then discarded, a new kind of toothbrush has been produced. It is made of chemically treated white sponge rubber fastened to a wooden handle. A strip of rubber is folded over and fastened to the handle. In addition, toothpaste is then compressed into the pores of the rubber, preparing the brush for immediate use when its cellophane wrapping is removed. The sponge rubber adjusts itself to the teeth so closely that the suction results in a thorough cleansing. Yet there is not the harmful effect on the gums that is caused frequently by bristle brushes. The curved handle makes the brush easy to use, facilitating massaging of the gums. Salt or other solutions can be substituted for paste. While the brush can be thrown away after a single use, it will last about six months under conditions to which other brushes are subjected.

Dr. Fabian Falk

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*Dr. Fabian Falk
308 W. North Ave.*

C436 Cont. Tom White
Box 44, Alameda Calif

World's Tallest Bridge to Span

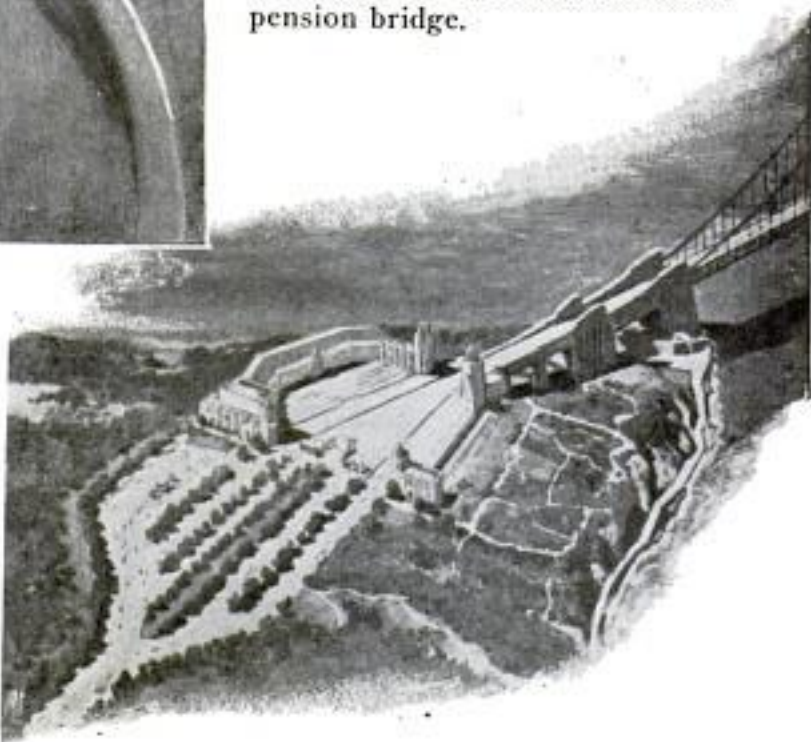
The Golden Gate bridge will be the largest structure of its kind ever built, the main span having a clear, over-water sweep of 4,200 feet, or four-fifths of a mile, between the towers, which will be 700 feet longer than that of the new George Washington bridge over the Hudson river. The two side spans will each add 1,125 feet, making a total length between anchorages of 6,450 as compared with 4,660 for the New York suspension bridge.

Drawing of Supporting Tower, 121 Feet Wide at Base and Designed to Carry Vertical Load of 400,000,000 Pounds

REARING their heads cloud-high and between them supporting the longest single-bridge span ever designed, the two mighty towers of the Golden Gate bridge will carry an aerial highway across the entrance to one of the world's largest harbors. When the mile-wide entrance to San Francisco bay is spanned, it will be the first time a bridge was ever built across the extreme outer mouth of a major ocean harbor.

The high-flung boulevard will link in a direct line an otherwise unbroken highway chain stretching along the coastline from north to south. Work has just commenced, and by January, 1937, the big structure will be carrying a load of approximately 6,000 vehicles daily. It will cost \$32,000,000 and call for the expenditure of 25,000,000 man-hours of labor.

Like twin sentinels of steel, the two mighty towers will rise 740 feet above high water, the world's highest and largest bridge towers. Measured from its ponderous base, the south tower will equal the height of the sixty-six-story William Hanover building in New York City—846 feet. Each tower comprises two glorified pillars of steel, built up of a series of rec-



See Jan. 1933 10.0
Steel work contractors
The Christie & Marshall, Berkeley, Pa. (?)



Photos and Drawings © Bankamerica Company
 Sketch of Proposed Bridge, Looking North Across the
 Entrance to San Francisco Harbor

tangular cells in groups, the number of cells ranging from ninety-seven at the bottom to nineteen at the top. There will be more steel in the two towers alone than in the entire Quebec bridge. Including the cables, 100,000 tons of steel will be required.

From anchorage to anchorage, the two giant cables will stretch nearly a mile and a quarter. These steel sinews will be thirty-six and one-half inches in diameter and made up of 27,572 separate wires one-fifth of an inch through. The total length of the cable wires will be 5,000 miles greater than three times the distance around the globe at the equator. Each cable will weigh 11,000 tons.

The two steel sinews, with a sag at the center of 475 feet, will have a total load-supporting capacity of nearly 500,000,000 pounds, or more than twice the maximum load. The total possible "live" load to be

carried by the two main cables will be 25,000,000 pounds, providing it were possible to pack the bridge roadway with vehicles solidly from curb to curb, and load the sidewalks with pedestrians from end to end.

The pull on each cable anchorage will be 63,000,000 pounds, against which the anchorage blocks will offer exactly twice as much resistance. Each anchorage will have ponderous twin blocks weighing thirty-two tons apiece.

Supported by steel "suspenders" from the main cables is the bridge deck itself, which is ninety feet wide and divided into six ten-foot traffic lanes and two sidewalks of equal width. The bridge proper and both approaches are designed to carry a daily traffic load of 260,000 automobiles. With a clearance of 220 feet over the main channel at any stage of the tide, lofty steamers will pass with ease under the new aerial artery.

Exceptionally high structures situated near the open sea, such as the Golden Gate bridge, are subjected at times to terrific wind pressures. Engineers estimated



Bridge Site on San Francisco Side, and Drawings of the Huge Span and the Mammoth Towers



there would be a horizontal wind force of 1,500,000 pounds at each tower top during a sixty-mile gale, and accordingly made ample safety provisions for wind velocities far above such an extreme.

The pier supporting the tower at the

San Francisco end of the bridge will be the first ever built in the open sea under the plan to be followed. This plan includes a unique steel and concrete cofferdam, built in place, section by section, thirty feet thick at the bottom with its top extending fifteen feet above water. The cofferdam will remain in place as a permanent fender inclosing the pier and protecting it from possible damage by passing ships.

The bridge will have independent telephone, fire and police telegraph system. So as to insure the utmost vigilance in the care and maintenance of the huge structures, a motor-driven, traveling platform to extend the full width of the span will be provided to facilitate inspection and painting.

A modern lighting scheme, at once effective and striking, has been worked out as a major element of design. The plan includes outlining both cables with lights that will form two mammoth festoons of brilliance from shore to shore, while both towers will be bathed in a glow of floodlighting from base to tip. Projecting their beams seaward nearly thirty miles, two powerful beacons will be installed at the tops of the lofty towers, which may also be used for

By Roy J. Harde

wireless stations. In stormy, overcast weather, fog horns in the tower tops will roar their warning to the commanders of incoming steamers.

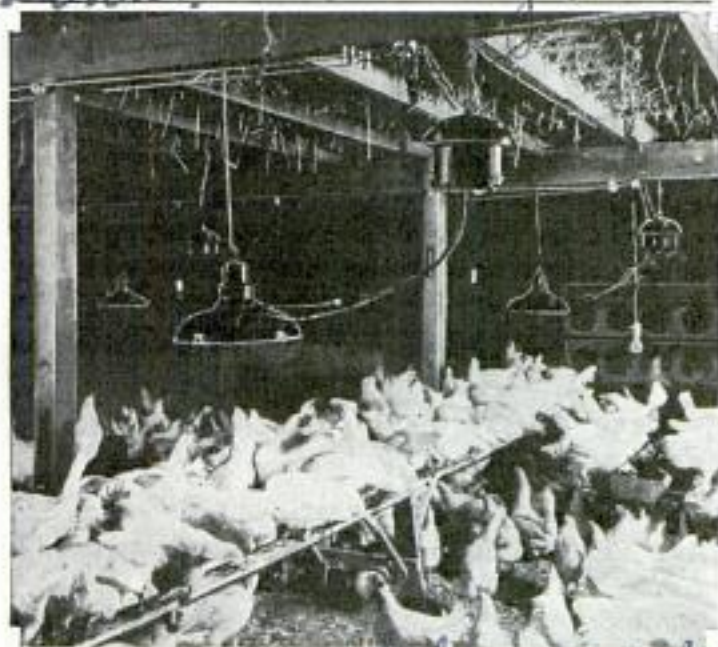
Perched like an eagle's nest directly under the top of both towers will be a built-in, glass-enclosed observation room, reached from the bridge floor by high-speed elevators rocketing aloft through the body of the tower. This will be the highest man-made lookout based at sea level and at the same time commanding an immediate view of the ocean.

C111

SUNLAMPS IN POULTRY HOUSE INCREASE EGG YIELD

Installation of sunlamps in the poultry house will result in increased egg production. In a recent test, it was found that hens getting ultraviolet light are healthier, lay more, and their eggs are more likely to hatch than those of birds not subjected to the stimulus. Twelve per cent more eggs of sixteen-per-cent greater fertility were produced by 450 hens under sunlamps than by 450 birds placed under ordinary lights. The irradiated hens also were found more resistant to disease, mortality being five per cent lower. The sunlamps are automatically controlled. On a Colorado poultry farm, twenty-four lamps serve 6,000 birds.

Denver, Colo. High



Courtesy General Electric Co. *Schenectady, NY*
Whether the Sun Shines or Not, These Chickens Get Their Health Rays; This Shows Sunlamps in the Poultry House



This Unusual Saw, Operated from the Ground, Makes It Easier to Cut Tree Branches

SAFETY SAW GUARDS LINEMEN CUTTING TREE LIMBS

Danger to linemen cutting tree limbs is reduced by the use of a chain type of saw operated from the ground. The saw is made of steel blocks, one and one-half by two inches, turned or ground to leave two ridges for cutting purposes. The blocks are connected by rounding off the ends, boring and threading to receive bolts which terminate in yokes of flexible joints. Teeth are cut on the two ridges, and a rope is attached to both ends of the saw. The linemen pass the saw over the limb to be removed and then work the ropes back and forth, slowly cutting through. By this means, branches difficult to reach are trimmed off and falling limbs are kept off power lines.

Tests indicate babies respond to colors at three months of age, but do not distinguish between hues until twelve or fifteen months old.

*not a market yet
Rogers Glass - Mass.
Salem.*

W. B. Conrad
American Magate

Cutting Co

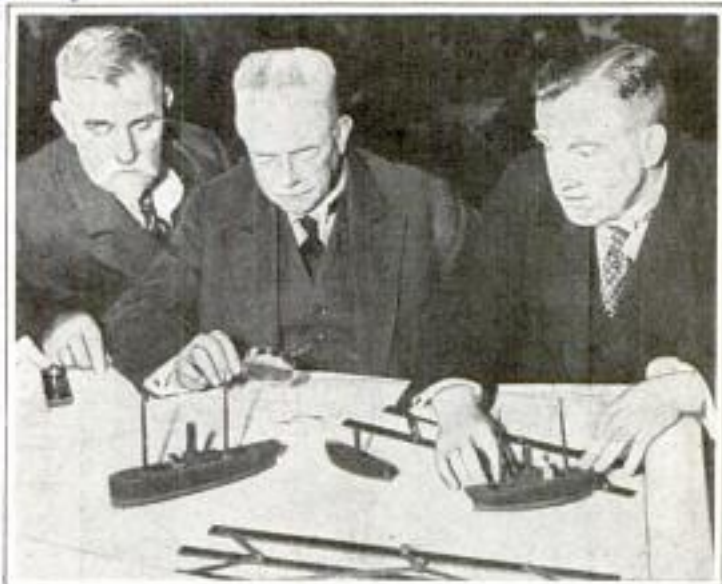
114 W. Midwest C 106

The panel nearest an observer has outlines of fenders and running board, the second represents the hood, body and one end of front seat, the third resembles the engine and controls and the fourth has the other side of body and hood while the fifth is like the first. Illumination in colors, combined with a voice from loud speakers, adds to the attractiveness.

One Carper W. W.

SMALL READING GLASS IS FASTENED TO FRAME OF SPECTACLES

Serving the same purpose as the ordinary reading glass, a small but powerful magnifying glass is mounted on a small arm which attaches to the spectacle frame where it is always handy. The arm holds it about an inch from the lens of the eyeglasses, and is hinged to a circular spring-brass mounting which snaps over the spectacle frame. When not in use, the magnifying lens can be turned upward on a hinge, a



Berlin Admiralty Court Using Charts and Small Models of Ships to Reconstruct a Collision at Sea

Wide World
SEA COURT USES TINY MODELS TO RECONSTRUCT COLLISION

In Berlin, seamen have their own law courts where cases involving collisions, accidents and other occurrences at sea are tried, to fix responsibility. In cases involving collisions, this court uses small models of ships and large marine charts to demonstrate the accidents and enable witnesses to explain exactly what took place. The court's decisions usually serve as a basis for insurance claims.



Handy Reading Glass Which Is Mounted on a Movable Arm Attached to the Spectacle Frame

small spring holding it firmly in this position or in place for reading. The frame can be bent to fit any-style spectacles and is easy to snap on or off. If the user does not wear glasses, the regular spectacle lens can be removed from a frame and the magnifier can be used on it.

San Diego Times 2/15/33
YOUNG TREES FOR NEWSPRINT TO REDUCE COSTS

Reduction in costs and time will result from discovery of a process for manufacturing white newsprint paper from pine trees only seven years old. Newsprint now is made from fifty-year old trees. The discovery suggests the possibility of farming "paper" trees like fruit trees are grown in orchards. Unusual strength and lightness are features of the new newsprint. It has a bursting strength of ten to twelve pounds per square inch, compared with only six to ten pounds for standard newsprint. It is a thirty-pound paper, while the standard is thirty-two. This means that newspapers would receive six and two-thirds per cent more paper per ton and that their mailing costs by weight would be six and two-thirds per cent less. Georgia pine trees were used in the manufacturing of this paper.

Georgia Dept. of Forestry and Reclamation
Savannah Plant. Div. of Pulp and Paper Research

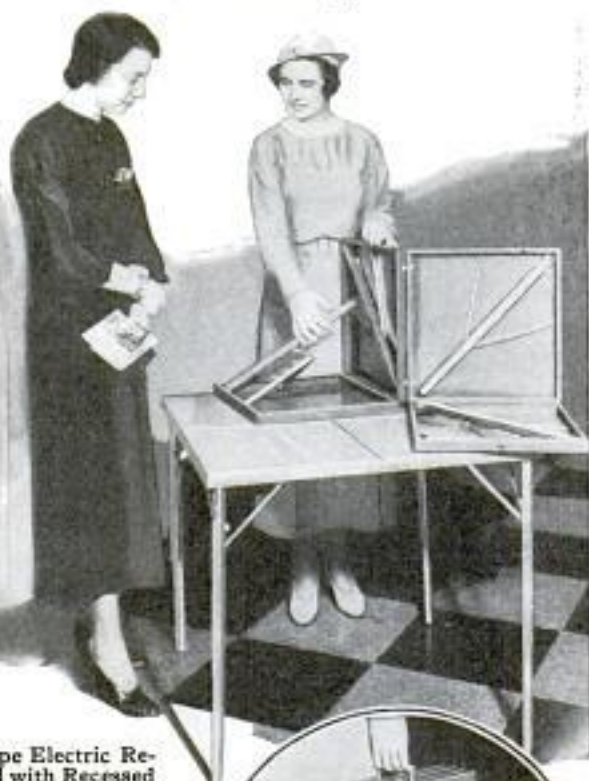
EASIER WAYS



Top, Converting a Floor Lamp into a Sun Lamp by Means of Adapter; Photo Shows How Special Reflector with Ultraviolet-Ray Bulb Is Installed; Small Transformer on Floor Is Plugged into Wall Socket and Connected to the Lamp; the Device Can Be Used on Other Lamps; It Is Considered a Safe Source of Health-Giving Rays



Top, Pouring Nut Meats on Cake from Handy Chopper; Nuts Are Cut Up Uniformly by Turning Crank of Chopper Attached to Top; Glass Jar Holds the Nuts; If Jar Breaks, Its Top Fits Standard-Size Mayonnaise Jars; Device May Be Used for Chopping Olives, Cherries and Hard-Boiled Eggs



Left, Latest-Type Electric Refrigerator Fitted with Recessed Door into Which Is Built Ample Shelf Space for Butter, Eggs, Jellies, Fruits, and Other Small-Packaged Perishables; Right, Folding Steel Table That May Be Closed into Small Area for Convenient Carrying as Shown in Circle; Legs Telescope into Camp or Beach, Card and Luncheon Heights; the Table Weighs Only Thirteen Pounds; It Folds into Package Fourteen Inches Square and Has a Carrying Handle



of DOING IT



Above, Latest Tea Strainer Fits All Spouts; Rubber Gasket Holds the Spout Firmly in the Strainer and Does Not Scratch; It May Be Cleaned by Holding under Running Water; Construction is Such That Staining the Tablecloth Is Eliminated



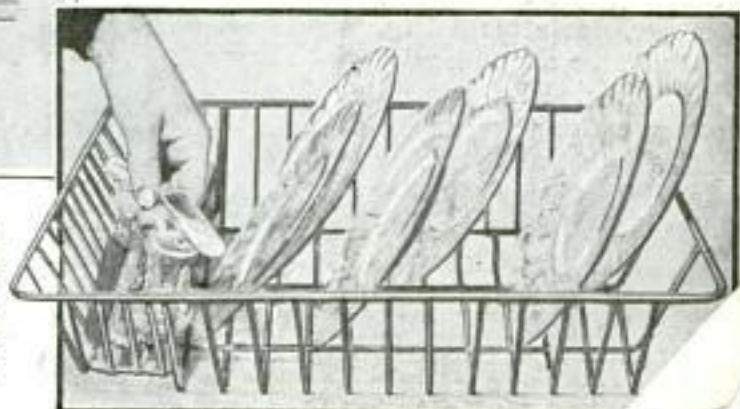
Below, Headlight on Latest Vacuum Cleaner Makes the Housewife's Job Much Easier; It Illuminates Dark Corners and Reveals Dust under Furniture and in Other Places Not Reached by Usual Lighting



Above, Washboard of Unusual Design Fits in Ordinary Basin; Its Raised Sides Prevent Splashing Water on the Floor; the Rubbing Board is Made of Copper and Attached to Frame That Holds it Out of the Water; Right, Chipping and Breaking of China and Glassware are Prevented by Rubber-Covered Drainer and Dishwashing Noise is Reduced; Drainer Will Not Rust



Attachment for Shaving-Cream, Tooth-Paste and Other Tubes is Shown in Several Uses; Left, as a Stand to Hold Tube in Upright Position; Center, How It Helps to Extract All of Tube's Contents; Right, Demonstrating Ease of Operation with One Hand





Bird Toy in Flight; Inset Shows How Carefully Wings and Body Are Balanced

BIRD TOY FLOWN LIKE A KITE ON ROD AND REEL

Flown like a kite, a new bird toy is controlled by a rod and reel. Under average wind conditions, the toy will soar the length of the line to which it is attached and will remain as long as the operator desires. It starts upside down, but rights itself and begins going up when the wind catches it. By manipulation of the rod it will perform many stunts. The body of the toy is made of light material treated to produce the proper shape and resistance quality. The wings, made of extremely light material and weighted for perfect balance, are attached to, and revolve around, wire wing arms. Fishermen believe the toy can be adapted to angling for tuna, swordfish and other large fish that now are caught with a kite arrangement. It is said also that the outfit can be used to advantage in training bird dogs.

FINGERPRINTS ON ALL CHECKS URGED AS PROTECTION

Fingerprint protection for all checks is suggested as a means of preventing forgery and theft. The system is used already in the postal banks. When you open an account, your fingerprint is taken and filed with your description and other identifying material. To withdraw money, you must go to that same post office and again have your fingerprints taken. If they are identical with those made when the account was opened, you get your money. Expanding the postal-savings system to allow depositors to draw negotiable or transferable checks on their accounts might make it necessary to establish a fingerprinting file of depositors at a clearing house. Thus, all checks could be identified before payment by comparison of fingerprints. Such comparison could be handled quickly, since the U. S. bureau of identification checks daily over 2,000 prints against their file of more than 3,000,000. For clearing checks, it would be necessary only to verify the fingerprints, which could be made by pressing the finger on a clean rubber-stamp pad or other inked surface and then rolling it on the check.

C. 256

HIGH-PRESSURE ENGINE MAKES NINETY MILES AN HOUR

Germany is experimenting with a high-pressure locomotive which has been successful in test runs between Berlin and Hamburg. Except for two giant fins at the front, it does not differ materially in

Germany's High-Pressure Locomotive Which Can Make Ninety Miles an Hour



Wide World
Developed by Krupp
State Railway Plant
Copyrighted material

*De Pont Cellophane Co.
Empire State Bldg
350. 5th Ave
New York City*

*13 1948 The Conveyor Co.
3360 E. Main St
Los Angeles, Calif. 913*

appearance from the conventional type of engine. The high-pressure "iron horse" has a normal speed of seventy-five miles an hour and a top speed of ninety miles.

CELLOPHANE STOPS MARRING OF LACQUER *c 457*

One of the difficulties encountered by a mid-west plant making motors for electric refrigerators was the marring of the lacquer finish on the motors, when they were stacked one upon the other. Various materials were tried to prevent this, and the problem finally was solved by using sheets of transparent cellophane between layers. This material eliminates the printing and marring since it pulls free from the paint or lacquer without leaving an imprint or fuzz.

c 398
MOVIES ARE RUN REPEATEDLY WITH AUTOMATIC CONTROL



subcase \$3.00

Motion pictures are shown and then run again automatically by a portable projector that does not require the services of an operator. If the film breaks, the device shuts itself off. Up to 400 feet of sixteen-millimeter safety film can be used. The projector may be plugged in on alternating or direct current. It makes an effective advertising or publicity medium, presenting moving pictures continuously. Brilliant illumination permits use of the screen under daylight or artificial-lighting condition.

Those wishing further information on anything described in our editorial pages can obtain it by addressing Bureau of Information; please inclose return postage.



Blower "Gun" for Use in Orchards Keeps Air Circulating and Prevents Formation of Frost; Hood "Shoots" Air in Desired Direction

WIND "GUN" PROTECTS ORCHARD BY BLOWING AWAY FROST

By circulating air over the orchards, giant revolving wind machines are protecting California fruit trees against frost. A motor-driven propeller forces air through a metal guide and down on the orchard like a gun fires a bullet. As the wind "gun" turns slowly, the air is kept in circulation, preventing frost from forming. Each machine is mounted on a tower seven feet above the ground so it does not interfere with cultivation, irrigation or other work.

RUBBER COATING FOR FENDERS IS APPLIED LIKE PAINT *c 379*

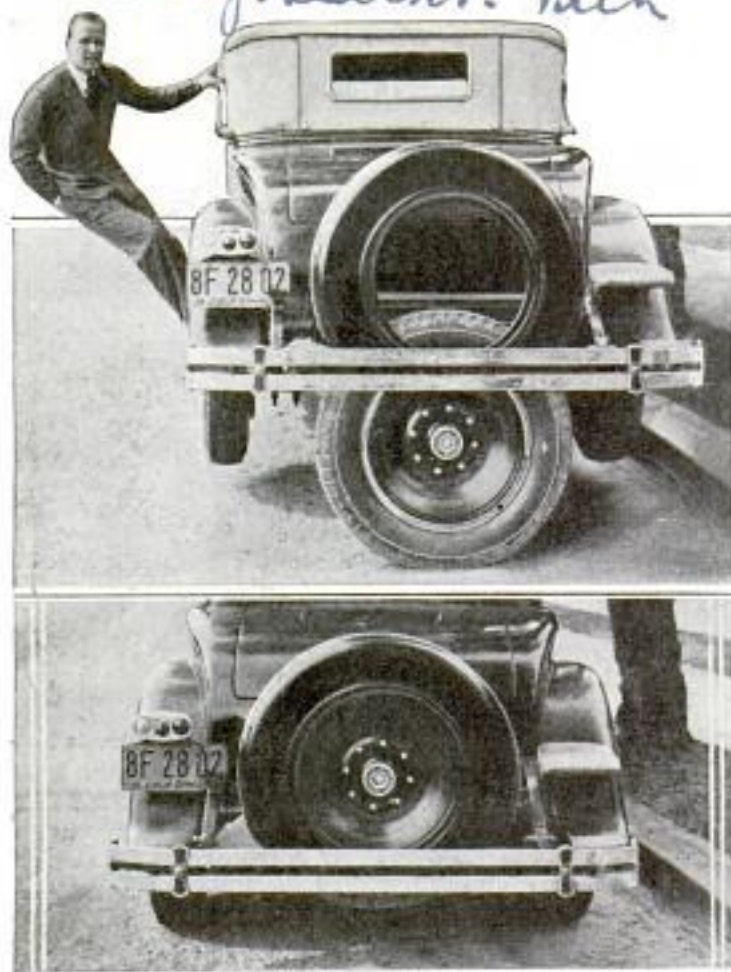
Rubber paint, which gives a tough, smooth coating that resists acids, salt and moisture, has been produced for use under automobile fenders and on other parts that are subject to corrosion. The coating is applied like any paint. It dries in twenty-four hours. Black and aluminum are the available colors.



Pholite

*Rubber
Goodyear
C. Copyrighted material*

*The Ampco Corp.
2839 N. Western Ave
Chicago*



Auto Equipped with Unit Which Lowers Spare Wheel for Jacking Up Car and Moving It Sidewise in Parking

AUTO IS JACKED UP AND MOVED BY SPARE WHEEL AND TIRE

Automobiles, carrying spare wheels and tires at the rear, can use the spares for jacking up the car and moving it sidewise in parking or turning, by installing a unit which lowers the spare wheel through engine power by hydraulic means. During the jacking operation, a connection is made with the driveshaft of the car, so that, in the elevated position, low gear and the regular clutch control the swinging of the rear to the right while reverse gear makes a swing to the left. Since the rear wheels are connected to the driveshaft and revolve as the car is being swung around, the service brake is used to stop the lateral motion in either direction. Stability is gained by automatically latching the vehicle frame to the front axle when the car is elevated, thus rendering the car more stable on the three-point suspension than when supported on the four wheels through the usual springs. For tire changing, a clutch is attached to

Fuel can be saved by installation of an automatic damper on warm-air pipes of the home-heating system. The damper keeps cold air from coming through the pipes when the fire is shut off. Thermostatic metal causes the damper to open when a fire is in the furnace. The device remains closed when temperature in the pipes drops. A manual control is provided for setting the damper in seven different positions. This feature is an advantage in dealing with long and short-run pipes, some of which cool off more quickly than others. In the seventh position, the damper never opens, so that any room can be shut off from a warm-air supply if desired. Used in the chimney vent, the damper causes quicker heating.



the spare-tire hub mounting so the device can be used as a power jack to lift the car for the interchange of wheels. The unit is used primarily for parking and turning in restricted spaces.

C484 RADIO-OPERATED ROCKET TO TRANSPORT MAIL TESTED IN GERMANY

In Germany an engineer has produced a sky rocket controlled by radio intended for carrying mail. It does not go straight up but ascends at an angle and levels off at about 3,000 feet. When it reaches its destination, mail matter can be dropped by remote control or a photograph can be taken if the rocket carries a camera. The missile can be made to return to its starting place by the same radio control which drops the mail or takes pictures.

C413 AUTOMATIC PIPE DAMPER KEEPS OUT COLD AIR

Walker Parcar

*Sambeung. 1
 Mr. Juckee.
 See many*

dno. J. A. Martin

Pat. # 1,834,958

Los Angeles, Calif

*Philips Heating & Ventilating Material
 1718 E. Alhambra St*



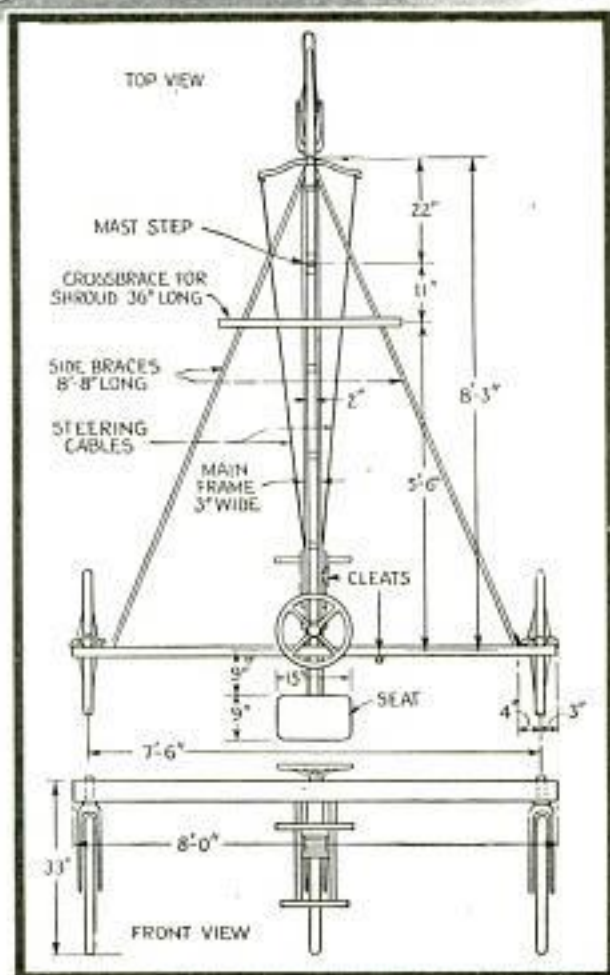
Lightweight, Collapsible SAILING TRICYCLE *rolls with ease*

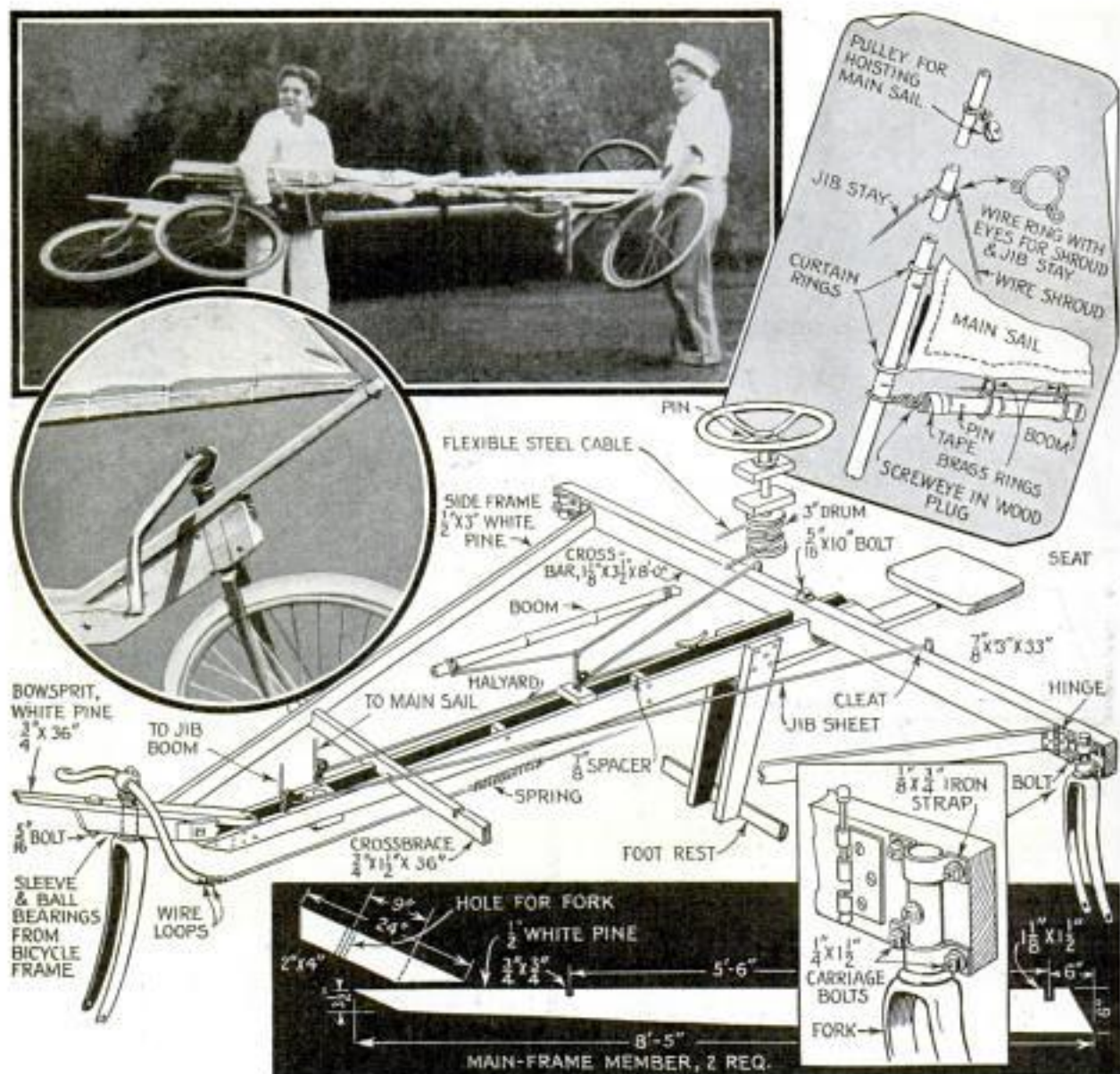
By BOB HARTLEY



WITH its light framework and bicycle wheels, this little sailing tricycle rolls over pavements or beach sand in a moderate breeze. It turns almost within its own length, and in tests on streets, school playground and beach, it proved extremely easy to handle. In a fair wind, it tacks like a real sloop, and when the boom swings around the navigator simply leans back out of its way. Large open areas, not public highways, should be used; wide beaches with hard sand are ideal.

Coaster-wagon wheels are not recommended, as they usually have roller bearings, which are not as easy-running as ball bearings of bicycle wheels. Wheels 28 in. in diameter will do, but smaller diameters are better, as they lower the center of gravity. The main frame, or backbone, is built up of two parallel pieces of $\frac{1}{2}$ by 3-in. white pine, with spacers between them. These members are tapered from the stern to the bow. The stem is made from a piece of the same wood, 2 by 4 by 24 in. It is bored for the fork barrel, or head, of bicycle frame that carries the bearings. This will be about $1\frac{1}{4}$ in. in di-

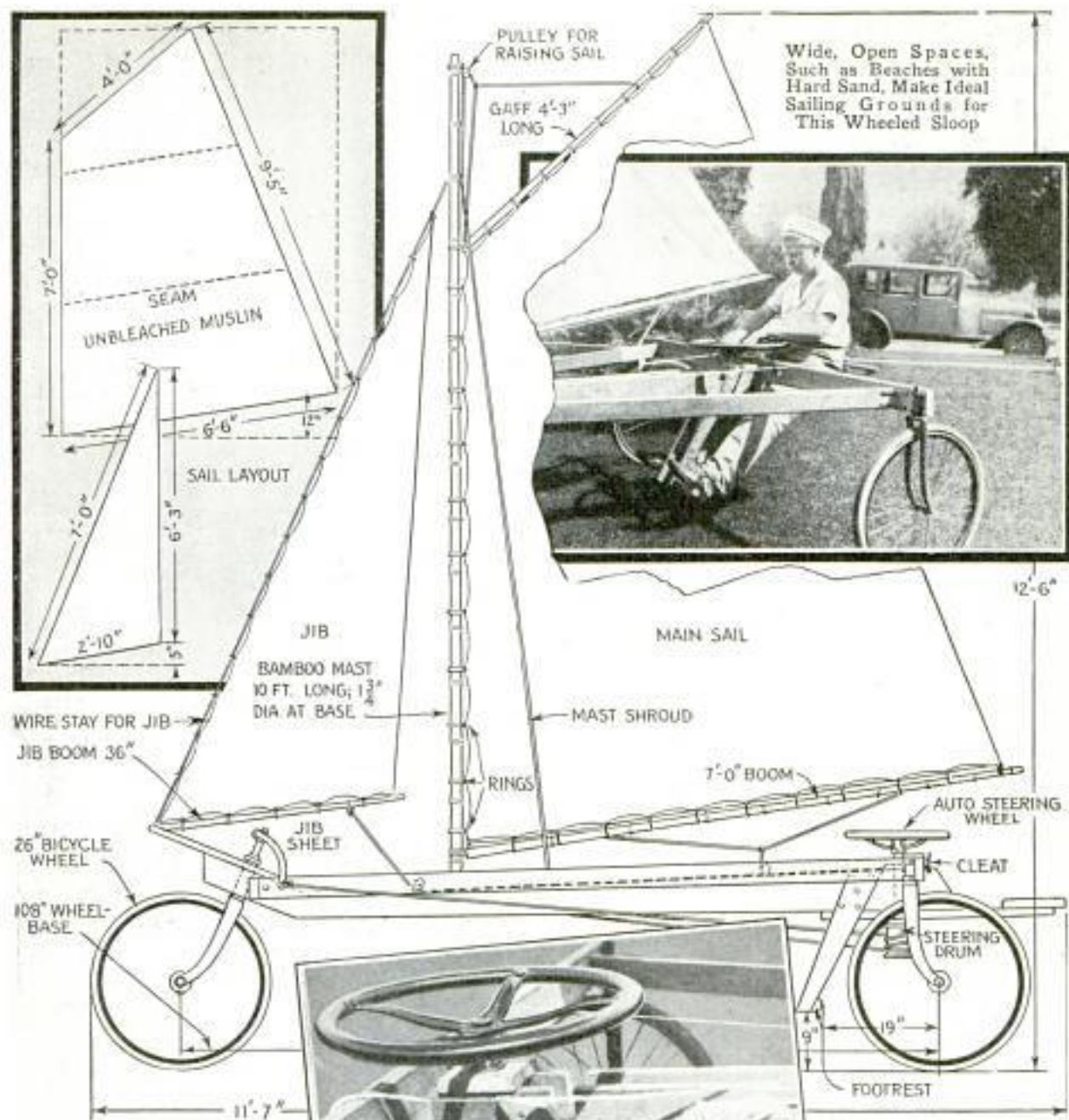




ameter, but if the parts you use are larger, it will be well to reinforce the stem on each side of the hole with $\frac{1}{2}$ -in. pieces, screwed on. The bowsprit, of course, will further strengthen the stem. Install the spacers and mast step, the latter being a block of wood, bored out to fit the base of the mast, and having a piece of wood across the bottom to prevent the mast from falling through.

Next make the crossbar for the rear wheels. It is set in a notch, $\frac{1}{2}$ in. deep, at the rear end of the main frame, to which it is fastened with a carriage bolt. Iron straps are bolted onto the extending ends, to hold the shanks of the rear-wheel forks. These are further anchored by a bolt through both the crossbar and the shank. Side braces are fastened to the

crossbar at the rear with door hinges of the removable-pin type, so they can be dismantled. The front ends are fastened to the stem with a bolt and two iron plates. The seat and foot rest should be located, after the wheels are on, in the most comfortable position for the prospective pilot. Almost any steering wheel will do. Fit it with a pipe or steel shafting on which a 3-in. wooden drum is pinned. Flexible steel cable, or light sash cord, will serve for the steering gear. To take up looseness in the cable, a stiff coil spring is used. The ends of the cable are attached to bicycle handlebars, adjusted as low as possible, so the cable will clear the side braces. Pass the cable through screw-eye guides on the inside of the foot-rest hangers. The right-hand guide should be higher

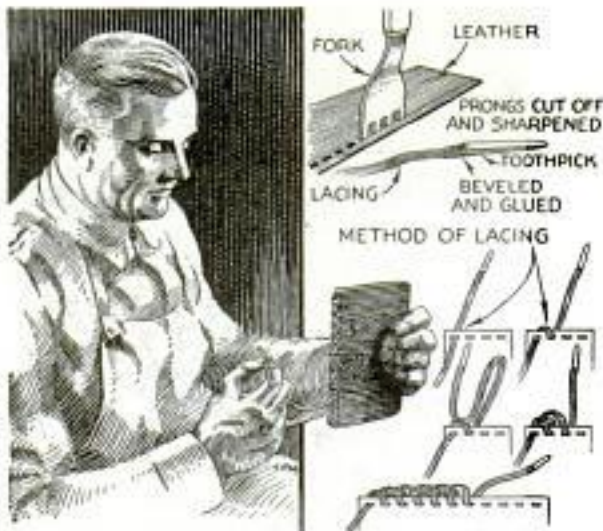


than the left, to prevent the cable from bunching on the drum.

Now you are ready to rig up the sails. A bamboo pole, about 10 ft. long and 1 3/4 in. thick at the base, makes a topnotch mast. The same material should be used for booms and gaff. Brace the mast with galvanized-wire shrouds and jibstay to the crossbrace and bowsprit, respectively. They are fastened to the mast by means of wire loops, as shown. For sails, unbleached muslin may be used, 6 yd. of which should be sufficient, by piecing the waste from the mainsail for the jib. Sew brass or wood

curtain rings, about 6 in. apart, on the mast edge of the mainsail, and small brass rings on the gaff and boom edges, as well as on the front and bottom edges of the jib. Light cotton clothesline is satisfactory for the halyard and main and jib "sheets" or ropes which control the sails.

You are now ready for a try-out. For sailing before the wind, let out the sails nearly at right angles, and in turning haul them in and tack diagonally against the wind, and so on until you reach the end of your sailing ground.



You Can Do Ornamental Lacing of Leather with This Improved Awl and Needle

Ornamental Lacing of Leather

While there are several stitches used in making ornamental lacing, probably the best one for general purposes is the lay-over or loop stitch, as it reinforces the edge of the work. A good lacing awl can be improvised from a steel table fork by cutting the prongs short and sharpening them so that they are about $\frac{1}{8}$ in. wide. Scribe a line about $\frac{1}{8}$ in. from the edge of the leather and then punch the holes, placing the first prong of the awl in the last hole punched each time the awl is moved. A good lacing needle can be made by beveling the ends of the lace and a toothpick and gluing them together. The stitch is made by proceeding as shown in the lower detail.—Geo. M. Zimmerman, Northville, Mich.

Rubber-Head Tacks Protect Hand against Bucksaw Handle

To keep the hands from being blistered by a bucksaw handle, two rubber-head tacks can be driven into the grip as shown. A large one is driven into the front to ease the pressure of the handle against the flesh between the thumb and forefinger, while a smaller one is driven in to the side for the thumb to rest against. This prevents friction between the hand



and the grip on the handle as the saw is pulled back and forth.—Frank Bentley, Jr., Missouri Valley, Iowa.

Emergency Repair for Spark Leak in Distributor Cap

Ignition trouble in a car is sometimes caused by a spark leak between two of the terminals inside the distributor cap. This trouble will reveal itself by a burned streak in the top of the cap, where the spark passes, and can be temporarily repaired by drilling a small hole through the path of the spark midway between the terminals. An invisible crack in the cap is often the cause of the leak, as it becomes filled with grease and dirt and provides a conductor of less resistance than the gap at the spark plug. By drilling the hole in the path of the spark, the resistance is increased so that the current passes through the plug.

Keeping Moisture Out of Salt Shaker

To keep moisture from getting into a salt shaker and causing the salt to stick, turn a water tumbler over it after each meal. While this may be rather inconvenient at times, it is better than having the trouble of removing the salt from the lid holes each time the shaker is to be used.

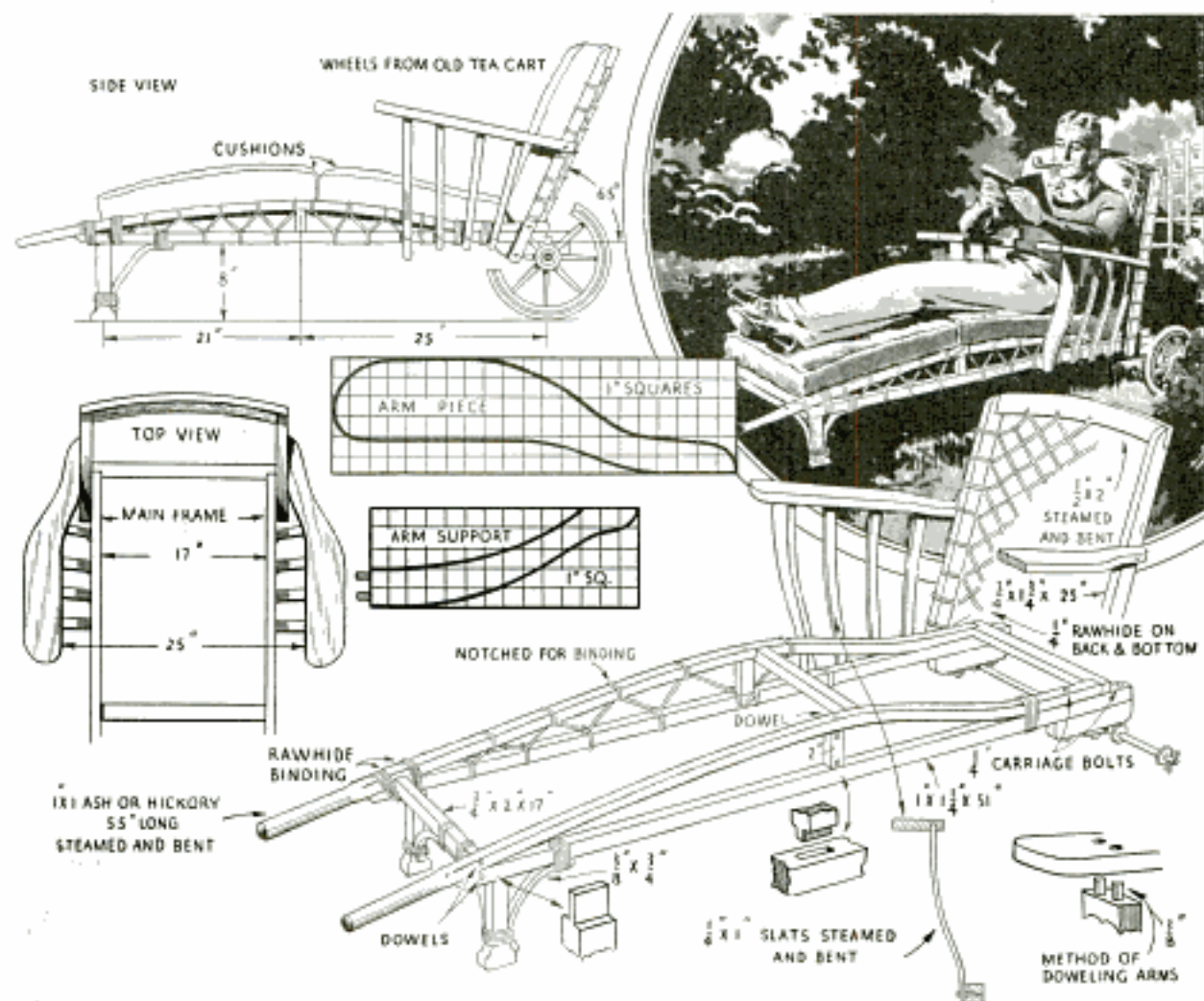


Good Drainage Makes Healthy Rose Bushes

Rose bushes will grow better if planted in well-drained soil. If they are planted on low ground where the drainage is slow, the hole should be dug twice the usual depth and then half-filled with loose rock or gravel before the bush is set and the soil replaced. This allows the water to drain down through the rocks and gravel so that it does not stand around the roots.

☛ Soldered over the spout holes in a coffee-pot, fine wire mesh will keep the grounds from coming out when pouring.

Barrow-Style Lawn Chair Is Easily Moved



Utilizing the wheels of an old tea cart, this comfortable lawn chair is moved about in a manner similar to that of a wheelbarrow. With the exception of the curved side members, which should be of ash or hickory, the frame may be made of white pine, although oak or other hardwood is more durable. The curved pieces should be steamed or soaked in water before bending them. Steaming can be done by inserting the stick in a length of pipe or rainspout and holding one open end over the spout of a steaming teakettle. Note that the front brace is doweled, while the other two are half-lapped and glued with waterproof glue. The legs and center spacers are mortised into the frame, while the leg braces are glued and wrapped with rawhide thongs. Before putting on the rawhide, with which the back and bottom are covered, finish the wood as desired, and apply two or three coats of spar var-

nish, rubbing down with steel wool after each coat except the last one. Cut the rawhide in $\frac{1}{4}$ -in. strips and install it as shown. Lash the frame members and make a 1-in. mesh weave on the back and bottom of the chair, being careful to draw the strips tight. The bottom weave is tied to the curved frame members and to the crossmembers at each end. Cushions are held in place with rawhide or cotton ties.

Mica Cleaned with Vinegar

When the mica in a stove door becomes clouded or blackened by gas and soot, it can be cleaned so that it looks almost like new. Take off the door and wipe off as much of the soot as possible with a dampened cloth. Then rub both sides of the mica with a clean cloth saturated with vinegar. This will remove the discoloration and produce a polished appearance.



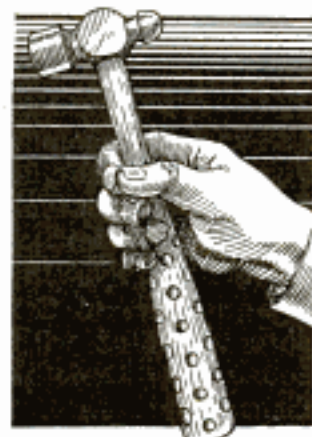
Porch Swing Suspended with Lengths of Pipe Cannot Be Tipped by Children

Pipe Supports Porch Swing

Having small children in my home, I found it advisable to suspend my porch swing with lengths of pipe, to prevent the swing from tipping over. An extra sill was fastened at each end of the swing and the pipe was run through a hole in the arms and down between two sills. Large bolts were inserted into holes drilled in the lower ends of the pipes for the sills to rest on and to hold the swing. Eyebolts may be welded into the upper ends of the pipe for hanging it to the porch ceiling.—Gordon R. Carson, Chicago.

Small Holes in Hammer Handle Improve Grip

The tendency of a hammer to slip out of your hand will be greatly reduced if



several shallow holes are drilled in the handle as shown. This gives you a firm grip on the handle without cramping the fingers, as a slight vacuum is formed in the holes under the hand.—Joseph C. Coyle, El Paso, Texas.

Carrying Oil for Fish Lures

Here is a simple container for carrying dry-fly oil on fishing trips. Get an old nickel watchcase of the kind known as a hunting type. Then trim a small sponge to fit in the case and pour just enough of the oil over the sponge to moisten it thoroughly. In applying the oil to the lure, all you have to do is to snap open the watchcase and press the fly against the sponge. This is much simpler than trying to take the cork out of a bottle and then using a camel's-hair brush to daub oil on a fly. Another advantage is that you can attach a cord to the ring on the case and tie it to your shirt or fishing jacket.

Sheet-Metal Shelf Holds Flowerpot on Window Ledge

Bent to the shape shown in the detail, a piece of sheet metal makes a neat shelf for holding a flowerpot on a window ledge. The lower end of the shelf rests against the side of the ledge and the other end hooks over the edge of the sill, where it is held by the window when closed. Painting the shelf to harmonize with the color of the house will produce a more pleasing effect.



Worn Valve Stems Cause Engine to Idle Unevenly

Worn intake-valve stems and guides allow air to leak into the intake manifold and dilute the mixture to a point where a decided unevenness in the running of the engine may result. Much of this air leakage may be eliminated by providing a small felt packing ring for the valve stem. This is held in place against the end of the valve guide by means of a small metal cap, which, in turn, is held by a small coil spring slipped over the stem in such a way that it will rest against the valve-spring retainer.

New Ideas for RURAL MAIL BOXES



ALL-STUCCO BOX

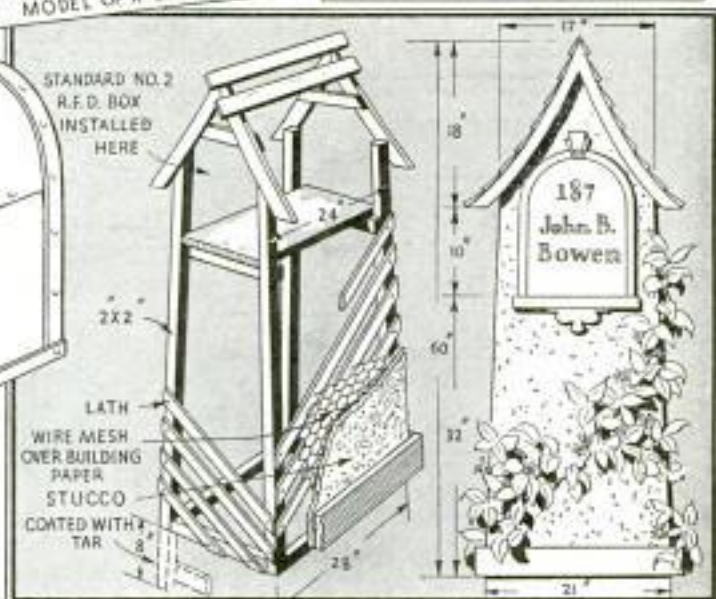
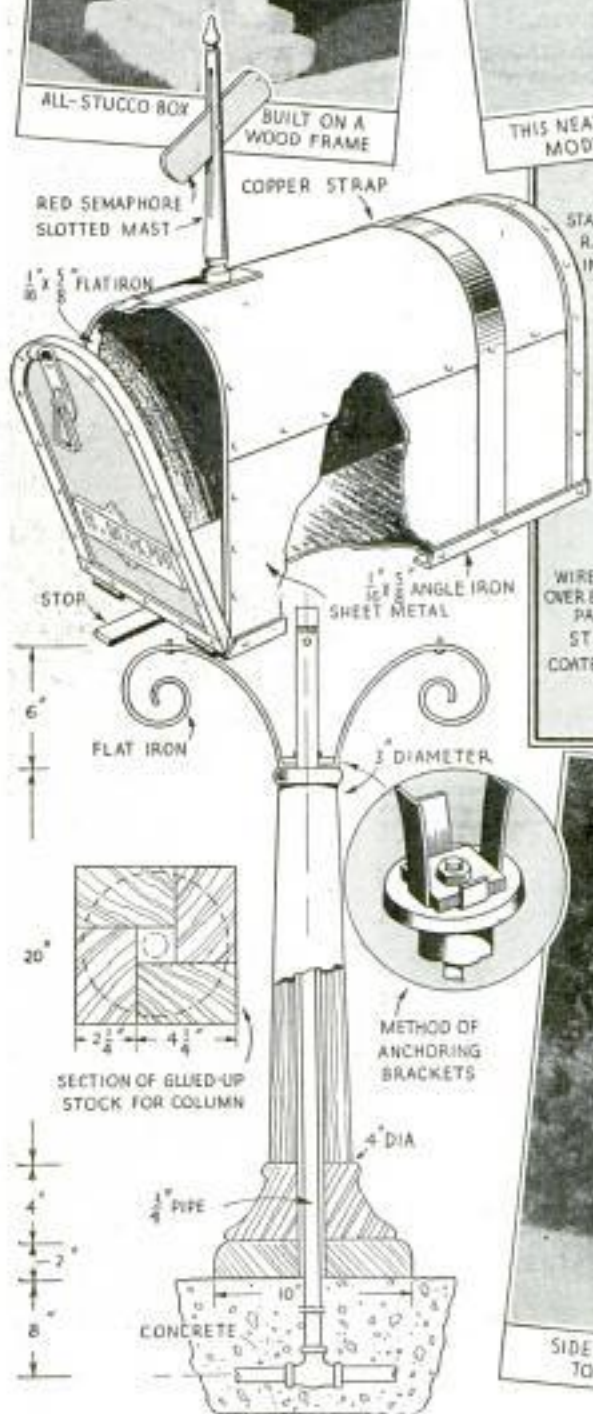
BUILT ON A WOOD FRAME



THIS NEAT JOB IS A SHEET-METAL MODEL OF A BARN



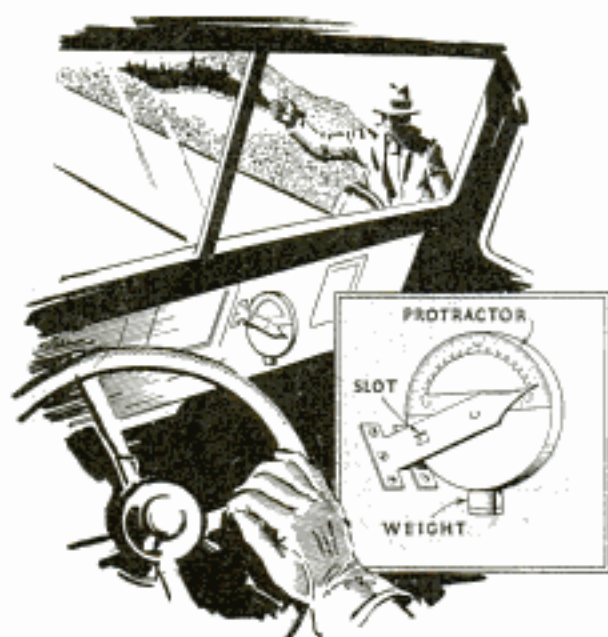
IVY VINES OFTEN ADD TO THE APPEARANCE



SIDE OF ROOF LIFTS UP TO RECEIVE MAIL



GATEPOST HOUSES TWO BOXES OF COMMON TYPE



Homemade Clinometer Screwed to Instrument Panel of Car Indicates Grades of Hills

A Clinometer for Your Car

Screwed to the instrument panel of a car, this clinometer will show the grade of any hill you drive up or down. A small protractor is tacked to a wooden disk, which is counterweighted at the bottom and pivoted between two sheet-metal brackets, as shown in the detail. When going uphill, the reading is seen through the slot in the bracket, and when going downhill at the point of the bracket.

Combined Salt and Pepper Shaker for the Camp Kit



Handy salt and pepper shakers for the camp kit, or for carrying in the pocket when on hiking trips, can be made from short pieces of bamboo. Cut the piece so that there is a joint in the center, and drill several $\frac{1}{16}$ -in. holes in the side near each end. Fit both ends with corks, notched as shown to let the contents of the shaker come out of these holes. When not in use, the corks are turned to close the holes.

☞Skins of tomatoes come off easily if the fruit is first scorched over a flame and then peeled under cold water.

Finding Area of Irregular Plane Surface

Ordinary drawing or writing paper is of such uniform thickness that advantage can be taken of this fact to find the area of an irregular plane surface. Trace the outline of the surface of which the area is unknown, cut this out carefully with scissors and then cut out another piece of the same paper 1 in. square. Weigh both pieces on a sensitive scale, and from their relative weights, compute the area of the larger piece. For example, if the 1-in. piece weighs .25 gram and the irregular piece, 19.5 grams, the latter would have 78 sq. in., obtained by dividing 19.5 by .25.—W. B. Lenhart, Long Beach, Calif.

Creosote Keeps Away Mosquitoes

Creosote is a repellent to mosquitoes and other insects and can be used to good advantage to keep them away from the sleeping quarters at your summer camp. If you are sleeping outdoors, smear one side of pieces of paper with the creosote, tack them to the legs of the cot and place a piece near your head. A few pieces of the paper hung about the inside of your tent or cottage will also help.—Thomas Moore, Detroit, Michigan.



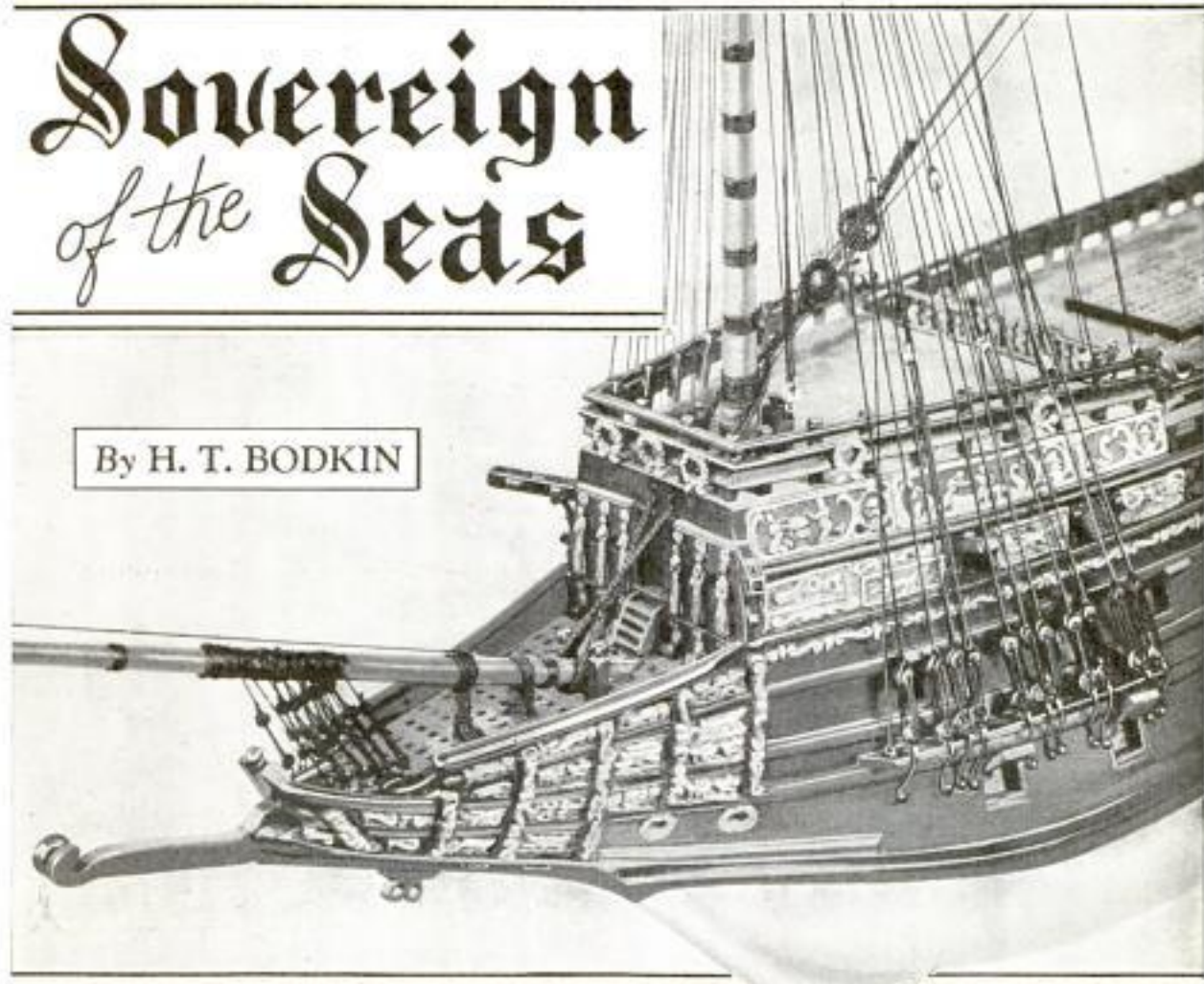
Teeth on Edges of Garden Trowel Cut Tough Roots

Teeth on the edges of the garden trowel enable you to quickly cut off heavy roots that may be encountered while loosening the dirt in your flower bed. The teeth are made with a three-cornered file, which is also used to sharpen them when they become dull.



Sovereign of the Seas

By H. T. BODKIN



PART VIII—Standing Rigging

STANDING rigging material for the "Sovereign" are: Single blocks, 47, $\frac{1}{16}$ -in.; 33, $\frac{3}{32}$ -in.; 28, $\frac{1}{8}$ -in.; 5, $\frac{9}{32}$ -in.; double blocks: 6, $\frac{3}{32}$ -in.; 4, $\frac{3}{16}$ -in. fiddle blocks. 5, $\frac{1}{8}$ -in.; three-hole black dead-eyes: 64, $\frac{3}{32}$ -in.; 58, $\frac{1}{8}$ -in.; 22, $\frac{9}{32}$ -in.; five-hole black deadeyes: 2 each, $\frac{1}{4}$ -in., $\frac{9}{32}$ -in. and $\frac{5}{16}$ -in. Four single $\frac{3}{32}$ -in. blocks, with hole reamed oversize, may be substituted for special spritsail topmast-backstay blocks detailed in this article. For rigging line, one 100 to 200-yd. spool each of linen thread, Nos. 30, 35, 60 and 70, and one spool of No. 50 cotton thread will be required. Also, a piece of beeswax, with which every line is thoroughly impregnated. Now, we can proceed with the job.

The first step is to drill at an angle through the forward edge of the forecastle deck and connect these holes with those previously made in the beakhead bulkhead just below this deck level, so that the

mainstay can pass through and down around the inboard end of the bowsprit. The main-hatch grating is glued and pinned to the spar deck on the centerline about 1 in. forward of the mainmast bits. Two small wire eyes are set into the after port corner, to belay the garnet tackle described later. Sixty wire chain plates are now made as detailed. Of these, the fourteen required for the mizzen chain plates are cut to about $\frac{1}{2}$ -in. length. The ends opposite the eyes are bent inboard to provide hooks for the wire strops of the lower-shroud deadeyes. The chain plates are fastened to the hull with small round-headed escutcheon nails. Before attaching, study the illustrations carefully. Chain plates of the fore and mainmasts are not evenly distributed along the channels, but are grouped as shown. This is required in order that the guns, in the ports partly covered by the shrouds, may be pushed outward without forcing the rigging aside.

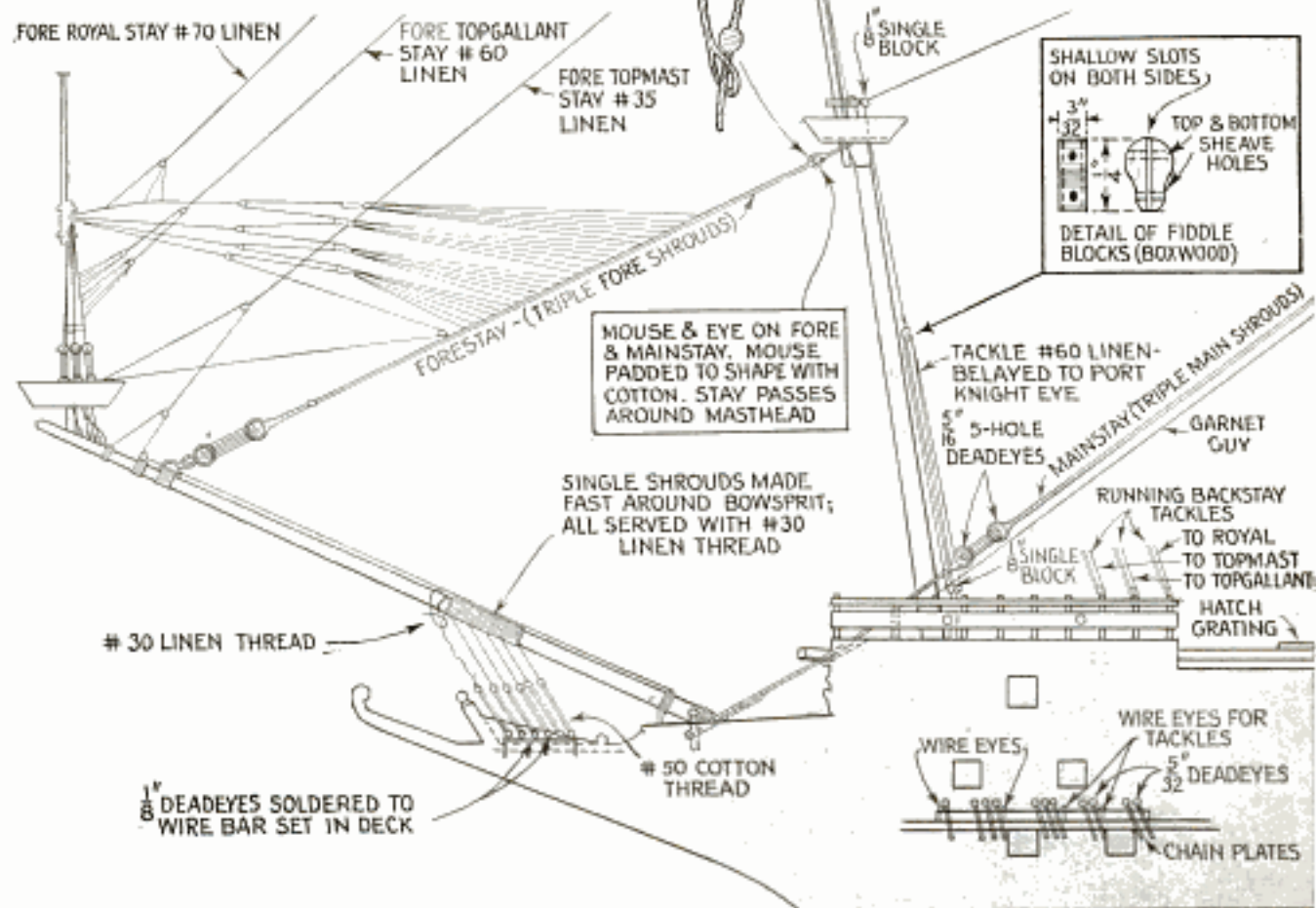
The mizzen chain plates can be evenly spaced. All the plates should line up with the angle of the shrouds attached to them. Therefore, the nails should not be driven home solidly until the shrouds have been rigged, which will allow proper adjustment of the plate angles. Complete the channel fastenings by putting four wire eyes just inboard of the fore and main-channel edges, and two eyes in the mizzen.

As a standard for rigging sizes, the fore-most shrouds are triple-wound strands of No. 35 thread; the mainmast shrouds are triple No. 30 thread, and the mizzen shrouds, triple No. 60 thread. You can make your own shrouds by twisting triple thread strands together, fastening one end of the threads to a hook in the wall and the other end to a hook chucked in a hand-drill. Twist the strands tightly, wax heavily and then stretch them as tightly as possible and pass rapidly over a flame. This melts the wax and prevents the line from unraveling. The stays are triple shroud thickness.

The fore, main and mizzen lower masts are set up in their holes in the decks. Then the stays are looped around each of their

respective mastheads, over the forward crosstrees and down through the square holes in the tops, which should be large enough to allow passage of lines on all four sides. The mizzen stay is sewn through with thread and served (wrapped with thread) to represent a long eyesplice. The fore and mainstay loops are secured with the eye-and-mouse detail illustrated in the rigging plan. The forestay is set up with two $\frac{5}{16}$ -in. deadeyes, the lower being fastened to a collar of stay-thickness which, in turn, is attached to the bowsprit with several turns of shroud line. The

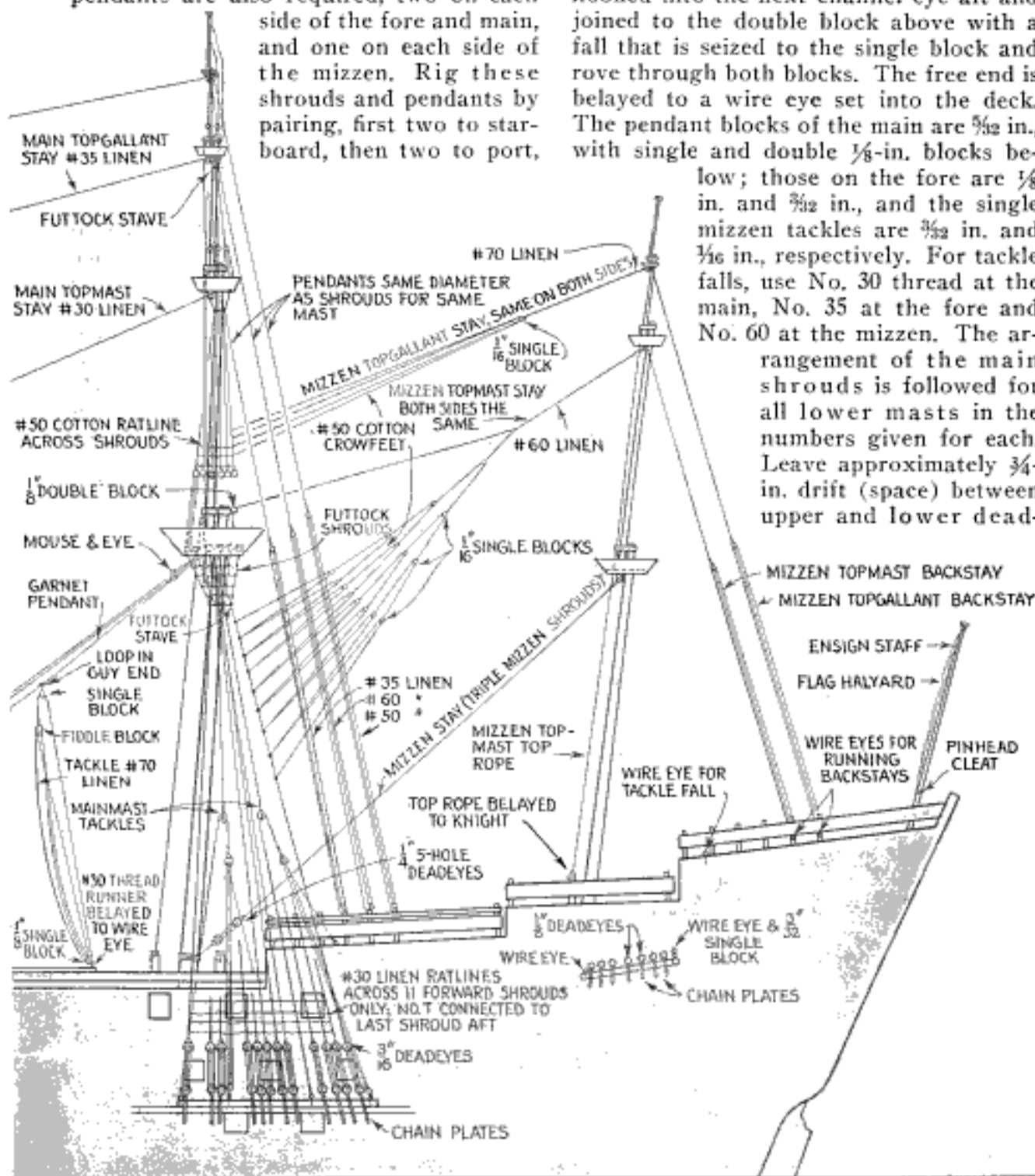
mizzen stay is set up similarly with a collar and seized to the main-mast, its angle just clearing the half-deck railing. The collar of the mainstay is much longer. It passes on either side of the fore-mast, through the holes in the deck, crosses itself above the beak-head and passes under the bowsprit, where

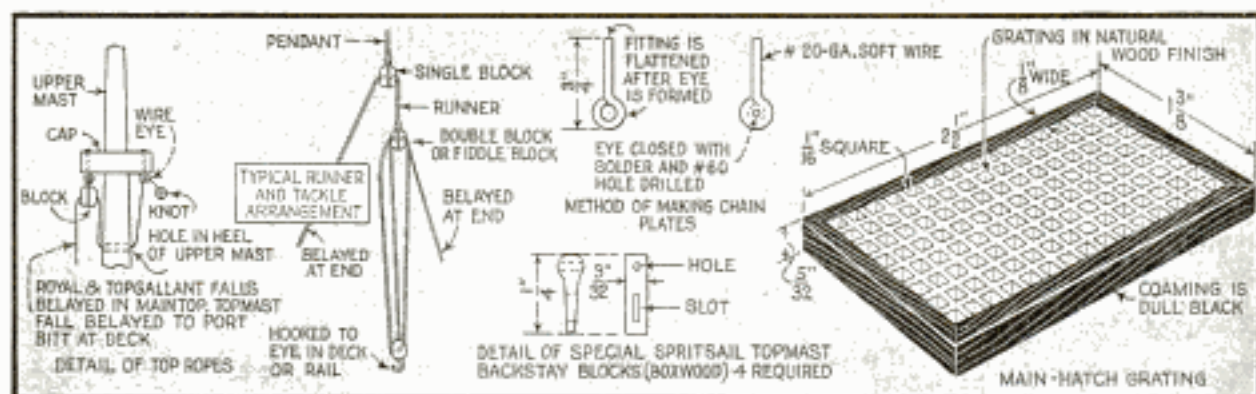


the free ends are seized to the adjoining part of the collar. For the deadeye lanyards, use No. 30 for the mainstay, No. 35 on the forestay and No. 60 for the mizzen. Take up firmly on all stays by means of the lanyards and secure the latter with a couple of half-hitches at the backs of the lower deadeyes.

There are 11 shrouds on the fore, 12 on the main and 7 on the mizzen. Tackle pendants are also required, two on each side of the fore and main, and one on each side of the mizzen. Rig these shrouds and pendants by pairing, first two to starboard, then two to port,

and so on. They should be long enough to reach just below the channels to give you a convenient length for seizing the upper deadeyes into them. Now, rig the shroud tackles by seizing single blocks into the pendants, starting a "runner" of shroud thickness at an eye in the channel, up through this block and down to be seized into another smaller double block at the opposite end. A single block is hooked into the next channel eye aft and joined to the double block above with a fall that is seized to the single block and rove through both blocks. The free end is belayed to a wire eye set into the deck. The pendant blocks of the main are $\frac{3}{16}$ in., with single and double $\frac{1}{8}$ -in. blocks below; those on the fore are $\frac{1}{8}$ in. and $\frac{3}{16}$ in., and the single mizzen tackles are $\frac{3}{16}$ in. and $\frac{1}{16}$ in., respectively. For tackle falls, use No. 30 thread at the main, No. 35 at the fore and No. 60 at the mizzen. The arrangement of the main shrouds is followed for all lower masts in the numbers given for each. Leave approximately $\frac{3}{4}$ -in. drift (space) between upper and lower dead-





eyes, their sizes being in the plan. For lanyards, the same thread sizes as for tackle falls are suitable.

You can rig shrouds on the upper masts before placing them on those below. No tackles are required. The main topmast has 6 shrouds on a side; the fore topmast 5, and the mizzen topmast, 4. Nos. 30, 35 and 60 thread sizes are suitable. The bottom deadeyes are made with a wire strop sufficiently long to pass through holes at the outer edges of the top flooring and to be formed into eyes just below; this applies to all upper masts. The topgallant and royal masts take deadeyes, shrouds and lanyards one-half the diameters of those on respective masts below. They also require one-half the numbers of shrouds. Let the heel of each mast come below each top not less than $\frac{1}{8}$ in. and glue in place before rigging.

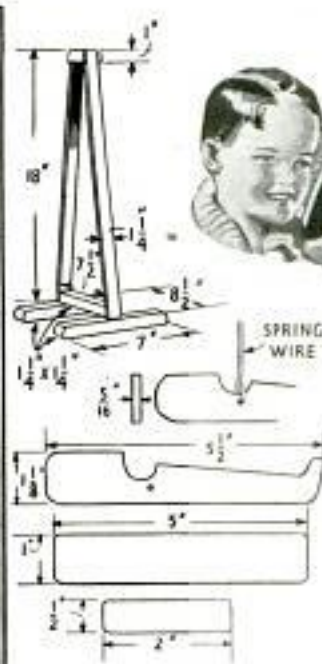
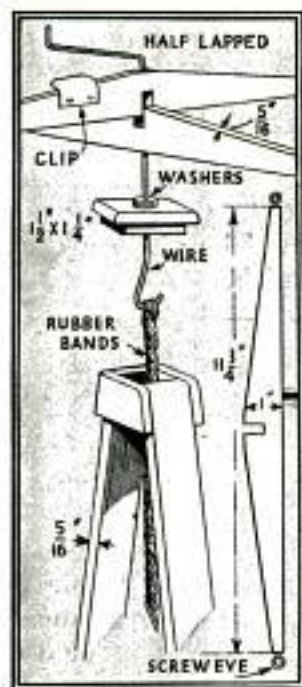
Beginning with the highest, the shrouds are rigged as noted. The assembled upper masts are glued on the lower masts. Using No. 20 wire, we now seize futtock staves, made from it, across the main shrouds about 1 in. below the main top and, from the eyes of the topmast shrouds (under the top flooring), the futtock shrouds are run downward to be seized around the futtock staff. This step is repeated on all masts except the uppermost, using proportionately smaller wire for staves and reducing their distances under the tops likewise. The futtock shrouds are the same diameters as those above. Running backstays are then rigged. The pendants are shroud thickness; the tackle falls of the fore and mizzen are smaller than those specified at the main. The blocks at the lower ends hook into wire eyes set into rail posts on the inboard sides. Blocks for the upper mast stays

begin with $\frac{1}{8}$ -in. size, then $\frac{3}{32}$ -in. and $\frac{1}{16}$ -in. The spritsail-topmast backstay uses a series of $\frac{3}{32}$ -in. blocks, and four special boxwood blocks, if you decide to make the latter as detailed. If not, ream out the sheave holes in four $\frac{3}{32}$ -in. blocks and pass the crowfeet and running lines through the same oversize holes. The running lines are the same as used for the fore topgallant stay; all crowfeet are No. 50 cotton thread. You can use fore-shroud line for the garnet guy, main-shroud line for its pendant, and the other thread sizes for runner and tackle. The mizzen-topmast stay tackles, one on each side, are duplicates of the arrangement of the main-topmast stay. As a general rule, all lines, blocks, deadeyes, etc., are about one-half the size of those immediately below, and all rigging for the mainmast is largest, the foremast smaller and the mizzen smallest.

For halyards, use No. 50 cotton for all except the ensign, which uses No. 60 linen. The plan gives the mainmast ratline sizes. The fore ratlines are No 35, and the mizzen, No. 60. The fore topmast ratlines are No. 60, and mizzen, No. 70 linen. No ratlines are rigged to the topgallant and royal masts. The ratlines are all started about $\frac{3}{16}$ in. above the lower deadeyes and continue horizontally across the shrouds, upward with the same spaces between them. Use clove hitches to attach to shrouds. The futtock shrouds, attached to lower and topmasts, are also "rattled down." Note that ratlines do not join the aftermost main, fore and mizzen shrouds. They do cross all topmast shrouds, but to avoid obscuring other details, are not shown.

As a final caution, before you begin, thoroughly wax all lines you use, or they may shrink or expand with disastrous effect on your mast alinement.

Rubber Bands Drive This Airplane Whirligig



Resembling the large airplane rides at amusement parks, this model, when wound up, will keep whirling at a surprising speed for several minutes. An upright frame supports arms, from which four small airplanes are suspended by means of screw-eyes and spring wire. The arms are pivoted to a cap on top of the frame with a piece of wire, which has a hook bent on one end and a crank on the other. Two washers are placed between the arm assembly and the cap, to reduce friction. Power from five or six heavy rubber bands, stretched between a screwhook in the base and the hook on the crank wire, is transmitted to the arms, the crank engaging with a clip on the upper arm.

Hints on Painting Screens

The bottom edge of screen frames should be given particular attention in painting as the end grain of the wood is exposed at this point, and water, running under it, is absorbed unless the wood is well protected with two or three extra coats of paint. For maximum protection, a heavily pigmented paint should not be used on the screen wire. It is better to apply thin paint more often. Even a brushing with kerosene before storing the screens for winter, and again before putting them up in the spring, will add many

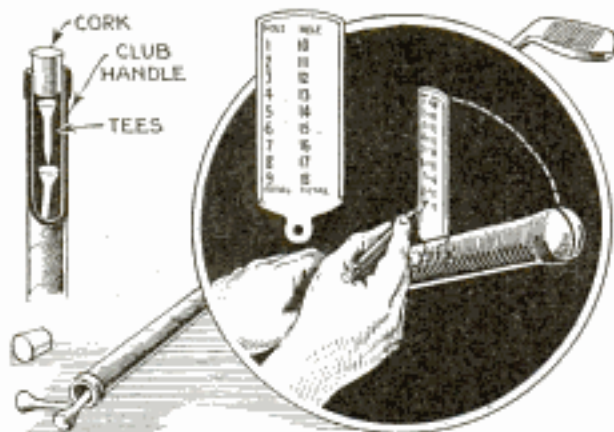
years to the life of the wire. If a pigmented paint is used, thin it down, and lay the screens in a horizontal position while applying the paint.

Holder Shields Point of Ice Pick

To eliminate possibility of injury from an ice pick lying on a table or in a drawer, it is a good idea to provide this holder on a wall near the ice box to shield the point.



A large cork is fastened to a thin piece of wood by means of long brads, and this piece is in turn nailed at right angles to the end of another piece as shown in the drawing. The holder, thus made, is hung on the wall by means of a screw-eye and hook, and the pick is inserted through a screw-eye driven into the center of the holder, and the point is pushed into the cork.



Tees and Score Card Can Be Carried in the Handles of Your Golf Clubs

Tees and Score Card Kept in Handle of Golf Club

A good place to carry golf tees is in the end of your club. It is drilled lengthwise and a cork is fitted in the hole. Another kink is to carry your score card in a handy place, which can be done by pivoting an aluminum holder in a saw slot cut in the end of the handle. The holder is merely a piece of sheet aluminum cut as shown, and the edges rolled over to hold the card.

Ebony Color Produced on Hardwood

Hardwood, such as birch and maple, can be given the appearance of ebony by painting them with the following two solutions: The first is made by boiling solid extract of logwood in water, and the second one (kept in a separate container) is made by dissolving green copperas, $\frac{1}{2}$ oz., in 1 pt. of water. First smooth the work by carefully sanding it, and then apply a

couple of coats of the logwood solution while it is hot, allowing the work to dry between coatings. Then put it away for a day or two before applying the second solution. There will be no immediate change when this solution is applied, but after a few seconds, the wood will begin to turn steadily darker until a deep, even black color has been obtained. After the work has dried, it should be given a coat of shellac or clear varnish.

Clothespins Serve as Rake Teeth

By bolting an old rake-handle assembly to a hardwood stick, you can make a serviceable lawn rake, using clothespins as teeth. The heads of the pins are cut off and the shanks are whittled down to fit in holes drilled in the stick, where they are held by driving small nails through both



Lawn Rake, Fitted with Clothespins for Teeth, Is Not Easily Clogged by Grass and Leaves

the stick and the pins. A rake of this type has the advantage of not stirring the surface soil and damaging the grass roots.

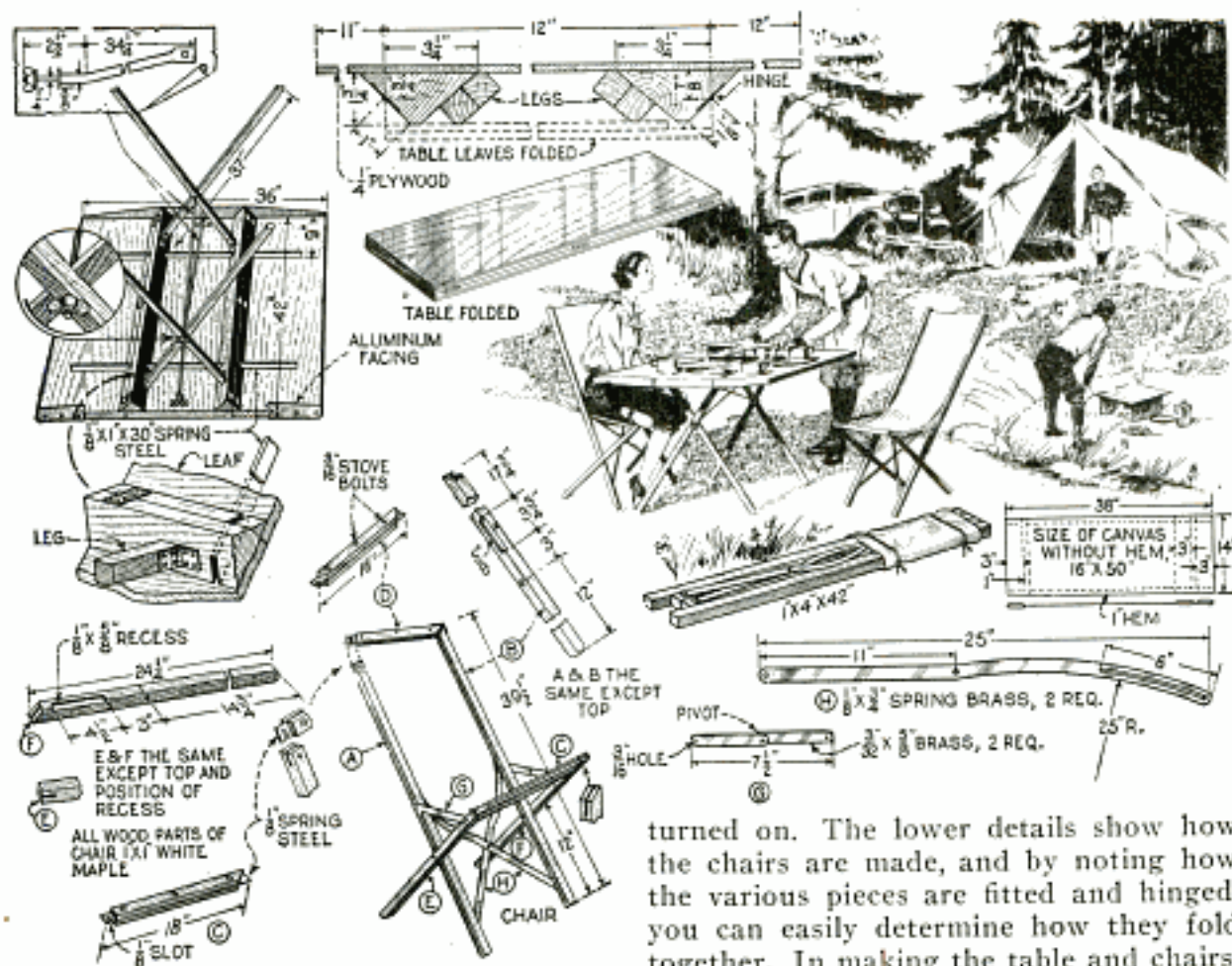


Craftmats and Blueprints on

“SOVEREIGN OF THE SEAS”

A Craftmat of the stern and lower-hull carvings will be sent upon receipt of 50 cents. Craftmat No. 2, of the carvings to go on sides of upper works, 35 cents. Seven blueprints on the “Sovereign” are available for \$1.25. A list of 380 practical projects will be sent for 3 cents postage. Also, a sample print with forty illustrations of finished projects available for 10 cents. Address Blueprint Department.

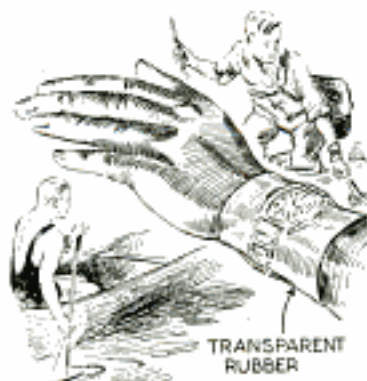
Folding Camp Furniture Takes Little Space



Camper and tourists can make their own camp furniture, most important of which are folding tables and chairs. Those shown here have been found thoroughly practical in every respect, as they are designed to withstand hard usage and have the additional advantage of being collapsible so that, when folded, they occupy very little space. The table has a plywood top in three sections which are hinged together. The legs are hinged to two triangular strips, which are ripped lengthwise, the narrow parts being fastened to the edges of the side leaves. The strips are also slotted crosswise at two points to accommodate narrow crosspieces, which are used to hold the center sections and side leaves rigid when the table is in use. To hold the legs, iron rods, shown in the upper left-hand detail, are hinged at the ends of the center section and are threaded at the opposite ends. The threaded ends are slipped through the legs at the point where they cross, after which a thumbnut is

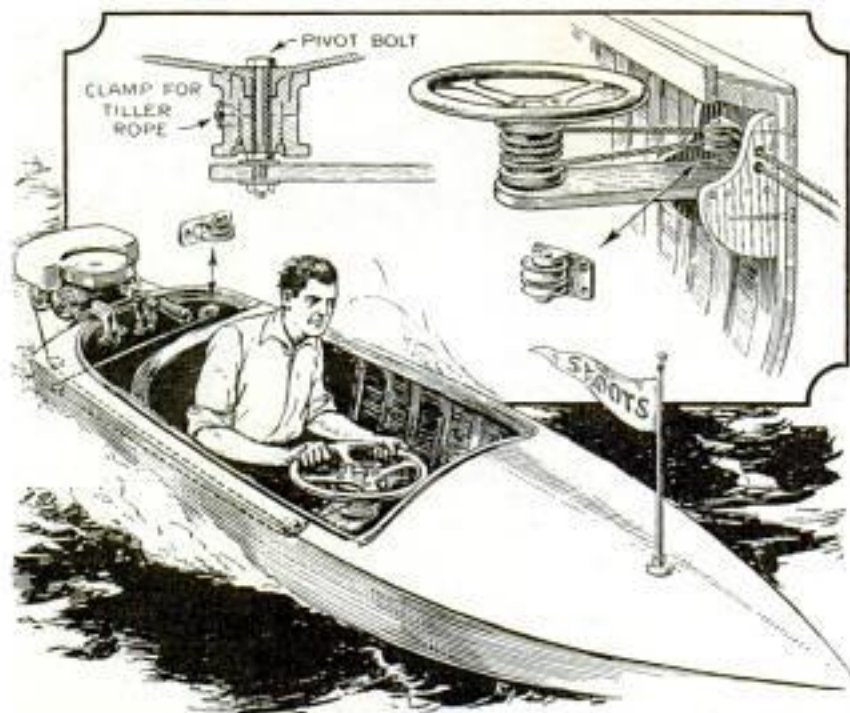
turned on. The lower details show how the chairs are made, and by noting how the various pieces are fitted and hinged, you can easily determine how they fold together. In making the table and chairs, use birch or maple, and, after each part is finished, waterproof it by impregnating with melted paraffin, the surplus of which should be removed with steel wool.

Transparent Rubber Protects Watch against Water



Boatmen, fishermen and others can wear a wrist watch without getting water into the mechanism by placing a hand of thin, transparent rubber over the wrist to cover the watch. The dial can be clearly seen through the rubber, which provides added protection for the crystal. Suitable bands can be obtained in most drug stores.

A Steering Convenience on Small Outboards



This Steering-Wheel Mounting Enables You to Steer an Outboard Boat and Adjust the Motor at the Same Time

Most outboard steering wheels, designed for small boats of the runabout type, have to be mounted at the front of the cockpit, usually making it impossible to steer the boat and adjust the motor at the same time. A wheel mounted on the side of the

boat just in front of the rear seat, will overcome this difficulty. Both tiller ropes are brought along the right side of the hull, one going directly through the transom of the boat, while the other crosses the boat inside and then passes out through the transom to the opposite end of the tiller, pulleys being arranged at the points where the ropes change direction. The wheel mounting takes little space, and there is room for your legs under it. A standard type of racing wheel can be used, or one may be made from an old auto wheel. The wood

drum is made in two pieces, clamped together with long wood screws. The steering wheel is fastened to it with countersunk, flat-head wood screws, one in each spoke of the wheel spider.—J. D. Brubaker, Evanston, Ill.

Homemade Bases for Your Ball Game



Boys often use blocks of wood, bricks and flattened tin cans for bases in their ball games, and are sometimes injured from sliding on them in a close

play. To prevent this, make the bases from old trouser legs filled with sand and sewed up at both ends. Small sugar and salt bags may be used in the same way.

Worn Timer Causes Motor to Miss

Wear in the timer of an auto engine usually causes some change in the gap between the points. In some timers this gap may become too wide, while in others it may be too small. Either case may be de-

termined by noting the operation of the engine at various speeds. If the points do not open sufficiently, the engine will miss at the lower speeds, and will tend to run more evenly as the speed is increased, while too wide a separation of the points will cause even running at lower speeds and missing at higher speeds.

Sealing Moth-Proof Boxes Keeps Out Dampness

When clothes are stored in moth-proof boxes these should be sealed to keep out damp air, which may mold the clothes and give them a musty odor. Sealing the edges of the box with gummed tape, will help to eliminate this trouble.

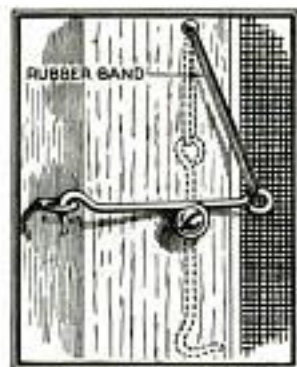


Annealing Brittle Bandsaw Blades with Molten Lead

Bandsaw blades that have become brittle from prolonged use can be brought to their normal hardness by immersing them in molten lead. This is melted in an old iron skillet or other suitable container. Remove the scum that collects on top of the lead and immerse the blade in it for 10 or 15 minutes or longer, taking care that the lead is no hotter than necessary to keep it liquid. Some of the lead may adhere to the blade when it is taken out, but this can readily be scraped off. The heating serves to relieve the strains set up in the steel of the blade, and the temperature of molten lead is not high enough to remove the temper. This treatment can also be applied to jigsaw blades and other steel tools that tend to become brittle.

Rubber Band Keeps Screen-Door Hook from Marring Woodwork

To keep the screen-door hook from jamming between the door and the casing and marring the woodwork, one cottage owner



made a hook from a piece of heavy wire as shown. A rubber band, tacked to the door and tied in the eye bent at the end of the hook, holds it in a vertical position when unfastened. If a strong band or even a coil spring is used, the

chances of an intruder opening the door by inserting a slender instrument between the door and casing will be very slight.

Belt Dressing Serves as Adhesive on Sanding Disk

The customary method of attaching abrasive to a sanding disk with glue can be improved by substituting stick belt dressing. Simply hold the stick against the bare disk as it rotates so that an even coating of the dressing is applied. Then stop the disk and immediately apply the abrasive sheet. It will stick at once and the sander can be used shortly afterward.



With This Tool You Can Cut Out Dandelions as the Lawn Is Raked

Simple Dandelion-Cutter Attached to the Garden Rake

When screwed to the handle of a garden rake, this cutter enables you to remove dandelions while raking the lawn. The cutter is a length of flat iron notched at one end, and ground until the edges are sharp.—Chas. C. Brabout, Detroit, Michigan.

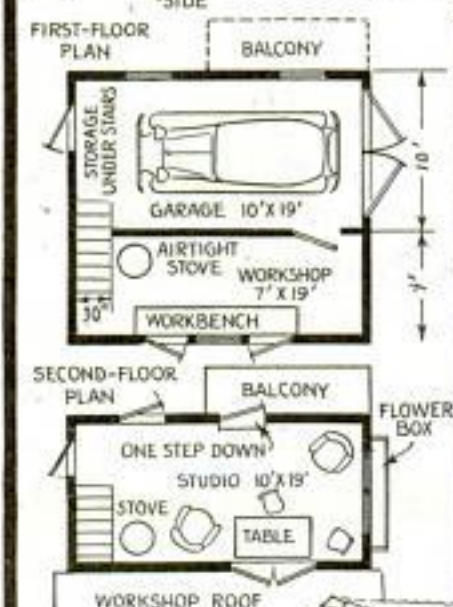
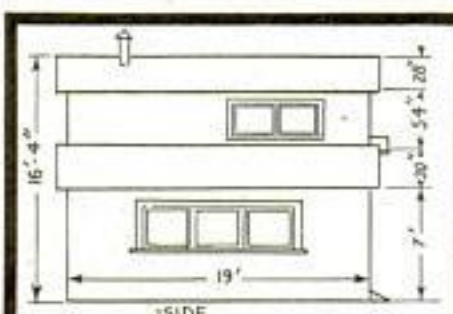
Brads Improve a Sink Stopper

To keep the ring in a sink stopper from wearing through the rubber, push a wire brad into each side of the ring boss so that they pass just above the ring. This strengthens the boss and makes it last longer, as it spreads the area of the pull well over the top of the plug.

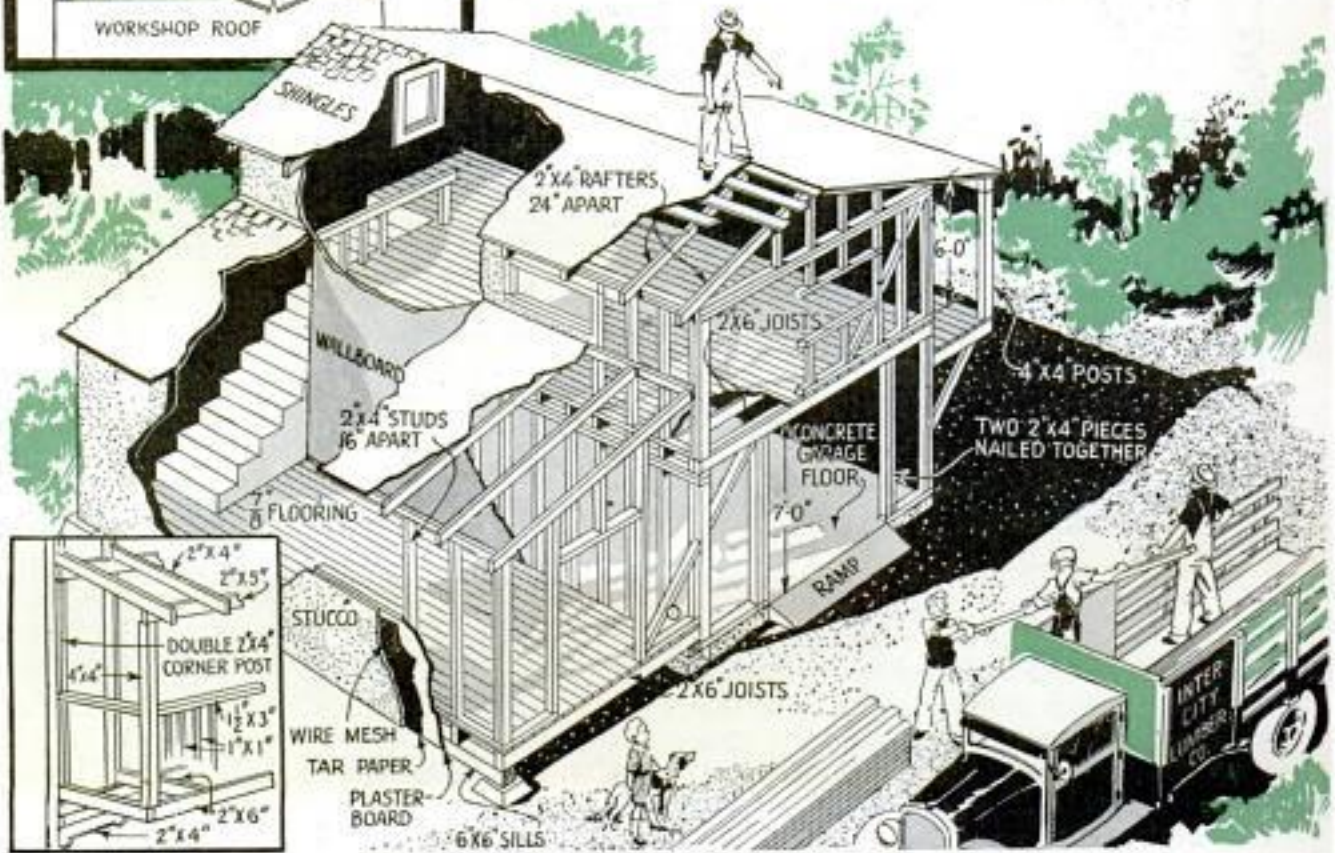


Hot pitch brushed over the inside of a garbage can will help prevent the contents from souring in hot weather.

Guest Room over the



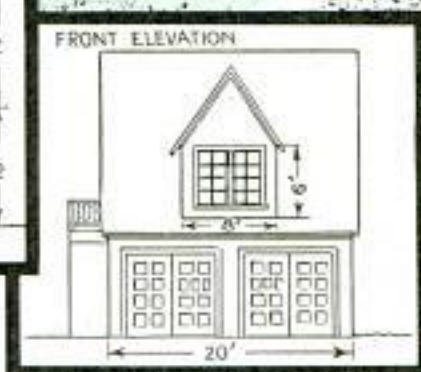
WHERE an extra guest room is needed, and alteration of the home is impractical or too expensive, you can build a cozy and comfortable room over the garage, by following these designs, offered by H. E. Walker, an architect of Altadena, Calif. Although a two-car garage is best suited to the purpose, a one-car garage can also be adapted. In this case, a lean-to is built on one side, which provides a workshop on the ground level and from which a stairway leads to the guest room above. If desired, a small balcony can also be added on one side, both for utility and for appearances; the lower left detail shows the framework. Note that the balcony floor is a foot lower than the room, to provide sufficient headroom. Do not build the stairway too



GARAGE

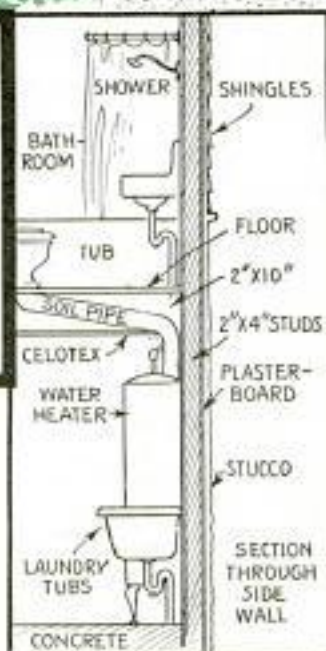


Outside Stairway Gives More Space Inside and Adds to External Appearance



narrow; it should be at least 30 in. wide to permit passage of furniture to the second floor.

The conversion of a two-car garage, of course, offers greater possibilities. In order to avoid a too rectangular appearance, the rear roof line is brought down to cover a flagstone terrace overlooking the garden. Substantial 2 by 8-in. floor joists are required if there are no center supports. Also, insulating board should be provided on the underside of the joists in order to assure a comfortable floor during the winter months. The walls may be lathed and plastered, or wallboard may be used, nailing thin battens over the seams. Casement windows are used throughout, while window boxes and dummy shutters may be added if you wish.





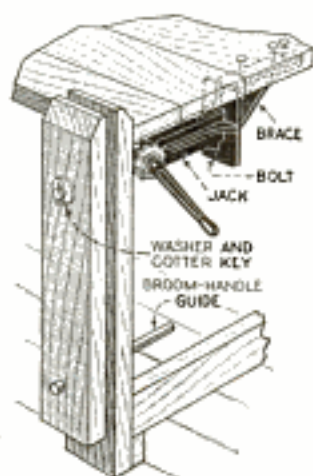
Magnifying Glass Held by Wire Headband Helps in Examining Fine Model Work

Improved Eyeglass from Camera Lens and Wire Headband

When doing fine model work requiring the use of a small magnifying glass, you can use a camera lens. It can be held in front of the eye by means of a headband made from a piece of wire bent to the contour of the head and slipped through a length of rubber tubing.—Albert W. Eidman, East Cleveland, Ohio.

Vise Screw Improved from Jack

An auto jack of the screw type, can be used in making a vise. It is mounted beneath the top of the bench by means of



an angle bracket, bolted to the base of the jack and to the bench as shown. Two holes are drilled in the screw end of the jack for cotter keys, the space between them being a little more than the thickness of the movable vise jaw. In assembling the vise, large

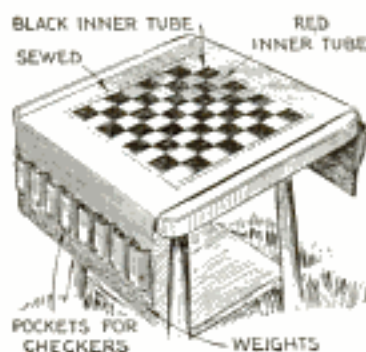
washers should be placed between the sides of the movable jaw and the cotter keys. It is also a good idea to provide a metal sleeve in the hole to keep the screw from enlarging it.

Watering the Roots of Plants

When watering plants with a garden hose they are often damaged by the force of the stream. To prevent this trouble, a large tin can can be buried in the ground so that its bottom is about even with the roots of the plants to serve as a reservoir for water. A few holes should be punched in the sides of the can near the bottom so that the water can seep out around the roots.—Charles A. King, East Kingston, New Hampshire.

Rubber Checkerboard for Lawn Table

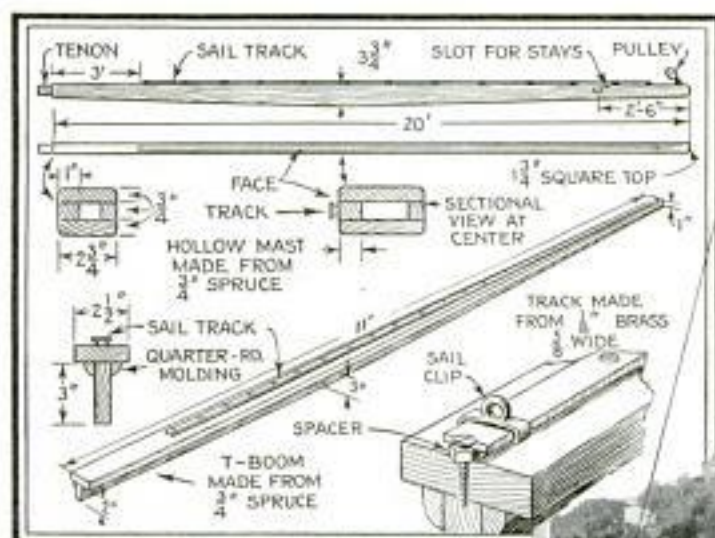
A rubber checkerboard for use on your lawn table can be made by weaving strips of red and black rubber, cut from old inner tubes, to form the squares, in an oil-cloth backing. The ends of the strips are sewed to the cover as they are woven, and the backing is fitted with pockets for checkers, score pads, etc. It has lead weights sewn into the hems to hold it down.—H. C. Thomas, Royal Oak, Michigan.



Atomizer Used as Typewriter Oiler

After trying various ways to find a quick and efficient method of thoroughly oiling and cleaning my typewriter, I finally hit upon the idea of using an atomizer. This was filled with kerosene, and all of the working parts of the machine were sprayed to loosen the old gummed oil, after which the atomizer was emptied and filled with oil and the parts again sprayed. In this way, I did a better job in less time than could be done with an oil-can, and besides used less oil.—James Stanley Meagher, Inglewood, Calif.

Homemade Masts and Sail Tracks for Boats



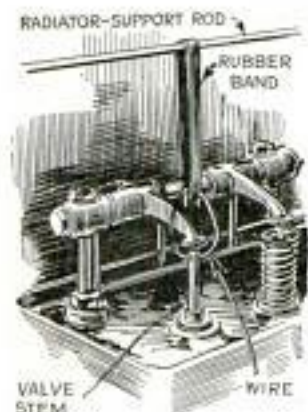
Owners of small sailboats can make strong masts and booms fitted with sliding sail tracks, in keeping with the tendency to discard the older method of using round masts and rings. The masts are built up in box fashion, from ordinary 1-in. lumber, and, being hollow, weigh much less than solid masts. The booms are built from two pieces of 1-in. stock, screwed together so that the section is T-shaped. The drawings show the method of construction and the comparative sizes of the tapered parts. As a matter of economy,



the sail track can be made up from brass strips, $\frac{1}{8}$ by $\frac{5}{8}$ in. in size. The tracks are screwed to the mast and boom, using nuts as spacers so that sail clips, which replace the regular rings for attachment of the sail to the mast, will slide freely. The clips can be obtained from marine-sup-

ply houses, and will be found to have a slight angle at each edge. This can be taken out so that they will fit the track, by squeezing them together with a pair of pliers.—R. M. Roland, Chicago.

Emergency Repair for Broken Valve Spring



On an auto trip, one of the valve springs on the motor broke when I was several miles from a garage. An emergency repair was made by fastening a heavy rubber band, cut from an inner tube, to the radiator-support rod

and to a wire loop fastened in the hole in the end of the valve stem, as shown. This repair enabled me to drive to a garage where a new spring was installed. A re-

pair of this kind can be used only on a valve-in-head motor.—Charles Latour, Jr., Plattsburg, N. J.

Tinfoil Keeps Door Button from Loosening Screw

If a piece of tinfoil is crumpled up and placed in the tapered part of a hole in a door button, the screw that holds it in place will be less likely to turn when the button is moved. As the tinfoil is slippery, it reduces friction between the moving parts and provides a flexible bed in which to sink the screw head in order to keep it from binding.



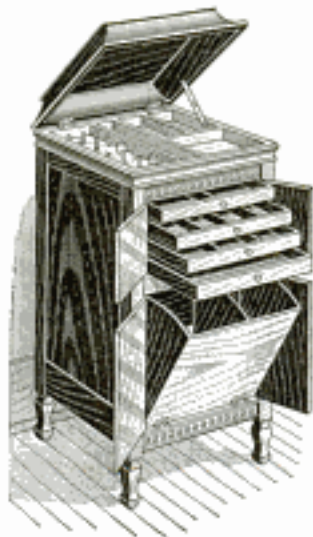


Sponge-Rubber Disk between Lathe Faceplate and Work Holds It for Light Turning and Polishing

Sponge Rubber Holds Work in Lathe without Marring Finish

After putting a high polish on some modernistic candlesticks, I discovered a small flaw in the center of one. To remedy this necessitated taking a light cut in the lathe and then repolishing. I avoided marring the finish at the ends by using the following method: A sponge-rubber disk was placed between the faceplate and the work, which was centered in the tailstock center and then pushed tightly against the rubber. This held the work so I was able to make the cuts and do the repolishing without marring the finish on the remaining surface of the candlestick.—C. A. Mowrey, Elmira, N. Y.

Sewing Cabinet Made from Old Phonograph Case



Having drawers and nests for spools of thread and other accessories as well as space for patterns and unfinished work, this sewing cabinet is made from an old phonograph case from which the mechanism and horn have been removed. The compartment that housed the turn-

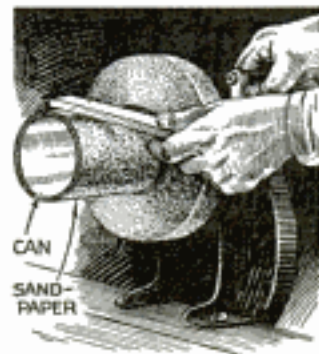
table is partitioned for spools and scissors, while that part which housed the mechanism is fitted with drawers to hold laces and embroidery. The lower part is used for unfinished sewing.

Repellents to Keep Away Insects

When applied to the exposed parts of the body, the following repellents emit odors that are offensive to mosquitoes and other insects: A mixture that is soothing to the skin as well as a repellent consists of castor or olive oil, $1\frac{1}{2}$ oz., camphor, $\frac{1}{4}$ oz., oil of pennyroyal, $\frac{1}{4}$ oz., sassafras, 1 oz., and citronella, $\frac{1}{4}$ oz. If the odor is not offensive, a strong repellent may be made by mixing pine tar, 1 oz., citronella, $\frac{1}{2}$ oz., pennyroyal, $\frac{1}{2}$ oz., olive oil, 1 oz., and sassafras, 1 oz. A repellent with a pleasant odor can be made by mixing oil of lavender to a little lanolin to give the desired odor. Pennyroyal, 1 dr., added to the preparation makes it more effective.

Drum Sander for Grinding Wheel Improved from Tin Can

A strip of abrasive paper, glued to a tin can which is attached to a grinding wheel, makes an effective drum sander for light work. A hole to fit the grinder shaft is drilled in the exact center of the bottom of the can, which is then attached by the same nut and washer that holds the grinding wheel in position on the shaft.—Martin G. Winterton, Ferndale, Wash.



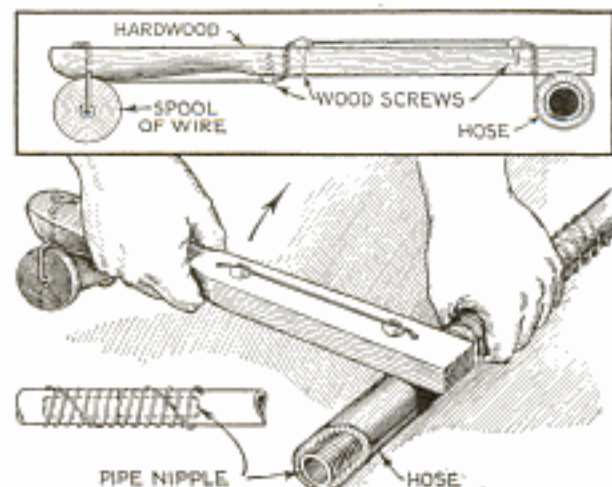
How to Reglue a Violin

When a violin is in need of regluing this should be done at once, as the wood may warp and cause an expensive repair. When gluing the fingerboard, first remove the old glue and warm the ebony. Then get two pieces of pine, about 4 in. long, $1\frac{3}{4}$ in. wide and 1 in. thick; hollow out one piece to fit under the neck and the other to fit on top of the fingerboard, and clamp

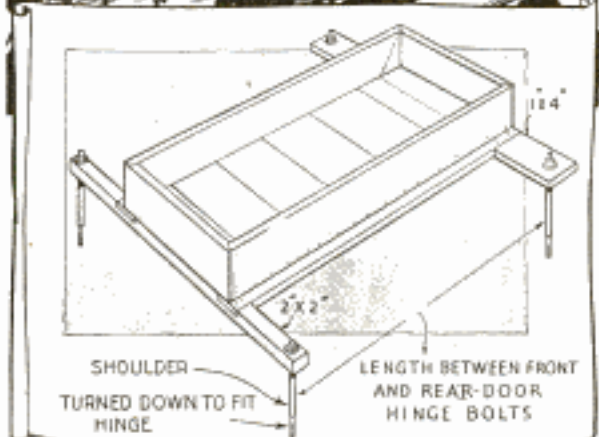
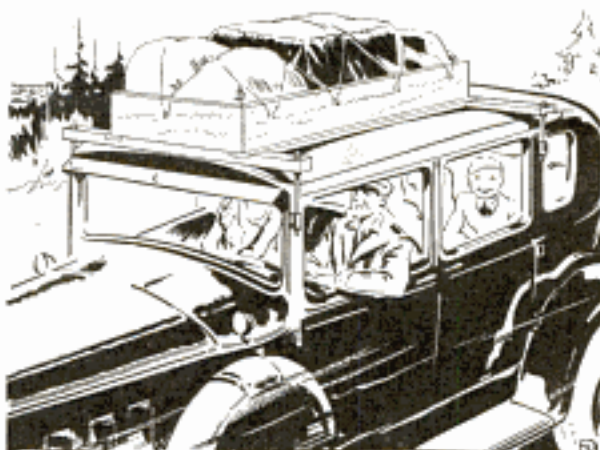
them in position to hold the assembly until the glue dries. Clamps for gluing the front or back to the sides can be made by cutting spools in two and using stovebolts to clamp the spool ends along the edge of the violin with the wide ends resting against the front and back. To repair a crack in the back or front, a good clamp can be made from a 10-in. length of $\frac{1}{4}$ -in. iron or brass rod. Flatten one end for a distance of about 3 in., bend it at right angles to fit over the edge of the wood and thread the other end for a nut. Then slip a spool over this end so that it fits against the end of the instrument when the nut is tightened. Caked rosin or dust should be removed with a few drops of oil, and the glue worked into the crack with a soft cloth, after which the surplus is wiped off with another soft cloth. A little melted cabinetmakers' wax applied to the crack will hide the repair.

Effective Repair for Water Hose

Leaky water hoses may be repaired by removing the defective section and slipping the severed ends of the hose over a pipe nipple, after which the section of hose over the pipe is tightly wrapped with wire. A tool for winding the wire with the necessary tension is shown in the illustration. A spool of wire is mounted at one end, the wire being guided through the slots in the heads of two wood screws and passing through holes of the handle, which is made of hardwood, to obtain sufficient friction.—Emmett Marshall, Deming, Wash.



Here Is a Simple Tool That You Will Find Useful When Repairing Your Garden Hose



Carrier Supported by Upper Hinges of Doors Allows Luggage to Be Stored on Car Top

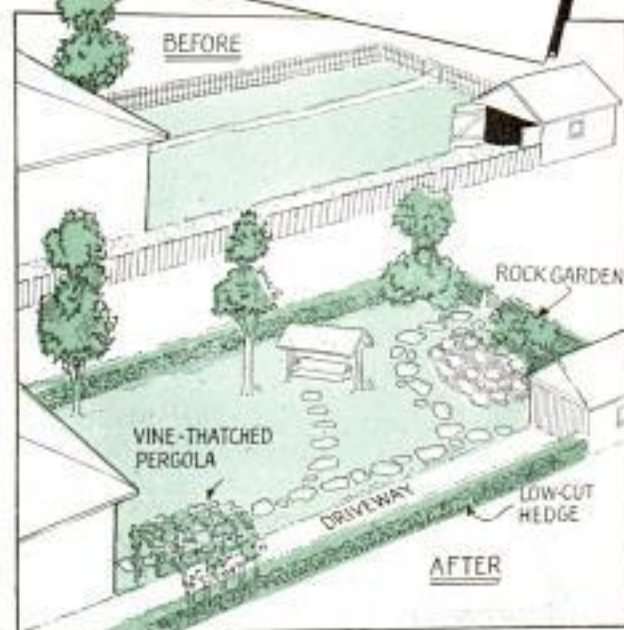
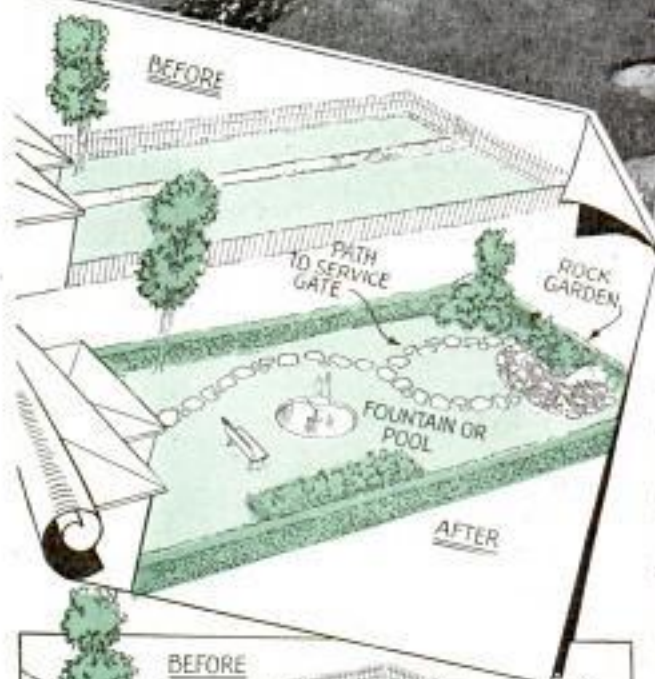
Luggage Carrier on Car Top

Supported by the upper hinges of the doors, this carrier is handy for transporting luggage on top of a sedan. The carrier is screwed to a hardwood frame, the joints of which are half-lapped and then glued and screwed together. The crossmembers of the frame are drilled near each end for studs, the lower ends of which are filed down so that they can be substituted for the regular hinge pins. The upper ends of the studs are threaded for nuts, one being placed on each side of the crossmembers to hold the latter in place securely. Small screweyes, driven into the sides of the carrier, provide an anchorage for tying a tarpaulin over the baggage.—H. Yates, Chicago.

Brushing Lumber to Remove Grit

Stock that has been handled in lumber yards is likely to gather considerable fine grit. For this reason, it is a good idea to go over the work with a stiff-bristled brush before sawing or joining it. This removes the grit and prevents dulling the cutting edges of the machine.

The Secrets of LANDSCAPING



POOLES, shrubs, trees, vines, hedges, paths and garden furniture transform commonplace yards into miniature estates that effectively hide unsightly alley scenes and afford enjoyment and seclusion to their owners. Rows of trees can be used to screen unpleasant views of buildings, sheds, barns, telephone poles and other high and imposing objects found in neighboring yards and alleys, while colorful rock and wall gardens can be built up and planted to sufficient heights to hide rubbish and board fences. It is helpful to first make a sketch of the lot with its neighboring territory and to locate the house in its relative position. The regions to be screened are then determined. Placement of the outstanding bright spot in the decorative scheme should be considered from vantage points in the house and in the street. Paths leading from the house to the pool or garden should be laid out to wind naturally through the planting and to command its most effective views.

The illustrations show typical lots before and after planting. Water-supply pipes for the pools, fountains and irrigating systems, as well as drainage, should be

Your BACKYARD



SCENE TO BE SCREENED



LANDSCAPING HIDES
OBJECTIONABLE ALLEY
SCENE

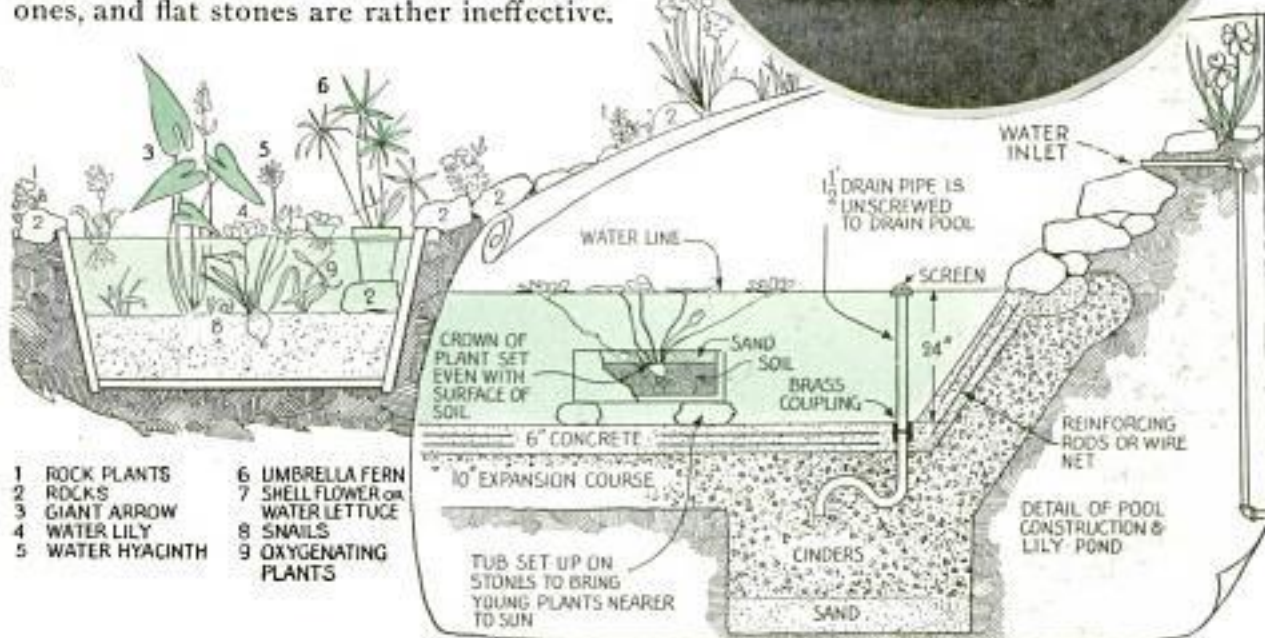
By JACK MODROCH

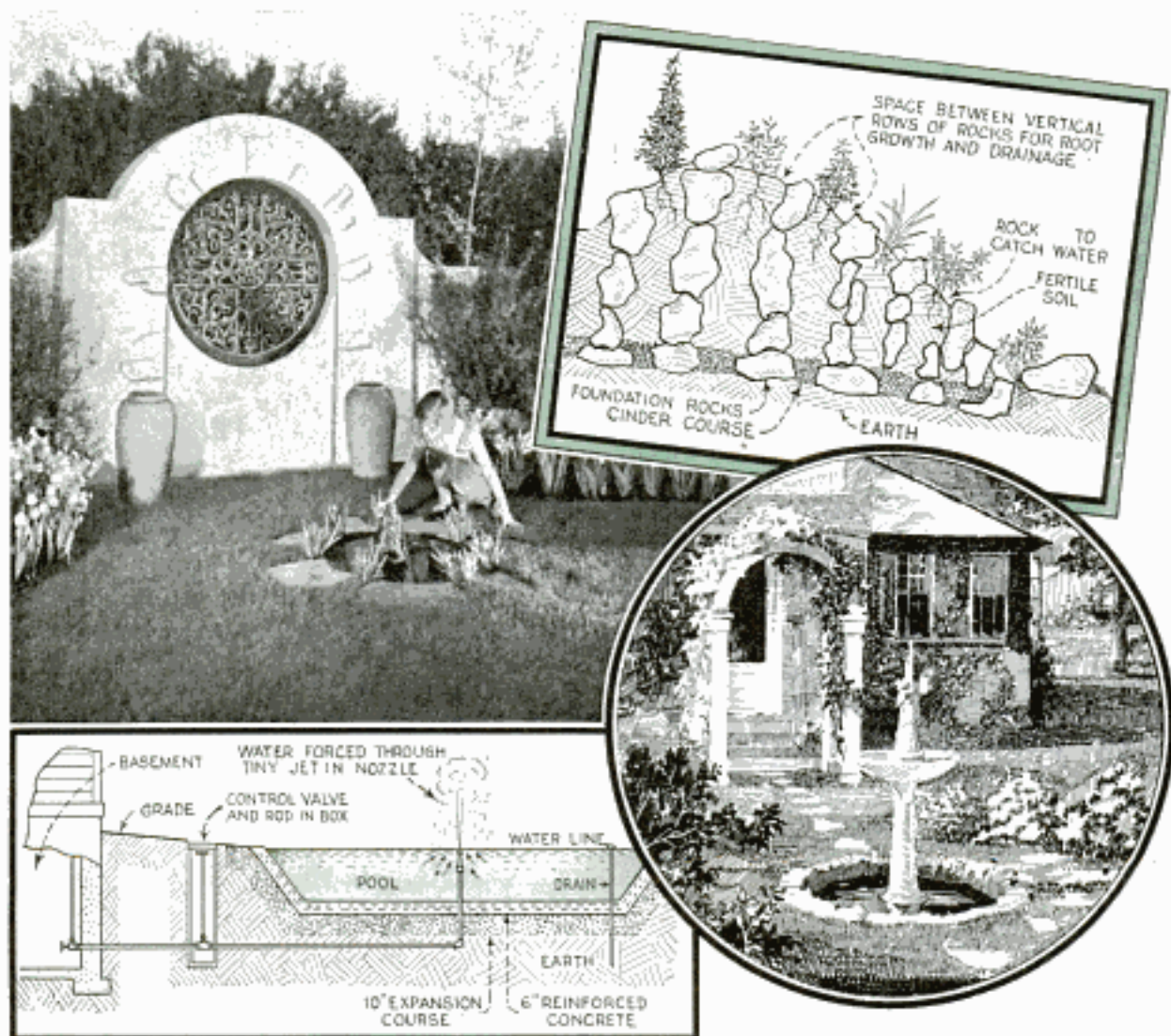
planned from the start. Drainage is greatly aided by removing any clay top soil and spading in a layer of coarse gravel or cinders.

After placing large foundation rocks, build up the desired elevation, allowing ample space between rocks for root growth and drainage. Fertile soil should be filled in between the vertical rows of rocks. The outside or protruding stones should be of irregular shape and arranged so that they form pockets to catch and hold water for the plants. Irregularity in placing these rocks, as well as those around the base of the mound, will give the garden a natural appearance. A few large rocks are better than many small ones, and flat stones are rather ineffective.



NEIGHBORS
SHARE A POOL
BUILT BETWEEN
THEIR LOTS

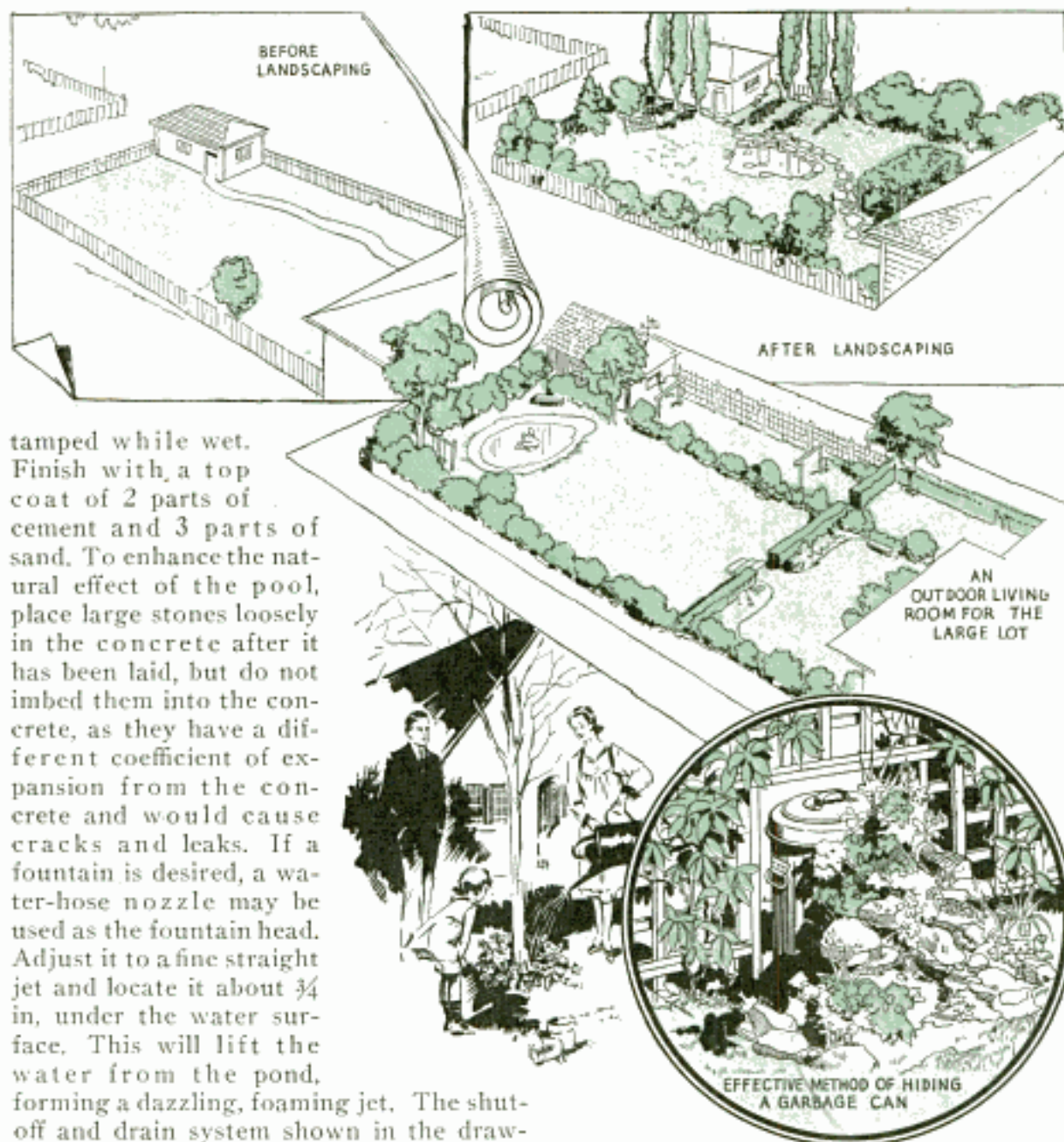




The months of April and August are usually best for setting rock-garden plants. A good procedure is to survey the garden carefully before planting and try to visualize an effective arrangement of rocks, shrubs and plants. Group the plants of similar habits into colonies. Consider the original habitat of each and strive to duplicate natural conditions. Put the plants that want sunshine on the south slope. If you choose Alpine poppies, give them the things they want—sun, wind, pure air and a well-drained soil. There are plants, like sedums, which prefer shady parts of the garden, and others that want damp and cool soil. Those that bloom at off seasons will keep the garden interesting and full of color many months of the year.

Running water adds activity to a rock garden. The water supply may be tapped in at the basement and fed to a waterfall from beneath a top rock. A miniature

windmill or lighthouse can be used to conceal the supply pipe. An informal pool, made by excavating a depression much like a natural pond, is the center of interest around which the scheme is laid out. The basin may be of clay worked until plastic, although concrete is more permanent. To prevent damage to the concrete by frost, the ground, after excavation, should be solidly tamped and provided with an adequate expansion course of coarse cinders. A drain box, composed of a deep layer of cinders extending below the expansion course, will take care of the overflow. After putting all outlets and drains in place, and checking to see that all edges of the pool are level with the water line, a 6-in. layer of concrete, consisting of 1 part cement, 2 parts sand and 3 parts of crushed stone, should be poured around a reinforcement of wire netting, or a network of steel rods, and thoroughly



tamped while wet. Finish with a top coat of 2 parts of cement and 3 parts of sand. To enhance the natural effect of the pool, place large stones loosely in the concrete after it has been laid, but do not imbed them into the concrete, as they have a different coefficient of expansion from the concrete and would cause cracks and leaks. If a fountain is desired, a water-hose nozzle may be used as the fountain head. Adjust it to a fine straight jet and locate it about $\frac{3}{4}$ in. under the water surface. This will lift the water from the pond, forming a dazzling, foaming jet. The shut-off and drain system shown in the drawing will completely drain the pipes in winter and prevent damage from frost.

In the pool, many species of water growths native to your locality can be planted. Cat-tails, water tulips, hyacinths and water lilies are the most common. Three or four lily pots will take care of the main varieties and colors. Empty butter tubs, or boxes large enough to hold at least 1 cu. ft. of a mixture consisting of 3 parts of loam and 1 part of rotted cow manure or the equivalent, can be used as lily pots. Because of the large leaf spread, it is best to have a separate container for each lily and to keep them 3 to 5 ft. apart. Stones can be used to hold the containers up to the correct height for starting young

plants. Shallow-water plants, or aquatics, should be planted in containers separate from the lilies, or a ledge may be provided when building the pool. The overflow pipe for the pool is covered with a screen cap. It drains into the seepage box or may be connected to a sewer if convenient. New concrete should be kept moist for several days and the pool drained and refilled a number of times over a period of three weeks to wash away alkali which is injurious to both plants and fish. Pools may be built without fresh-water supply or drain. Scavengers and oxygenating plants in the pool can be relied upon to keep the water pure and clear. Fish may be kept in

the pool throughout the winter if it is covered with boards and heaped over with straw or leaves to prevent the ice from freezing solid. This protection will also help to prevent damage to the concrete.

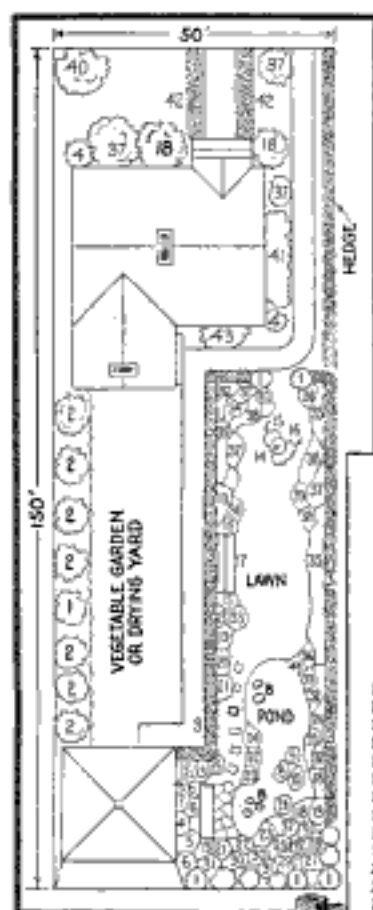
A sunny spot is best for the flower garden. If a spot where water tends to settle must be used in order to carry out the garden as planned, drainage can be provided by removing both top and subsoil to a

top soil. Scatter in a handful of broken bone and a little lime. In the top course—the part above ground level—rake in wood ashes, bonemeal and more lime, and let it stand for several weeks. Soil so prepared should give good results for a number of years. Care should be taken not to use fresh manure; it should be well rotted. To prevent weeds, the manure should be confined to the lower levels, well under ground. Commercial fertilizer is also available for this purpose.

Watering of the lawn and garden can be made easy by providing enough outlets so that hose can be attached at convenient places, or by installing an irrigation system fed from pipes laid above or under the ground. Watering is usually most beneficial in the early morning or late afternoon and evening.

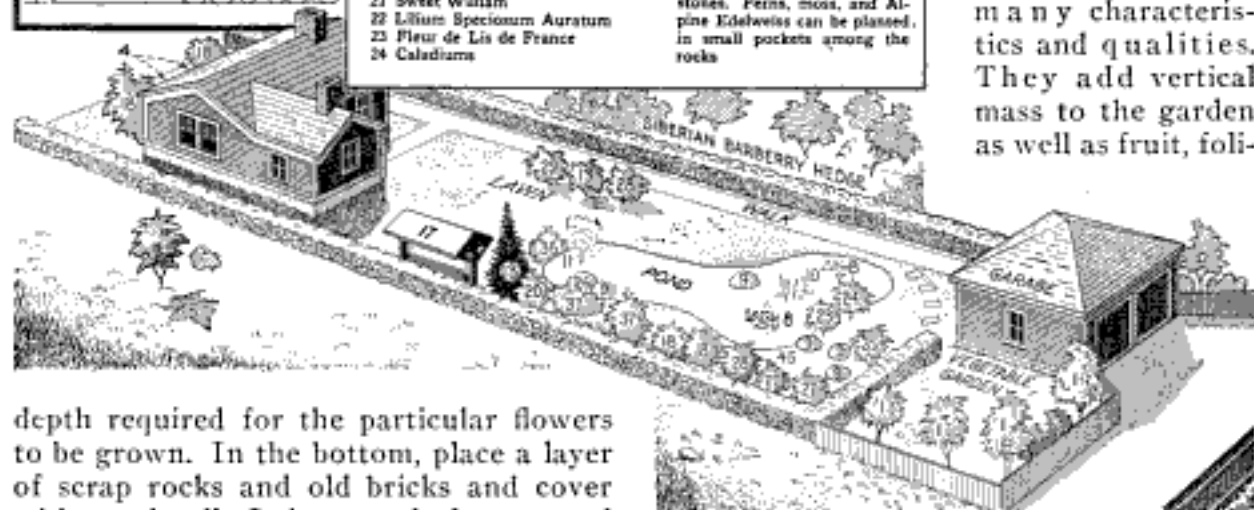
A thorough watering once a week is more advisable than a light sprinkling daily.

It is possible to grow flowers, such as saxifrage, columbine and fleabane in dry soil where artificial watering is impractical. Vines are valuable for their many characteristics and qualities. They add vertical mass to the garden as well as fruit, foli-



PLANTING KEY

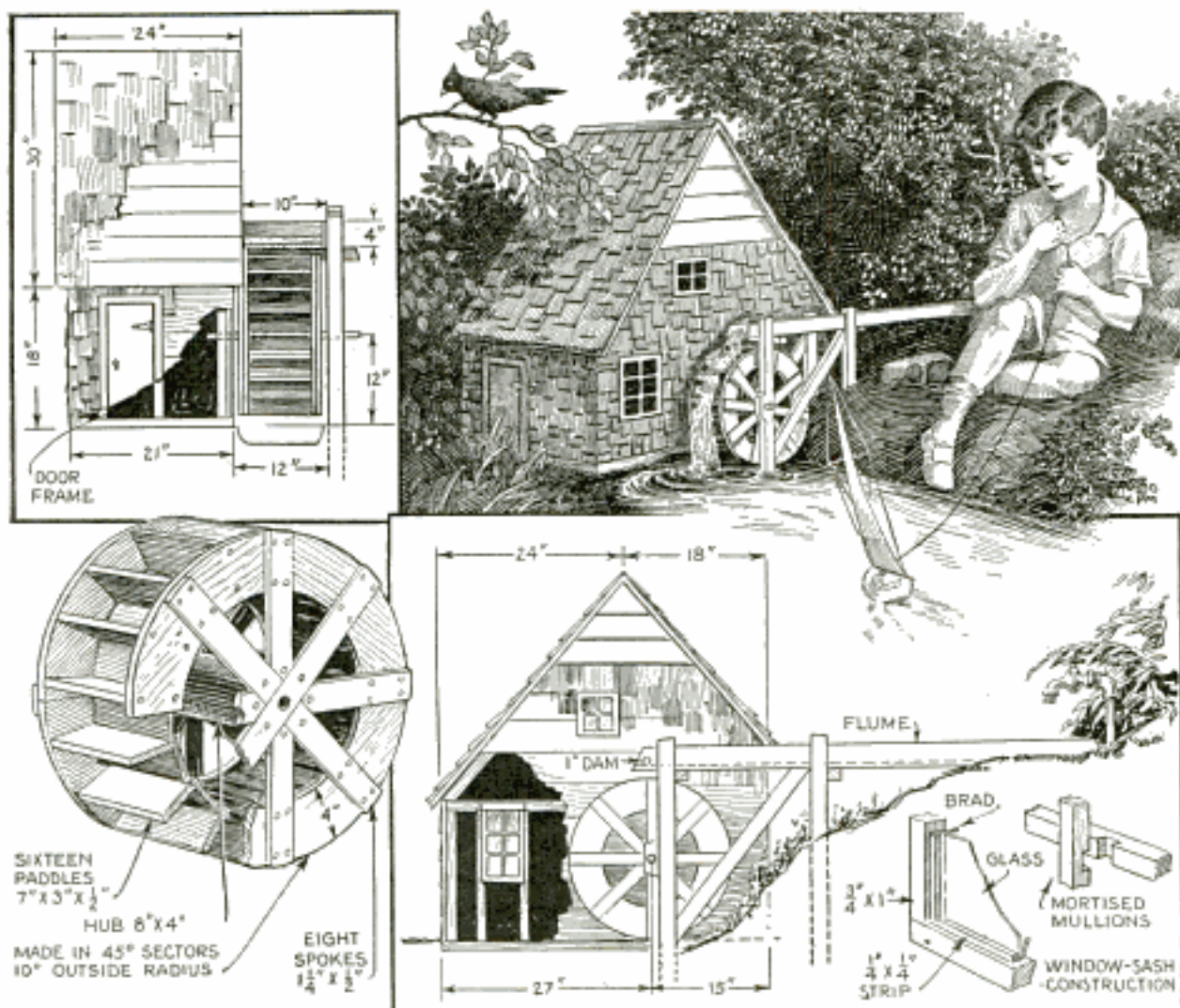
- | | |
|---|--|
| 1 Lombardy Poplars | 25 Water Tulip in pot |
| 2 Small fruit—Currants, Gooseberries, Raspberries, etc. | 27 Golden Elderberries |
| 3 Russian Mulberry | 28 Forsythia |
| 4 Boston Ivy | 29 Syringa |
| 5 Phlox Drummondii | 30 Snowberries |
| 6 Giant California Poppy | 31 White Pines |
| 7 Grapevines | 32 Larkspur |
| 8 Pond Lilies | 33 Rosa Rugosa |
| 9 Large Stones | 34 Candytufts |
| 10 Cat-Tails | 35 Assorted Hollyhocks |
| 11 Fountain Head | 36 Geraniums |
| 12 Stepping Stones | 37 Peonies |
| 13 Evergreens | 38 Alpine Edelweiss |
| 14 Sundial | 39 Shasta Daisy |
| 15 Climbing Roses | 40 Drooping Mulberries |
| 16 Annual Pinks | 41 Tea Roses |
| 17 Covered Lawn Swing | 42 Tulips and later Sweet Alyssums and Parsies |
| 18 Bridal Wreath | 43 Lilies of the Valley |
| 19 Canterbury Bells | 44 Lilium Speciosum Rubrum |
| 20 Pougloves | 45 Location of Cascade between stones. Ferns, moss, and Alpine Edelweiss can be planted in small pockets among the rocks |
| 21 Sweet William | |
| 22 Lilium Speciosum Auratum | |
| 23 Fleur de Lis de France | |
| 24 Caladiums | |



age or flowers, depending on the kinds selected. Vines can be made to hide ugly architecture and, when trained on posts, fences or trellises will screen off objectionable views. Rapid climbers are available for quick covering. Birds will flock to your pool to eat the berries of selected shrubs.

depth required for the particular flowers to be grown. In the bottom, place a layer of scrap rocks and old bricks and cover with good soil. It is a good plan to send samples of your soil to your state agricultural station. They will gladly tell you the type of plants which will grow best and what is needed to improve your soil. To build up a run-down soil, put in a layer of turf (grass-side down) followed by successive layers of manure, leaf mold and

A Miniature Grist Mill Improves the Garden



With its weatherbeaten shingles and the luxuriant growth in the damp soil surrounding it, this little grist mill will add a picturesque effect to your garden. Select a site under a small bank, or build up soil to support the flume. A shallow basin of concrete should be provided along the front of the mill to hold the water coming over the wheel. Note that all framing of the mill is 2 by 4-in. pine and is sheathed with 3/4-in. stock, over which shingles are laid. The latter should be cut off to about half of their original length and laid unevenly on both the sides and the roof. Before doing this, however, windows and a door should be installed. The window sash are made up as shown, the glass being held against a strip nailed to the inside, while mullions are mortised and set on the outside of the glass. The hole for the axle of the water wheel must be true,

to keep the wheel from wobbling, and large enough to receive a pipe bushing driven in to a tight fit. Give the shingles and all exposed parts a light stain and then let exposure to the elements tone it down. Although the flume should be made water-tight, a slight leakage of water on the vegetation below is advisable, especially water plants, such as spearmint or peppermint. These plants are fragrant and will grow fast in the saturated soil.

Drilling Small Holes in Glass

Silicon-carbide dental points are handy for drilling small holes in glass and can be obtained from dental-supply houses. A solution of one part lard oil and two parts kerosene should be used on the glass while drilling, to keep the points from crumbling.



Hammock Support Made of Pipe and Fittings Is Light and Rigid, and Easily Moved

Hammock Suspended from Portable Pipe Frame

Made of 1½-in. pipe and fittings, this light and rigid frame enables you to move a hammock to any place you may desire. Each end of the upper horizontal pipe is screwed into three-way elbows, which also take the support pipes, while the lower horizontal pipes are fitted with tees, which take shorter pipes for crosspieces.

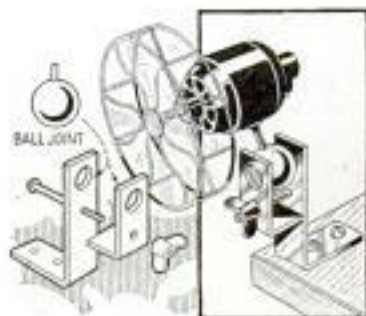
Checking Bearing Trouble in Auto

When knocks develop in your motor bearings, little can be done except removing the crankcase and tightening them. However, if this occurs frequently, it is a good idea to check the oil-pressure gauge, which should register past the center of the dial at average riding speeds. If this is not the case, the pressure is easily adjusted on most cars. Trace the oil line from the gauge up to its entrance into the

motor, at which point the adjustment is found. Usually there is a spring adjustment, and if you cannot obtain results by tightening it, take the spring out and stretch it a little to increase the pressure.

Swivel-Joint Mounting Improvised from Ball and Flat Iron

An efficient swivel-joint mounting for cameras, easels, tripods, small motors and electric fans can be improvised from a steel ball and a couple of pieces of flat iron. The ball is annealed and tapped for a stud to permit attachment of the part to be mounted, after which holes, one-half the diameter of the ball, are drilled near the end of each piece of flat iron. Holes are also drilled for a bolt with a wingnut. The two



pieces are bent at right angles, the longer one being screwed to a base, while the bend in the shorter one is of a length equal to the diameter of the ball, which is held in place by tightening the wingnut.

Replacing the Bearings in Wringer of Washing Machine

When the bearings in a washing-machine wringer wear out, they can be re-



BLUEPRINTS ON BOATS

Six complete marine and construction blueprints on "Hi-Ho,"—a 14-Ft. Outboard Runabout described in our February, 1933, issue, can be had for \$1. Order No. SN 840 to 845, incl. Also, there are many other boat blueprints, including rowboats, in our total collection of 380 prints, of which a list can be obtained for 3 cents to cover postage. A sample print with pictures of 40 completed projects will be sent for 10 cents. Address Blueprint Department.

placed with oak or maple bearings of the same shape and slightly longer. Care should be taken to get the shaft hole exactly in the center. When first installed, the bearings should be oiled frequently as the wood will absorb considerable oil until it has become saturated.

Test Tells When Prints are Free of Hypo

Photographic prints sometimes turn yellow because all of the hypo has not been washed off before drying them. A test for this can be made as follows: Dissolve permanganate of potash, $\frac{1}{4}$ teaspoonful, and caustic soda, $\frac{1}{4}$ teaspoonful, in $\frac{1}{2}$ pt. of water. Then fill a medicine dropper with the solution and mix it in a tumbler half filled with clean water. Take one of the prints from the wash tray and let a few drops from it fall into the glass. If, after about 30 seconds, the water turns yellow or green, the print still contains hypo and should be returned to the wash tray. When no color change is produced, the print is ready for drying. If kept corked tightly in a bottle, the solution can be saved for future use.

Improvised Heater for Bending Balsa and Bamboo



Model airplane builders will find it an easy matter to bend small strips of balsa and bamboo with this heater. It consists of an alcohol lamp, made from an oil-can, that heats a rounded arm, over which the material is bent. The arm is tapered and curved as shown, and is supported by a vertical piece which is screwed to a base. The front of the vertical piece is covered with asbestos to keep the heat from burning it. Balsa should be moistened with water before bending, but it is not necessary to moisten bamboo.—E. A. Corfar, Buffalo, N. Y.

☐ A paper cone, slipped over the end of a curtain rod, will protect the curtain from being torn while stringing it.



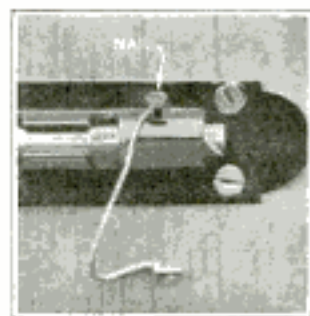
Simple Attachment Holds Glass Tubing to Permit Quick Parting with Ordinary Glass Cutter

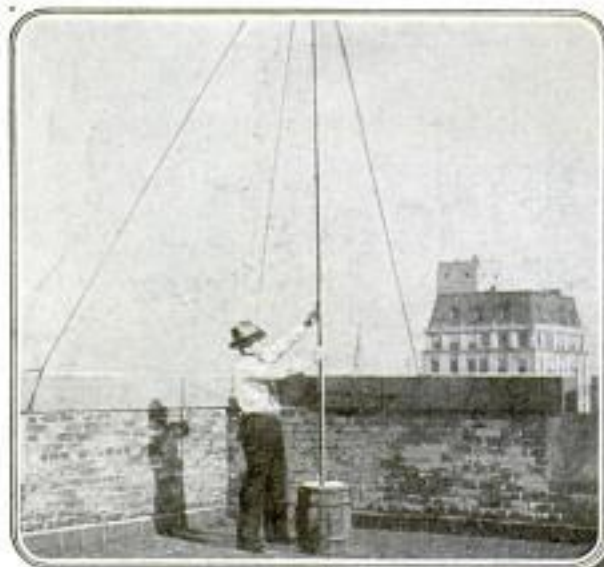
Attachment on Glass Cutter Helps to Part Tubing

Glass tubing is easily parted with an ordinary cutter by using the attachment shown in the detail. It is a piece of flat iron shaped as shown and pivoted to a clamp around the handle of the cutter. In use, the tube is placed over the cutter, where it is held by pressing down on the free end of the attachment with the thumb, while turning the tube against the cutter with the other hand.

Improving a Bolt Lock

An ordinary bolt lock can be improved by drilling a small hole through both the bolt and the guide, with the bolt in locked position, so that a small nail can be inserted. This type of lock is sometimes used on buildings where there is sufficient space between the door and the casing to insert a flexible instrument, which may be used to raise the catch so that the bolt can be moved back. By using the above method, it is impossible to raise the catch, as the nail holds it and one can unlock the door from the inside but not from the outside.





DX DOUBLET

for your Short-Wave or

volume if the antenna system picked up no noise interferences of greater strength. Most fields of interference are confined close to their sources, and it's easy, therefore, to place the pick-up section of the antenna well above all electrically operated machines and house wiring. The signal energy must be conserved by means of

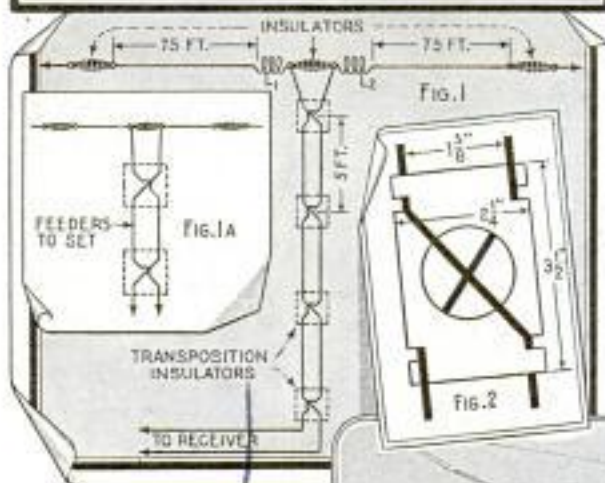
suitable insulators, and some method must be adopted to avoid noise pick-up by that part of the antenna known as the lead-in. This is the portion that passes through the interference area.

The doublet-antenna system to be described is suitable for both short and broadcast wavelengths and is, of course, ideal for the new all-wave receivers. When we speak of antenna we mean that portion of the antenna system which col-

PERHAPS you have wondered why your friend, who has a receiver exactly like yours, can bring in distant stations with good clarity and volume which you cannot even hear with your set. The reason is quite simple: He evidently has a better antenna system.

Almost any receiving antenna is good enough to bring in programs from high-powered local broadcasting stations and, if man-made static and weather conditions do not interfere, fairly distant reception is sometimes possible in spite of a poor antenna. However, anyone can easily take advantage of the full possibilities of the highly sensitive modern receiver if a little thought is given to installing an antenna suitable for the set and location. Such an antenna need not cost any more than a poor one, and there is little economy in having a good receiver if you are unable to operate it efficiently.

The average receiver of either the broadcast or short-wave type is capable of responding to faint distant signals that could be brought in at good loud-speaker



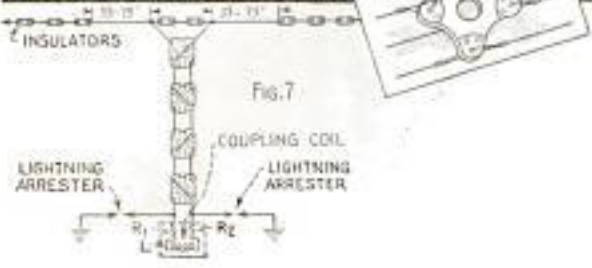
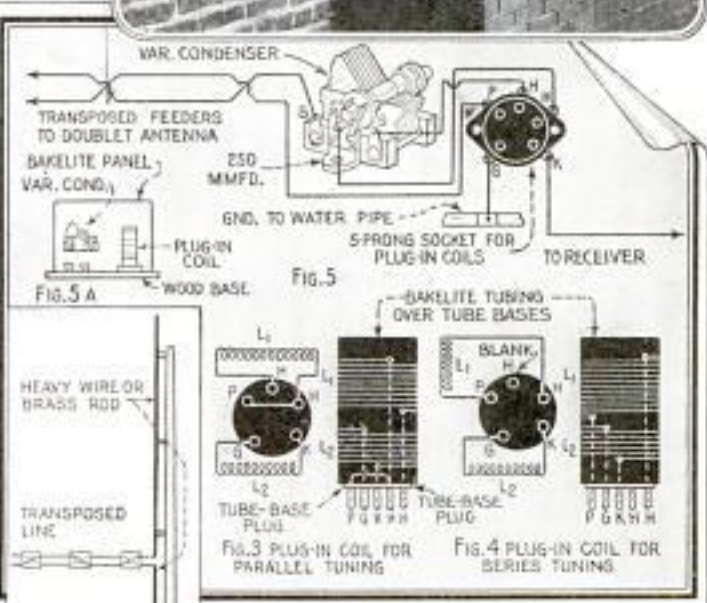
Lynch H. C. Wey, New York
 51
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Lynch Mfg Co
57 Vesey St
New York

ANTENNA Broadcast Receiver

By FRANK L. BRITTIN

lects the signal energy from space. The lead-in, or feeder, together with the other necessary parts, make up the balance of the antenna system. The doublet, sometimes called a transposition antenna system, is simply two separate antennas, as shown in Fig. 1, with the feeders taken from center and transposed, or crossed, at intervals of 5 ft. or as close as 15 in. where interference is particularly high. All signal pick-up is limited to the antenna itself, as the transposed lead-ins, or feeders, act to prevent interference pick-up on the way down to the receiver. This transposed feeder line can be of any length desired. Ordinary two-conductor twisted lamp cord may be used for the line inside the house, but this should be kept as short as possible, as it has a tendency to cause a



slight loss in signal strength. The installation photos indicate the method of supporting the feeder line over long stretches, and the photo at the upper right on this page shows a simple bracket arrangement for taking the line over the edge of the roof and away from the building. Porcelain-creat insulators are used to hold the feeder line on the 2 by 4-in. uprights. Variations of this method may be applied to any installation. The photo, at the upper left on page 946, shows how antenna masts may be held in kegs of cement on flat roofs.

Stranded, enameled antenna wire will do for the entire system, or flexible rubber-covered wire may be used for the feeder line if preferred. The insulators

(Continued to page 120A)

*Wonder Specialties in
Cleveland
Ohio*

Easy Solutions for Everyday Radio Problems



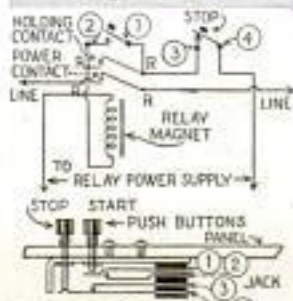
Below, Snap Cuff Links Used to Make and Break Temporary Connections in Experimental Hook-ups; Right, Radio Dial Lock for Portable Sets Where Fixed Tuning Is Required; Setscrew in Slot Is Threaded into Panel to Hold Dial



Above, Small Microphone Enables Person in Adjoining Room to Temporarily Stop Radio Program and Make Unexpected Announcements through Loud Speaker; Loop Terminals Fit over the Plate and Cathode Prongs of an A.C. Detector, or the Plate and Filament Prongs of Battery Detector



Right, Start and Stop Arrangement for Controlling a Radio or Power Circuit by Means of an Old Telephone-Type Relay and Push Buttons Mounted on a Double-Circuit Jack with Blades Altered as Shown; R Indicates Relay, Connections and Jack Terminals Are Numbered



Left, These Vernier Dials, Necessary for Highly Selective Short-Wave Receivers, Operate without Gears



Above, Metal Template for Spacing and Drilling Terminal Strips; Left, Quartz Crystal with Moisture-Proof Bliley Holder for 40-Meter Amateur Transmitters Can Be Plugged into Tube Socket



*Bliley - Fargo Electric
Co. Masonic Temple Bldg.
2018
National Company Inc.
Malden, Mass.*

PUSH-PULL AMPLIFIER

for your old Receiver

YOUR a.c. receiver may have a good power unit and r.f. stages that are efficient and selective enough for all practical purposes, but it is quite likely that the audio output leaves much to be desired when compared with later sets. One of the simplest methods of improving this output is to make a separate amplifier, of compact type, that can be operated from the same power supply. If you have from 250 to 300 volts available from your present power pack, it is a simple matter to add a 2.5-volt filament transformer, if necessary, to supply the additional tubes in the audio-amplifier to be described.

This amplifier is not expensive and takes up very little space inside the console. It consists of two stages of push-pull audio on a base, 5 in. wide and 11 in. long. Tubes in push-pull, as used in most modern receivers, have the ability to carry a heavier signal load without distortion and greatly decrease the a.c. hum noticeable in earlier sets. The single first audio stage, commonly following the detector, usually gives more hum trouble than the output stage. Therefore, to further reduce hum in this amplifier, the first stage is also made push-pull.

Costly interstage transformers are avoided by the use of resistance coupling, which is economical and provides excellent quality. It will be noted that only one high-voltage lead is required, as the same voltage is applied to the plate-coupling resistors and the plates of the four power tubes. The resistors have been selected so that, after the drop in voltage through them occurs, the right value reaches the plates of the tubes in the first stage.

The top view of the unit is shown in

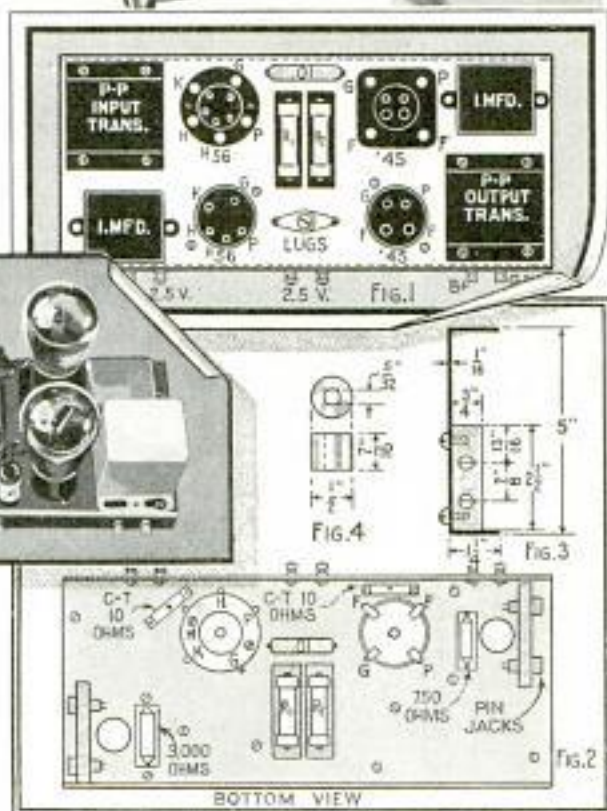
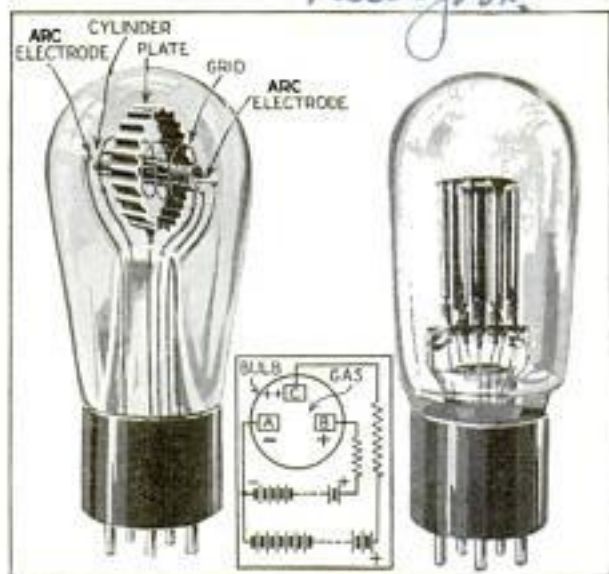


Fig. 1. The base is made from a piece of aluminum, or sheet metal, $\frac{1}{16}$ by $7\frac{1}{2}$ by 11 in. The edges, at front and back, are bent over $1\frac{1}{4}$ in. to form the base. The two tube sockets at the rear, and the resistor clips are mounted directly on top of the base. The other half of the push-pull arrangement is mounted under the base, as shown in the bottom view, Fig. 2. Holes, $\frac{3}{4}$ in. in diameter, are cut in the base for

(Continued to page 122A)

c 4527

Wired Radio, Inc.
60 Broadway
New York



Gas-Discharge Tubes of the Type Recently Described by Dr. August Hund

Ionized Gas Replaces Tube Filament

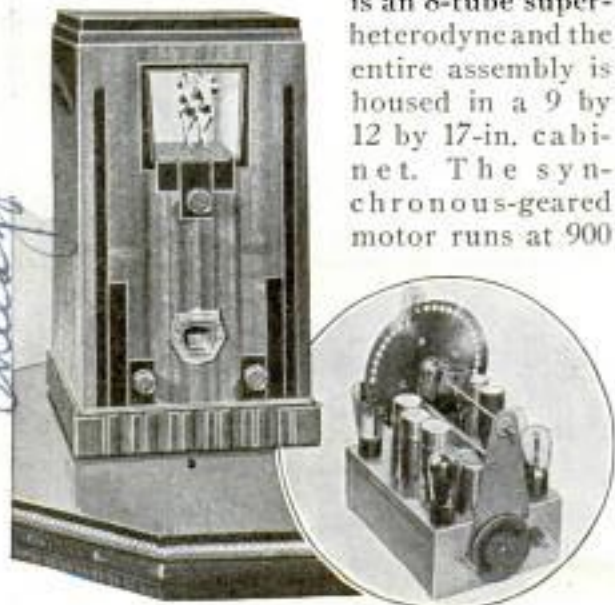
Tubes that employ an ionized gas instead of a filament have an extremely long life, which offsets the fact that their operation requires more power. The tubes are not yet on the market. In the elementary circuit, A is the cold cathode; B, the anode, and C, the plate. One electron stream passes from A to B and another to C. The former replaces the filament.

c 4525

Television Receiver with Scanning Disk

The triple-spiral scanning disk used in this television set is only 8 in. in diameter and contains 45 small lenses. The receiver

is an 8-tube super-heterodyne and the entire assembly is housed in a 9 by 12 by 17-in. cabinet. The synchronous-gear motor runs at 900



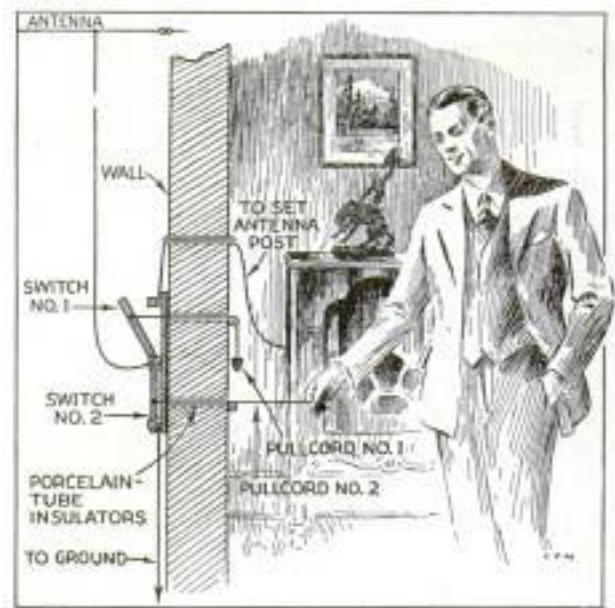
Television Receiver Showing Projected Picture and Tuning Controls; Insert, Compact Chassis Assembly

Western Television Corp.
400 W Madison
Chicago

revolutions per minute in step with the various stations in the middle west which are operating on daily schedules with the 45-line 3-spiral system. The received picture is 4 by 3 3/8 in., and the new crater-type lamp behind the disk produces sufficient light to show the pictures in a fairly well-lighted room from various angles. Stations in the following middle-west cities are broadcasting on this system: Kansas City, Mo.; Iowa City, Iowa; Minneapolis, Minn.; Milwaukee, Wis., and Chicago, Ill. There are also stations at Montreal, Canada, and in Los Angeles. In addition, a number of amateurs in central states transmit pictures with the same system.

Antenna Switch Grounded from Inside

Operated with pull cords from the inside, this antenna-grounding switch enables the owner of a radio receiver, or amateur transmitter, to throw the switch



Outdoor Antenna-Grounding Switch Controlled from Inside by Means of Pull Cords

without opening the window. The illustration is self-explanatory. An extra blade is added to the usual switch, clamped at the angle shown, and a hole is drilled near the end of each blade for the cords.

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; when material lists are not included in the articles, these are available without charge upon receipt of return postage.



TRICKS of SHARPENING KNIVES

and other

Straight-edge Tools



By W. Clyde Lammey

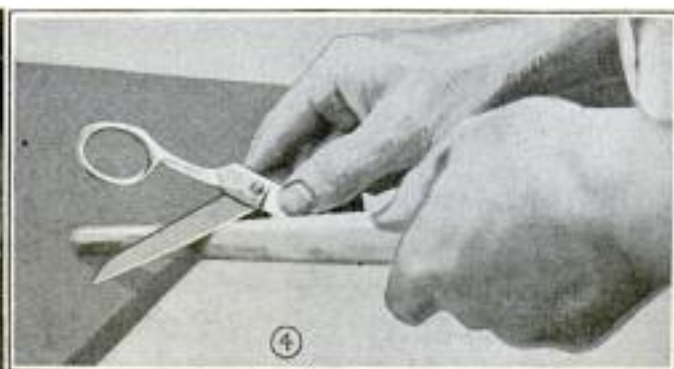
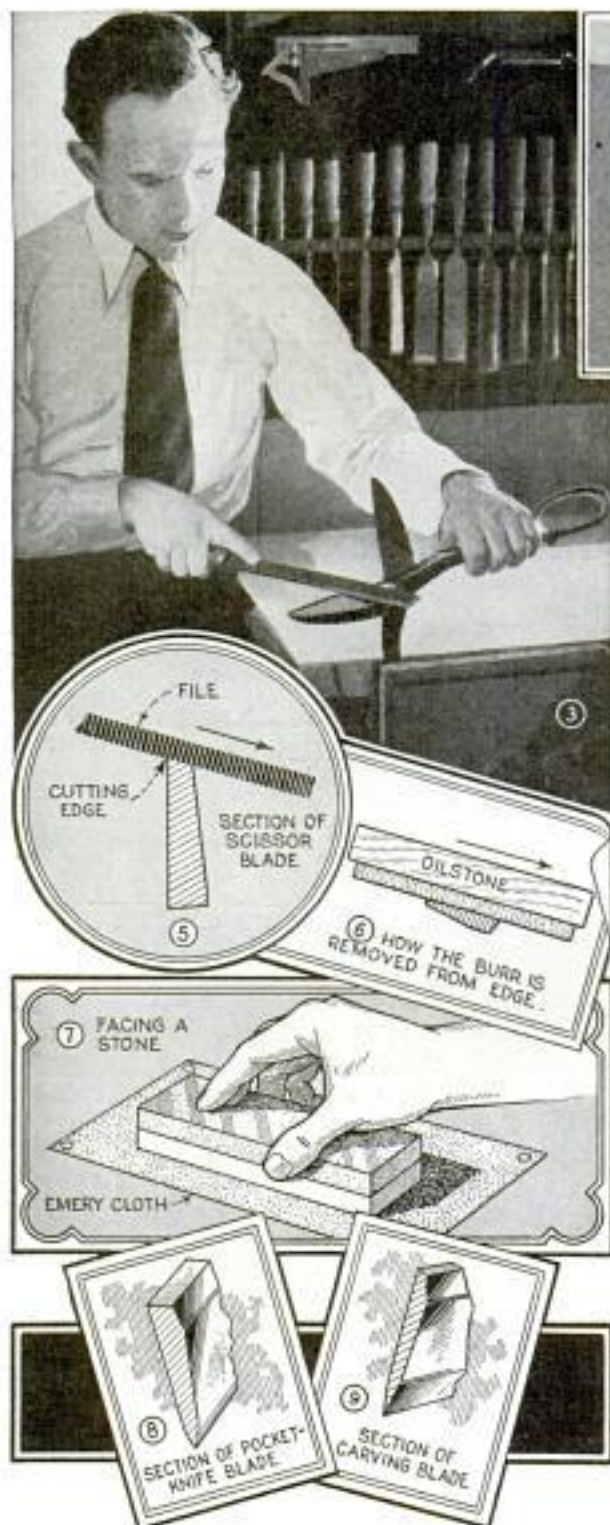


Correct Method of Sharpening a Carving Knife on a Tapered Stone

THE process of sharpening a knife, plane iron, chisel or other tool being simple, there is a tendency to omit the niceties that mean the difference between a really keen cutting edge and one only moderately satisfactory. The edge should be ground to suit the purpose for which the tool is intended, and it is necessary to use the proper grinding tool. For example, you would not use a fine slipstone in sharpening a carving knife but a long tapering stone. The stroke should begin at the heel of the blade and continue under uniform pressure to the point, as in Figs. 1 and 2. The strokes should be equally divided on both sides of the blade to prevent turning the edge, and as the latter is not required to stand up to hard material, the bevel of the cutting edge should be longer than with other tools. As a rule, the angle of the cutting edge on a knife with the face of the stone should be about 30° . After sharpening, the edge is generally finished on a steel made for the purpose, the strokes being the same but lighter.

A keen cutting edge on common pocket-knives, woodcarvers' knives or sloyd, chisels and plane irons, is generally produced manually, and the first consideration is the condition of the stone on which

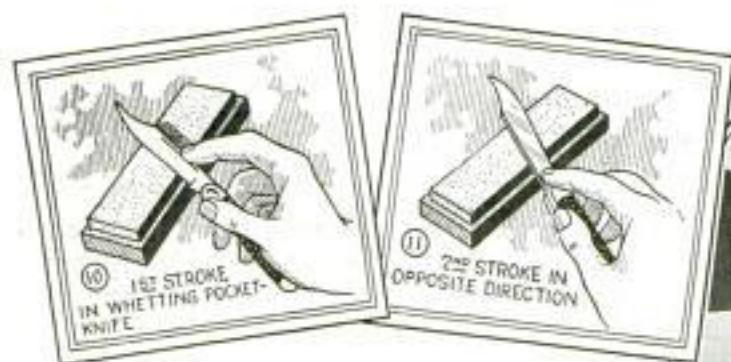
the sharpening is to be done. If the latter is chipped, scratched or hollowed by long use, the grinding face must be brought to a plane surface. To do this, a piece of abrasive cloth, several grades coarser than the stone, is tacked to a flat surface, as in Fig. 7. The stone is turned face down on the cloth and rubbed back and forth with straight strokes. Both the cloth and the stone should be dry and clean. Oil and dirt on the emery cloth may be removed with turpentine. The next step depends on what the edge is to be used for, although in nearly every type of cut the blade acts as a wedge. In some work, it is necessary to get through the wood with a



chip. One who carves with a pocketknife must have his blade ground and honed so that it cuts either with, against or across the grain of the wood with equal facility, which requires a short, rounded bevel, as in Fig. 8. This bevel will cause the chip at the edge to clear without a tendency to split the wood ahead of the blade. To produce a cutting edge of this kind requires first a careful rough grinding on the fine side of the combination stone to get the proper bevels. The edge is then finished on a fine oilstone or knife stone, the honing strokes being kept at the same angle but the pressure uniformly diminishing. In any case, the stroke should be straight, not circular, and the edge should be drawn against the stone on both the grinding and the honing stroke, as in Figs. 10 and 11. There are different opinions on the exact method of honing, but the majority favor that just stated. If much rough grinding must be done to bring the edge to the proper bevel, an equal number of strokes may be made in each direction. This is faster and is an aid in producing the bevel on each side of the blade. In honing, it is better to alternate the strokes uniformly. When grinding or honing, the blade should be held at an angle of about 60° to the sides of the stone, not straight across it. After some practice, you will acquire the knack of turning the blade at the end of each stroke so that the opposite bevel is presented to the stone on the return stroke.

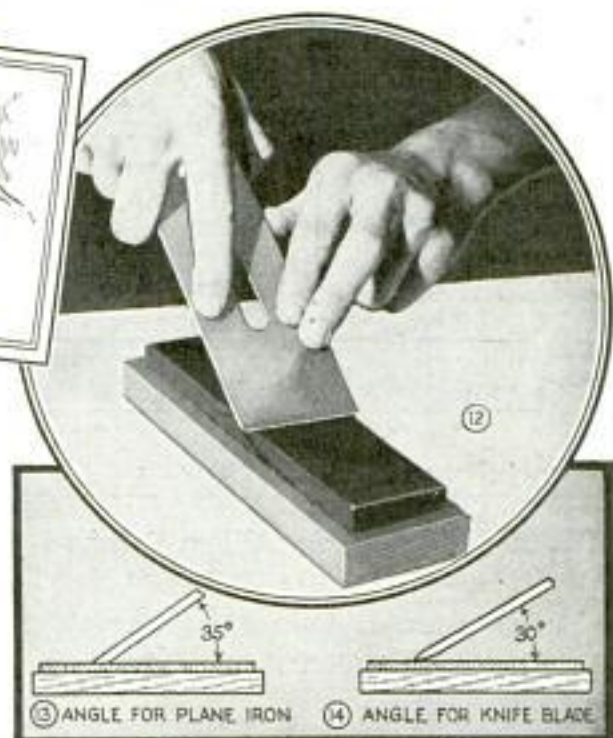
minimum of friction, and for this purpose the edge should be ground and honed with a long bevel, sometimes half the width of the blade. On the other hand, a blade ground in this way will not do for fine close work, where paring is necessary, as it is then difficult to control the depth and direction of the cut. Under pressure, the edge tends to wedge in the wood, and changing the direction of cut splits off the

Wood chisels, turning chisels and carving tools present essentially the same problems in sharpening as a knife blade. Wood chisels are best ground on an emery wheel provided with a toolrest. Unless the edge of the tool is badly nicked, or otherwise damaged, the fine side of the oilstone will serve for the rough grinding,

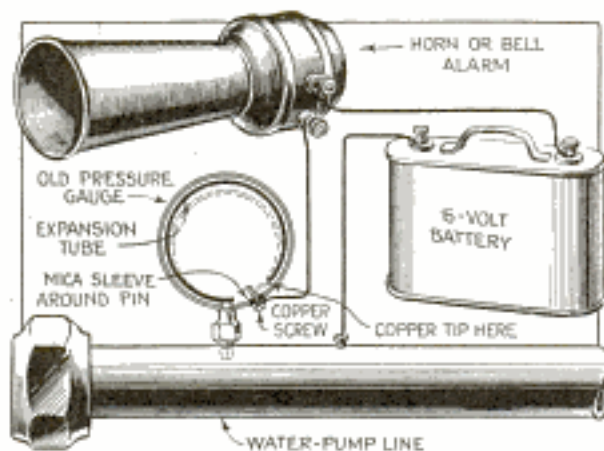


which is merely to bring the blade to an edge and to shape the bevel. When control of the blade is of secondary importance and it is necessary to take a deep cut in the wood with a minimum of friction, the grinding should produce a bevel of approximately 30° the full length of the blade, as in Figs. 9 and 14. To be sure that the edge will stand up, grind a short bevel just above the cutting point. This will prevent the edge from turning over. For average work, the edge of wood chisels should be beveled approximately 35° . The same is true of a plane iron, Fig. 15. Turning chisels should be ground and honed with a bevel slightly longer. When grinding an edge tool on a high-speed emery wheel, the blade should be dipped in water frequently to prevent overheating and drawing the temper. After honing the edge of a plane iron, as in Fig. 12, the burr is removed by lightly bringing the iron over the face of the hone, as in Fig. 15.

A double-cut fine file is useful for sharpening household scissors or shears, although the blades may be sharpened on a taper slipstone, as in Fig. 4. On examining a pair of scissors, it will be noted that the top edges of both blades are beveled as in Fig. 5. This is where the filing should be done—never on the flat side of the blades except for the purpose of removing the burr after the filing is done. In sharpening, the file should cut against the edge, the strokes should be light and uniform and should begin at the heel. Care should be taken to keep the same bevel and curve and to avoid hollowing at the center, as any irregularity of either cutting edge will cause the shears to take up and then release suddenly when in use. After the edges have been filed sharp, they will be rough and the blades should not be closed until this burr has been removed. To do this, the scissors are laid on a table with



the flat side of the blade up, as in Fig. 6. Then an oilstone is laid on the blade and drawn a few times against the edge with a light sweeping stroke which carries it the full length of the blade. In doing this, care must be taken not to round the edges, for then the two will not meet when the blades are closed. To test for sharpness, moisten a small square of wrapping paper and, opening the blades wide, close them slowly on the paper. The blades should sever the moistened paper without tearing. Some types of tinner's shears may be edged with a file, as in Fig. 3. The blades of high-grade shears, however, are generally hardened and will require use of an emery stone.



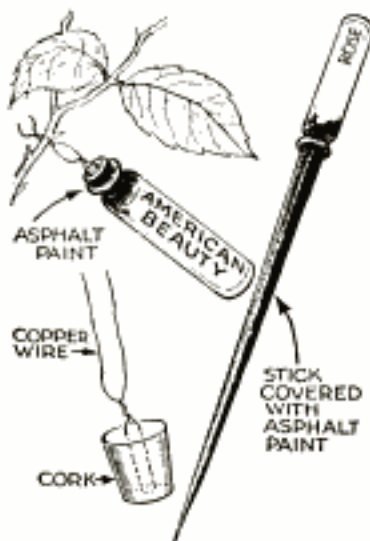
Converted Steam Gauge Closes Circuit and Sounds Alarm When Water Pressure in Pump Line Drops

Horn Gives Warning When Pressure Is Lowered in Pump Line

The foreman of a manufacturing plant, where the water supply was pumped directly from a river, installed this alarm, which sounds when the water pressure drops in the pump line. An old steam-pressure gauge, with all the parts removed except the expansion tube, was fitted with electric contacts. It was then installed in the line and wired to a 6-volt battery and an auto horn. A copper screw in the gauge case contacts with a copper tip soldered to the end of the expansion tube, as soon as the pressure drops, and closes the circuit to the horn.

Plant Markers from Glass Vials

Glass vials, such as perfume bottles, make good plant markers. The name of the plant is printed on white paper with India ink as common ink usually fades in sunlight. The paper is rolled with the printed side out and inserted into the vial, which is then fitted with a cork having a piece of fine copper wire fastened to it for attachment to the plant. If a pointed stick is used instead of the



cork, the marker can be pushed into the ground to identify plants that are set in rows.—Archie Amos, Fort Wayne, Ind.

Screwdriver Converted into Wire Scraper

An ordinary screwdriver can be converted into a tool for removing enamel insulation from wire. Heat the end and bend it at right angles. Then file a V-notch, about $\frac{3}{16}$ in. wide, in the end, making sure that the sides of the notch are cut squarely to assure a good scraping edge. After the tool has been reheated and hardened, it is ready for service. In use, the wire is placed in the notch, and the tool is drawn back and forth until the insulation has been removed.

Door Kept from Bulging at Bottom

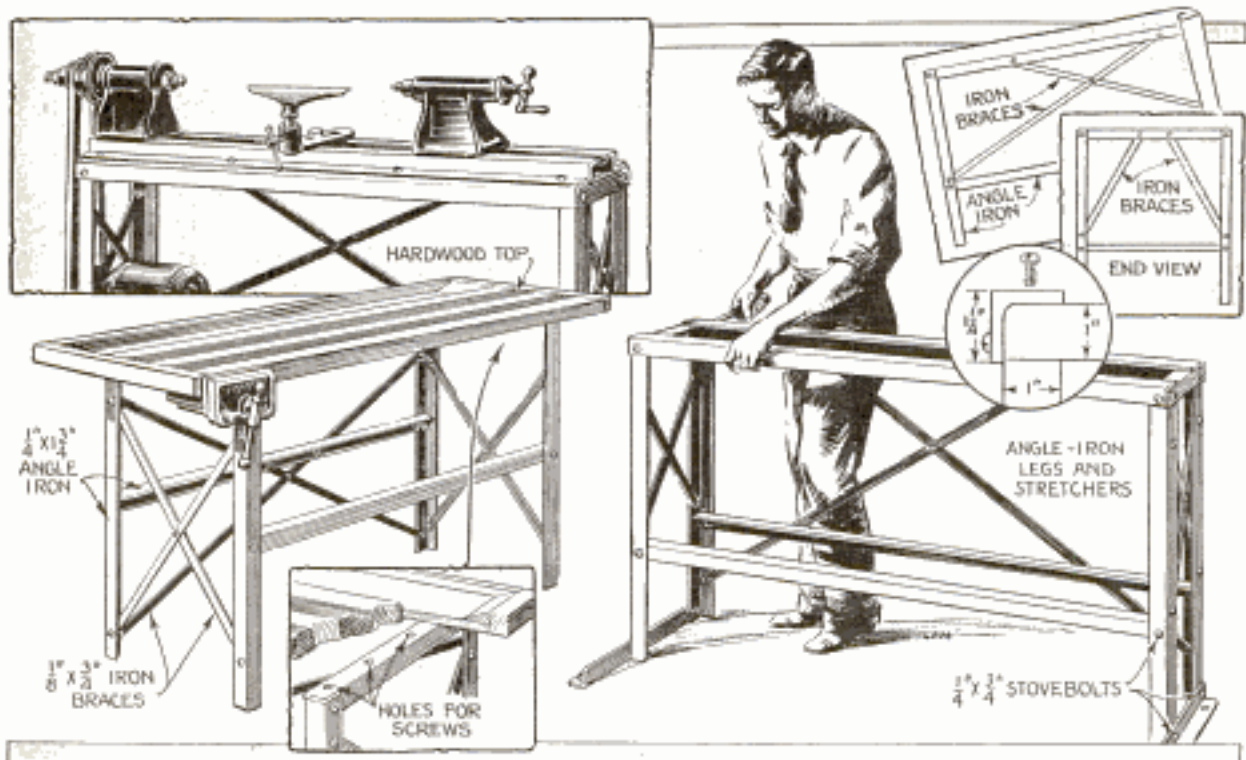
An effective method of keeping a barn door from bulging at the bottom is to employ two latches, which are operated as one unit, one being located at the usual height, while the other is placed near the bottom of the door. Small holes are drilled in each handle and the two latches are connected by light chains. In this way, no outside handle is needed for the lower lock.—L. M. Harrington, Lakefield, Minn.



Increasing the Thermal Capacity of a Soldering Iron

Thermal capacity of small soldering irons can be increased for heavy work by winding four or five layers of No. 18 gauge copper wire around the upper portion of the iron. The wire increases the size of the iron so that the heat will not be dissipated so rapidly.

Rigid Angle-Iron Bench and Machine Stands



Rigid stands for power machines and frames for workbenches are easily and cheaply made of angle iron. Effective methods of construction and bracing are indicated in the illustrations. Most important to the rigidity of the stand is the manner of joining the corners, which is shown in an enlarged detail. It will be seen from this that $1\frac{1}{4}$ -in. angle stock is used for the lengthwise piece, while 1-in. angle iron forms the leg and crosspiece. After cutting, the end of the crosspiece is

filed to a rounding contour so that it fits the rounded corner of the $1\frac{1}{4}$ -in. stock neatly. Holes are drilled for $\frac{1}{4}$ -in. stovebolts, and the nuts are drawn down on lock washers if the stand is subjected to vibration. Though not always necessary, it is generally best to put in at least one lower stretcher which will give additional support to both frames and braces. It is also a good idea to fit narrow machine stands with feet to prevent any tendency to tip, as shown at the right.

Cooling Piece Helps in Grinding Hand Tools

Chisels, plane irons, and similar tools can be ground with less danger of burning the cutting edge if a piece of aluminum or copper is clamped to the tool as shown. The piece should be bent up a little in the center to assure a firm contact with the cutting edge of the tool. The extra metal conducts the heat away from the



edge of the tool, which in many cases can then be held in contact with the grinding wheel until the job is done.

Rubber Holds Washers and Shim Stock for Filing

A piece of an old inner tube, cemented to a wooden block, provides a means of holding thin washers and shim stock for filing it. The work is laid on the rubber surface and then filed in the usual way. When pressure is applied to the work, it sinks into the rubber and will not slip. This holds true whether taking either light or heavy cuts with the file.

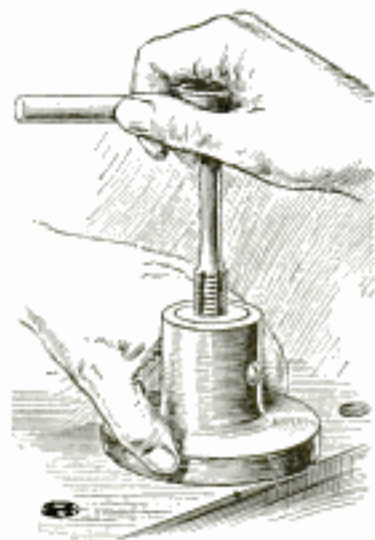


Interchangeable Pads of Varying Hardness Enable All Kinds of Work to Be Clamped in Vise

Snap-On Pads for Vise Jaws

By keeping on hand a number of interchangeable vise-jaw pads of varying hardness, you will be able to clamp almost any kind of work in a vise without marring the surface. The pads are mounted on triangular pieces of brass or sheet metal, bent to fit the contour of the jaws and held in place by snap pins made as shown in the circular detail.—Walter Wells, Ft. Ann, New York.

Guide That Starts Tap Square with Work



This device facilitates starting a cap square with the surface of the work. It is simply a flange with the face and the inside of the hole trued up to take a sleeve, which is held in position with a setscrew in the side of the flange. It is, of course, necessary to provide a sleeve for each size of tap needed.

It is, of course, necessary to provide a sleeve for each size of tap needed.

In use, the device is set over the work and the tap is turned into the hole as shown, the sleeve keeping it square with the surface of the work.

Leaky Exhaust Valves Detected with Paper

Leaky exhaust valves in an auto motor are easily detected with a piece of paper. With the motor idling as slowly as possible, hold a rather heavy piece of paper $\frac{1}{2}$ in. from the mouth of the exhaust pipe. If the valves are in good condition, the paper will be blown away from the mouth of the pipe with each successive explosion of the motor. But if one or more of the valves are leaking, the paper will be sucked against the opening of the pipe whenever the piston with the leaky valve is on its downward stroke. The piston, because of the leak, draws air from the exhaust pipe into the cylinder, thus drawing the paper against the opening.—G. R. Lierle, Plymouth, Ill.

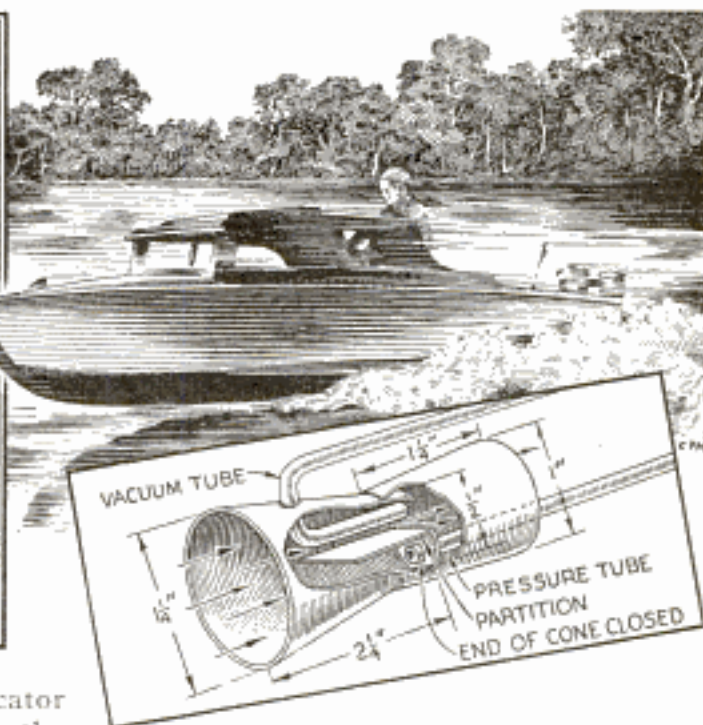
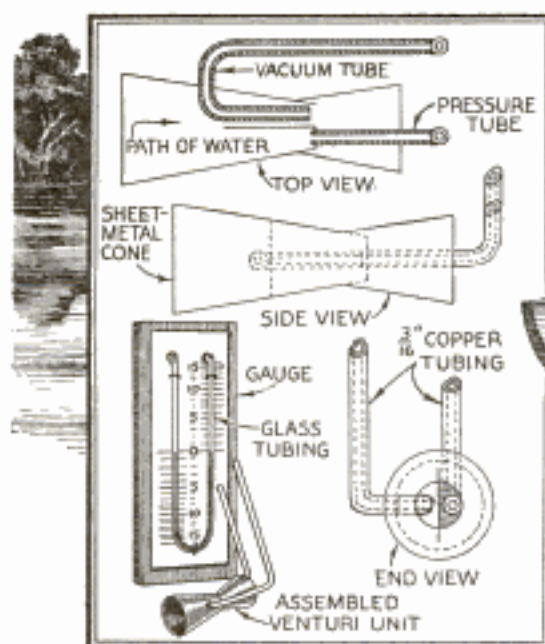
Springs Aid Windmill in Light Wind

Two tension springs attached to a windmill pump rod so that they exert a pull on the upstroke will aid pumping in a light wind. Two metal arms are pivoted on opposite members of the windmill frame and are attached to the pump rod by means of leather straps. One end of each spring is attached to the frame above the arms, while the other end is fastened to the arm. As the greatest pull is on the upstroke, the tension of the springs takes part of the load, thus enabling the windmill to run in a light wind. Gravity and the weight of the pump rod suffice to overcome the spring tension on the downstroke.—A. S. Wurz, Jr., Rockyford, Alta., Canada.



As the greatest pull is on the upstroke, the tension of the springs takes part of the load, thus enabling the windmill to run in a light wind. Gravity and the weight of the pump rod suffice to overcome the spring tension on the downstroke.—A. S. Wurz, Jr., Rockyford, Alta., Canada.

An Accurate Speed Indicator for Your Boat

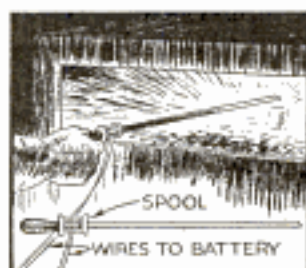


Calibrated properly, this speed indicator is fairly accurate. To make it, prepare the following units: two truncated sheet-metal cones; one partition, having a semicircular vertical part and a flared horizontal part to fit the smaller opening and the inside of one cone, and two $\frac{3}{16}$ -in. copper tubes, bent as indicated. Assemble these parts by soldering. The upper ends of the copper tubes are connected to a U-shaped glass gauge, half filled with mercury and attached to a wooden panel, which is hung in a convenient place in the boat. The water streaming through the meter when the boat moves, thus sets up a partial vacuum in one tube and a pressure in the other, causing the mercury to rise in one branch of the gauge and fall in the other, the difference in level varying with the boat's

speed. For speeds up to 15 miles per hour, 6-in. branches should be sufficient, while 8-in. branches should be suitable for speeds from 15 to 25 miles per hour. For still higher speeds, the pressure compartment of the underwater unit may be eliminated, so that gauge readings depend entirely on the suction. In this case, one end of the glass tube should be left open. The indicator may be calibrated by timing it over a measured course, with the boat engine running at constant speed. If this is done in a river, currents must be taken into consideration. By traveling upstream and then downstream, the mean of the differences in mercury levels will indicate the speed in still water.

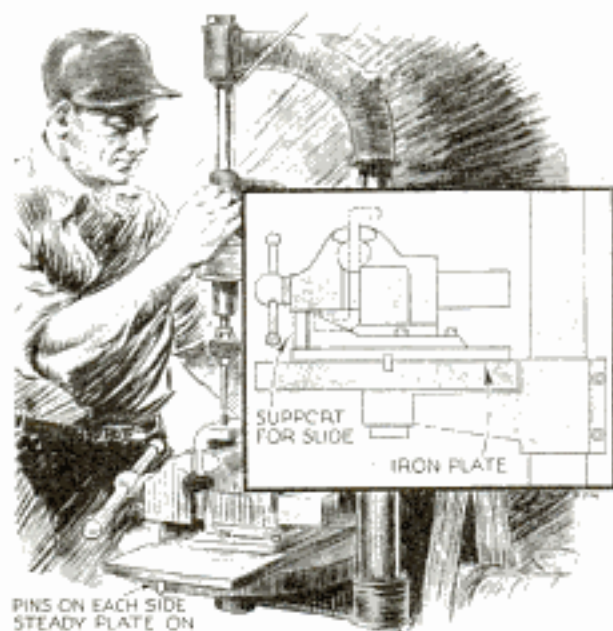
Electromagnet Tests Temperature in Heat-Treating Metal

Here is a simple electromagnet for testing temperatures when heat-treating iron and steel. The magnet is operated by a 6-volt storage battery, and consists of a small steel rod, one end of which is fitted with a wooden grip, and a coil of



about 900 turns of No. 28 enameled wire, wound on a wooden spool. The leads from the coil are connected to the battery, and the spool is slipped on the rod to rest against the grip, as shown. In use, the magnet is held in a furnace so that the point is just above the work being treated. When the critical point is reached, the metal will no longer attract the magnet.

☛ Dense spots on snapshot negatives are easily reduced by rubbing them with oil-base metal polish on a wad of cotton.



Work of Irregular Shape Firmly Held in Position on Drillpress Table with Small Bench Vise

Bench Vise Holds Irregular Work on Drillpress

Mounted on an iron plate, a bench vise can be used for holding irregular-shaped work on a drillpress. A small block is welded to the plate as shown, to serve as a support for the vise slide. Pins inserted in holes drilled through the plate on each side of the drillpress table, steady the vise when in use.

Scale on Pipe Wrench Saves Time

For adjusting it to various sizes of work, a scale on the movable jaw of a pipe wrench will save time. The numerals



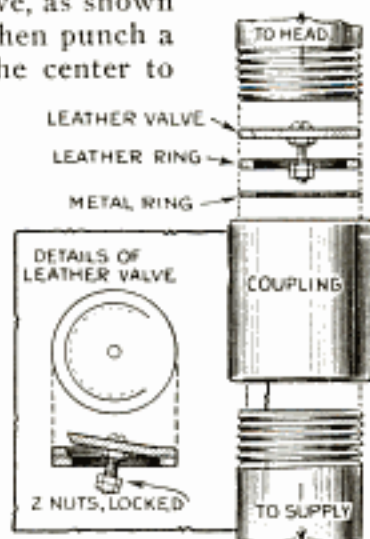
may be painted on, or etched into, the metal. Etching is done by first applying a thin layer of paraffin and scratching the numerals through it so that the lines bare the surface, after which nitric or sulphuric acid is poured into the scratches and allowed to remain until it eats into the metal. Both the acid and the paraffin are then removed, and the scratches filled with white paint.—Harry Miller, Corydon, Iowa.

Welding Gasoline Tank Safely

Welding a gasoline tank may be done without danger of an explosion from fumes confined inside, by using the following method: Pour several gallons of motor oil into the tank and shake it so that the oil goes to all corners. In this way, the gasoline is absorbed by the oil, which is then drained out. When ready to weld, fill the tank with water to the point where the repair is to be made, leaving a vent so that no pressure is created through expansion of heated air.

An Improved Check Valve

An effective check valve for use in water pipes can be made from a stovebolt, a pipe coupling, and two leather disks having a diameter equal to the outside diameter of the pipe line. Cut a hole in the center of one disk equal to about two-thirds of its diameter, and slit the other to form the valve, as shown in the detail. Then punch a small hole in the center to



take a stovebolt, which has one nut screwed up tight against the leather and two more locked at the end to provide a weight. Place the assembly in the pipe coupling, with a metal ring over the leather at the supply end to keep the pipe from damaging the assembly. If the valve is to be used in a horizontal position, place the hinge part on the bottom so the weighted end of the bolt will automatically close the valve when the flow stops.

Calking Boat with Grease Gun

A hand-type grease gun is useful for spreading seam compound over the calking in a boat. The gun keeps the compound from drying, and, by using a small tip on the nozzle, the material can be easily forced into the desired places.

Chairside Table for the *LIVING ROOM*



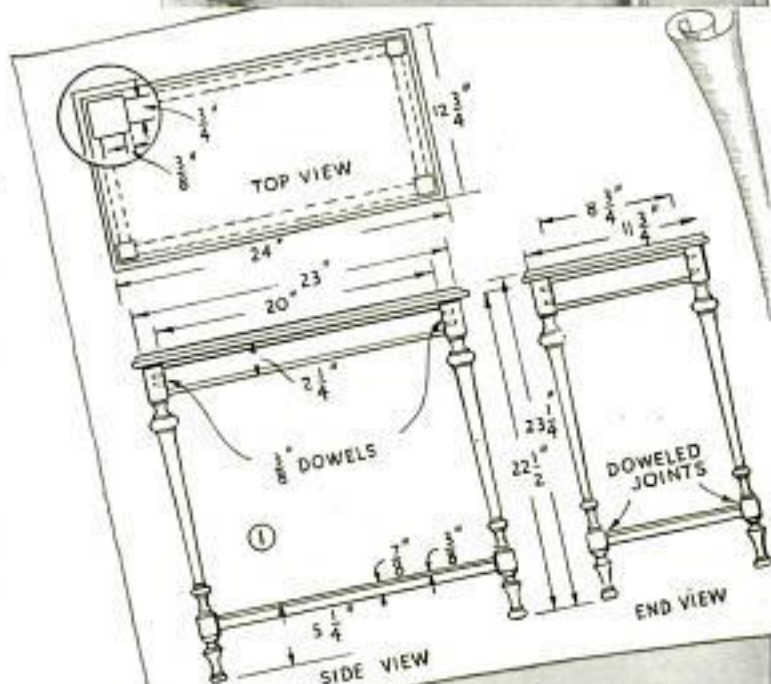
By R. O. BUCK
Lane Technical High School, Chicago

WITH its slender, fluted legs and banded apron, this little table of modern design, in either walnut or mahogany, shows such marked Colonial influence that it might easily be a reproduction of a genuine antique.

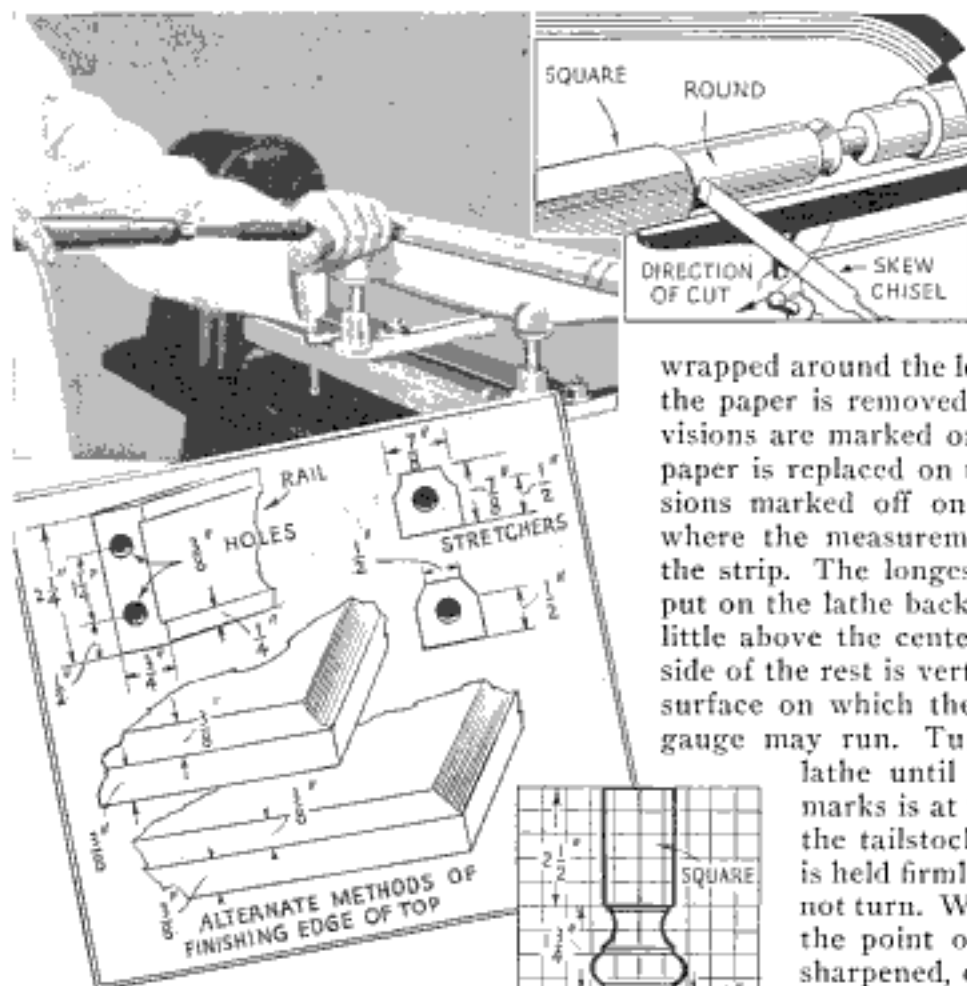
The top is the logical piece to make first. You will either have to glue up stock to a width of 13 in. or get a piece of that width. The top piece is simply cut to size and squared true and smooth. A molding is cut using a cutter head on a circular saw, or a combination plane. The rails have a banded-edge effect which is obtained by recessing the faces between the bands. This is done with a groover or dado head on your saw, or with a hand grooving plane. Another method is to glue the banding strips into the face of the stock. The stretchers, or lower rails, carry the same molding as the top, and should be cut before they are sawed to width, as they are difficult to hold after ripping. The turned legs are fully dimensioned. Note that the large ring near the top is of greater diameter than the squared portions. For this reason, the latter are cut to size before the legs are turned. It is essential, therefore, that the piece be mounted in the



YOU CAN DO THE FLUTING
WITH A SMALL PARING CHISEL



A MARKING GAUGE IS HANDY TO
SCRIBE LINES FOR FLUTING



lathe as nearly at the exact center as possible, or the squared portions will be off center in relation to the turned portions. Care must be taken when rounding the corners of the squared portions. A skew chisel, held as shown in one of the details, is used to make this cut, the arrow showing the direction in which the tool should be moved. The sizes are first measured off along the piece and grooves made with a cut-off or sizing tool to the several diameters required, calipers being used to check these diameters. The concave portions of the turning are made with a round-nose scraper and the convex ones with a skew chisel. Each leg should be carefully sanded before being removed from the lathe.

Fluting is used to ornament the legs. To do this, the leg should be mounted in the lathe

just as it was when turned, and a pencil line drawn around it at the largest end of the portion to be fluted. A strip of paper, cut so that ends just meet, is then wrapped around the leg at this line. Next, the paper is removed and eight equal divisions are marked on it, after which the paper is replaced on the leg and the divisions marked off on the penciled circle where the measurement was taken with the strip. The longest toolrest should be put on the lathe backward and adjusted a little above the center of the work. This side of the rest is vertical and gives a true surface on which the head of a marking gauge may run. Turn the work in the

lathe until one of the division marks is at the top, then tighten the tailstock screw until the leg is held firmly in position and will not turn. With a marking gauge, the point of which has been sharpened, cut a groove or deep scratch along the line where a flute is to be. By loosening the tailstock and resetting the work, all of the flutes can be marked in this way. The next step is to enlarge the scratches into V-cuts, about $\frac{1}{8}$ in. wide, with an ordinary $\frac{3}{8}$ or $\frac{1}{2}$ -in. paring chisel having beveled sides. Care must be taken that the cuts are always with the grain, and it may be necessary to reverse the direction of cut even on a single flute if the wood is somewhat knurled or of wavy grain. The vees are rounded with a small gouge and with sandpaper, wrapped on a dowel rod.

The table is assembled with $\frac{3}{8}$ -in. dowels, spaced as shown in the drawings. Glue and clamps are used to put together the frame in the usual way. The top is fastened with ten wood screws which are driven into the top piece through pockets cut into the inner faces of the rails.

Portable Turntable for Railroad Section Cars

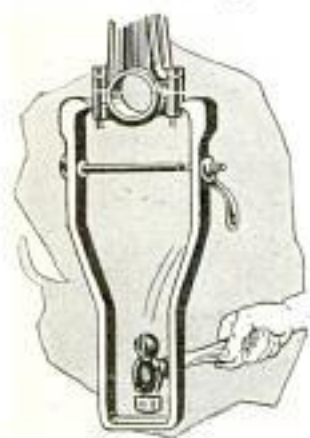
Men repairing railroad tracks will find this portable turntable useful in reversing the handcars. It consists of three pieces of hardwood, two of which are bolted to the third, or center section, and are tapered at one end to lie flat on the rails so that the car can be pushed onto them. Small blocks bolted to the opposite ends keep the car from rolling off. The center section is pivoted to a block of sufficient thickness to raise the table a couple of inches above the rails so that the entire assembly can be swung around. When not in use, the table can be stored on the side of the car.



Tool for Removing Connecting-Rod Bearing Caps

When adjusting connecting-rod bearings, the tool illustrated will be found handy for removing the bearing caps. Sharp jaws are formed on each end and hardened, after which the piece is bent to the shape shown. Holes are drilled in each side near the jaws to take a bolt, with

which the tool is clamped to the bearing cap. In use, the tool is clamped to the cap, after the nuts have been removed from the bearing bolts, and the lower part is struck with a hammer to loosen the cap.



Testing a Radiator for Leaks by Pressure

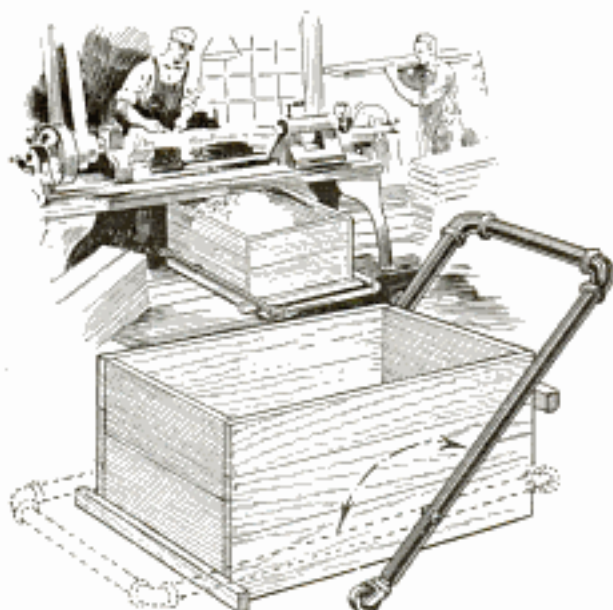
Stoppers for plugging the hose connections when compressed air is used to test auto radiators for leaks, can be improvised from two pieces of hose and two

wooden cylinders. The latter are shel-lacked and clamped in one end of each hose, which are, in turn, clamped to the radiator connections. The threads on the filler hole are waxed and the cap screwed on, after which a piece of rubber tubing, with a tire-valve assembly inserted in one end, is clamped over the end of the overflow pipe. If all connections are tight, you can use an ordinary tire pump to fill the radiator with air and it will then be an easy matter to locate the leak.—W. C. Wilhite, Hornsby, Ill.

Eye Dropper to Fill Ruling Pen

By substituting an eye dropper for the regular quill in an ink bottle, draftsmen will find it easier to fill their pens. The quill is removed from the old cork and a new hole drilled to take the dropper. This hole can be cut with a sharp penknife.





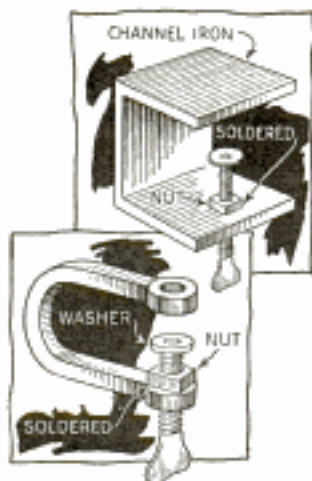
Wood-Shaving Box Made Portable by Addition of Pivoted Handle Fitted with Large Casters

Portable Box Simplifies Removal of Lathe Shavings

One woodworker simplified the task of removing the shavings from his lathe by making the box provided for this purpose portable. Three pieces of pipe and two elbows were assembled to form a handle, wooden plugs being driven into the two ends and drilled to take large casters. The handle was pivoted to the box so that it could be raised to the position shown, where the casters would elevate and support it while it was being moved.

C-Clamps Made of Scrap Parts

C-clamps are easily made from scrap pieces usually found around a shop. The upper detail shows one made from a short section of channel iron. The side of the iron is drilled and a washer is soldered



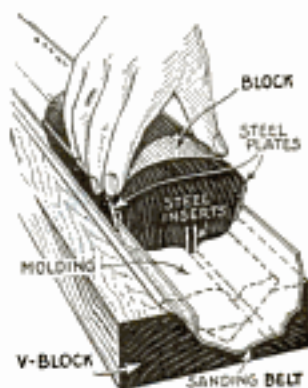
over the hole on the inside to take a thumbscrew, which has an iron washer loosely riveted to the end. Another method is to use an old clevis, soldering a nut over one of the holes in the end and using a thumbscrew.—N. P. Lewchuk, Canora, Sask., Can.

Catching Snakes in Mousetraps Set in Fish Pool

Attempts to propagate fish in an outdoor pool are often made futile by snakes that eat the eggs as well as the baby fish. However, the snakes can be caught in an ordinary mousetrap by using a live bait, such as soft-shell beetles or any of a variety of waterbugs, and sometimes even fresh beef or newly born mice. The bait is fastened to the trigger of the trap, which is then set on a rock in the pool, so that it just comes even with the surface of the water, which serves the purpose of keeping the fish from getting at it.—Charles Latour, Jr., Plattsburg, N. Y.

Molding Finished on Belt Sander

Finishing molding on a belt sander is easily done by providing a hand block with a face of the same contour as that of the molding. Steel plates are screwed on the sides of the block to take the edges of the belt, and steel inserts are put in the block where narrow grooves are made in the molding. In use, the molding is held in a V-block and the hand block is held against the back of the belt. It is, of course, necessary to make a block for each kind of molding sanded. In using a belt sander for this purpose, it is a good idea to reverse the direction in which the belt is running frequently, to get more service out of the belt.

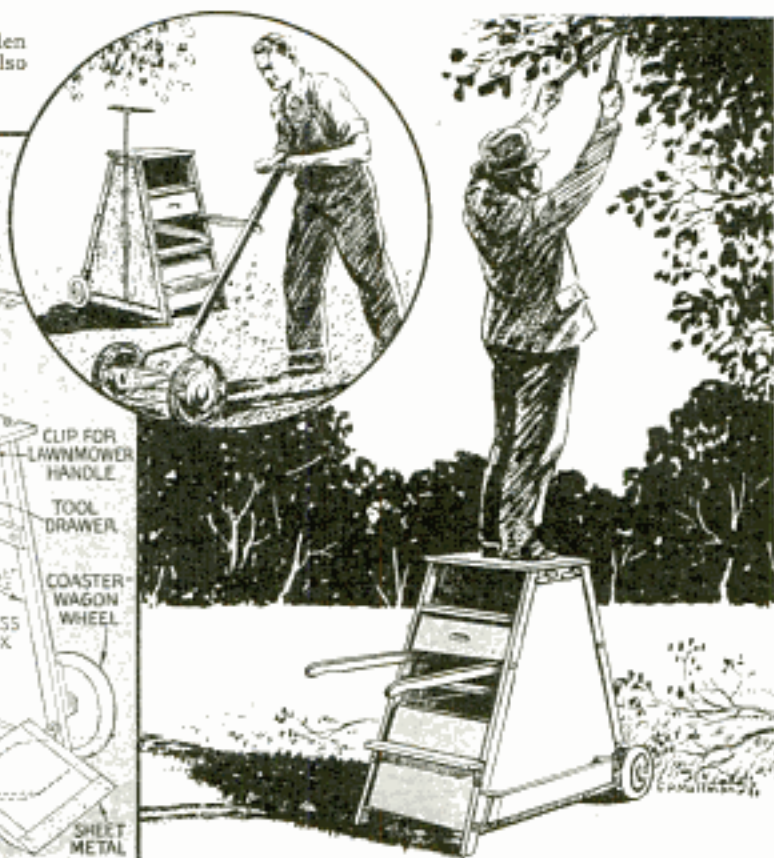
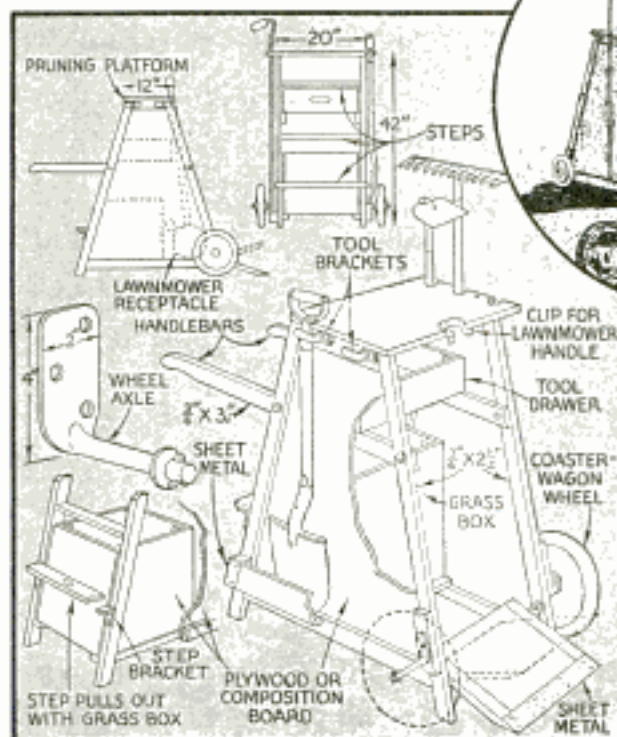


Lime Sulphur Kills Shot-Hole Fungus

Cherry trees are often killed by shot-hole fungus, which is apparent when a rapid yellowing of the leaves is noticed. Such trees that lose their leaves early in the summer are seriously weakened, and may die the next year. After picking the fruit, spray the tree with a lime-sulphur solution made by mixing liquid lime sulphur, 1¼ gal., with water, 50 gal. If lead arsenate, 1¼ lb., is added to the mixture, it will kill any slugs that may still be feeding on the leaves.

Gardener's Carryall Is Also Pruning Platform

You Can Keep All the Lawn and Garden Tools Together in This Carryall, Which Also Serves as a Short Stepladder



Gardeners will find this wheeled carryall exceptionally handy, as it contains, in addition to tool-storage space, a 42-in. platform from which you can prune tall shrubs and low trees. Shovels, rakes, etc., are stowed in brackets on the sides, small hand tools are kept in a drawer, and the large compartment will house both the lawnmower and a box to receive grass clippings and leaves. There are three steps, spaced about 10 in. apart, for mounting the platform, the first one being attached to the front of the grass box so that it will not interfere with removing the box. When in position, this step is supported by iron brackets. A low ramp is also provided to help in moving the lawnmower.

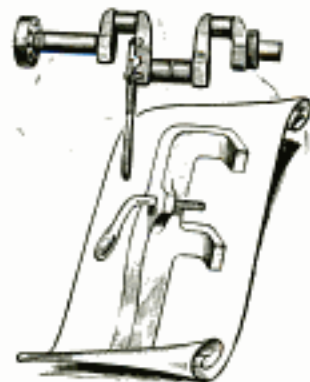
How to Cut Wire Glass

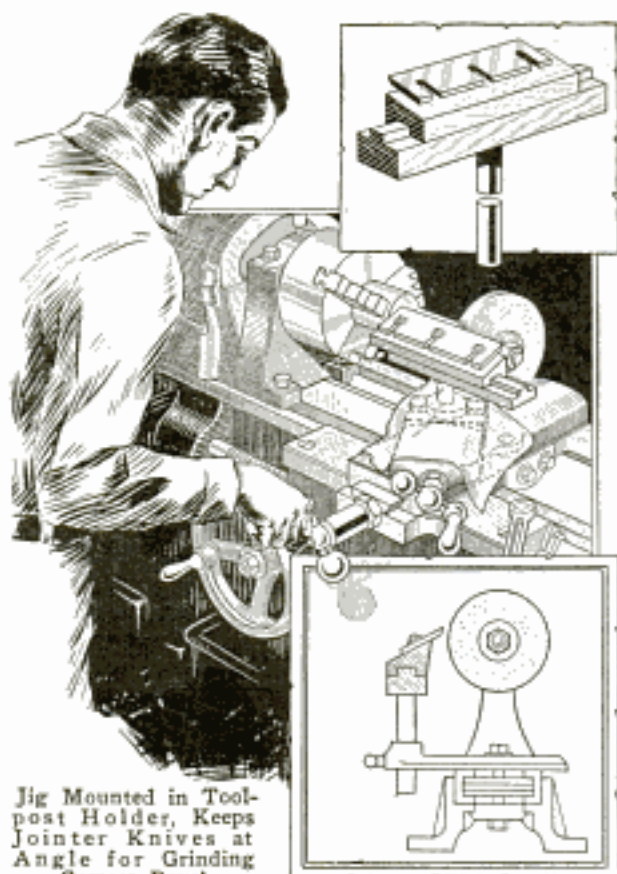
Glass that has woven wire molded into it may be cut in the regular way. The glass is placed on a perfectly flat surface and is scored with a cutter, after which it is moved so that the scored line is directly over the edge of the surface. In this position, the projecting edge of the glass is

pressed down until it breaks off. The loose end is then lifted upward sharply to snap the wires. It is best to stand to one side, or otherwise protect your eyes and face from small particles of flying glass that may be broken loose.

Simple Tool Helps in Adjusting Connecting-Rod Bearings

Here is a simple tool that will be found handy for "rocking" a crankshaft to get the proper adjustment of connecting-rod bearings. The tool can be cut from a piece of iron, or may be forged. It has three projecting prongs bent over at right angles, one being drilled and tapped for a threaded handle, with which the tool is clamped to one of the cranks on the shaft.





Jig Mounted in Toolpost Holder, Keeps Jointer Knives at Angle for Grinding Correct Bevel

Jointer Knives Ground on Lathe

Grinding the correct bevel on jointer knives is easily done by mounting an emery wheel in the lathe chuck and using a jig, as shown. The jig consists of two hardwood blocks held together with a sliding dovetail or a tongue-and-groove joint and mounted on a rod or bolt that fits in the toolpost holder. If a metal-turning lathe is used, the sliding joint between the blocks is not necessary, as the carriage can be moved back and forth to run the cutter over the wheel. In this case a cloth is laid over the lathe ways and compound to protect them from the fine grindings. The sliding joint between the blocks is necessary on a woodturning lathe, however, as it is the only means of moving the knife across the wheel.—W. C. Leckey, Aurora, Ill.

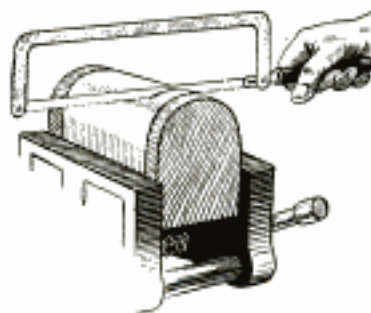
Corrosive Fumes Exhausted without Damage to Fan Motor

Corrosive fumes from paints, electroplating tanks or chemical processes may be effectively exhausted without damage to the fan motor by using a blower action instead of suction. To do this, a square

sheet-metal duct, large enough to carry away the fumes, is installed over the tanks, or at one side, with an opening facing the source of fumes. The duct should rise to the level of a window or other outlet, and should turn at a right angle and continue through the opening to a point where the fumes may be safely exhausted. A hole is cut in the duct to take the guard of an electric fan at the end of the horizontal piece where the bend is made. The fan is then mounted on a shelf, or on brackets outside of the duct, with the blades just inside the opening. When the fan is turned on, the draft of air across the top of the vertical section tends to create a vacuum and draws in and exhausts the fumes from the lower opening. A 12-in. fan used in this manner will handle about 500 cu. ft. of air per minute.

Slotting Sheet Metal with a Hacksaw

Slots can be easily cut in sheet metal with a hacksaw by bending the metal over a wooden form and clamping it in a vise. A cut is then made for each side of the slot, after which the metal is removed from the vise and the ends of the slot cut with a chisel.



The edges are smoothed with a file. Slots of almost any size can be made in this manner.—J. T. Watkins, Astoria, N. Y.

A Universal Bench Stop

Attached to the end of a bench, this stop will hold work having square or irregular ends. Two pieces of 2 by 4-in. hardwood are used, one screwed rigidly to the end of the bench and the other clamped to it with bolts and wingnuts. Vertical notches between the two blocks hold bolts or lagscrews which serve as stops, being adjusted to the contour of the work in hand.

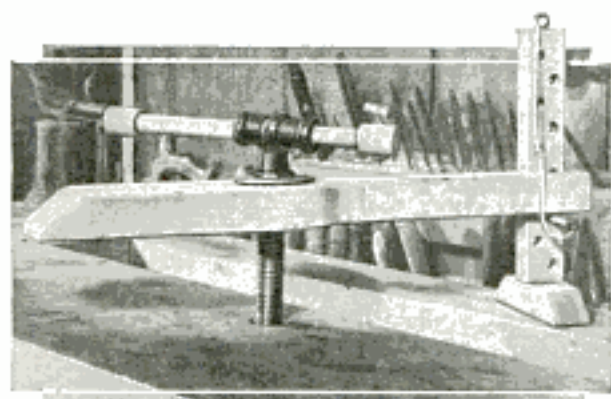


How to Fell a Tree Accurately

Here is a method used by lumberjacks to fell trees in the direction desired. A notch, from 6 to 14 in. deep, is cut in the side of the tree facing the direction it is to fall. After the notch has been cut, start sawing from the opposite side of the tree a few inches above the bottom of the notch. If the tree leans in any other direction except that in which it is to fall, wedges should be driven into the slot as the work progresses to help guide the tree. This is also a good precaution when the tree stands straight, as the wedges will keep a sudden gust of wind from blowing it over in the wrong direction when it is nearly sawed off.

Vise Holds Work on Top of Bench

This vise clamps work against the top of the bench and is attached by the vise screw, which makes it readily removable.

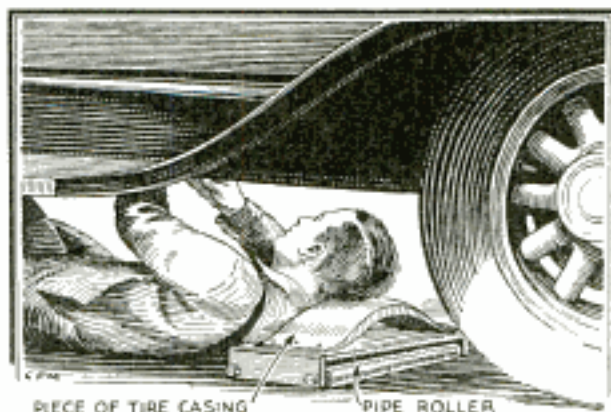


Mounted on Your Bench Top, This Vise Will Be Useful for Clamping Down Work

Several holes for a pin are drilled in a vertical hardwood support, which permits the vise to be quickly adjusted to any height suitable for the work.—Emilio A. Binachi, Ventura, Calif.

Waterproofing Tops of Closed Cars

Worn tops on closed cars may be waterproofed with a solution made by mixing equal parts of gasoline and melted paraffin. The top should be as warm as possible before applying the solution so that it will penetrate the fabric before the wax hardens. As this solution is inflammable it should be kept away from a fire, and should be applied outdoors or in a well-ventilated building.



This Portable Headrest Is Made from a Piece of Tire Casing and a Block Fitted with Rollers

Mechanics' Headrest Made from Old Auto Casing

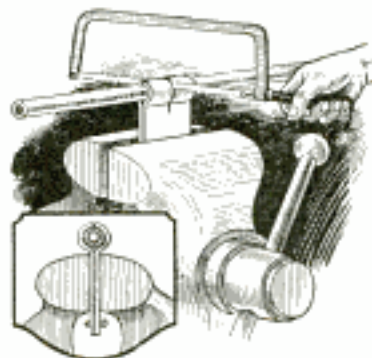
A convenient headrest for mechanics while working under a car, can be made by nailing a section of an old tire casing to a piece of wood as shown. Two end-pieces are provided and two pipe rollers fitted between the latter. The axles for the rollers may be pieces of tie-rod threaded on both ends to receive nuts, to hold them.—H. C. Thomas, Royal Oak, Mich.

Locating Exhaust-Gas Leaks

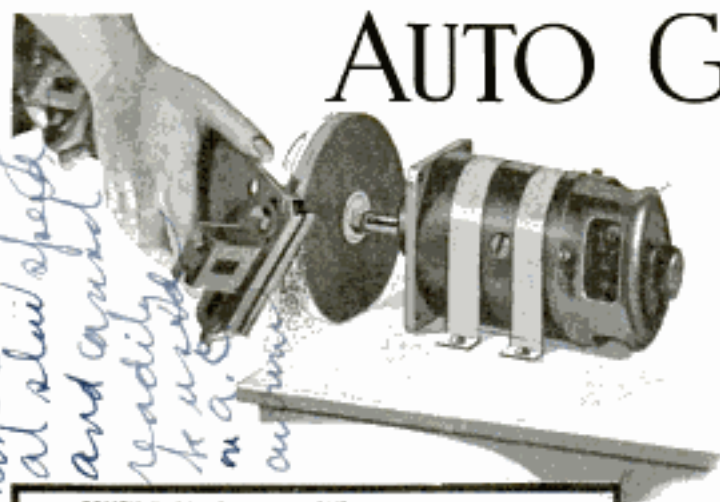
If you have trouble in locating an exhaust leak in the motor of your car, inject a little kerosene in the air intake of the carburetor as the motor runs. This will cause considerable smoke, and by watching the gaskets around the exhaust-manifold pipe and muffler, you can usually find where the smoke issues.

Guide Aids in Sawing Brass Tubing

Cutting a square end on brass tubing with a hacksaw is made easier by using this guide. It is a piece of sheet metal bent to fit tightly around the tubing, and has a slot in the center, which guides the saw blade. By keeping guides of different sizes on hand, you can handle any tubing work that may come to your shop.



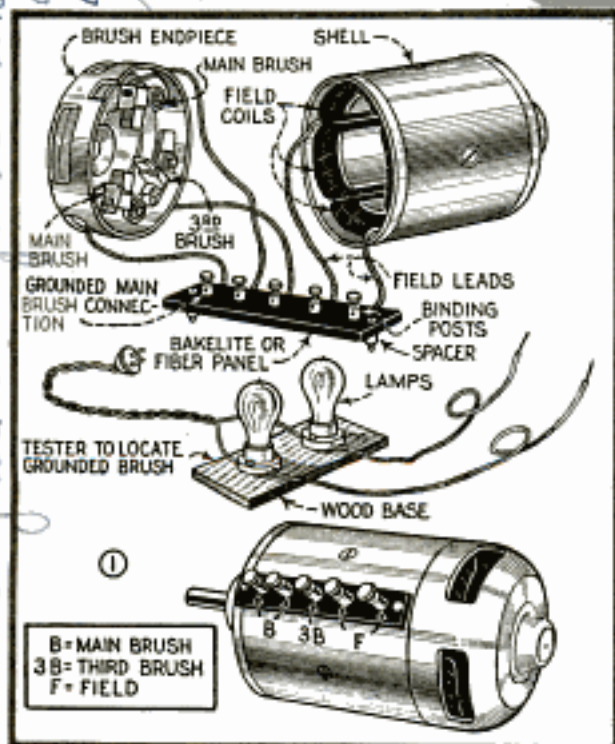
AUTO GENERATORS that run



piece, one of which is set at an angle to the other two. The third brush is usually smaller than the other two. The lead running from this brush to the field coils should be disconnected and labeled "field." Next, a piece of wire, about 8 in. long, is connected to

the third brush and a tag marked "third brush" is tied to the other end. One of the two main brushes has connected to it a wire also leading to the field coils. This is disconnected and should have a wire attached to it marked "main brush." The remaining brush, which you will find connected to the large screw on top of the generator, is disconnected and a piece of wire, labeled "main brush," is run to the brush connection, but not to the screw, which may be removed. There will now be five wires coming from the generator, two connected to the large brushes and each labeled "main brush," two running to the field coil and labeled "field," and one labeled "third brush." One of the main brushes is grounded to the frame of the generator, and it will be necessary to test and find out which one this is. Fig. 1 shows a generator with wires attached as they should be and a diagram of a tester which you can use for finding the grounded brush. To make the test, touch one of the feeler wires to the metal case in which the brushes are mounted and touch the other feeler to first one and then the other of the wires from the main brushes. The one that lights the lamp is grounded. The tag on this lead should now be revised to read "grounded main brush." For convenience in making connections, it is a good plan to mount five binding posts on a strip of bakelite and attach it to the generator shell. The binding posts may be connected to the five wires from the machine, and marked accordingly.

To make a high-speed series motor, the binding posts are connected as shown in Fig. 2. One of the wires of the 110-volt lighting circuit is grounded, and it is im-



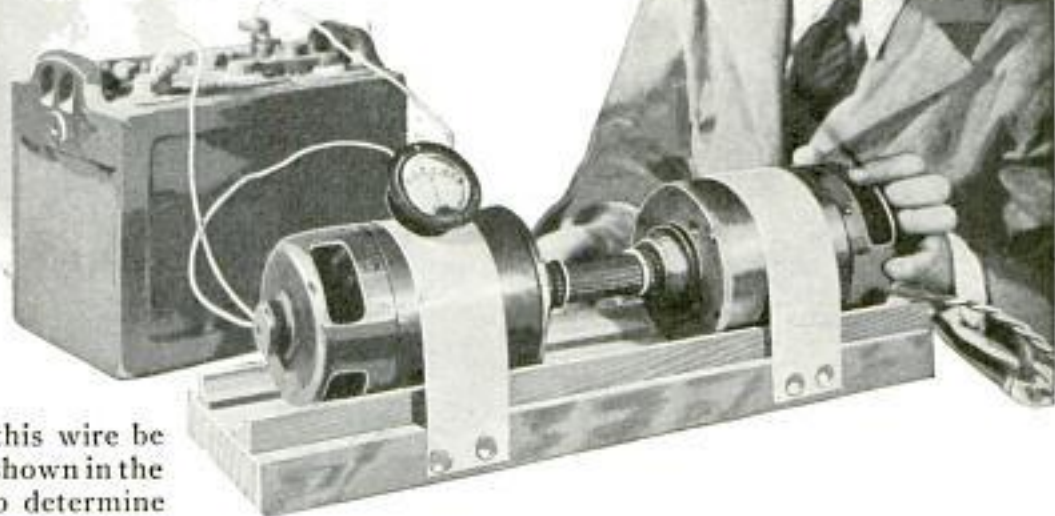
AUTOMOBILE generators that are in good shape can be converted into motors, motor-generator sets for charging batteries, and into a multitude of other useful shop tools, such as hand drills, shapers and grinders. Before making any change on a generator, it should be tested to make sure that it is in good condition. To do this, first clean it thoroughly with gasoline, removing all grease. When dry enough so that sparks will not ignite the gasoline, wire the generator to a storage battery to see if it will run. If it will not run on a battery, it is useless and cannot be made to operate as an a.c. motor.

The next thing to do is to remove the cut-out, which will not be needed. When you examine the generator, you will find that there are three brushes in the end-

This does not include starting as they are designed to move a heavy load at slow speeds and cannot readily be used as a.c. motor.

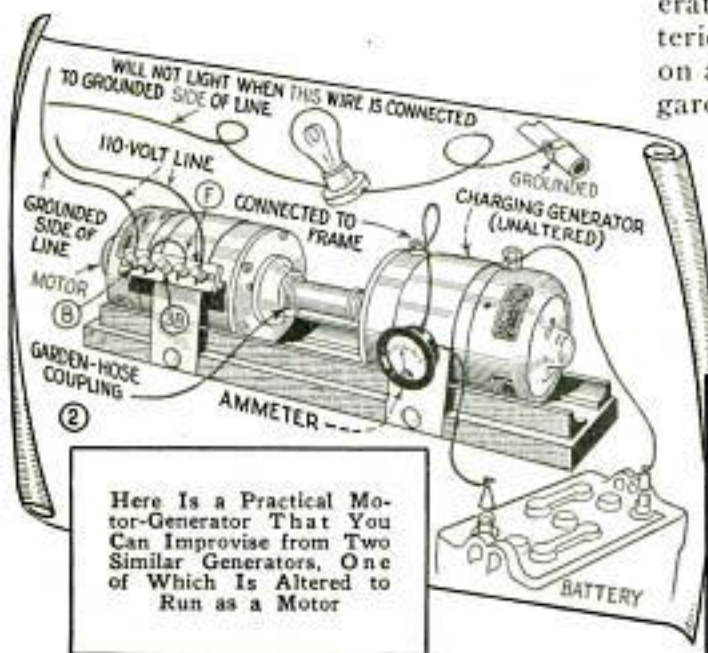
Converted to MOTORS on A.C. Lighting Circuit

By C.A. CROWLEY

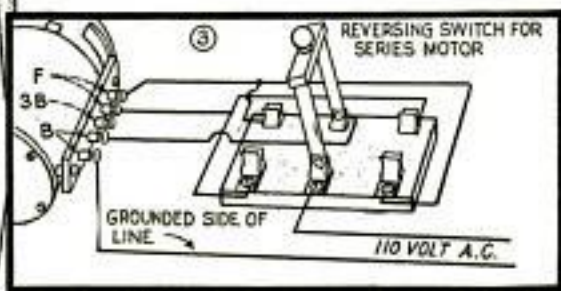


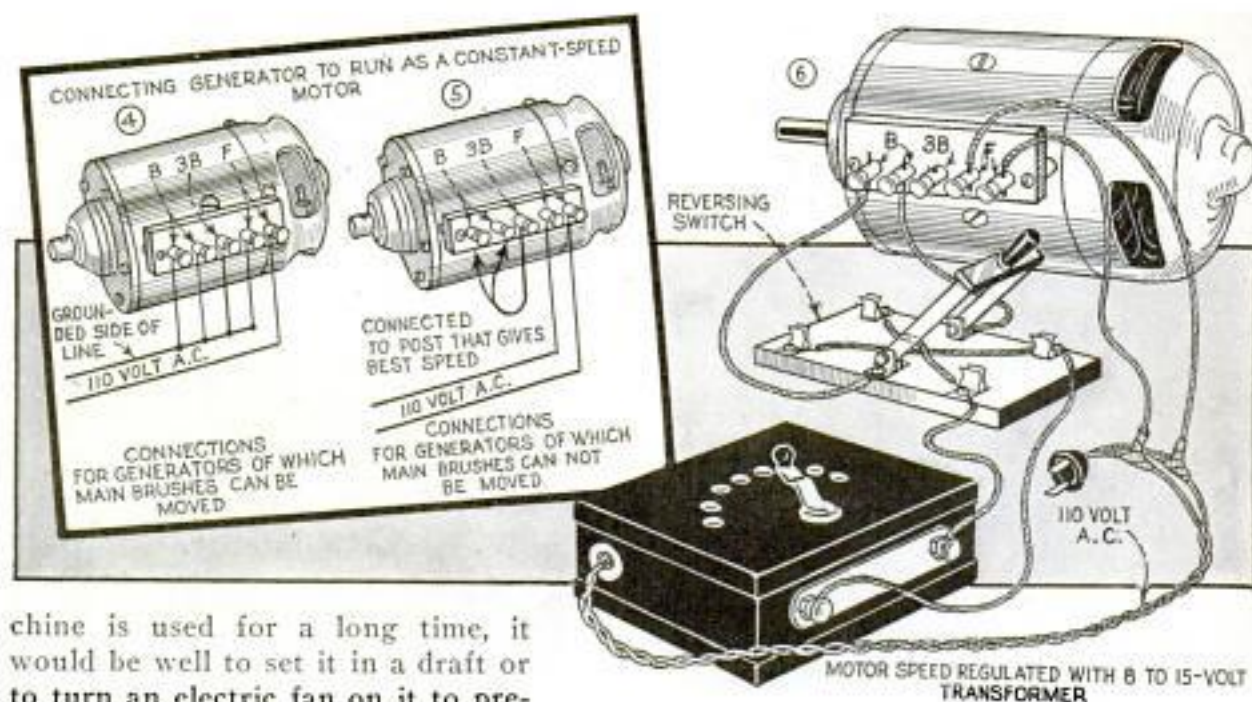
portant that this wire be connected as shown in the diagram. To determine which line is grounded, connect one side of a light bulb to a water pipe and, using the other wire as a feeler, touch it first to one of the wires and then to the other. The light will not burn when the feeler is touched to the grounded or dead wire, but will burn with full brilliancy when connected to the "hot" side of the line. It is important that the grounded side of the line be connected to the brush

that is grounded to the frame of the generator, to avoid shocks and blown fuses. Fig. 3 shows the same motor connections with a reversing switch installed. When the generator is connected as shown in Fig. 2 or 3, it will run at very high speed unless it is pulling a load. This method of connection may be used on one generator coupled to another, to form a motor generator, which is useful for charging batteries. The two machines may be mounted on a board as shown in Fig. 2. A piece of garden hose and clamps are used as a coupling. The charging rate may be varied to suit by moving the third brush of the generator. If the motor runs faster than is desired, a 50-ohm, 3-amp. rheostat may be inserted into the hot side of the line to give better control. If the ma-



Here Is a Practical Motor-Generator That You Can Improvise from Two Similar Generators. One of Which Is Altered to Run as a Motor





chine is used for a long time, it would be well to set it in a draft or to turn an electric fan on it to prevent overheating. All motors made from generators will heat if they are run continuously; however, they can be kept sufficiently cool with a fan.

Fig. 4 shows another method of connecting a generator to operate as a 110-volt a.c. motor. When this method is used, it will be necessary to loosen the brush holder and move the brushes until the motor operates at the best speed. If the brushes can be moved through a large distance, it may be possible to reverse the motor by changing their position. If all of the brushes in the generator cannot be moved, the connections should be made as in Fig. 5. The wire from the third brush

should be connected to one of the main brushes that gives the best operation. By moving the third brush and touching it to first one and then the other of the main brushes, an adjustment will be found that will give good results with any standard automobile generator. Old model-T Ford generators are plentiful and cheap, and have a brush rigging that can readily be moved to almost any position by simply loosening the three screws on the front of the generator housing. This makes them particularly useful for conversion into motors. Fig. 6 shows another high-speed motor using a toy transformer.

Drinking Vessels for Chickens

Water for small chickens can be kept clean by providing a vessel of the type



Sheet-Metal Cover over Vessel Keeps Fowls from Getting Their Drinking Water Dirty

shown. It is a shallow pan with a tin or sheet-metal cover bent so that the fowls

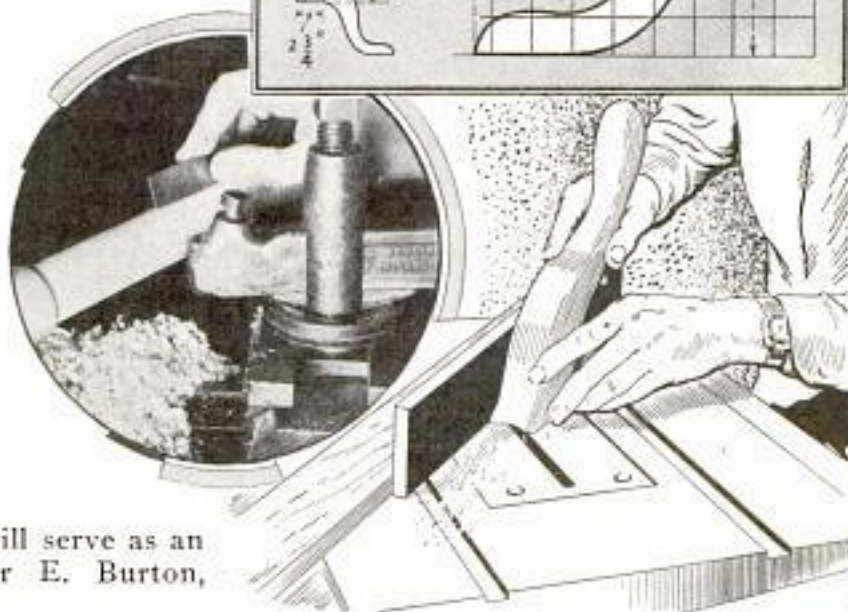
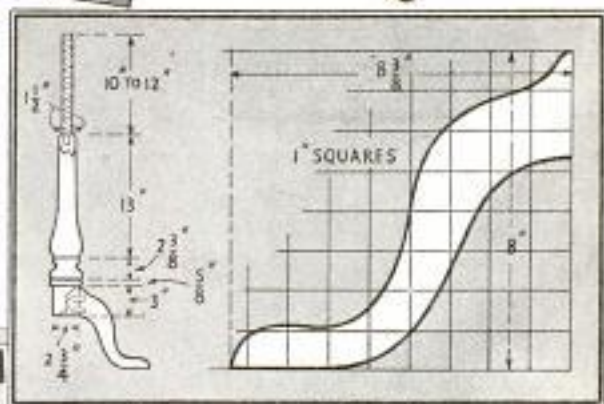
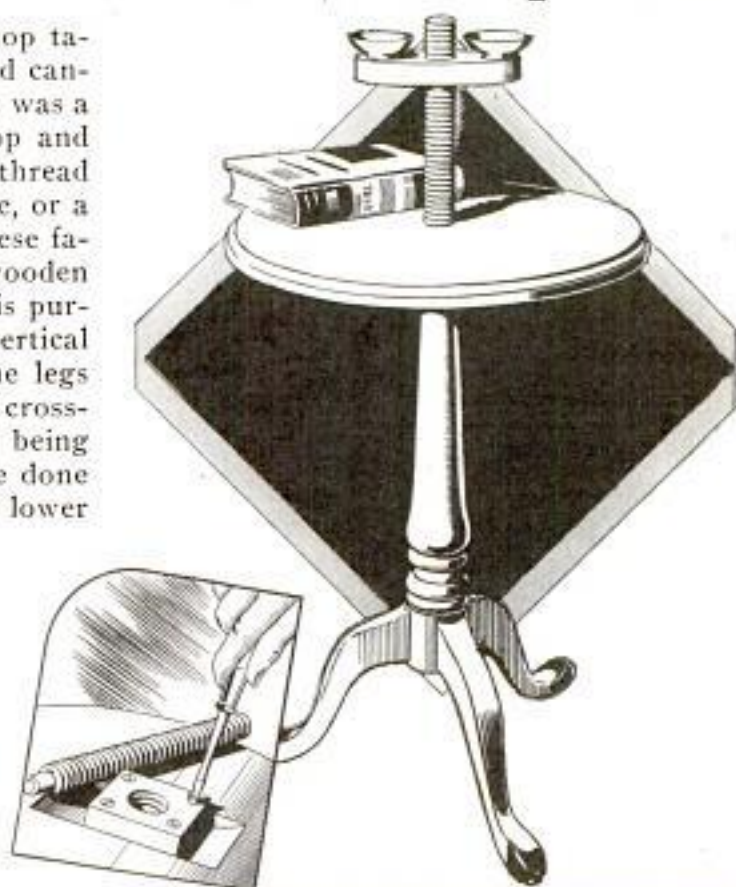
can get to the water at each end. This keeps them from getting into the water with their feet.—Fred J. George, Los Angeles, Calif.

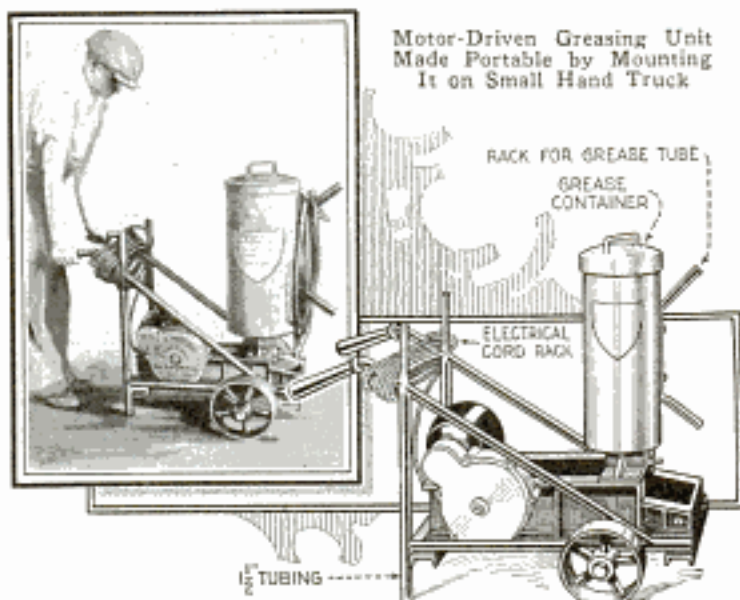
Sawhorses Aid in Clamping Work

I have found that two sawhorses may be used to advantage in holding cabinet-makers' bar clamps in a vertical position while gluing work, by sawing slots in their tops to receive the bars and to prevent them from falling over while being adjusted. The slots are sawed at regular intervals, just deep enough to hold the clamps, and will not interfere with the regular use of the sawhorses.—George A. Smith, Quarryville, Pa.

Modernized Replica of Old Screw-Top Table

Made of hard maple, this screw-top table is a modern adaptation of an old candle table whose outstanding feature was a threaded standard on which the top and candle support were screwed. The thread may be cut on a screw-cutting lathe, or a screw box may be used. Lacking these facilities, you may adapt a threaded wooden bench screw, with nuts to fit, to this purpose, setting it into the end of the vertical post as indicated in the detail. The legs are laid out and cut as shown in the cross-hatched detail, one end of each being curved to fit the post. This can be done on a circular saw as shown in the lower drawing, after which the legs are doweled and glued in place. The top is 17 in. in diameter and is cut from two pieces of 1-in. stock, glued and doweled together. If desired, a molding may be cut around the edge of the top to improve its appearance. A nut, made from a 2 by 2 by 1¼-in. piece of hardwood to fit the threaded part of the post, is next screwed in a recess cut in the underside of the top, the threaded hole aligning with a hole drilled through the center of the top. An oval 7 by 3¼-in. piece, carrying two small ash trays, is drilled and tapped to fit the upper end of the screw, above the table top. After all surfaces have been thoroughly scraped and sanded, apply a coat of stain, followed by a coat of shellac, and finally two applications of wax, with moderate polishing. Fumed or light-oak stain and a coat or two of orange shellac will produce a surface that resembles antique maple. The top and oval piece are adjustable to any height within the length of the threaded piece. If the threaded parts have a tendency to stick, a little melted paraffin applied to the threads with a brush will serve as an effective lubricant.—Walter E. Burton, Akron, Ohio.



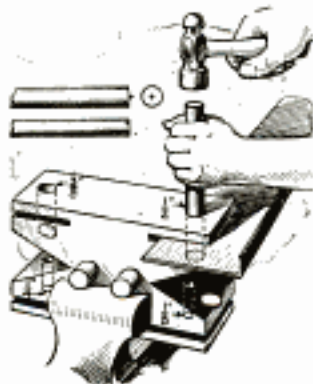


Greasing Unit Made Portable by Mounting on Small Truck

This greasing unit was made portable by the addition of a light frame of $1\frac{1}{2}$ -in. tubing. The grease containers rest on two 18-in. lengths of $1\frac{1}{2}$ by 3-in. channel iron, to which the triangular side frames are welded. The front part of the channel iron rests on the axle, while the rear end is supported by vertical tubes, which extend about 6 in. below the frame and serve as legs. The side tubes extend 1 ft. to the rear of the frame proper, and are cut and welded 6 in. from the end to form handles. Two vertical sections of tubing, welded to the top of the handles, hold the electrical cord in place when it is wrapped about the handles. A rack welded to the front of the grease container holds the grease tube when it is not in use.

Simple Bench Punch for Light Metal

Here is a simple punch for light metal work that is easily made from a block of machine steel. V-notches are cut at the ends of the block and holes of different sizes are drilled through the top and bottom at each corner to meet the notches. Slots are then cut to take the work as shown. In use,



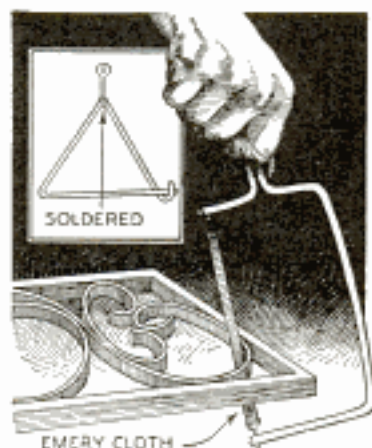
the punch is clamped in a vise and supported by two large pins, which rest on top of the jaws.—H. E. Jones, Los Angeles, Calif.

Making Straight Furrows in Soil with Angle Iron

Straight furrows in seedbeds are easily made with a length of angle iron. To make a furrow, lay the iron on the ground, sharp edge down, and push it into the soil. This makes a V-shaped furrow in which the soil is firmly packed. Holes can be made in the ground for setting out cabbage, tomato and similar plants with a cone-shaped peg. It may be fitted with a leather strap in such a way that it can be fastened to the shoe like an ice creeper. By pressing the peg into the ground with the foot, a hole is made for each plant in succession.—John E. Hyler, Peoria, Ill.

Intricate Work Sanded with Emery Cloth Held in Scroll Saw

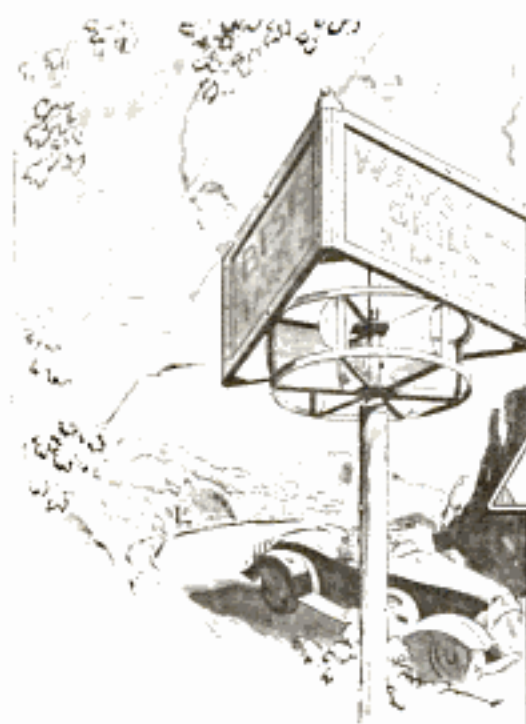
A simple tool for sanding intricate scrollwork can be made by substituting a strip of emery cloth for the blade in a scroll saw. Wire fasteners are made as shown in the detail, to hold the cloth in the saw frame. The cloth should be folded and glued at each end to form a loop for attachment of the fasteners.



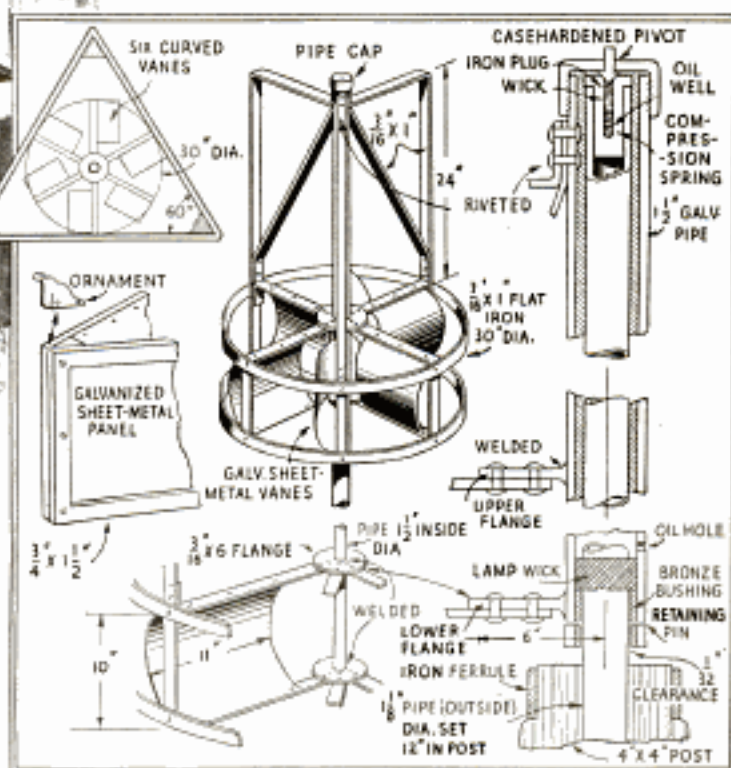
Broken Tap Removed with Acid

When a tap breaks in a hole, it can be loosened with muriatic acid. Fill the hole with the acid and let it remain for several hours. In that time the acid will dissolve the steel around the broken tap so that it becomes loose and can be removed.

Wind-Driven "Turbine" Sign Turns Slowly



Turned by a wind turbine, this sign will attract the attention of passing motorists and help to increase your sales. A length of pipe, set in the top of a post, supports the assembly, the weight of which is carried by a case-hardened pivot pin seated in a countersunk hole in an iron plug which is driven into the end of the support pipe. The pivot pin is held in a pipe cap screwed to a second pipe, as shown in

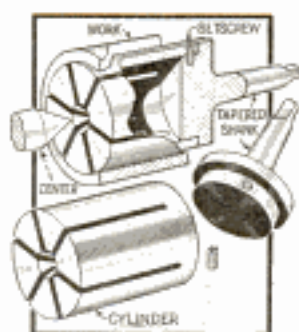


the drawing, the latter being fitted at the lower end with a bronze bushing held in place by a retaining pin. The flat-iron frame members of the turbine are riveted to pipe flanges, which are welded to the sleeve, while the frame members of the sign proper are riveted to the turbine

frame and to the upper end of the sleeve as shown in the drawing.

Expanding Mandrel Holds Cylindrical Work in Lathe

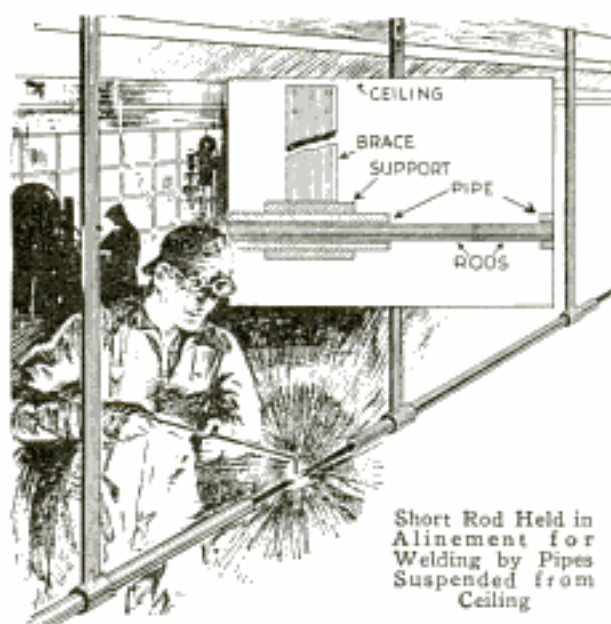
Thin brass, aluminum or steel cylinders can be turned in a lathe by using this mandrel. The expansion part can be made from a piece of heavy tubing with a disk soldered in one end, or from a piece of round stock. It is slotted as shown almost its entire length. The slotted end is countersunk to take the tailstock center, while the other end is fitted with a special-



ly made center, the shank of which is tapered to fit in the headstock. The expansion piece and the headstock center are held together by means of a setscrew. In use, the work is slipped over the expansion piece, the tailstock center of which spreads the expansion piece tightly against the work.—G. A. Luers, Washington, D. C.

Repairing Babbitted Bearings

Flaws in the end of babbitt bearings cast in a wood form may be filled as follows: With a small bit, drill a cavity under the flaw and then wash it out with gasoline. After the work has dried, slip a shaft in the bearing and run babbitt into the flaw. If care is taken, an oil-tight repair will result.



Suspended Pipes Aline Rods for Welding

On a job requiring longer rods than were available, shorter ones were welded together end to end. To do this, two horizontal pipes were suspended from the ceiling with equal lengths of flat iron, short sections of pipe being welded to their lower ends to take the rods and hold them.

Simple Method of Locking Nuts



Nuts are easily locked on bolts so that they will not be loosened by vibration. To do this, saw about half-way through one side of the nut, screw it in position on the bolt,

and then close the saw slot with a hammer. To loosen the nut, simply pry open the slot with a chisel.—Walter H. Barker, Rowan, Iowa.

Copperplating without Electricity or Poisonous Cyanides

A durable copperplate is easily applied to iron, steel, and many other metals, without the use of electricity or poisonous cyanides. Dissolve copper sulphate, 1 oz., in 1 pt. of water. In a separate container, dissolve Rochelle salts, $5\frac{1}{4}$ oz., and lye, 2 oz., in another pint of water. These two solutions are mixed while hot. Clean the work to be plated by boiling it in a solution of scrubbing soda, to which a small

amount of lye has been added. The work should be handled with a wire to avoid finger marks. After the soda dip, rinse the work and immerse it in a dilute solution of acid, made by cautiously pouring $\frac{1}{4}$ lb. each of sulphuric acid and nitric acid into a gallon of water contained in a stoneware crock. Do not pour the water into the acid. The pickled work is then rinsed in clean water and placed in an aluminum pan containing the copperplating solution, moving it around from time to time. If the plating is slow, it may be speeded by heating the solution. The same solution may be used with batteries.

Turnbuckle Used as Tap Wrench

Serviceable tap wrenches are easily made from turnbuckles. Two steel blocks, to slide inside the buckle, are drilled part way through to take the screws. The ends of the latter are grooved to take a pin in each block, the pin being inserted in a hole drilled through the block so that it just breaks through the side of the hole. In this way the blocks are held on the ends of the screws, and are moved back and forth as the screws are turned.



Rounded Point Improves Coil File

If the point of a coil file is rounded, its usefulness for filing the points in the distributor of a car will be increased. The rounded corner can be rested against the top of the distributor under the points so that longer strokes can be taken, and a

smoother job of filing done on the points. The handle end can also be ground to the shape of a screw-driver blade so it can be used for loosening small screws.



"HAPPY LANDINGS" in FOG



By JULIAN LEGGETT

WHEN the transport pilot of tomorrow approaches an airport, the ground dispatcher's radioed warning of "heavy fog" will call for nothing more than flipping a switch to set his landing indicators to work. From any point on the main-radio beacon which he may be following between two cities, he will sweep down a beam to earth through weather so thick that the ground is absolutely invisible.

And when the pilot sets the ship down, he will know it is on the runway toward which he has been flying for hours.

The day of completely "blind" landings is here, thanks to the aeronautics branch of the United States department of commerce. Hundreds of tests have been made, countless times have pilots intrusted their lives to the accuracy of two pointers on a dial, and scores of improvements have been made in transmitting and receiving

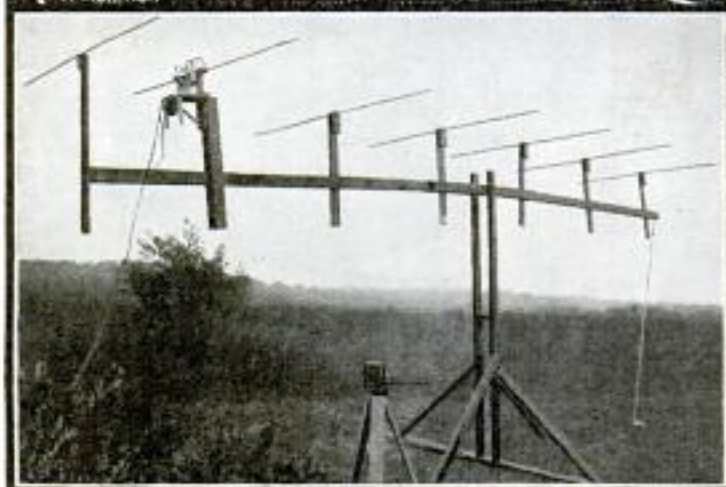
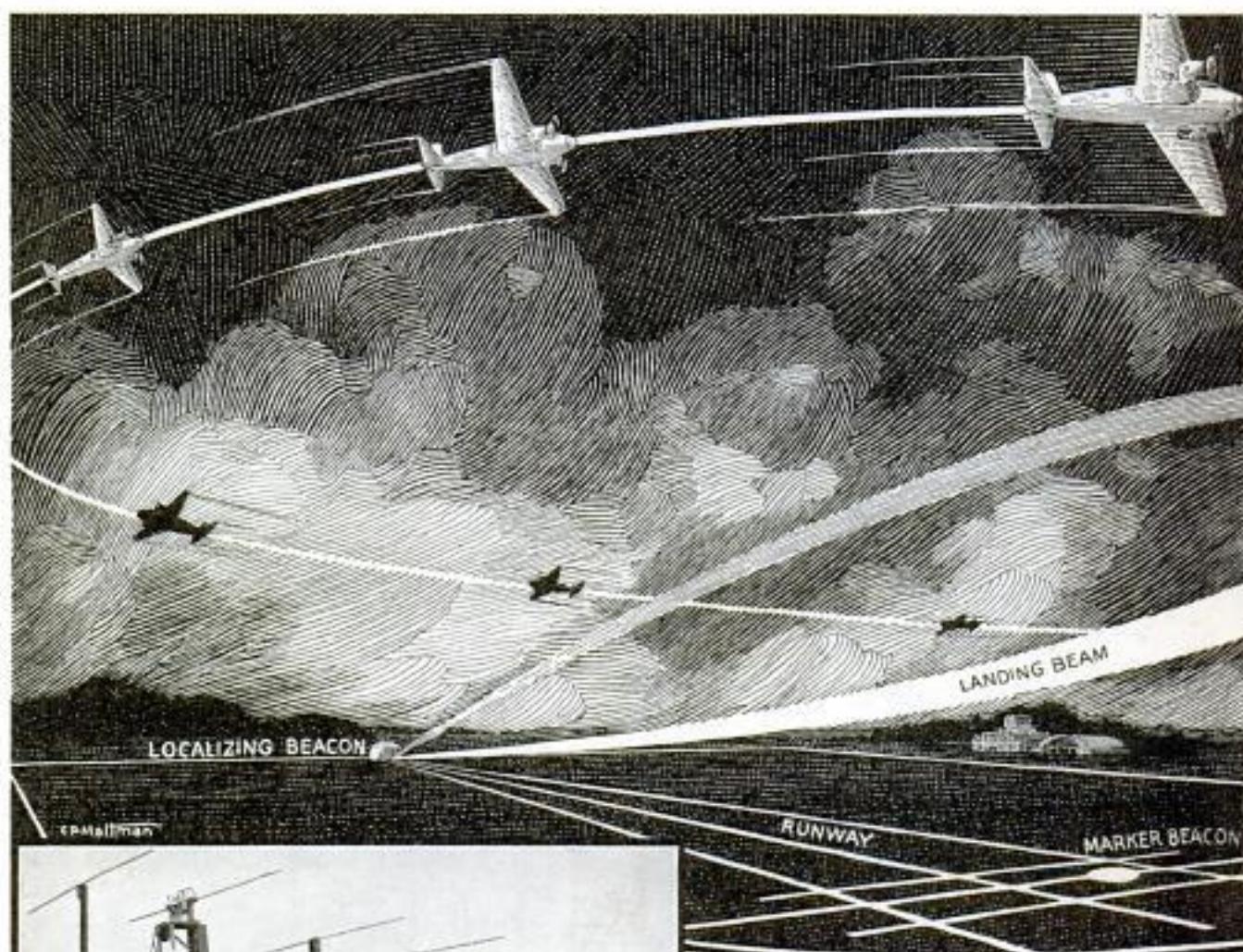
Back of Dial Which Records Runway Beacon and Landing Beam, Guiding the Pilot to Earth

equipment—all to the end that tomorrow's transport may fight its way through any weather and land in safety.

A system of radio-directional guidance has been successfully tested by department of commerce radio engineers and daring airmen. Experimental installations are in use today and soon every transport ship will be fitted with this protection.

In one public test, a pilot flying through a snowstorm located the Newark, N. J., airport, picked up the runway on which he was supposed to land and then followed a curved radio beam to within five feet of the earth.

The pilot, James Kinney, department of commerce flyer, did not actually land the plane because a cross wind was blowing at right angles to the path marked out by



Top, Artist's Conception of How Pilot Follows Radio-Directional System through Darkness or Fog to the Proper Runway; Left, One Type of Antenna Used in Transmitting the Landing Beam

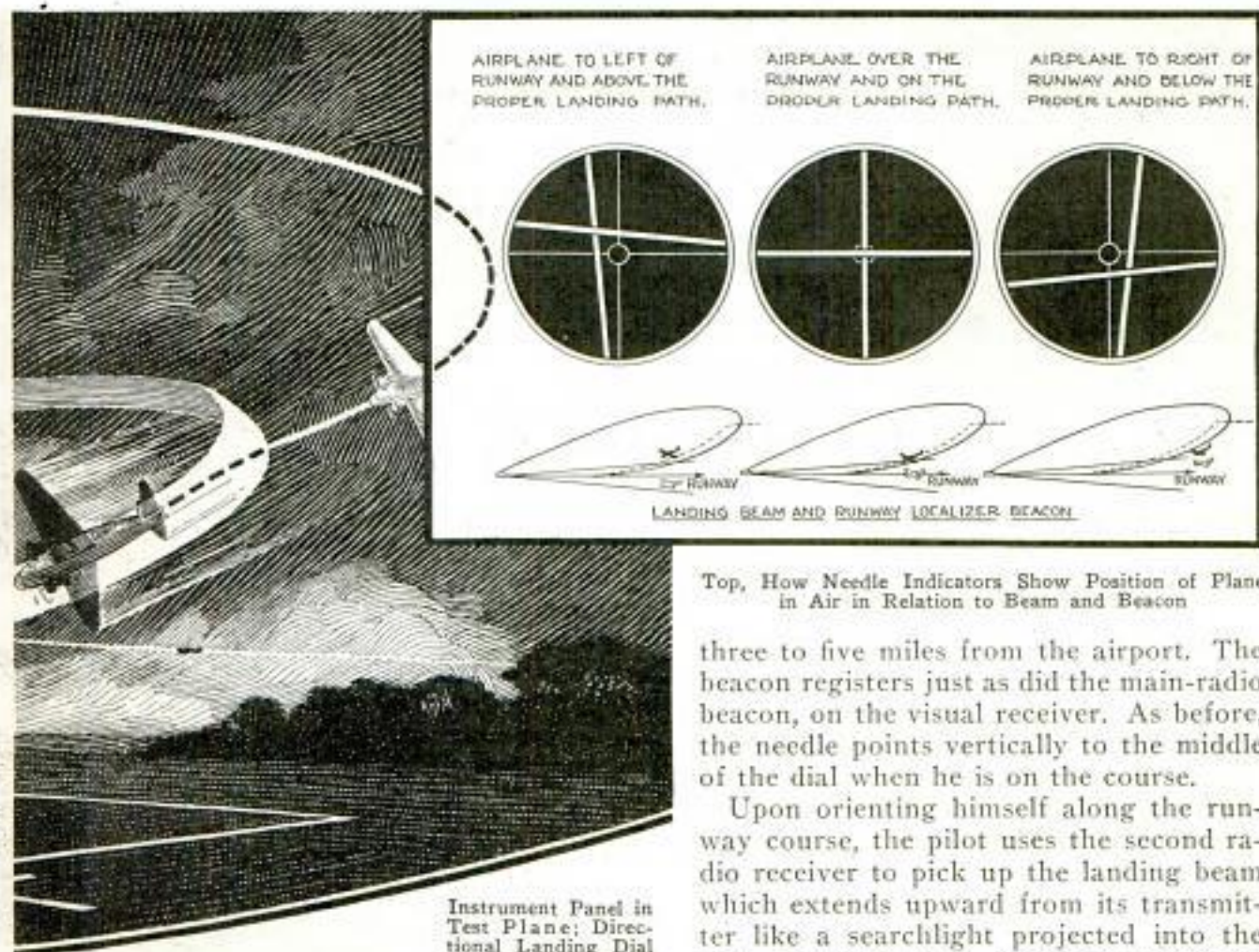
the apparatus installed at Newark. But the ship could have been brought down easily, in spite of the pilot being entirely blind, all visibility shut out by a hood over his cockpit.

In later tests, Pilot Kinney made perfect landings. And in the same way will the transport of tomorrow sweep to its "happy landing," right on schedule.

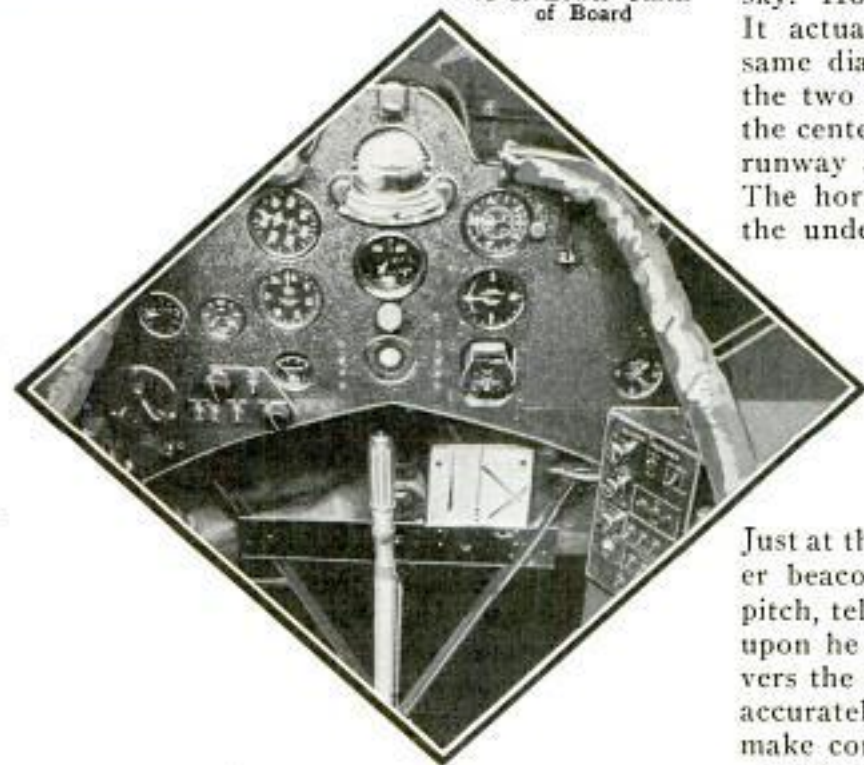
As now constituted, the department's system gives the pilot directions in three dimensions—lateral, longitudinal and vertical. Lateral direction is given by a runway-localizing beacon, longitudinal by

marker beacons and vertical by a landing beam. The pilot watches a dial that records the runway beacon and the landing beam, and listens for marker-beacon signals in his headphones.

Approaching the airport, the pilot keeps on the course by following the main-radio beacon, which registers on a visual receiver on the instrument panel. This receiver, by the way, is necessary in the new landing system, replacing reception of beacon signals in the radiophones. As the pilot passes over the beacon-transmitting station, his receiver stops recording, due to a zone of silence peculiar to such stations, and he knows that he is near the airport. Swinging in a counter-clockwise direction, he retunes his receiver to pick up the runway-localizing signals and switches on a second set for the land-



Instrument Panel in Test Plane; Directional Landing Dial Is at Lower Center of Board



ing beam. Since the runway beacon operates on low power, the pilot will pick it up

Top, How Needle Indicators Show Position of Plane in Air in Relation to Beam and Beacon

three to five miles from the airport. The beacon registers just as did the main-radio beacon, on the visual receiver. As before, the needle points vertically to the middle of the dial when he is on the course.

Upon orienting himself along the runway course, the pilot uses the second radio receiver to pick up the landing beam which extends upward from its transmitter like a searchlight projected into the sky. However, it is ellipsoidal in shape. It actuates a horizontal needle on the same dial with the runway indicator. If the two needles cross at right angles in the center of the dial, the pilot is over the runway and following the landing beam. The horizontal needle directs him along the underside of the landing beam in a sweeping glide, flattened at the end for a proper landing.

Following these invisible guides, the airman approaches the field. About 1,000 feet from the boundary of the airport, the marker beacon sounds a warning buzz in his headphones. Just at the edge of the field, another marker beacon sounds a buzz of a different pitch, telling the pilot to level off. Thereupon he throttles his engine and maneuvers the plane to follow the landing beam accurately to the point where he is to make contact with the ground.

A second later the wheels touch the runway and the big transport is down with its load of passengers.



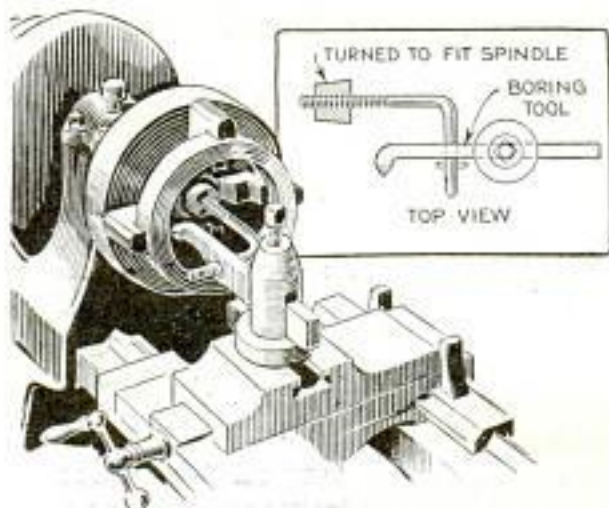
Two Rear-View Mirrors and a Canvas Curtain Aid the Driver in Keeping Children off Rear of Large Truck

Keeping Children off Trucks

To keep children from riding on the rear of his truck, an iceman installed a heavy canvas curtain that pulls down and hooks on the inside of the body. He also put up a pair of mirrors at the front and rear of his truck and alined them so that he could see what was going on behind it by looking into the front mirror.

Threads Cut in Lathe Not Equipped with Lead Screw

Having an internal threading job and no lathe with a lead screw, I used the following device successfully: A nut, having the same pitch thread as that needed in the work, was obtained, and the outside was turned and tapered to fit in the lathe spindle. A bolt with the head removed was bent at right angles and attached to



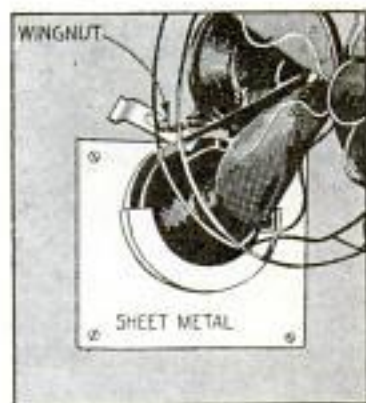
Simple Device Enables Cutting of Threads in Lathe Not Equipped with Lead Screw

the threading tool as shown, so that the threaded end would enter the nut. As the lathe turns, the bolt pulls the carriage in a manner similar to that of a lathe equipped with regular thread-cutting facilities.—Peter L. Budwitz, Meriden, Conn.

Improved Wall Bracket Supports Fan

An electric fan is easily hung on a wall by using this bracket. A semicircular flange is

welded or soldered to a piece of sheet metal, which is in turn screwed to a wooden base for attachment to the wall. In use, the fan base is inserted in the flange and is held at the top edge by a clamp made from a piece of flat iron. In this way, the fan is held safely on the wall, yet can be easily taken down and set on a table or shelf so that it can be used in the regular way.



Spray Cures Strawberry Disease

Botanists of a mid-western agriculture college have found that a solution of water, 60 gal., copper sulphate, 4 lb., and hydrated lime, 6 lb., sprayed on strawberry plants, will cure leaf spot. The disease is a spongy growth, which appears as small brown or purplish marks on the leaves. A smaller quantity of the solution may be made by dissolving hydrated lime, 3 oz., in 1 gal. of water, and copper sulphate, 2 oz., in another gallon of water, after which the two solutions are mixed. Both sides of the leaves should be sprayed. Mowing the patch and burning the leaves after the plants have borne fruit, will aid in minimizing chances of carrying the disease over from one year to the next.

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THE FAKIR'S BASKET TRICK

ILLUSION:

A boy is bound up in a net and thrust into a small basket. Seizing a sword the fakir plunges it into the basket, drawing it out dripping with blood....He jumps up and down as proof that the basket is empty! The boy then steps out of the basket, smiling and unhurt.

EXPLANATION:

The nimble assistant holds a cord that unties the net. For the sword-and-jumping act he curls around the *side* of the basket. He guides the sword past himself and into the opposite wall of the basket. Then the fakir rams it all the way through. The "blood" may be produced by a mechanical device in the sword hilt causing a red liquid to run down the blade.

SOURCE: "Illustrated Magic" by Ottokar Fitcher, translated and edited by J. B. Massey and Fulton Oursler, The Macmillan Company, New York.



KEPT FRESH IN THE WELDED
HUMIDOR PACK



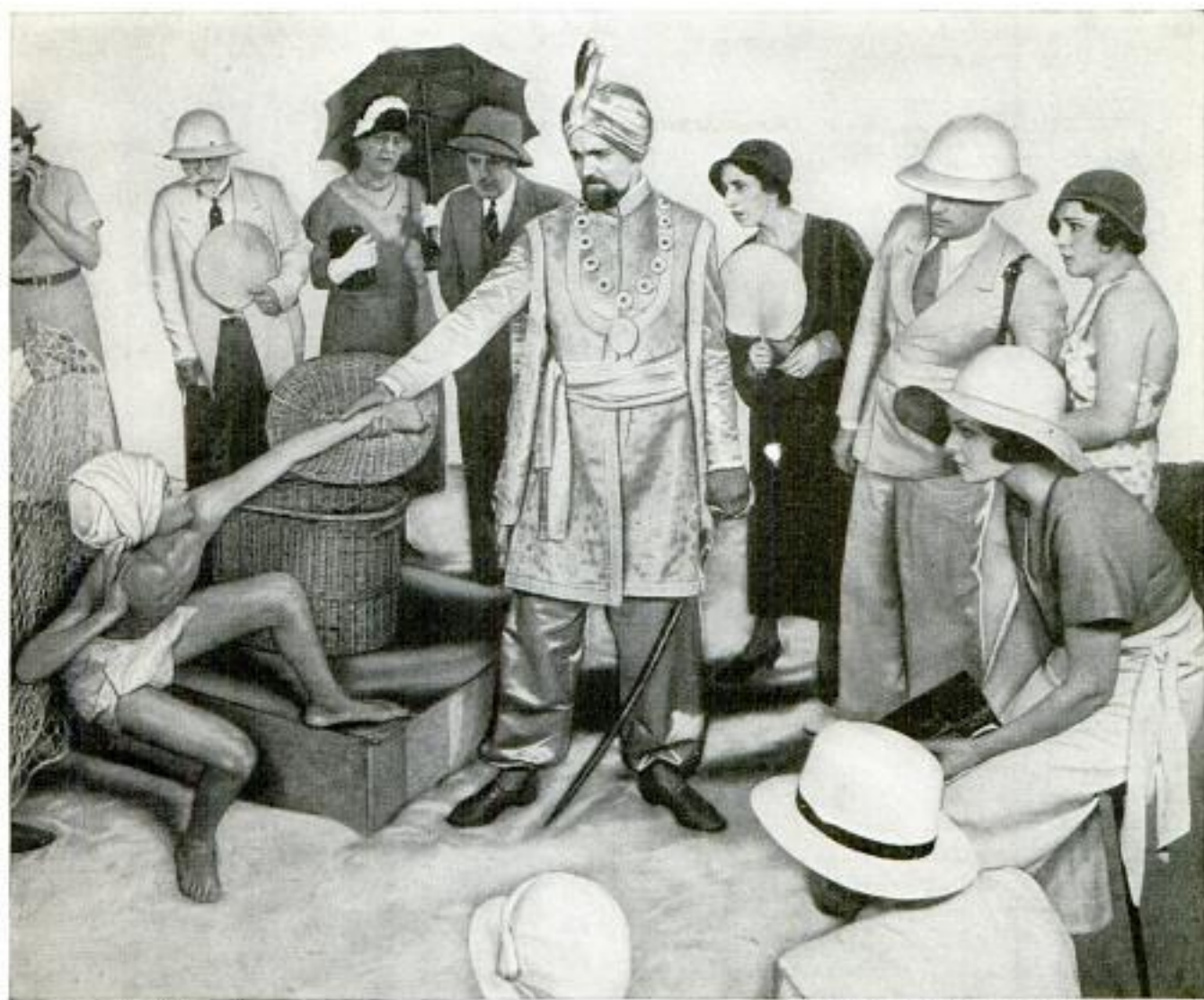
It's fun to be



No tricks...just Costlier Tobaccos

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fooled...it's more fun to know

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EXPLANATION: All cigarette manufacturers use heat treatment. It is a routine process of manufacture. Harsh, raw, inferior tobaccos require considerably more intensive treatment than choice, ripe tobaccos.

But neither the heat treatment nor any other treatment can take the place of good tobacco.

Camels are made from finer, MORE EXPENSIVE tobaccos than any other popular brand.

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LIFE LINES OF THE AIR

(Continued from page 837)

other." Today, the modern parachute does work. Its recognition as a life line of the air by the department of commerce aviation division is so strong that as much attention is paid to a parachute as to the airplane itself.

Parachute riggers today are licensed by the department and are charged with the responsibility of refusing to repack any chute which is not air-worthy.

What is needed now is an absolutely fool-proof parachute that cannot fail to float the passenger to safety. While the modern parachute is a great deal more dependable than it was a decade ago, the elements of fear and judgment in the average person's make-up have not greatly changed.

"In spite of the safety of the modern parachute as a life line of the air as demonstrated thousands of times by forced and exhibition jumps," says Mr. Crane, "the fact that one has to place one's life so unqualifiedly in the hands of a manufactured product may arouse hesitancy in some aerial travelers—and hesitation in a disabled airplane is many times fatal.

"The future of the parachute as an aerial life-saver will be assured to everyone when the means of releasing the chute is controlled entirely by the pilot who, when he senses danger, can automatically drop his passengers by their individual chutes."

At the present time, Mr. Crane does not believe that the parachute large enough to lower an airplane is commercially practical although it can be done. A two thousand dollar parachute to lower a three thousand dollar airplane isn't good business for the airplane operator, he explains.

In the meantime science is going forward in its work of perfecting life lines of the air to an even greater extent. It has made the aerial world overhead a safer place for man, from an altitude of 300 feet to a height as great as it is possible for man to fly. Within that range it has greatly contributed to aerial progress.

Now it is faced with the task of providing safe life lines of the air that will function efficiently from an exceedingly low altitude—the crucial height from fifty to 300 feet, within which range statistics show that many of the present airplane fatalities occur. It is the final step in a task started but a few short years ago.

You're a shrewd Car-Buyer...



but . . . do you know how to safeguard your investment?

Read this bit of bookkeeping from a Kansas driver:

"Herewith a complete cost analysis on my car, which I have just traded in for a 1932 model:

"Time of operation, Nov. 7, 1928 to Mar. 14, 1932 . . . 3 yrs. 4 mos. 1 wk.
Total miles run, 103,000.

Purchase price \$1,115.00
Total operating & upkeep . . . 2,512.76

Selling price (trade-in) . . . \$ 300.00
Net cost 3,327.76
Cost per mi. @ 103,000 3.23c ★

"This car, when turned in, had the original rings, pistons, and connecting rods had never been taken up. Quaker State was used throughout its life."

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Quaker State takes out this light-end material . . . at the refinery. You get 4 quarts motor lubricant per gallon, net. After a hundred miles or so, you still have 4 quarts.

Look for the Quaker State sign . . . you will find it displayed everywhere you go. Most places now supply Quaker State from the patented green-and-white drum . . . double-sealed at the refinery.

QUAKER STATE MOTOR OILS and Superfine Greases

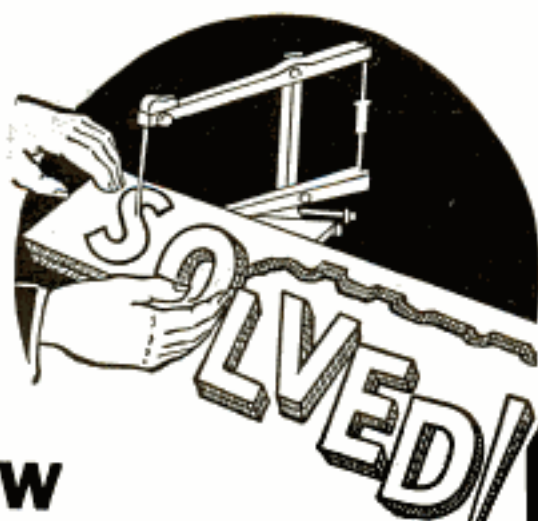
Price now 30c per quart except in several high-freight areas of Rocky Mountain States.

★ National average 6.4c. What's your experience?
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TRICK SHOTS WITH THE ARM OF THE LAW

(Continued from page 885)

a third cuts grooves in the stock to improve the grip, and another files a larger notch in the rear sight. Nearly all of the expert shots have definite prejudices as to the best ammunition.

Here are some tips on pistol shooting by Detective Lieut. Thomas M. Carr, member of the American Olympic pistol team: Stand with your right side toward the target. Raise and fully extend the right arm. Hold the gun steady but not tense, gripping high on the stock so that the barrel is an elongation of the arm. Take a full breath, half-exhale, and hold the rest. Aim and hold the gun as steadily as possible on the bull's-eye. Squeeze the trigger so slowly that you can't tell when the hammer will fall. Never squeeze the trigger suddenly just because the sights seem to be alined on the target.

These suggestions, Carr says, will make a good shooter out of the average person who practices diligently. The practice doesn't need to be expensive, for "dry snapping" with an empty gun is nearly as good as actual shooting. The most important thing is that the trigger must be squeezed slowly and steadily. A good score is not possible otherwise.

STUNTS WITH YOUR CAMERA

(Continued from page 879)

white pavement or on a sandy beach on a sunny day so that light is reflected up into their faces.

Silhouettes are excellent camera fun. Usually preferred are profiles of subjects to be silhouetted. Be sure, then, that the head is in just the right position to outline the features fully.

These shadow pictures can be made by daylight, by electric light, or by flashlight. The basis of silhouette-making by photography is merely to get an abundance of light on the side of the subject away from the camera so that the side toward the camera will be devoid of detail. For this reason light in the room where the camera is placed should be much subdued.

Indoor silhouettes are easily made by using ordinary incandescent electric light,

(Continued to page 126A)



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CARS OUT OF CONTROL

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TRAVELING 40, 50, 60 and 70 . . . mile after mile . . . the heat *inside* the tire carcass becomes terrific. Rubber and fabric begin to separate. A blister starts . . . and grows . . . bigger and bigger, until BANG! A blow-out!

How it prevents blow-outs

To protect you from blow-outs, every new Goodrich Safety Silvertown Tire has the amazing Life-Saver Golden Ply. This new invention resists heat. Rubber and fabric don't separate. Thus blisters don't form. The *cause* of blow-outs is eliminated *before* they start.

At gruelling speeds on the world's fastest track, the new Goodrich Safety Silvertown, with

the Life-Saver Golden Ply, lasted 3 times as long as first quality tires that did not have this feature. These SILVERTOWNS *never* blew.

Scientific tests with leading makes of tires prove that the Goodrich Safety Silvertown has the most skid-resisting tread on the road. Its squeegee drying action gives your car *extra* road-grip.

Remember—this wonderful protection is *free!* Goodrich Safety Silvertowns cost not a single penny more than other standard tires.

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Goodrich Safety Silvertown

Copyright, 1933, The B. F. Goodrich, Rubber Co.

WITH LIFE-SAVER GOLDEN PLY



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"Warm rubber is tough and clings, so the blades are lubricated with water. An inexperienced person will have the knife jerked out of his hand if he doesn't keep the edge straight and firm against the stream of rubber.

"Any expert workmen will tell you to finish an edge of a tool on an *oilstone*. Note the greater quantity and quality of work done, and how much less tired and strained you are."

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DX DOUBLET ANTENNA

(Continued from page 947)

should be of good material, a suitable Lynchite type being shown in the photo above Fig. 1. The transposition insulator blocks can be made from $\frac{3}{16}$ -in. bakelite, as in Fig. 2, or they may be the Lynchite ceramic type, shown in the photo at lower left on page 947. A cage-antenna spreader, of the same material, is shown at the right, which will be described in a coming article. The feeder connections at each side of the center antenna insulator should be well soldered. The receiver end of the feeder line should be inductively coupled to the receiver for best results. This means that the antenna and ground connections

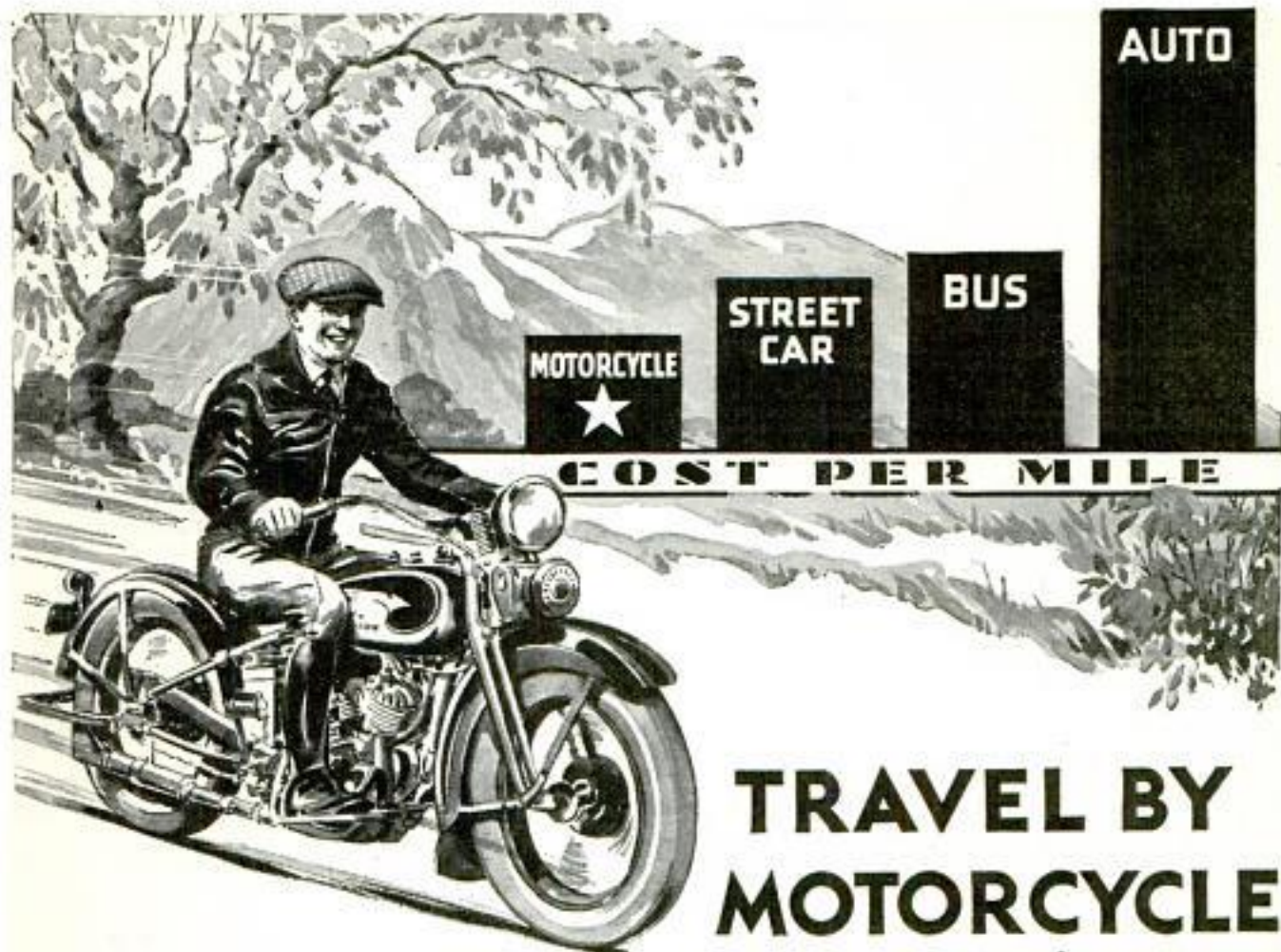
PLUG-IN COIL CHART

All Coils $1\frac{1}{4}$ In. in Diameter—No. 28 D.C.C. Wire			
Wavelength Range	L ₁ Turns	L ₂ Turns	Series or Parallel
14½ to 28 Meters	5	4	Parallel
26 to 40 "	12	5	"
39 to 75 "	18	5	Series
70 to 130 "	28	6	Parallel
130 to 200 "	40	6	Series
180 to 320 "	60	10	"
300 to 600 "	60	10	Parallel

to the primary of the antenna-coupling coil in the receiver are removed and the feeder leads connected directly to the primary coil instead. Or, if the primary-coil leads are difficult to get at, the regular ground and antenna leads to the receiver are removed and the ready-made all-wave antenna coupler, shown at the left of Fig. 6, can be inserted inside the receiver-antenna coupling coil, where it is held by means of fiber spring strips. The leads from the new coupling coil are connected to the feeders, which are automatically balanced. Details for this entire doublet-antenna system are shown in Fig. 7. Resistors R₁ and R₂ are about 400-ohms each, and L is the antenna coil.

If the doublet antenna is to be used just for the broadcast band, and without any special means for tuning, it will be necessary to employ the layout given in Fig. 1. Each half of the doublet is 75 ft. long, but this length is not critical and may be anything from 20 to 150 ft. Coils L₁ and L₂ are wound on a good substantial form of wood or bakelite, 3 in. in diameter. Each coil is wound with 6 turns of No. 20 enameled wire and the finished coils are then

(Continued to page 130A)



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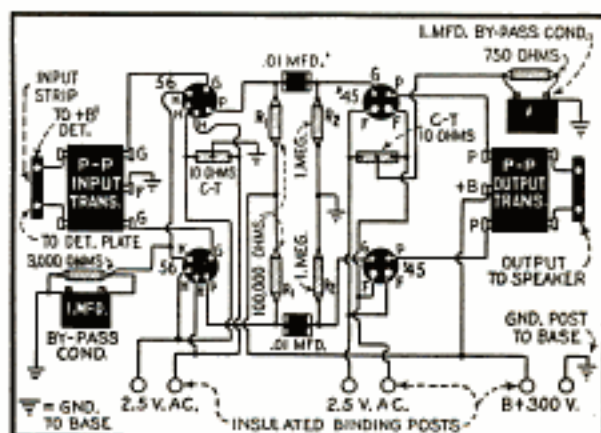


PUSH-PULL AMPLIFIER FOR YOUR OLD RECEIVER

(Continued from page 949)

mounting the front sockets, which may be of the wafer type. These socket terminals, extending below the base, are within easy reach of the second pair of coupling resistors and their .01-mfd. blocking condenser. The binding posts at front are all insulated from the metal base except that for negative-B, which is grounded directly on the base.

Bakelite or hard-rubber mounting strips for the input and output pin jacks are de-



tailed in Fig. 3, which shows an end view of the base. If standard tube sockets are used under the base, instead of the wafer type, it will be necessary to use four spacers cut from round wood dowel stock, as shown in Fig. 4. These will space the sockets below the base so that the terminals will clear. The 750 and 3,000-ohm biasing resistors may be placed under the base, as shown in Fig. 2, or they can be mounted upright on the top of the base, near the front, as shown in the photos. The 10-ohm center-tapped resistors are connected directly across the tube filaments if center-tapped filament windings are not available. Both sets of tubes may be connected to the same 2.5-volt filament winding, but if two filament windings are available, it is better to use one for each pair of tubes, as shown in the wiring diagram.

All parts values are given in this simplified wiring diagram. The push-pull input transformer may be a Thordarson, type T-4304, and the output transformer a T-2903 for a dynamic speaker, or a T-2880 if a magnetic speaker is used.

If you are familiar with the circuit of your receiver, it is an easy matter to locate

(Continued to page 128A)



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See Delta Tools in the Electrical Group at the Century of Progress—Chicago

POWER FROM THE INVISIBLE WORLD

(Continued from page 893)

fection and an electrical machine which will restart a heart which has stopped beating has recently been invented. When the heart beats normally, its rate is set by a small muscle in the oricle, called the "pace-maker." A needle, introduced into the oricle, delivers a series of electrical impulses which imitate the normal rhythm of the heart. The invention has been successfully used on animals.

Life rays have even been used to make the dead speak! The British Museum has phonograph master disks on which, in the old days of horn recording, were registered the voices of famous men, scientists, statesmen and poets now dead. Some time ago, a number of people gathered to hear Lord Tennyson speak from a disk made many years ago. Only a jumble of sound resulted and it was found the disk would have to be played on a phonograph in use at the time it was made, but no such instrument is in existence. Engineers finally solved the problem. Putting the disk on a modern phonograph they played the old cylinder and converted the harsh and unintelligible sounds into minute electric waves, which were then passed through tone filters and transferred to a new master disk.

MYSTERY OF ANIMAL SPEECH

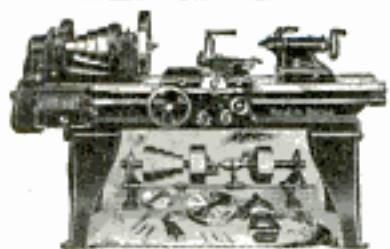
(Continued from page 845)

young. Migratory birds seem to have a separate 'follow me' call to preserve order in the flocks when they are on the wing.

"Most animals understand the languages of the other species. A warning cry uttered by a robin, for example, is understood and acted upon by all the other birds that hear it. The larger animals also pay attention. Blue jays are one of the few birds that are able to imitate the calls of other species. One of the favorite tricks of the blue jay is to imitate a hawk when it wishes to scare other birds away from the vicinity."

Hunters have learned to call many animals into gun range, but they don't always attract the animals they desire. Imitating the bleat of a lost fawn, for instance, is just as likely to attract a bear as a buck or doe.

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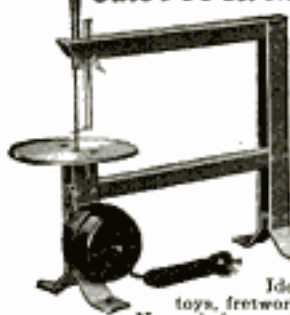


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STUNTS WITH YOUR CAMERA

(Continued from page 118A)

or better still photoflash or photoflood lamps. Three or four regular household sixty-watt lamps placed back of a sheet, which has been stretched tightly across the opening between two rooms, will sufficiently illuminate the field so that a short exposure—say five or ten seconds, with the camera's largest "stop" opening—will bring results. With two photoflood lamps the exposure could be as short as half a second. It is well to use some sort of reflector, such as a sheet of cardboard or a piece of tin, back of the lamp so that no light is lost. Place the subject close to the sheet, on the camera side.

Satisfactory silhouettes can be made indoors by daylight, using a window or a glass-paneled door as the background against which the figure will be silhouetted. All light in the room should be cut off, or much subdued, except that which comes through the door or window in front of which the subject is posed.

The way to adventure farthest without leaving home with the kodak is through table-top photography. Desire a bear-hunting scene in the Rockies to show to friends? A table-top, a small toy bear, some sand, a small stone, two or three small weeds, and a photograph of Rocky Mountain scenery clipped from a magazine will pay the fare to a realistic view of a fierce encounter in a desolate mountain setting.

Simply set up the scenery photograph in the background, build the foreground terrain out of the sand, stone and weeds, put the bear in position, and take the picture with a "diffusion portrait attachment" that can be bought for less than a dollar to fit over the camera's lens.

Practically all of the tricks outlined by this article—and thousands more—can be done either indoors or out-of-doors. The new types of fast, color-sensitive film, used in conjunction with new types of photographic light bulbs, have made photography indoors virtually as simple as the traditional outdoor picture-taking—whether the camera is behaving conventionally or misbehaving after the manner of a magician's pack of cards.

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PUSH-PULL AMPLIFIER FOR YOUR OLD RECEIVER

(Continued from page 122A)

the detector-plate lead. If the set is a superheterodyne, the second detector is that which feeds into the first audio stage. The present detector-plate lead is removed, and a new one is brought to the input terminal of the amplifier unit. The detector B-positive lead is then located and diverted to the other post on the input strip. The positive high-voltage lead goes to the B-positive post on the amplifier. The B-negative lead is taken to the grounded post on the base. In most cases this will simply be a lead extended from the receiving-set chassis as a common ground. The audio stages in the receiver are, of course, no longer used. If the power unit does not supply the necessary high voltage, a separate power pack or a B-eliminator could be used. If separate filament transformers are required for the amplifier, these may be mounted at any convenient point inside the console and the primaries cut into the receiver 110-volt a.c. supply line, so as to be controlled by the line switch on the receiver. A simpler method would be to connect the filament-transformer primary leads in parallel with the supply line, leave the set switch turned on and plug the supply line in and out at the wall socket.

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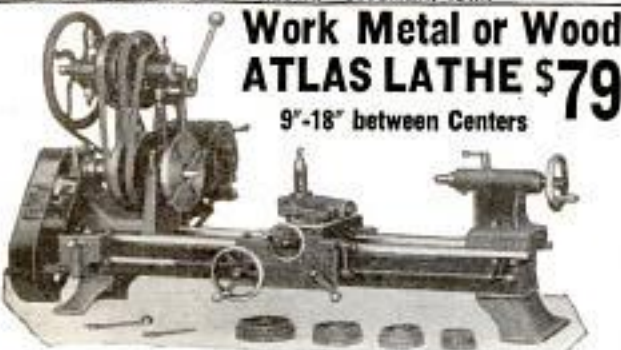
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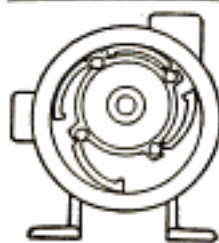


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DX DOUBLET ANTENNA

(Continued from page 120A)

impregnated with hard paraffin to make them weatherproof.

For a tuned all-wave doublet, the coils are omitted, as shown in Fig. 1A. The fundamental wavelength of a 100-ft. antenna flat top is approximately 130 meters. If the feeder line can be made 140-ft. long, this will add about 180 meters, making a total of 310 meters which, when loaded with a coil and variable condenser as detailed in Figs. 3, 4 and 5, will tune to 550 meters, the highest broadcast wave. With the coils for the wavelengths below 200 meters, the antenna system starts to work on its harmonics until, at about 14.5 meters, it is working on the twenty-first harmonic. The action of tuning the feeders is double, as it creates an acceptor circuit for the desired wavelength, rejecting all others, and also makes the fundamental slide up and down the feeder length in the manner of a trombone. The layout in Fig. 5, mounted as shown in Fig. 5A, permits the doublet antenna to be coupled directly to the grid of the first tube in any standard short-wave receiver, converter or regular broadcast set. Although it adds a tuning control, it is well worth while. The regular antenna-coupling coil in the receiver is no longer used, and the antenna and ground are, of course, removed. The plug-in coil-winding data are given in the chart, and Figs. 3 and 4 show the necessary plug-in coil connections to provide for parallel or series tuning as specified in this chart.

Where a doublet antenna favorable to a specific frequency is preferred, as in the case of amateurs working in the 20, 40 and 80-meter bands, the non-directional doublet of the vertical type, shown in Fig. 6, may be employed. The antenna consists of two brass rods or heavy wires supported on stand-off insulators. For the 20-meters, these are both 17 ft. long, and for 40 meters, 33 ft. This vertical type would not be practical for the 80-meter band, as each rod would have to be 62 ft. long. In this case, it would be necessary to go back to the horizontal type.

Test meters should be placed where they are protected from shocks and jars when not in use; acid fumes and moisture affect all sensitive meters.

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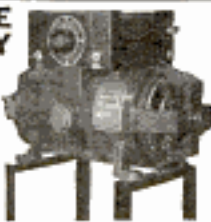
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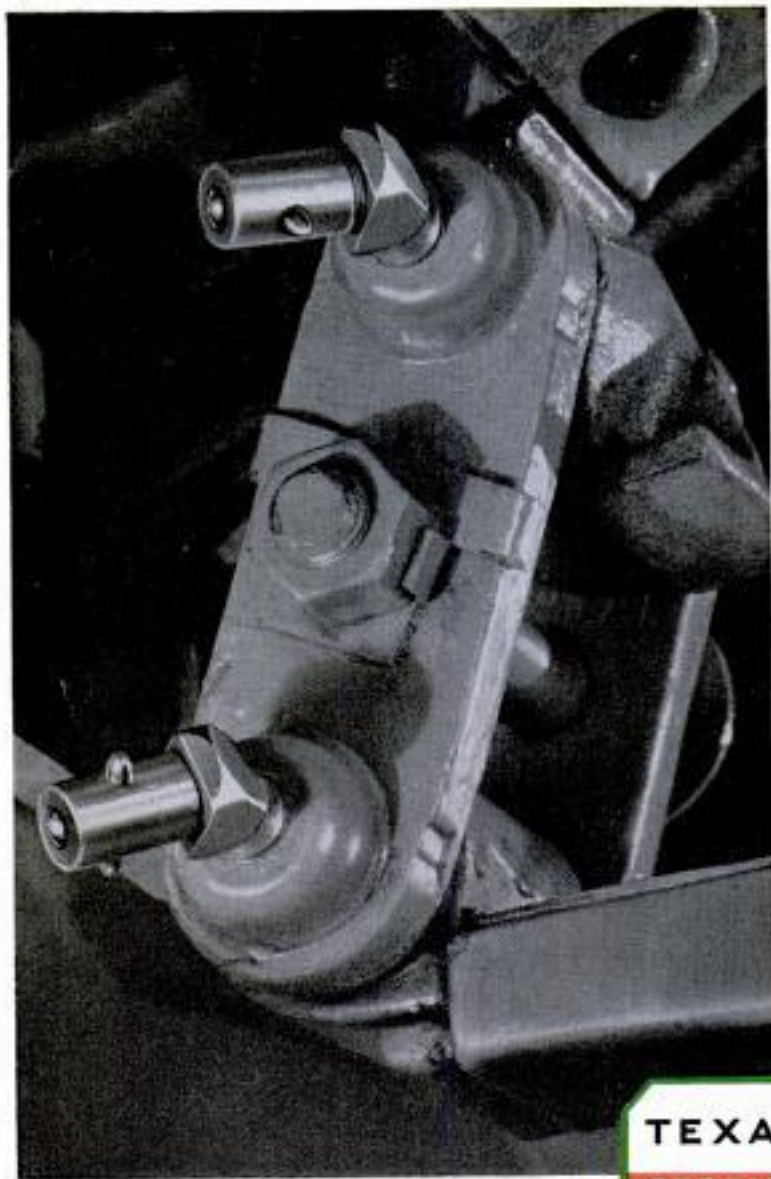
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