

SOUND GHOSTS HAUNT SPEED FLYERS

# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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SEE PAGE 655





# Step into your OWN BARBER SHOP!

LIFT the lid of this box and you open a private tonsorial parlor. All the professional deftness and skill of the expert barber are *shaped* in Gem's modern design.

Gem's straight, slant-top frame presses the slack out of every flesh fold—tightens the skin like a barber's stretching fingers, and brings all bristles against the blade at right angles and *root* level. Gem Micromatic moves with the master barber's swift, tugless, *face-length* glide.

Only Gem can give such a shave, because Gem controls the patent on Dual Alignment,

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Gem Safety Razor Corp.,  
Dept. PM 21, Brooklyn, N. Y.



Enclosed find 25c for complete trial Gem set with a single- and a double-edge blade and the same gold-plated Gem Micromatic Razor now featured in regular \$1.00 outfits.

Print Name.....

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which makes it absolutely safe to use the sharpest blades on earth.

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take-down parts, guaranteed unbreakable and fool-proof. Gold-plated sets—one dollar *anywhere*. Or a trial kit with Gem's latest razor and two blades, for your quarter and our coupon.



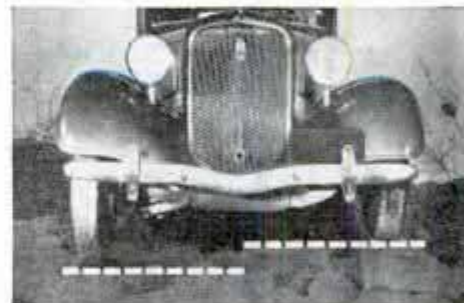
## GEM MICROMATIC Razor and Blades



# "I Got All 4 for My Money!"



## Plymouth is the only Low-priced Car with all these Vital Features



Plymouth's individually sprung front wheels "step" over bumps!



Floating Power engine mountings put an end to all motor vibration.



Plymouth's safety-steel body lasts longer — insures greater security!



Hydraulic brakes give you quicker stops — and fewer relining jobs.

**W**HY PAY MORE for less than Plymouth offers? Get the facts about "All Three!"

Do you want Individual Wheel Springing . . . the feature that ends nose bounce and road fight? You can get it in a Plymouth . . . and at a lower price.

Do you want quick-stopping, self-equalizing Hydraulic Brakes? Plymouth, alone, of the three lead-

ing low-priced cars, gives you this vital safety feature.

Again, check the low-priced cars! Plymouth alone gives you both the protection of a Safety-Steel Body plus the vibrationless comfort of Floating Power engine mountings.

Maybe you didn't know that there was such a big difference in low-priced cars this year. It will pay you to look at "All Three."



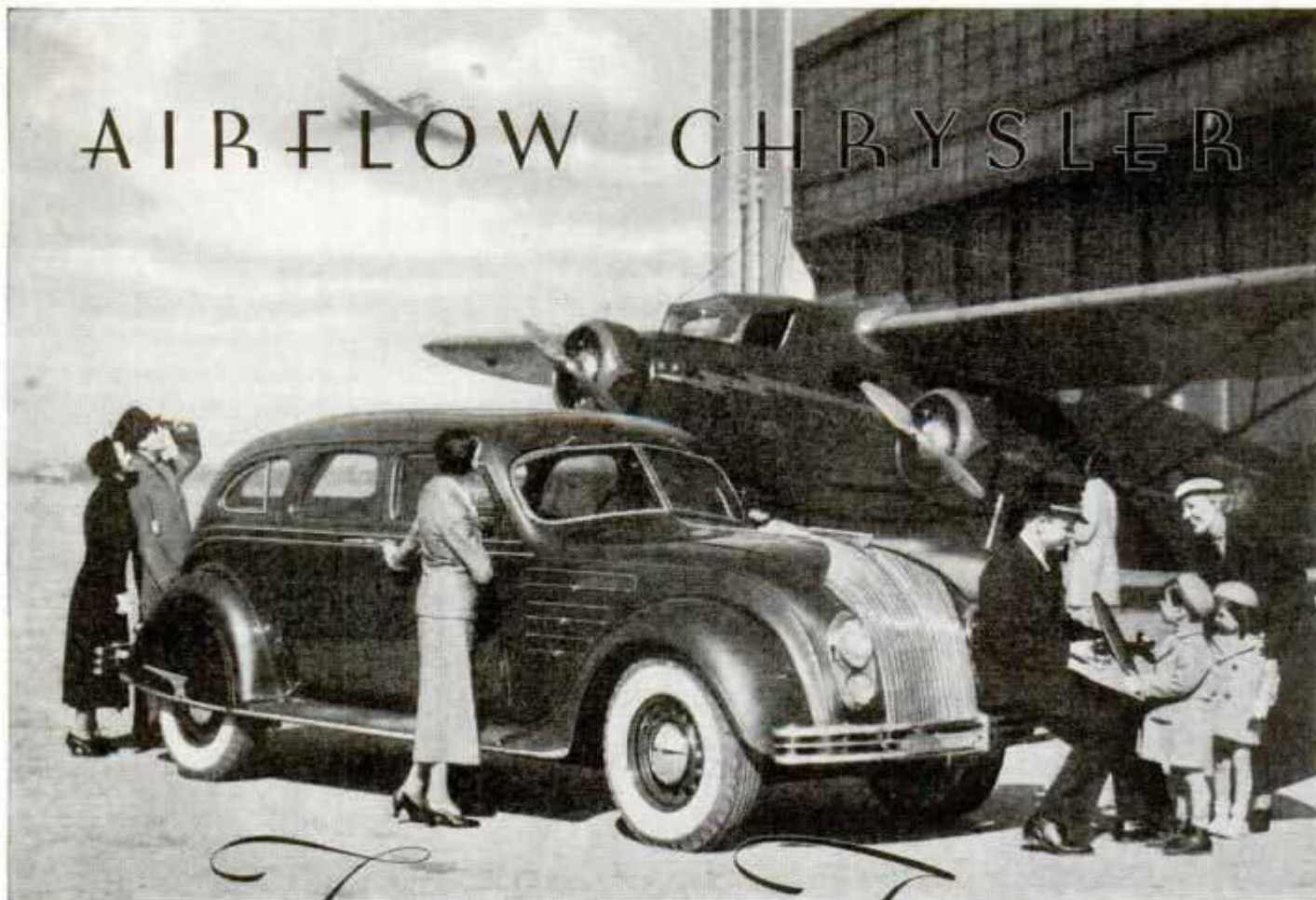
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LOW-PRICED CAR**

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*Fashioned by Function!*

## THE AIRFLOW CHRYSLER IS THE WORLD'S FIRST BUILT-FOR-THE-PURPOSE CAR

**I**N 1925, average cars had 50 horsepower and made 60 miles per hour. In 1933, they had 100 horsepower, but could travel only 80.

Chrysler engineers discovered by wind tunnel tests that air resistance on the front of a car increases as the square of the speed. At 50 miles an hour, it is four times, not two times, as great as at 25 miles an hour.

The power required increases as the *cube* of the speed. On a 1933 car, to overcome air resistance alone at 40 miles per hour, required 7 of the available horsepower. To overcome the wind at 80 required 56 horsepower.

Like streamlined airplanes and trains, the Airflow\* Chrysler is designed to cleave the air with the highest

possible efficiency. It is likewise designed to give the smoothest ride over the ground.

Write for the booklet which describes the romantic development of the Floating Ride. Address Chrysler Sales Corporation, 12208 Jefferson Avenue, Detroit, Michigan.



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### *Four Distinguished 1934 Models*

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*All Prices F. O. B. Factory, Detroit*

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# Popular Mechanics Magazine

200 E. Ontario Street, Chicago, U. S. A.

H. H. WINDSOR, Founder

H. H. WINDSOR, Jr., Editor and Publisher

May, 1934

Vol. 61, No. 5

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## The New World's Fair

**M**ILLIONS of dollars are being spent to turn A Century of Progress into a truly great international exposition. The midway is being replaced by foreign villages which will be inhabited by strange peoples. In the next issue you will find sixteen pages in color describing all of the latest wonders you will find at the Fair this summer. Improvements resulting from the experience of last year will make the exposition a far more effective spectacle.

## Next Month

**T**HE adventurers of this century are the archæologists. They are the recorders of what happened to the mightiest of nations dug up in the jungles of forgotten centuries. Theirs is the thrill of finding the new, the strange and the startling. Read about their work in the June issue.

## The Coming Car

**T**HROUGH harnessing a portion of what now goes to waste, the automobile industry expects within the next few years to be able to provide the motorist with now undreamed of comforts and conveniences. In garrets and factories, inventors are now busy harnessing unused momentum, vacuum and electricity for your use. Read all about this intensive search in the next issue.

## Money in Hobbies

**D**ID you ever think that anyone could make money with a home movie camera? In the next issue you will find the true story of a wall-paper salesman who built himself a business as an amateur film editor and title-builder—a new way of making money by combining business and pleasure.

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# EVERY CAR NEEDS SIMONIZ



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"Although my 7 year old Chrysler Imperial has also been driven over 55,000 miles, Simoniz keeps it looking like a new car"—says Mr. A. F. Snyder, 43 East Ohio Street, Chicago, Illinois.

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Millions of motorists will tell you that your car can't be expected to stay beautiful unless it is Simonized.

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Motorists Wise  
**SIMONIZ**  
KEEPS CARS BEAUTIFUL





# DOES YOUR CAR TAKE A BEATING?

Do you treat 'er rough? Keep your foot on the floor board for long stretches? Give her lots of wear and tear? Then you'll be interested in this letter from R. W. Werckle of St. Louis:

*"I drive a Buick roadster. Total mileage now 130,000. Five batteries, eight sets of tires have gone, and my third speedometer is breathing its last. However, pistons and bearings in the motor have never been changed. Quaker State has had everything to do with that... I never use anything else."*

You can't get results like this with ordinary oil. For every gallon contains one quart, more or less, of weak, non-lubricating material called "light-end" oil. This breaks down, vanishes, causes faulty lubrication.

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When you give the crankcase its next drain and refill, try Quaker State... the choice of experienced drivers.

Look for the Quaker State sign. Most places will service your car from 1-quart and 5-quart refinery-sealed cans. Or, get Quaker State in the patented, double-sealed drum.

Quaker State Oil Refining Company, Oil City, Pennsylvania.

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*"First choice of Experience"*

Retail Price . . . 34¢ plus 1¢ Federal Tax: 35¢ per quart

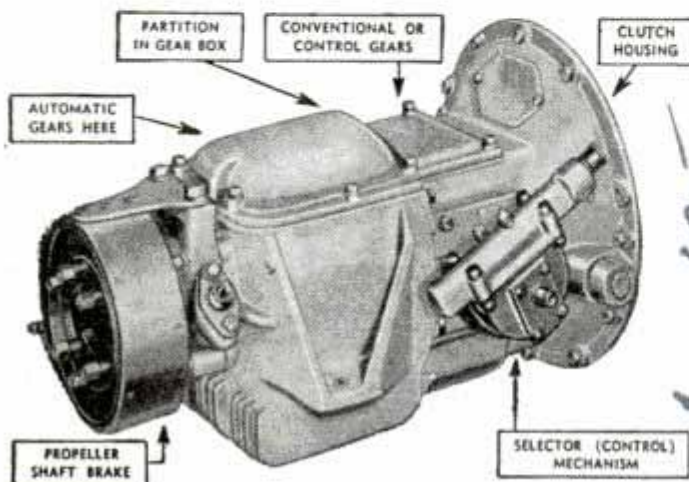
This One



1UYP-97L-UESW



# THIS AMAZING INVENTION ABOLISHES GEARSHIFTING BY HAND IN THE NEW 1934 REO



● The automatic transmission has been a subject of intensive research in the automobile industry for years.

It was the major ambition of many an eminent engineer to be the first to abolish gearshifting by hand.

In view of this general eagerness to arrive at a solution, the industry was astounded when, on May 1, 1933, the Reo Motor Car Co., announced its SELF-SHIFTER.

That it was fully as important as had been anticipated is now evident from the astonishing deluge of praise from the thousands who have bought it. Simple, practical and foolproof in every respect, the SELF-SHIFTER makes driving fully a third easier—and infinitely more enjoyable and safer.

How was it developed? What is the underlying principal of the car without a gearshift lever? These and many other questions that suggest themselves to those interested in scientific achievement, will be answered gladly by our Research Division. The fact that you may or may not be in the market for a car is of secondary importance. Your request for information will receive our prompt attention.

See the New Reo Flying Cloud for 1934—A Brilliant Triumph in Aerodynamic Streamlining and Long Life Construction.

Standard Reo passenger car prices are now as low as \$795 at factory, plus tax.



WRITE today for copy of our interesting booklet, PROOF, containing enthusiastic comments of Reo owners. Also detailed explanation of Self-Shifter operation.

## REO MOTOR CAR COMPANY LANSING, MICHIGAN

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# Promoted—when others were fired!

## The Story of LaSalle Student Shaw



"Since the War I have been book-keeper at \$35 a week. Married, with one baby girl, I found it harder every month to make ends meet. I was desperate!



"Last winter my wife brought me a LaSalle ad on Higher Accounting—showing how I could study in spare time for the job ahead. I investigated, and enrolled January 23. Just in time! For—



"Suddenly, orders came through to cut the force. I watched seven men in my department get the bad news and leave. Then the office boy tapped me, said I was 'next.' My heart sank as I followed him to the Front Office.



"Smiling, the boss handed me a letter. It was from LaSalle to him, announcing my enrollment and my good work on the first lesson. 'We are keeping you,' he said, 'because we like your spirit.'



"Naturally, I had more work to do, with the smaller force, but my training made it easier. I learned quickly, and when the Department Manager left, the boss moved me up.



"I have since been promoted twice; and now carry the title of Chief Accountant—at a salary several times greater. The future looks bright. If it had not been for LaSalle, I would be looking for a job right now."

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**hail**  
**TO THE**  
**UNCONQUERABLES!**

EDUCATION in itself is not a guarantee of success. But it is a vital contribution. There are many other factors, one of the most important of which is the individual's true estimate of himself. The man who is satisfied with what is generally referred to as "college education" and is content with this background, or the man who, deprived of college training accepts the handicap as the will of fate, lacks the urge that inspires men to great heights in their chosen careers.

These are not the unconquerables! *The unconquerables fight . . . ignore odds . . . prepare themselves for the next offensive!* The college graduate realizes that he must

constantly modernize his training in order to make the most of his start. The less fortunate man, in his spare moments, must acquire the advantage of this start and then follow the same trail of keeping his knowledge modernized.

For 43 years the International Correspondence Schools have been the citadel of training for unconquerables all over the world. Modern and thorough, hundreds of courses invite the consideration of men who have that old fighting instinct. Write for our interesting booklet, "The Business of Building Men." It is free. International Correspondence Schools, Scranton, Penna.



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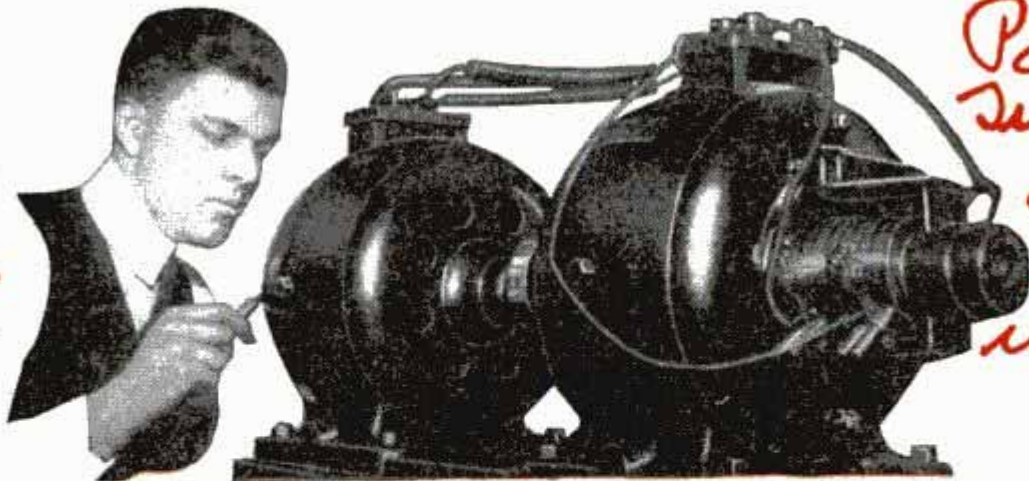
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| <input type="checkbox"/> Contractor and Builder                              | <input type="checkbox"/> Steam Engineer  |
| <input type="checkbox"/> Structural Draftsman                                | <input type="checkbox"/> Steam Electric Engineer                               |
| <input type="checkbox"/> Structural Engineer                                 | <input type="checkbox"/> Civil Engineer  |
| <input type="checkbox"/> Electrical Engineer                                 | <input type="checkbox"/> Surveying and Mapping                                 |
| <input type="checkbox"/> Electric Lighting                                   | <input type="checkbox"/> Refrigeration   |
| <input type="checkbox"/> Welding, Electric and Gas                           | <input type="checkbox"/> R. R. Locomotives <input type="checkbox"/> Air Brakes |
| <input type="checkbox"/> Reading Shop Blueprints                             | <input type="checkbox"/> R. R. Section Foreman                                 |
| <input type="checkbox"/> Telegraph Engineer                                  | <input type="checkbox"/> R. R. Bridge and Building Foreman                     |
| <input type="checkbox"/> Telephone Work                                      | <input type="checkbox"/> R. R. Signaller                                       |
| <input type="checkbox"/> Mechanical Engineer                                 | <input type="checkbox"/> Highway Engineering                                   |
| <input type="checkbox"/> Mechanical Draftsman                                | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy           |
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| <input type="checkbox"/> Inventing and Patenting                             | <input type="checkbox"/> Navigation <input type="checkbox"/> Boilermaker       |
| <input type="checkbox"/> Patternmaker  | <input type="checkbox"/> Textile Overseer or Supt.                             |
| <input type="checkbox"/> Heat Treatment of Metals                            | <input type="checkbox"/> Cotton Manufacturing                                  |
| <input type="checkbox"/> Bridge Engineer                                     | <input type="checkbox"/> Woolen Manufacturing                                  |
| <input type="checkbox"/> Bridge and Building Foreman                         | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing    |
| <input type="checkbox"/> Gas Engines <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> Poultry Farming <input type="checkbox"/> Radio        |
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| <input type="checkbox"/> Office Management                                 | <input type="checkbox"/> Lettering Show Cards                          |                                |
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| <input type="checkbox"/> Traffic Management                                | <input type="checkbox"/> Civil Service                                 |                                |
| <input type="checkbox"/> Accountancy and C.P.A. Coaching                   | <input type="checkbox"/> Mail Carrier                                  |                                |
| <input type="checkbox"/> Bookkeeping                                       | <input type="checkbox"/> Railway Mail Clerk                            |                                |
| <input type="checkbox"/> Secretarial Work                                  | <input type="checkbox"/> Grade School Subjects                         |                                |
| <input type="checkbox"/> Cost Accountant                                   | <input type="checkbox"/> High School Subjects                          |                                |
| <input type="checkbox"/> Salesmanship <input type="checkbox"/> Advertising | <input type="checkbox"/> College Preparatory                           |                                |
| <input type="checkbox"/> Service Station Salesmanship                      | <input type="checkbox"/> First Year College                            |                                |
| <input type="checkbox"/> Wallpaper Decorating Salesmanship                 | <input type="checkbox"/> Illustrating <input type="checkbox"/> Spanish |                                |
|  | <input type="checkbox"/> Cartooning <input type="checkbox"/> French    |                                |
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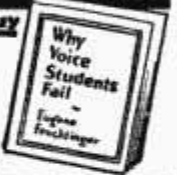
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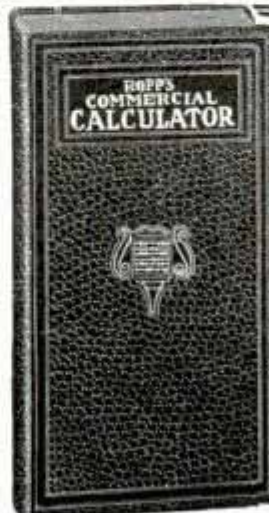
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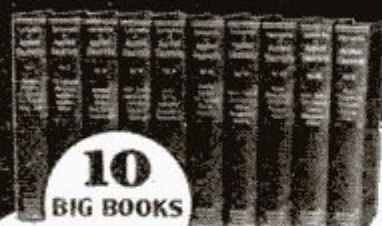
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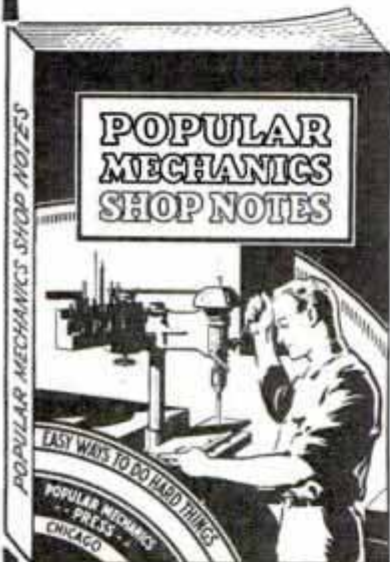
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**ARTIFICIAL** Marble making puts you in a paying business all your own. Easy, pleasant, profitable work. Interesting particulars free. Marblene Institute, 201 N. Wells, Room 600-C, Chicago.

**OPERATE** A collection-adjustment bureau. Opportunity everywhere. Easily learned. Write Cole Associates, Tower, Syracuse, New York.

**CASH** Income daily resilvering mirrors at home. Replating autoparts, tableware, etc. Outfit furnished. Write Sprinkle, Plater, 127, Marlon, Ind.

**WE** Will finance national sales for preferably, but not necessarily, an established manufacturer having a product suitable for direct selling to homes. Product must be outstanding, low-priced, wide margin. No food or drug products. Box 83, Doremus & Company, 43 Broad Street, New York.

**POPCORN** Machines, gasoline, electric, Northsides Co., 2117 - Harding, Des Moines, Iowa.

**HANDY** Men—Earn money home repairing vacuum cleaners. Capital unnecessary. Write L. Stafford, Makanda, Ill.

**BIG** Profit selling automobile necessity. Not mechanical. Territory. Brozol, 2761 Edgehill Ave., New York City.

**TYPEWRITER** Ribbons, 50c. Wonderful sideline. Unbeatable proposition. Twentieth Century Laboratories, Shamokin, Pa.

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

**MAKE** Products yourself. Tested formulas—catalog free. Grinstead Laboratory, Edwardsville, Ill.

**ENORMOUS** Profits—Making glass name plates. "Sunlector" daylight signs. Write. Rapido Service, Edwardsville, Ill.

**\$5 TO \$50** Weekly. Grow fancy "White Queen" mushrooms in cellar or shed. Free mushroom book tells how. American Mushroom Industries, Ltd., Dept. 606, Toronto, Ontario.

**CASH** For spare or full time. No canvassing. Curtiss, Bergman, Ark.

**OLD** Spark plugs worth 3c each. Large company rebuilds. Thousands wanted. Work yourself or hire unemployed. Instructions, how to collect, sell, ship, 25c coin. Hammond Co., Paulding, Ohio.

**"SCHEMER** Magazine." Alliance, Ohio, prints schemes, ideas, business starters, formulas; big winners—\$10,000 to \$50,000 reported. 36th year. Subscribe now! Six

**PLATE** Auto fixtures, tableware, resilver mirrors. Guaranteed outfits. Metalcraft, 515 Louderman Bldg., St. Louis, Mo.

**MAKE** Money at home full or part time. Big pay. Experience not necessary. Write Easy Platers, Dept. 6, Drawer Y, Chicago.

**ANYONE** Can make artistic, accurate weather barometers. Costs five cents, sells for a dollar. Barometer and how to make 25c. Tellweather, 7331F Linwood, Detroit, Michigan.

**SWAP!** Buy! Sell! Anything!! Anywhere!!! Six months subscription and 25 word advertisement once—20c. Traders-Exchange, Brookings, S. Dak.

**BARGAINS**—Paint spray outfit, gasoline engine drive. Terms—trial. Helmick Paint Spray, Exchange, M543, Troy, Ohio.

**PATENT** Your idea. Other men have read and profited by our free book, "How to Obtain a Patent." Fully explains many interesting points to inventors and illustrates important mechanical and electrical principles. With book we also send free "Record of Invention" form. Prompt service, reasonable fees, deferred payments, thirty-five years experience. Avoid risk of delay. Write immediately to: Victor J. Evans & Co., Registered Patent Attorneys, 650-E Victor Building, Washington, D. C.

**BOYS**—Like outdoor sports? Get details today spare time opportunity. Both fun and profit. F. E. Hopps, Ypsilanti, Mich.

**MAKE** Simple automatic bookmark. Sell through agents. Trial offer of 6 completed automatic bookmarks for \$1. Faas Laboratory, South Orange, N. J.

**MAKE** Money by mail. Details for stamp. Mailway System, 1418 Peden, Houston, Tex.

**ARTIFICIAL** Marble formulas. 3 for 25c. Johnson, 4520 Christiana, Chicago.

**DISTRIBUTOR**: Protected territory. New invention. Piston rings. Saves reboring. Requires \$100 to \$500 for merchandise. Steelcraft National Distributors, 5716 Cass Ave., Detroit, Mich.

**STEADY** Income from drained auto oil. Instructions, 20c. International Agency, Cincinnati.

**DOLLARS** in "Fixit" service. We instruct. Particulars. Houlgate's "Fixit" Service, Station C, Pasadena, Calif.

**INVENT** Something! Sell your inventions before patenting. Write W. T. Greene, 963 Barrister Building, Washington, D. C.

**FREE** Books mail order business. Stamp appreciated. Dolsen Herald, 36 Liberty Street, Brooklyn, N. Y.

**SUCCEED** With your products. Formulas, Processes. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

**MAKE** Artificial marble, glazed tiles, no polishing, uncanny. Tabletops, bookends, floors, whetstones. Inexpensive, hard, enamel wood. Rubber moulds for exquisite novelties. Secret cement processes. Colorful samples free. (So. Calif. business reserved.) John A. Payn, 945 Grande Vista Avenue, Los Angeles, Calif.

**MAIL** Order business is your opportunity. Many began small, now earn thousands yearly. No personal contact. Boundless opportunities. Have had over 30 years experience; will help you succeed. Send 25c for valuable booklets, none free. B. Breniser, 257 South 21st, Philadelphia.

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

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

**BIG** Profits. Sell watches, fountain pens, razor blades, tooth paste, novelties, etc. Wholesale catalog 10c. Hagn Co., 223 Madison, Chicago.

**BIG** Money at home plating auto parts, reflectors, mirrors, chandeliers; by new method; experience unnecessary. Outfits furnished. Gunmetal Co., Ave. N, Decatur, Ill.

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

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

**SELL** By mail. Books, novelties. Bargains! Large profits. Particulars free. B. Eifco, 525 S. Dearborn, Chicago.

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

**LEARN** Account collecting. Good income, quick results. Interesting booklet free. National Collectors Association, Newark, Ohio.

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

**HOME** Industries, Irvington, Nebr. Bi-monthly, 32 pages, three months 10c.

#### FORMULAS AND TRADE SECRETS

**GENUINE** Pretzel formula, \$3.00; Klor-Ox, \$1.50; full directions; no machinery required. W. C. Wagner, 646 N. Madison, Stockton, Calif.

**GUARANTEED** Superior carbon-removing liquid for automobile engines. Formulas with instructions for making and using, one dollar. Patrick O'Neill, 326 W. 47 St., New York City.

**ANALYSIS** Insures correct formulas for fast selling articles. Manufacturing information. Associated Chemists, Indianapolis, Indiana.

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

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

**FREE** 1933-34 Formula catalog. Wonderful bargains. Western Chemical, Salem, Oregon.

**LATEST** Formulas for almost any preparation. Particulars. Chemist, 830 South 41st, Omaha, Nebr.

**FORMULAS**, Business plans. Literature free. Belfort, 4042 No. Keeler, Chicago.

**MAKE** Automobile specialties. Tremendous profits. 41 guaranteed formulas including tire repair dough, radiator solderseal, etc. All \$5.00. Chemical Research Laboratories, Ossining, N. Y.

**20 FORMULAS**, 20c. Latest, best—why pay more? International Agency, Cincinnati.

**MONEYMAKING** Formulas—Plans, Catalog free. Bestovall, 4047P North Whipple, Chicago.

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

**SUCCEED** With your products. Formulas, Processes. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

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

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

#### CHEMISTRY

**CHEMISTS'** Slide rule, editorial Jan. issue, saves time solving equations, gives molecular weights, shows formulas, 391 compounds. Durable precision instrument. Postpaid, complete instructions, two dollars. MWC Company, 508 Andrus Bldg., Minneapolis, Minn.

**"SCIENCECRAFT"** Magazine now free! See ad on page 127A.

**AMERICAN** Amateur Chemists Society, founded 1931. Journal free. Lansing, Mich.

**HANDBOOK** For chemical experimenters (revised 1934) illustrated, 50c. Experiment booklet 15c. Catalogue 10c. General Chemical Co., Reading, Penna.

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

#### AGENTS WANTED

**SILVERING** Mirrors; profitable. Formula, process 50c. Westway, Box 774, Great Falls, Mont.

**BIG** Profits! Repeats! Amazing new 100 watt electric bulb. Guaranteed 1500 burning hours. Territories open. Sample 50c (refundable). Hanover, Dept. 5E, 32 Union Square, New York City.

**SELL** Race horse, the new game. Sensational. Different. Over 100% profit. Sample offer: Gameboard, horses, instructions, postpaid 50c. Regal Games, Postoffice Box 687, St. Louis, Mo.

**DISTRIBUTORS**. Represent manufacturer. Sell Protecto Self Sealing Medicated Bandage. Big profit. 8811 Olivet St., Detroit, Michigan.

**MEN** Or women! Look after local coffee and tea route. Call on homes with 300 highest quality necessities. Spare or full time. No investment. Permanent. Pay starts immediately. Bright future. Blair Labora-



300% PROFIT Selling mystery gas lighter. Retail 25c. Costs you \$1.00 per dozen. Sample 10c. Square Deal Co., Desk PM-4, Bradford, Pa.

AGENTS—Clever invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample 5c. H. Marul Company, Tribune Bldg., New York, N. Y.

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

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

NEW Transparent day and night signs, 8"x14", cost 4c, retail 25c. Sample free! Clean up now. Lowy, 8 West Broadway, New York.

STRANGE Ironing cord. Prevent scorching. Saves electricity. Abolishes kinks, snarls. Approved by Good Housekeeping. For telephones also. 140% profit. Samples furnished. Neverknot, Dept. 5-A, 4503 Ravenswood, Chicago.

BIG Money transferring gold initials on automobiles, furniture, luggage, etc. No experience needed. \$3.00 complete outfit nets you \$200.00. Free samples. Gold Letter Supply House, Box 791, Tyler, Tex.

ELECTRIC Pencil, new, writes on almost everything in rich gold, silver, colors. Big seller, big commission. Send \$1.50 for sample outfit or send stamp for samples of work. R. E. Stafford, 2434 N. Meridian St., Indianapolis.

SALES Kit free. Write for our free offer and catalog of household deals, cosmetics, extracts, etc. Make big money selling your friends and neighbors. Clyde Collins Chemical Co., Dept. PM-4, Memphis, Tenn.

ADDING Pencil. Adds mechanically; new invention; sells on sight; agents wanted immediately. Add-O-Graph Co., Dept. 25, Saltillo, Miss.

SELL Changeable signs to stores for \$1.00 each. Cost you 25c in dozen lots. Particulars free. National Sign System, St. Louis, Missouri.

300% PROFIT. Buy direct from manufacturer, moth exterminators, deodorants, insecticides, specialties, polishing cloths approved by Good Housekeeping, pure food flavors. Free samples. Shef Mfg. Co., Union City, N. J.

SW RADIOS. 2-3-4 Tubes. 65% profit. Southern, 3907A Main, Kansas City, Mo.

AGENTS 100% Profit demonstrating the new "Automatic Service Fork." Every housewife a prospect. Sample 25c. Hutchison Mfg. Co., Nashville, Tenn.

AGENTS: Make 600% profit selling cleaner, polish, shampoo, vanilla, tonic laxative, spot remover, etc. Your name on labels. Free sample. Standard Chemical, Dept. E-54, Dayton, Ohio.

SALESMEN'S "Ideal" all-profit repeater. J. Home, 3949 Metropolitan, Chicago.

JUST Out! Silt-A-Pack cigarette case. Holds original package. Prevents crushed cigarettes, tobacco spilling. Cigarette smokers, stores buy on sight. Sample 25c. Money back guarantee. Barton Mfg. Co., A-201 N. Wells, Chicago.

BE Your own boss. Sell our money making specialties. For free sample write Amco, 5610A Washington Blvd., Milwaukee.

1934 SENSATION! 250% Profit! New safety-razor blade hone. 100 shaves from one blade. Sample 25c. Particulars free. Atlas, F-855 East 87th, Chicago.

100% PROFIT In the mystery cigar lighter. No flint or friction. What makes it light? No wind can blow it out. Retail 50c. Sample and sales plan 25c. New Method Company, Desk PM-17, New Method Bldg., Bradford, Pa.

DISTRIBUTORS: Represent manufacturer. Sell Latex—self-sealing bandage that breathes. Great demonstrator. Lowest prices. 400% profit. Good repeater. Exclusive territory. Neway, 3815-BT Harrison, Chicago.

NEW Type, small, compact. Never fails. \$1 delivered. Ask for circular. Agents wanted. Sentinel Alarm Company, Elkhart, Indiana.

MAKE Products yourself—Tested formulas. Catalog free. Grinstead Laboratory, Edwardsville, Ill.

DISTRIBUTORS—Agents—Cleaning up with new sensational patented tool. Write for money making proposition. Wonder Manufacturing Company, Dept. 6, Fort Worth, Texas.

300% PROFIT Selling new "20-in-1" kitchen utensil. Retail 25c. Costs you \$1.00 a dozen. Sample 10c. New Method Co., P.M.M. 17, Bradford, Pa.

REGULAR Income; home or office. Men, women, get facts! McArthur Co., Desk 5, Butte, Mont.

QUIT Peddling. Hire agents yourself. Be a distributor. Particulars free. Mission, No. 55, 2328 W. Pico, Los Angeles, Calif.

EVERYBODY Needs coffee, tea, spices! I'll start you with a regular weekly route supplying these necessities to steady consumers. Routes pay up to \$37.50 a week immediately. Write Albert Mills, Route Mgr., 4544 Monmouth, Cincinnati, O.

SPARE Time and ambition brings added income my method. Hetzel, 802 Garden, Hartford, Conn.

BEAUTIFUL Imported oriental slippers. Big sellers. Send 35c for sample pair and proposition. American Specialty Company, 424 South Broadway, Los Angeles, Calif.

A REAL Opportunity. Agents and dealers wanted to sell the latest in radio receivers for house and automobile. Many new inventions and new features. Write today and place your feet on the road to success. Orr Mfg. Co., 6919 Wayne Ave., Chicago, Ill.

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

AGENTS—Six purpose kitchen tool, cost dime, sells 25c. Baums Specialties, Kansas City, Mo.

SELL Made to measure raincoats. Outfit free. Goodyear Rainwear, 18 West 22nd, New York.

MAKE—Sell your own goods! Formula catalog free. Kemico, 32, Parkridge, Ill.

FLAVORING Extracts—Bottle yourself! Labels, 600% profitmaking repeaters! Free offer! Thomas Manufacturing, Indianapolis, Indiana.

SELF-THREADING Needle packages, sample 10c. Wm. Oglesby, Vandalia, Ill.

SELL Fibre flowers—Women buy on sight. Sample corsage 25 cts. Flowerart, Shreveport, La.

GET into the independent class applying gold initials to automobiles, travelling equipment, houses, etc. Easy to get work. Nearly all profit. Experience unnecessary. We teach you, supply everything. All or part time. A. Buck Initial Supply, 177 State St., Boston.

METALLIC Liquid—Repairs metal, wood, everything without heat. 200% profit. Sample work free. Bestco, 5009-PM Irving Park, Chicago.

FREE Literature describing many business plans. Belfort, 4042 No. Keeler, Chicago.

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

MAKE Money. Collect \$5, keep \$4. Two quick selling dollar per month "hard times" life policies. Write the Fidelity Mutual Benefit Association, Rockford, Ill.

AGENTS: Build additional income; 14 legitimate business enterprises; spare, full time; home, office; proved money-makers. Free booklet. Charlton, Box 6310, West Market St., Philadelphia, Pa.

AGENTS—Distributors. Sell moth cakes, pads, crystals, bowlizers. People buy millions. Fastest selling line in America. New items. Big profits. Patterson E-Co., 3705 University, Des Moines, Iowa.

NEW \$30.00 Value radio given in "free deal." Earn up to \$100.00 weekly. New sales plan. Meritone Mfg. Co., 3857 North Hamilton, Chicago.

COSMETICS Put up under your label. Samples 20c each. Asco, Box 1081, Washington, D. C.

SELLS Like hot cakes. Big profits. New laundry soapflakes. Perfumes clothes lasting when washing. Territory given. Sunset Laboratories, Lynbrook, N. Y.

SUCCEED With your products. Formulas, Processes. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

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

MAKE More money selling shirts, ties, underwear, dresses, hosiery, raincoats, coveralls, pants, uniforms, play suits. Outfit free. Nimrod Company, Department 8, 4922-28 Lincoln Avenue, Chicago.

AGENTS: Smash go prices! Santos coffee 12c lb. 4-oz. vanilla 8½c. \$1.00 size tonic 14c. Razor blades 5 for 8½c. 100 sticks chewing gum 12c. 150 other bargains. Experience unnecessary. Write, Carnation Co., P.O. St. Louis, Mo.

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

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

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

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

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 Derraw St., Brooklyn, N. Y.

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

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

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

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

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

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1956W Broad, Richmond, Va.

SENSATIONAL New invention makes gas automatically for cooking, heating and lighting. Easily installed. Low cost operation. Safe, dependable, noiseless. Millions of homes need gas. Big profits for aggressive distributors. Write quick. L. M. Hangel, President, 800 North Clark Street, Chicago.

#### HIGH-GRADE SALESMEN WANTED

MEN Wanted by world-wide industry—Apply by letter only giving age, experience, references. Industry and reliability main qualifications. Man selected will become authorized Rawleigh dealer on our capital and taught how to establish a profitable business in over 200 farm and home necessities. Man with auto preferred to introduce products and travel steadily. Write immediately. Rawleigh's, Dept. E-N-PPM, Freenort, Ill.

BIG Money in tire patches. Sell new auto tire patch to service stations, garages, etc. Tiger-Grip patches guaranteed 10,000 miles. \$75 weekly for salesmen or distributors. Protected territory. Write Economy Rubber Co., 690 Burkhardt, Dayton, Ohio.

ABSOLUTELY New, Mystic power pellets. Makes ducks, fish, etc., swim for hours. Advertising premium or toy. Los Angeles store sold 1000 in 3 days. Sell stores \$5.00 profit, advertisers \$50. Send 25c for two samples and sales plan. Mystic Power, Huntington Park, Calif.

AUTO Accessory salesmen: Complete line fastest sellers. Prices dealers want to pay. Big commission daily. Exclusive territory. National, 1916-V Wentworth, Chicago.

BUSINESS Stationery: Largest line. Highest quality. Quickest delivery. Biggest commissions. Free copyrighted cuts. Experience unnecessary. Outfit free. Lionel, 311 South Hamilton, Dept. 29, Chicago.

SELL Motor Master spark plugs—your cost 18c. Light bulbs, ignition points. Big profits. Steady repeat business. Motor Master Co., 1601 So. Michigan, Chicago.

"THE Third Hand" holds your flashlight. Puts your light where you want it, leaving both hands free. A good salesman's proposition. Sample 60c. McMasters, Groton, N. Y.

STICK-ON Window sign letters. 500% profit. Free samples. Metallic Co., 438-A N. Clark, Chicago.

MAKE Big money steady. High grade coveralls, shopcoats, pants, shirts, summer suits. Advertising on back. Fast sellers. Free outfit. Strong Mfg. Co., 901 West Jackson, Dept. N-5, Chicago.

DISTRIBUTORS—Home and foreign for Soderite cold flowing solder. Attractive proposition to reliable parties. Soderite, Van West, Ohio.



**SELL \$1500 Mutual Life protection for \$7.00; non-medical; ages 5 to 75; all races. Write Family Mutual Benefit Association, Heard Bldg., Phoenix, Ariz.**

**THIS is new—Just out. Big money selling house to house. K. C. Clothes Line Tightener Co., Manufacturers' Exchange, Kansas City, Mo.**

**FLOOR-SERVICE Salesmen needed. Wax floors, rent machines, sell paste, liquid and self-polishing wax. On market ten years. Durham Company, 9 School Street, Des Moines, Iowa.**

**BUILD Steady Income! \$5.00 profit on \$6.00 sale. Up to \$25.00 daily easy. New plan protection at cost. All ages. No medical examinations. Not insurance. Experience unnecessary. Outfit free. Provident Aid Society, Dept. M-520, South Bend, Ind.**

**MANUFACTURER Guaranteed shoes—30 years in business, wants salesman. Ready cash daily. No experience required. Sales outfit free. Write Mason Shoe Manufacturing Co., Dept. G26, Chippewa Falls, Wis.**

**MARVELOUS New toy. Big 10c seller. 300% profit. Write immediately. Sample free. Send dime for packing, mailing. General Supply Company, Dept. 618-PM, Piqua, Ohio.**

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

**AT Last! \$20.00 day opportunity. Life and accident protection at cost. Not insurance. Benefits up to \$1,000.00. Experience unnecessary. Hurry! National Aid Society, Dept. B, Springfield, Ill.**

**MAKE More money selling shirts, ties, underwear, dresses, hosiery, raincoats, coveralls, pants, uniforms, playsuits. Outfit free. Nimrod Company, Department 65, 4922-28 Lincoln Avenue, Chicago.**

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

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

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

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

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

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

#### HELP WANTED

**AMAZINGLY Simple spare-tire business. Big profits. No risk. Your home is your office. If you want to make real money, here's your chance. Full details free—write quick. Albert Mills, 4543 Monmouth, Cincinnati, O.**

**BIG Money growing mushrooms. Cellar, idle places. Supplies furnished. Free book. Mushroom Growers Association, 431-LF N. Clark, Chicago.**

**\$100 PER Ton and up for certain common weeds, roots and barks. Particulars 10c. U. Merritt, 1752 Nicholson, St. Louis.**

**EARN \$5.00 Daily raising mushrooms in cellar, shed, attic. We buy crops. Guaranteed materials furnished. Odorless method. Book free. United, 3950-M Lincoln Avenue, Chicago.**

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

**CASH!—Gathering common weeds. Details 10c (coin). International Agency, Cincinnati.**

**MONEY In mushrooms. Up to \$25 or more weekly, growing in cellars, outbuildings. Ready market. We instruct you. Booklet and particulars free. Adanac Mushroom Company, Dept. 147, Toronto 10, Canada.**

**SELL Dollar boxes herb tea 49c. 100% profit. Sample \$1.00 box 25c postpaid. Andrew Beck, 328 South Eastern, Los Angeles.**

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

#### EDUCATIONAL AND INSTRUCTION

**LEARN Bookbinding for home, school and business. For information write Hartley, 156 Malone Ave., Belleville, N. J.**

**FAST And correct figuring, latest method. Frederick A. Smith, 2410 Smalley Ct., Chicago.**

**BUSINESS Management—One year course. Catalog free. Ohio Institute of Commerce, 1344 Corbin Road, Toledo, Ohio.**

**U. S. Government jobs. Start \$105-\$175 month. Men-women, 18-50. Qualify for coming vacancies. 25 coached free. Write immediately. Franklin Institute, Dept. C3, Rochester, N. Y.**

**WANTED Immediately, men-women, age 18-50, qualify for steady government jobs, commence \$105-\$175 month. Common education. Valuable information by our civil service expert, mailed free. Write Ozmert's Instruction Bureau, 101, St. Louis, Mo., today!**

**WE Can qualify you for secret service and scientific investigators career. International Secret Service Institute, PM-54, Hoboken, New Jersey.**

**COMPLETE Letter service course, 20 years experience in writing—15 lessons—200 pages letter size—illustrated—\$15. Particulars free. Ostlin Letter Service, 1334 - 7th Ave., Moline, Ill.**

**CONTESTANTS. Are your entries clicking? Send 25c coin for my 50-50 plan. Returnable on first assignment. Satisfied customers everywhere. Contest Consultant, 1926 Whitmore Ave., Los Angeles, Calif.**

**LEARN Doctor of Theotherapy. Worldwide instruction. Seminary "B," South Whitley, Indiana.**

**MEN Wanted to learn machinist trade, tool and die making, automatic screw machine. Get experience on actual work; steady demand at big pay. Employment help. Start now. Days or evenings. Write for free book. Allied Screw Machine Company, 609 West Lake, Chicago.**

**COMPLETE Detective training course, twelve lessons \$10. Easy payments. Write, former agent United States secret service, Joseph Kavanagh, PM-54, Hoboken, N. J.**

**LEARN Chiropody. Complete course by correspondence. Evans Foot Inst., Montgomery, Ala.**

**MANY Home-Study courses, including analytical and industrial chemistry. Bachelor Science degree conferred. McKinley-Roosevelt, University, Chicago.**

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

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

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

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

**ELECTRICITY — Radio — Public-address profession quickly taught—Complete correspondence course with experimental laboratory apparatus \$10.50 cash—\$12.00 payment plan. Bulletin free. Lincoln Engineering School, 855-K 37th, Lincoln, Nebr.**

#### PRINTING, MULTIGRAPHING AND MIMEOGRAPHING

**MIMEOGRAPHING—Lowest prices. Illustrated free. Samples. Paisley, 102 N. Broadway, St. Louis, Mo.**

**1000 LETTERHEADS, Billheads, statements or envelopes. \$2.90; 500, \$1.25. Samples. Village Press, Somerset, Mass.**

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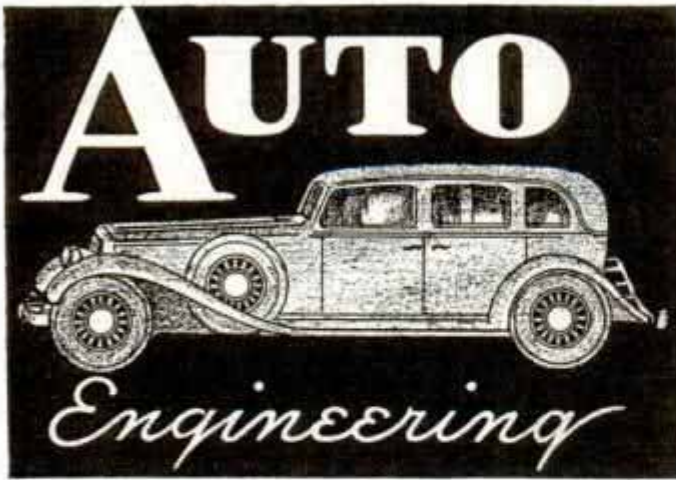
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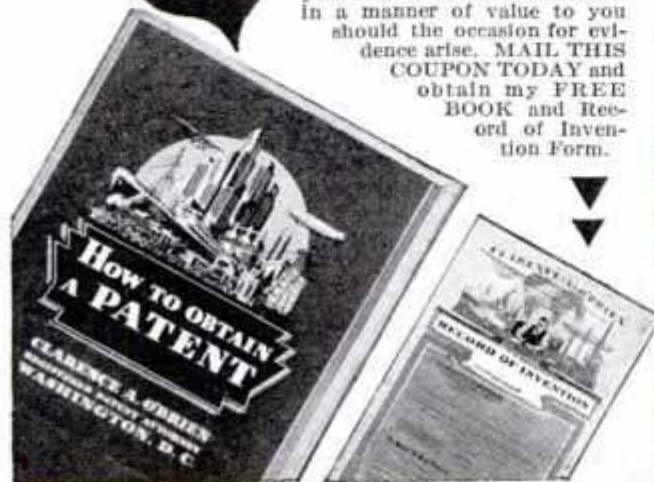
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The principal secret of happiness comes from making others happy. That is well known in our personal relations. It is equally true in business. Business can succeed only as it contributes to the welfare of others.

CHARLES F. ABBOTT, *Executive Director*

American Institute of Steel Construction, Inc.





D 471

**KAYAKING**—The latest sport. Fast, inexpensive, play boats, so light they may be lifted with one hand, are built like an airplane and are unsinkable. Here is a boat for everybody that is able to compete with the Hawaiian surfboards at Waikiki. It may be easily built at home.

*Mead Slides - 12 S. Market*



*Chicago*



Stamps magazine. 1006. 6. 11. C. v. e. neupord

# Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE AND CANADA

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 61

MAY, 1934

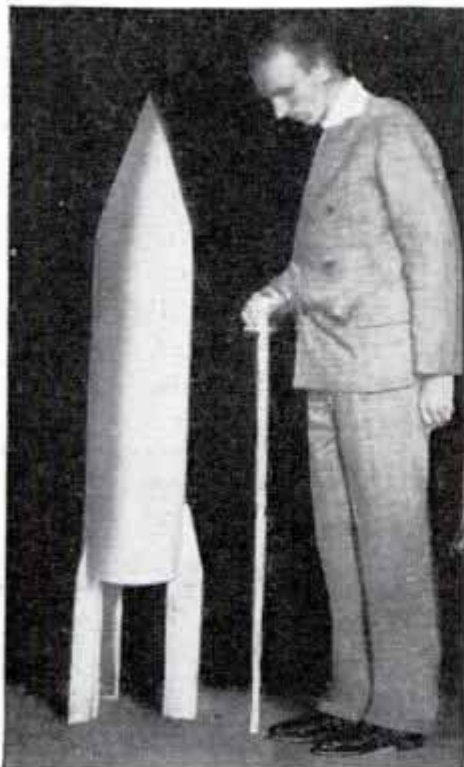
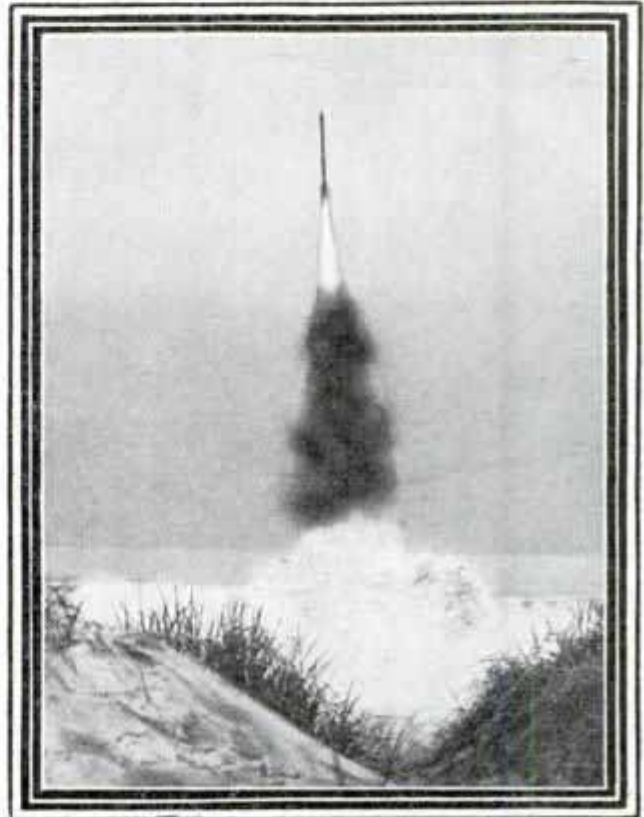
No. 5

## The FIRST ROCKET MAIL

D 348

ROCKET transportation of mail on scheduled flights between two points has been accomplished in Austria for the first time in history. Each rocket carries 200 to 300 letters from the starting point, the Shocket, to Radegund or Kunberg, in the neighborhood of Graz, whence the mail is forwarded by regular postal service.

All of the mail rockets have functioned perfectly, each flight being made according to scheduled plans without the loss of a single letter. Bearing special "rocket mail" stamps, the letters are sealed in a metal container to prevent damage, but this precaution has been unnecessary, due to the accuracy with which the rockets have arrived at destination.

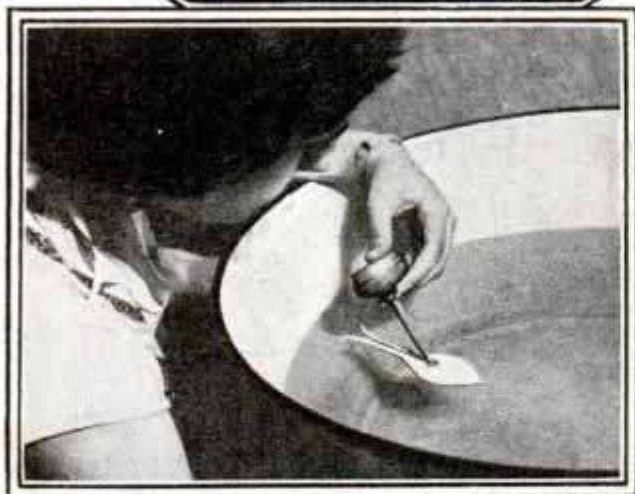
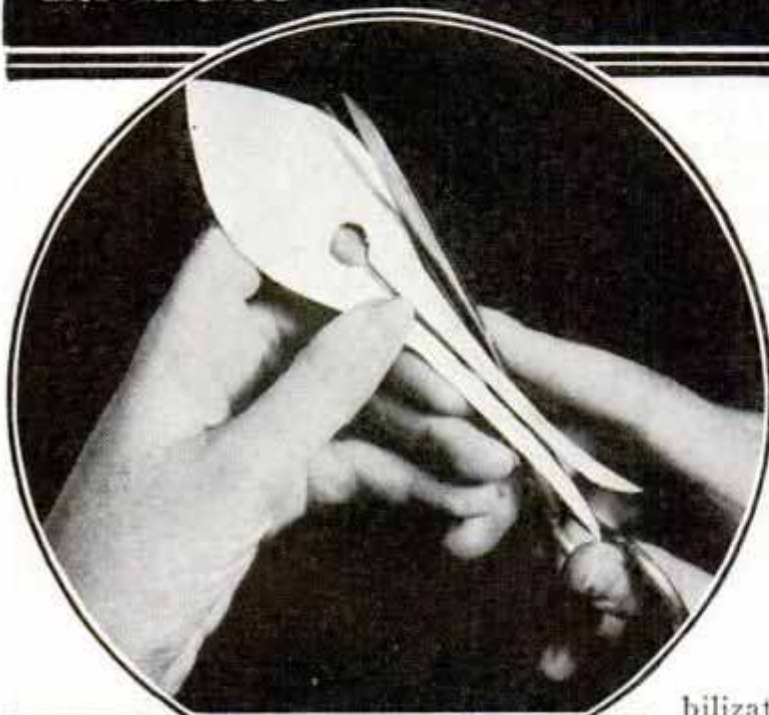


Left, Inventor with Mail Rocket after Successful Flight; Top, Right, One Second after Start of Rocket; Bottom, Right, Crew Preparing Rocket for a Mail Flight

Cont. Herbert Rosen  
Paul Carrere

Marsailles  
France





Top, "Rocket Mail" Stamps; Center, Cutting Out "Rocket Fish" for Test; Bottom, Drop of Oil at Proper Place Propels the "Fish"

Loaded with a special mixture of chlorate and nitrate powder, the rocket rushes away from the starting point at an angle of sixty-five degrees and rises high into the air. Its rapid flight continues until the fuel is exhausted, then a parachute opens

automatically and lowers the rocket to the earth. The distance that each rocket travels is calculated in advance by the inventor, Fritz Schmiedl, an engineer of Graz, who has spent years in research and experimental work.

All parts of the rocket are selected and built to withstand considerable expansion. The case is made of thin brass sheeting, with an inner lining of asbestos. The combustion chamber, or oven, is lined with loam extending back to the blast pipe, which is narrow and covered with asbestos. Stabilization fins or planes screwed on the tail enable the inventor to control the rocket's flight. That this method of construction is practical was demonstrated by a test flight from a mountain peak. After the rocket had landed, its casing was found undamaged.

While the first rocket mail flights have been over short distances, from one mile to two and one-half miles, the distance might be increased easily by means of larger rockets or by changing the starting angle so that the rocket will not ascend as high.

The rocket's basic principle is recoil and its most important property is speed, which may surpass that of a cannon ball, according to Prof. Oberth, who is regarded as an authority on the subject. The speed is not attained immediately, but increases slowly as the rocket releases gas. Recoil is the force which causes the rocket to move in the opposite direction to that of gas being released from its tail, just as a



shotgun "kicks" when the gas of its exploded charge rushes from the muzzle.

A simple experiment explains recoil. A piece of hard cardboard is cut in the shape of a fish, the form of a flounder. An incision is made from the tail toward the head, ending at about the middle of the fish in a half circle which must be larger than the incision. Then the fish is laid in a bowl of water and a drop of oil placed in the half-circle hole. Immediately the fish darts ahead, because the oil, which cannot submerge in the water, must spread out through its only channel, the incision leading to the tail of the fish. This pushes the fish forward. In the rocket, the oil is replaced by powder or gas in various compositions, but the action is the same, the rocket rushing forward as the gas escapes through the blast pipe in the tail.

D308

**TELEPHONE BOX WITH SPEAKER  
ELIMINATES EARPIECE**

Telephone conversations can be conducted without holding a receiver to the ear or speaking directly into a transmitter by employing a recent British invention consisting of a box containing a sensitive

*Post office invention*



You Can Talk from Across the Room into This Telephone Containing a Microphone and Loud Speaker

microphone and a loud speaker. The box is placed on a table and the person carrying on a telephone conversation may be seated in an easy chair several feet distant. The microphone picks up the sound of his own voice and the loud speaker amplifies the voice of the person with whom he is talking.



Top, Relief Lettering in Colored Wax; Bottom, Electric Pen Used by the Artist

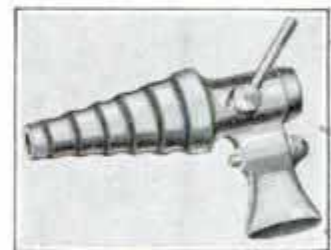
**ELECTRIC RELIEF LETTER PEN  
USES WAX INSTEAD OF INK**

Wax sticks instead of ink are used in an electric pen designed for relief lettering of display cards. The pen contains an electrical element which melts the wax so that it flows off the point in the desired quantity. A rheostat controls the flow of wax by regulating the heat. The wax, which is available in colors, adheres to cardboard, wood, glass and metal. The pen may be plugged into a light socket.

D260

**CAR RADIATOR FLUSH GUN**

For flushing the automobile radiator, an air-water gun is used in connection with a flushing compound. The device has a water cut-off and an air trigger for controlling pressure. Openings on the attachment permit easy connection to water hose and to a high-pressure air system.



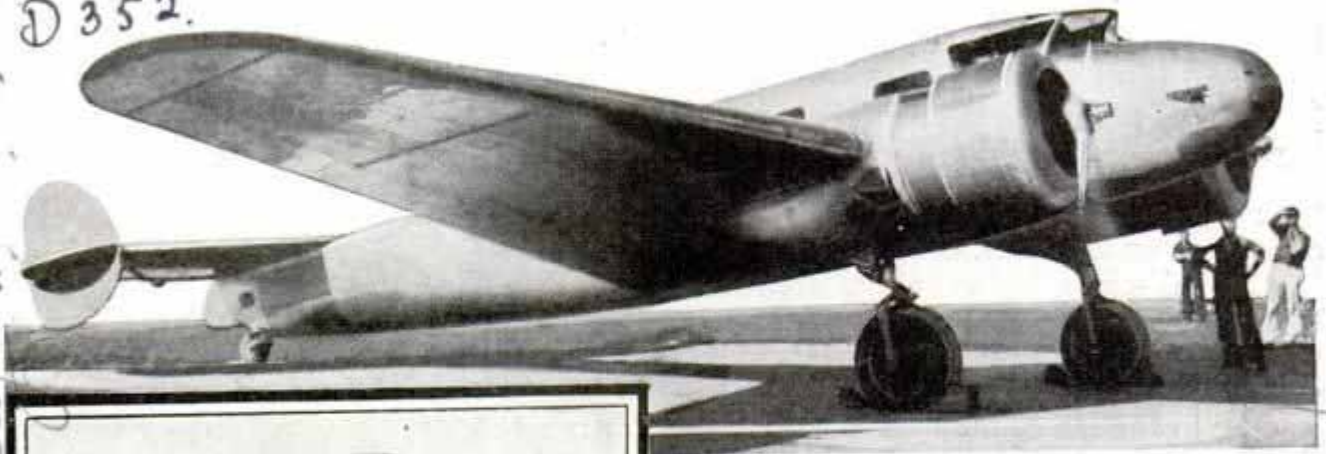
*Radiator Specialty Co*

*Handwritten notes on the right margin:*  
 Hartmann Co  
 161 E. Erie, Chicago  
 643  
 Mann...  
 161 E. Erie, Chicago



# Tail Wing Rudders Control Transport Plane

D 352.



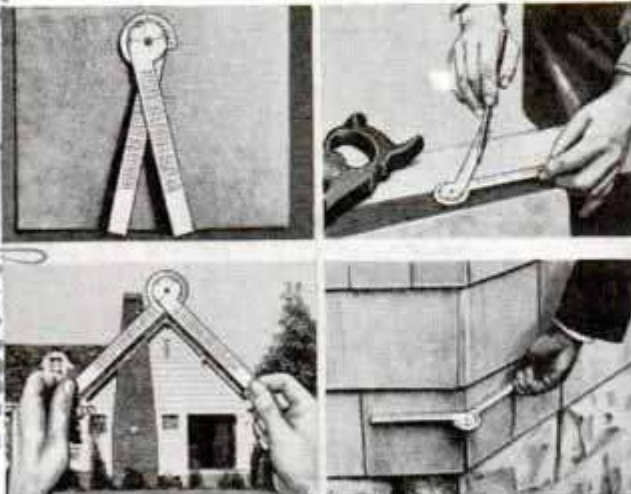
Above, the "Electra" and One of Its Wing Tip Rudders; Below, a Close-Up of the Rudder

Two rudders at the tips of a wing on the tail replace the conventional control surfaces in the latest Lockheed transport plane, the "Electra," a twelve-place, bi-motor monoplane with a cruising speed around 200 miles per hour fully loaded. Each rudder is directly behind one engine where it receives the full benefit of the propeller blast. Both rudders work together and the pilot operates the controls in the usual manner. The all-metal streamlined ship has a wing span of fifty-five feet and its two engines develop 840 horsepower. It is equipped with retractable landing gear, controllable pitch propellers, wing flaps and a soundproof cabin, carries 200 gallons of fuel, enough for a 750-mile trip, and has a space for baggage in the nose and in each wing stub.

## Roof Pitch Indicator Shows Measurement of Any Angle

D 271 Finding the roof pitch of any building is made a simple matter by using a pitch

indicator, the arms of which are adjusted so they can be lined up with the roof when the user stands facing the gable. The rise per foot run is then read on a dial. In a similar manner the indicator may be used to find the pitch of roofs in photographs and cuts.



Indicator for Finding Roof Pitch and Other Angles

## D 98 AIRPLANE HAS THREE CABINS

Two big British airliners now being built will each have three cabins accommodating thirty-nine passengers. These ships, fully loaded, will weigh fourteen tons and have a cruising speed of 108 miles per hour. They will be used between London and Paris and will be driven by four motors with four-bladed propellers.

Imperial Airways

Lockheed Aircraft Corp  
 Burbank, Calif.  
 Richard Service Bureau  
 Staten Island, N.Y.

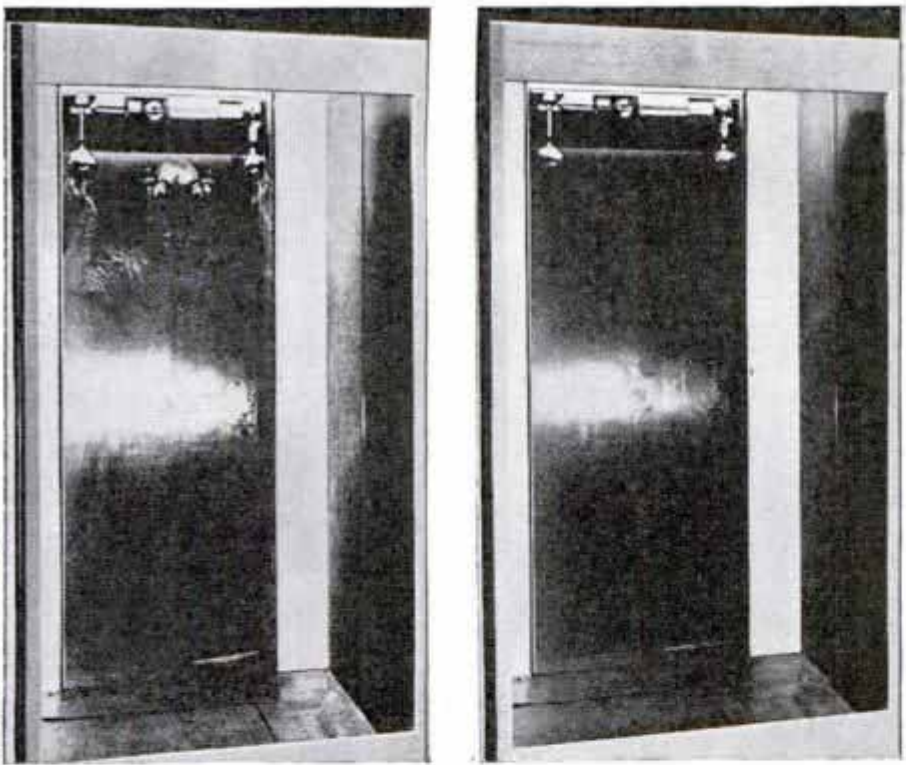
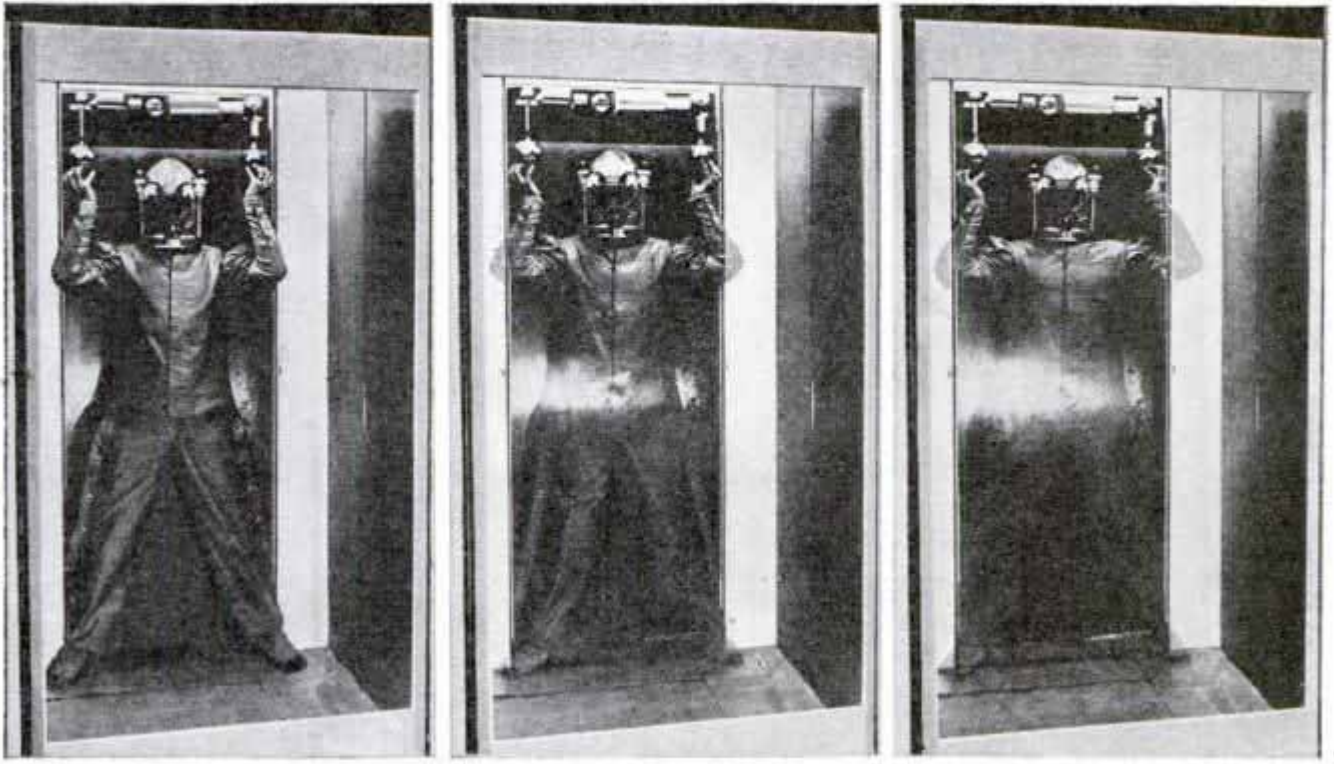
New York Herald Tribune



D2876

# Photographs Show a Man Becoming Invisible

From Illustrated London News, P. 99, Jan. 20, 1934



Photographs Taken at Successive Stages of the Vanishing Act; the Man Seems to Become Transparent and Then Becomes Invisible, It Is Claimed

After years of research, a young British inventor claims to have produced an apparatus which can render a man invisible although he still stands before you in the flesh. Operation of the device, which is being used for exhibition purposes, is a closely guarded secret but the man who is to disappear is clothed in what is described as an "electro-helmet" and a "spectral

subject then is said to be tangible but not visible. Spectators are invited to verify the man's presence in the cabinet by a touch of the hand, and maintain they can feel he is still there but are unable to see him. Even the eye of the camera does not reveal the secret. Photographs taken during successive stages of the vanishing act, show only what the human eye perceives.

no details available.

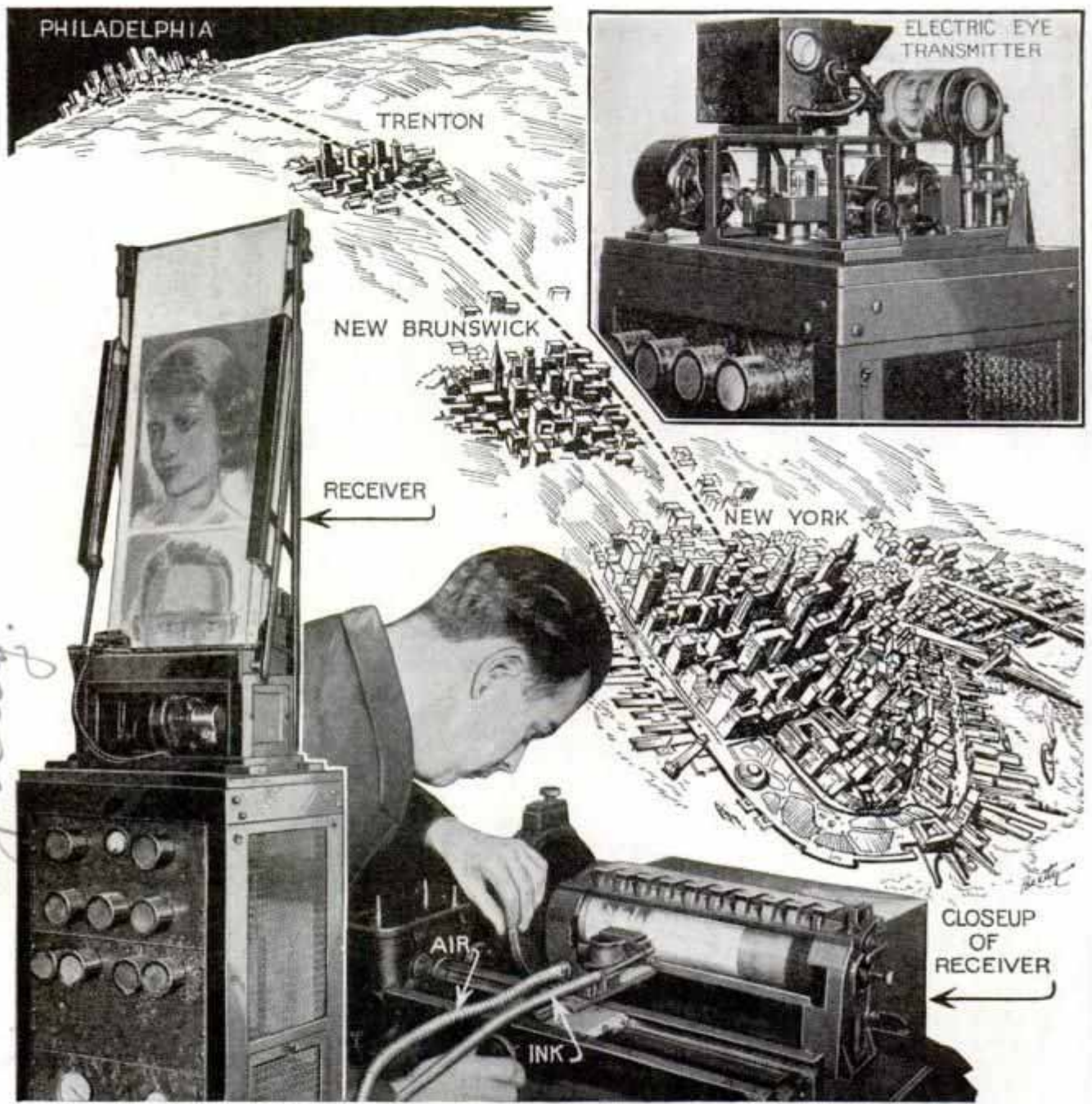
address



*Cont. Am. Mass. 55 W. 862  
New York*

*D280*

# Facsimile Service to Open New Radio Field



Top, Right, Apparatus for Transmitting Facsimiles of Photos by Radio; Bottom, Two Views of Facsimile Receiver; Drawing Shows How Short-Wave Transmission Requires Use of Relay Stations

Ten years ago, radio's big feat was to streak around the globe. Today, that is easy. The big feat now is to bridge a gap of only fifty miles by short-wave transmission. Recently, the Federal Radio Commission granted the Radio corporation an experimental license to operate the first radio facsimile service between two cities, Philadelphia and New York. While this service will be entirely of a commercial nature, it may be extended later to homes for the reception of newspaper bulletins. Another development

makes possible the simultaneous sending of three different radiograms on one wave length. Each of these three channels has a speed of sixty words a minute in code signals. Ultra-short waves, less than five meters in length, will be used on the facsimile service. The peculiar properties of these waves makes it possible for them to carry clear signals, without static or fading, over a distance of fifty miles. Their extremely limited range makes it practical to establish thousands of transmitters on the same wave length all over the United

*of America, 30 Rockefeller Plaza, New York City.*

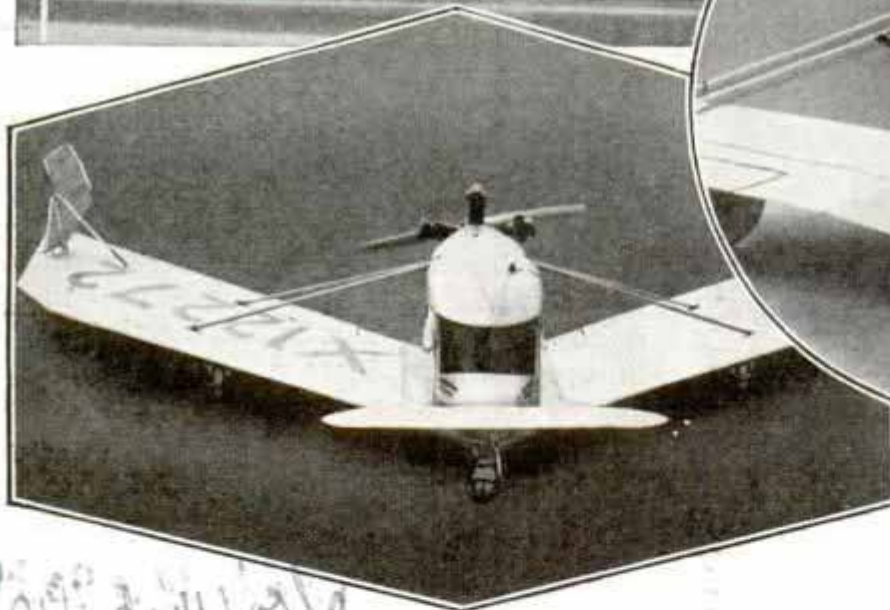
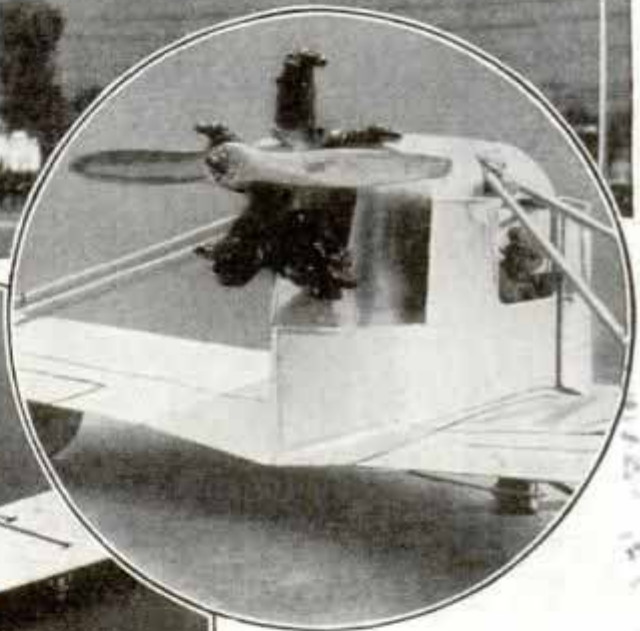
*Post Office... New York City*







# Plane without Tail Is Guided by Stabilizer



Views of Tailless Airplane Which Is a Flying Wing Guided by Its Forward Stabilizer; It Is Claimed This Ship Is Virtually Fool-Proof

Capable of traveling more than 100 miles per hour, an economical two-passenger airplane without a tail has been constructed and tested by a former airmail pilot. The flying wing craft is powered with a small radial air-cooled engine and is guided by its forward stabilizer. It is claimed this pusher-type monoplane is virtually fool-proof since it is asserted it cannot nose dive, spin or otherwise get out of control. The inventor says it can be produced and sold at a price in line with the plans of the department of com-

merce which has been obtaining data concerning the demand for a ship selling for about \$700. Because people who have seen it fly invariably gasp, "What is it?" the inventor calls the craft the "Whatsit."

D281  
**WORLD CALLED HUGE DYNAMO CHARGED WITH COSMIC RAY**

Charged by the cosmic rays from the radium in the stars, the world is a huge dynamo producing 200 million amperes of electricity, according to Dr. Luther S. H.

*Chicago Daily News*

*Vertical handwritten text on the right margin, possibly a page number or reference.*



Gable, sole survivor of six chemical engineers who refined the first commercial radium in America. A few more balloon ascensions to the stratosphere will produce information for building machines to convert cosmic-ray energy into heat, light and power, he says.

*D192*

**CAMERA AIDS SCULPTOR TO MAKE CARVING MORE LIFELIKE**

Photography has come to the aid of the sculptor through a system invented by a Japanese. The person whose bust is being executed is placed in a revolving chair and a hair-line ray of light is projected on his face. At an angle of thirty degrees from the chair, a high-speed shutterless camera photographs the reflection of the ray of light at the rate of 1,600 exposures a minute as the chair revolves. If the film on which these reflections were photographed is developed and enlarged, and the impressions are cut out and pieced together in a radial form, they would represent a photographic reproduction of the subject. After the pieces are strung together and paraffin is poured over the figure, something like the form shown in the photograph results, the lines representing the reflections of the ray of light photographed.

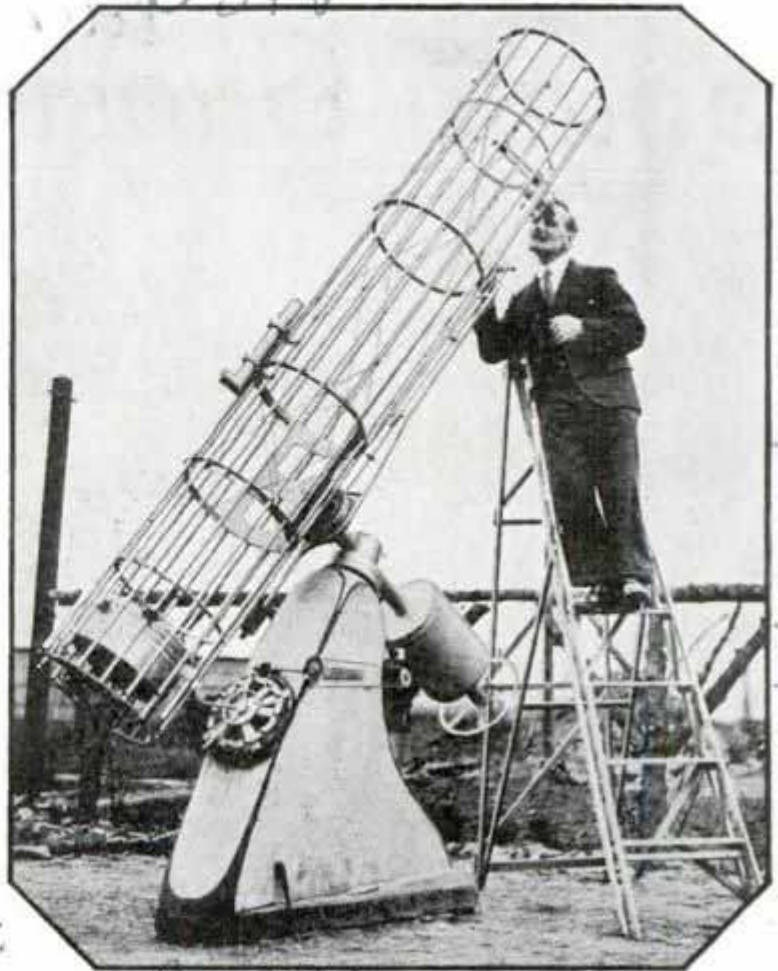
*Clp. from Sunday Tribune, Mrs. Cole under draw.*



*U. S. A. Morooka Tokyo, Japan.*

*Wide World*

Sculptor Working on a Bust, the Form for Which Was Obtained by Taking Thousands of Photographs of the Living Subject from Different Angles



Twelve-Inch Reflecting Telescope Built by an Amateur Astronomer as a Spare-Time Hobby

**TELESCOPE MADE BY AMATEUR AS SPARE-TIME HOBBY**

As a spare-time hobby, a British railway employe makes telescopes to further his ambition to study astronomy. After two years of part time work, he has completed a twelve-inch reflecting instrument, equatorially mounted and clock-driven. For the mirror he used specially annealed glass two and one-half inches thick, and it required nine months' time to grind this down to an accuracy of one-millionth of an inch.

There were 60,347 motion-picture theaters operated throughout the world at the beginning of this year, of which 41,822 were equipped to show sound pictures.

*J. D. Isolden, Specialist*

*Edwin H. Hefner, 2 Windont, England*

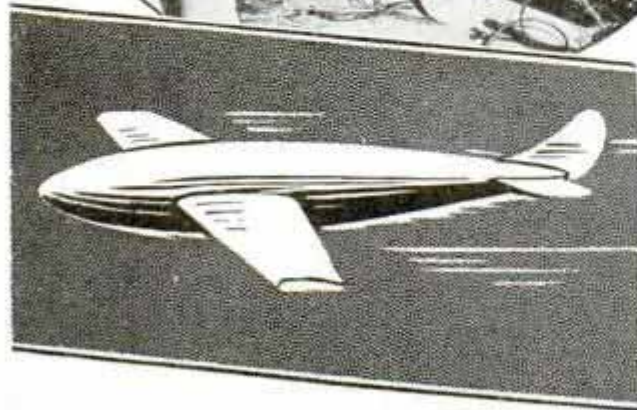
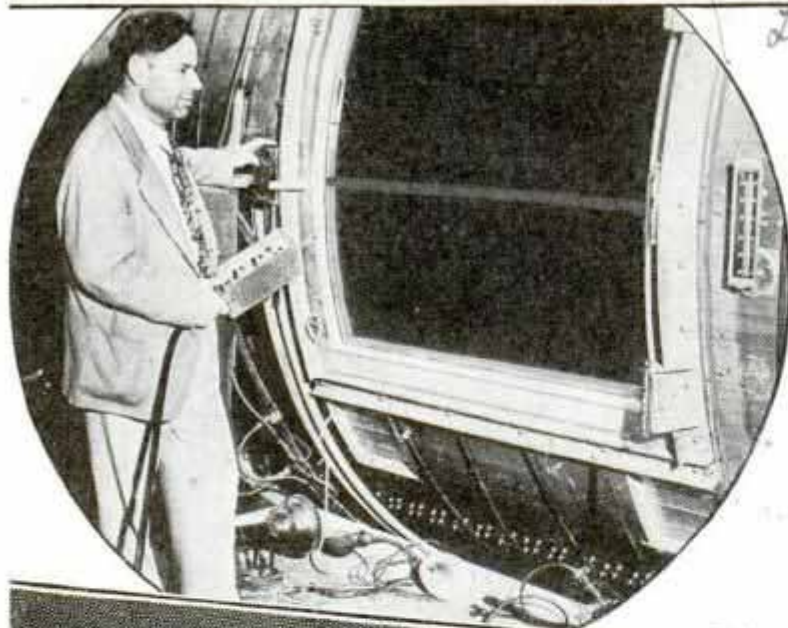
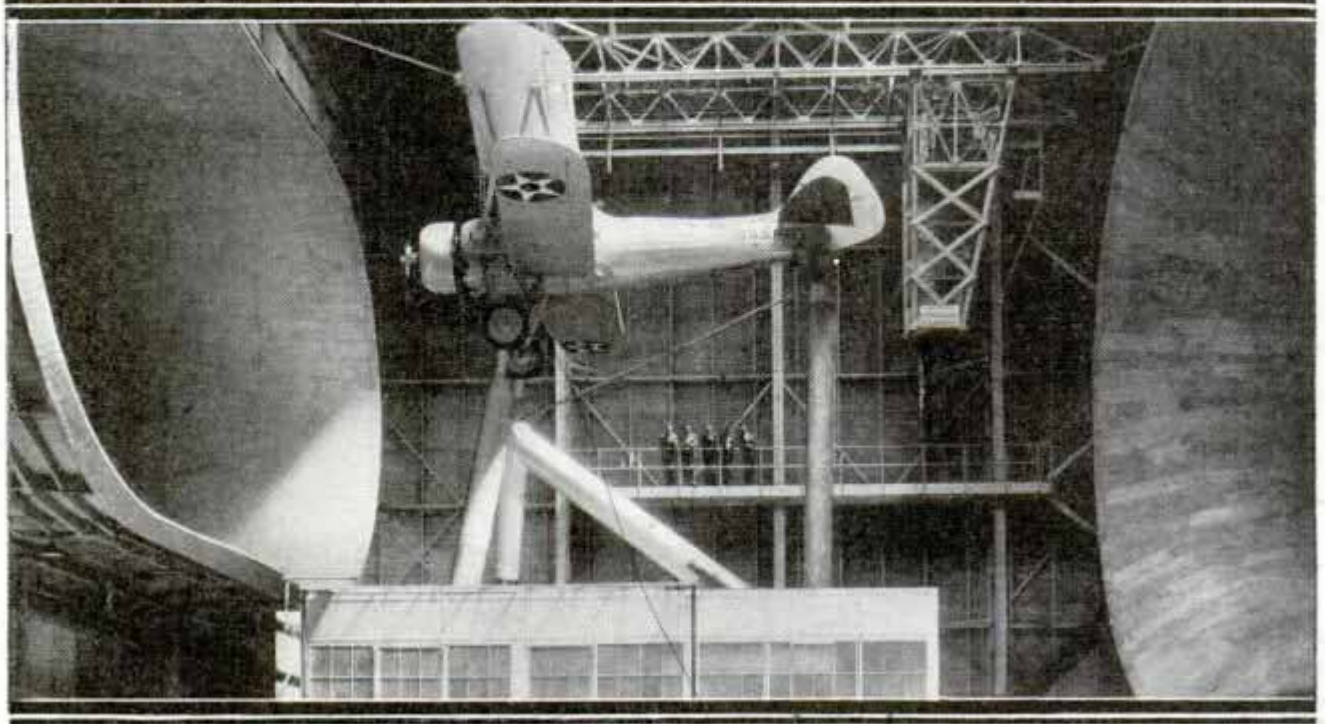


D252

Wingas Field, Sharpsburg

Branch, Pottsville Pa

# Sound Ghosts HAUNT



Trents

By CORLEY McDARMENT

WITH the main figures worked out and models tested for an airplane that will fly 544 miles an hour, the question arises as to whether materials used in present airplanes can stand the heavy beating and vibration of such speed.

Some strange things have recently been discovered in connection with metals and high speeds—especially speeds approaching that of sound. A ghost may haunt this new plane.

John Stack, engineer for the national advisory committee for aeronautics, admits that he started something he cannot finish when he put little vanes of many shapes into the mouth of a high-speed wind tunnel and, by carefully reading all the "clocks" of the complicated mechanism, discovered a wing shape that could "take it on the chin" at 566 miles per hour and still have plenty of lift. He shaved off twenty-two miles an hour from the 566 on account of drag and friction, leaving a clean cut 544-mile speed. This increase in

as... new... materials... performance... speed

Top, Wind-Tunnel Test of Full Size Plane; Center, Watching Wind-Tunnel Test of Model; Below, Design for "Theoretical" Plane Experts Say Could Make 544 Miles per Hour



D282

# High-Speed FLYERS

544 Mile-an-Hour Plane Planned



speed, however, is only 121 miles an hour faster than planes have already flown in races.

But a discovery has been made by wind-tunnel tests that air begins to act differently toward objects at speeds in excess of 300 miles an hour. It "hardens" up toward objects going through it at very high speed. Taking advantage of this "hardening" discovery, experiments were started with different shaped wings to see where the "burbbling" point started. An airplane wing stalls when the burble point is reached and the plane usually goes into a spin. When the air can be kept flowing slick and clean over a wing it will not stall. Slots and flaps are nothing but devices used to cheat burble.

This burble also starts when an ordinary wing begins to travel too fast in the air. It will begin to "mush" as eddies set up above and behind it retarding its forward movement. But a wing of newly found shape can be

Above, Electrically Driven Motor and Dynamometer Inclosed in Metal Plane Fuselage Used for Studying Characteristics in Wind Tunnel; Below, Plane Being Turned Upside Down for Load Test





141.2 square feet; fuselage diameter, forty inches; average wing chord, 4.85 feet; aspect ratio, six. And to jerk this machine through the air at 544 miles per hour a 2,300 horsepower engine is required.

The figures show that a plane like the one whose model was tested can make a speed of 300 miles an hour with an engine of 325 horsepower. Since nearly all military planes have engines of greater power, it appears possible

(Continued to page 128A)



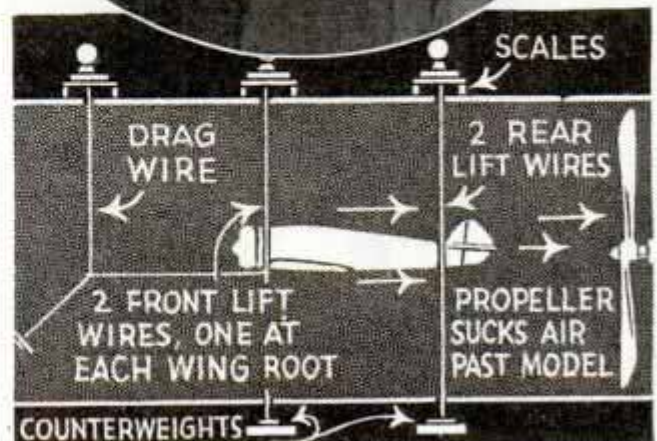
Top, Changing Shape of Wind-Tunnel Model with Clay; Below, Resistance Met by Three Shapes Passing through Air

used at high speeds and cheat this burbling. This wing, however, will burble at certain speeds below 300 miles an hour, but an aviator can jump through this speed quickly and get into the "velvet" that exists above 300 miles an hour.

In the hardened air that results from high speeds it appears as if the wings of the plane jump through so fast that eddies or burbles do not have time to form. It is like running a boat through the water so fast that the water would not have time to form a wake behind it.

The type airplane which the wind-tunnel tests showed best for these high speeds is a midwing monoplane with full retractable landing gear. There can be no wires, struts, or even screw heads protruding. A three or four-bladed propeller will be necessary because an ordinary two-bladed propeller would have to turn too fast.

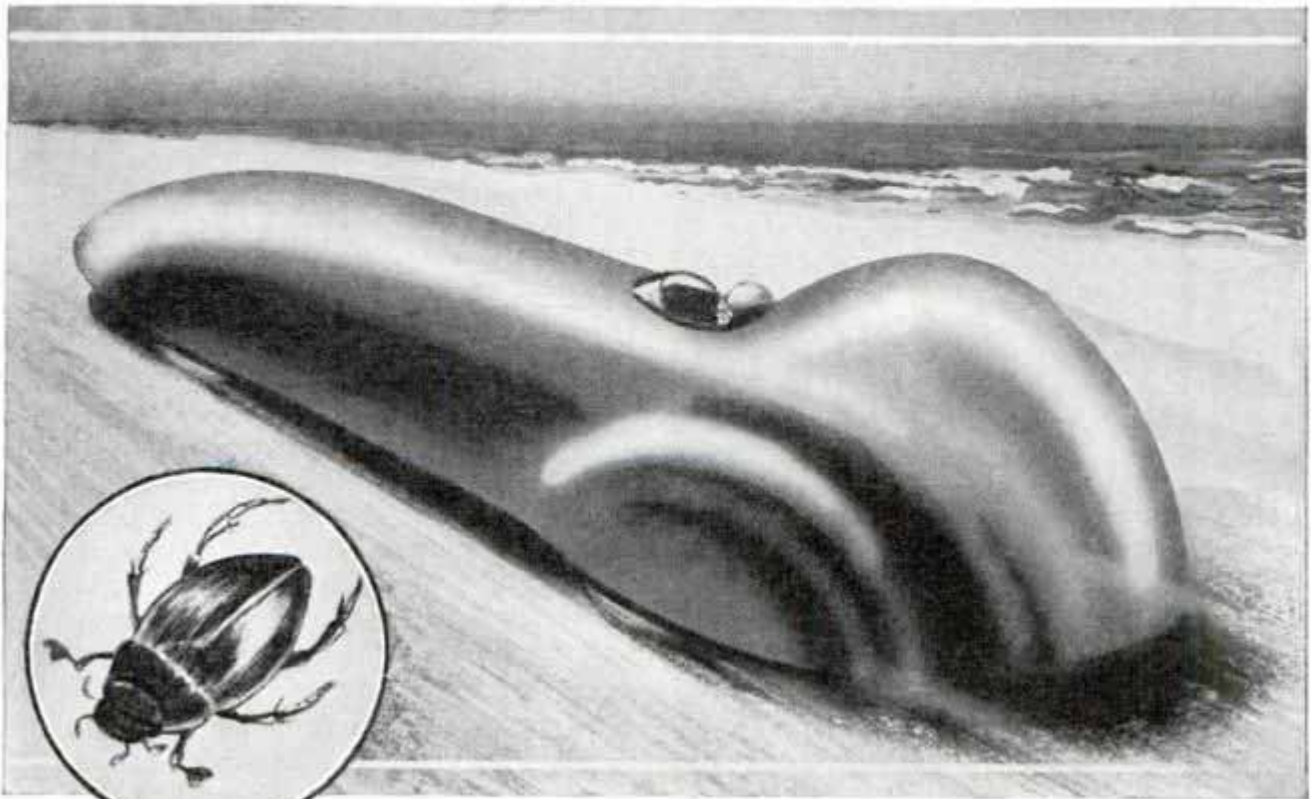
The actual dimensions of an "ideal" plane which can make this speed are already worked out. It would weigh 5,750 pounds; wing span, 29.1 feet; wing area,



Above, Examining Cowl Equipped with Pressure Tubes Before Test; Below, Diagram of Wind-Tunnel Test



# Car Like a Beetle Designed for Speed King



© Planet News

Artist's Conception of the Beetle Car Designed for Sir Malcolm Campbell; the British Speed King Hopes to Travel 300 Miles per Hour with This New Creation

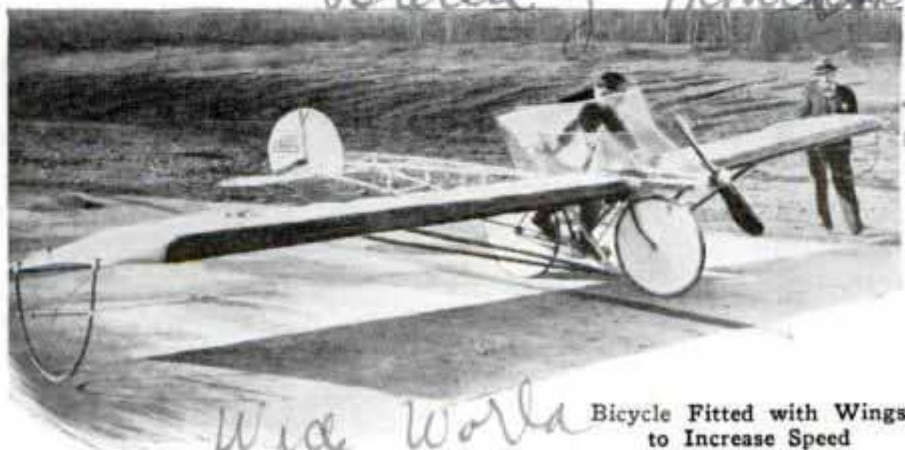
Sir Malcolm Campbell, British auto speed king, hopes at last to realize his dream of traveling five miles a minute, 300 miles per hour. A car shaped like a giant beetle has been designed to replace his fleet "Bluebird" in which he made more than 272 miles per hour at Daytona Beach, Fla., last year. With the beetle car Sir Malcolm hopes to set a mark of 300 miles per hour this year, probably making the run on the sands of dry Salt Lake in Utah some time in August. The latest racing creation was designed by two German airmen and is to be equipped with a 2,000-horsepower engine. It will look like a flying beetle with a hump on its back and two big blisters on its sides. Models under test showed wind resistance was about one-third less at a speed equivalent of 300 miles per hour as compared with former racers. This would provide several hundred extra horsepower for speed, power for-

merly used to overcome the wind's force. The beetle body incloses the entire car.

*D313*

## WINGS ARE BUILT ON BICYCLE TO INCREASE SPEED

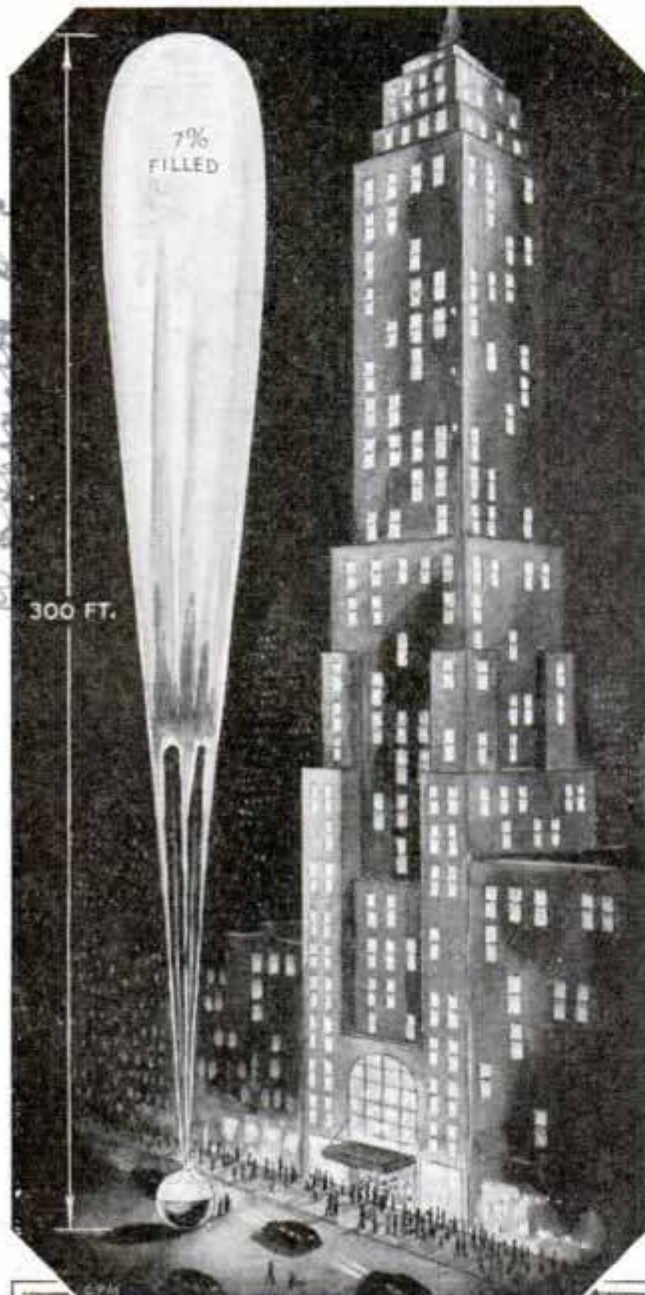
One French cyclist has attached wings, a small propeller and a tail to his streamlined bicycle in an attempt to add to its speed. The rider does the pedaling seated in a "cockpit" inclosed by a transparent material, the form of which decreases wind resistance. He has attained a speed of twenty-five miles per hour.



Bicycle Fitted with Wings to Increase Speed



# Fifteen Miles Up Is the Aim of Army Flyers



Three miles higher than man has ever risen before is the margin by which two noted army flyers will attempt to crack the altitude record this summer in a free balloon five times bigger than the gigantic bag in which Settle and Fordney established the present mark of 11.6 miles. The U. S. Army Air Corps has assigned Maj. William E. Kepner and Capt. Albert W. Stevens to man the mammoth balloon now being constructed. Two and one-third acres of cotton fabric, impregnated with rubber, will be used in making the balloon bag, which will weigh, together with the nine-foot spherical gondola, more than 5,000 pounds. With the crew, instruments and ballast, the total weight will be nearly twenty tons, of which sixteen tons will be ballast. The bag will be inflated only seven per cent at the start, allowing the gas to expand fourteen times in the rarefied atmosphere. Difficulty has always been experienced in passing a line through the air-tight gondola, as any leak would be fatal to the crew. Capt. Stevens has designed a compressed-air valve control, similar to the shutter release on a camera. A similar arrangement will be used to release the ballast, thus doing away with the necessity for any lines passing through the walls of the sphere. The exact point at which the balloon will take the air has not been selected, but it will probably be just east of the Rocky mountains so the bag can drift east with prevailing winds.



Above, the Army Stratosphere Balloon, When It Leaves the Earth, Will Be as Tall as a Thirty-Story Building; Below, Photo Taken over Dayton, Ohio, at 32,200-Feet Altitude

*Cont. Robert W. Gordon.  
1115-17th St. N.W.  
Washington D.C.*

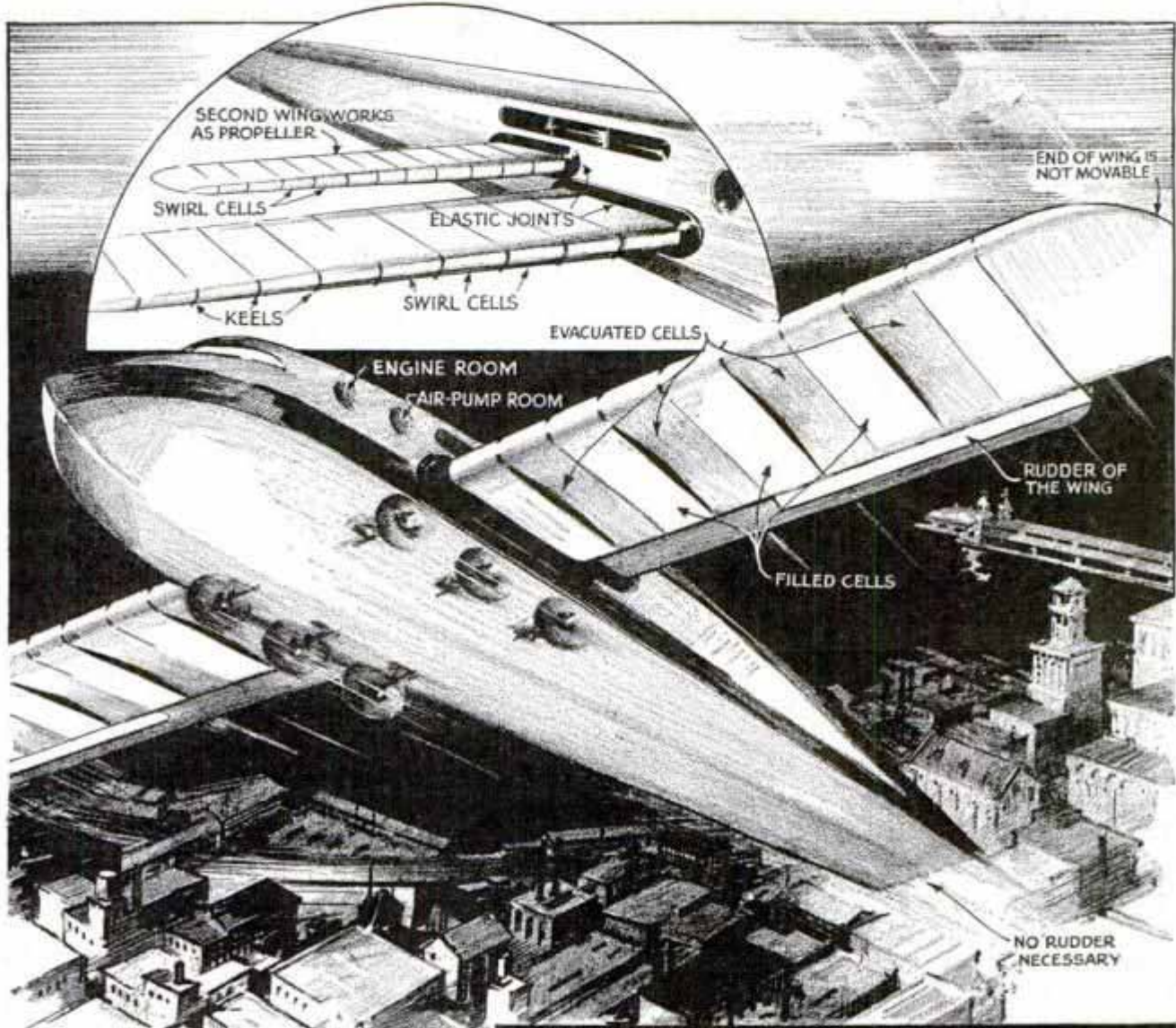
*Leathergear. Jepsen & Co. Chicago*

*D268*



0257

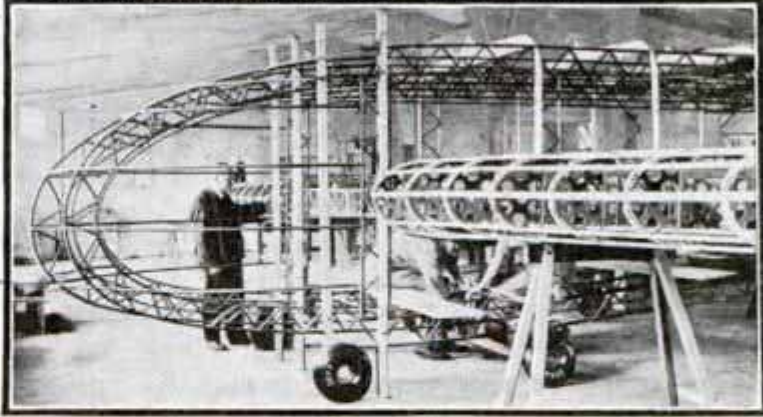
# Pulsating Wing Plane Imitates Buzzing Bee



SEE PAGE 133  
GO THROUGH

*Vienna*

Pulsating wings oscillated by a ten-horsepower motor are to propel a 2,200-pound plane of unusual design being built by Dr. Raymund Nimfuhr, Austrian scientist, who studied the flight of insects in planning the ship. The craft, a metal frame about thirty-eight feet long with two large forward wings thirteen feet long and two smaller rear ones ten feet long, has neither a screw propeller nor a rudder in the ordinary sense. The wings contain pneumatic cells and the under sides are of rubber. The small motor compresses and evacuates air from these cells, causing the under side of the wings to pulsate like the wings of a bee. The wings are attached by elastic joints



Drawing of Pulsating Wing Plane and Diagram Showing Construction; Below, the Partly Completed Frame

and have a stationary leading edge but a movable trailing edge so they can be manipulated to control the craft. The small wings serve as propellers and, it is claimed, the craft will be able to rise or descend almost vertically and to travel forward, backward or hover almost motionless.

*Cont. Kutschbach*



D 164 *S. Wilbur Cornelius*

# Movable Wings Help Pilot to Control Plane

*Los Angeles Calif.*



Showing Wing of Plane with Trailing Edge Much Lower Than Angle of the Ship; the Wing Is Controlled from Cockpit

Wings on a new-type airplane are arranged so that the entire wing surface is permitted to move at will from the cockpit. This construction results in a reduction of "drag" on the craft while in flight. Instead of being stationary, the wings move on an axis situated at the exact center of a lift located one-third of the distance from the leading edge to the trailing edge of the wing. The wings serve as ailerons. Movements of wings and tail surface are co-ordinated, enabling the ship to fly itself when the pilot sets a stabilizer. This co-ordination also automatically rights the ship from any abnormal flight position, preventing nose dives, spins or stalls. Capable of 147 miles per hour, the plane is powered by a 120-horsepower engine. In tests, the free-wing plane has shown unusual safety, remarkable maneuverability and riding ease and economical operation.

## RIGID "WICK" CARRIES WATER TO POTTED PLANTS

Potted plants can be kept watered with a minimum of personal attention by using a simple wicklike rod for the purpose. The "wick" consists of a fine-grained artificial filtering material which resembles

porous sandstone. One end extends upward two inches through an opening in the vessel, and the other is immersed in a reservoir of water. The wick carries water up into the pot where the soil tends to settle firmly against its upper end, maintaining a good capillary contact. The only attention required is an occasional filling of the reservoir.

## D 285 VENTILATOR FAN PLACED OVER KITCHEN LIGHT

Located over the electric-light fixture in the ceiling, a ventilator fan for the kitchen clears away fumes and heat from cooking. The fan is controlled by a switch placed conveniently at the center of the window, within easy reach.

The arrangement was devised by engineers of Westinghouse Electric and Manufacturing company as an improve-



Switch at Center of Window Controls Ventilator Fan over Central Light in the Kitchen

ment over present methods of ventilation, many of which are regarded by the engineers as inadequate.

*Sp. Metropolitan Airport*

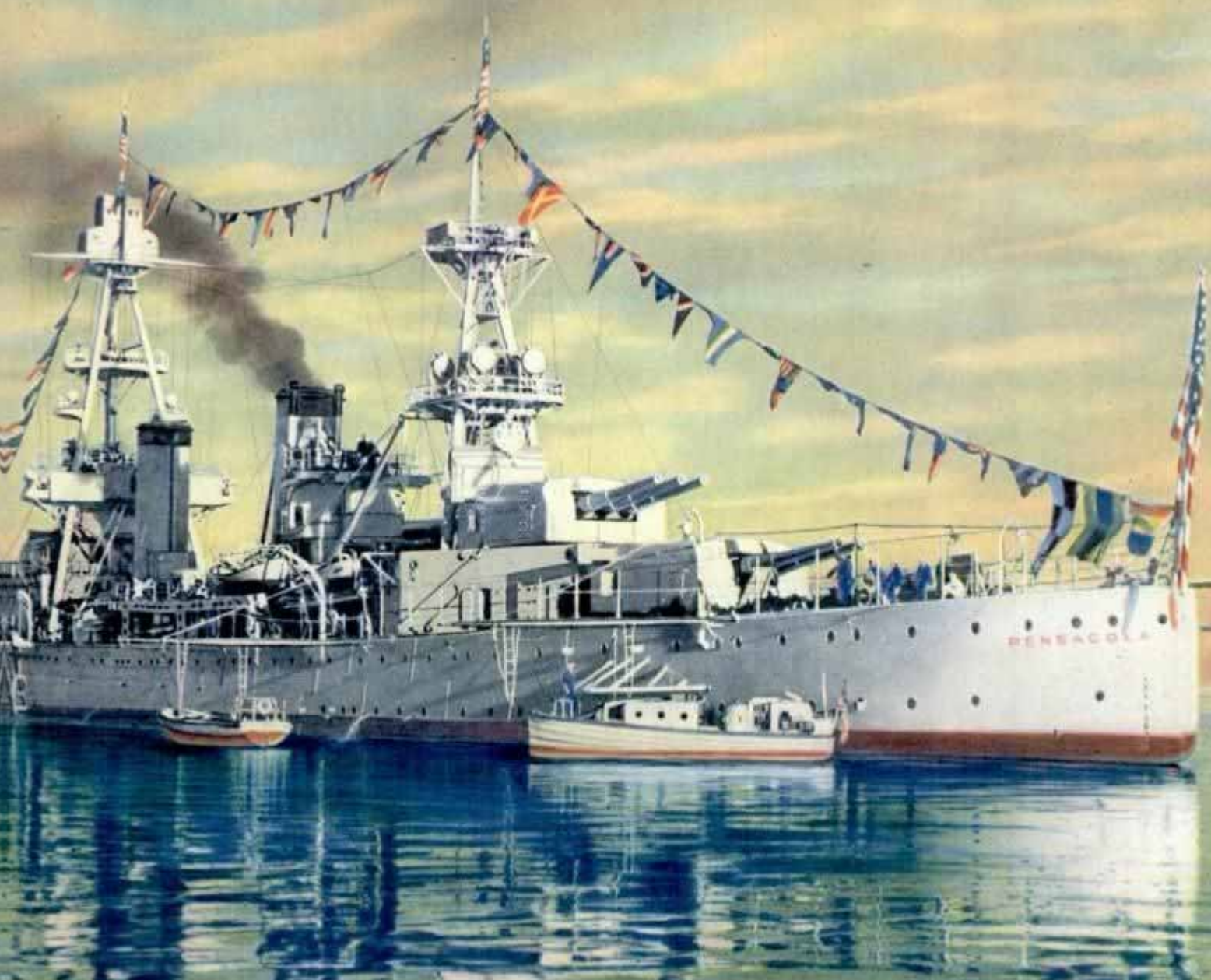
*Invented by Prof. B. E. Livingston, Johns Hopkins University, Baltimore, Md.*

*East Pittsburgh Pa.*



220 & 42nd New York

U.S.  
FLEET  
*to be*  
*Second to None*







**THE "BIG THREE" STATUS**  
AT THE END OF 1933

	UNITED STATES	GREAT BRITAIN	JAPAN
TOTAL SHIPS UNDER AGE	84	134	164
TONNAGE	708,550	966,379	653,389
CAPITAL SHIPS	14	15	8
DESTROYERS	3	44	60
SUBMARINES	45	31	63
LIGHT CRUISERS	10	19	17



**A** REMARKABLE view of the United States Navy submarine "Nautilus 'N-2,'" made when that mighty undersea craft passed under Manhattan bridge in New York on her way to Brooklyn navy yard. Recently the "N-2," formerly the "U-6," established a new record for such craft by submerging to a depth of 336 feet.





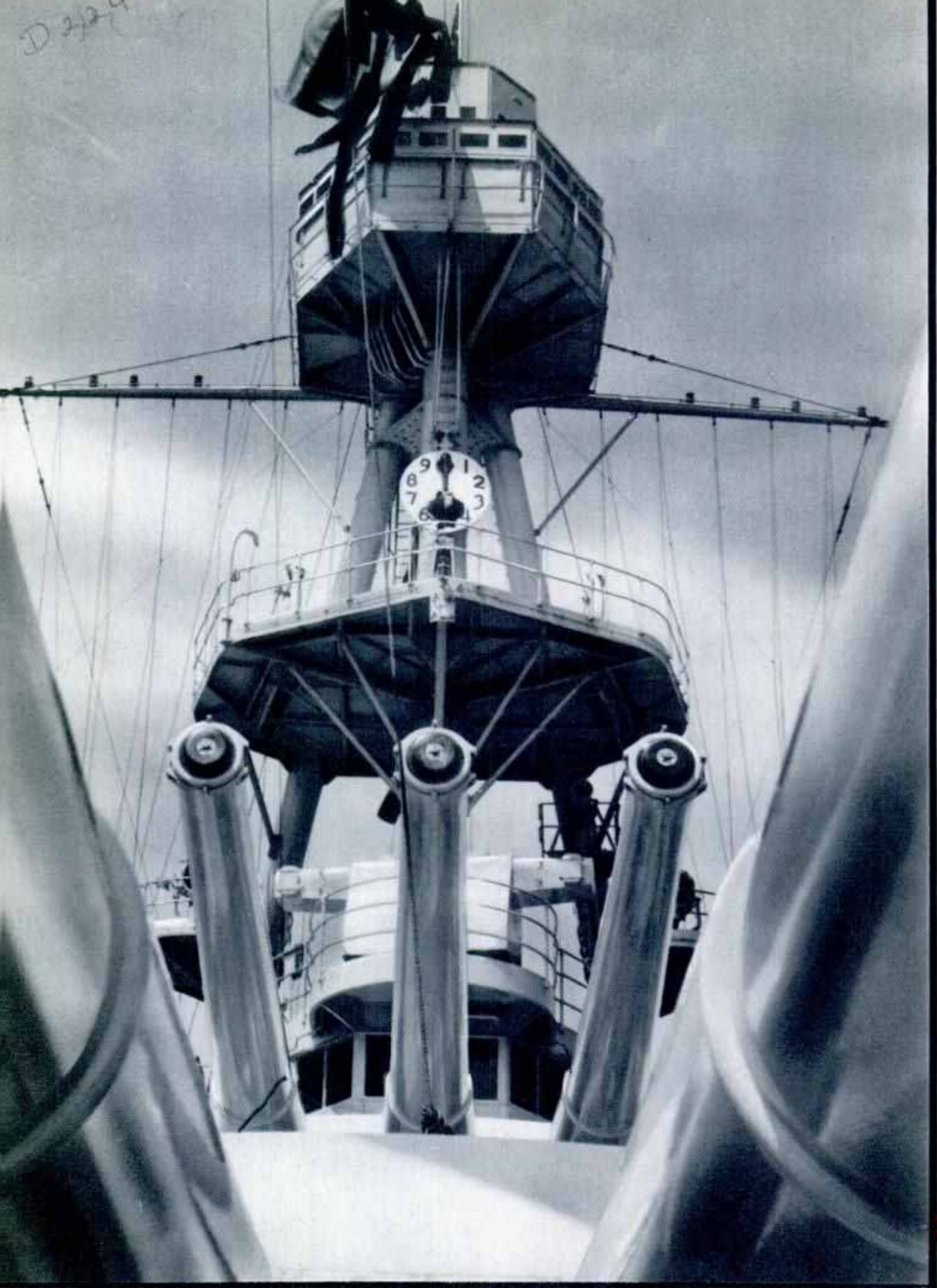
**MEMBERS** of crew hoisting torpedo aboard the "Houston" in Pacific waters.

**F**OR FOUR reasons, 1934 looms as one of the most important years in the history of the United States Navy. First, thirteen new combat ships are to be added to the fleet this year. Second, construction is starting on forty-one additional fighting vessels. Third, a five-year program under which 101 ships will be built to replace old ships is beginning. Fourth, the navy is engaging in its most comprehensive schedule of mimic warfare, including a seven-months' cruise to the Atlantic.

On its Atlantic cruise the fleet will pick up five new 10,000-ton heavy cruisers mounting eight-inch guns. These are the "Astoria," "New Orleans," "San Francisco," "Minneapolis," and "Tuscaloosa." Each of these vessels is 588 feet long, has a crew of 855 men, and is armed with nine eight-inch guns, eight five-inch anti-aircraft guns, torpedoes, and a half dozen airplanes.

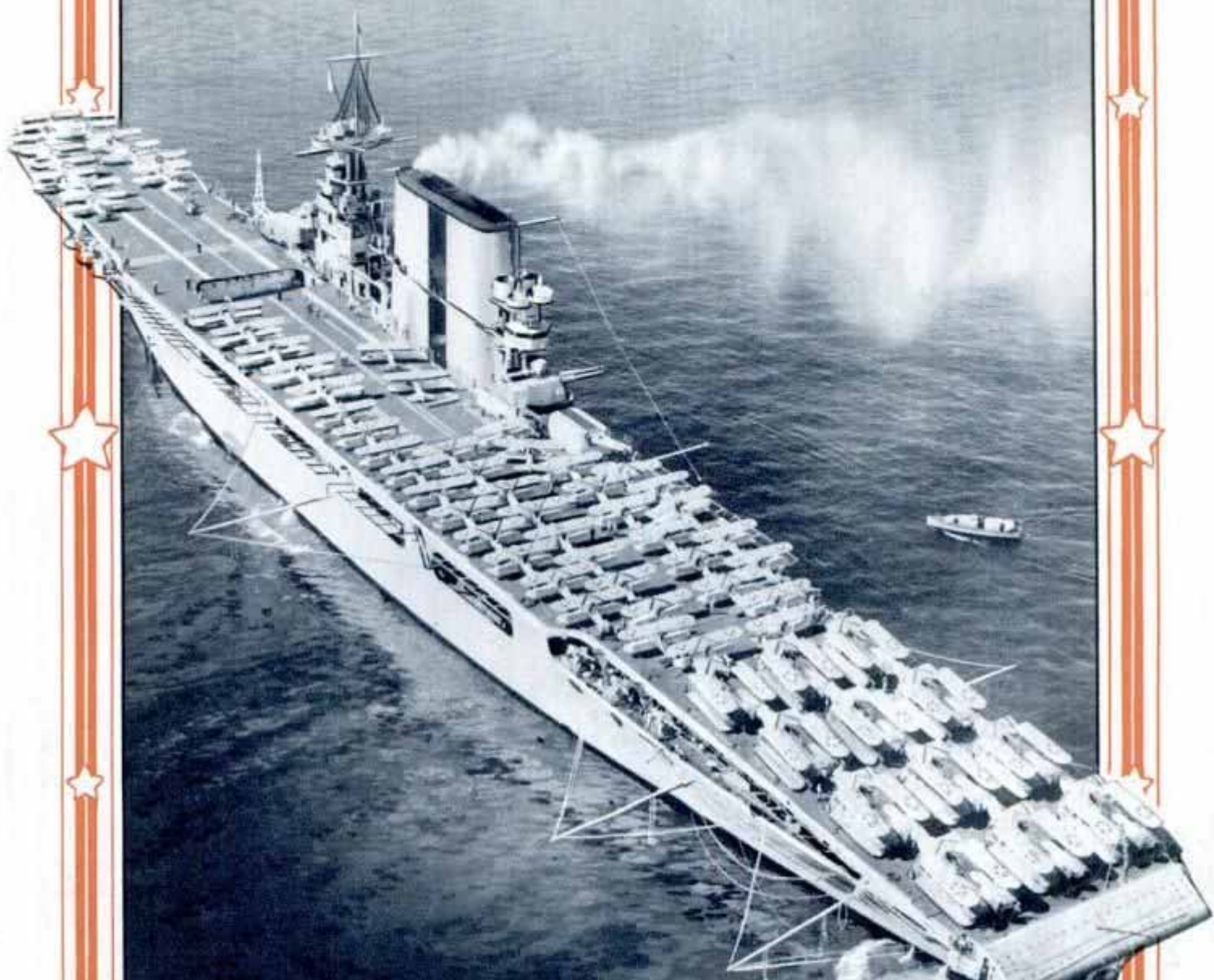
Unlike their older sister ships, the new cruisers will have no foremasts. The masts are being replaced by tiers





SOME of the mighty guns of the U. S. S. "Pensacola," one of Uncle Sam's sea-going watchdogs. (Photo from Ewing Galloway)





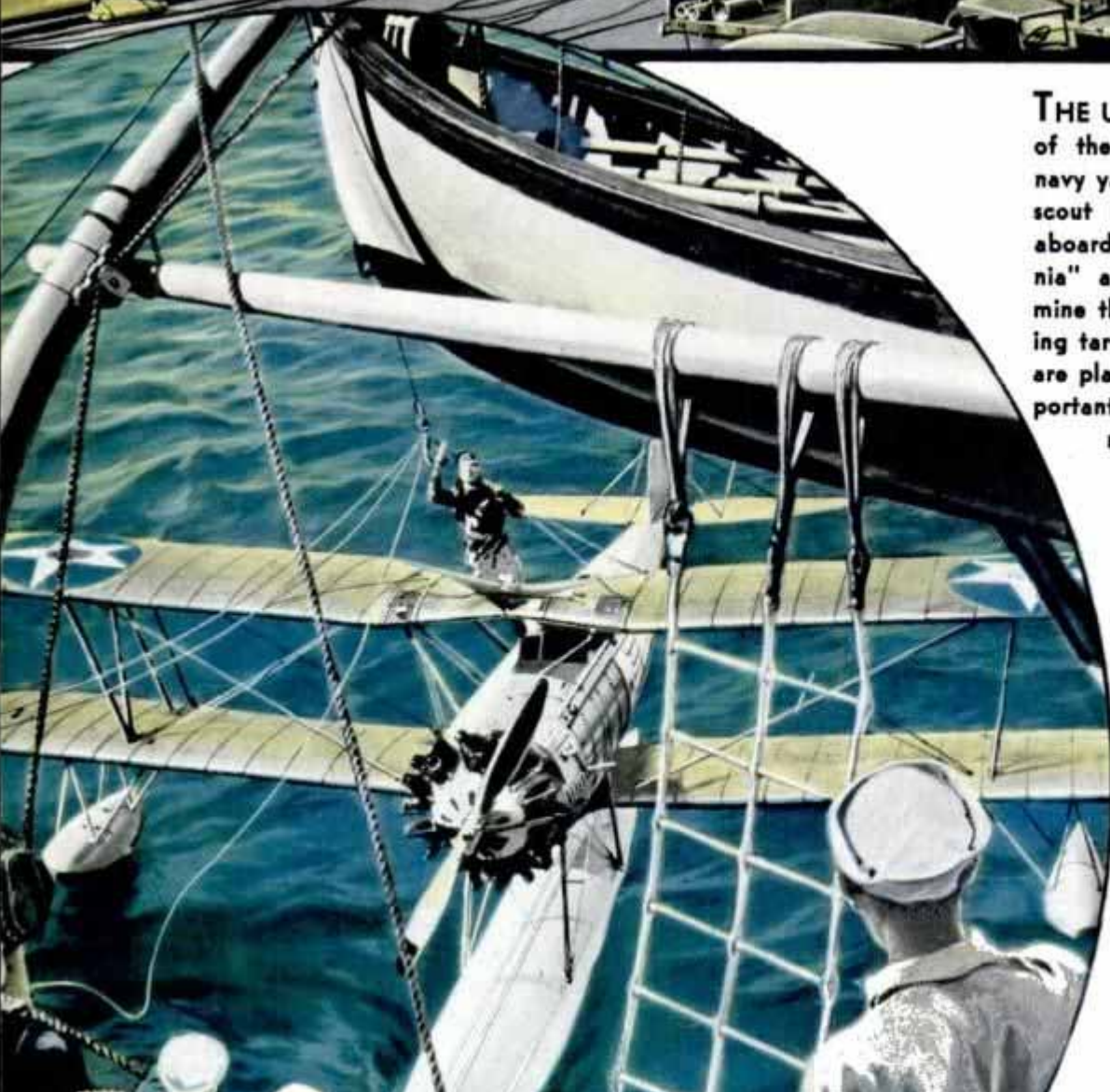
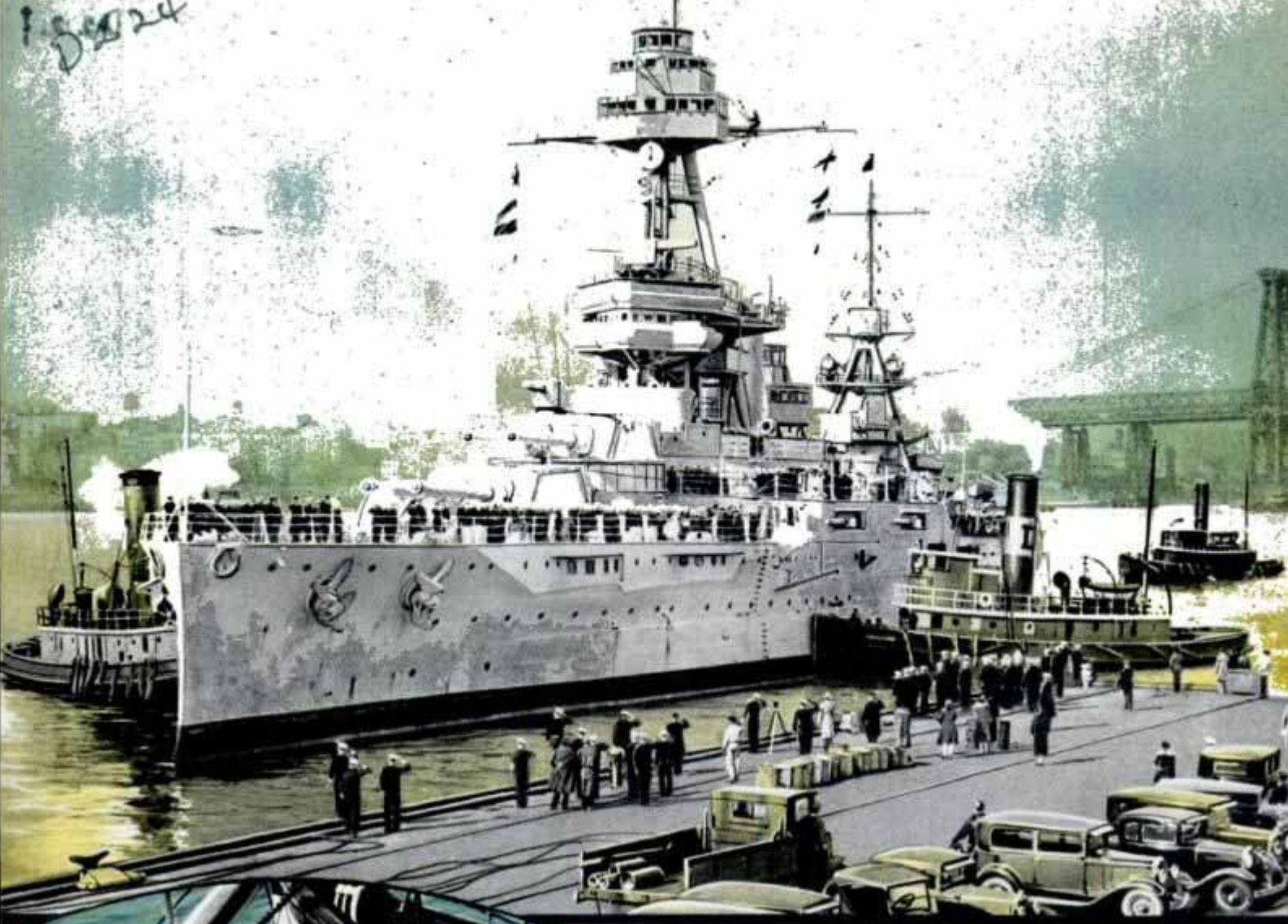
**AIRPLANES** on the huge landing deck of the "Saratoga," one of the navy's aircraft carriers. Another similar ship is planned.

of bridges and fire control platforms rising in a mound in front of the forward stacks. The new aircraft carrier "Ranger," with 120 planes on board, will join the fleet on the east coast, as will the new submarines "Cachalot" and "Cuttlefish" and the new 1500-ton destroyers "Farragut," "Dewey," "Hull," "MacDonough," and "Worden." With these additions the fleet will consist of approximately 110 ships, not counting those assigned to outlying stations. After the modernization of the battleships

"New Mexico," "Mississippi," and "Idaho," every unit will be in first-class fighting shape.

Construction has started on the 10,000-ton eight-inch gun cruisers "Quincy" and "Vincennes," the 20,000-ton aircraft carriers "Yorktown" and "Enterprise," four 10,000-ton six-inch gun cruisers of the Savannah class, eight 1850-ton destroyer leaders, nineteen 1500-ton destroyers, four fleet submarines, two coastal gun boats, and a fleet of multi-motored flying boats.



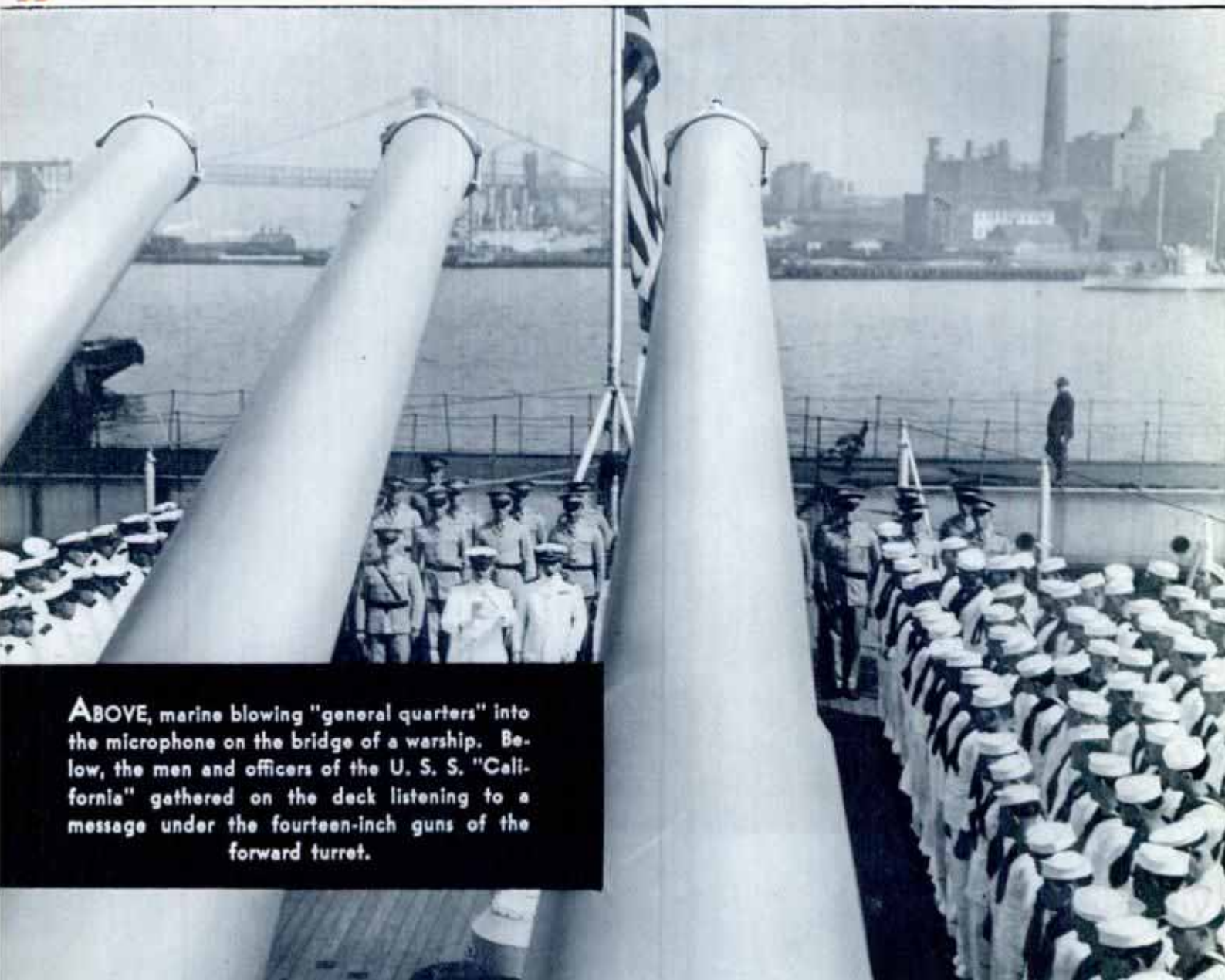


**THE U. S. S. "Texas,"** flagship of the fleet, arriving at the navy yard in Brooklyn. Left, a scout plane being hoisted aboard the U. S. S. "California" after a flight to determine the gun-firing range during target practice. Airplanes are playing an increasingly important part in the development of the navy.



Under present plans, the fleet will be built to full treaty strength by 1940 at a cost of more than one billion dollars. The new fleet will consist of 240 ships and 2100 aircraft, which, because of their increased effectiveness, will be superior to the 1919 Navy, when 559 ships were in service.

En route to the east coast, the fleet is under orders to conduct the most ambitious war game yet devised. Officially designated as "U. S. Fleet Problem XV," it includes an attack against the fleet by submarines based at Panama, scouting operations in the Caribbean between two parts of the fleet, and a general battle



**ABOVE**, marine blowing "general quarters" into the microphone on the bridge of a warship. **BELOW**, the men and officers of the U. S. S. "California" gathered on the deck listening to a message under the fourteen-inch guns of the forward turret.





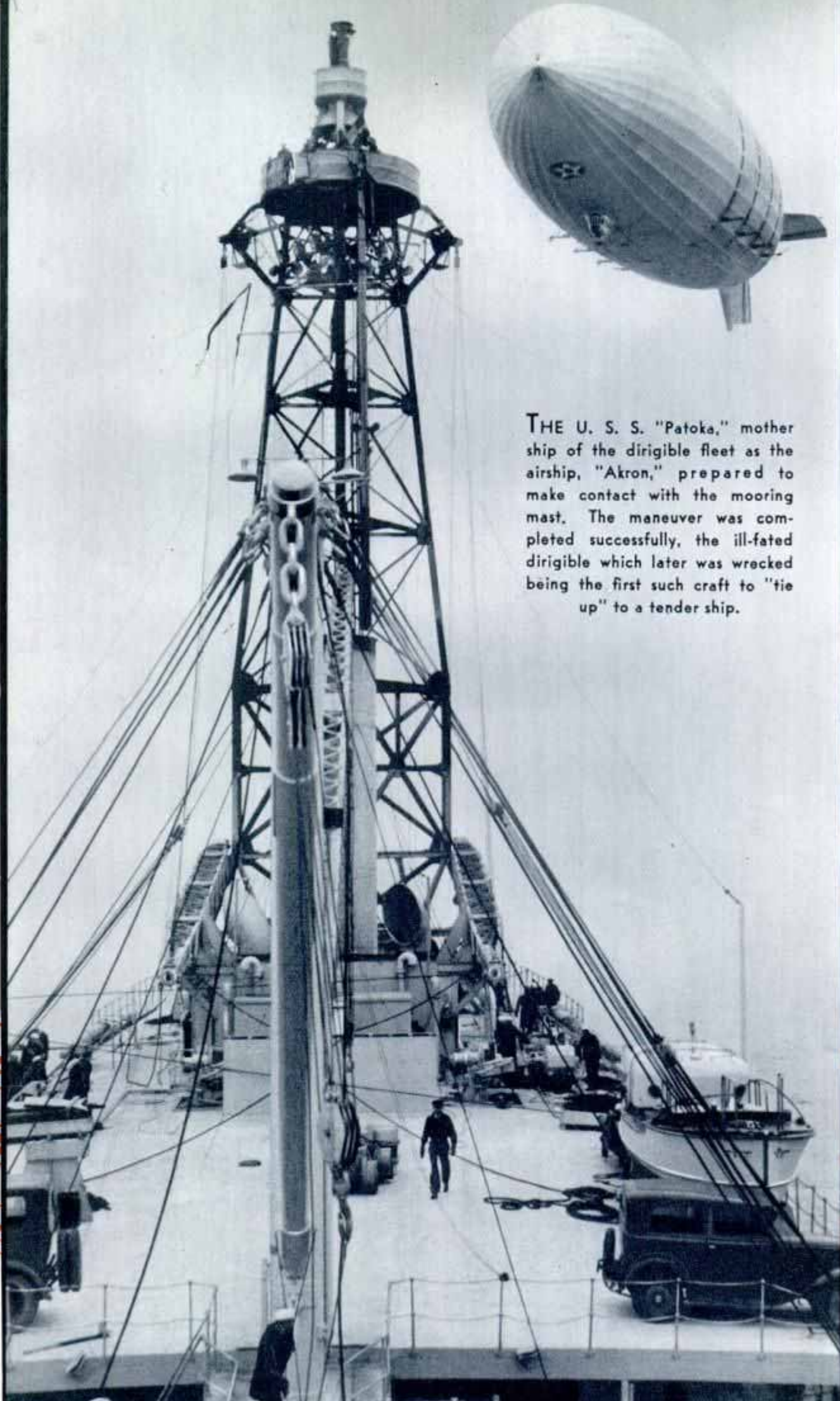




**ABOVE**, at left, lined up for inspection on board the U. S. S. "Oklahoma" during recent maneuvers. Above, right, Uncle Sam's battle fleet as seen from the deck of the "California." Below, left, sailors "seeing the world" at Miami, Fla., during shore leave after a three months' cruise. Right, one of the navy's fighting boats takes time out for an inspection and overhauling. This is the 10,000-ton battle cruiser, U. S. S. "Salt Lake City," as she appeared in dry-dock at the Philadelphia navy yard. The United States has fewer modern warships than either Great Britain or Japan but the naval construction program will make it second to none and bring it to treaty strength by 1940.



D22



THE U. S. S. "Patoka," mother ship of the dirigible fleet as the airship, "Akron," prepared to make contact with the mooring mast. The maneuver was completed successfully, the ill-fated dirigible which later was wrecked being the first such craft to "tie up" to a tender ship.







D224  
**ABOVE**, plane being catapulted from deck of the U. S. S. "Oklahoma." Left, gunners' mates with the five-inch anti-aircraft battery on the "California."

exercise in which all units will participate. The airship "Macon" will take part in the program at Panama, then return to its California base. On June 1 the fleet will be reviewed by President Roosevelt in New York as it steams up the North River. After visiting other ports, it is scheduled to return to the Los Angeles-San Diego area about November 15.

When Commander-In-Chief David F. Sellers orders the fleet on one of its regular practice cruises, fifty thousand fighting



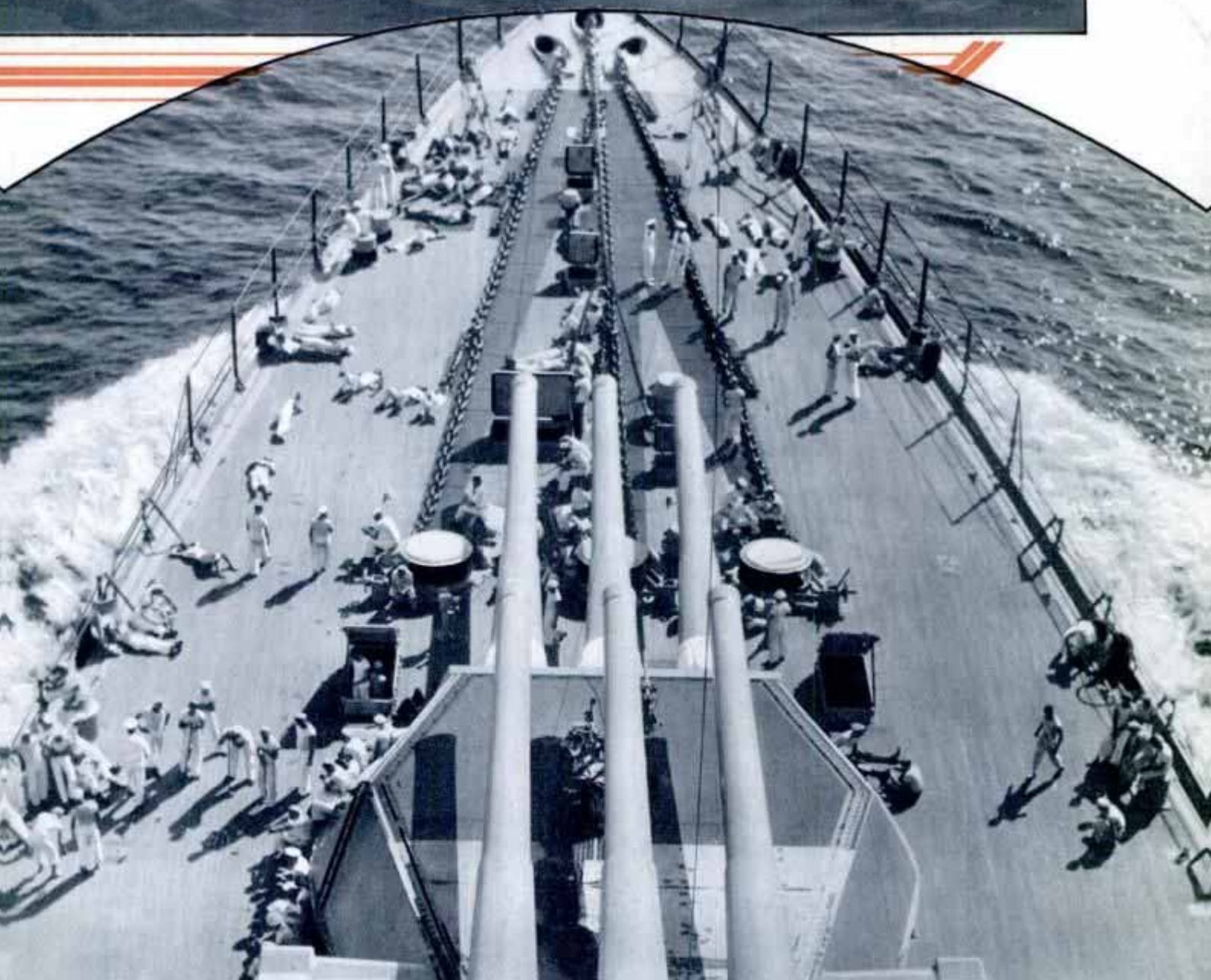


**ABOVE**, one of Uncle Sam's warships during recent maneuvers. Left, the V-4, world's largest submarine on its maiden journey to join the United States battle fleet. At the end of 1933 the United States had only forty-five submarines to sixty-three for Japan and thirty-one for Great Britain. Four more submarines are being built as part of the navy program.





**A**BOVE, navy plane speeding up for the takeoff. Below, sailors enjoying deck games aboard the U. S. S. "California" during fleet maneuvers a few months ago.





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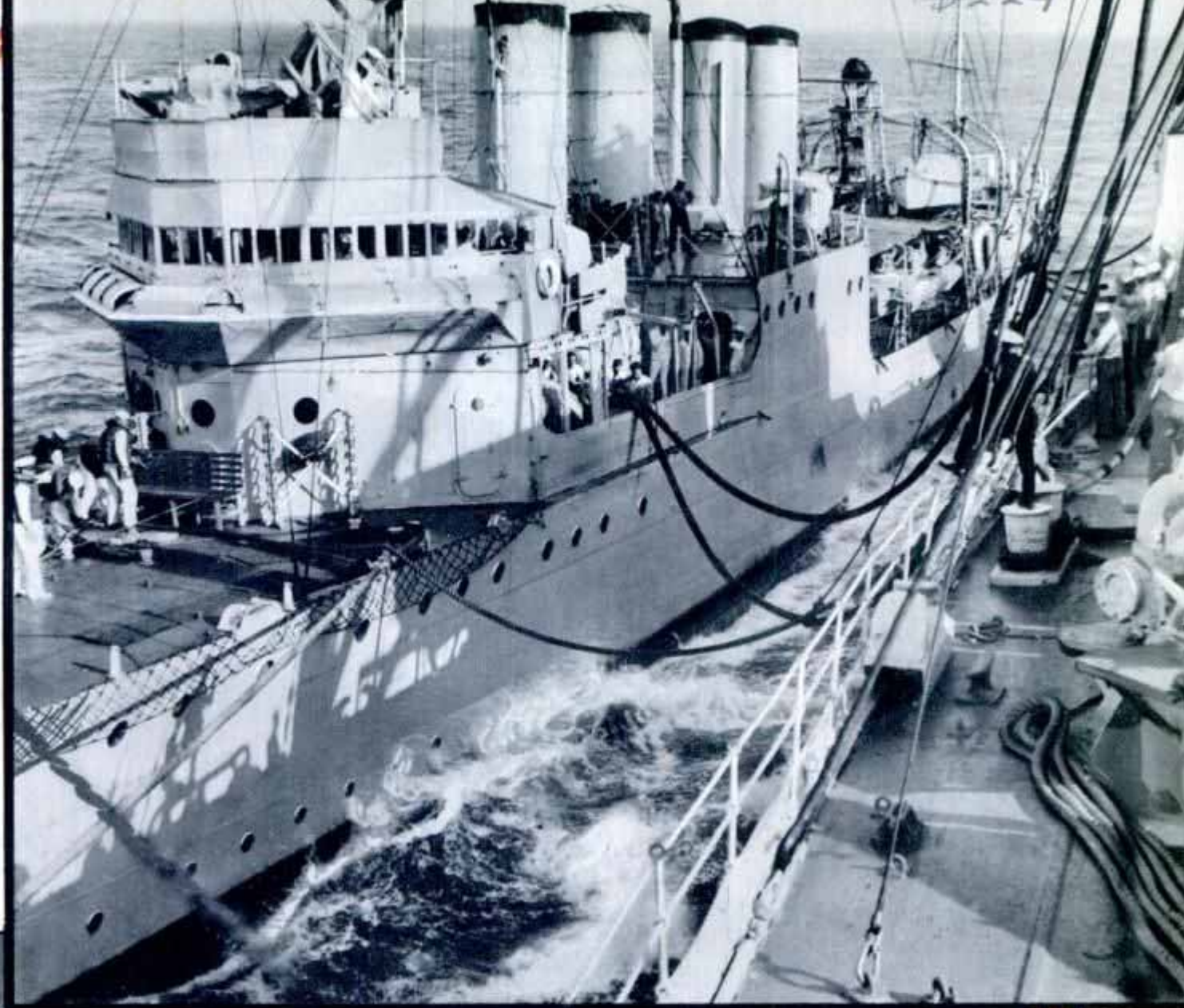
**HERE** is a head-on view of the U. S. S. "Arizona" as she runs at top speed.

men and a half million tons of steel take part in the grim rehearsal of war. Every act of actual warfare is simulated and half the fleet is pitted against the rest. Mine sweepers clear a channel through the mine field assumed to be laid around the anchorage. Destroyers and airplanes search the waters for submarines. Then the

ships file out. Paravanes, miniature under-water airplane-shaped dredges armed with cutting blades, are hung from the bows of the ships to ward off any mines the sweepers had missed.

From the "Colorado" in the center of the "Blues" fleet one looks ahead at the masts and squat turrets of the  
*(Continued on Page 122-A)*





ABOVE, one of Uncle Sam's destroyers taking aboard oil and other supplies at sea from tanker alongside, thus eliminating the necessity for a long trip to port. Below, an air view of the plane carrier, "Lexington."



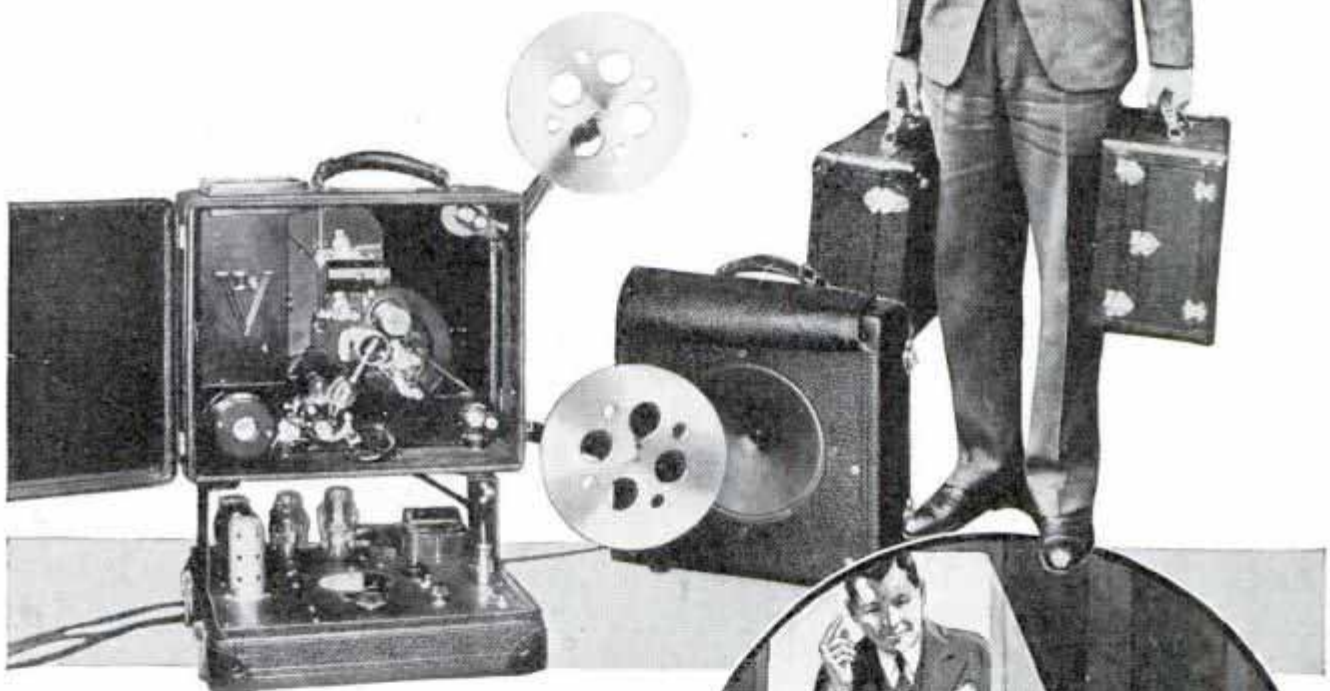


**HERE** is a new cruiser, the U. S. S. "Minneapolis," going down the ways and into the water as it was launched at the Philadelphia navy yard a few months ago. This was the thirteenth cruiser to be laid down of the eighteen permitted the United States under the provisions of the naval treaty.



# Sound-on-Film Projector Built in Suitcase

So compact that it fits into two suitcases, a new sixteen-millimeter sound-on-film projection outfit has volume sufficient for an audience of 1,500 persons. The quality is said to be equal to that of large theaters. The projector and amplifier form one unit, the projector fitting over the amplifier during projection. The outfit runs all size reels from 100 to 1,600 feet. The reel arms fold inside the case when not in use. A 750-watt lamp, with an improved optical system, gives a picture

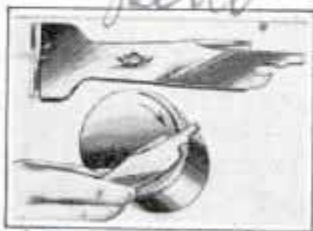


Top, Carrying "Talkie" Outfit Pictured at Left; Bottom, One Use of Light-Weight Projector

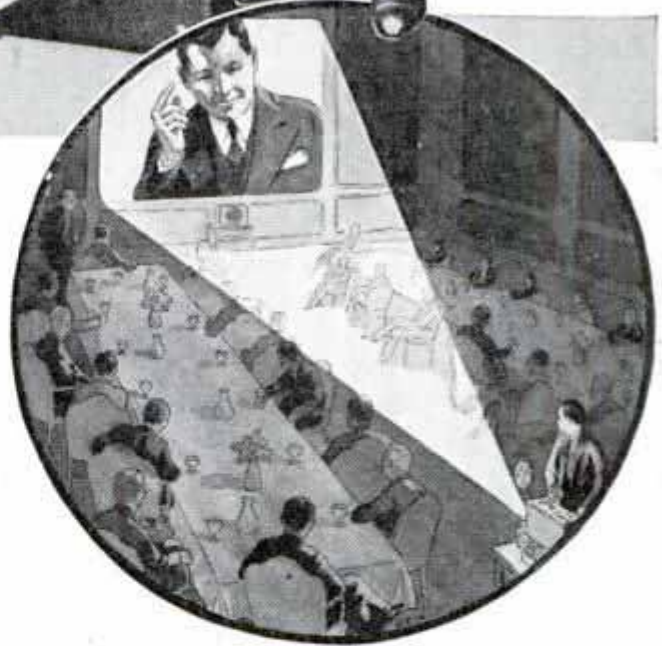
more brilliant than many thirty-five millimeter projectors. The outfit also may be used for silent motion pictures.

## D286 HANDY KITCHEN TOOL USES OLD RAZOR BLADES

Old safety-razor blades are employed in a handy and inexpensive kitchen tool which has half a dozen uses. It consists of a metal holder, in the end and side of which blades can be inserted by tightening a thumb nut.



As a scraper the tool can be used on kettles, windows and in removing paint. The



side blade can be used as a knife for peeling potatoes or ripping seams. One end forms a screwdriver or ice pick. There is also a bottle cap remover and, by hooking a spur over the outside of a tin can and puncturing the top, the tool can be used as a can opener.

Baum's Metal Specialties  
1523 N. W. 11th St. K. O. 27



*Walter E. Goodrich*  
*32 Florida Ave*  
*Akron, Ohio*

# Vast **NEW** FIELDS

*American anode - B. F. Goodrich Co. Akron, Ohio*



B. F. Goodrich company of Akron became interested in the discovery, and brought about the joining of the pioneer companies in the formation of American Anode, which has its laboratories at Akron.

Latex is a milky fluid collected from the bark of rubber trees. If left alone for a time, it coagulates into a sticky mass.



**B**BETTER fountain pen sacs, more durable gloves, superior dish racks and dozens of other articles in which rubber is a chief ingredient, are resulting from the anode process, as the revolutionary electrical method of depositing latex-rubber compounds on molds is called.

Left, Dish Rack Illustrates Intricate Forms That Can Be Covered with Rubber; Right, Sandblaster's Helmets; One at Right Is Rubber Covered

This process has had a romantic origin and growth in laboratories at Budapest, Hungary, Rochester, N. Y., and Akron, Ohio. Dr. Paul Klein and Dr. Andrew Szegvari, working in Budapest, found that rubber from natural latex can be deposited on molds by the action of tiny electrically charged particles known as ions. Similar observations were made at about the same time by Dr. S. E. Shepard and Dr. L. W. Eberlin of the Eastman Kodak company at Rochester. The

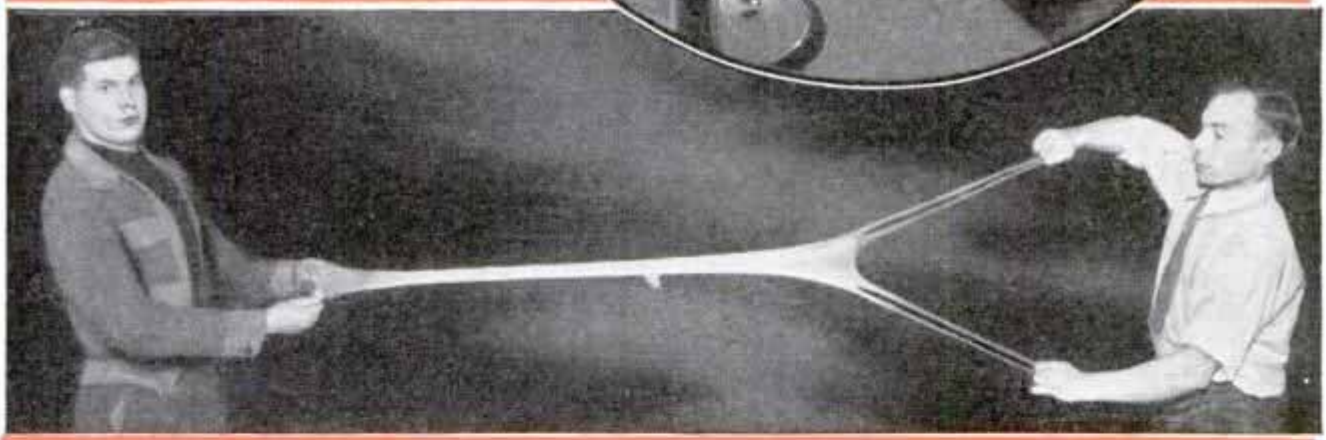
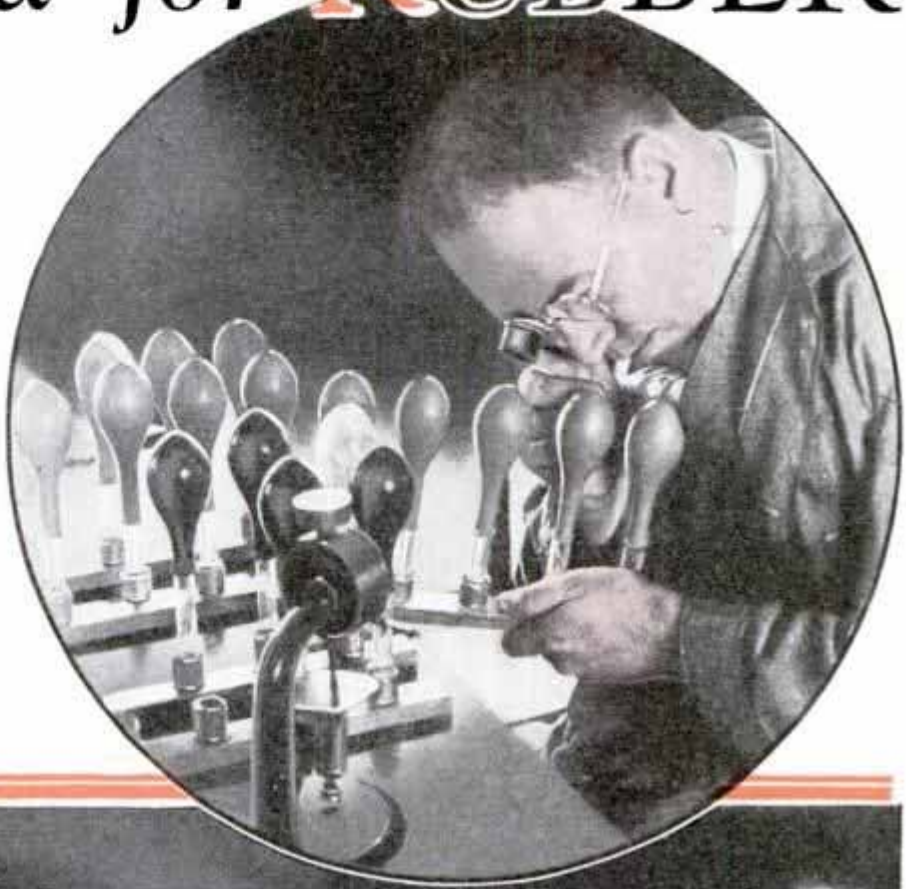
When the latex is to be employed in the anode process, ammonia is added to it to give the particles of latex, charges of negative electricity. Because like electrical charges repel each other, the particles stay apart, and no coagulation results.

When other materials are mixed with the latex preparatory to the manufacture of some rubber product, care must be taken that each substance added will be negatively charged when in suspension in the



# Opened for RUBBER

"mix." When the galvanized-iron mold or anode is in place and all of the necessary chemicals are at their posts in the latex mix contained in a three-section tank, the chemist throws a switch. The process opens with a battle scene. Out rush positively charged ions of hydrogen and zinc, propelled from the anode by the electric current. Their mission is to break up the mad movement of the negatively charged particles in the latex mixture.



Top, Looking for Flaws in Toy Balloons; Center, Stretching Anode Glove to Ten Times Its Original Length; Bottom, Numbered Strip on Anode Electrician's Glove Is Punched to Record Inspections

Zinc particles clash with tiny globules of rubber carrying negative electricity. The positive charge on the zinc neutralizes the charge on the rubber. The latex globule still keeps up its mad dance, but it is drawn toward the anode mold. It bumps into another rubber particle that has been shorn of its charge. They stick together. They are joined by defeated particles of sulphur, coloring material and whatever else goes into the final product. This is happening all over the anode at once. The result is that there is built up on the gal-



vanized surface a layer of uncured rubber compound from which all but about forty per cent of the water is squeezed by action of the electric current.

Deposits of almost any thickness can be produced. Hard rubber, soft rubber or any intermediate kind can be deposited electrically. A wide range of colors is possible.



The anode process is helping to save human life through the medium of better surgeons' gloves. Anode rubber gloves having roughened surfaces are being manufactured. Ice cubes, instruments and body tissues can be grasped with them without difficulty. Such gloves do not crack or become stiff with age; and their strength, compared with that of the



Rubber-Plated Basket of Centrifugal Extractor; Right, Gloves Resist 10,000 Volts

All Parts of This Shoe Except the White Trimmings Were Made by Ionic Process

If the galvanized iron or solid zinc anode is replaced by a hollow, porous porcelain form filled with a salt solution and containing a metallic electric terminal, the rubber is deposited on the surface of the porcelain, no matter how intricate the form. Zinc or zinc-coated metal electrodes gradually roughen and become pitted, necessitating re-polishing or re-plating; but porcelain shows no such wear. It does become polarized after a period of use, but can be restored to normal by passing an electric current through it in the opposite direction.

Anode rubber is stronger than rubber that is produced by the conventional method. It has no grain. It is easy to make, by the electrical process, rubber that will withstand a pull of 6,700 pounds per square inch.

Small balloons such as those used for toys and for sounding upper air currents are being made by the anode process. The rubber is deposited on the mold to the desired thickness in a few seconds.

older product, is surprising. Among the articles now being made or covered by the anode method are:

All-rubber articles—household gloves, electrician's gloves, acid gloves, industrial gloves, pineapple pickers' gloves, hot-water bottles, throat bags, rubber molds, diaphragms, fountain syringes, drainage tubing, rubber thread, bathing caps, women's rubber galoshes (zippers), men's rubber shoes, children's boots, women's low rubbers, all-rubber corsets, panels for fabric-rubber combination corsets, toy balloons, pilot balloons, sounding balloons, rubber boat bladders, float bag bladders, various surgical applicators.

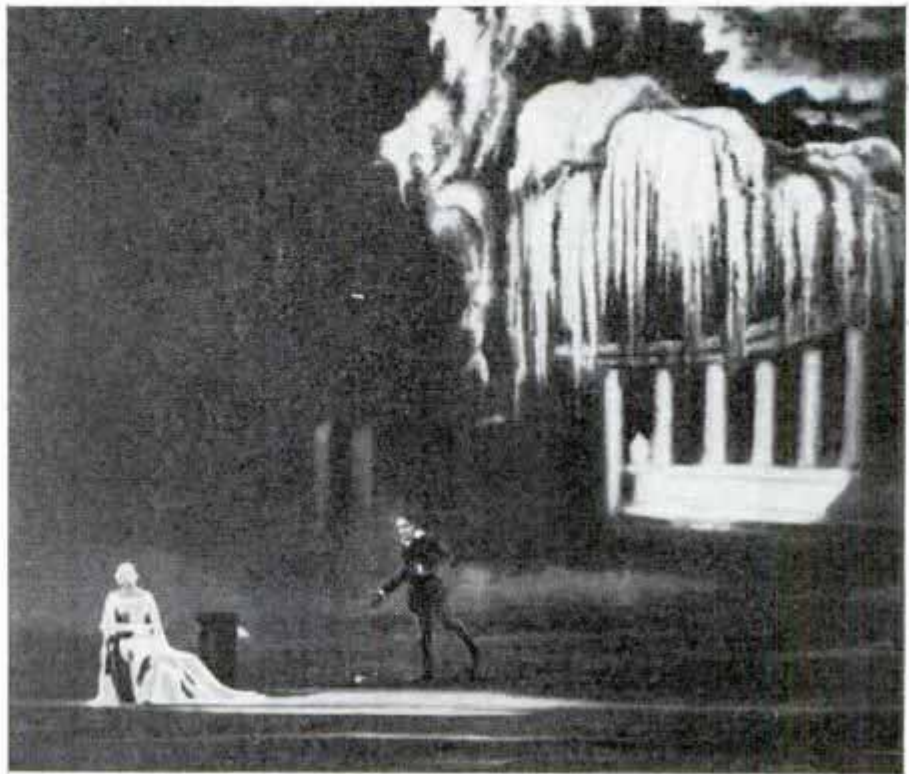
Rubber-covered articles—wire screen, plating baskets and racks, electric wire, dish-washing-machine baskets and a host of miscellaneous items used where abrasion or corrosion must be resisted.

The future of the anode process is one about which rubber chemists and engineers hesitate to make predictions because the field is so vast in its possibilities.



# Stage Scenery Is Supplied by Lantern Slides

Paris theatrical producers have substituted color projections from lantern slides for the expensive stage scenery heretofore necessary in presenting operas and similar spectacles. No stage decorations are used, all the backgrounds being projected in colors on a curved "horizon" at the back of the stage. In this manner, the entire scenery for a complete opera can be carried in a small box. Two kinds of projection have been tried. In one, the background is projected on a flat white screen, but this is not as effective as when the curved screen is employed. For the latter, three projectors are placed side by side behind the stage and careful adjustments are necessary to obtain continuity in the pictures and counteract distortion.



Color Projections from Lantern Slides Form the Background for This Stage Setting, Thus Eliminating the Need for Elaborate Scenery

## ONE-WHEEL "SWITCH" ENGINE MOVES FREIGHT CARS



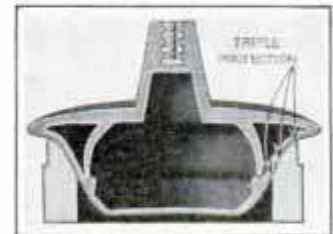
How Small Shunting Engine Enables One Man to Move a Loaded Freight Car

Equipped with a single, rubber-tired wheel, the latest engine for moving freight

cars over short distances has only six horsepower. It operates on ordinary commercial fuel and may be handled by one man, thus reducing the number of workers required to move freight cars by hand. A smaller wheel, directly in front of the large rubber-tired wheel, makes it possible for the operator to drive the engine across tracks without effort. It was made by German engineers.

## TANK BALL IS TRIPLE SEAL

Triple sealing action is claimed for a new water-tank ball designed for efficient operation of plumbing fixtures. The ball is made of pure rubber stock, shaped so that the action of the water forces the ball firmly into place over the outlet even when the seat of the outlet is pitted from corrosion or encrusted with scale.



Our Bureau of Information will answer questions regarding articles in this magazine, if accompanied by return postage.

*The Dayton Machine Works*  
*Radiator Specialty Co.*

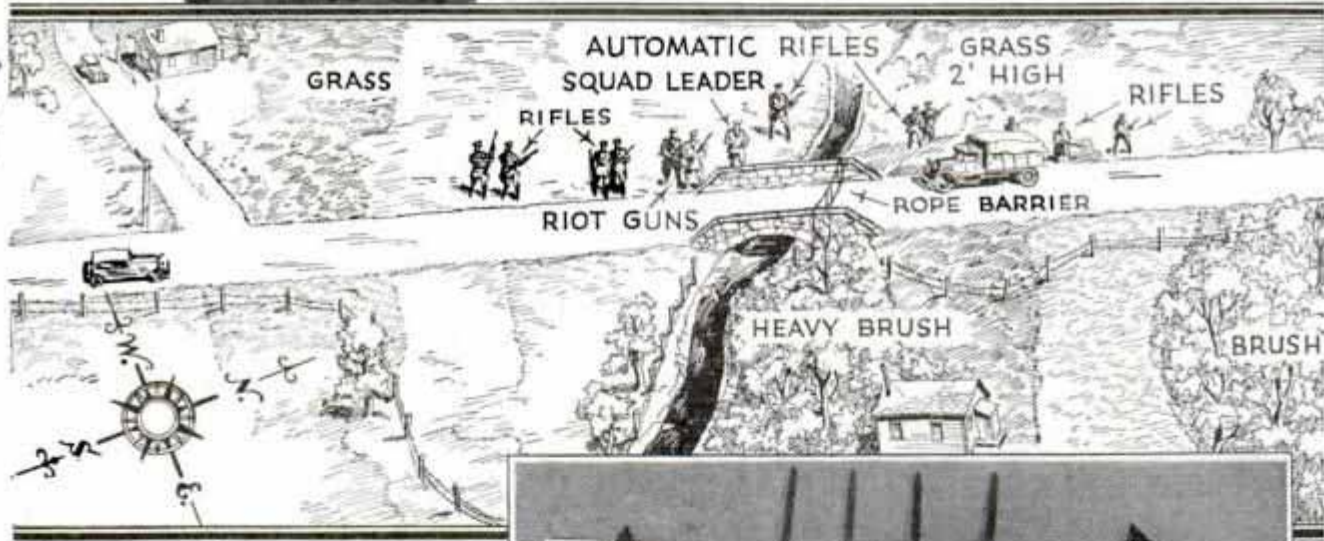


# U. S. Army Prepares for War on Criminals



ization adapted to thwarting jail breaks and capturing bank robbers. Rifle companies have been converted into a company commander's squad, three riot squads, two machine-gun squads, and a supply squad, each squad being trained especially for certain work. The company commander's squad is armed with two sub-machine guns, two automatic rifles, two Springfield rifles with bayonets, two shotguns and one automatic pistol. All eight men are sharpshooters. Men armed with the shotguns and rifles are also equipped with gas masks, tear-gas grenades and smoke candles. The method of blocking a road to prevent the escape of criminals is a typical problem for the organization. The point for the barrier may be a large culvert, which, due to low ridges on each side, can not be seen by an approaching car 150 yards away. The barrier may consist of 100 feet of two-inch rope,

*Comd. Robert W. Gordon  
1115-17th St. N.W., Washington  
D.C.*



Top, Member of Anti-Crime Detail Ready for Action; Center, Diagram of Road Barricade; Bottom, Weapons of Crime Fighters

Joining local authorities in a war on racketeers, kidnapers and bank robbers, the United States government plans to use every force at its command, including the army. Methods of training to combat gangsters have been prepared and published for the information of officers. Maj. Sterling A. Wood, commanding the seventeenth infantry at Fort Leavenworth, Kans., has worked out an organ-



one end of which is tied to an iron post of the bridge. The rope is then laid diagonally

*See page 150 for more*

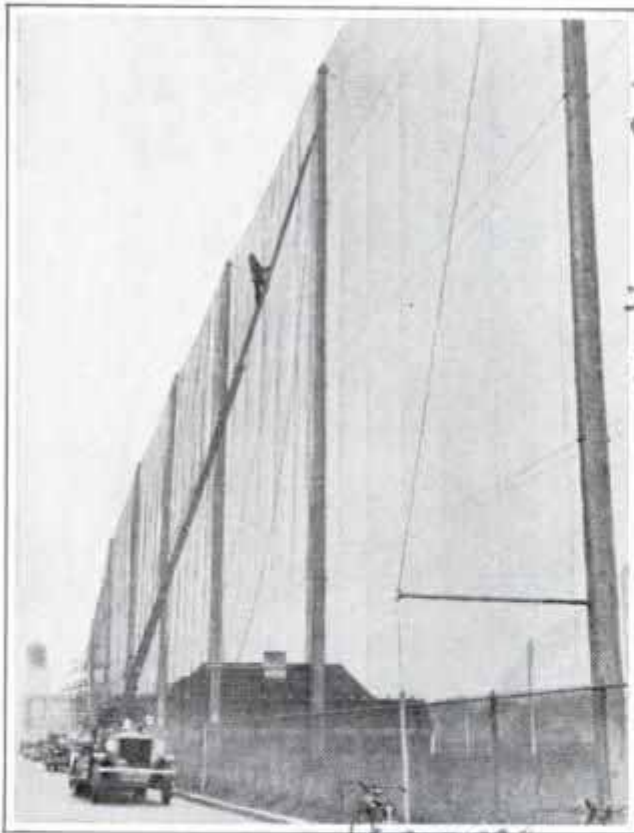


across the road, the loose end fastened to a heavy rock balanced on the edge of the culvert wall. The corporal has a long pole to push the rock off the wall, thus tightening the rope if it becomes apparent that a car does not intend to stop. Owing to the angle at which the rope is placed, a car striking it would be guided into the concrete guard rail of the culvert. The men are distributed on one side of the road so they will not fire into each other. As cars stop they are searched. If gangsters attempt to turn around, fire is opened immediately on the tires of the car. When the car stops, the occupants are ordered out with their hands over their heads. A tear-gas bomb is to be thrown under the car if the occupants fail to obey.

D175

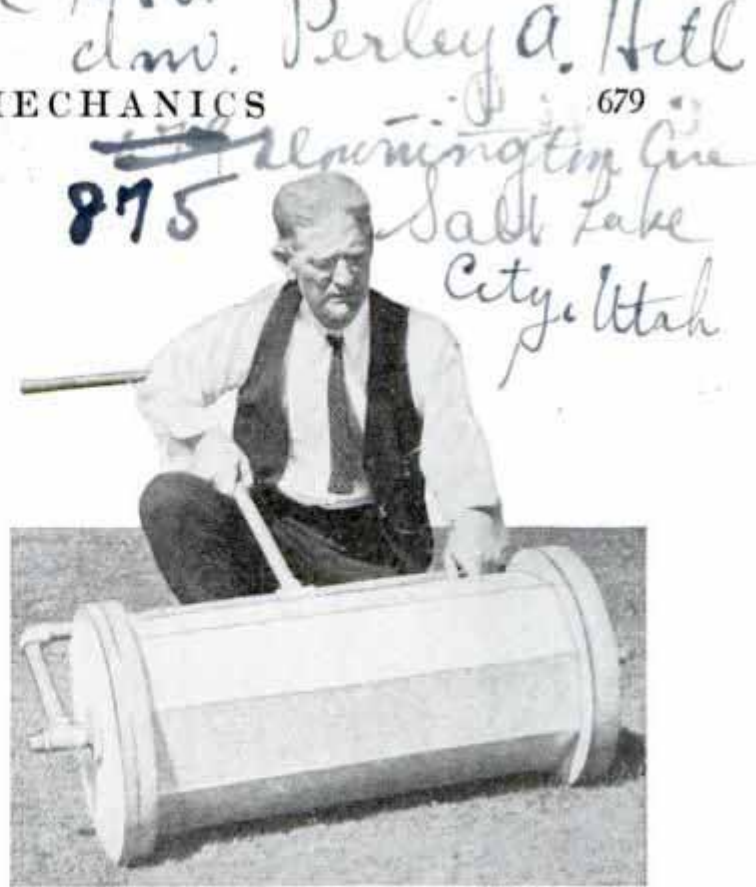
**HIGH FENCE PROTECTS HOMES FROM FLYING GOLF BALLS**

One golf course near Portland, Ore., is surrounded by a wire fence almost as tall as the trees of the neighborhood. It was



Repairing High Wire Fence Surrounding an Oregon Golf Course with Aid of Fire Truck and Ladder

erected to keep flying golf balls from bombarding homes, pedestrians and vehicles in the vicinity. Maintenance work on the fence was solved by employing a fire truck equipped with an extension ladder.



Rotary Seed Planter for the Lawn; the Cylinder Is Perforated with Hundreds of Tiny Holes

**ROTATING SEEDER FOR LAWNS WORKS CLOSE TO GROUND**

Every inch of lawn receives an even amount of seed when the grass is planted with a rolling seeder which works close to the ground and does not allow the tiny seeds to scatter before they reach the soil. It consists of a rotating metal cylinder which is pushed by a handle. The cylinder contains 1,100 holes, so placed that the seed falls evenly over the ground, even when a wind is blowing.

D166

**SAFETY SWITCH STOPS WASTE OF CAR BATTERY CURRENT**

To aid motorists to remember to switch off electrical devices operated by current from the car battery when they are not needed, a safety switch is being offered which gives visual evidence that some device on the car is using current. The switch contains a tiny lamp which glows whenever current is on. It can be attached through the dash.



C. Child, Box 46 73, Kansas City, Mo.

*Chas. Perley A. Hill*  
*875*  
*Washington Ave*  
*Salt Lake*  
*City, Utah*

*Liberty Foundries*  
*of Detroit, Mich.*



c. 1964

motor engine. W  
Nelson, 5406  
Maplewood Dr.  
Belmont, N.C.

# IS THE AGE OF Here's a Chance

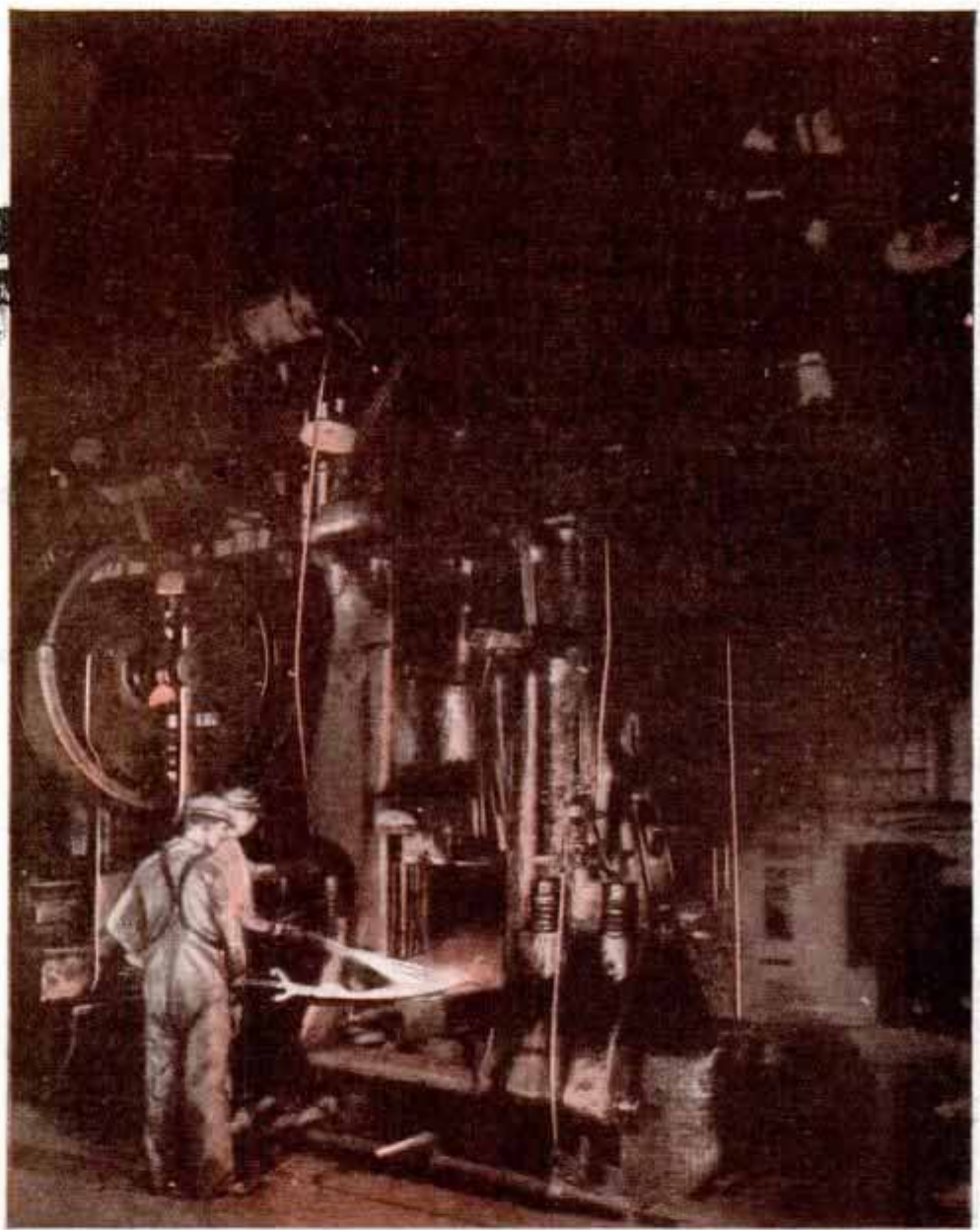


**W**IDESPREAD advances in highway, air, and water transportation through the further development of new steels and light metals, are also seen as forecasting the end of the age of steel and the coming of the alloy age.

The first alloy steel was manufactured commercially less than fifty years ago, when an English scientist added the metal manganese to ordinary steel. This new alloy had such remarkable properties that in a short time many other investigators were experimenting with the addition of other metals to steel.

The result was the long list of alloy steels known today; steels containing manganese, silicon, nickel, chromium, vanadium, tungsten, cobalt, copper, aluminum, and other metals, either used alone or in combinations of two or more of the alloying metals.

Alloy steels have two outstanding advantages. Most of them are stronger and a large number of them resist rusting, staining, and other forms of corrosion,



Forging an Auto Axle with the Aid of a Big Power Hammer Delivering a Blow of 7,500 Pounds

much better than common steel. Many of the alloy steels now used combine both of these advantages.

The advance in alloy steels is summarized by Sir Robert Hadfield of Sheffield, England, inventor of manganese steel and silicon steel, and one of the world's foremost steel makers.

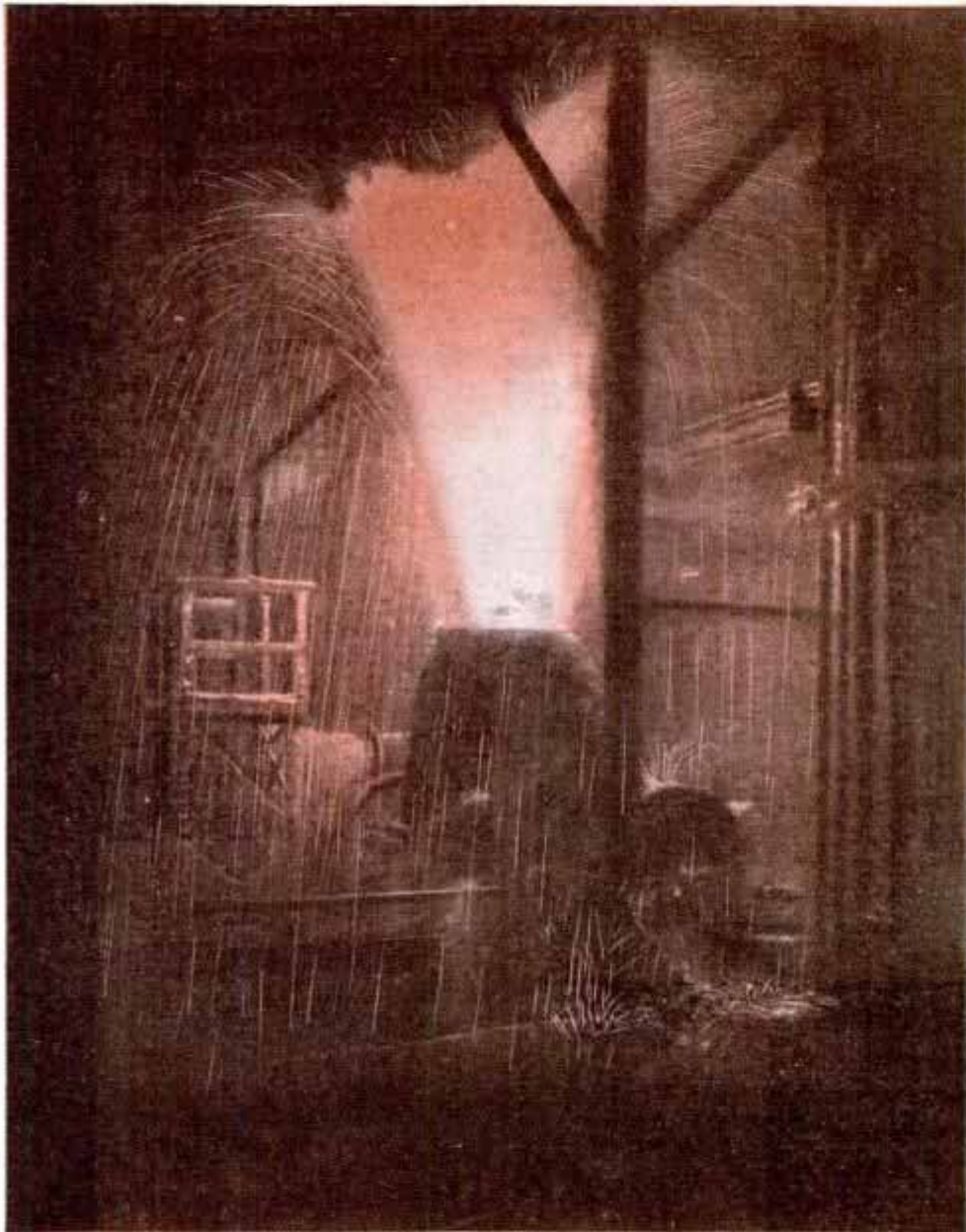
"If a motor car were built to a modern design but with the materials available at the time of the production of the first au-



C1964.

# STEEL PASSING ?

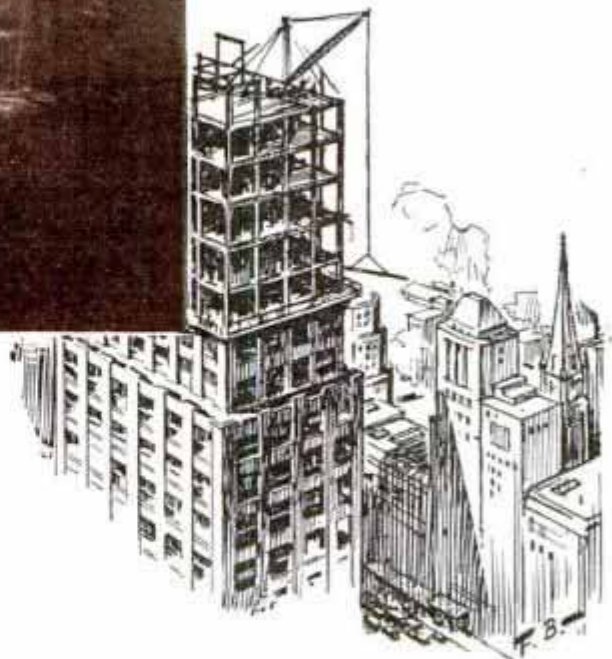
for Inventors



Molten Metal Being "Blown" in a Bessemer Converter

Thirty years ago a steel with a tensile strength of 100,000 pounds to the square inch was considered about as strong as it was possible to make. But this steel was so hard that it was impossible to machine it. Now, by the use of alloys, steels can be given a strength of 200,000 pounds per square inch—twice that possible before the auto—and they can be machined quite readily!

With increased knowledge of the values and uses of alloys, metallurgists have also learned to make the most of other properties which steel has always possessed. For centuries man has real-

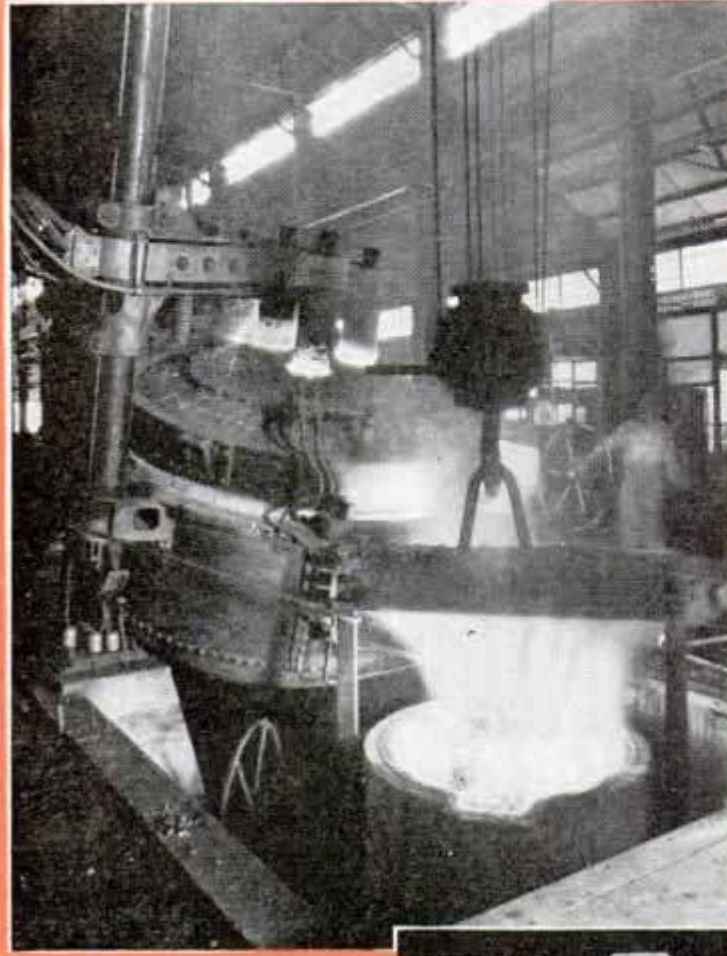


tomobile, it would certainly break down after a few miles running, if, indeed, it would run at all," Sir Robert said.

"On the other hand, if the car were made mechanically strong enough with materials of the early type, it would be prohibitively heavy and costly to run. It is literally true that notwithstanding the advances in the science of engineering design, the motor car as we know it today would be impossible without alloy steels."

ized that a wooden plank has grain and he has put that property to work. He early learned to cut the plank in such a manner that the grain of the wood ran lengthwise.





© Ewing Galloway

This gave the board more strength for supporting loads than when the plank was so cut that the grain ran across it at right angles to the length.

It has taken man centuries to learn this same fact about rolled and forged steel, and it has taken him even longer to find out how to apply his knowledge. In fact, it was not until 1918 that any experimentation was done with the grain in steel. Harry Brearly, a metallurgist who is never content with the old methods, made some test bars from rolled steel. In half of these bars the grain ran lengthwise and in the other half the grain ran crosswise. He broke them and his results showed that nearly twice as much strength was required to break the pieces which had the grain running parallel with the length as was needed for the bars in which the grain was crossways with the length.

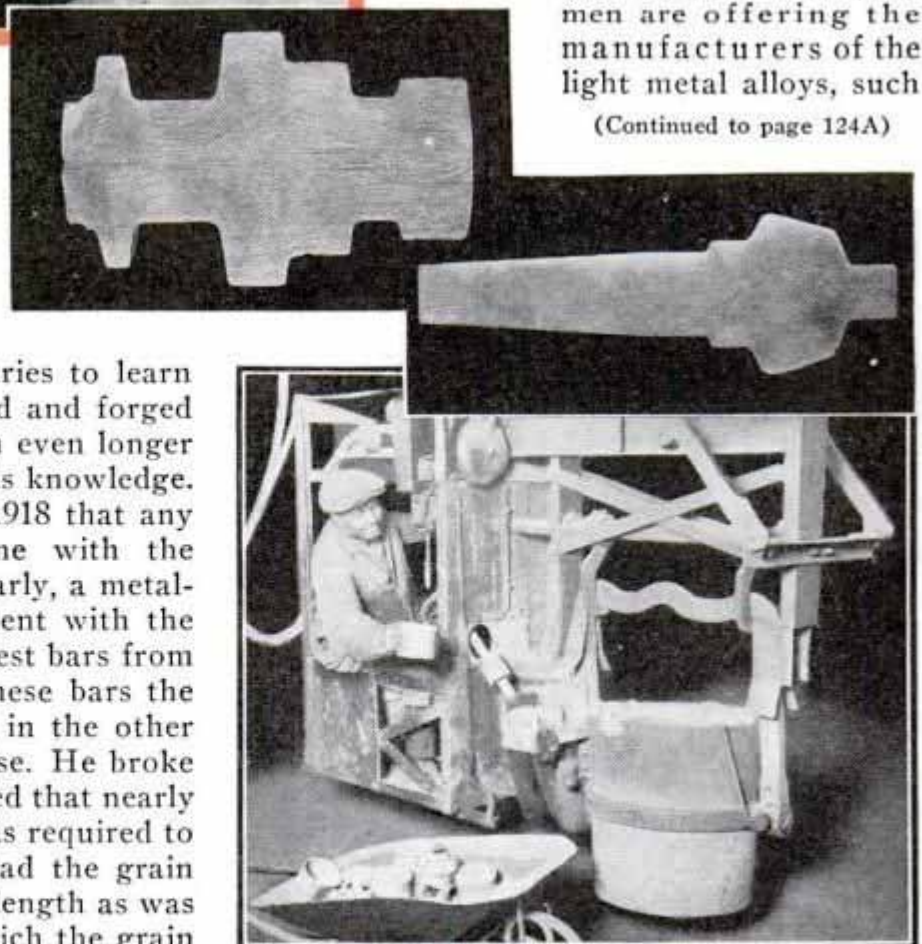
Not only has the metallurgist been called upon to make steels to fit every

need—he has also been required to insure the quality of his product. As a result, the old-style cupola is giving way to the electric furnace. As late as 1910 there was no alloy steel produced in electric furnaces, yet in 1930 some 433,000 tons of alloy steel were made in electric furnaces.

The use of twenty per cent scrap steel has given rise to another important material called semi-steel. It can be handled and poured as easily as cast iron and yet has improved strength and resistance to wear, which is why it is being used extensively in the manufacture of automobile cylinders.

Thanks to the constant demands of the transportation designers, the steel industry has at last awakened from its centuries-long sleep. What the future may bring no one can definitely state, but already the steel men are offering the manufacturers of the light metal alloys, such

(Continued to page 124A)

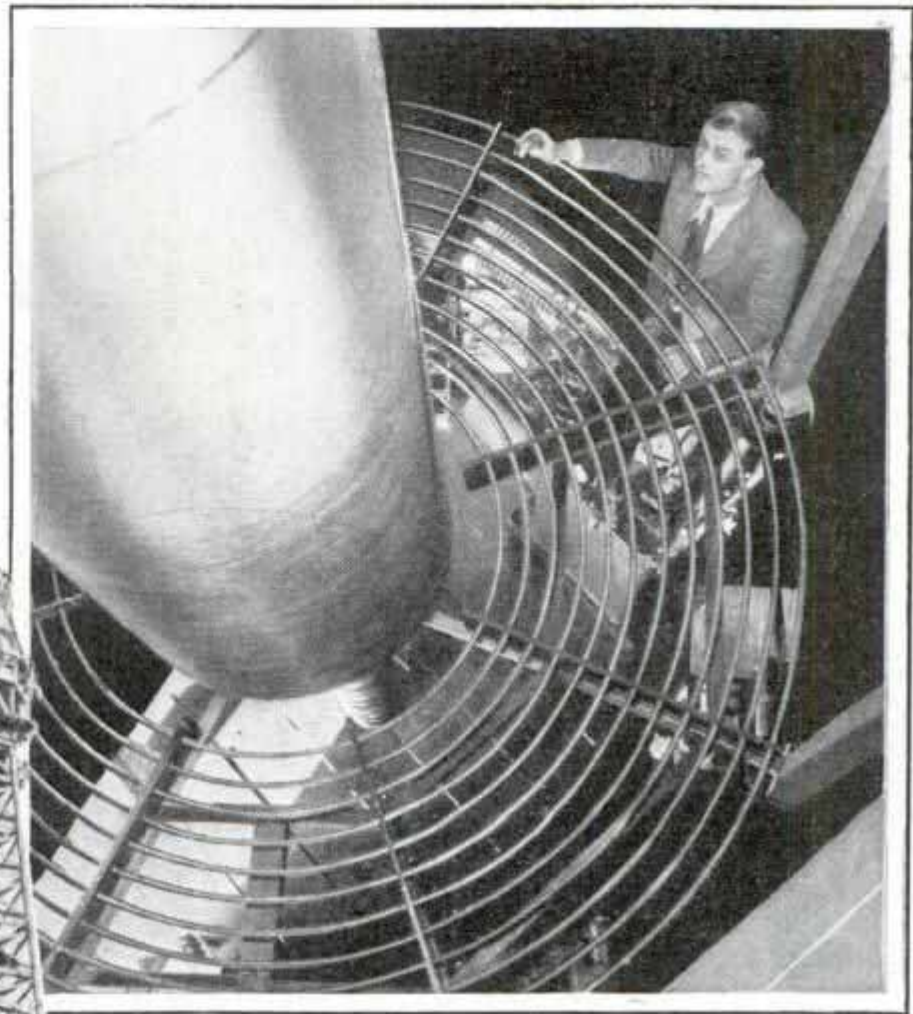


Top, Pouring Molten Steel from Electric Furnace; Center, Sections through Forgings Showing Grain of Metal; Below, Giving Molten Steel a Shot of Nickel



# Tower Flashes High Voltage to Combat Fog

Half a million volts of electricity are projected into the atmosphere from a giant tower designed to help combat fog. The tower is 100 feet high, topped by an electrodome containing a twelve-foot coil for stepping up a 13,000-volt current to 500,000 volts. The inventor claims that the electricity projector will be a great help in clearing



Right, Looking Down from Top of Anti-Fog Tower; Bottom, Full View of Giant Tower



sation. This means that the tower is expected to convert the fog into drops of moisture through forced condensation, resulting in rain and clearing the air.

D 72.

## SCIENCE GETS ONE-THIRD CENT OF EACH FEDERAL DOLLAR

Only one-third cent of each dollar spent by the United States government in the fiscal year ending on June 30, 1934, goes to scientific research. The total cost of running the government this year will amount to nearly \$10,000,000,000, with science and research receiving approximately \$29,500,000. Of course, the ten-billion dollar figure includes emergency expenditures under the administration's recovery program. If these expenditures are left out of the picture, the amount spent on scientific research is less than one cent in each federal dollar.

of Alfred S. Jones, Cleveland  
Sound travels 1,087.13 feet per second.

Computed by Dr. Haykin

above Turnbull Canyon

Science Service 1/10/34

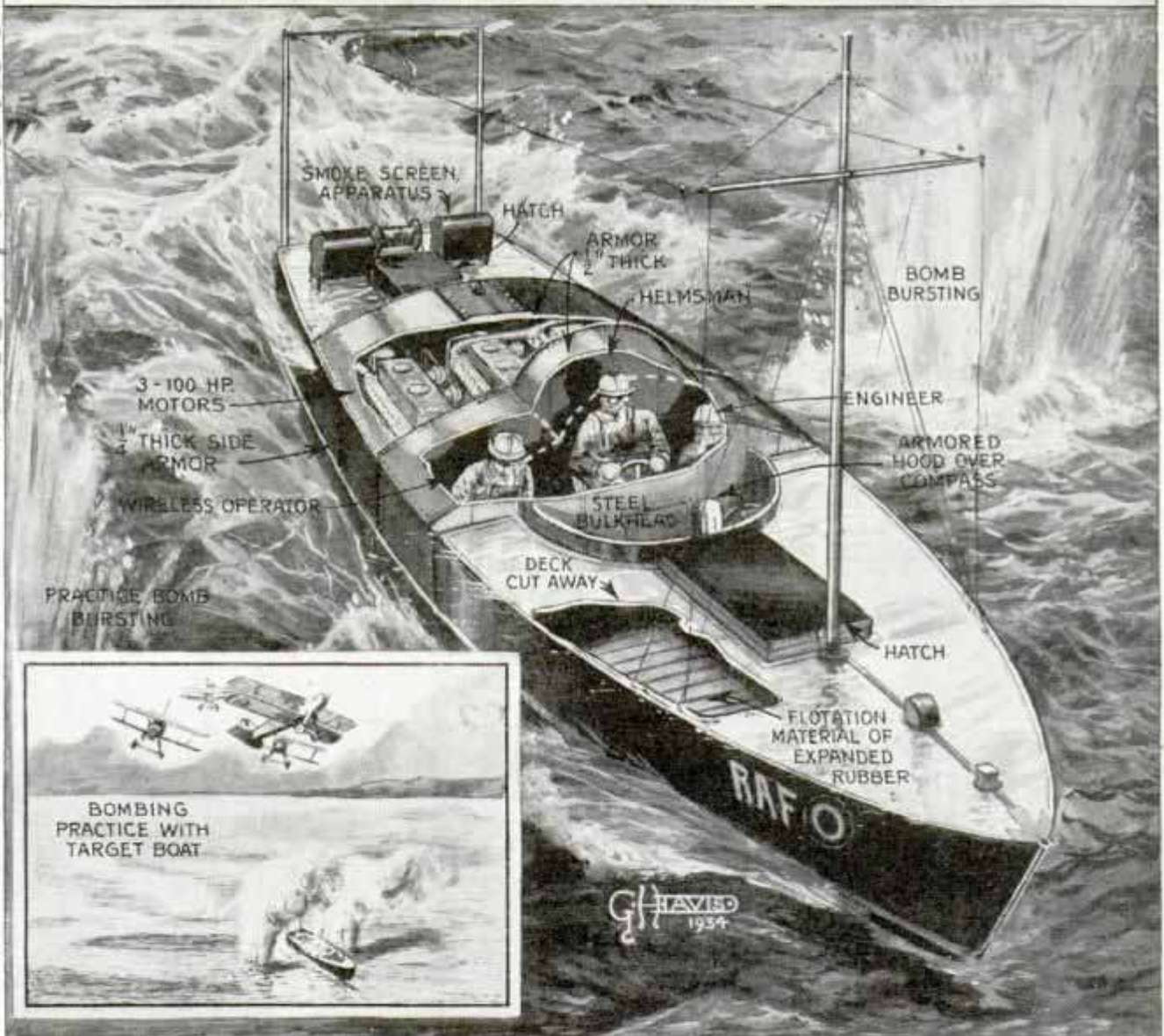
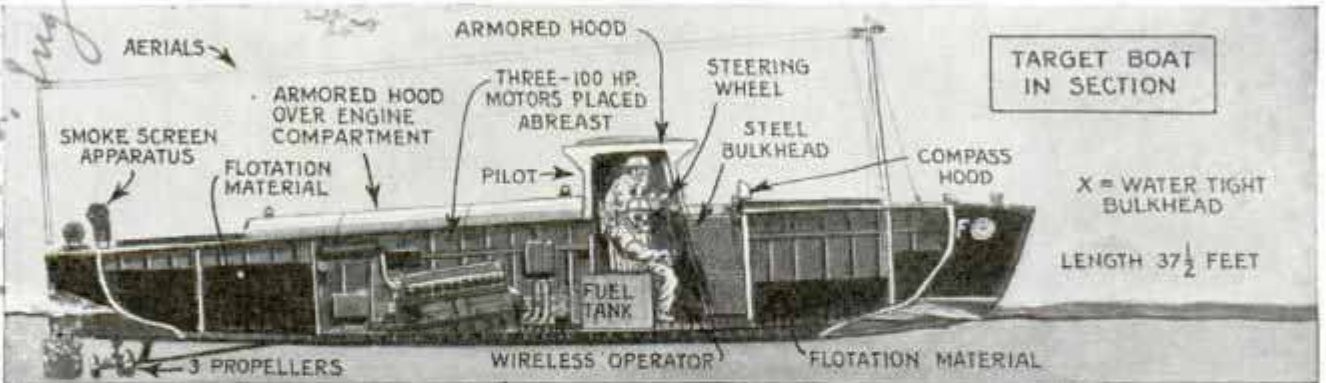
away fog for ships to dock and for planes to land at their respective airports. The tower is said to be effective throughout an area three miles in diameter. Negative current is flashed from the electrodome, going up from six to twelve miles where it meets a positive natural current. This is said to create a vertical rise in energy, buoying up the atmosphere and tending to create a low-pressure area for conden-

Located 3 miles from



# Armored Speed Boat Is Target for Bombers

*Designed and built by Herbert Scott Pine*  
*Comd. Lt. H. Davis, Eng*  
*"Limbers" Helmside Road, Ewell, Surrey, Eng*



Artist's Sketches of Armored Speed Boat Serving as Target for British Bombers; the Crew Is in Touch with the Planes by Radio and Signals a Hit by Releasing a Smoke Screen

Armored speed boats, manned by crews of three and driven by three 100-horsepower motors and three propellers at speeds of thirty miles per hour, are used as targets for British bombing planes. Armor plate mounted on rubber shock ab-

sorbers protects the engine and control space and the crew wears crash helmets and gas masks. A direct hit forward or aft goes right through the thirty-seven-foot boat, which is prevented from sinking by slabs of tightly packed expanding rubber.

*Vertical text on the right edge of the page, partially obscured.*



### DOMES OF SPARKLING CONCRETE WILL LAST FOR CENTURY

One of the five largest domes in the world adorns a religious temple being erected at Wilmette, Ill., near Chicago, but this dome is unusual in more than size, for it is faced with blocks of sparkling concrete which twinkle when viewed in the sun from an airplane. The base of this concrete facing is quartz, an exceptionally strong and light stone. White opaque and crystalline quartz are crushed and mixed with clear white cement. This mixture is then poured into molds, forming a material which will retain its brilliant, scintillating whiteness because of its extreme hardness and imperviousness to moisture. The material used is believed to be virtually indestructible from weathering.

### OFFICER WEARS MIDGET RADIO

Policemen in some parts of England have been equipped with midget radio sets for the reception of orders broadcast



from police headquarters. The attention of the officer is called to the broadcast by a small signal bell which is attached to the miniature set carried beneath his coat. When the bell rings, the policeman claps on the headphones and listens to the latest order.

### LAPPING MACHINE SAVES EDGE OF TUNGSTEN-CARBIDE TOOL

Longer life is imparted to the edge of a tungsten-carbide tool by a lapping machine. Experience has shown that when the edge is lapped, the quality of the finish grinding is not so vital. Principal objections to the lapping of tungsten-carbide tools have been the cost of diamond dust, the material generally used, and the erroneous idea that the dull appearance of the edge when lapped with a less expensive abrasive, used loose on the lapping



Lapping Machine Stands at Height Best Suited to Convenience of the Workman

disk, indicates that the finish is not good. The lapping machine is equipped with a one-half horsepower motor with a speed of 1,200 revolutions per minute. The height of the lapping disk from the floor is thirty-nine inches. Simple attachments make radius lapping possible. A portable lapping machine, for free hand use without sliding tool carriage, also is available.

### NON-SPILL INK CONTAINER

Ink can be removed from a new non-spillable container only by pressing a protected rubber bulb at one end. The ink is forced through a thin tube. A cap with a pin arrangement keeps the tube from clogging. The container is used for waterproof ink to prevent the spoiling of drawings by the overturning of the ink bottle.



Ink Is Squeezed from Tube in Small Quantities by Pressing Rubber Bulb

*S. S. Brown, Decatur, Ill.*

*W. S. Wolf, Syracuse, N.Y.*

*Machine Co. 100 Wolf, D. J. 100 Wolf, Syracuse, N.Y.*

*Isunter Wagner*



# Triple-Deck War Plane Has Armored Hull



Courtesy l'Aeronautique Journal  
French War Plane with an All-Steel Armored Hull Inclosing Three Decks; Note the Battery of Machine Guns Mounted in the Nose of This Giant Flying Fortress

France now boasts a flying fortress with an all-steel armored hull inclosing the three decks. A battery of machine guns is mounted in the nose and the hull is separated from the engines which are mounted, with their air screws, on either side.

## AERIAL CAMERA FOR AMATEUR EFFICIENT AT LOW COST

Easy to operate, yet highly efficient, an inexpensive aerial camera has been devel-

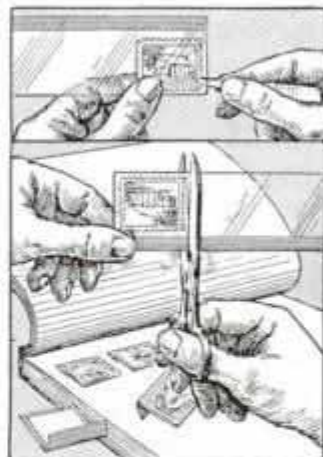


Lightweight Camera for Amateur or Commercial Pilot Weighs Less Than Fifteen Pounds

oped for commercial or private flying. It weighs less than fifteen pounds and may be handled easily in either open or cabin aircraft. The camera is fitted with an F4.5 lens of the Tessar type and takes a four-by-six picture, which is the best proportion for obliques. Filters may be installed. The camera is constructed largely of aluminum. It is suitable for close-range photographs, even time exposures on the ground, in addition to aerial obliques.

## TRANSPARENT STAMP TUBES PROTECT RARE ISSUES

Rare stamps can be protected by inserting them into transparent, non-shrinking tubes which may be mounted in the collector's album. The tubes are available in two sizes, one for single copies of any size and the other for unused blocks of four. The mounts, which come in flat, tubular lengths, are cut to size with scissors. Being gummed at the upper edge, the tube containing the stamp may be inserted directly into the album. The stamp is said to be protected from oxidation of delicate inks over long periods when covered with the transparent material.



*Mr. Jean Boche  
Redacteur en Chef de  
L'Aeronautique  
Journal  
Paris  
France*

*Wichita Aerial Camera Corp.  
62-10 Woodside Ave.  
Woodside  
L.I.  
ny.*

*Cmd. Wilkins*

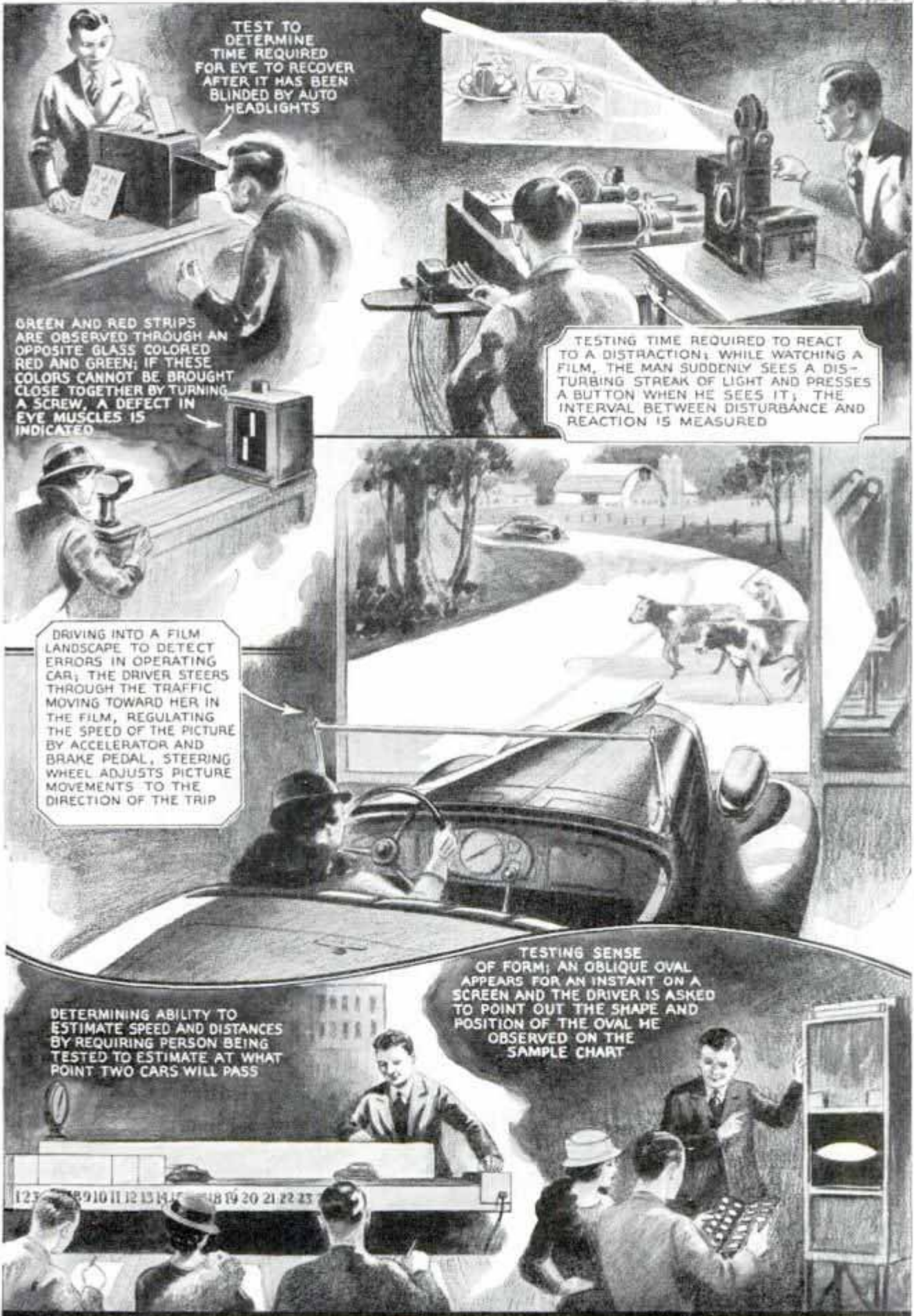
*Cyclops  
\$ 194.00*

*D244*

*H. E. Harris & Co.  
108 Massachusetts Ave.*



# Laboratory Shows Fitness of British Drivers



TEST TO DETERMINE TIME REQUIRED FOR EYE TO RECOVER AFTER IT HAS BEEN BLINDED BY AUTO HEADLIGHTS

GREEN AND RED STRIPS ARE OBSERVED THROUGH AN OPPOSITE GLASS COLORED RED AND GREEN; IF THESE COLORS CANNOT BE BROUGHT CLOSE TOGETHER BY TURNING A SCREW, A DEFECT IN EYE MUSCLES IS INDICATED

TESTING TIME REQUIRED TO REACT TO A DISTRACTION; WHILE WATCHING A FILM, THE MAN SUDDENLY SEES A DISTURBING STREAK OF LIGHT AND PRESSES A BUTTON WHEN HE SEES IT; THE INTERVAL BETWEEN DISTURBANCE AND REACTION IS MEASURED

DRIVING INTO A FILM LANDSCAPE TO DETECT ERRORS IN OPERATING CAR; THE DRIVER STEERS THROUGH THE TRAFFIC MOVING TOWARD HER IN THE FILM, REGULATING THE SPEED OF THE PICTURE BY ACCELERATOR AND BRAKE PEDAL, STEERING WHEEL ADJUSTS PICTURE MOVEMENTS TO THE DIRECTION OF THE TRIP

TESTING SENSE OF FORM; AN OBLIQUE OVAL APPEARS FOR AN INSTANT ON A SCREEN AND THE DRIVER IS ASKED TO POINT OUT THE SHAPE AND POSITION OF THE OVAL HE OBSERVED ON THE SAMPLE CHART

DETERMINING ABILITY TO ESTIMATE SPEED AND DISTANCES BY REQUIRING PERSON BEING TESTED TO ESTIMATE AT WHAT POINT TWO CARS WILL PASS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23



*From The Sphere 1/30/34*

*at Rugby Station*



Tower Illuminated with Neon Tubes to Warn Aviators Away from Masts of Wireless Station

### NEON LIGHTS WARN AIRPLANES OF HIGH TOWERS

Steel towers equipped with tubes of neon lights which are visible at a great distance are used in England to warn pilots to stay clear of an area containing several giant wireless masts, some of them more than 800 feet high. It has been found that the neon warning lights serve efficiently in directing the attention of aviators to the hazard of the several towers grouped in a central location near a British broadcasting station.

### RUBBER LIFEBOAT FOR PLANES IS INFLATED WITH GAS

Carried in a zipper bag, a rubber-fabric lifeboat for airplanes, balloons and dirigibles can be instantly inflated with a cylinder of gas under pressure which is carried in the bag with the folded boat. The bag also contains the sectional parts of the

oars, an emergency hand pump, shears, pliers and repair materials. Only a few seconds are required for emptying the bag and inflating the boat which is divided into two compartments, either of which is capable of supporting the occupants. The hand pump can be used in case a drop in temperature decreases the volume of gas. The boat is made in sizes to accommodate one, two, four and seven persons. It can also be used by hunters, campers, fishermen and swimmers and, since instant inflation is not necessary when the craft is used for pleasure, the cylinder of gas can be omitted. It is light enough to be carried easily in one hand and has rope hand-holes around the outside so several persons can cling to the craft, if necessary,



Inflated Rubber Lifeboat for Planes and a Similar Boat Deflated and Packed in Bag

as it is buoyant enough to support more than its rated capacity.

Cattle salt is being mixed with materials used in the surfacing of German highways to prevent ice from forming.

*Reported by American C. ... General at*

*Goodyear Tire & Rubber Co*



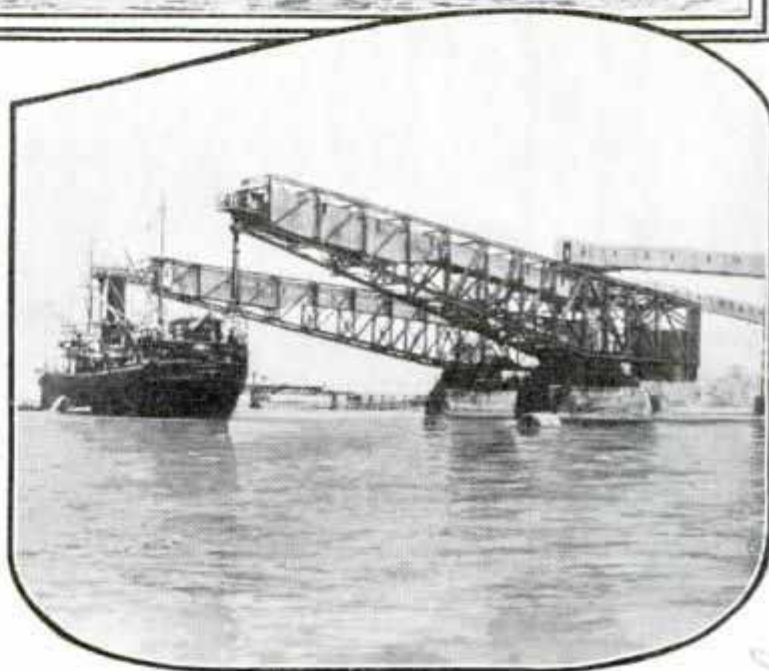
# Steel Arms Load Ship Quarter-Mile Offshore

*Creedle, Leath, Island  
no U.S. agent known*



© Henry Simon  
Conveyor and Loading Arm Shown Discharging Phosphate into Ship's Hold; Right, Close-Up of Ship and Giant Arm

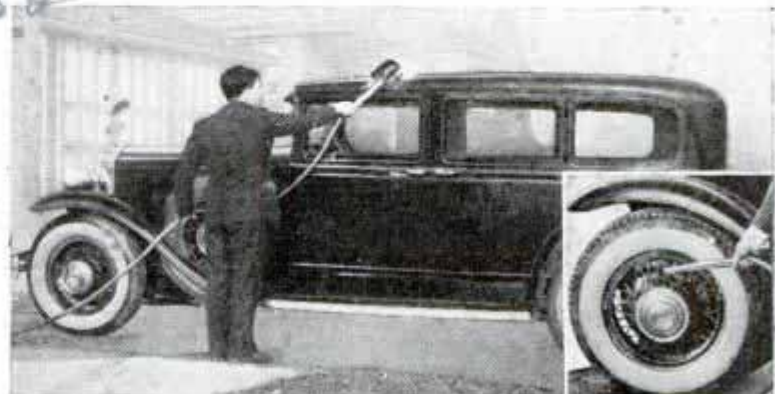
Ships lying one-fourth of a mile off Nauru island and Ocean island, in the Pacific ocean, are loaded by means of two giant arms of steel that are part of an automatic loading system. On shore is a storage bin in which phosphates produced on the islands are kept until a steamer arrives. The phosphates ride from the bin to the end of the cantilever arms on two conveyor belts, then are discharged into the ship's hold. The ends of the loading arms are telescopic, capable of being worked into position for fast loading. The cantilever arms are mounted on double piers of concrete, anchored to the rocks below. This method of loading solves the problem of getting the phosphates off the islands without wrecking ships. It is impossible for vessels to approach closer than 500 feet to the beach,



shut off entirely without making a trip to turn the water faucet. The brush is large enough to wash the entire car, but at the same time small enough to go between spokes and into other small openings. It is made of aluminum, is light in weight and has no moving parts of any kind to get out of order.

## BRUSH FOR WASHING CAR IS CONNECTED TO HOSE

Washing the automobile is made a simple task by using a special brush which attaches to the garden hose. Dipping the brush in water thus is eliminated and it is equipped with a long handle so the operator need have no fear of soiling his clothes. A device in the handle controls the flow of water which can be reduced or



Washing Car with a Long-Handled Brush Which Gets Its Water Supply from the Garden Hose

*Beaver Auto Brush Co.  
4215 Woodward Ave.  
Detroit, Mich.*

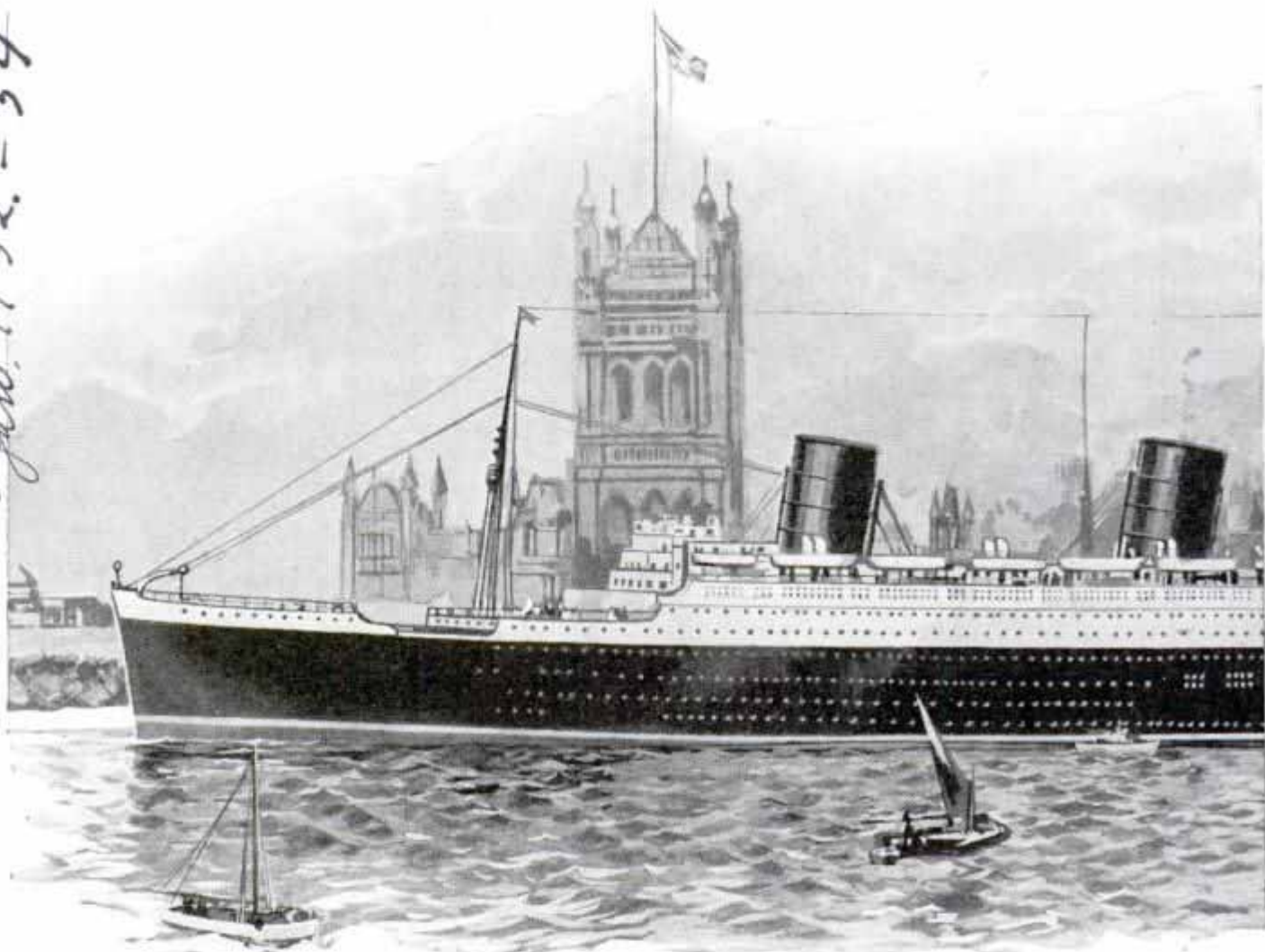
*Beaver Auto Brush Co.  
4215 Woodward Ave.  
Detroit, Mich.*

*Hammond Vacuum Products Co.*



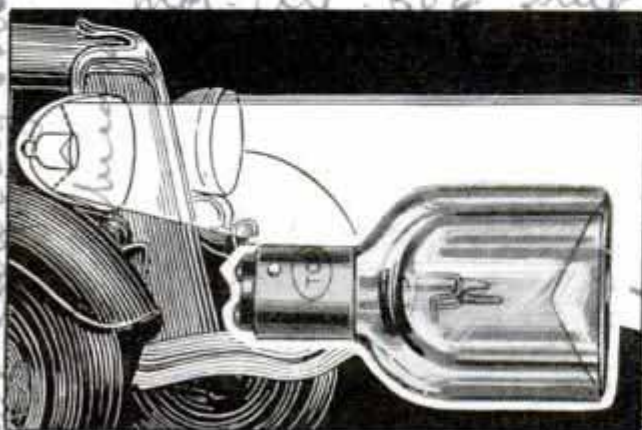
# Giant Liner Like a Floating City

see March 1934 326  
Jan. 1932 - 34



## NON-GLARE AUTO LIGHT BULB MAKES DRIVING SAFER

Greater safety for night driving is claimed for an automobile headlamp bulb which controls the light rays. There is no



Controlled-Ray Headlamp, with Illustration of Safety Driving Light Which It Gives

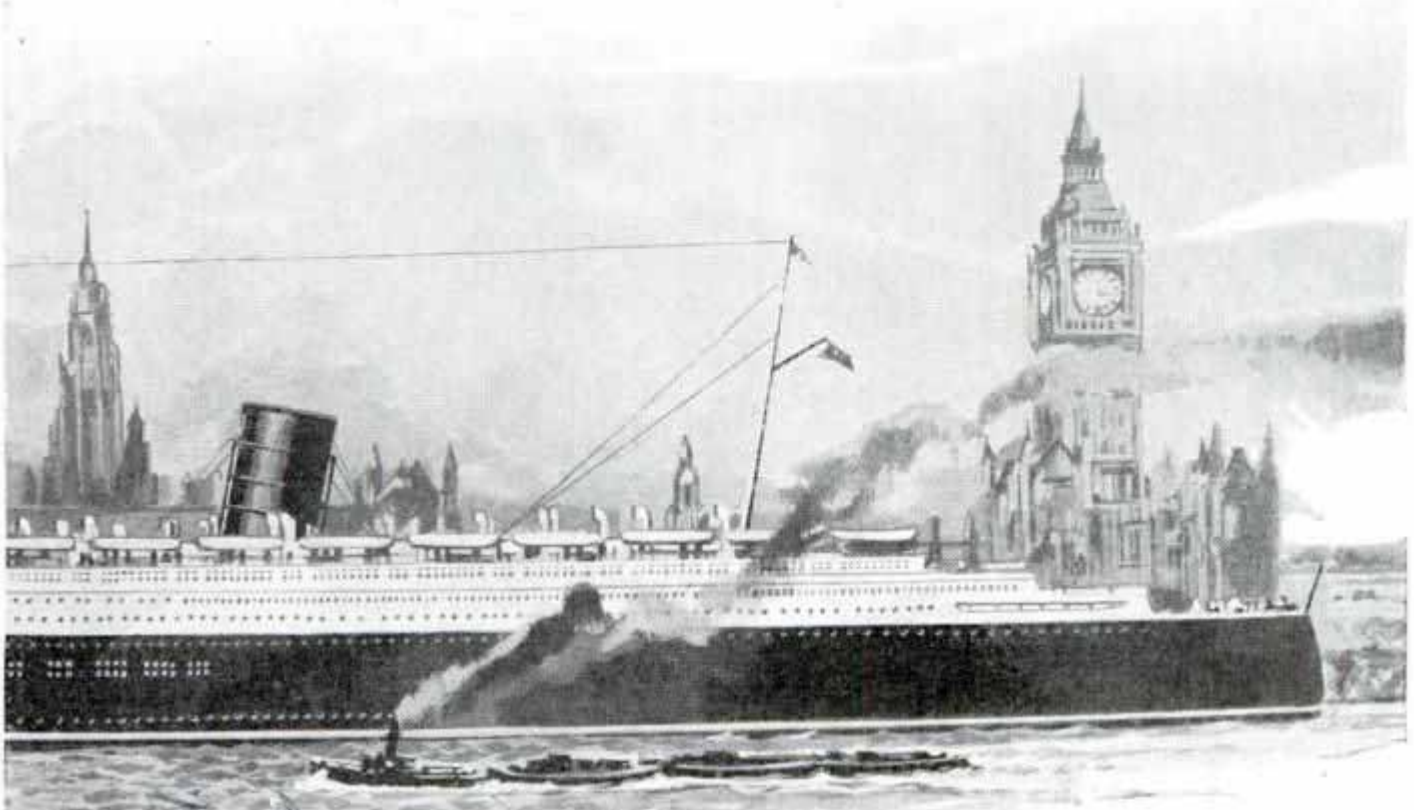
glare to confuse approaching drivers. Instead, the light rays from the car equipped with the bulbs cut through glaring rays from approaching cars, illuminating the road clearly. The bulbs direct the light rays downward, giving a light from ditch to ditch for a range of 400 to 500 feet. Safer driving in fog is claimed for the bulbs, which throw a sharp, clear light parallel with the road and below the eye line, eliminating reflection into the driver's eyes. The makers claim that double the amount of road light is produced by the bulbs.

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

Charles F. Murrin, Jr. ...



# to Seek Atlantic Speed Record



© London Daily Telegraph

Artist's Sketch of the Mammoth Cunard Liner, "534," Tentatively Named the "Princess Elizabeth," Comparing Its Size with the British Houses of Parliament; England Hopes to Regain the Atlantic Speed Record with This Boat, Which Will Be 1,018 Feet Long. Will Carry 5,000 Passengers and Is Expected to Develop More Than Thirty Knots an Hour

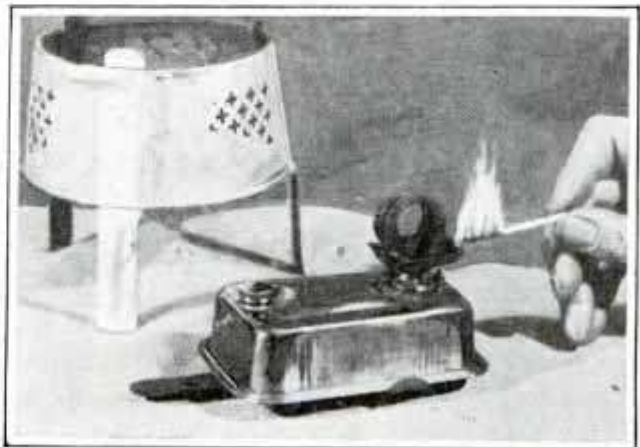
*Sold by Union Amputating Co  
120 S. Los Angeles St  
Los Angeles, Calif*

*D 179*

## SMALL GASOLINE CAMP STOVE WEIGHS LESS THAN POUND

Requiring little space for carrying, a midget gasoline stove is proving popular with campers and tourists. The entire outfit weighs less than a pound, and the little stove needs no pump to maintain air pressure. It is started by filling a heating pan with gasoline just below a coil-shaped burner. When lighted, the heat generated around the coil causes air inside the tank to expand and forces the fuel up to the burner. The stove holds about half a pint of gasoline, which is sufficient for three hours of burning, and is equipped with a circular stand for holding a frying pan or other cooking utensil. To stop the stove, a cap on top of the tank is unscrewed, thus releasing the air pressure and stop-

ping the flow of gasoline to the coil. A funnel, a cleaner for the coil and a stand for the base are included in the outfit.

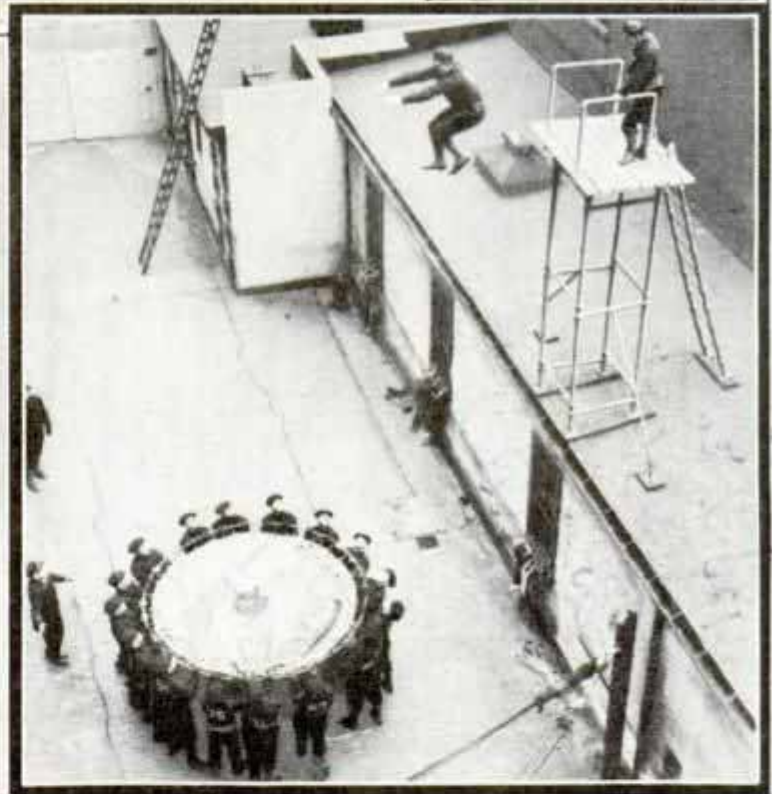


Tiny Gasoline Camp Stove Weighing Less Than Pound and Requiring No Pump to Maintain Air Pressure

*(Western Amputating Co. Los Angeles)*



# Rookie Firemen Trained in "High" School



© International News Photos  
New York City's Rookie Firemen Going Up and Down during "High" School Training

*International*  
Rookie firemen of New York City have a ninety-day course of training before being assigned to the fire department and part of this is in a real "high" school—five stories high. They are required to make leaps into life nets, to climb scaling ladders to the top of the five-story train-

ing quarters, and to slide down ropes from the roof of this structure. As a result of this work, they enter the department ready to scale the side of a burning building or follow the veteran leaders up a ladder or down a rope without fear of falling.

Up to last September, Germany's "Graf Zeppelin" had made 300 flights, crossed the ocean forty-eight times, traveled 428,766 miles and carried 17,500 passengers and 81,570 pounds of freight.

from the... of...  
 ... of ...  
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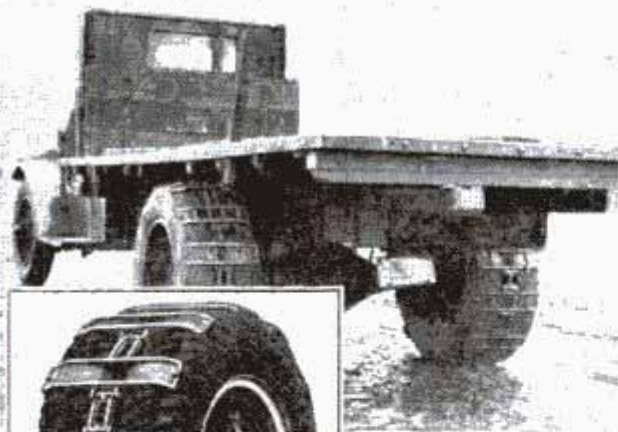


*D 248*  
**NEEDLE-THREADING AS AN ART  
 REQUIRES PRACTICE**

Threading a needle with several dozen lengths at the same time may sound easy, but it requires considerable patience, skill and many hours of practice. So much attention has been given the subject that men, women and even children in many parts of the United States are hard at work, each trying to thread a few more strands than the latest claimant to the "championship." One Californian succeeded in threading a number four needle with seventy-three lengths of thread, but his record was broken a few days later. He learned the art of needle-threading on a mountain-climbing expedition.

*D 184*  
**TRACTOR TREADS ARE APPLIED  
 TO PNEUMATIC TIRES**

Tractors and trucks equipped with dual pneumatic tires can obtain greater traction with the aid of steel treads which are applied directly over the rear tires. They extend across both dual tires, are equally spaced about the circumference and are



Steel Treads Applied over Dual Pneumatic Tires Like Tire Chains to Give More Traction to the Truck Either in Mud or Snow

held by a chain against the rubber firmly enough to prevent slipping or chafing. The inside of the plates is smooth and curved to fit the contour of the tires and it is claimed tires are not injured in any way by the treads. For severe conditions where very great traction is necessary, detachable lugs can be slid into the treads.



Photo of Seventy-Three Strands of Thread through Eye of Number Four Needle

The treads are applied like skid chains on a passenger car, a self-locking toggle holding them in place while a turnbuckle adjustment compensates for tire wear.

*D 243*  
**LOW-WATER BOILER ALARM**

Home heating plants may be protected from damage caused by low water in the boiler by means of a new alarm. The device does not depend upon floats, but on the action of the water from the boiler in establishing contact, through an electrode, in a low-voltage circuit. The small current induced in this circuit causes a shift in the path of the magnetic flux in the iron circuit of the alarm when the water level drops to the danger point, causing a signal to sound. Modifications of the device include a low-water cut-out for oil burners or stokers, a high-water alarm for tank, sewer or sump protection, a water-level control for either high or low levels through the medium of a pump and other applications.

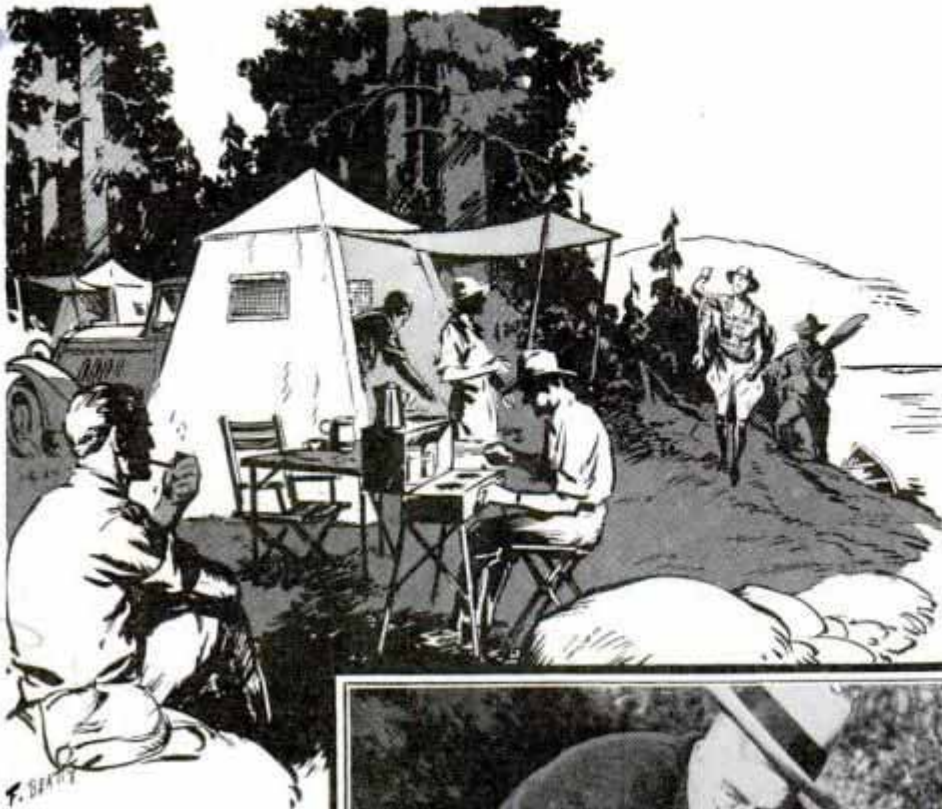


*W.A. Riddell Co., Bay View, Miss. Ohio*

*Bender-Warwick Corp., 14390 Canterbury Road, Detroit, Mich.*



# Secret of Camping Comfort



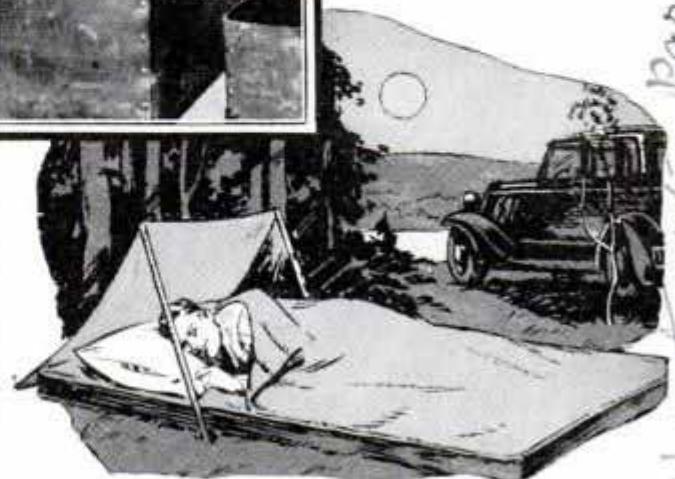
other side, or fasten them together with blanket safety pins. Line the bag with two tan-colored sheets and cover with an envelope of waterproof balloon cloth, allowing a flap at the head to protect your face in bad weather. A comfortable sleeping bag measures thirty by seventy-four inches and weighs less than ten pounds.

The rest of the sleeping equipment consists of a waterproof ground cloth, a light pad or an air mattress to go under the sleeping bag, and a light waterproof tarpaulin for a final covering. With this equipment you can sleep snugly through wind or rain without a tent. If you put each bag in a heavy dustproof container, it can be



**I**F you want the last word in camping comfort this year, use an automobile trailer. A modern "land yacht" has built-in beds and kitchen conveniences, weighs less than a ton, and tows easily at speeds up to fifty miles an hour. You may build one or invest in a \$15,000 model that has all the appointments of a private railway car.

Don't make the mistake of cutting down too much on equipment. That is the advice of Ceph B. Salisbury, of the Automobile Club of Southern California, whose 750,000 miles of auto camping have taught him the fallacy of going on a vacation with a can opener and a frying pan. One of the best beds a camper can have is a sleeping bag. To make your own, stitch four blankets together along one side, across the bottom, and half way up the



Top, Serviceable Campers' Tent; Center, Fiber Board Carrying Cases with Telescopic Tops; Below, Comfortable Sleeping Bag

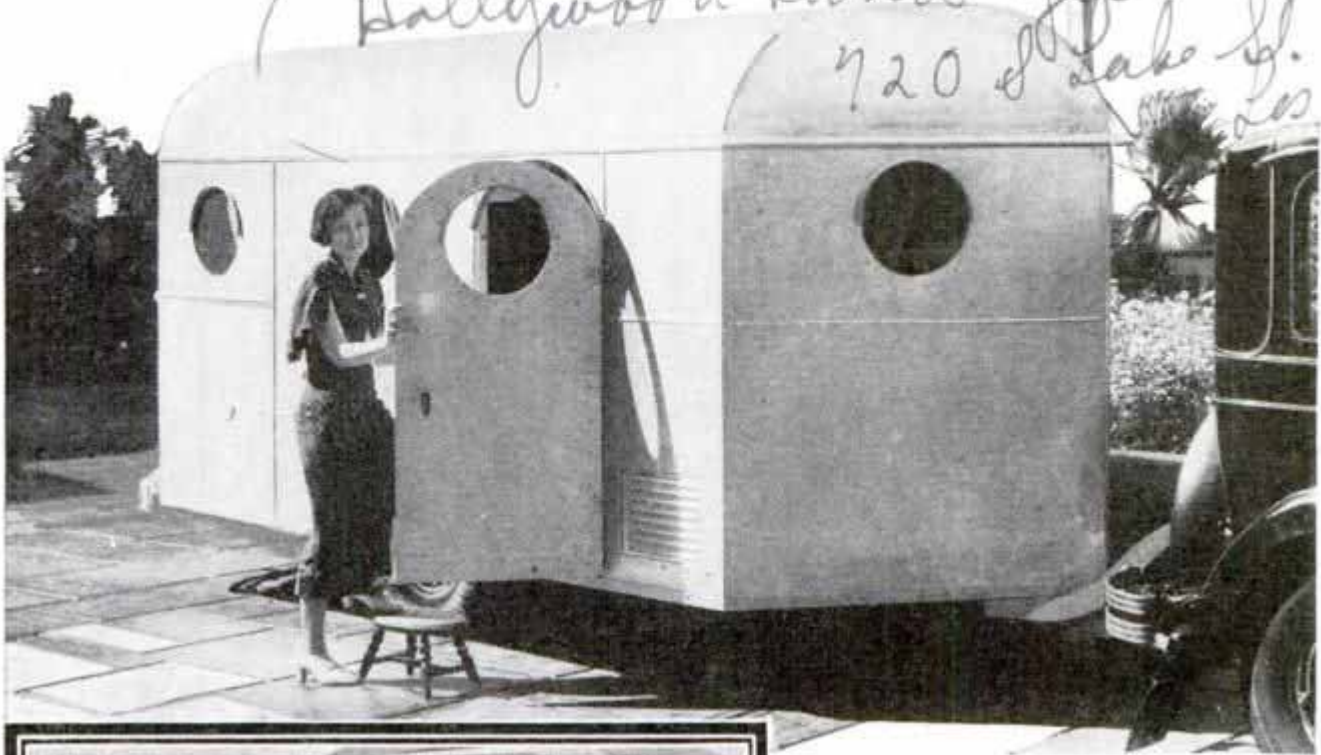
Cutting Bureau, 519 W. 17th St., Los Angeles, Calif.  
 and Adams, Los Angeles, Calif.

420 S. San Pedro, Los Angeles, Calif.

*Angelas - Meyer & Co*



Is in Equipment You Select



Above, Light and Compact Camping Trailer; Below, Interior of Small Camp Trailer

carried safely between the front fenders and the hood of the car.

Unless in the hills or the desert, experienced campers rarely carry much food, preferring to depend on local supplies. Living out of cans alone when fresh foods are available is a mark of the amateur. Salisbury builds his kitchen around a reliable gasoline stove, fitted with demountable legs to raise it off the ground. An oven that may be placed over one burner is worth taking along and is a convenient place in which to stow the dishpan and washbasin.

If the pots and pans are selected with an eye to nesting compactly, all the cooking and eating utensils can be carried in two small cases. Into one goes an aluminum kettle, coffeepot, saucepans and frying pans with detachable handles, bowls and coffee cups, together with heavy Pyrex crockery plates which, when heated, keep the food warm until eaten. The other case should be fitted up to carry knives, forks, spoons, seasonings, and a bag in which you can pack can openers, large spoons and other kitchen tools. One of the best ways to carry water is in large canteens. Campers who forget to carry a lantern usually regret it before the trip is ended.

Small collapsible stools and camp tables are also convenient. If two people are traveling in a sedan, all of the camping gear can be stowed in the rear. When more are going, most of the equipment should be carried in a rear trunk, with the collapsible table strapped on one running board. It is always best to camp on high ground, especially in regions where sudden summer storms are common.

*Product of General Supplies, 720 S Lake St, Los Angeles, Calif*

*Hollywood Land Yacht Co, 720 S Lake St, Los Angeles, Calif*

*Los Angeles, Calif*

*refer any about plans to Little*



# Mosaics in Great Mosque Cleaned with Steel



*Turkey*

Mosaics above the portal of Santa Sofia, in modern Istanbul, a Mohammedan mosque for 500 years and one of the greatest churches in the world, have been cleaned with steel instruments by Thomas Whittemore, director of the Byzantine Institute of America. To eliminate the danger of damaging the mosaics, the cleaning crew used no water or other liquid. Instead, they scaled the surfaces with delicate steel tools to remove paint and plaster applied many years ago upon the order of a Turkish sultan. The central figure, one of the finest Christian mosaics ever discovered, shows Emperor Leo, who reigned in 886 to 912 A.D., kneeling before Christ, with panels of the Virgin and the Archangel Gabriel. It is of finer workmanship than the famous mosaics of St. Mark's in Venice, Italy. Other panels have byzantine crosses in colors on solid gold, which date from the time of Emperor Justinian, build-

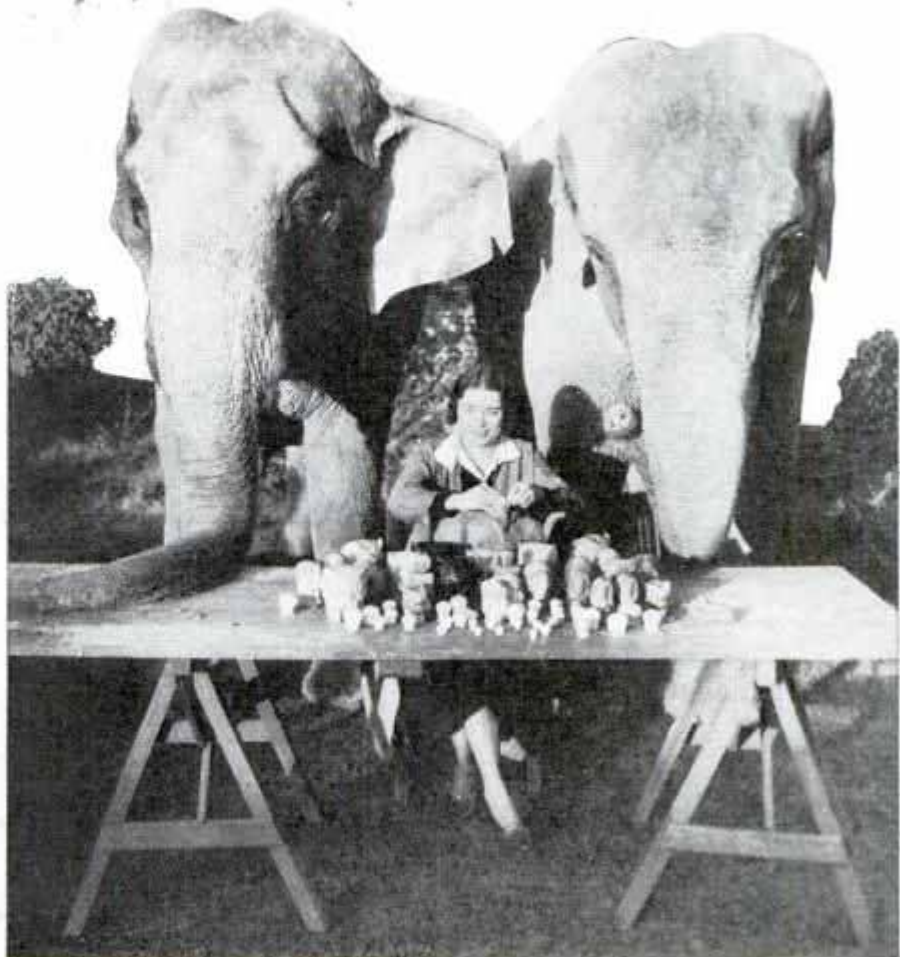
Top, View of Santa Sofia; Bottom, Workers Cleaning the Mosaics; Inset, Sample of Restoration Work That Is Done with Delicate Steel Tools



er. Santa Sofia, known as "The Jewel of Christendom," has been a Mohammedan mosque since 1453, when the Turks captured Constantinople, the name of which has been changed to Istanbul. The church narrowly escaped destruction in 1933 when the Turkish law court building beside it was destroyed by fire.

**DOUBLE CAMERAS TAKE LONG SHOT AND CLOSE-UP**

One method of obtaining long shots and close-ups of the same scene simultaneously with only one set-up is provided by mounting two movie cameras on a special tripod head and running them with two motors actuated by a single switch. One camera is provided with a fifty millimeter lens and the other with a 100 millimeter lens. The



Instructor of Clay Modeling Class in California Is Shown with Two Elephants and a Collection of Replicas of the Animal Models

**ELEPHANTS POSE FOR CLASS IN CLAY MODELING**

Full-grown elephants pose for a class in clay modeling at a western university. The result is a whole herd of clay replicas of the two animal models, "Anna May" and "Queeney," brought from the California Zoological Gardens for the classes, which are directed by Miss Mildred Dudley, animal sculptor.



Two Movie Cameras Mounted on Plane for Taking Long Shot, and Close-Up of Same Scene

arrangement is particularly suited for aerial photography.

**ICE-CUBE TRAY HAS HANDLE**

Ice-cube trays in the latest electric refrigerator may be removed easily by pressing down a convenient handle. This frees the tray from the ice-cube compartment. Then the tray may be pulled out and the cubes emptied.



*Ann. of Southern California, Los Angeles*

*Arthur W. Price*

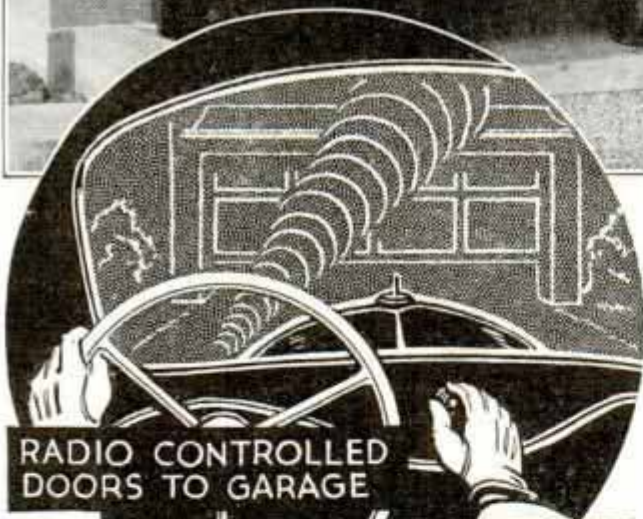
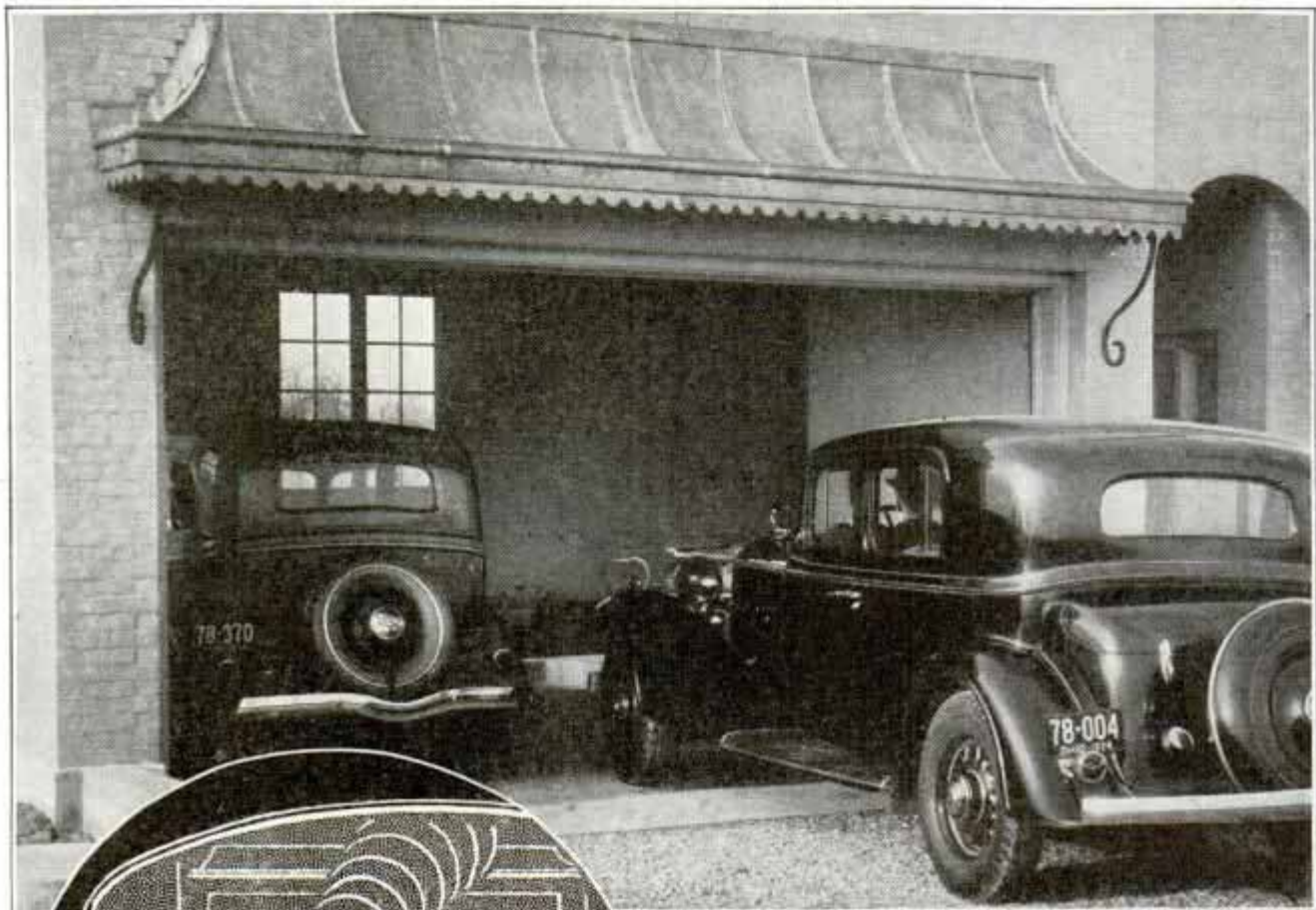
*Frigidaire Sales Corp.*



D284

Webb's House Electric  
& Mfg Co. E. Pittsburgh  
Pa

# The ELECTRICAL



Top and Center, Garage Doors Opened by Radio Waves from Transmitter in the Auto; Bottom, Built-In Electric Clock

**T**OMORROW'S housewife will do most, and perhaps all, of her work by pushing buttons and flipping switches. Cooking, washing dishes, answering the doorbell and the telephone, tending furnace, doing the laundry—all these tasks, and more, will be performed quickly and efficiently with the assistance of mechanical and electrical servants devised by science for the family of moderate means.

Some of the equipment for relieving the housewife of drudgery is on the market and more will be available soon. An idea of what the future holds may be gained from an inspection of the "Home of Tomorrow," constructed and furnished by experts and equipped with the latest scientific aids to the comfort and convenience of the homemaker. If all the switches in this experimental house should be turned on at the same time, electrical capacity equal to the efforts of 864 trained servants would be set to work.

In the kitchen is an automatic dishwasher that washes and dries the dishes,



# HOME . . .

then opens its cover as a signal that the job is done. A cabinet in which towels may be dried quickly is near by. Next to it is an electrical refrigerator with a clock that not only tells time but automatically defrosts the refrigerator regularly without attention. Mounted in the evaporator of the refrigerator is an ice-cream freezer which has a thermostat control.



Too, Novel Lighting from Panels around Windows; Bottom, "Remote Control" Door Handle Eliminates Stooping to Reach the Knob

An improved electric range is another feature of the kitchen, which is arranged like an automobile factory production line to eliminate unnecessary steps. Packages placed in a device opening on the outside of the house may be delivered to the work table inside the kitchen by turning the device.

The laundry has its own telephones and radio and all equipment is electrically operated, including a three-unit washer which carries on a continuous process of washing, rinsing, bluing and wringing. An electric clothes dryer and a permanently connected electric iron in a small cabinet are other features. The iron is switched "on" and "off" by opening and closing the cabinet. All equipment in the laundry is so arranged that there is no need of bend-





at the windows contain bulbs which illuminate the curtains in such a manner that sunlight appears to be coming through. There is a night light system controlled by a switch on a flexible cord so that it may be kept under the pillow of a bed in the master's bedroom. A burglar light system, controlled by a wall switch in the same bedroom, consists of twenty-two lights all over the house and two floodlights outside. For

(Continued to page 124A)

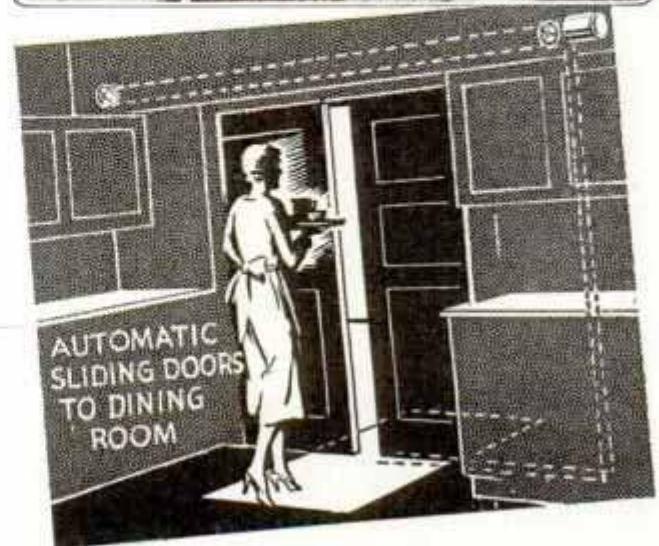


ing the back or stooping from the time the soiled clothes are taken from the clothes chute until they are ironed.

Sliding doors between the dining room and the service pantry open automatically when the housewife steps on a floor panel suspended on springs. An electric motor opens and closes the doors when set to work by the panel.

Weather within the home is selected by its occupants and maintained automatically by a system of thermostats and manual switches controlling air-conditioning units. Air is washed, filtered, humidified and heated or cooled before being released from the equipment installed in a "weather room" in the basement.

Ideal illumination is a feature of the home. There are 320 electric lamps, compared to twenty-eight bulbs in the average electrified home of today. Light units are sunk in the ceiling and the walls. Panels



Top, Left, Well-Lighted Mirror; Below, Penthouse Heating; Top, Right, Example of Unusual Ceiling Fixture; Bottom, Panel Controls Door



# Flexible Wheels Smooth Bumps for Truck

One eight-wheeled truck recently produced in England travels the roughest roads without jars and bumps, due to the independent suspension of its wheels. Each wheel bears its own share of the load regardless of the roughness of the road surface because each is flexible, enabling it to sink into a rut or rise over a bump without affecting the others. The tractor is intended to haul two trailers, each with eight wheels of similar design, the twenty-four wheel truck-train being drawn by a 130-horsepower oil engine.



Flexibility Made Possible by Independent Wheel Suspension Enables This Truck to Travel the Roughest Roads without Jars or Bumps

*Black Knight Co 449 Main St. St. Paul Minn*

D204  
**BIRD HOUSE MADE OF METAL CAN BE TAKEN APART**



Shaped like an acorn and constructed of metal, the latest bird house can be taken apart for cleaning. A small hole in the bottom furnishes nest drainage, while ventilation is adequate. The house may be attached to the underside of a tree branch by means of a screw. It is

made in only one size, for wrens and chipping sparrows.

D234  
**AIR BUBBLES DENT PROPELLER**

Air bubbles strike the propeller of Gar Wood's world-record speed boat with such force that the bronze propeller is dented as though it had been subjected to a charge of buckshot. A hard blow of a hammer would be necessary to dent the metal ordinarily. According to University of Michigan scientists, the air bubbles

*Eckhardt*

beat against the propeller like machine-gun bullets as the boat flashes along. Wood's boat holds the record of 124.86 miles per hour.

D216  
**LIGHTED SIGNAL FOR THE BLIND AIDS IN CROSSING STREET**

Blind persons traveling the streets at night are aided by illuminated signals which are carried in the hands and which direct attention to them at intersections. Many of the blind are guided by trained dogs, but the signals give added safety.

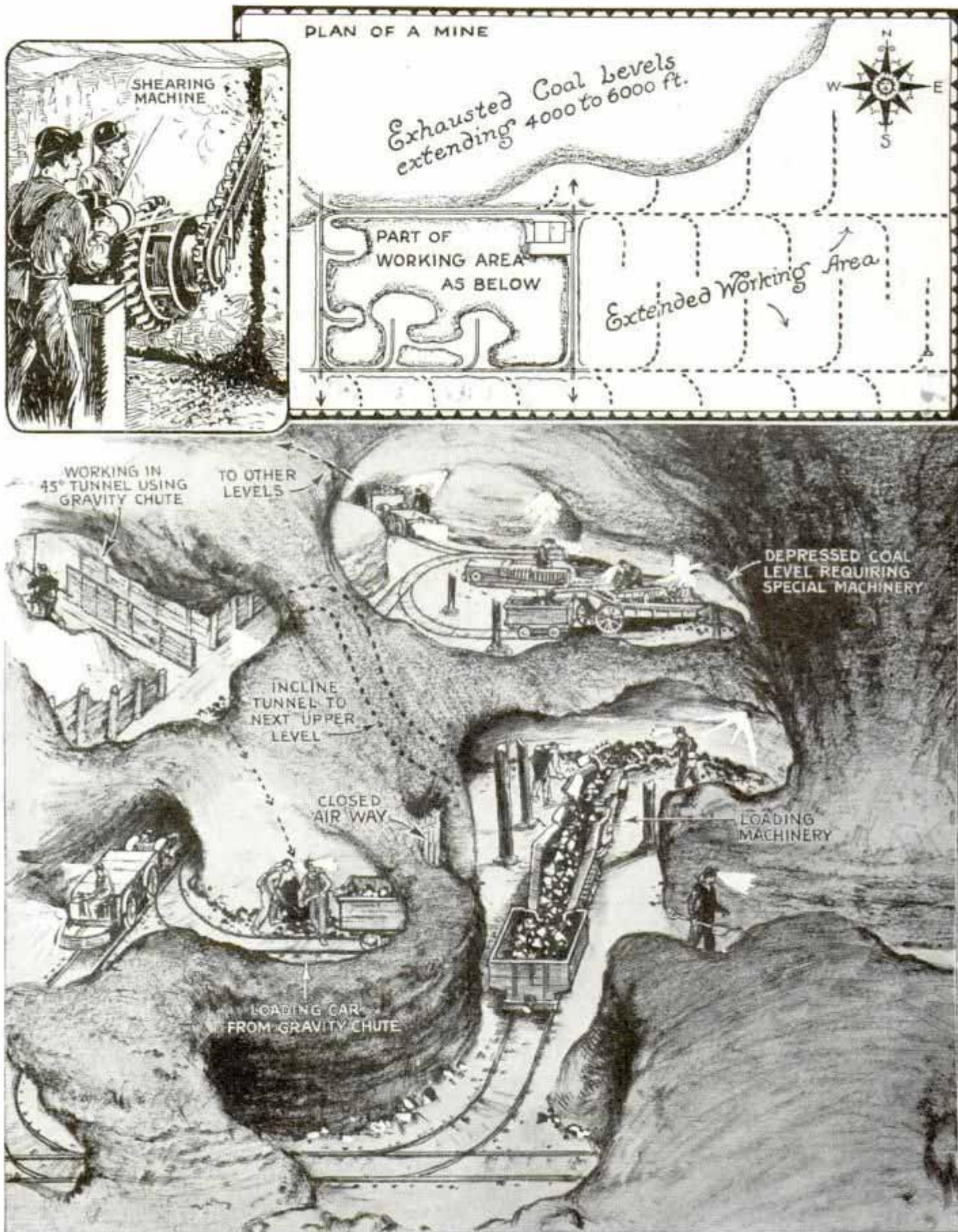


Blind Man Using Illuminated Hand Signal to Direct Attention to Him as He Crosses Street

*Ann Arbor Mich*



# Man-Made Coal Mine Shows How

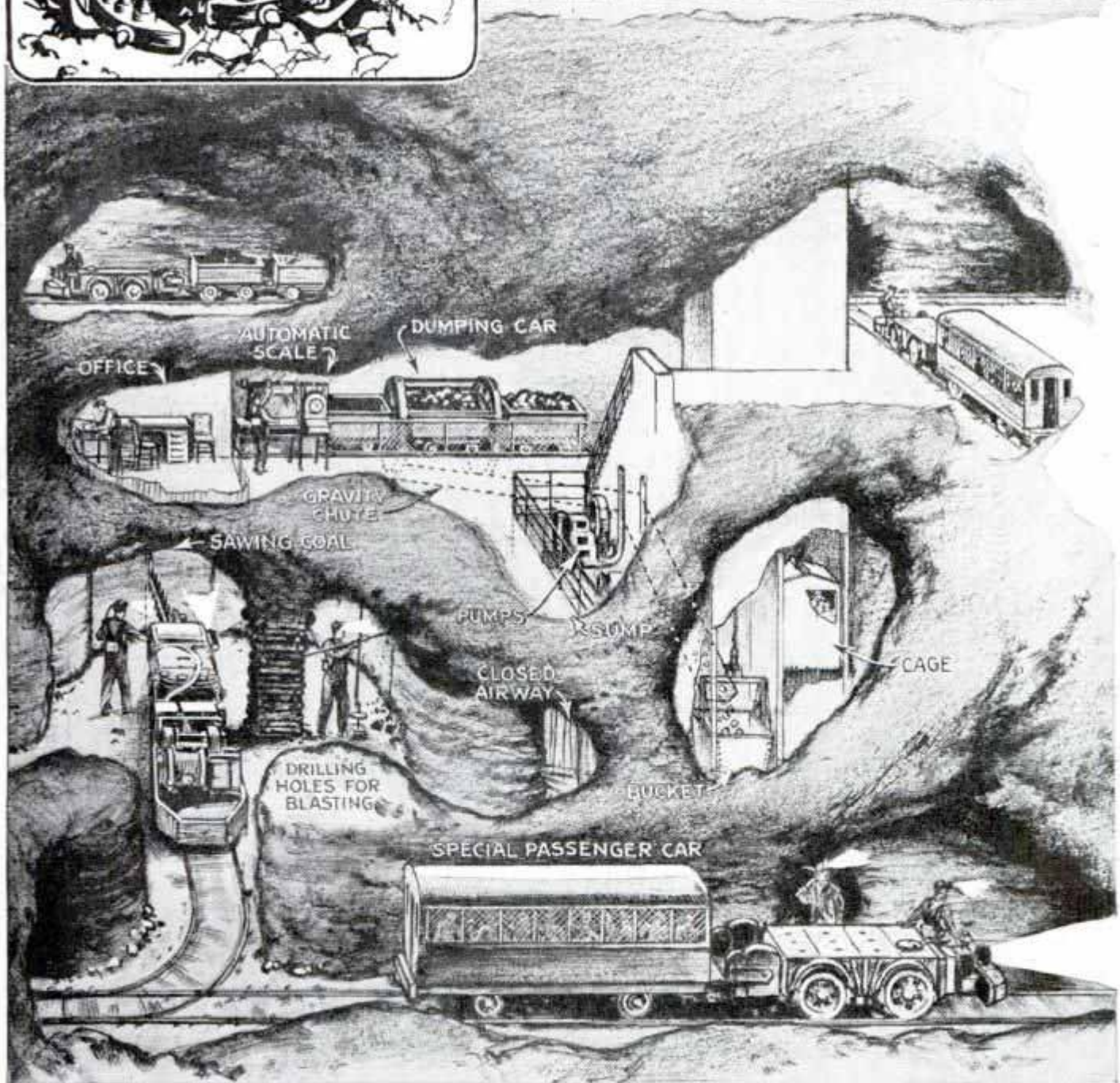
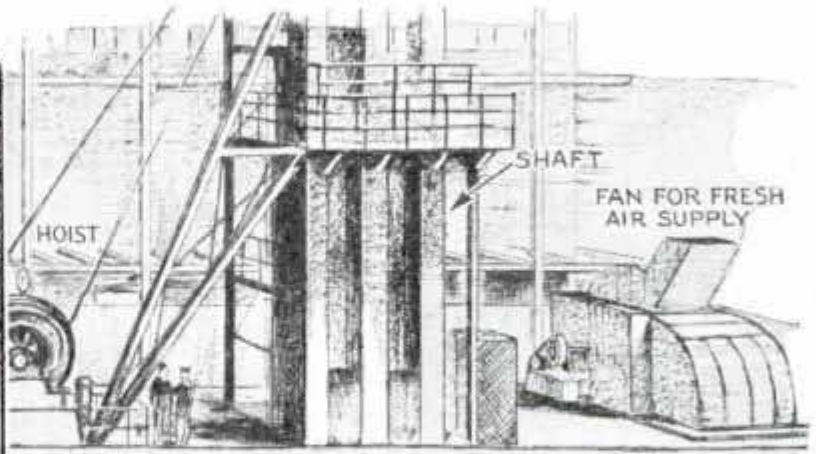
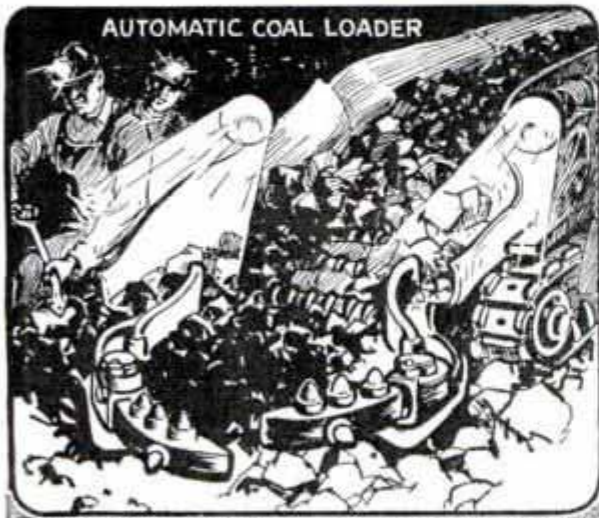


Cross-Sectional Drawing of the Mine Constructed by the Rosenwald Museum of Science and Industry at Chicago to Tell the Story of Man's Underground Fight for Fuel

*Jackson Park*



# Fuel to Run a Nation Is Obtained



Note That Nearly All Processes of Handling, Weighing, Hauling, Dumping and Hoisting Are Wholly Automatic or Semi-Automatic; This Man-Made Mine Is Complete in Every Detail



collected in a pocket formed by the enlarged end of the handle grip and is removed by sliding out the bottom of this compartment.

Showing How Two Suits May Be Carried in Separate Holders without Wrinkling



**WRINKLE-FREE SUIT HOLDER LATEST LUGGAGE FEATURE**

Among the latest features to aid the modern traveler is a small wardrobe case equipped with one or two suit holders. Each holder has a presser board which keeps the suit wrinkle-free and out of contact with other apparel. The holder may be removed from the case. At the journey's end, the suit is ready for wearing without pressing. In the two-holder case, either holder may be used independently. One pivots from the lid and the other from the body of the case.

**SUCTION AIR GUN ALSO BLOWS TO MAKE CLEANING EASY**

Intended particularly for the use of mechanics in garages, a trigger gun operated from an air line will either suck or blow as required. It can be used to blow out radiators and gas lines, to clean batteries, suck out carbon deposits, draw dirt from casings and water from damp-



ened parts or for cleaning floors and upholstery. It is made of aluminum and is attached to the air hose with a brass coupling. Its action is reversed merely by adjusting a set key on the valve. Dirt is

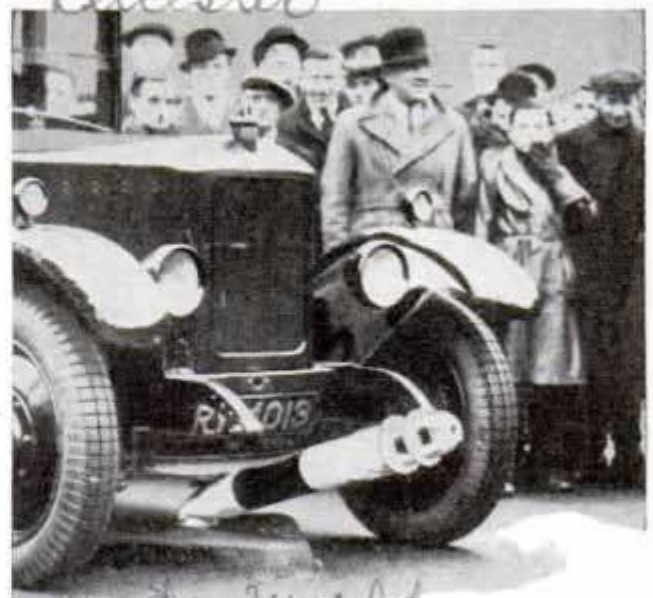
**SCREW HAS SQUARE SOCKET**

Screws having square sockets instead of slotted heads are being produced by an American company. The square socket gives the screwdriver a firmer grip, resulting in more continuous work and in less shearing of the screw-head slot. In other construction, the screw is unchanged



**COLLISION-PROOF ROAD SIGNAL BENDS WHEN STRUCK**

England is experimenting with a flexible standard for lights indicating safety islands in the middle of streets. The post supporting the light is made of rubber and bends when a car passes over it, returning to its normal position without damage to light, post or vehicle. The rubber posts



Flexible Standard for Highway Sign or Light Which Bends without Damage When Hit

were tried after the rigid supports were broken repeatedly by traffic.

J. W. Alkie, Public

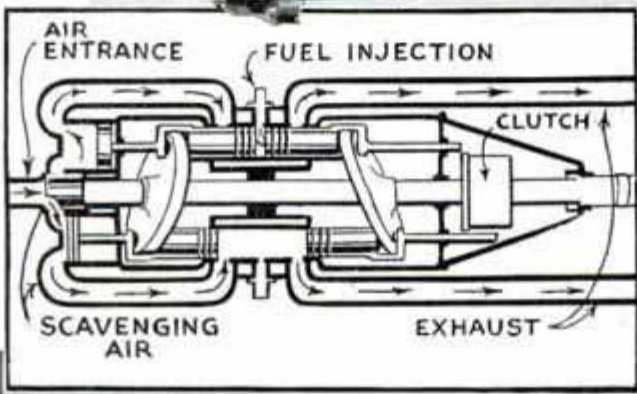
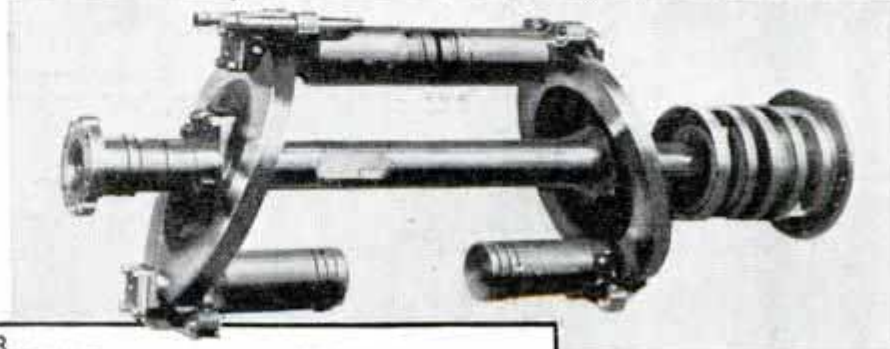
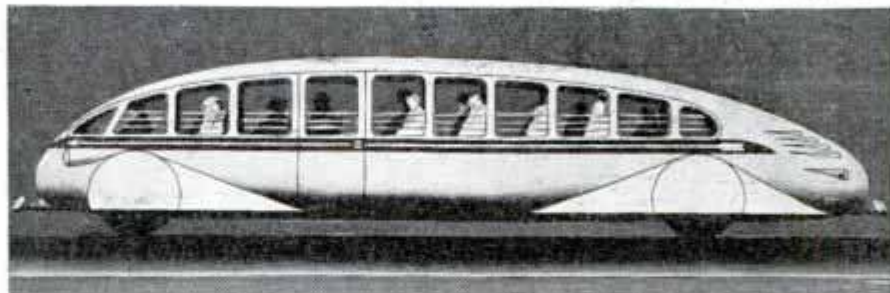
D 205 W. Henry Trunk & Machine Co. 1934 Thurston Av. #16.50-110.00

D 188 Charles E. Wood, Highland, Blount Co.



# Latest Crankless Motor Has No Spark Plugs

Low enough to be placed under the driver's seat of a bus, light enough to rest safely in the heart of an airplane, economical to operate and yet powerful enough to propel tanks, submarines and even locomotives, an oil-fueled engine of the Diesel type underwent tests recently. It has no cylinder heads to blow out, no camshafts or crankshafts to break, and no cylinder head gaskets or valves because the cylinders lay horizontally and the two pistons in each cylinder operate horizontally, approaching each other from opposite directions to compress air to such great pressure that



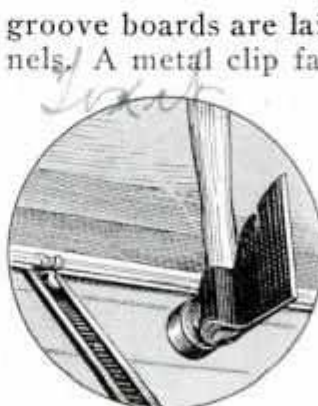
Details of Design and Operation of Light Diesel Engine with Two Pistons in Each Horizontal Cylinder, and Some Designs Made Possible by the Motor

the heat of compression ignites the mixture of atomized oil and air that is injected in a fine spray. The engine operates on the cheapest grades of fuel oil, makes no smoke and compares in over-all dimensions to a gasoline engine. Its center of gravity is low and this, along with its other features, makes it valuable for powering military vehicles like gunmounts, mobile tanks, armored rail cars and submarines, and for use in speedy naval patrol craft. Because of its compact size, it makes possible the super-streamlining of large air and water craft and military

vehicles. The horizontal motion of the pistons, it is claimed, results in smoother operation.

## LOCK CLIP FOR FLOORING

Wood floors may be laid without nails, wood sleepers or mastic by means of a simple channel and lock-clip system that prevents flooring from buckling, creeping and squeaking. Ordinary tongue-and-groove boards are laid on the metal channels. A metal clip fastens the flooring together. The carpenter slips the clips into the channels immediately ahead of the last board and drives up the next board. This forces the clips to bite into and over the

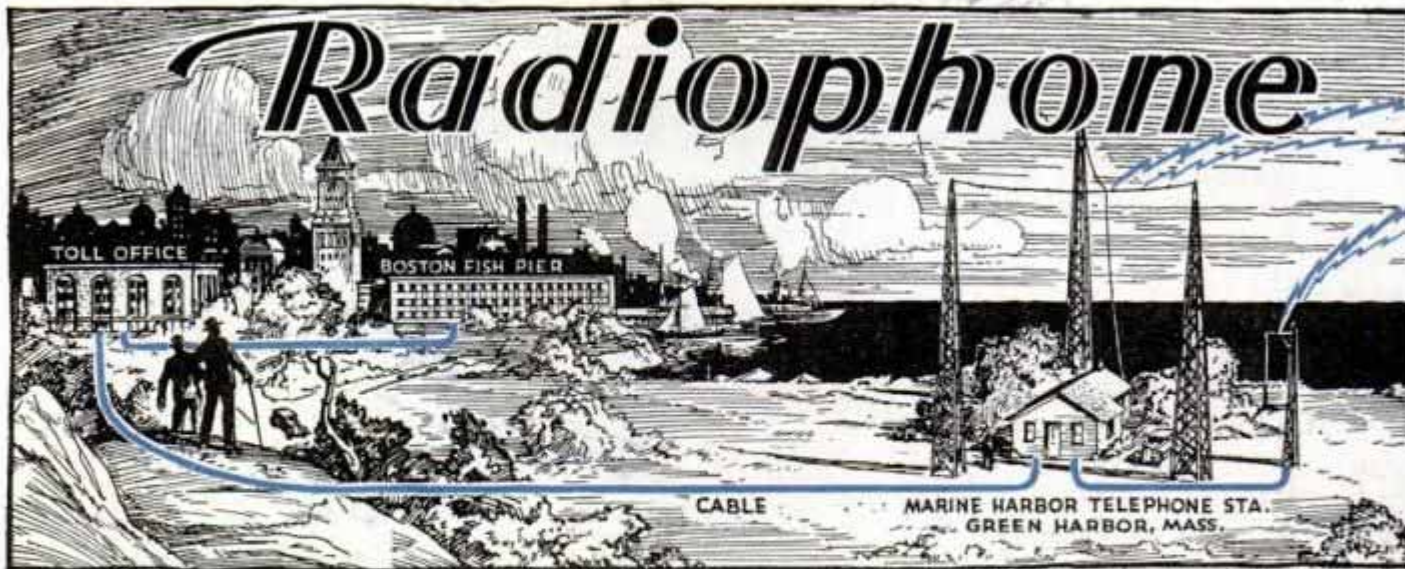


tongue of one board and embed themselves in the groove of the other board.

*Chas. A. Esch. Mitchell  
Melbourne Australia  
D 177  
Chicago*

*Knapf Bros Mfg Co.*





By JULIAN LEGGETT

Above, Sketch Showing Ship-to-Shore Radiophone Hookup of Fishing Fleet

"FISHERMAN'S luck," that time-worn alibi of many a fishing-boat captain for his failure to return to port with a full load of halibut or haddock, soon will be obsolete, so far as the world's fishing fleets are concerned. Not far distant is the day when the captain of any fishing craft will be able to step into his cabin and put in a telephone call to find out where fish may be found in abundance.

Such calls will be made to the captain of the nearest fishing craft. Others will be made to company headquarters ashore to learn whether market prices warrant an immediate return to home port and also to transact other business.

Even now, some fishing craft carry equipment of this type, experimental installations that have been pronounced successful over distances as great as 500 miles.

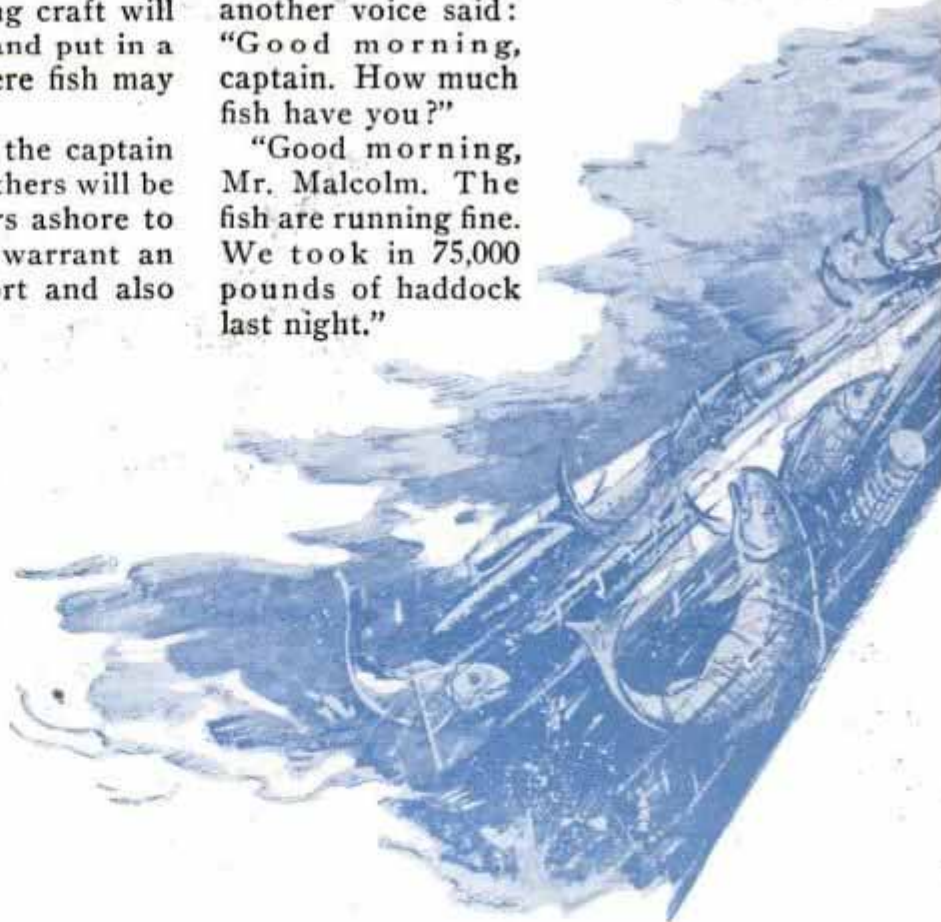
One morning as the trawler "Flow" steamed over the Georges Banks, 200 miles off Boston, a shrill tone came from a loud speaker in the pilot house. Then a voice: "Marine Service, Boston, calling the 'Flow'."

The captain stepped into his cabin and removed a telephone handset from a hook projecting from a small metal box fastened just inside the door. In a moment a red light showed that his equipment was ready for use. He pressed a switch in the

handle of the headset and replied: "This is 'Flow' answering."

"Just a moment, please," came the voice, now from the handset receiver. "Mr. Malcolm, of the Bay State Fishing company, is calling you." A moment's pause—then another voice said: "Good morning, captain. How much fish have you?"

"Good morning, Mr. Malcolm. The fish are running fine. We took in 75,000 pounds of haddock last night."

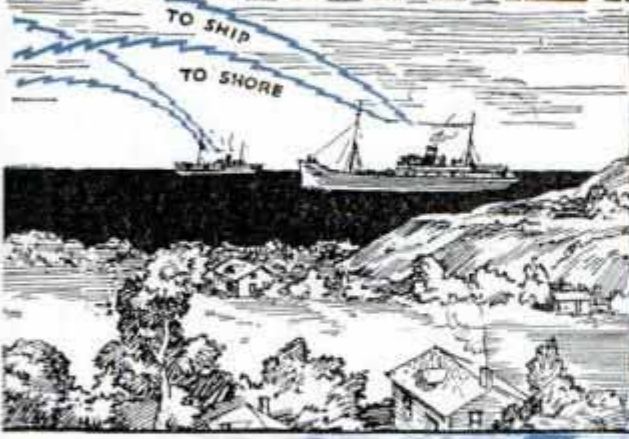


"That's fine," replied Mr. Malcolm. "We expect the price for haddock to be very good tomorrow. You had better come in."

"All right," replied the captain. "We



# FISHERMEN



Courtesy of  
New England Telephone  
& Telegraph Company

will head for Boston in a couple of hours. Good-bye." And he hurried from the cabin to order a quick run for the market where prices would be good on the morrow.

This new tool for the conduct of the fishing business is radio-telephone service, a development on a smaller local scale of the ship-to-shore service established with the "Leviathan" in 1929 and since extended to many other ocean-going vessels. For the coast-wise fishing boats, a new

Member of Trawler Crew Calls Up His Home Ashore by Means of Western Electric Radiophone as Mascot Listens In



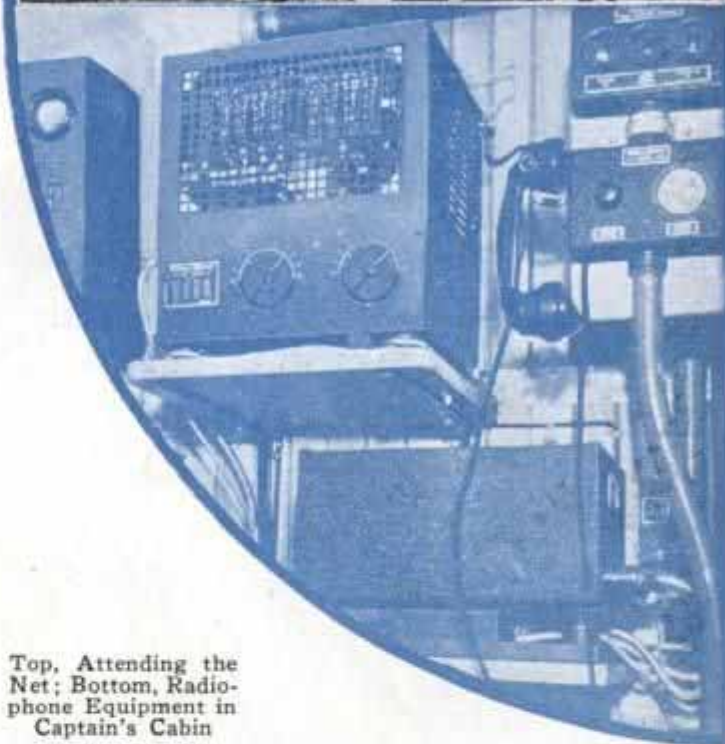


Engine Room of Trawler Showing Part of Radiophone Equipment in Middle Center

type of low-power telephone equipment was developed. The apparatus on ship-board is similar to that used by air-transport companies in maintaining communications between planes and flying fields. It operates on the short-wave lengths of radio, just as does the equipment of police radio systems. All of the equipment in the fishing craft, with the exception of the control unit and the signal device, usually is mounted in the engine room.

The shore station through which the representative of the fishing company sent his call to the "Flow" is located at Green Harbor in Marshfield, Mass. Here are located the sending and receiving antennas and the radio-telephone equipment, provided by the New England Telephone and Telegraph company by means of special apparatus made by the Western Electric company.

The operation of the equipment is simple. Perhaps the headquarters office on the Boston Fish Pier wishes to talk to the captain of one of its trawlers at sea. The calling party lifts his regular telephone instrument and asks for the Boston Marine Service operator. Giving her the name of the ship, he holds the line while the oper-



Top, Attending the Net; Bottom, Radiophone Equipment in Captain's Cabin

ator plugs into the circuit and speaks the name of the ship. The captain hears the signal and the name spoken, coming from the loud speaker. Stepping into his cabin, he lifts his receiver, which switches on his transmitting equipment. When a red light shows, he knows that the transmitter is ready. By pushing a button to talk and releasing it to listen, he carries on a con-



Right, Trawler Captain Shows His Son How to Call Home on the Marine Radio Telephone



Top, Shore Station Interior; Bottom, Scene Aboard the "Gertrude M. Fauci"

Whereupon the "Flow" was invited to "come on over" and the call, which was put through the station ashore, resulted in both vessels returning to port with large catches.

Fully as important as its use as a means of taking the "luck" out of fishing is the safety which the radio-telephone brings to the industry. It is a means by which storm warnings may be received in time for the small craft to scurry to sheltered harbors or out of the path of gales. It makes possible the transmission and reception of distress signals so that help may be sent quickly to some helpless ship or to a vessel on which there may be someone seriously ill.

New England fishing fleets are not alone in the application of the wireless telephone. British fisheries are making rapid progress with low-power sets, more than 150 craft being equipped with radio.

The combination of radio-telephone and efficient mechanical refrigeration proved profitable for a British-owned fleet which spent five months in the Arctic circle fishing for halibut. Eight radio-equipped vessels, headed by the S.S. "Thorland," returned to England with more and better fish than would have been possible under ordinary conditions.

versation with Boston. Not long after the experimental radiophones were installed in the fishing boats, the captain of the "Flow" called the captain of another craft near by and asked: "What sort of luck are you having?"

"Great," was the reply. "How about you?"

"Rotten," said the captain of the "Flow."



*Germany*  
Berlin no. 4, Chausseestr. 17 1/2

*U.S. address Mr. Es. A. J. ...  
508 W. 231st St. New York*



Demonstrating Efficiency of Street Lamp That Uses Mercury Vapor and Has No Filament

**LAMP WITHOUT A FILAMENT CUTS CURRENT COSTS**

Constructed without a filament, the latest electric lamp consists of two cylindrical bulbs, one within the other, with the space between the two evacuated. The inner bulb contains two electrodes at opposite ends of the tube. Mercury vapor, with which the inner bulb is filled, burns when the current is turned on. It is said that the lamp reduces current consumption considerably and that its use would save New York City sixty per cent of its lighting bill.

**HEAT GAUGE FOR MOLTEN LEAD**

Accurate tests of the temperature of molten lead, solder, wax, paraffin and various insulating compounds can be made with an all-metal instrument that withstands rough handling.



The device is a ten-inch tube containing a coil of flat thermostatic metal, one end of which is anchored to the tube and the

other to a metal shaft. An indicating pointer at the top of the shaft shows on a scale the temperature of any fluid from zero to 1,000 degrees Fahrenheit, the pointer being actuated by the expansion of the thermostatic metal.

**RESURFACER FOR WORN FLOOR**

Irregularly worn factory floors, trucking aisles and platforms may be repaired by means of a resurfacing material that is applied cold. The material is mixed with sand and cement, the mortar being laid cold, one-half inch thick. Ordinary cleaning is sufficient in preparing the floor for resurfacing. The material is bonded easily to concrete, wood, brick, wood block, asphalt or composition floors and is ready for traffic thirty-six hours after applying.

**SCRATCHING POST FOR CATS IS STUFFED WITH CATNIP**

Cats kept indoors usually select the corner of a davenport or a chair leg on which to sharpen their claws and the furniture \$1.75 \$3.60 \$5.00



Cats Using a Scratching Post Stuffed with Herbs; the Pets Soon Prefer It to the Davenport

suffers in proportion to the vigor with which tabby does its daily dozen. You can save the furniture from damage by providing the household pet with a scratching post—an upright support wrapped with carpet and stuffed with catnip or other herbs attractive to pussy.

*W.C. Elliott,  
423 Cherokee St.  
Leavenworth, Kas.*

*W.C. Yoder,  
1210 N. 1st St.  
Seattle, Wash.*

*Chicago. 530 ...  
7816 142 ...  
7816 142 ...  
Tree 120 Western Seattle.  
Standard Co 405 Myrtle*



# Meter on Auto Dash Makes Parking Easier

Assistance in parking the automobile is given the driver by an electrically operated meter that may be installed on the instrument panel. When the driver is directly opposite the rear bumper of the car ahead of the parking space, he stops his car and pulls a button to engage the meter. The two cars should be about twelve inches apart. Then the car is driven ahead until a pointer on the meter reaches a red arrow, signaling the driver to stop and put the car into reverse. The steering wheel is turned to the right as far as it will go while backing up slowly. When the pointer reaches a white arrow on the meter, the driver turns the wheel as far to the left as it will go, the car still moving slowly in reverse. This brings the car into the parking space. The meter may be adjusted to any wheelbase.



Top to Bottom, the Four Steps in Parking an Automobile with the Assistance of a Meter That Is Shown, Inset, on the Dash

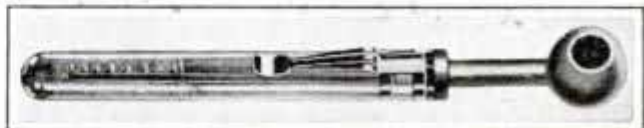
Lakewood Engineering Co Columbus

*D254*  
**NEON ROAD SIGNS FLASH**

Flashing road signs that operate on neon gas at a cost of only one cent for each twenty-four hours have been developed. The signals are self-contained, being operated by a storage battery which provides the fixed voltage needed for signal operation for uninterrupted periods of six to twelve months without adding water or recharging. The battery is rechargeable during an estimated life of six to ten years. The flasher motor is of positive, clock-type mechanism, fully inclosed and insulated. The motor is said to be capable of operating under all changes of temperature and humidity and under conditions of severe vibration. Shatter-proof glass protects the sign.

*D165*  
**WATER BUBBLE GAUGE SHOWS LEAKY TIRE VALVES**

Leaky tire valves can be detected quickly by using an appliance like a tire gauge



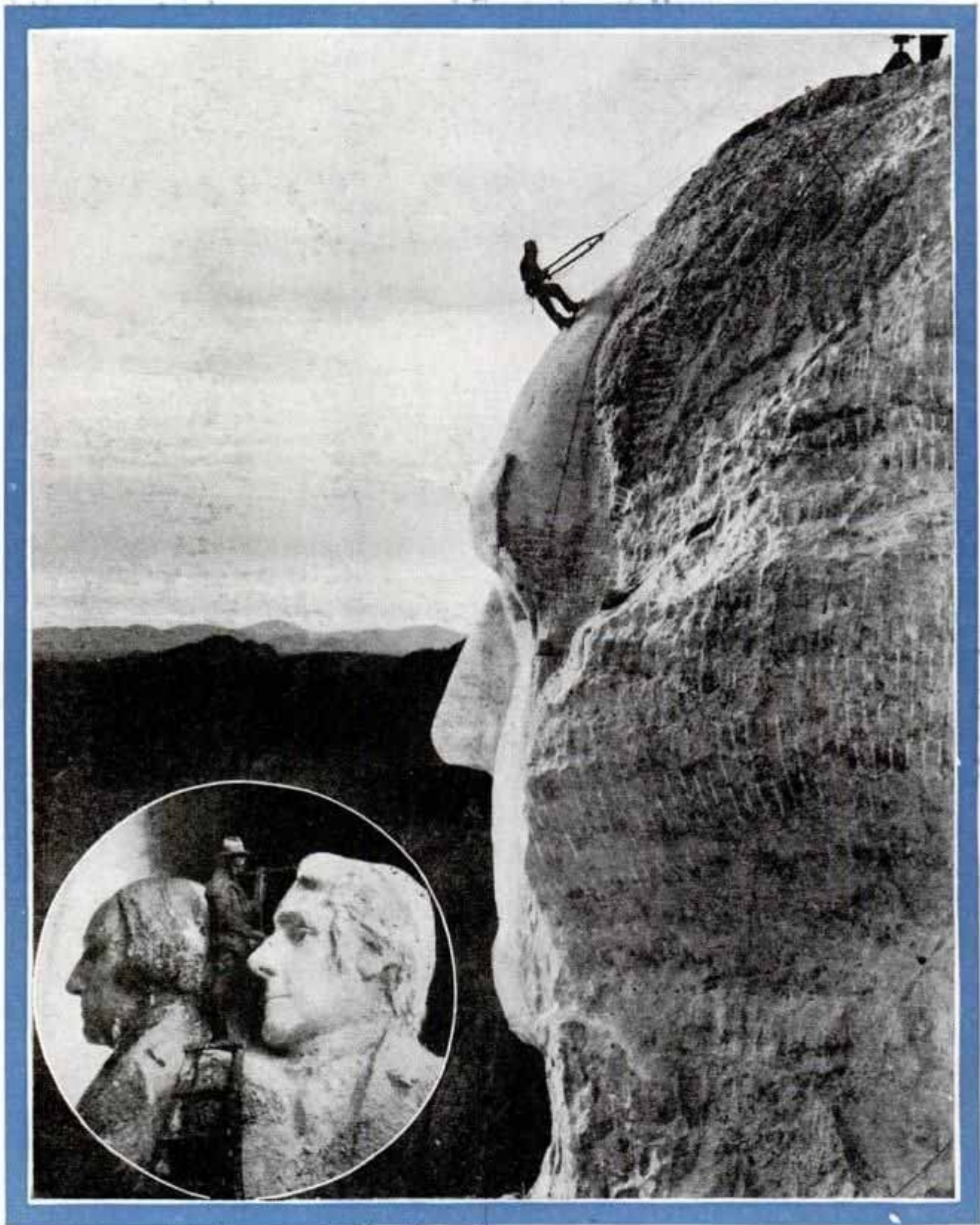
instrument enables the user to carry it in his pocket like a pencil

*Still Mfg Co 687 E 82nd St*



D 198  
712

# Mountain Sculpture Depicts Nation's Heroes



Completed by the sculptor Gutzon Borglum

*Publishers Photo Service*

Above, at Work on the Head of George Washington, One of the Gigantic Figures Being Carved by Gutzon Borglum, Noted Sculptor, on the Face of Mount Rushmore in the Black Hills of South Dakota, as a National Monument to the Builders of the American Nation; in Circle, Taking Measurements of Models of the Heads Being Carved on the Mountain Side; the Mountain Figures Will Be 1,728 Times the Size of the Big Models

Letter 10 37 - 1 1/2 feet tall



**ELECTRIC WINDOW CLEANER  
RUBS AND POLISHES**

Polishing windows is made easy with an electric cleaner which rubs and polishes the glass to a high luster. It consists of a long handle to which a small motor is attached. The motor turns two rotary felt pads beneath which are two blocks of polishing material in contact

*D213*

*used in London*



Window Cleaner and Polisher Operated by an Electric Motor Which Turns Rotary Felt Pads

with the felt. Cleaning is accomplished as fast as the felt pads can be moved.

**CLOCK KEEPS DAILY SCHEDULE  
FOR HOME OR OFFICE**

Designed to control and to measure time, the latest precision clock is equipped with a web record which keeps pace with the time. Marked into five-minute spaces, the web may be used for helping the executive to keep his appointments or the housewife her daily routine. If the business man has an appointment at ten a.m., he makes a note on the ten o'clock line of the web. As the clock hands move, the web also moves, so that when the clock shows ten o'clock, the ten o'clock line of the web is at the bottom of the dial, reminding the business man of his appointment. Also in view at the same time is his schedule for one hour ahead. The instru-

*Edna Mrs. L. J. Wyffels*

*Economizer*

*Time Controlled*

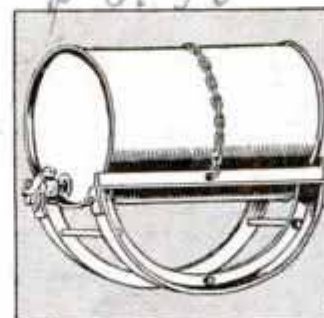


Top, Radio with Built-In Clock Control; Bottom, Desk Clock with Moving Schedule Tape

ment also may be used to turn radio programs on and off, the schedule being prepared for twenty-four hours ahead by means of the web. Parts of programs can be cut out by punching holes in the web at the proper places.

**METAL CRADLE HOLDS BARREL  
ABOVE THE FLOOR**

Barrels containing oil or other fluids may be placed in horizontal position above the floor to facilitate removal of their contents. This is accomplished by means of a metal cradle, constructed with flanges to prevent the barrel from slipping or rolling off.



*\$ 5.50*

A chain around the center of the barrel and attached to each side of the cradle also helps to keep the barrel in place. As the level of the barrel's contents drops, the barrel may be rocked forward on the cradle to permit draining all of the liquid through the petcock in the top.

*Kellner Barrel Lifter, Kuno Elevator Co., Silver Lake, Kans*



D138

# WHY EXPLORE



By DON GLASSMAN

*55 W. 86th N.Y.C.*  
**F**IVE million square miles of mystery—that's the Antarctic. It's the only lifeless continent on the face of the globe; the only continent hostile to beasts and plants. Only man has found a way to survive in its desolate white wastes.

Practically all that is known about the Antarctic was discovered since 1900. And now dogs, ponies, motor sledges and foot parties have yielded to man's great annihilator of time and space, the airplane.

Three airplane-equipped expeditions look upon the Antarctic as their prize this year. Two American expeditions have already dared their way through the ice pack. The commanders of these expeditions, Admi-

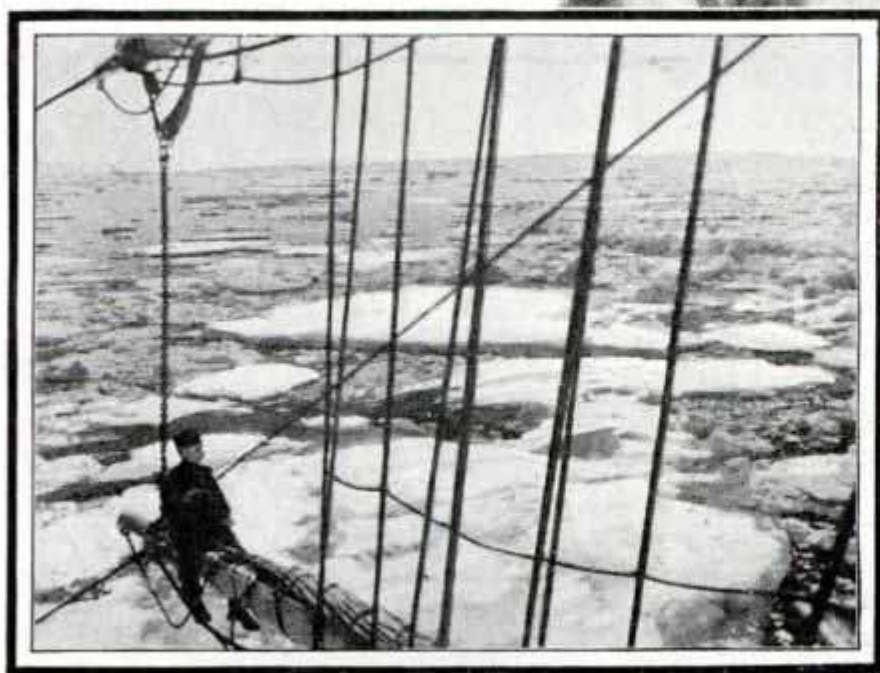
© New York Times  
 Top, Member of Mawson Antarctic Expedition Serenades Penguins; Bottom, Admiral Byrd with Members of Party



# THE ANTARCTIC ?

ral Byrd and Lincoln Ellsworth, look forward to exploring an ice-covered land area larger than Australia and Europe, not counting Russia. A British expedition commanded by Capt. Ernest Miles Joyce, who visited the Antarctic with both Scott and Shackleton, plans to start south late this summer, and to what purpose? "To investigate the commercial possibilities of the Antarctic," says Capt. Joyce. Capt. Joyce's backers think enough of these "commercial possibilities" to invest \$1,000,000 in his venture, which will be one of the most costly expeditions ever to undertake polar discovery.

What practical men are bound to ask themselves is whether any amount of buried treasure is worth the effort of clearing away millions of tons of ice and snow that have been accumulating since time immemorial. If explorers find gold in the Antarctic, it will require extraordinary machinery



© New York Times and St. Louis Post Dispatch

to prepare it for commercial use. Undoubtedly there is gold in the Antarctic—but, by the time it reached civilization, it would be worth ten times its own weight.

Commercially speaking, the open waters within the Antarctic circle are at present valuable only for the whales they contain. Blue, fin, and hump-back whales abound in Antarctic waters and they are eagerly sought by hunters. These whales

Top, Mask Protects Face of the Explorer from Fierce Winds of the Antarctic; Bottom, Photo Taken as the "Discovery" Carried the Mawson Expedition through Ice-Filled Waters





Suppose the earth's history should repeat itself and suddenly thaw out the great masses of ice in Greenland and the Antarctic! The oceans would rise 150 feet! Every principal seaport would be drowned, and whole countries, like Holland for instance, would be submerged. Under favorable conditions, however, the melting process would be so slow that sea level would be raised only one-eighth of an inch each year.

The geological evidence points to a steady retreat

(Continued to page 114A)



© New York Times  
reach 116 feet in length. The tongue of a fin whale yields up to three tons of oil. It is estimated that more than 70,000 whales have been killed in Antarctic waters in the last twenty-five years, but there is no sign that they have diminished.

The water locked up in the Antarctic is a considerable quantity. In a milder region, Greenland, the thickness of the ice cap was only recently measured and found to be thousands of feet. The same is true of Antarctica, where the interior plateau, rising to 10,000 feet above sea level, is covered by vast glaciers pressing toward lower levels.

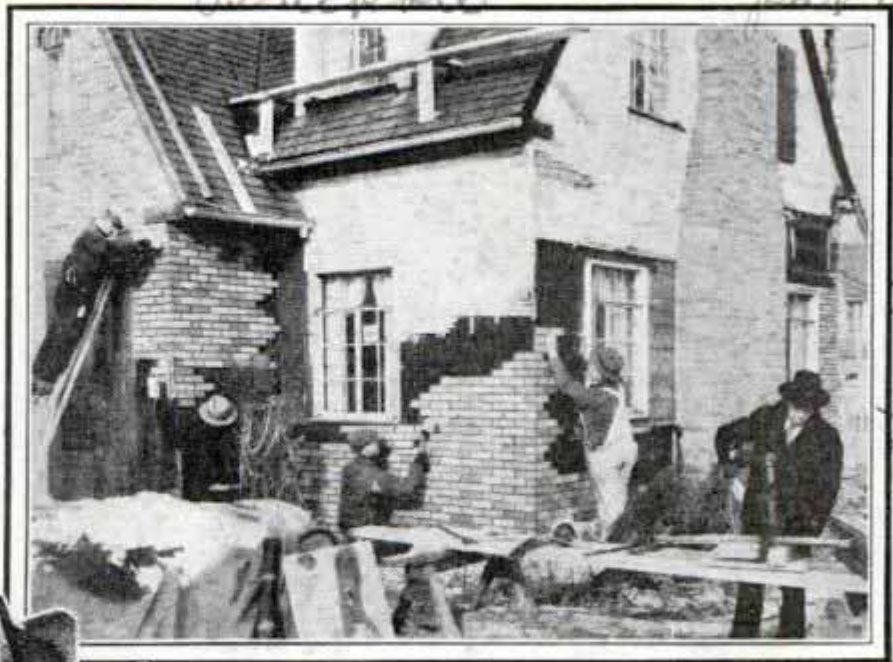
Top, Operator of Byrd Expedition Listens in on Radio Compass; Center, Byrd's Men at Work; Bottom, Heading through Mackenzie Sea



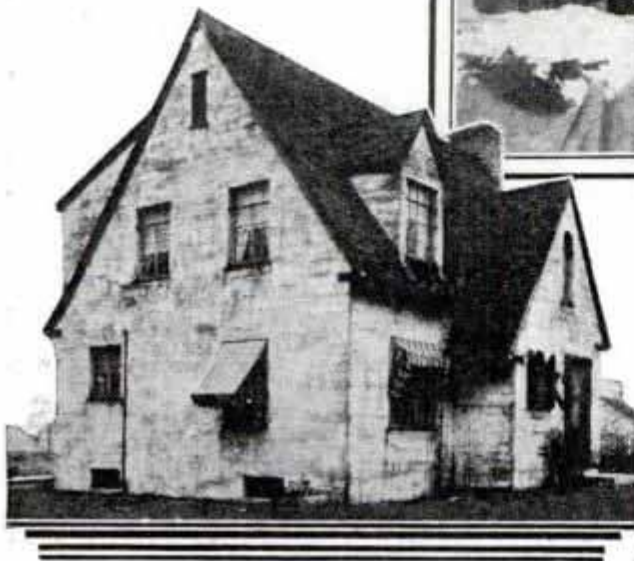
*License cancelled -*

# Brick Veneer Turns Old Homes into New

Frame or stucco houses may be given a permanent brick exterior by means of vitrified brick-surfaced panels that are nailed on. Each panel consists of twelve brick-veneer slabs permanently mounted on insulating board and spaced as in standard brick construction. The panel is nailed through the joints to the



Left, Old House in Need of Exterior Repair Work; Top, Same House with Brick Veneer Being Applied



outside of the building. Regular brick mortar is used to fill the joints between the brick slabs. Around windows, doors, cornices and the like, the veneer panels may be cut into pieces resembling single brick to facilitate the work. The board on which the brick slabs are mounted insulates the house, resulting in lower fuel consumption by the heating plant.

## CLOCKWORK IN ELECTRIC PLUG TURNS CURRENT ON OR OFF

Electricity for operating any particular appliance may be turned on or off at any desired time by means of a time switch with plug pins which can be inserted into any plug socket. Two models have been developed, one for a setting up to



one hour and the other up to four hours. The hand of the clock is turned to the time at which the appliance is to be switched on or off, thus winding the clock. When the hand reaches its zero position, the clockwork stops, causing the current to be turned on or off. For cooking or heating, special models switch from powerful current to a weak current. The time switch has many applications.

## COUPLER FOR GARDEN HOSE IS EASY TO ATTACH

Simple to attach and leak-proof when the connection is made, a coupler for the garden hose has been produced for use where water is under ordinary pressure. One part of the coupler may be fastened permanently to the faucet. The other part, attached to the hose, permits quick connection between the faucet and the hose, the two parts being fitted and given a quarter turn to wedge them tightly. The device also may be used for coupling two lengths of hose.



*Perimmaichester 6*

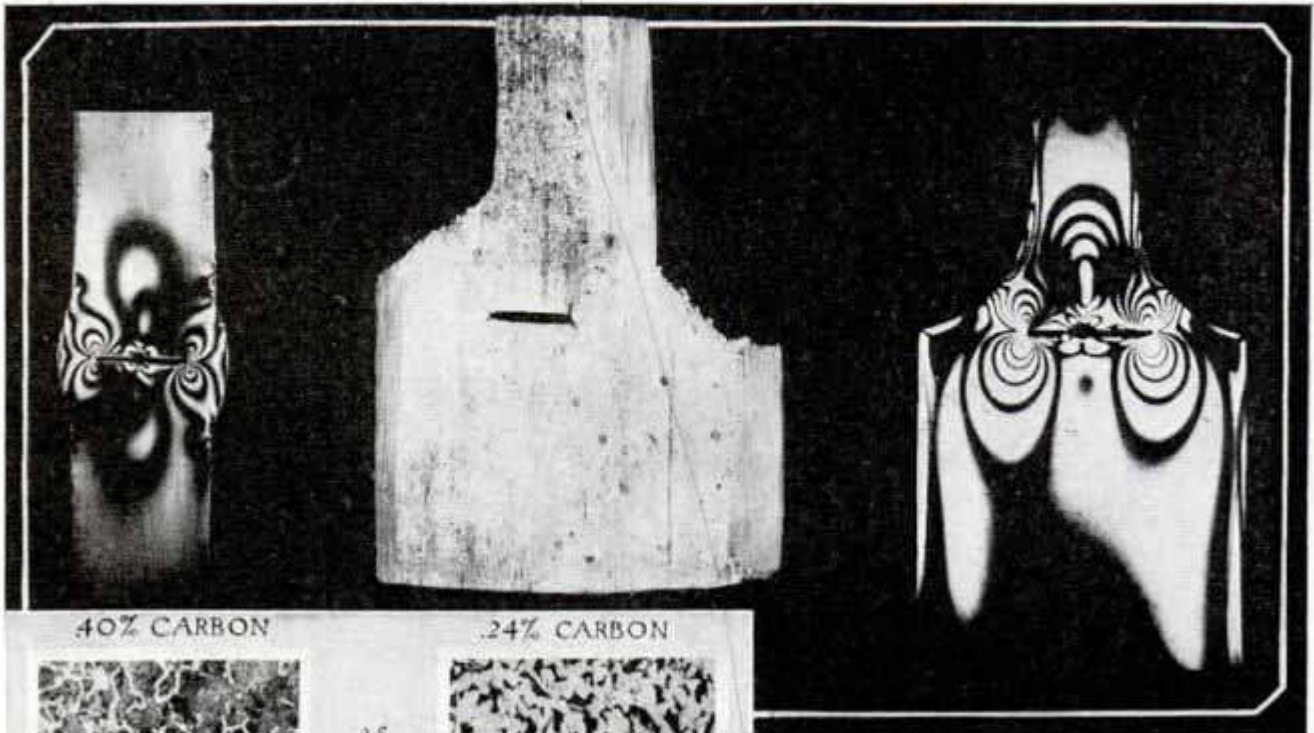
*switch Feb 14 35 260*

*Robert Miller, Leipzig Letter*

*The Brickote - 631 Clearmont Ave. Cleveland, Ohio 11-8 Cleveland, O 4600*

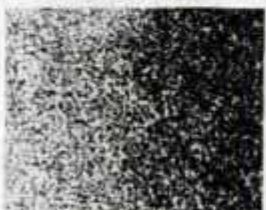


# Strain in Metal Studied with Aid of Light



40% CARBON

.24% CARBON

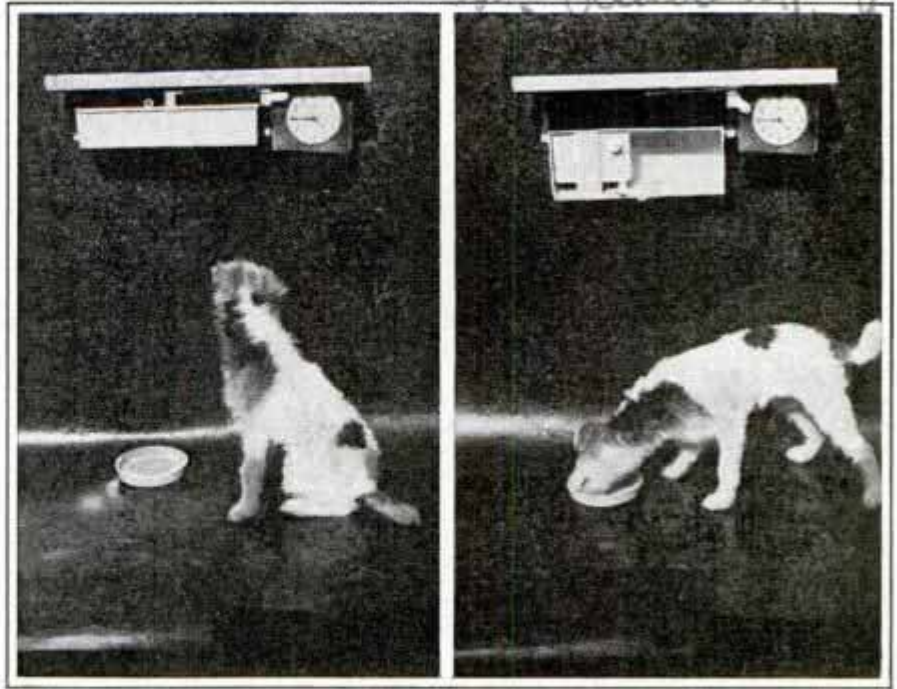
AS  
ROLLEDAS  
WELDED1200°  
FAHRENHEIT  
FURNACE  
COOLED1350°  
FAHRENHEIT  
FURNACE  
COOLED1650°  
FAHRENHEIT  
AIR  
COOLED

By duplicating a piece of metal in celluloid or other transparent material and studying it with the aid of light, the stresses within the piece of metal may be determined. When transparent substances which transmit light with equal velocity in all directions are subjected to strain, the speed with which light passes through is altered, the velocity of light becoming proportional to the stress at each point. Polarized light, in which all the waves are vibrating in the same plane perpendicular to the direction of the beam, is used in studying the transparent substances under strain. The result is a pattern of light and shadow. If the light is all one color, the area under strain will be banded with light and dark areas. If white light is used, the strained material separates the light into its component wave lengths and the alternate bands will be in various colors. Everett Chapman, of Lukenweld, Inc., points out that distribution of stress throughout odd-shaped pieces of material is of prime importance to designers. Under action of repeated loads,

Top, Left, Stress Lines at Weld; Top, Center and Right, Welded Metal and Its Celluloid Replica; Bottom, How the Metals Appear under Test



tiny cracks in the material may appear at the point of greatest strain and spread until the structure gives way. These tiny cracks usually can be prevented by designing the member so as to equalize the strain instead of concentrating it. Engineers can make a duplicate in celluloid of the piece under consideration and by observing the optical changes in it caused by stress, can see where the strain is concentrated and redesign the member to spread the stress more evenly. This redesigning often consists in taking away metal instead of adding to it, Mr. Chapman says. Thus, massive parts of bridges, engines and other structures have been made less heavy, more graceful and stronger. The polariscope is the instrument with which the studies are made.



Time-Clock Feeder for Pets Which Serves Food without Spilling at any Hour for Which It Is Set; It Dispenses Dry or Liquid Foods

**AUTOMATIC FEEDER FOR PETS OPERATED BY TIME CLOCK**

Household pets can be fed automatically at any predetermined time by using a time-clock feeder which can be set to serve the food at any minute within twenty-three hours after being set. It can be used for rabbits, pigeons and chickens as well as cats, dogs and other household pets and will dispense either dry or liquid foods without spilling or splashing. This enables the family, when leaving home, to feed the dog at its regular mealtime.

**PEN KEEPS COUNT OF WORDS AND INK LEVEL**

How many words can be written with the ink remaining in the latest fountain pen can be determined by the writer by a glance at a "word gauge" engraved on the transparent ink section of the barrel.

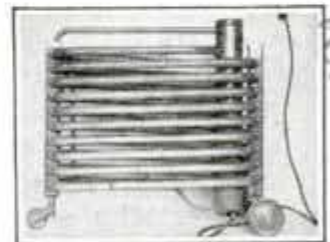


The gauge measures the ink level in terms of words. In actual tests, 7,034 words were written with a single filling of ink. The scale is divided into seven parts, each indicating the word capacity as 1,000, or a total of 7,000 words.

An ink made with ammonia instead of acid is said to have virtually no deteriorating effect on paper.

**PORTABLE ELECTRIC RADIATOR GIVES STEAM HEAT**

Steam heat wherever desired is offered by a portable electric radiator which can be tumbled about the house and plugged into the electric outlet in any room where extra heat is required. An electric heating element in the base of the radiator produces the steam which passes through the coils, where it condenses and returns to the heater. The movable radiator is particularly suited for booster service—adding to the heat produced by the central heating plant in any particular room.



Letter 12/30/32

Mr. (E) see card file

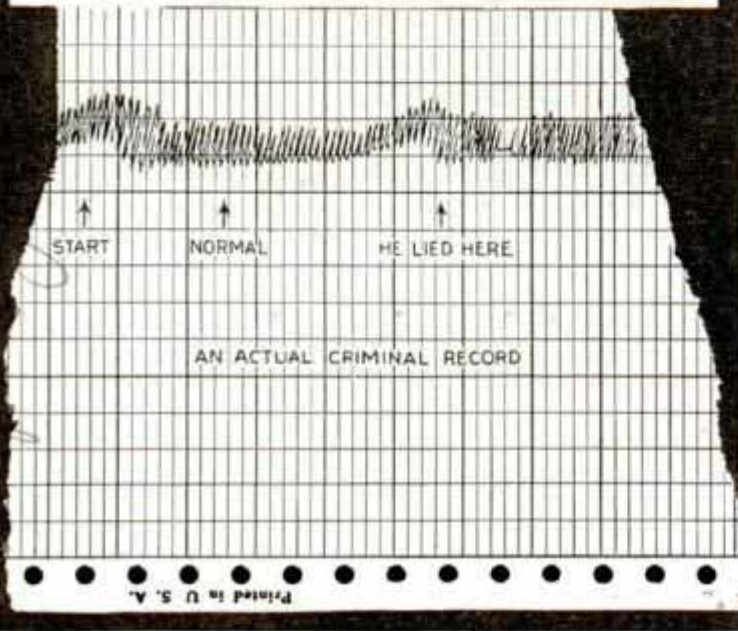
Contin Pen Co Toledo, Ohio

Refer any (Hager) Rutachbach Bruchwitzstrasse 20 Hamburg, Germany

J. Seidel 809 Church St. Reading, Pa



*4205 Terrace  
Oakland Calif*



Top, "Lie Detector"; Bottom, Actual Record Made by the Device, Showing Point of "Confession" by Subject

### ALL-ELECTRIC LIE DETECTOR AIDS POLICE

In a city of 100,000, police picked up a man whose movements were suspicious, but they had no information on which to base accusations of any crime. Milton A. Chaffee, University of California physicist, was called upon by the police to try his all-electrical "lie detector." A tiny disk-shaped device was attached to the back of the suspect's hand, another to his chest and the current was turned on. As a recording sheet revolved on its rotary cylinder, Chaffee asked a few casual questions that could be answered by "yes" or "no." Then he asked: "Have you a bank account?" The suspect's face remained inscrutable, but the quivering needle of the detector recorded a sharp rise on the graph as the word "bank" was spoken. With this lead, the police obtained a con-

fession that the suspect had participated in a bank robbery. In Chaffee's lie detector, the cylinder on which the graph sheet revolves is operated by an electric motor. The recording needles are actuated by sensitive galvanometers. The "pulseometer," which is the key to the machine, consists of finely granulated carbon particles between two electrodes, one of which is fixed, and the other placed against the suspect's pulse, his hand and lungs. Every beat of the heart, varying the blood pressure against the electrode of the pulseometer, is communicated to the galvanometers. The pulseometer picks up the blood pressure, measuring it as a microphone measures sound pressure.

### D215 MAIL BOX FOR AUTOIST STANDS AT CURB

Motorists in Omaha can deposit letters in mail boxes without leaving their cars. The boxes, which stand at the curb, are the ordinary kind of containers except for a special chute extending above each box and facing the street. A flap at the top of the chute can be operated with one hand so the motorist can deposit letters as he stops momentarily at the curb.



Special Chute Attached to a Curbside Mail Box, Making It Easy for the Motorist to Mail Letters

*Berkeley Calif*

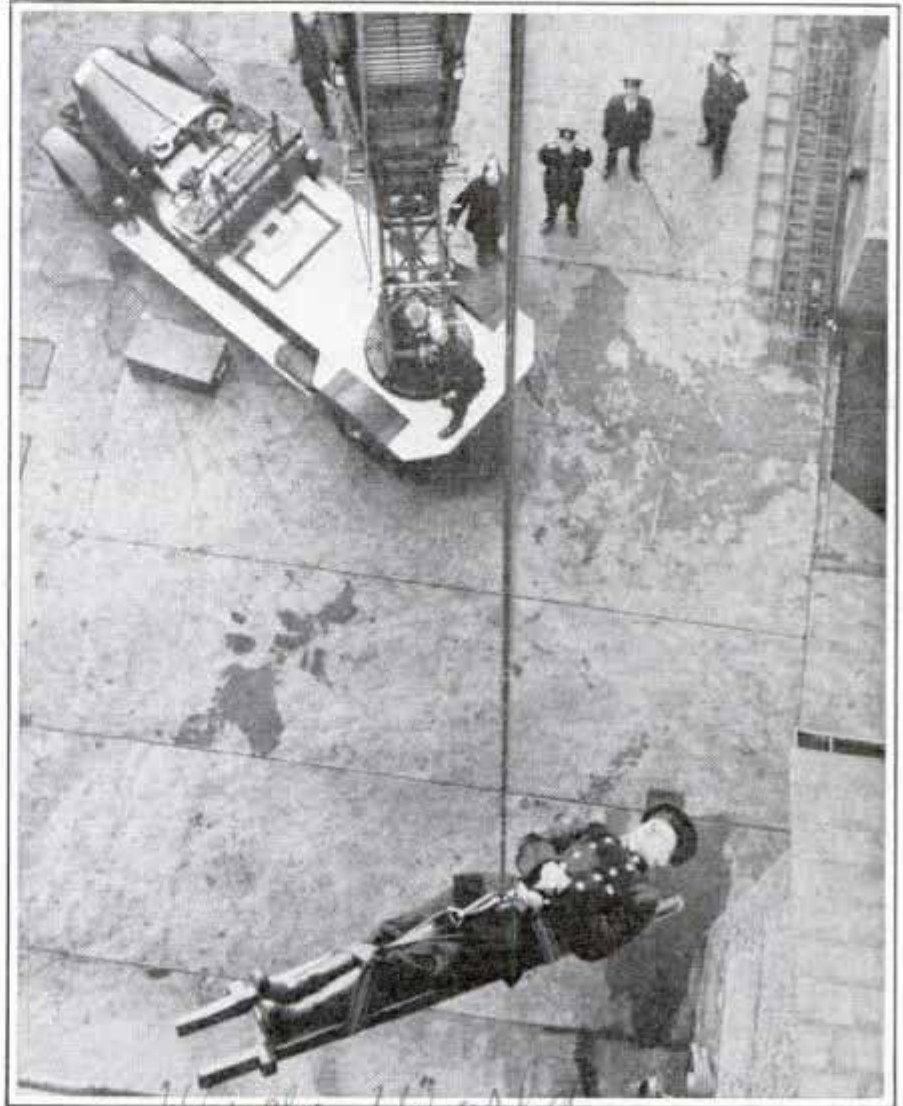
*Chaffee, Univ. of California*

*Omaha Neb*



# Sling Stretcher Saves Helpless Fire Victims

Fire departments are being equipped in England with sling stretchers on which persons injured in fires or those overcome by smoke can be lowered safely to the ground. The helpless victim is lashed to the stretcher, which is then lowered with the aid of a cable operated by a motor turntable. In this manner, rescues can be made more rapidly than when the firemen must carry the victims down.

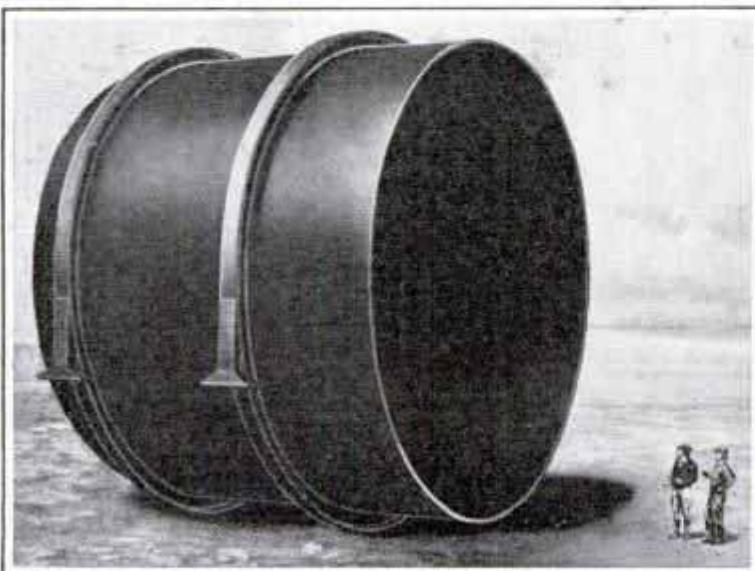


Sling Stretcher Being Used by Firemen to Lower a Helpless "Victim"

## PIPES BIG AS HOUSE CARRY BOULDER DAM WATER

Monster steel mains, fabricated on the site, will control the flow of water at Boulder dam. More than 45,000 tons of steel plate will be required when the 14,500 linear feet of immense conduits are completed. About 4,700 feet of this pipe will have an internal diameter of thirty feet, 1,900 feet will have an inside diameter of twenty-five feet and the rest will be thirteen feet or

eight and one-half feet in diameter. These great conduits will form the arterial system through which water impounded by the dam will be delivered to the turbines of the power plant. Because of their bulk, and the limited clearances of bridges and tunnels, the pipe sections could not be built at any of the steel mills and then hauled by railroad to the dam. One unit section of a thirty-foot diameter conduit is composed of three plates, each about thirty-two feet long and twelve feet wide and weighing twenty-three tons. Two of these plates constitute a carload and more than 1,000 carloads of plates are to be hauled to the fabricating shops near the dam.



Monster Main at Boulder Dam; It Is Thirty Feet in Diameter

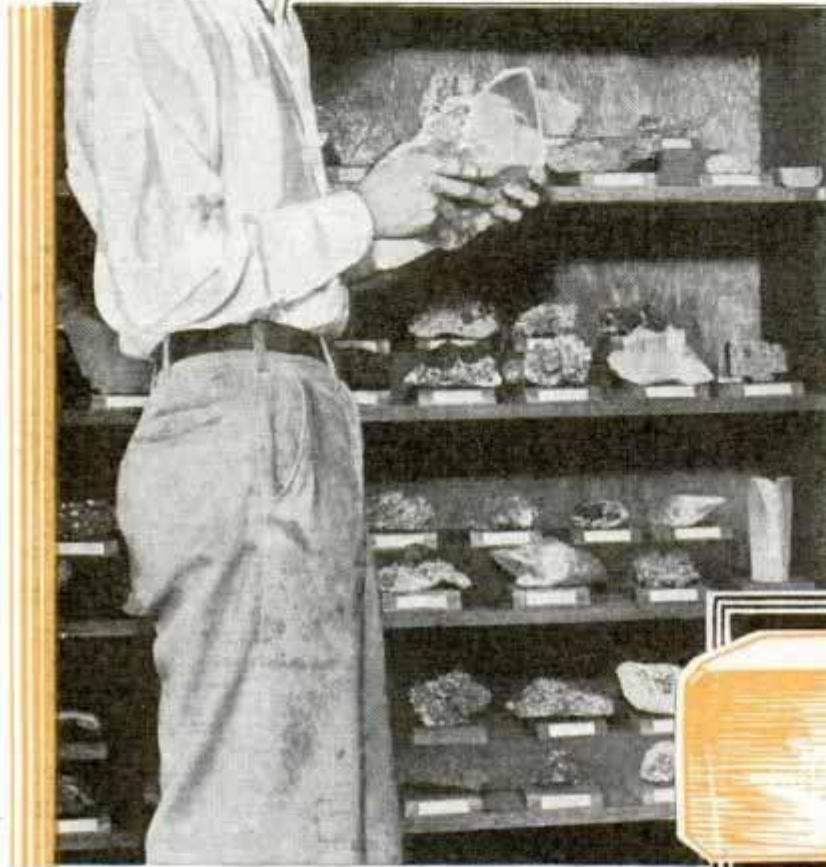
*The Babcock & Wilcox Co., 85 Liberty St.*



1046  
Reference  
10.88 Baldwin Co  
Arcadia, Calif.

# ROCKS

worth more than



unique specimens of crystallized galena command many dollars on the open market.

Every part of the United States abounds in minerals, and those who make a hobby of mineral collecting sometimes find themselves well repaid. One collector, hunting for specimens in an abandoned mine dump, found two chunks of salmon-colored beryl one afternoon for which he received \$300. Another, walking across the hills near San



By THOMAS E. STIMSON, Jr.

420 S. San Pedro Los Angeles Calif

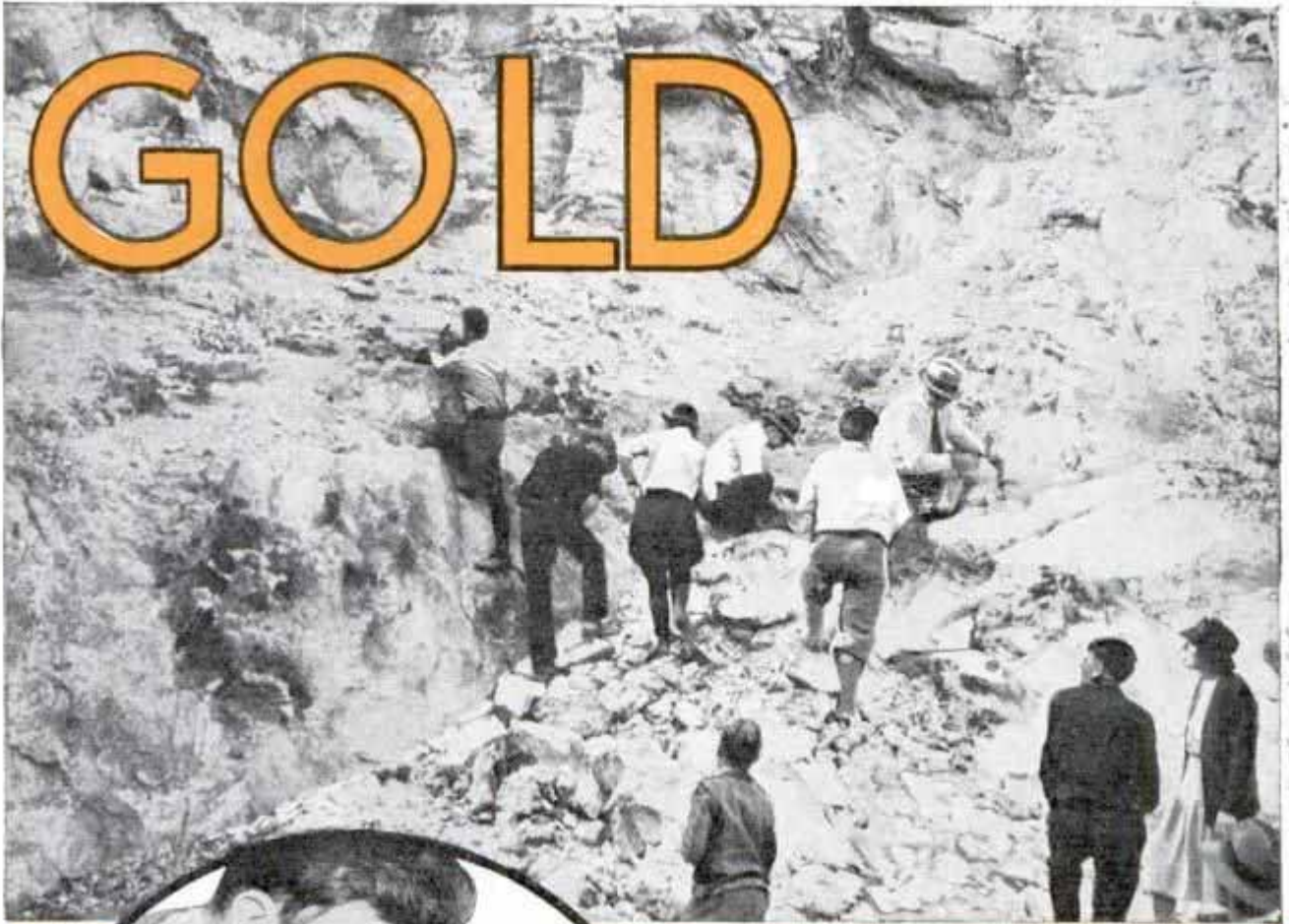
**Q**UARTZ is the most common mineral in the earth's crust, but some grades of it are sold by the carat instead of the ton. If you find a large water-clear crystal of quartz you may receive several hundred dollars for it. Sometimes a piece the size of a walnut is worth \$10 or more.

Feldspar is a common constituent of rocks and calcite, another mineral, is almost as common as quartz, yet large clear crystals of either are valued at \$100 and up. What makes such mineral specimens valuable are their perfection, beauty, and rarity. Worthless beryl, for instance, is found in many granite ledges, but emerald, a rare variety of common beryl, is worth many times its weight in gold. Galena, the ore from which lead is obtained, brings only a few cents a pound, yet

Above, a Collector and His Specimens; Below, Typical Crystal Shapes Assumed by Minerals and Much Sought by Collectors



# GOLD



Above, Collectors Seeking Specimens; Below, Roughing Down Surface of Mineral before Polishing

Diego, picked up a piece of flawless kunzite from which \$500 worth of jewels were cut. One of the best finds ever made also occurred near San Diego, where a mineral hunter opened up a pocket containing several hundred pounds of red tourmaline worth \$100 a pound.

Mineral collecting as a hobby is growing, according to John A. Renshaw, president of the Mineralogical Society of South-

ern California, because collecting rocks is inexpensive, takes one out into the open, and opens the eyes of collectors to the many beautiful colors and formations found in the earth.

Even a small collection may include half a dozen different types of crystals and a score or so of variously colored minerals. Some individuals gather collections that are worth thousands of dollars by obtaining good speci-

mens of every mineral in the vicinity of their homes and then trading some of these with collectors in other parts of the country.

Not everyone knows that nearly all of the gems, including diamonds and rubies, are found in the United States. Diamonds are picked up in a dozen states, several thousand having been found in Arkansas. North Carolina yields rubies. Sapphires

1038 Baldwin Ave. Enclosure 723  
Shelton



Largest producer of commercial sapphires in world, few miles out of Mudds on edge of Rich Creek  
 Largest supply of blue gems (sapphires) in world, near Summit of Yoga mine, near Summit of Yoga mine

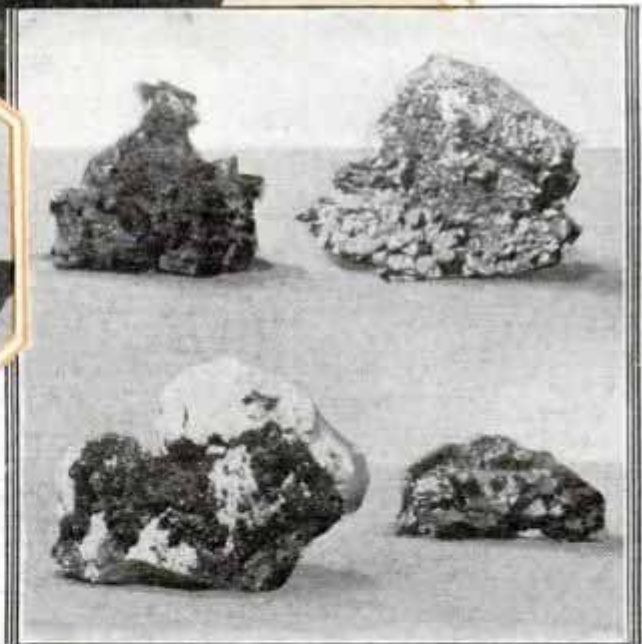


Above, Galena Crystals; Right, Using Pick to Chip Out Specimens; Below, Two Large Crystals of Smoky Quartz and a Ball Carved from the Mineral



fornia. "Anyone can gather samples of a dozen minerals in a few hours," says Renshaw, "but finding good specimens is not so easy. One of the best places to look is in the dumps of mines, for valuable specimens are sometimes tossed away. Large

galena and calcite crystals have been recovered from ore dumps in Oklahoma, and good specimens of copper and cinnabar are found in Arizona mine dumps. Collectors in southern California find hundreds of broken crystals suitable for their collections in the ore dumps of the San Diego gem mines.



Above, Galena Crystals from Oklahoma; Below, Marcasite from Kansas and Nodular Calcite from Oklahoma

are found near Helena, Mont. Collectors find aquamarines in Connecticut. In most of the New England states they hunt for golden beryl, green tourmaline, zircon and amethyst. In the Lake Superior district they find thomsonite, agate, and azurite. Topaz, garnet, opal, turquoise and lapis lazuli are among the jewels collected in other states.

The diamond, considered the most precious gem, is by no means the rarest. Some crystals like red spinel and brown anatase are so rare that they are known only to small groups of mineralogists and collectors. Hiddenite and rhodolite are two rare gems found only in North Carolina. An unusual blue gem, benitoite, so far has been found only in one district in Cali-

The walls of old deserted quarries frequently yield fine mineral specimens.

"Another good place to look is in caves, where large clear crystals of several minerals are often found. There are frequently crystallized formations in veins running through rocky regions in hills. Old stream beds and river washes are good hunting

(Continued to page 116A)



## "Midget-Wave" Radio Uses One-Inch Aerial

With the opening of a new short-wave station at Lympne airfield, Kent, experimental work in the ultra-short wave radio field advances another step in England. The station is expected to permit communication between Kent and the airfield at St. Inglevert, France, on a wave length of eight inches. Since such waves travel in a straight line, similar to a beam of light, it is necessary that the transmitting station and the receiving station be high enough to avoid interruption of the waves by the horizon. The English station transmits the invisible "beam" from the top of a tower, using a giant reflector on which is located a one-inch aerial.

### PATIENT IS LOWERED BY PARACHUTE FROM AMBULANCE PLANE

Army men attached to the air base at Kelly field have made a parachute designed particularly for lowering helpless patients from an ambulance plane in case the ship is disabled or must land upon terrain which presages a crash. The recumbent patient is



© Planet News  
Giant Reflector Mounted Atop Short-Wave Tower Is Used in Cross-Channel Radio Communication



Testing Special Parachute Intended to Lower Patients from Ambulance Plane in Case of Emergency

placed in the harness of a regular parachute but the pack containing the parachute is freed from its usual position on the lower part of the harness and is attached to the under side and head of the litter on which the patient rests. To the rip cord a line eighteen feet long is tied, the other end of the line being fastened to the interior of the plane. In an emergency, the patient is ejected from the ship on the litter, both falling together until the length of the line is reached, when the weight of the falling body frees the rip cord and the parachute opens. The speed of the patient is thus checked, the unsupported litter falls free and the patient floats to earth supported by the chute.



# Indian Medicine Men Still Practice



Indian medicine men still practice in Canada—until caught and punished. While many cases of witchcraft have been discovered in northern British Columbia, only once have white men witnessed the actual ceremonies, and that without the Indians' knowledge. As two officers of the Royal Canadian Mounted Police trailed a group of Indians, they came upon a lonely hut in which a ceremony known as Swanusk, which means blowing away, was being used to "cure" the old chief of the tribe, Tye David, of illness. While the officers watched, the Indians conducted the weird rites, with the medicine men appar-



Top, Indian in Western Canada; Center, Ceremonial Headdress; Bottom, Medicine Man's Tepee





# "Magic" among Canadian Tribes

ently scooping the "evil" from the old man's body and blowing it away. At the trial of the Indians, the chief testified that whenever he had been treated by the medicine men, he felt better. On the reserve near Brantford, Ontario, Indians make merry in springtime with witch dances. There is nothing secret about these dances. The young men are the witches. Wearing huge, grotesque masks, they visit each house, dancing and shaking rattles to drive out evil spirits.

Top, Right, Indian Wearing Echo Mask; Center, Left, Another Strange Mask; Center, Circle, West Coast Indian Medicine Man in Full Regalia; Bottom, Old Men of an Indian Tribe Shown Gathered around Medicine Man in Mountainous District of Canada





*Ammanecer camp  
Dept. Nela Park  
Cleveland Ohio*



Installing Some of the 10,491 Pipes in a Big Organ; This Instrument Contains 176 Draw Stops and There Are Four Keyboards

means that the lamp will fail almost immediately. The vapor from a single teaspoonful of water would be enough to spell doom for more than 5,000,000 lamps. So efficient is the evacuating system and so vigilant the inspection of the purity of gas used in the lamps made by the General Electric company that a dryness making the Sahara desert dripping wet in comparison is effected.

*D263*  
**LOCOMOTIVE MADE FROM JUNK HAULS SIX-TON LOAD**

Scraps, junk and odds and ends of machinery have gone into a small "locomotive" made by a British shop foreman during his spare time. While it looks like a real steam engine, in reality it is an old automobile engine converted and disguised to appear like a miniature locomotive. Included in the rail car are such articles as an old hot-water boiler, pieces of brass bedsteads, kitchen uten-

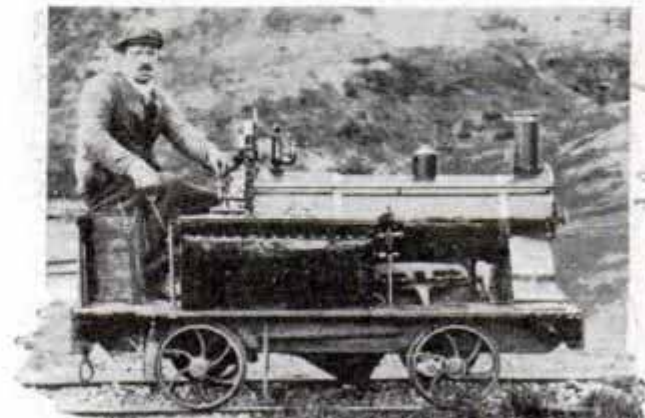
*England*  
**BIG CONCERT ORGAN CONTAINS TEN THOUSAND PIPES**

England now possesses one of the finest and largest concert organs in the world, the Albert Hall instrument which has been entirely rebuilt at a cost of \$130,000. It contains 176 draw stops, 10,491 pipes and four keyboards, and is pumped by electric motors.

sils and ash cans. The engine actually works and can haul loads of six tons or more up steep grades.

*London*  
**SUPER-DRYNESS IN LIGHT BULB MAKES IT EFFICIENT**

One drop of water is sufficient to ruin 68,000 incandescent lamps, according to illumination engineers. A single part of water vapor to 100,000 of the proper gas means trouble, and four parts to 100,000



*acme*  
"Locomotive" Made from Odds and Ends and Run by an Old Auto-Engine Which Hauls Six-Ton Loads

*John E. Hales, Clara  
Wah...*

*England  
London  
County Durham*



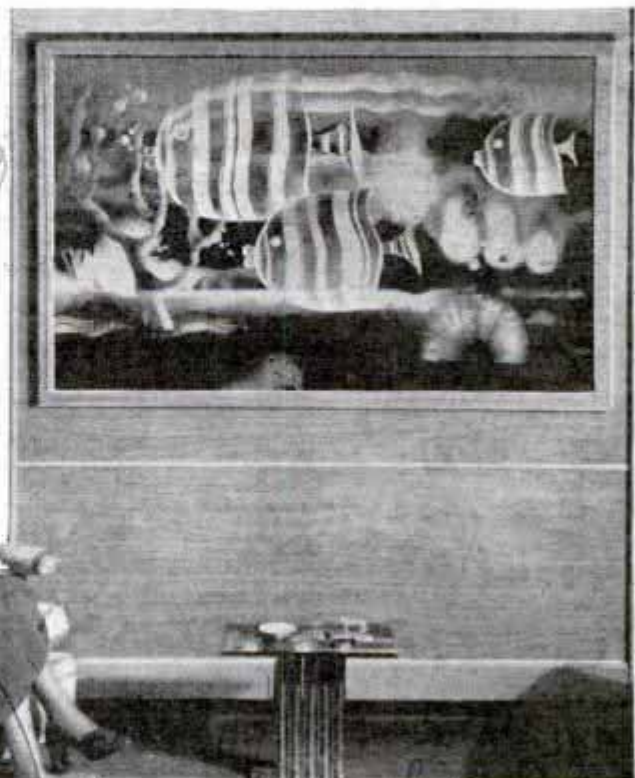
*Ferro-enamel Co. South Holiday Cleveland Ohio.*  
**Porcelain Enamel Murals Are Latest in Art**

found. Between fifteen and twenty million meteorites enter the earth's atmosphere every twenty-four hours, but most of them are burned up by the friction of passing through the atmosphere before they strike the earth.



Top, One Step in Making Porcelain Murals; Center and Bottom, Two of the Murals

Porcelain enamel murals, ranging from simple scenes to elaborate panoramas on futuristic lines, are the latest contribution to interior decoration of home and office. Molten glass is poured over a metal strip and the two are fused at high temperature, giving great strength. Then, colors are shot through a stencil, cut from the artist's design, to the porcelain surface. When baked and cooled, the mural is ready for hanging. The work is done by M. Edward Winter, Cleveland artist, in co-operation with the Ferro corporation.



*D 233*  
**METEORITE IS WORTH MONEY TO THE FARMER**

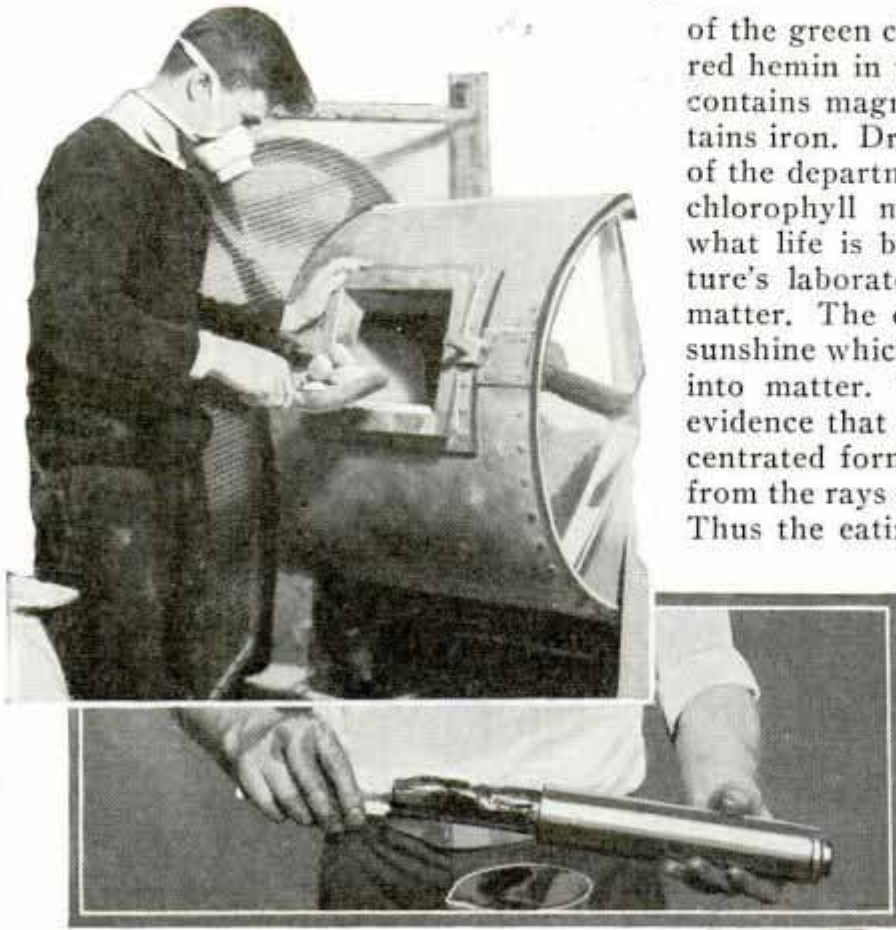
If the farmer finds a meteorite on his land, he may be able to sell it for enough to pay off his mortgage, according to Ralph W. Stone, assistant state geologist of Pennsylvania. Museums have paid as high as five to ten dollars per pound for meteorites. One Pennsylvania farmer paid off the mortgage on his farm with the money realized from the sale of a meteorite which he



*Gen. Eckhardt Letter from (line) misc file*



# Human and Plant Life Chemically Related



Top, Throwing Stones into Mill to Grind Up Dried Leaves and Extract the Chlorophyll; Center, Some Pure Chlorophyll; Right, Drying the Green Leaves

From the laboratory of the organic chemist has come proof that plant life and human life are chemically related, if not one and the same basic thing. Chlorophyll is to the plant what the blood is to the animal—the giver of life—and it has been found that blood and the green of plants are so nearly alike that their chemical properties are shown in formulas which are almost identical. Chemists have extracted chlorophyll from plants in nearly pure form and have found that when this product is introduced into the digestive tract, the red blood cells immediately increase and their hemoglobin content rises, for hemin, the red pigment of the blood, and chlorophyll, the green pigment of plants, are virtually identical. The eating of green foods takes chlorophyll into the body's laboratory, and feeding it in concentrated form is merely a short cut in giving the body sunshine which the plant caught and benefited by. The chief chemical difference in the organic construction

of the green chlorophyll of plants and the red hemin in the blood is that the former contains magnesium while the latter contains iron. Dr. Frank M. Schertz, chemist of the department of agriculture, suggests chlorophyll may give a clue as to just what life is because it appears to be nature's laboratory converting energy into matter. The energy reaches the earth as sunshine which is transformed in the plant into matter. This chemist says there is evidence that chlorophyll is a highly concentrated form of energy coming directly from the rays of the sun and other planets. Thus the eating of green foods may give far greater benefits than has been realized heretofore. In any event, man's closest approach to the chemical secrets of life now seems to be through the green leaves of plants. When the riddle of chlorophyll finally is solved, it



is possible that nature's story of life and how it is produced may be revealed.

## TIME SYSTEM IN USE TODAY DEvised BY BABYLONIANS

Why does your watch not show ten hours of 100 minutes each, instead of twelve hours of sixty minutes? The answer can be traced to the Babylonians who found the number twelve is divisible by two, three, four and six, while ten is divis-



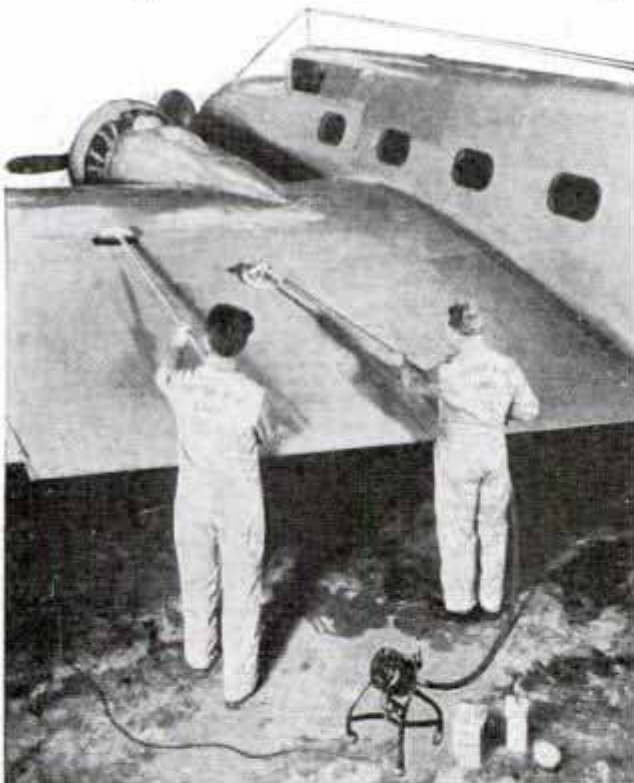
235, 45  
number

ible by only two and five. They also determined the number, sixty, is more flexible than 100, because the latter lacks the factor, three. So they began counting by twelves, still used in our dozens, grosses, and in reducing feet to inches. They had no watches, or clocks, of course, but did use sand clocks, water clocks and sun dials. The year of twelve months is also believed due to the computations of these ancient astronomers and mathematicians.

D270

**WAXING OF WINGS ADDS THREE MILES TO SPEED OF BIG PLANES**

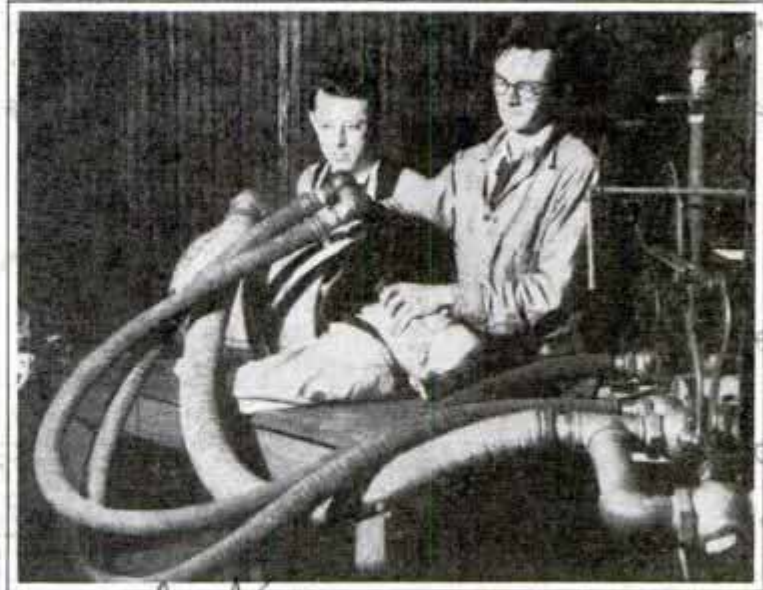
By applying a coat of wax to the wings and fuselage of United Air Lines transport planes, three miles an hour has been added to the speed of the ships through decreasing air resistance. The wax is ap-



Applying Wax Coat to Wings of Transport Plane to Increase Speed by Three Miles per Hour

plied with a brush to the wing surface and polishing is done with an electric motor.

☐ An Englishman has invented a process for producing permanent documents by printing platinum characters on very thin sheets of gold.



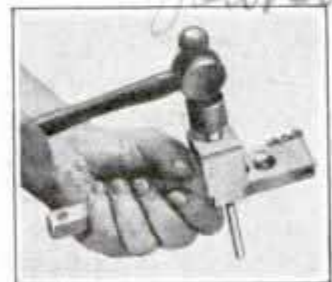
Compressor Tubes and Bellows Apparatus Used to Revive the Heart Beat after Death Has Occurred

**SHEEP'S HEART MADE TO BEAT HALF HOUR AFTER DEATH**

Chemists and physiologists of the University of California have brought a step nearer the age-old dream of reviving the dead, by using an arrangement of compressor tubes and bellows to start the heart of a dead animal. In one experiment a sheep was put to death with nitrogen gas. Forty-one minutes after respiration had ceased and a stethoscope failed to detect a heart beat, and thirty-two minutes after the electro-cardiograph failed to show the slightest tremor of the heart, a few faint beats were recorded with the aid of the compressor tubes and bellows, although the animal was not revived.

**FLARING METAL TUBES**

Brass or copper tubing can be flared easily by using a flaring set consisting of a holder to accommodate different tube sizes and a punch to form the flare. To operate, it is only necessary to insert the tube in the proper slot, place the punch assembly unit over the end and strike the plunger with a hammer. Six openings are provided to accommodate tubes from three-sixteenths to one-half inch in diameter.



Webster R. E. Cornish, Webb, Berkeley, Calif.

D265  
Cleveland Ohio

Suena Letter 2/17/34

The Weatherhead Corp

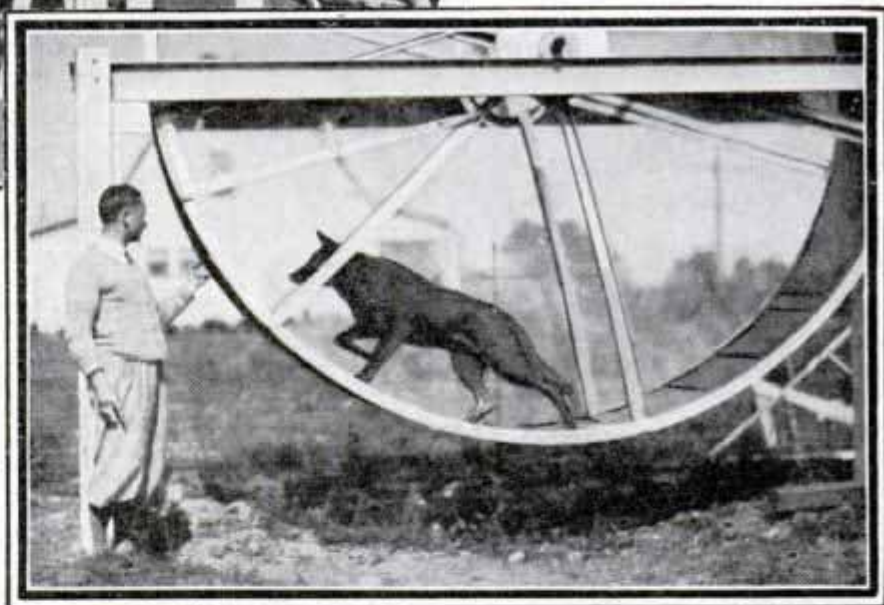


1945  
 Mrs. W. S. Smackwell  
 129 S. Rexford Street  
 Beverly Hills, Calif.

# DOG SCHOOL



Left, How the "Class" Learns to Go Up and Down Ladders, Which Is One Part of the Jumping Lesson; Below, Dog "Pupil" on Training School "Treadmill"



*Box 86*

**W**HEN a dog arrives at Benno Stein's training school at Chamblee, Ga., to be taught protective work or how to do tricks, the trainer first wins its confidence and friendship. Fright or ill temper resulting from a long ride in cramped quarters is dispelled by quiet words and kind treatment. Then comes the first lesson.

From this time until "graduation" day, the dog is schooled in obedience. Teaching it how to execute certain commands means nothing if the dog fails to obey those commands, so the trainer works hardest to obtain perfect control of the "pupil." It is known that a well-trained dog is never vicious and that it can be depended upon at all times, simply because it obeys its master instantly.

In the first lesson, the dog is taught to

walk at the master's left side, with its head in line with his legs. This point is stressed because it places the dog in the best position to protect its master in case of attack. Presuming that most persons are right-handed, the master would swing at his assailant with his right arm and the dog would attack from the other side without the danger of injuring the master.

Next the dog is taught to sit down whenever its master stops and then to lie down at command. "To enjoy a dog in the home, you want it to behave like a



# Secrets

well-trained child," says the trainer. "You want it to lie down when told and to stay there until commanded to get up. When taking your dog in the automobile, you want it to lie down quietly in the back seat. In police work, an officer may wish to enter a place and leave the dog on guard outside." These things may be taught easily if the dog is placed in a comfortable position.

Then comes the lesson in jumping, which is often regarded as a trick, but which is essential in protective work. In police activities, the dog is expected to catch the burglar instead of merely chasing him away. Con-



27:43  
Training School for dogs, Bar 86 Chamberlain



Courtesy Benno Stein

sequently, a police-trained dog is required to clear a three and one-half foot hedge, to scale a six-foot wall, to jump through fire and to climb ladders.

Later, the dog is trained in methods of attack. Contrary to the general belief that a dog always will defend its master, not one in fifty will attack its owner's assailant without training. This is because the dog has been taught to be friendly as a puppy.

Top, Trainer in Heavily Padded Suit Puts a "Pupil" through a Lesson in Attacking the Arm Holding the Weapon; Bottom, Teaching Dog to Give the Alarm





Courtesy Hollywood Dog Training School

steps. If the dog is intended for police work, it is trained in retrieving and trailing. A dog is taught to retrieve, or bring back to its master, everything thrown away by someone they are trailing. This is done by utilizing the dog's acute sense of smell and by stressing obedience.

Trailing, which is the last step in training, requires months of hard work. Methods differ, but Trainer Stein prefers the method by which trailing instruction is built up with retrieving as a basis, so that the dog "gives tongue" only when it finds the fugitive and attacks only when attacked.

(Continued to page 126A)



Top, Dog Attacks "Robber" Using Club; Center, Dog Sits Down While Master Searches "Robber"

Now the dog learns that under certain circumstances, it is required to attack and that it has the strength to conquer a man with its teeth. Following immediately upon this training is another lesson in obedience, because the trainer knows that now the dog is dangerous unless under perfect control. Thus, the next step is to teach the dog to release its grip, at the first command, and to cease attack as soon as the person attacked stands still. For this lesson, many trainers use a protection suit, consisting of heavily padded coat and trousers into which a dog may bite without hurting the wearer.

To round out the lesson in attack, the dog is trained to lie down and to stay there while men walk and run or chase each other near by. This convinces the dog that under no circumstances is it allowed to attack every person who happens to approach. It is obvious that the dog must be perfect in obedience to learn these



Bottom, Dog in Act of Attacking "Robber" Using a Pistol; the Man Is Dressed in Leather for Protection against the Attack

12239 Ventura Blvd.  
Hollywood, California  
1945







D 136



Anti-Aircraft Machine Gun Mounted on Motorcycle Can Negotiate Ground Impassable for an Automobile

### MACHINE GUN ON MOTORCYCLE IS ANTI-AIRCRAFT WEAPON

France is experimenting with a motorcycle as a carrier for an anti-aircraft machine gun. The weapon is mounted at the rear of the motorcycle for firing, but is carried in a case when on the road. It has been found that the motorcycle not only makes better speed than the usual form of gun carrier, but also can travel roads impassable for a car.

### SANDER FOR REACHING EDGES HAS REVOLVING GUARD



Lightweight and easy to operate, a disk sander for reaching the edges has a revolving guard that prevents the machine from damaging the shoestrip. The sander eliminates hand scraping for floor men. It weighs but twenty pounds. Special handles make it unnecessary for the operator to get on his knees while running the machine. A switch in

one handle gives instant control for starting and stopping. The sander is designed for all edge applications and other hard-to-get-at places where large sanders cannot be used. It is equipped with a dust-collecting system. A three-quarter-horsepower motor drives the sander at 3,200 revolutions per minute.

D235

### TOBACCO SAVED BY TRAP BAITED WITH LIGHT

Millions of cigaret beetles, tiny insects which cause great damage in tobacco warehouses, are lured to death in traps equipped with low-power lights. When tests revealed that very bright lights had no effect on the insects, which spend most of their lives in semi-darkness or diffused light, the traps were constructed with forty or fifty-watt electric bulbs which give moderately intense light. More than five million beetles were collected from traps



Insect Trap in Tobacco Warehouse; Note Electric Lamp Suspended in Mouth of Device

operated for three months in open tobacco storage warehouses. As the insects are attracted to the trap, they are drawn into a glass jar by a suction fan. The jars, are emptied once a week.

american floor Surfacing Machine Co. 518 - 605 S. W. Clair St. Toledo, Ohio

Chicago 21

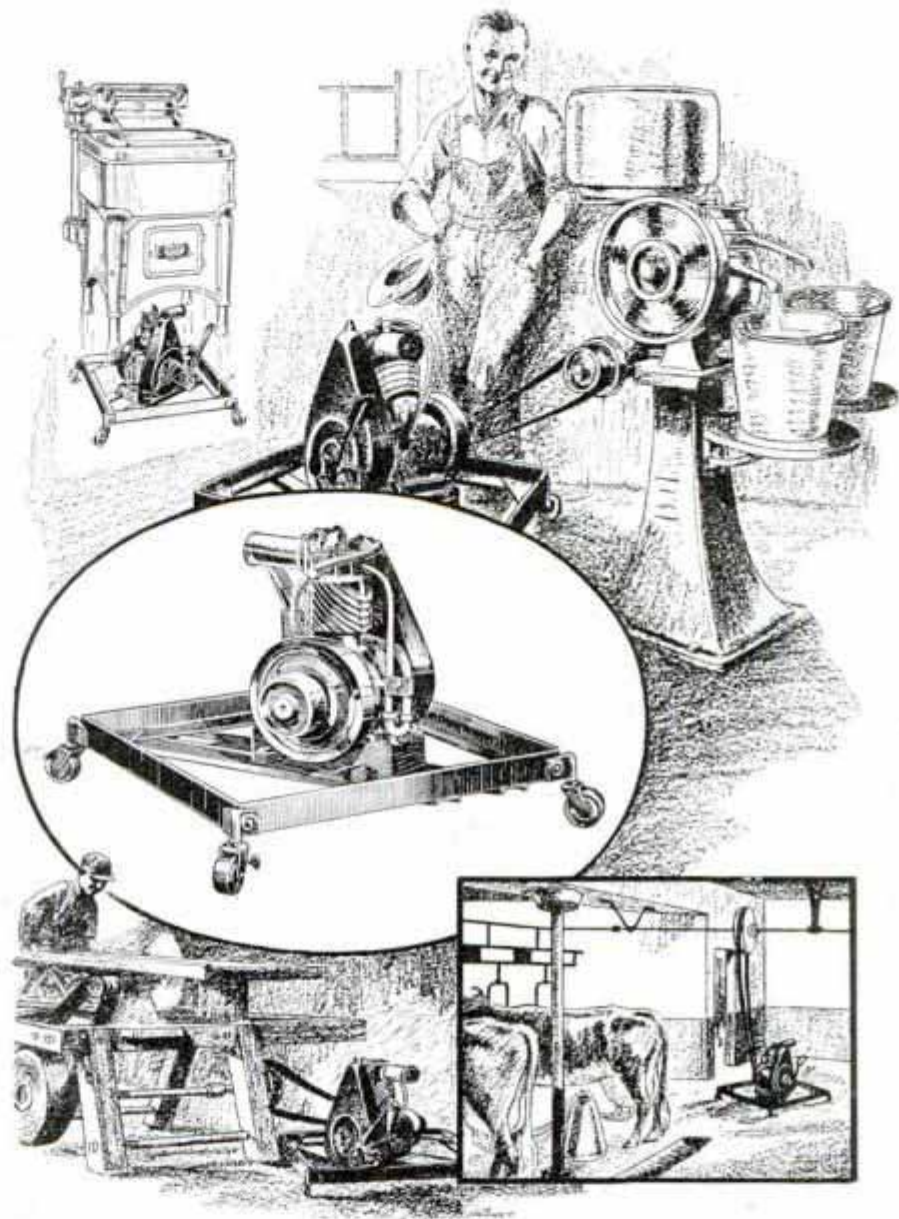
Developed by government

Vertical handwritten notes on the right margin, including 'Washington D.C.' and other illegible text.



# Engine from Washer Runs Farm Machines

Operation of many farm machines is made possible by detaching the power plant from one type of washing machine and adapting it to other work. The power plant consists of an engine run by gasoline. It may be used to drive an electric generator, milk separator, water pump and other equipment. On washday, of course, it is connected to the washing machine to perform that work.



D206  
**"MERRY-GO-ROUND"  
 RIDE DRIVEN  
 BY FOOT**

So easy to propel that a four-year-old child can cause it to revolve, a riding device for playground or beach is driven by foot-power. It consists of a circular platform on which are seats for the riders. In the center is a stationary shaft. The platform rests on a network of iron spokes, the hub of which revolves about the center shaft. A fixed wheel on the shaft, about thirty inches above the platform, is grasped by one or more operators and the platform is propelled in the treadmill

manner. Once started, the platform will turn or "coast" several minutes, due to "free-wheeling" construction. Since the only moving part is under the platform, completely inclosed, the device is safe for the smallest child rider. No concrete foundation is necessary. The platform is made in three sizes, the largest being fourteen feet in diameter and accommodating forty riders seated and twenty standing, or sixty in all. It is shipped knocked down, is easily portable and can be erected quickly by one man.

Oval, Small Engine That Is Detachable from Washing Machine May Be Used for Other Work around the Farm, as Shown in Surrounding Sketches



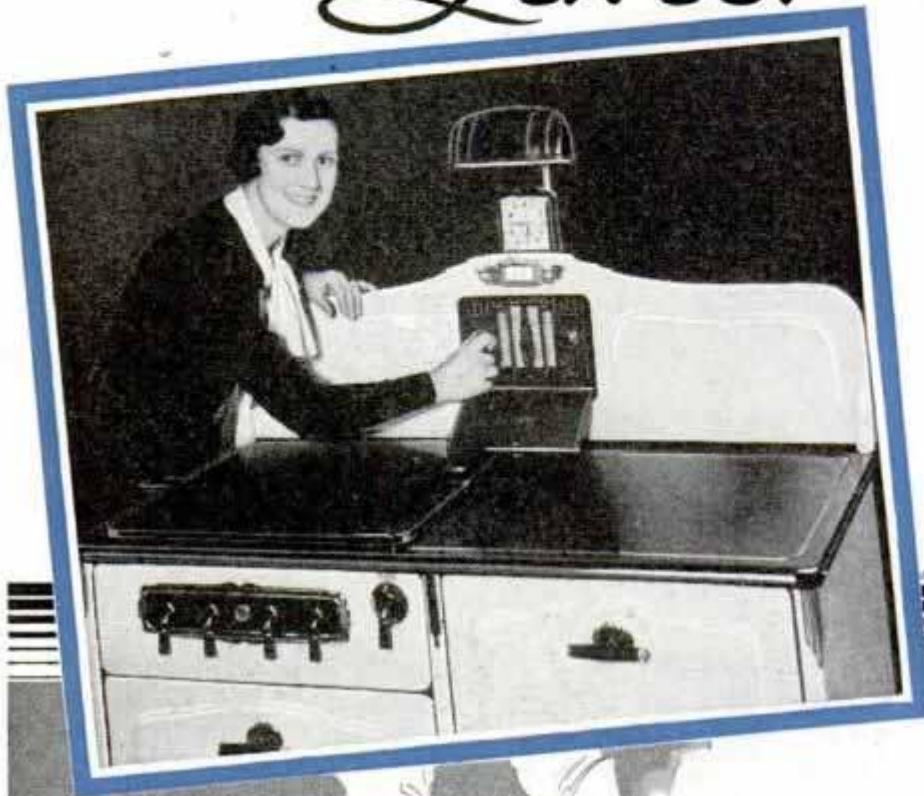
Two Child Riders Propel Merry-Go-Round in Treadmill Fashion While Their Companions Enjoy Latest Safety Equipment for Playground

3200 W. Villard

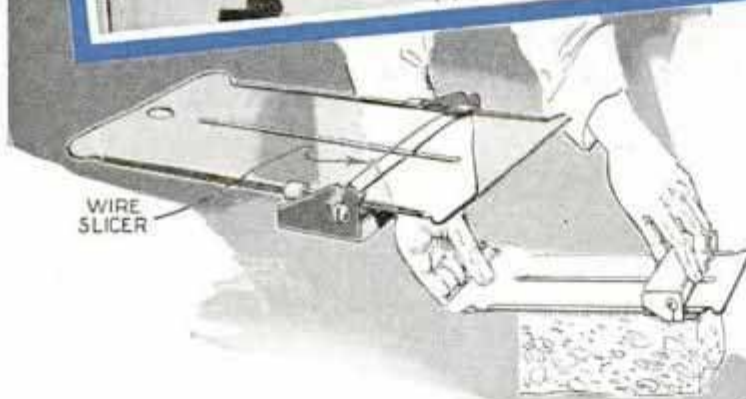
The Joy Rider Co. 1392



# Latest HOME



Left, Gas Range with Built-In Radio; the Space Can also Be Used for an Electric Toaster or Grill if the Radio Is Not Desired; Below, Measuring Cup Which Takes Place of Household Scale; Its Capacity for Principal Foodstuffs Is Stamped on the Inside



Left, Cheese Slicer Which Is Easy to Operate and Cuts a Thin and Even Piece; a Wire Attached to the Cross-Bar Does the Cutting and the Wire Can Be Raised or Lowered to Regulate the Thickness of the Slices

Below, Cushion Stuffing Material Made of Latex, Which Has the Softness of Down without the Disadvantages, Such as Warmth and a Tendency to Get Out of Shape



Above, Self-Winding Extension Cord for the Iron or Other Electric Appliance; the Reel Can Be Clamped to Ironing Board or Table and the Cord Is Always Out of the Way



# ACCESSORIES



Left, Insecticide Gun with a Hollow Pointed Needle, Like the Surgeon's Hypodermic Syringe, for Injecting Moth-Killing Liquids into Upholstery



Above, Three-Section Davenport, the Parts of Which Can Be Moved about to Serve as Individual Chairs; Left, Swinging Arms for the Bathroom Shower Curtain; They Replace the Overhead Rail and Sliding Parts and Push against the Wall and Out of the Way When Not in Use



Above, Clothespin Basket Which Hangs on the Line and Can Be Pushed Ahead of the User; It Can Be Washed without Damage; Left, Rack Which Holds Cracked Ice in a Compartment under the Regular Ice Container, Thus Providing a Super-Chilling Section; It Is Easy to Handle and to Clean





The "Severn," Pride of England's Underwater Fleet, as It Was Launched Recently at Barrow-in-Furness

**BRITAIN ADDS NEW SUBMARINE TO HER SEA FORCES**

When the new British submarine, "Severn," was launched recently, it marked another addition to England's forces afloat. At the end of 1933, Great Britain had thirty-one modern submarines, compared to the United States' total of forty-five. However, England's naval tonnage amounted to 966,379, compared to 708,550 for the United States, due to the fact that England had more destroyers, capital ships and light cruisers.

**CHICKS TURN HEAT ON AND OFF**

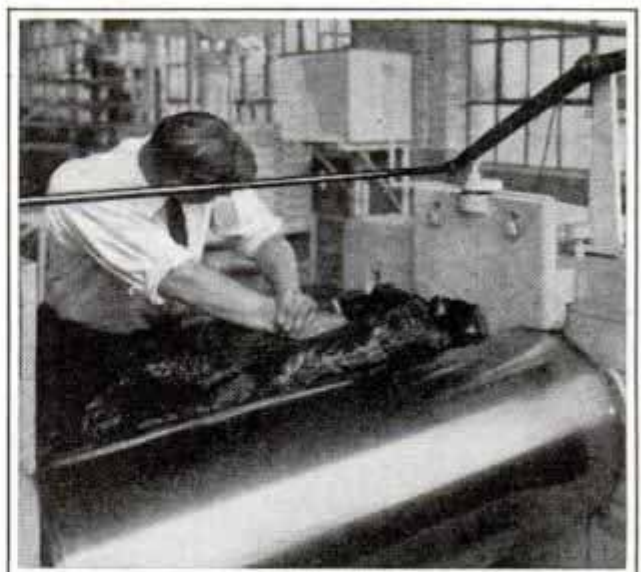


Operated by the chicks themselves, a regulator and heater for brooders is plugged into the nearest electrical socket. A pilot light which burns constantly attracts the baby chickens to a small platform when they become cold.

The weight of several chicks pushes the platform downward, causing a mercury switch to turn on two other large electrical bulbs, thus supplying more heat. When the chicks get sufficiently warm, they move off the platform and the heat is turned off. This operation is repeated many times and the chickens get just the amount of heat that they need, keeping the brooder heated uniformly. Use of ultraviolet bulbs is advised by the makers to produce healthier chickens. A saving of twenty-five to fifty per cent in current is claimed.

**WORKER STOPS MACHINE WITH HEAD BRAKE**

Actuated by a slight pressure of the head, an electrical clutch safety brake instantly stops the machine in which the worker's hands or clothing may be caught. Even if both hands should be trapped, the brake's operation by means of the head might prevent serious injury or perhaps loss of life. One type of control for the brake is a bar extending across the front of the machine and within easy reach of the operator's head. With slight modification, the brake could be at-



Worker Shows How Machine May Be Stopped Instantly by Head Brake, Preventing Hand Injury

tached to thousands of dangerous industrial machines. If more convenient, the brake can be arranged with foot or foot and head control.

*Conger Mfg Co. Wm. B. Throp +*





D 4314

# CONDENSER MICROPHONE Operates on A.C.

By RALPH P. GLOVER

NO longer is it necessary to contend with heavy batteries, when desiring to use the condenser-type microphone, especially for portable service. True reproduction and the absence of carbon hiss are outstanding features in this variety of "mike."

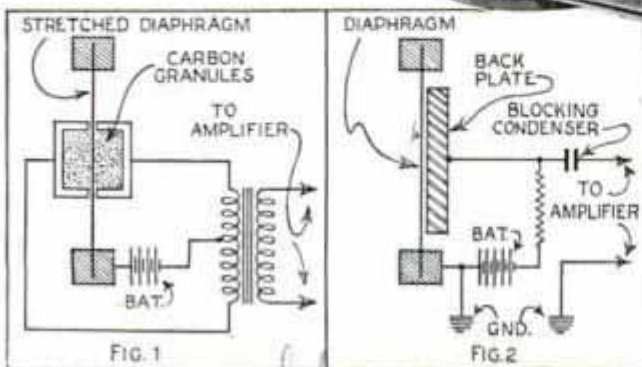
The instrument illustrated in the photo employs a two-stage amplifier, using two type-30 tubes, built into the case directly back of the transmitter head. With this pre-amplifier, the output is approximately that of a two-button carbon microphone and connections to the mike transformer, of the regular speech amplifier, are made by simply omitting the central leg



of the circuit. The special power-supply unit, shown in the insert photo, provides hum-free performance without the expense of battery replacements. This unit can be plugged into any 110-volt, 60-cycle, a.c. line or it may be operated in sound trucks from the usual public-address system generator supply.

The power unit weighs only 12 pounds as compared with 24 pounds for the lightest corresponding battery equipment.

The difference between the ordinary double-button carbon microphone and a condenser microphone is clearly shown in Figs. 1 and 2. The carbon type, in Fig. 1, depends for its operation on the varying resistance of the carbon granules when subjected to varying pressure. Sound waves that make these pressure changes cause the diaphragm to vibrate accordingly, varying the current, which flows through the transformer. The carbon microphone does not require as much gain as the condenser type, how-



(Continued to page 120A)

Shure Brothers Co. 215 W. Huron 741

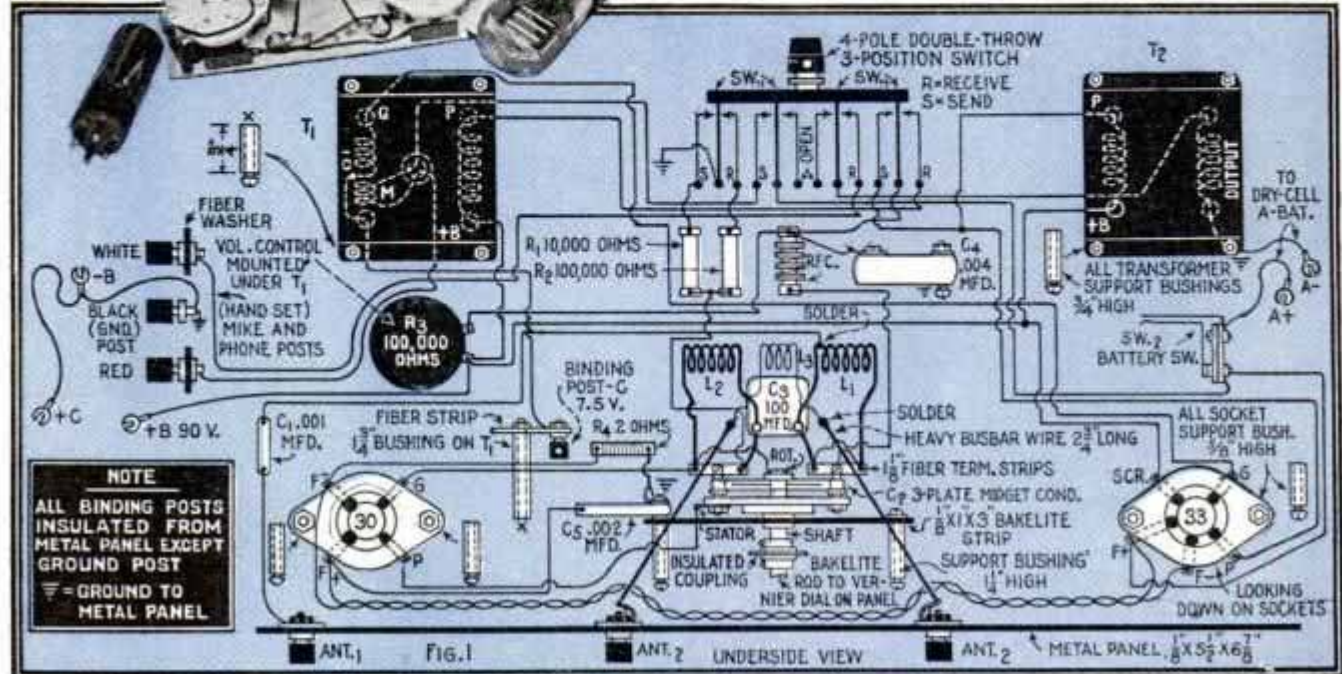


# TWO-WAY

## *Built in Tool Box*

By T. P. LEONARD  
and C. F. HADLOCK

A SMALL inexpensive metal tool box houses this hand-portable combination 5-meter radiophone transmitter and receiver. The construction is quite simple and all parts are available at low cost. Two-way radiophone conversations are possible over distances up to 30 miles, depending upon the location. Free from the usual static noises, the 5-meter waves employed are very good for relatively short-distance communication and do not inter-





# FIVE-METER PHONE



ferred with radio-phones on the same band in other localities. Similar portable "transceivers" have been used for some time by a group of amateurs in Massachusetts with excellent results.

The improved model shown in the photos and diagrams has been thoroughly tested by Popular Mechanics Magazine radio department, and the results were highly satisfactory. The new antenna system used was designed by Dr. G. W. Pickard, and is a great improvement over any other type that has been commonly employed for the 5-meter band. However, fairly good results may be obtained by merely connecting a 4-ft. wire to antenna post No. 1. The "mike," a Western Electric hand-set telephone unit, has three color-coded leads that are connected to the binding posts on the panel when the transceiver is placed in operation. Several suggested uses for these two-way radio-phones are illustrated in the sketches and many other applications will present themselves to the reader.

The parts are all assembled on a metal panel  $5\frac{1}{2}$  in. wide and  $6\frac{7}{8}$  in. long. Fig. 1 shows this panel

turned up and all of the parts in their relative positions. It will be noted that the transformers and isolantite tube sockets are mounted on metal bushings fastened to the panel with machine screws. The 3-plate tuning condenser,  $C_2$ , is mounted on a narrow strip of bakelite between the tube sockets. This bakelite strip is supported, well away from the metal panel, by means of two  $1\frac{1}{4}$ -in. metal bushings. Two, 2-lug, fiber terminal strips are mounted directly on the tuning condenser and coils  $L_1$  and  $L_2$  are firmly soldered to the lugs. The midget fixed condenser,  $C_3$ , is also connected directly to the two inside lugs. A complete parts list is available upon application without charge.

No. 12 enameled-copper wire is used for coils  $L_1$  and  $L_2$ . Each coil consists of 5 turns,  $\frac{5}{8}$ -in. inside diameter, spaced  $\frac{1}{8}$  in. apart and later adjusted to cover the band.





Coil  $L_3$  consists of 3 turns of No. 20 hook-up wire with push-back insulation. The diameter is the same and also the spacing but the coupling should be slightly adjustable. The space between coils  $L_1$  and  $L_2$  is about  $\frac{1}{2}$  in. Coil  $L_3$  is supported with two heavy busbar wires connected to the insulated antenna posts Ant. 2. After soldering  $L_3$  to the ends of these supporting wires, a bit of silk thread is wound around the ends of the coil to hold the turns in position. Fixed condenser  $C_1$  is connected directly to antenna post No. 1, and a flexible insulated lead from this condenser is soldered to the point indicated on coil  $L_1$ .

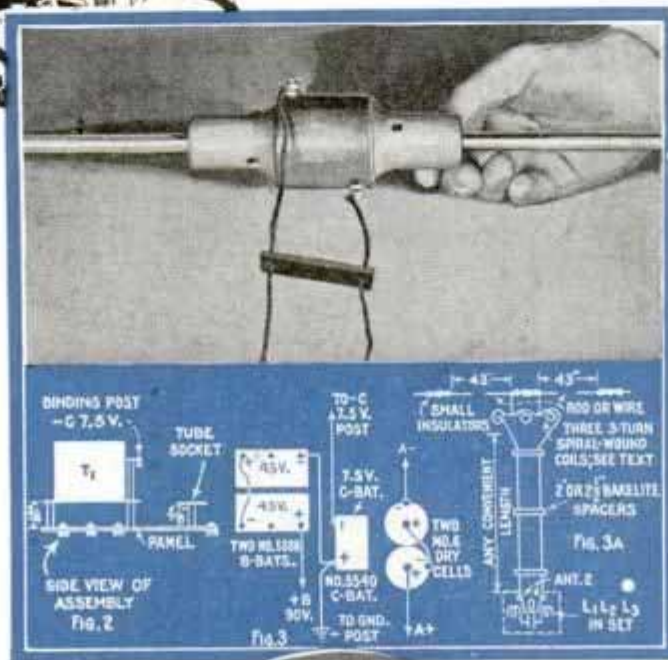
The transformers can be purchased or those who wish to adapt their own may do so. Transformer  $T_1$  may be any ordinary interstage audio type with the addition of a 300-turn microphone winding;  $T_2$  is a 7,000-ohm-to-15-ohm speaker-output transformer for use with the low-resistance telephone receiver specified. Fig. 2 shows a side view of the panel as-

sembly and the method of mounting the binding post for the negative terminal of the  $7\frac{1}{2}$ -volt C-bias battery. This battery is held with a clip soldered to the bottom of the tool box as shown in the photo. The battery hook-up is given in Fig. 3. Small angle brackets are mounted under the panel at front and rear; short machine screws threaded through the box and brackets, hold the assembly rigid. It is a good idea to use nuts or a drilled and

threaded metal strip inside the edge of the box to further strengthen the mounting. The inside measurements of the tool box are as follows:  $13\frac{5}{8}$  in. long,  $5\frac{1}{2}$  in. wide and  $5\frac{3}{8}$  in. deep. These dimensions do not include the lid, which is about  $1\frac{1}{2}$  in. in depth.

When completely assembled, and ready to operate, the knob at lower left on the panel is the volume control and the knob at lower right operates the filament jack-switch. The

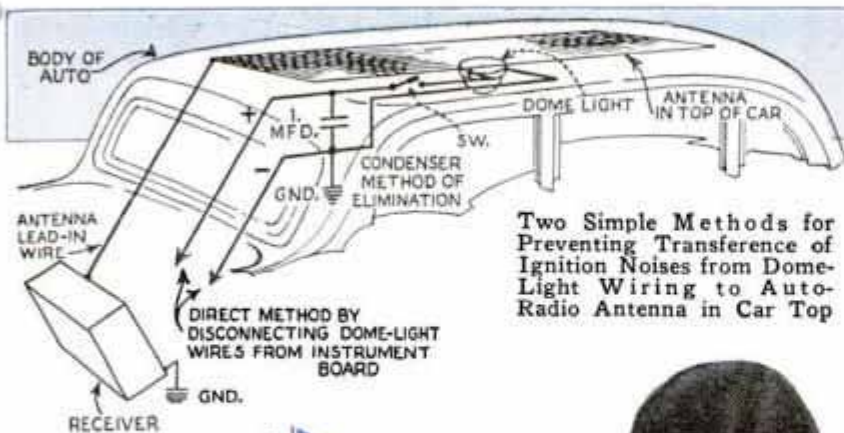
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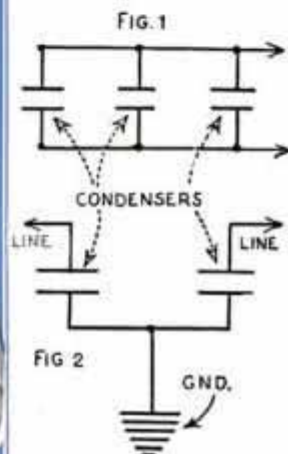
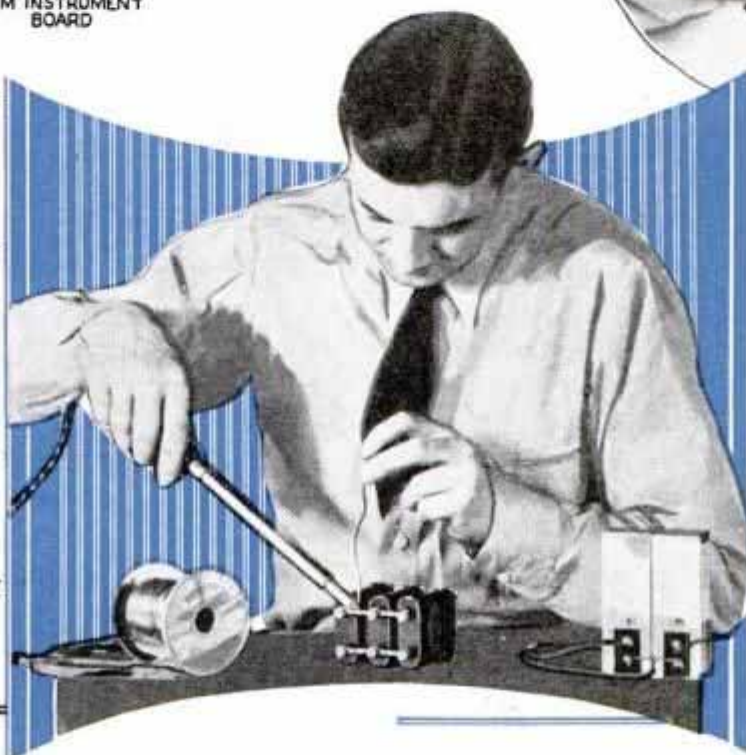
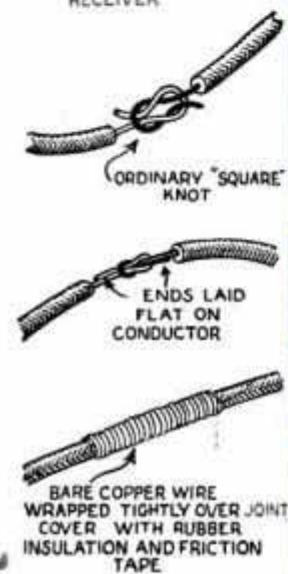


# Practical Ideas for the Radio Experimenter

National Co. ch. 61 Sherman St. Malden, Mass.



Two Simple Methods for Preventing Transference of Ignition Noises from Dome-Light Wiring to Auto-Radio Antenna in Car Top

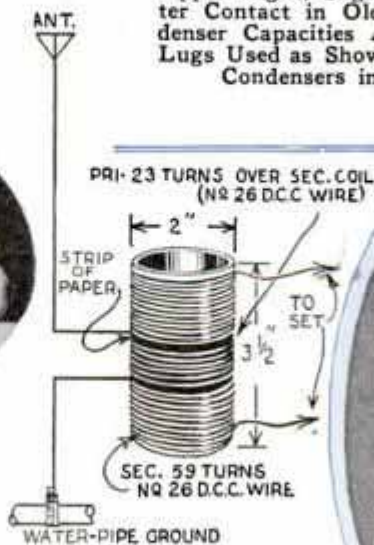
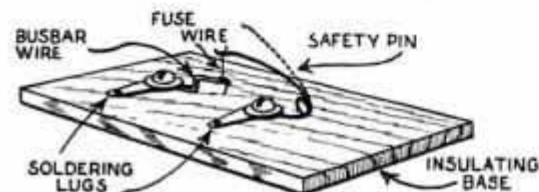


Above, a Good Electrical and Mechanical Joint, of Low Resistance, That May Be Made without the Use of Solder

Upper Right, Slight Cuts on Tube Prongs for Better Contact in Old Sockets; Below, Fig. 1, Condenser Capacities Added by Parallel Connections; Lugs Used as Shown in Photo; Fig. 2, Noise-Filter Condensers in Series across Power Line



Compact Receiver for Ultra-Short Waves; Below, B-Battery Fuse from Safety Pin

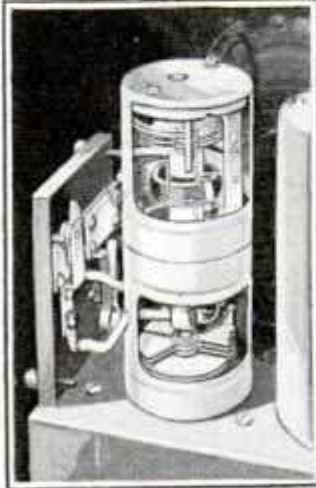
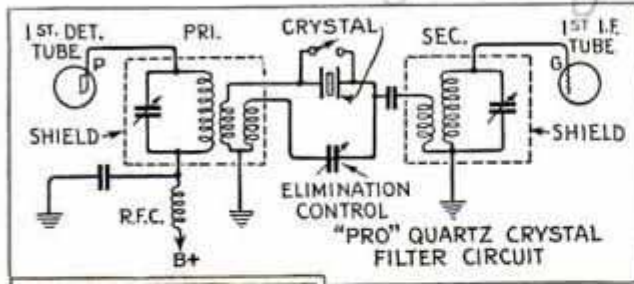


Above, Antenna Coil for .0005 Mfd. Condenser; 72-Turn Secondary Used for .00035 Mfd. Condenser; Right, Gluing Old Tube Base in Coil Form





Crystal Filter for Short-Wave Sets



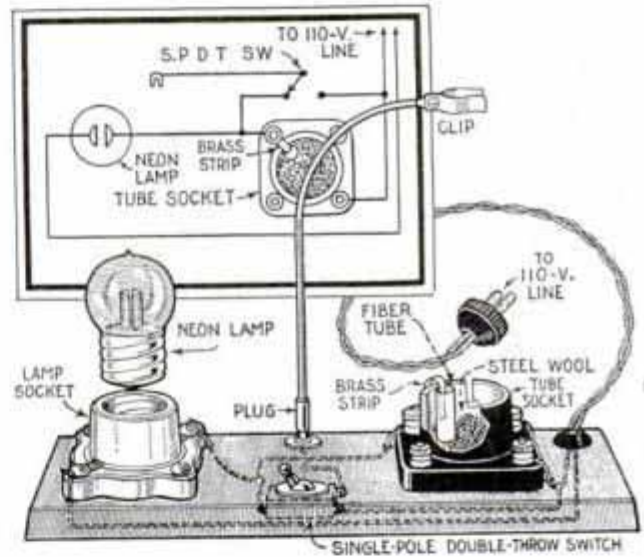
Several high-grade short-wave receivers are now equipped with crystal filters for extreme selectivity on some of the amateur bands which are badly congested. Under test, in Popular Mechanics radio laboratory, powerful heterodynes from interfering stations were easily eliminated and the desired station received without difficulty. A switch is provided to cut the crystal in and out of the circuit as required. The method of employing the crystal filter is shown in the diagram and the accompanying photo.

A control knob on the front panel enables the operator to adjust the crystal for maximum results.

out of two pieces of metal fastened together and bent to form a U-shaped channel for the coil and tubes, also another inverted channel, the front of which forms the sloping instrument panel. The chassis acts as a shield to isolate the variable condenser and other parts directly back of the front panel. The set is available in kit form and requires three 45-volt B-batteries, a 13½-volt C-battery and two 1½-volt dry cells. An air-cell A-battery, or one cell of a 6-volt storage battery may be used instead of the dry cells, if desired.

Tube Checker Made from Junk Parts

Tests for shorts and filament continuity are easily made with this simple tube checker. The idea is to select one prong



Wiring Diagram for Homemade Tube Checker

Beginner's Receiver Has Chassis of Unusual Design

This battery-operated short-wave set for beginners combines in a single unit the chassis, panel and shielding. It employs four plug-in coils for the various short-wave bands. The chassis is made



Short-Wave Battery Set with Self-Shielding Chassis

at a time and instantly check it against the rest, which are all of the same polarity, through steel wool. One contact is removed from an old bayonet-type socket and a short length of fiber tubing, that will admit any one of the tube prongs, for the isolated external connection, is inserted as shown. All of the other prongs, regardless of number, will contact the steel wool. An inexpensive neon test lamp is in series with the 110-volt line. The clip connection, for tubes having caps, is wired to a single-pole double-throw switch.

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; when material lists are not included in the articles, these are available without charge on receipt of postage.

*The Wholesale Radio Service - 6 St. Ave. New York 100 - Pretzel*

*Handwritten notes and signatures on the right margin, including '4-24-33' and 'A.L.'.*

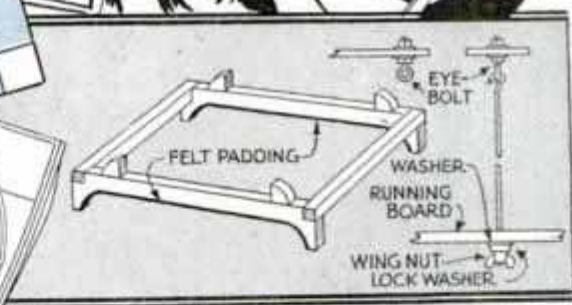




CB P. 905



*Sectional  
ROWBOAT  
fits your car*



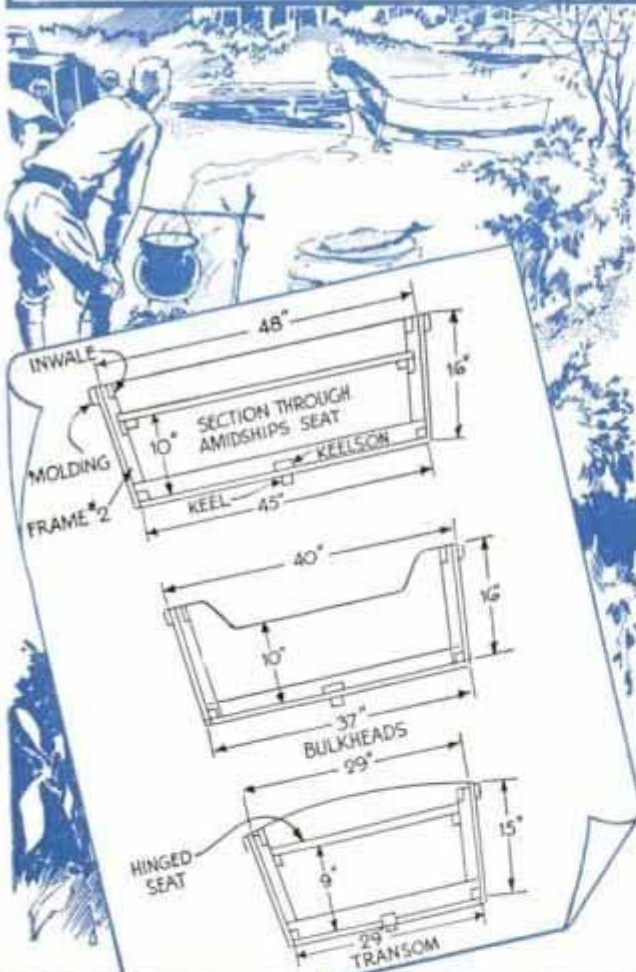
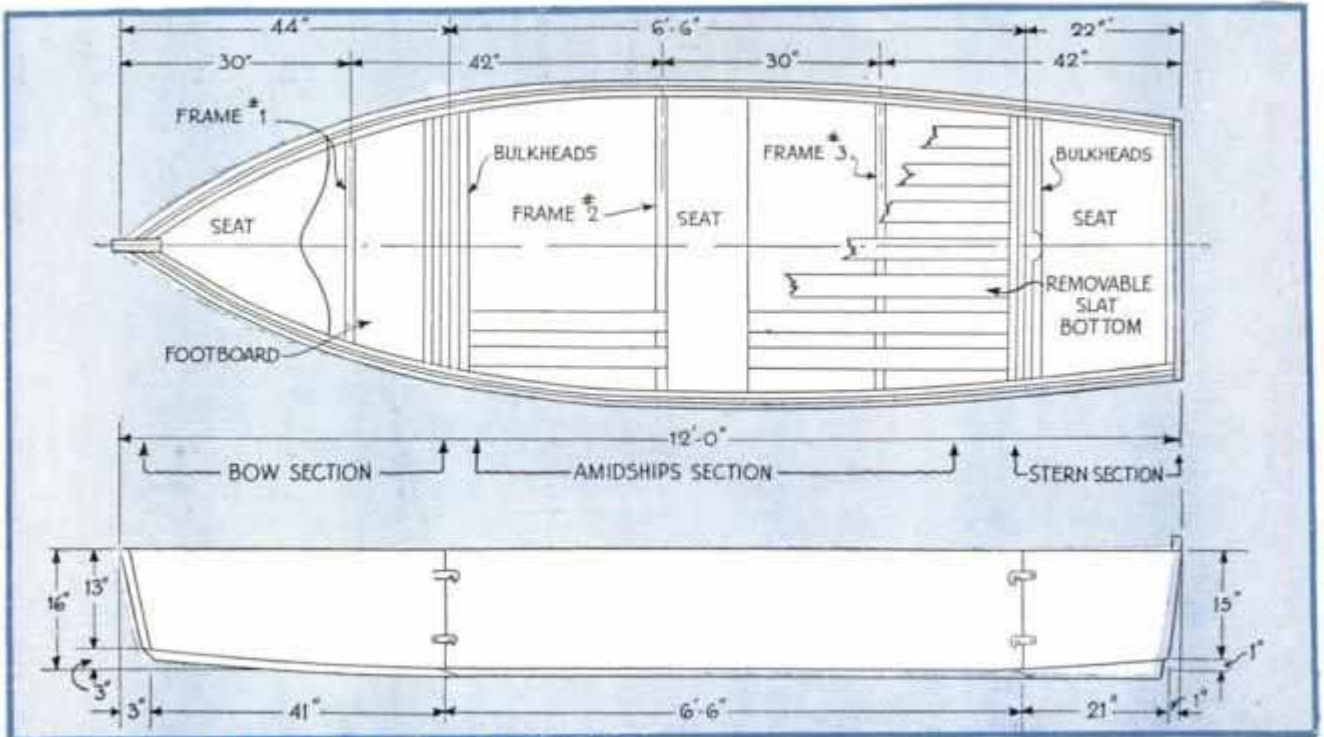
WHEN taken apart and nested, this 12-ft. rowboat occupies a space only 6½ ft. long, and by virtue of its thin plywood construction is so light that one man can easily stow it on top of his car, using a suitable cradle to hold it. The boat is designed along standard lines, Fig. 1, and construction differs only in the use of ⅜-in. plywood for sides and bottom. In fact, it is built up as a single-unit rowboat, and then sawed between the two double-bulkheads to form the three sections.

It is highly advisable to use waterproof plywood, if it is available. If not, the ordinary grade can be satisfactorily water-

proofed by giving it three or four coats of paint or shellac, taking care to work it well into the exposed edges. If the wood is not thoroughly waterproofed, moisture will loosen the thin layers of wood and ruin the boat. In fact, all parts, whether directly exposed to the water or not, should be given two coats of paint or shellac before assembling them, and at least two more coats after assembling. Screws, also, should be seated in white lead. When in use, the boat should be given an application of paint more frequently than an ordinary boat.

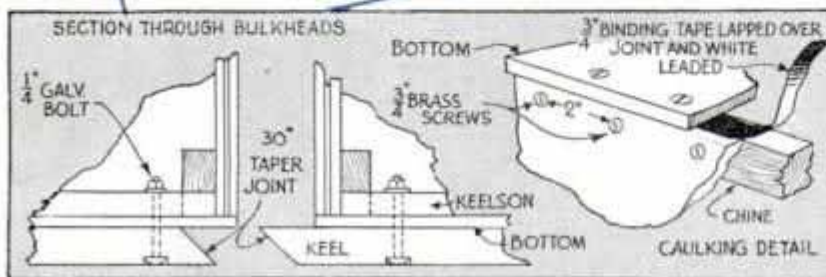
First build the stem. Four wedge-shaped pieces are screwed to a central section of



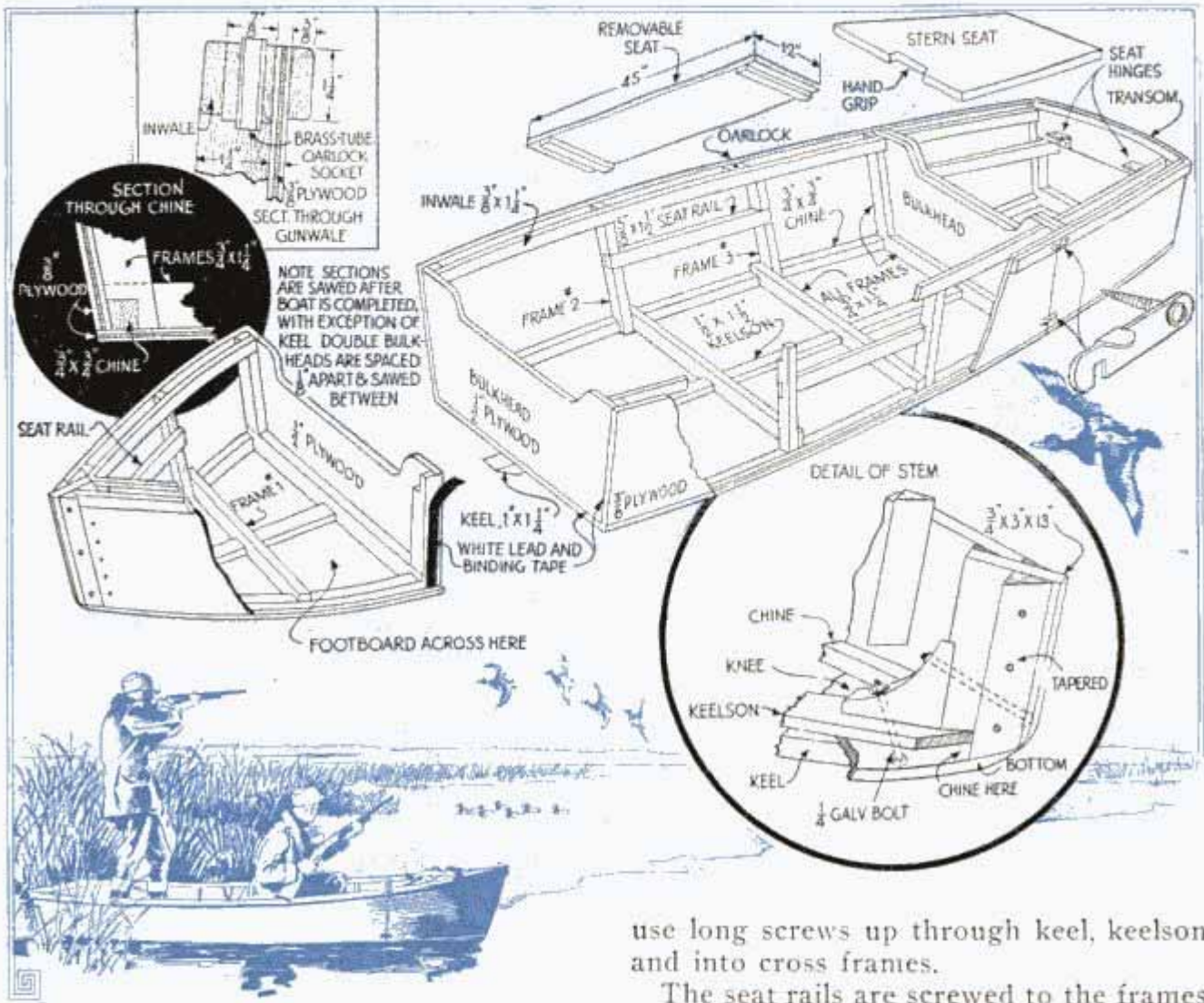


$\frac{3}{4}$ -in. pine having grain at right angles. The stem is fastened to a knee and keelson by means of galvanized carriage bolts, with heads countersunk. Next make the frames Nos. 1, 2 and 3, and the bulkheads. Note that there is a frame on each bulkhead. All frames are notched for chines, keelson and inwale, and frames Nos. 2 and 3 for the seat rail. The bulkheads should not be notched. In assembly, the keelson will be in three sections. Fasten the frames, bulkheads, stem and transoms to the keelson in their relative positions with galvanized or brass screws, and nail the keelson, with assembled frames, etc., temporarily to a plank in order to hold it rigid while installing the chine and inwale. Strips should be nailed across the tops of the frames, just below the inwale notches, to hold them in position, and removed after the side boards are on. The bulkheads, of  $\frac{1}{2}$ -in. plywood, should be located about  $\frac{1}{8}$  in. apart so that a saw can be inserted for separating the sections.

After the plywood side boards are on, turn the boat upside down for putting on the bottom. This is cut from a single sheet of plywood. The panel is nailed temporarily to the bottom and the outline marked. It is then removed, sawed, and replaced with a finishing nail here and there





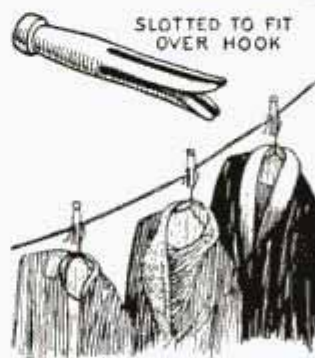


after a strip of binding tape has been laid over the joint and soaked in white lead. Bear in mind that the edge of the sideboard and chine must be smoothed with plane or sandpaper to make a flush and even joint. Fasten with  $\frac{3}{4}$ -in. brass screws set about 2 in. apart. This will make an absolutely water-tight joint. Bulkhead joints should be made the same way. In making the oarlock, a piece of brass tubing is driven into a hole bored in a block that is fastened between sideboard and inwale. The tube, of course, should be large enough for the shank of the oarlock to turn freely, and should fit tightly in the wood block. The keel is bolted on after the hull sections have been sawed apart. This is necessary because of the tapered joints of the keel which lock the sections against an up-and-down motion. Bolts should be used only near the joints, and then through the keelson. Use galvanized carriage bolts with heads countersunk slightly in the keel. Elsewhere

use long screws up through keel, keelson and into cross frames.

The seat rails are screwed to the frames in bow and stern sections, as shown. The bow seat is screwed down, but the stern seat is hinged and forms a locker for fishing tackle, lunch, etc., out of the hot sun. The rowing seat is removable, which is necessary for nesting the bow and stern sections. A false bottom should be made for the amidships section, Fig. 1.

### Double-Slotted Clothespins Hold Coat Hangers on Line



When airing garments on coat hangers slipped over a clothesline, they can be kept from sliding together because of the line sag by using double-slotted clothespins. The legs of the pins are slotted and are then slipped over both the line and the hanger as shown.



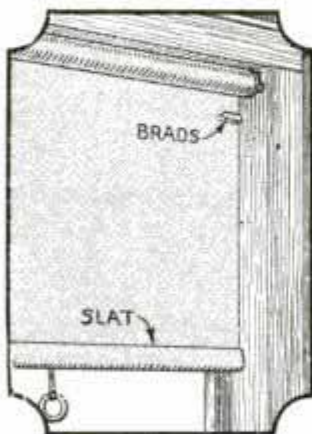


Tin Muffin Pan Serves as Tray in Which to Keep Nails and Screws around the House

### Muffin Pan Used as Nail Tray

A good tray in which to keep nails, screws, tacks, etc., can be had by using a tin muffin pan. In order to have the hammer handy when needed, drill a couple of holes in the center of the pan near the ends to take eyebolts with which to support the hammer above the pan. Be sure the eyes in the bolts are large enough to take the hammer handle, and fasten them in place with nuts on each side of the pan. In this way, the hammer also serves as a handle for carrying the tray.

### Small Brads Prevent Window Shade from Unrolling

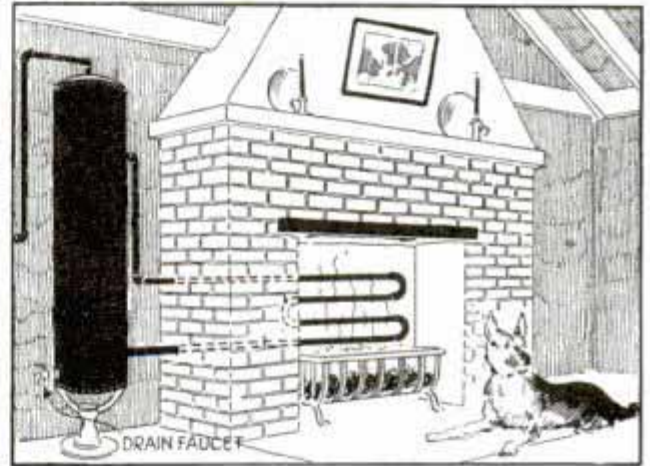


the window casing, one on each side of the shade as shown. In this way, if the shade should slip, the brads prevent the slat in the bottom of the shade from passing, and hold it.

Did you ever have a window shade slip out of your hand and unroll so that it had to be taken down and the spring in the roller tightened? If so, try the following trick. Just below the roller, drive a couple of brads into

### Cabin Fireplace Heats Water

In addition to assuring a supply of hot water, a water-heating coil and tank in a fireplace help to keep the room warm on chilly nights after the fire has gone out. The installation is simple, the main items needed being a water tank and some 1½-in. pipe from which to make a coil. In a one-room cabin, the tank is set alongside the fireplace, but in a two-room building it is better to place the tank in the next room, yet as close to the fireplace as possible. This helps to heat the room away from the fireplace. Water is put into the tank through an opening in the top. If you have a force pump, it may be fitted with a length of pipe or hose and used to force the water into the tank. In the absence



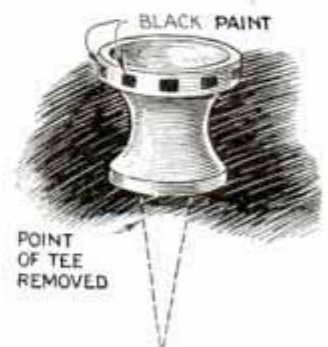
Hot-Water System in Cabin Fireplace Assures Plenty of Hot Water and Helps Keep Room Warm

of a pump, it will be necessary to use a pail and funnel.

### Ship-Model Capstans Made from Wood Golf Tees

Realistic capstans for ship models may be made from golf tees. Get some similar to the one shown in the drawing and saw off the pointed ends, leaving only the heads.

The upper part of the head should be painted with rectangular black spots to simulate holes for the capstan bars.—Norris Sutherland, Jr., Holyoke, Mass.





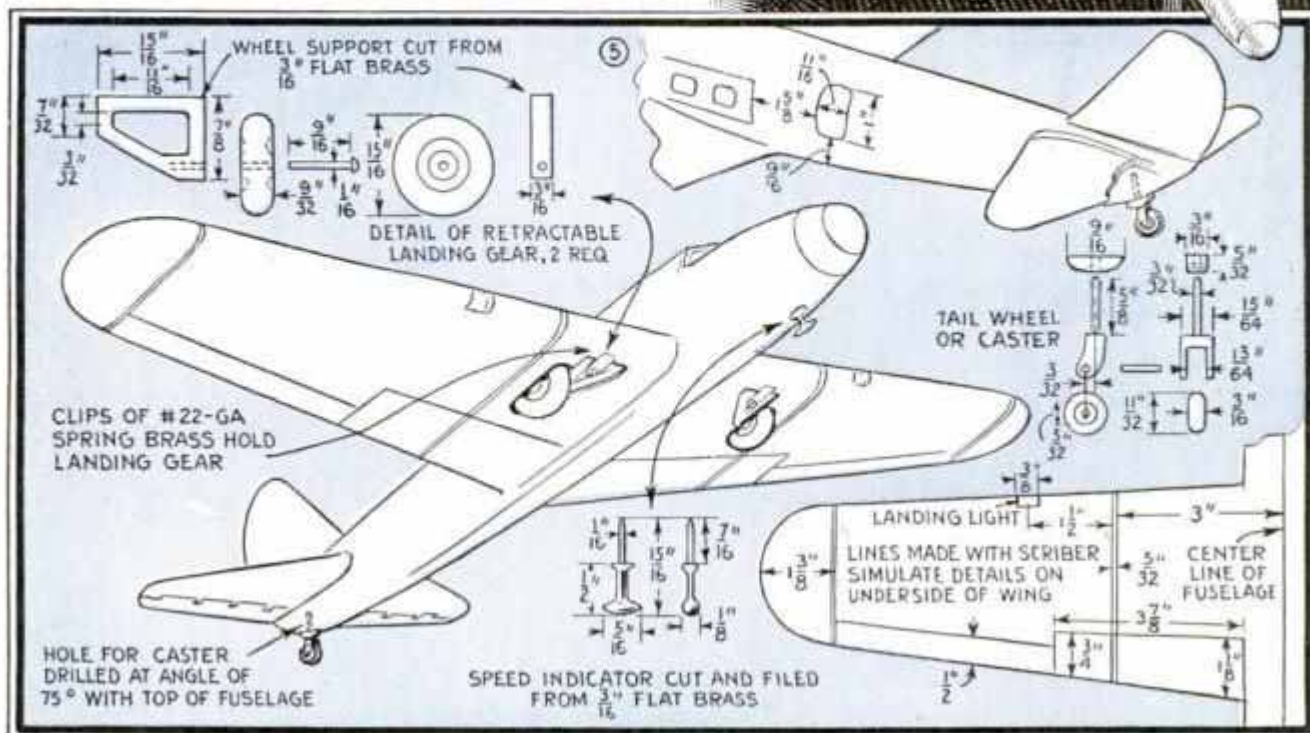
# Scale Model of FAST AIR LINER

by W Clyde Lammey

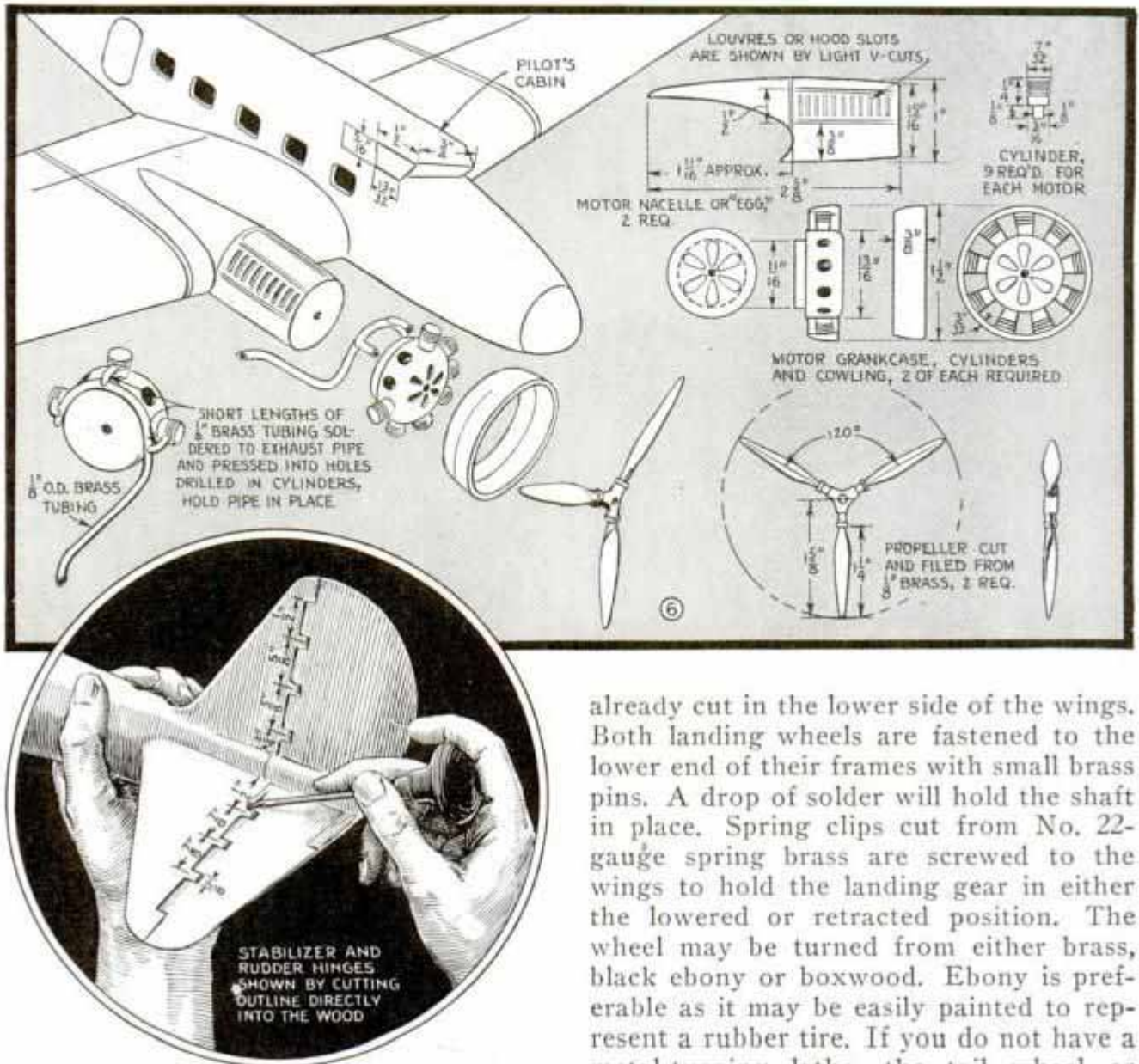
## PART II

THE wings and fuselage should be carefully finished to size by scraping, which is better than using sandpaper. Rounded corners and sharp curves can be finished with a round die-sinker's file and a sharp knife used as a scraper. Cut a hardwood block about 6 in. long and saw one edge to the same curve as the lower side of the wings. Drill a small hole at the center of the block and another centered on the fuselage and wings. Screw the block to the bottom of the plane and clamp in a vise.

Templates cut from thin sheet metal to the exact size of the fuselage and wing sections in Fig. 4 (see Part I) will aid in bringing these parts to the proper curve. Remove only a small amount of stock at any one time. In this kind of work one must rely greatly on the accuracy of eye







alone. When finishing up the trailing edge of the wing where it joins the fuselage, the latter is undercut to give it a regular curve. This may be done with a half-round cabinet file held with the flat side down on the wing. The nose of the fuselage ahead of the pilot's cabin is shown on squares in Fig. 4.

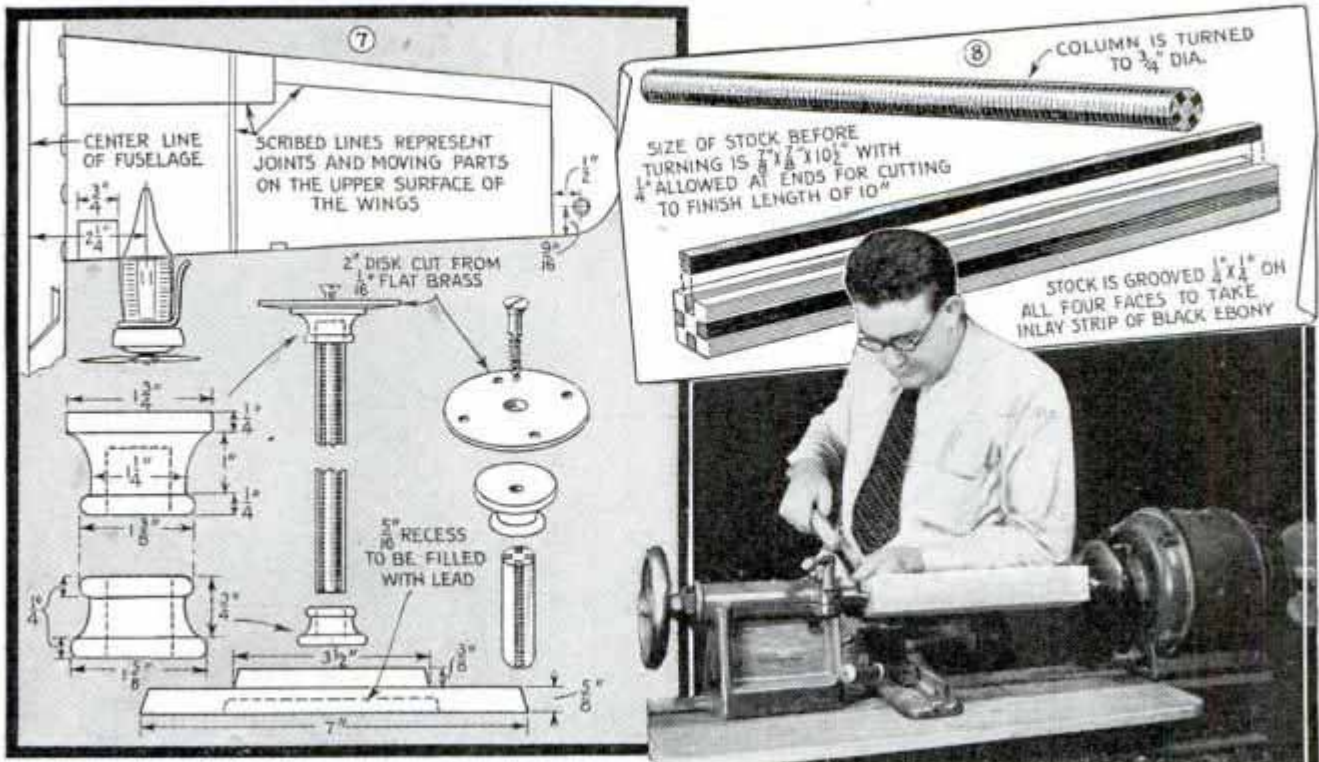
After the parts have been scraped to size, finish with fine sandpaper, No. 00 or finer, and apply a coat of thin, white shellac. Riveted joints in the metal, and the location of certain moving parts on the wings and fuselage, are shown by lines scribed directly on the wood, uniform in width and about  $\frac{1}{32}$  in. deep. Dimension these lines as in Fig. 5.

The frame pieces of the retractable landing gear are cut and filed from flat brass as in Fig. 5. They fit in triangular grooves

already cut in the lower side of the wings. Both landing wheels are fastened to the lower end of their frames with small brass pins. A drop of solder will hold the shaft in place. Spring clips cut from No. 22-gauge spring brass are screwed to the wings to hold the landing gear in either the lowered or retracted position. The wheel may be turned from either brass, black ebony or boxwood. Ebony is preferable as it may be easily painted to represent a rubber tire. If you do not have a metal-turning lathe, the tail wheel or caster may be turned from the same wood, but the swivel and yoke should be cut and filed from brass as detailed in Fig. 5. A semi-circular block of hardwood fits over the wheel yoke or fork. A spot of glue holds the assembly in place.

The stabilizer and rudder hinges are represented by cutting or relieving the outline directly into the wood with a very small chisel, as shown in one of the illustrations. The nacelles or mountings for the motors are from hardwood to the dimensions shown in Fig. 6. A curved section is sawed to fit the forward edge of the wing. Louvers or slots are represented by light V-cuts. Other lines represent removable parts. The mountings are then glued and bradded to the wings. Holes  $\frac{1}{8}$  in. in diameter are drilled in the ends of the mountings to take short dowels holding the motors in place. The motor crank-

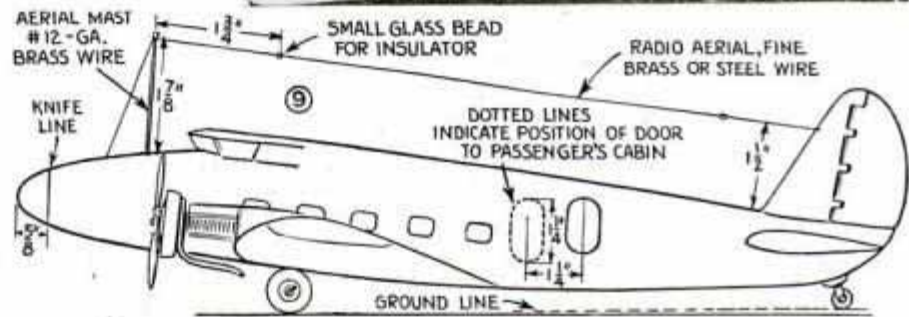




case, also turned from hardwood, is counter-bored at the center  $\frac{1}{8}$  and  $\frac{1}{16}$  in., to take the dowel and propeller shaft. Nine equally spaced holes,  $\frac{1}{8}$  in. in diameter, are drilled along a center line on the face of the turning to take the cylinders, as shown in Fig. 6. The cylinders are turned from ebony or brass rod. The motor cowling also may be either ebony or brass, and when finished is placed over the cylinders as shown, depending on the material used. The exhaust pipe is a length of  $\frac{1}{8}$ -in. O.D. brass tubing bent as shown in Fig. 6. Short lengths of the same material connect the exhaust pipe to the cylinders. These pieces are pressed into holes drilled in the cylinders to hold them in place.

The propellers are cut and filed from  $\frac{1}{8}$ -in. flat brass, and are attached with small brads, which serve as miniature shafts.

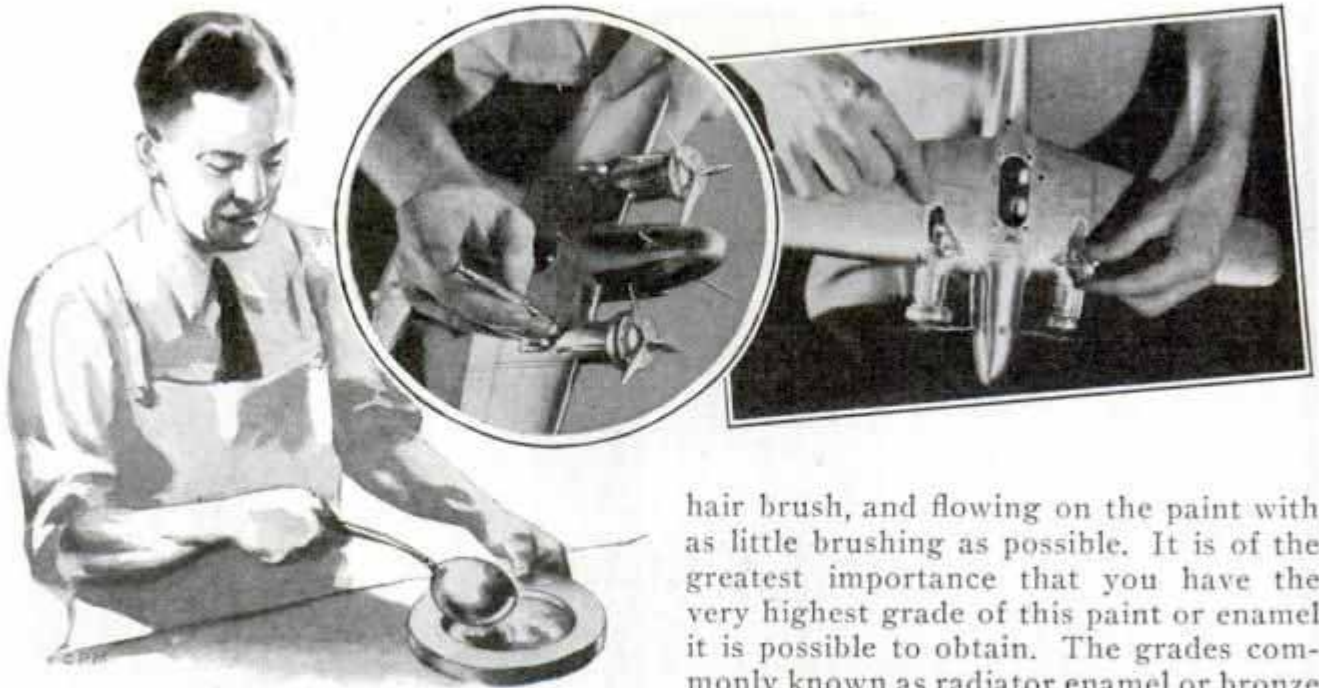
Lines scribed on the top of both wings are duplicates of those on the lower side with but two exceptions as indicated in Fig. 7. The two doors, one on each side of the fuselage at the rear of the passengers' cabin, are simply indicated by scribed lines. The same is true of the windshield and windows of the pilot's cabin, and also



the streamlined door, which opens at the end of the fuselage.

As will be seen from Fig. 7, the base and column are composed of simple turnings of hardwood. The column is grooved on all four faces to take strips of black ebony flush with the surface. Then the square is turned down to the required size, leaving the four strips of the dark wood exposed in sharp contrast to the lighter colored maple. The base is turned out of hard white maple to the form shown and it is recessed at the bottom to take a lead weight. Short flat-head screws, driven part way into the wood at the bottom of the recess, hold the lead in place after it is poured. The lower end of the column passes entirely through the turned ornament and into the base. The upper ornament is bored to fit over the end of the column and is counterbored to take a short flat-head screw, which holds the brass disk to which the plane is fastened. This arrangement allows the plane to



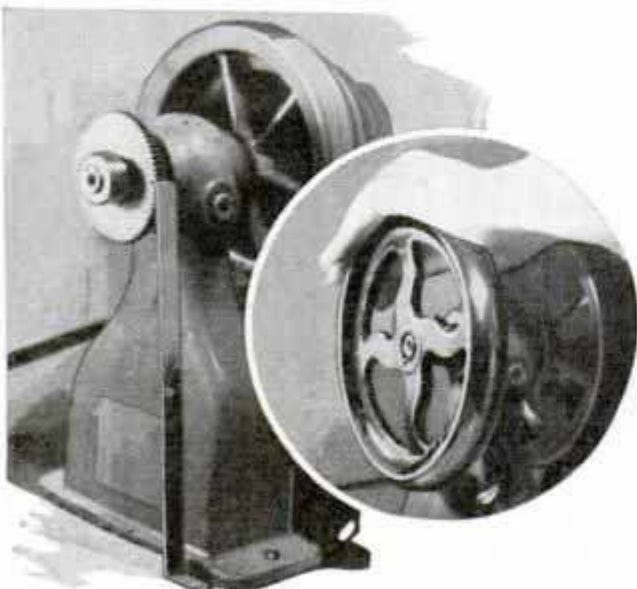


swing about the column as an axis. If it is desired to have the plane tilt, as in some of the illustrations, it is necessary to fit a ball-and-socket joint at the top of the column. In either case the plane is fastened to the base by means of small screws driven through holes in the disk into the lower side of the wings and fuselage.

To finish, sand all surfaces lightly with No. 4-0 paper and apply two thin coats of white shellac. When dry, sand all surfaces again with the same grade of paper. Then apply a single coat of highest grade of aluminum bronze, using a fine camel's-

hair brush, and flowing on the paint with as little brushing as possible. It is of the greatest importance that you have the very highest grade of this paint or enamel it is possible to obtain. The grades commonly known as radiator enamel or bronze are too coarse for this purpose. If you wish to make careful workmanship a feature of your model, then it is advisable to finish the model in the natural color of the wood by means of a shellac and high-luster varnish. If you do this, substitute boxwood for black ebony except the three wheels. Or, if you have metal-turning equipment, you may make the entire motor assembly of brass aside from the mounting, which may be of boxwood. Whether or not the plane is painted, the lines on the wings and fuselage should be blacked in with a ruling pen and India ink after the finish is thoroughly dry.

## Two Handy Improvements for a Wood-Turning Lathe

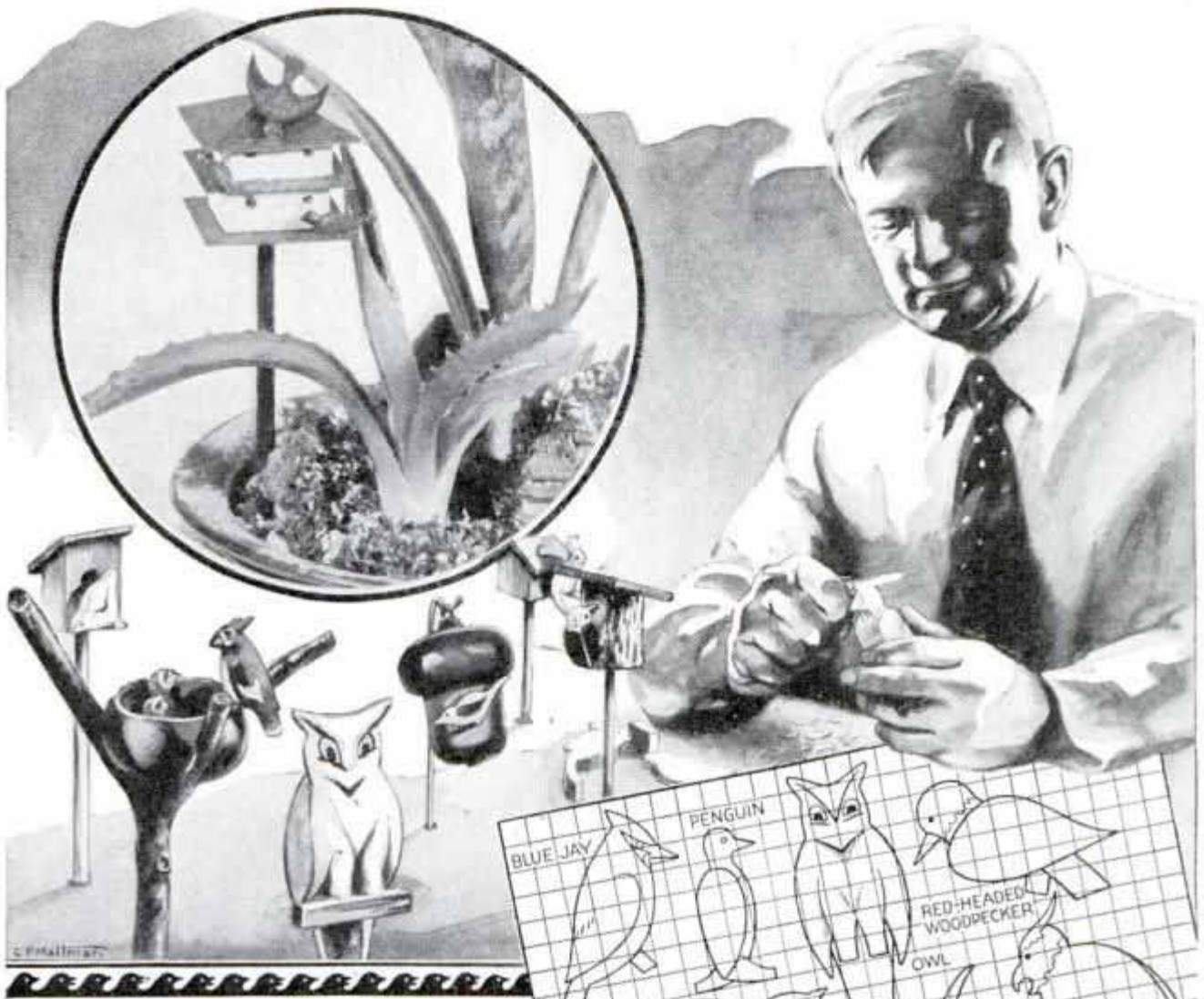


Hand and Indexing Wheels on a Lathe Help in Winding Coils and in Dividing Periphery of Work

Owners of home workshops will find that indexing wheels and hand wheels on their wood-turning lathes save time. The indexing wheel is handy for accurately dividing work in the lathe into halves, quarters, etc., and consists of a gear mounted on the end of the spindle shaft. An old hack-saw blade, annealed and bent as shown, is mounted on the lathe bed so that it will engage the teeth and lock the shaft in any position desired. The hand-wheel is an old sewing-machine flywheel mounted on the end of the lathe spindle. It is especially handy for turning the lathe by hand when winding coils, and when the hand is held against the wheel, the machine can be stopped quickly.—Daniel Reynolds, Moline, Ill.



# Small Carved Birds Make Neat Ornaments



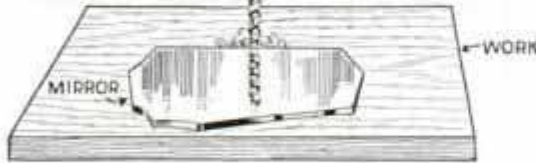
Carved or sawed from white pine or other soft wood, these miniature birds and houses make neat ornaments for mantels, Japanese gardens or bric-a-brac shelves, and, when fitted with pointed standards, they can be pushed into the soil around potted plants to produce a realistic effect. For most purposes, skewers or candy-sucker sticks make good standards, while toothpicks can be used as perches. The designs may be varied to suit your fancy, and the birds can be copied from life or from colored pictures. The martin house shown in the circular detail is carved from solid stock and has holes drilled through it to represent doors. In most cases the birds are simply glued on their perches. Although the birds have a more realistic appearance when carved, good results can be had by sawing them out in silhouette and then posing them properly. They may

also be cut from cardboard with a pair of scissors. In this case, it will be necessary to reinforce the cardboard to prevent it from warping.

## Powder Helps Sharpen Razors

If leather razor strops are dusted with a mixture consisting of equal parts of jewelers' rouge and fine aluminum powder, you can sharpen your razor in about half the time usually required. The powders should be thoroughly mixed before applying them.





Drill Bit Reflected in Mirror Aids in Drilling Holes at Right Angles to Surface of Work

### Reflection in Mirror Aids in Drilling True Vertical Holes

A small mirror will serve as a handy guide for drilling a hole at right angles to the surface of the work. It is laid flat on the work and as close to the drill bit as possible. The reflection will then enable you to hold the drill in a true vertical position.—Dexter Allis, Everett, Mass.

### V-Pulley Cuts Putty into Strips for Glazing

To save time in glazing a number of windows, one home owner rolled out the putty on a smooth surface and then cut it



into strips with a small V-pulley, which was attached to a suitable handle. Being V-shaped, the strips were readily pressed into the joint between the pane and frame.

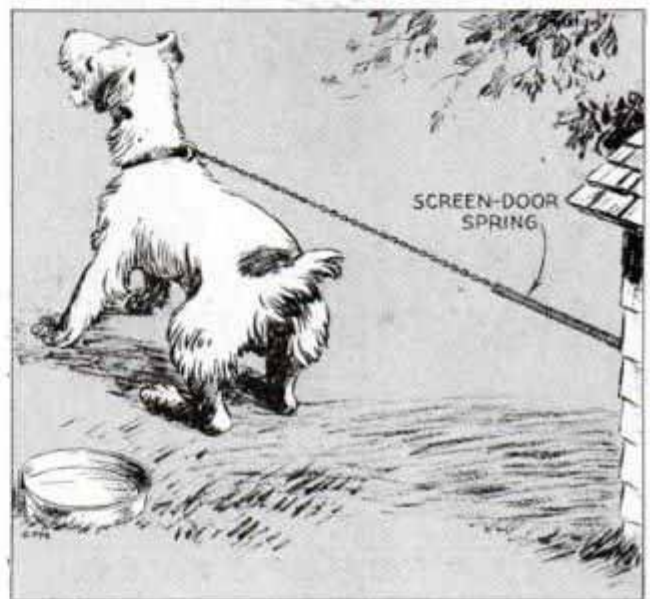
### Scaring Game Fish from Their Haunts

The next time you are casting for pike or bass around a submerged weed bed without much luck, try the following: If your boat is equipped with an outboard motor, start it up and cut a few circles and figure-eights over the bed until the water is agitated for 10 or 15 min. A long pole

or an oar may also help in stirring up the water. This will scare out the fish. Now shut off the motor and row gently back to the edge of the weed bed and start casting. After the water has become quiet again, the fish will come back, and being thoroughly awakened, are more apt to strike. An alarmed game fish will invariably snap at a lure that passes before it.

### Spring Absorbs Jerks in Dog's Tether

Fastened to one end of a tether, a screen-door spring will absorb sudden shocks on a dog's neck when it tugs and

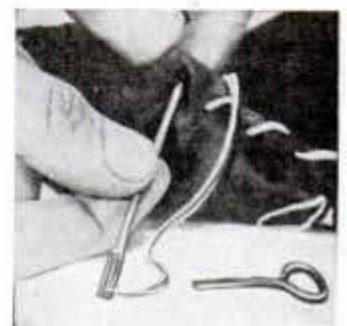


Screen-Door Spring Tied to End of Dog Tether Absorbs Shocks on Its Neck

jerks on the tether. The spring will be found especially effective when a pup is tied to a post.

### Needle for Sewing Burlap

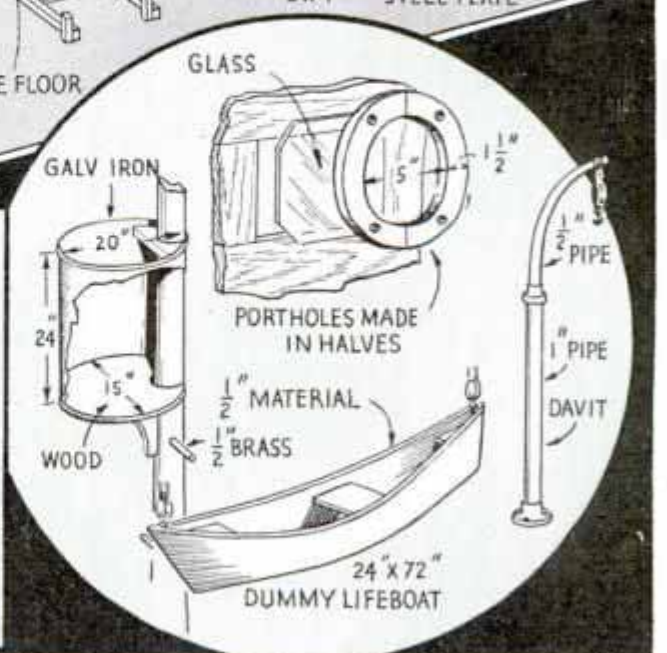
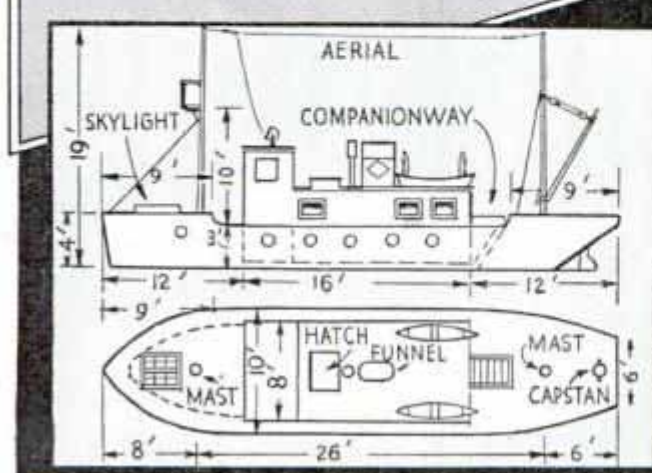
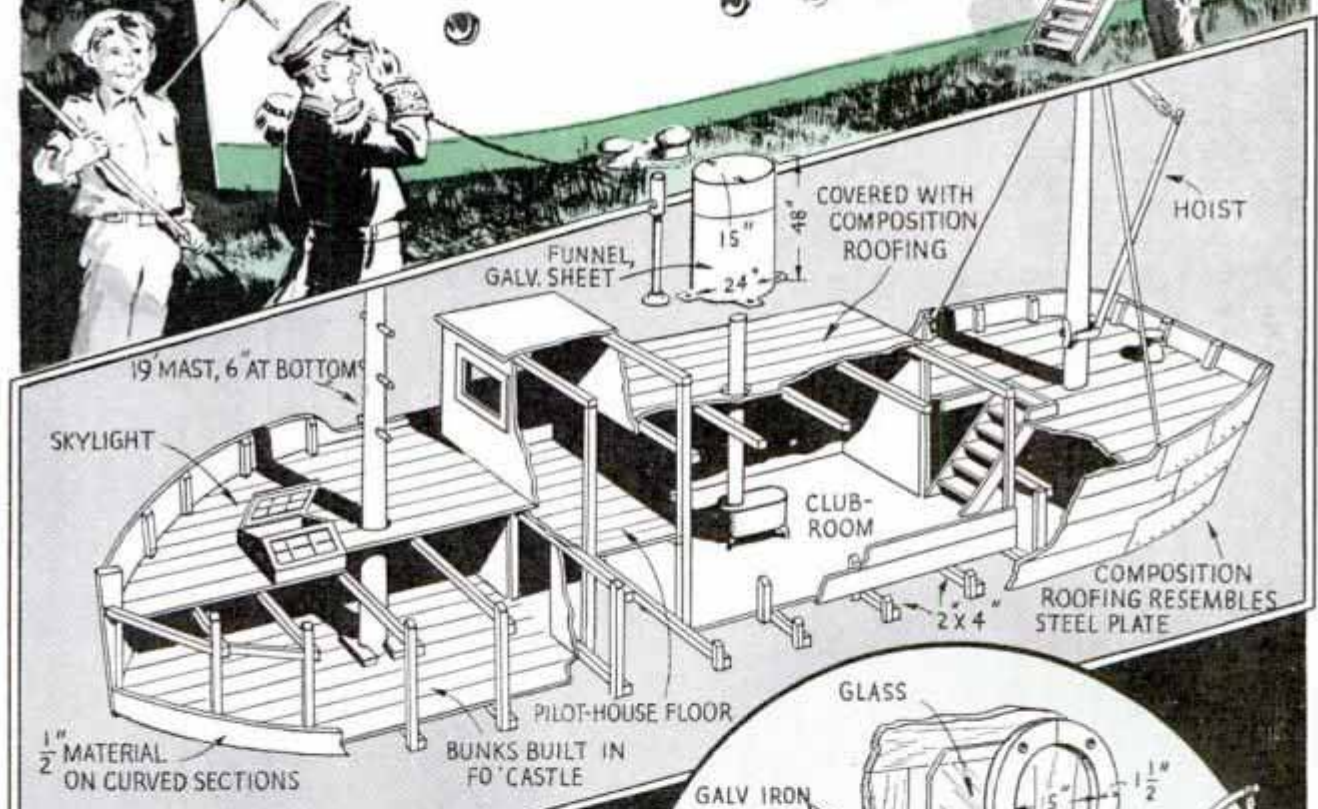
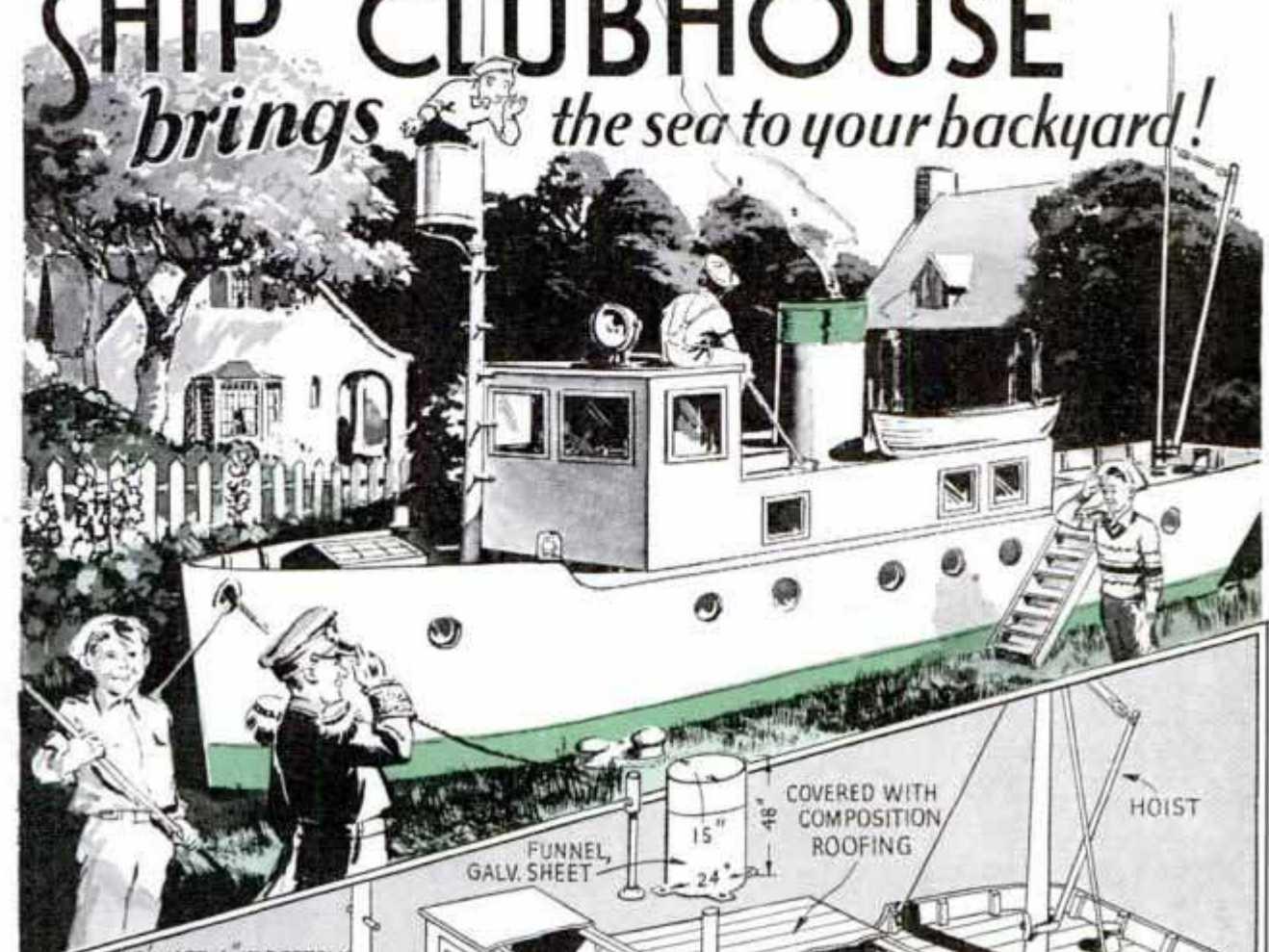
When you are on a camping trip and a needle for sewing burlap or other heavy cloth is not at hand, a satisfactory substitute can be made from a key can opener. All that is necessary is to straighten out the end used as a finger grip and file it to a sharp point. In use, the cord or thread is slipped through the eye at the other end.





# SHIP CLUBHOUSE

*brings the sea to your backyard!*







Hot Flatiron Run over Canvas Covering on Canoe Makes the Fabric Adhere Snugly

### Canvas Covering on Canoe Pressed Down with Flatiron

When canvas is used to cover a canoe, try pressing it down with a hot flatiron. The heat and pressure will help to draw the glue into the fabric and make it cling tightly to the surface.

### Old Pair of Scissors Renewed with a Spring



A pair of scissors on which the blades have spread apart so that they will not cut, can be repaired by using a spring to hold them together. Get a short piece of spring brass and shape it as shown. Then put it underneath the nut on the pivot bolt. If the scissors are riveted together, remove the rivet and substitute a small stovebolt for it.

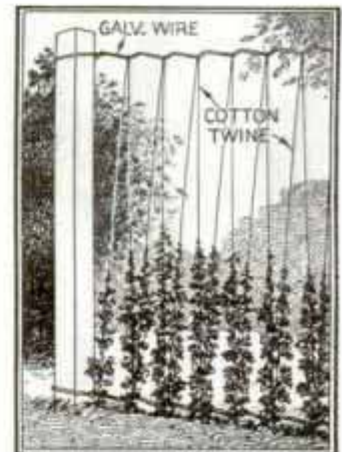
Before laying linoleum over a rough or uneven floor, apply a light coating of sawdust, which will reduce the tendency of the linoleum to crack.

### Threads Repaired with a Nut

Damaged threads on the ends of bolts, studs and shafts can often be repaired with a castellated nut, the type commonly used on auto axles or other parts where cotter keys are necessary. If the end of the bolt or shaft has been enlarged by hammering, it will be necessary to first file it down. The end is then tapered slightly and the castellated end of the nut is started on the shaft and is carefully worked back and forth, advancing a small fraction of an inch with each turn until the threading is repaired. Plenty of oil will be found necessary or the threads will be damaged beyond repair.—A. H. Vance, Chicago.

### Crimped Wire Evenly Spaces Strings on Vine Trellis

Cotton cord is better than wire to use in training sweet peas and other climbing vines, as it permits the plants to be readily cut down and burned in the fall. To keep the cord taut and evenly spaced, tie it to a couple of galvanized wires, which have been stretched between two posts and then crimped with a pair of pliers at 4-in. intervals.



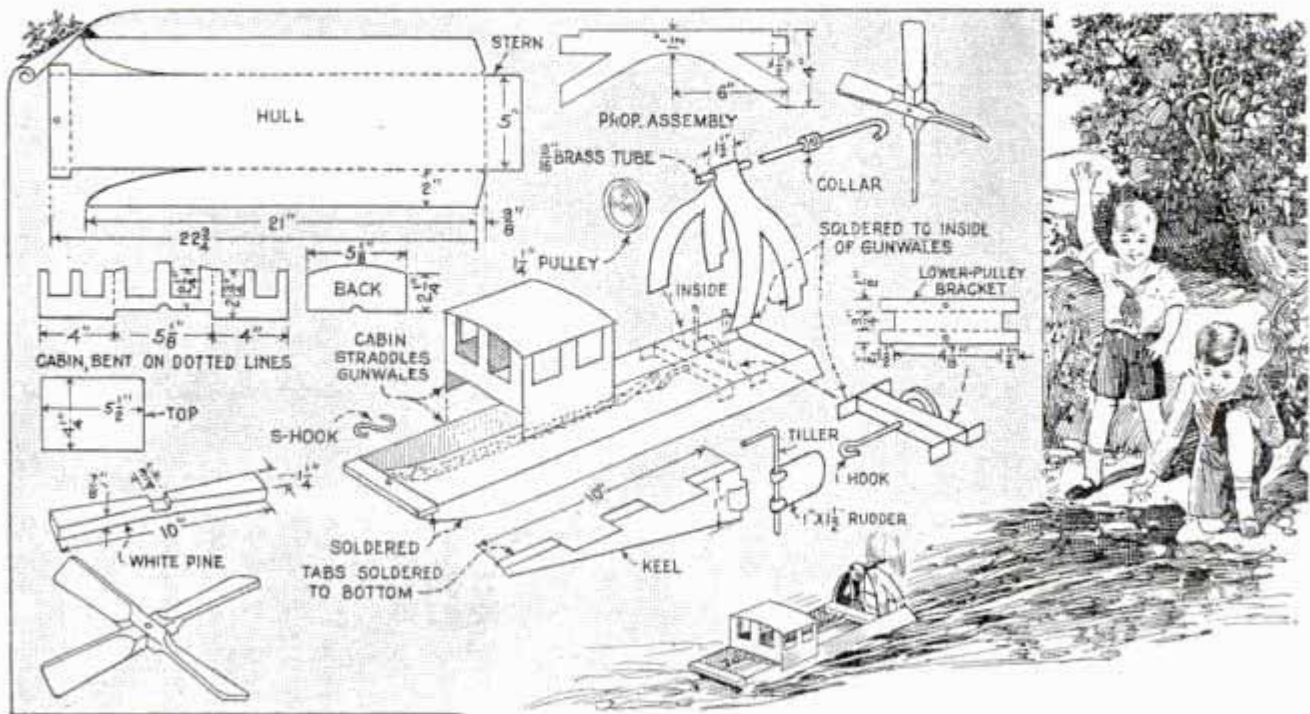
### A Safeguard for the Padlock

After several padlocks had been broken by the insertion of a jimmy bar through the shackles, I stopped this mode of vandalism by putting nuts on the legs of the shackles as shown in the drawing. The nuts filled the space between the lock and the hasp so that a bar could not be inserted.—W. C. Wilhite, Hornsby, Illinois.





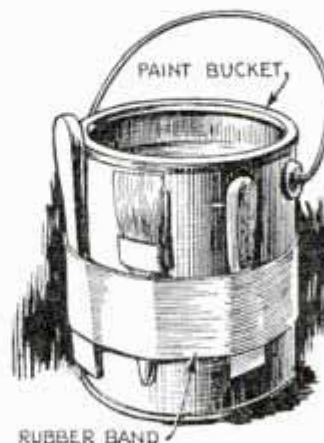
# Miniature Sea Sled Driven by Air Propeller



A rubber-band motor propels this little sea sled at a lively rate and runs for a considerable distance. By using a smaller pulley on the propeller shaft and a larger one on the drive shaft it will navigate for a longer period though at a slower speed. Construction has been simplified, and with the tin and galvanized sheet hull and parts, it is very durable. The hull is cut from a single sheet of tin and the ends soldered together. By pre-heating the tin, solder will spread more easily and make a neat joint. The propeller-assembly frame is cut from fairly heavy-gauge galvanized sheet iron—but not so heavy it cannot be handled with tin snips. Bend the central section around a piece of  $\frac{3}{16}$ -in. brass or copper tubing to serve as a bearing for the propeller shaft. Then solder the frame to the hull. Suitable pulleys and shafts will be found in any toy construction set. A keel is essential and one can be cut from galvanized sheet. Note the hinge arrangement of the rudder. A stiff brass wire serves as a hinge-pin, the upper end being bent for a tiller which rests on the stern piece. Notches are filed in the latter to hold the tiller in any desired position. The wire is soldered to the rudder. The cabin is principally for appearance, but it also serves to balance the weight of the propeller assembly. Note that the cabin simply straddles the gunwales and can be

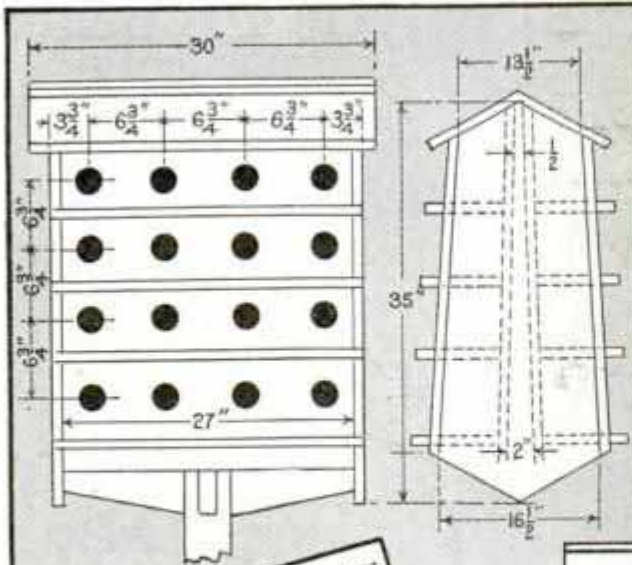
lifted off when adjusting or winding the rubbers. It is not necessary to make the propeller as light as in model-airplane practice, and white pine or redwood is therefore satisfactory material. Assemble all the parts and string on four double strands of  $\frac{1}{8}$ -in. flat rubber band. For a belt, use a single strand of stout cotton cord and tie it tightly over the pulleys. If it has a tendency to slip, apply powdered resin or beeswax. It is best to use a mechanical winder, such as a hand drill with a hook in its jaws.

## Rubber Band Holds Tools on Side of Paint Bucket

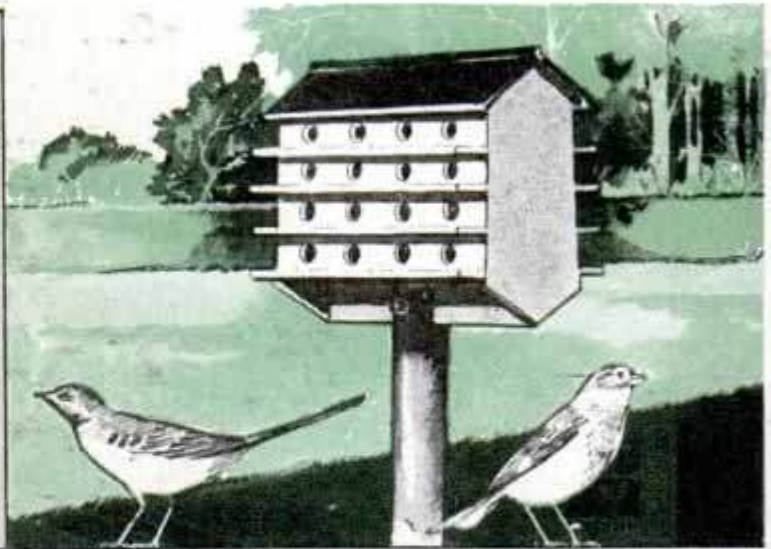


Much time can be saved in looking for mislaid painting tools, such as brushes, stirring paddles and putty knives, if they are kept in a holder on the paint bucket. A holder for this purpose can be had by slipping a wide rubber band cut from an old inner tube on the bucket as shown—A. H. Waychoff, Phoenix, Ariz.





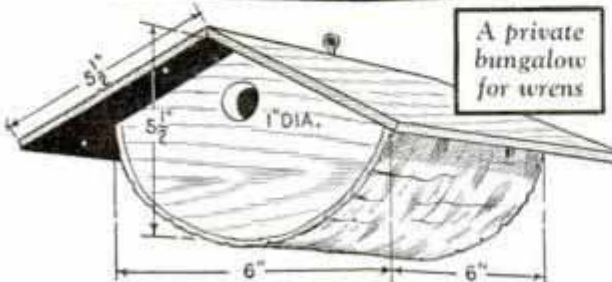
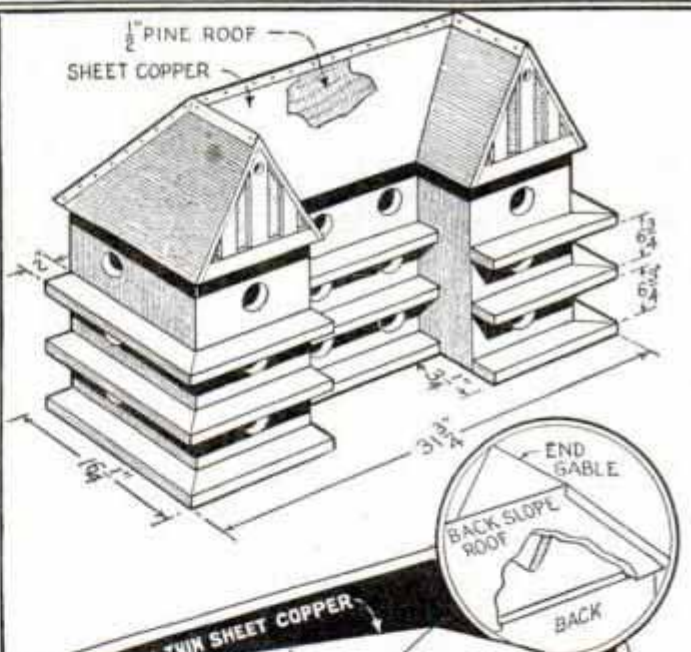
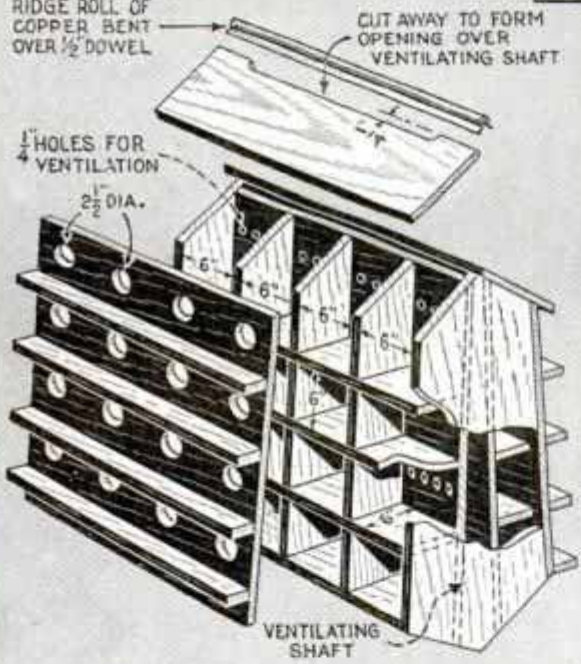
Colony houses are especially suitable for purple martins



# BIRD HUTS

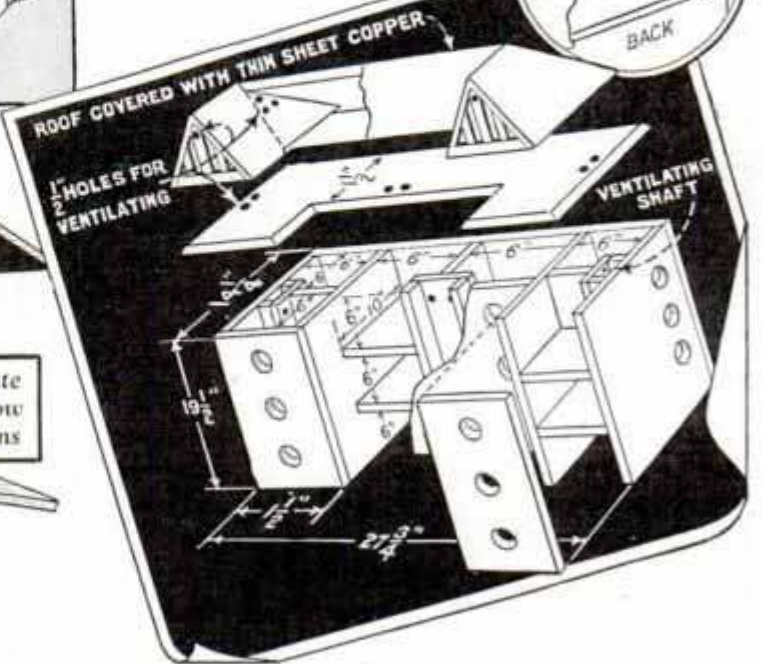
RIDGE ROLL OF COPPER BENT OVER 1/2 DOWEL  
 CUT AWAY TO FORM OPENING OVER VENTILATING SHAFT

1/4 HOLES FOR VENTILATION  
 2 1/2 DIA.

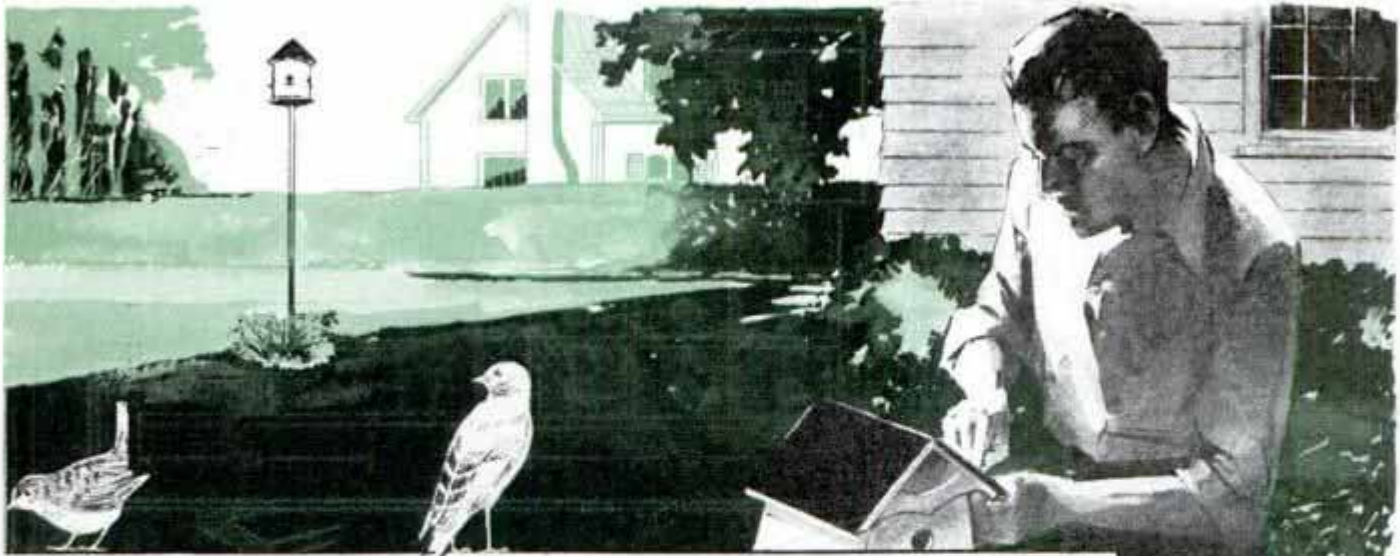


A private bungalow for wrens

COVERED WITH BIRCH BARK

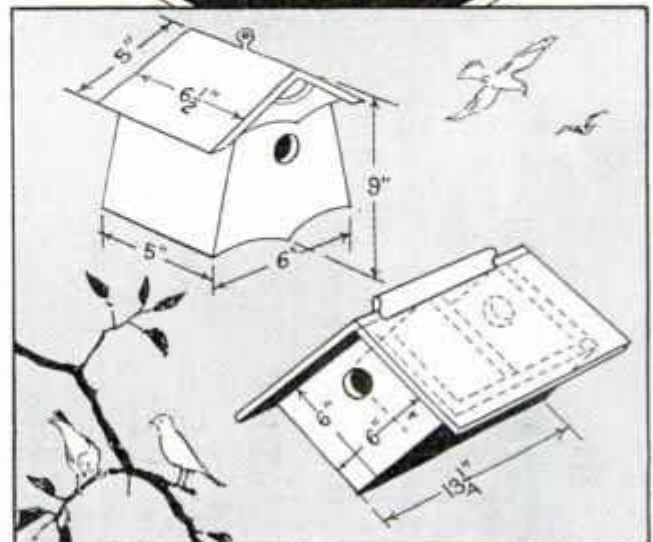
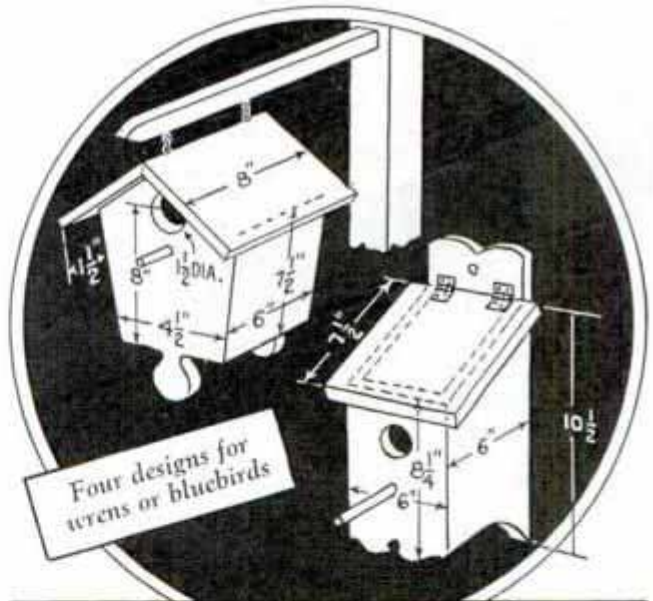




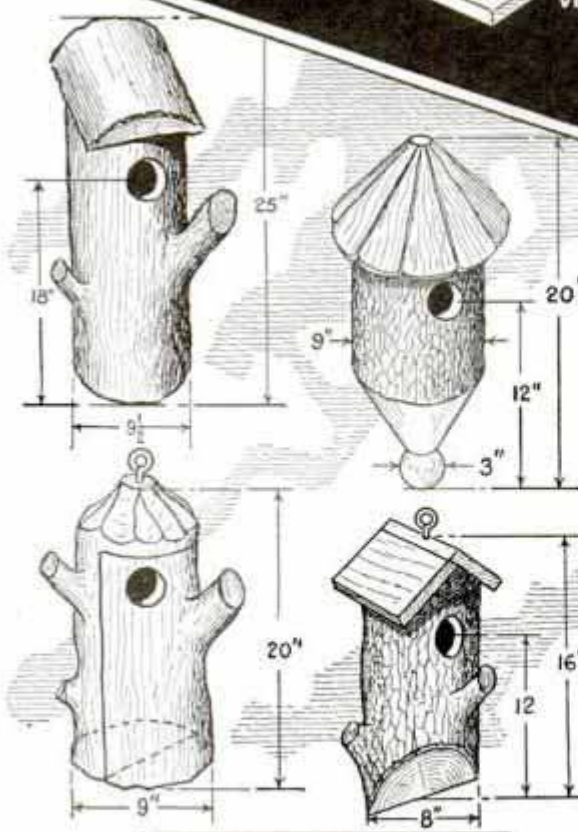
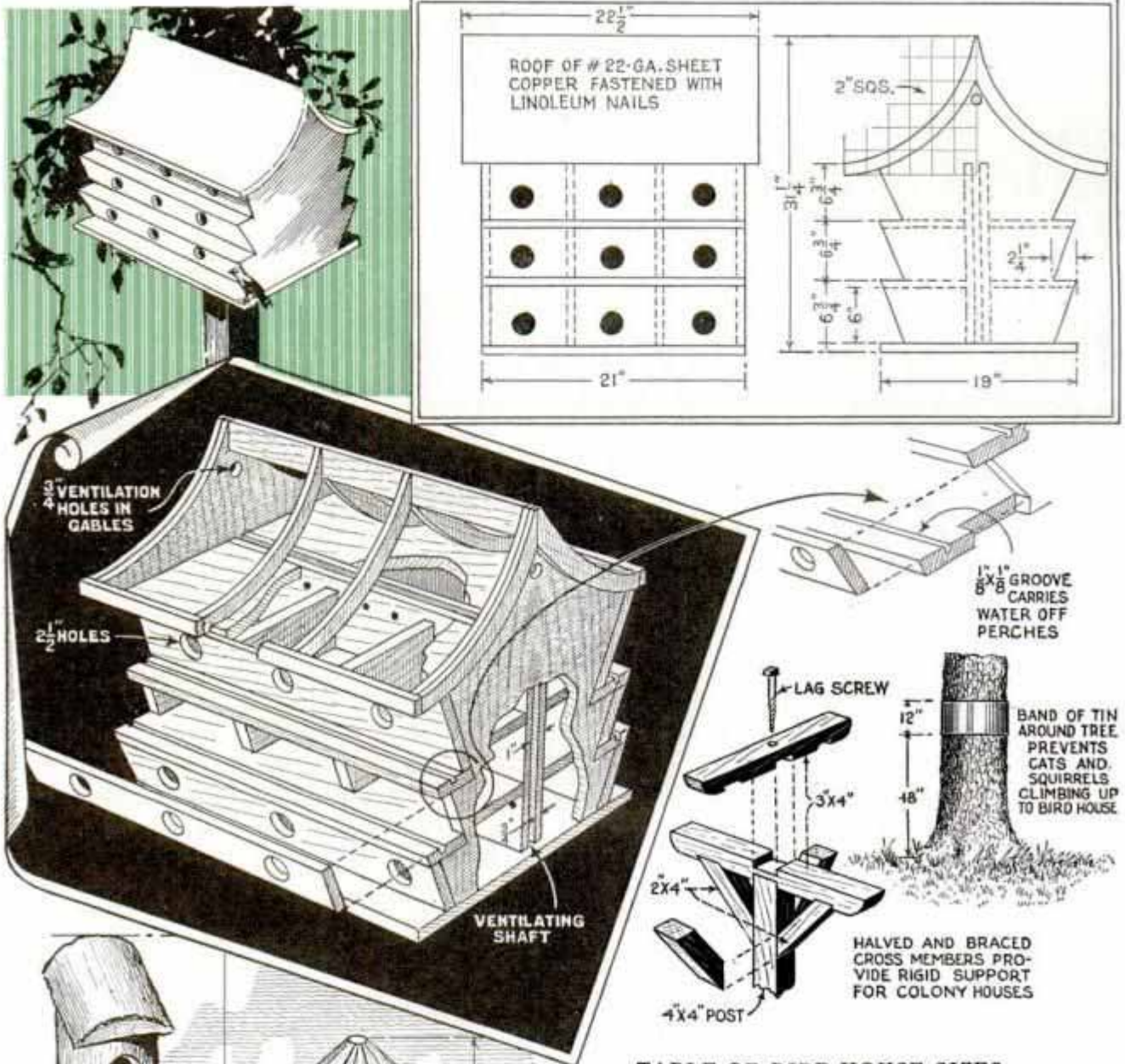


# and BIRD HOTELS

HERE are several designs for bird houses that should meet the requirements of almost any lover of birds. Among those shown, are colony houses, four-apartment log cabins and single-apartment homes of rustic design, which are made from short sections of logs. Essential dimensions in building bird houses are the sizes of the nesting compartment and the entrance hole, which are given in the table. For colony houses, use  $\frac{3}{4}$ -in. selected cypress or California redwood for durability. Small single-apartment homes, for wrens and bluebirds, may be constructed of lighter material, and require no perch as the birds fly directly into the entrances. The small frame houses and the log-cabin types should be colored with brown or green shingle stain, while white paint, with a harmonizing trim color, is best for colony houses. The latter should be mounted rigidly on a stout post, which is pivoted at the bottom so that they can be lowered for cleaning. Also, note that the colony houses have a built-in system of ventilation, which is essential. The construction of the rustic-bark homes is clearly shown. Those made from single logs are ripped, and, after the cavity has been chiseled out, the halves are fastened together with wire or large screws. A thin coating of asbestos-roofing cement spread on the joining faces of the two halves will keep water out of the nesting cavity.







Rustic homes for woodpeckers

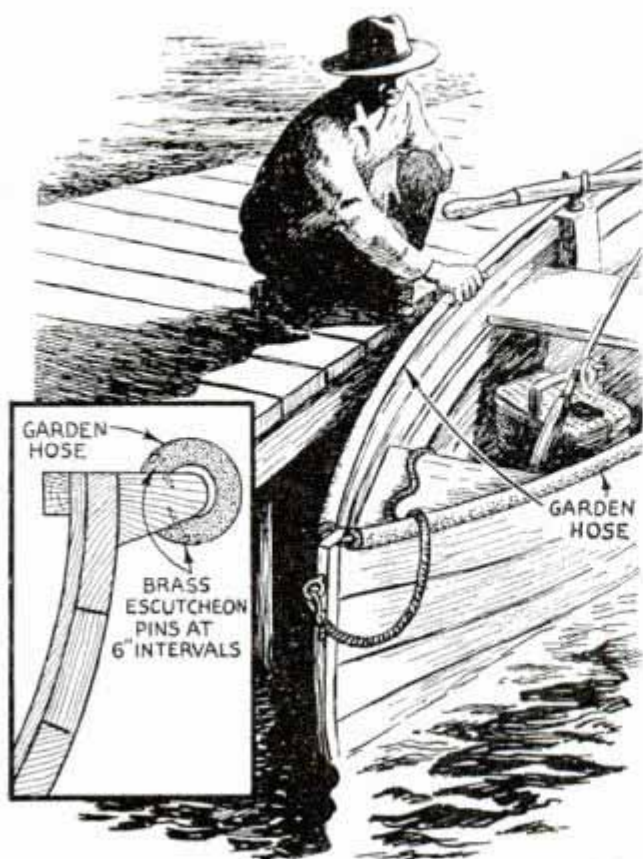
TABLE OF BIRD-HOUSE SIZES

Kind of Bird	Floor of Cavity	Depth of Cavity	Entrance Above Floor	Dia. of Entrance	Height above Ground (Ft.)
Bluebird	5 x 5	8	6	1 1/2	5 to 10
Robin	6 x 8	8	2 adjacent sides open		6 to 15
Chickadee	4 x 4	8 to 10	8	1	6 to 15
Nuthatch	4 x 4	8 to 10	8	1 1/4	12 to 20
Wren	4 x 4	6 to 8	1 to 6	3/8	6 to 10
Tree Swallow	5 x 5	6	1 to 6	1 1/2	10 to 15
Barn Swallow	6 x 6	6	2 adjacent sides open		8 to 12
Purple Martin	6 x 6	6	1	2 1/2	15 to 20
Song Sparrow	6 x 6	6	3 sides open		2 to 4
House Finch	6 x 6	6	4	2	8 to 12
Phoebe	6 x 6	6	2 adjacent sides open		8 to 12
Woodpecker	6 x 6	12 to 15	12	1 1/2 to 2	12 to 20
Downy Woodpecker	4 x 4	8 to 10	8	1 1/4	6 to 20
Flicker	7 x 7	16 to 18	16	2 1/2	6 to 20
Screech Owl	8 x 8	12 to 15	12	3	10 to 30









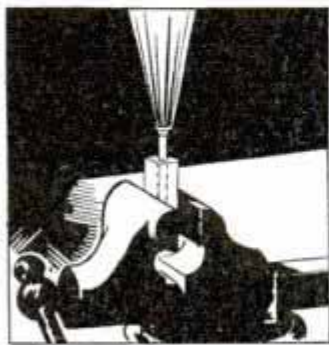
Lengths of Old Garden Hose Have Been Found Effective for Protecting Gunwales of Small Boats

### Old Garden Hose Protects Gunwales of Small Boat

Slit along one side and then slipped over the gunwales, sections of old garden hose make effective bumpers to protect them. Brass escutcheon pins, driven through the hose as shown in the circular detail, hold the bumpers in place. The use of hose for this purpose makes a neater job than rope or old auto tires.

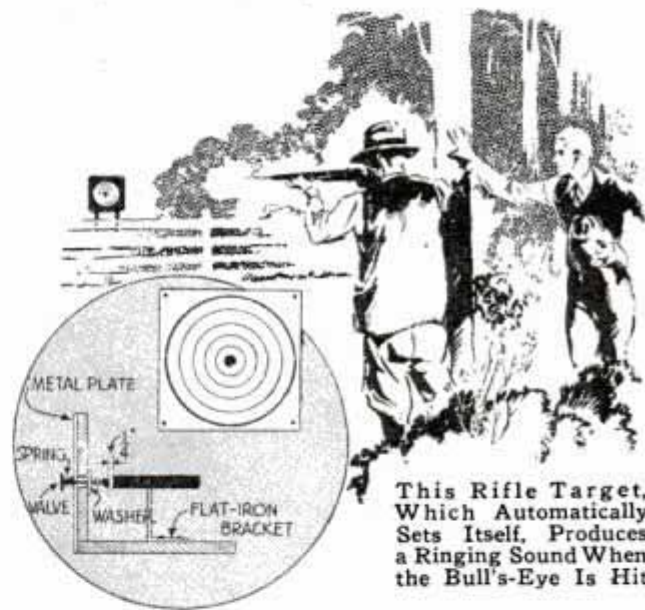
### Jig Aids in Repairing Umbrellas

The umbrella man may not call when he is needed and then it falls to the lot of the handy man to make repairs. The umbrella is supported by placing the end of the center rod in a hole bored in a block of hardwood which is held in a vise as shown. The umbrella cover is then removed, after which the joints that need rivets or wire channels in the barrel joints will be easily accessible.—Lester P. Young, Culver, Ind.



### Rifle Target Made from Auto Parts

Utilizing an old auto valve as a movable bull's-eye and a brake drum as a bell, this rifle target will stand hard use. A base is made by screwing two boards together at right angles, and the front is covered with a metal plate on which the target is painted. A hole is drilled in the center for a metal sleeve in which the valve stem slides, a small coil spring being placed between the plate and the valve head to force it back when a bullet drives it against the drum. An iron washer used as shown, and a pin through the end of the stem will check the rebound of the valve. The drum is mounted on the base by means of a flat-iron bracket, which should be located so that there is a 1/4-in. clearance between the end of the valve stem and the side of the drum.—Eugene Szabo, Garfield, N. J.



This Rifle Target, Which Automatically Sets Itself, Produces a Ringing Sound When the Bull's-Eye Is Hit

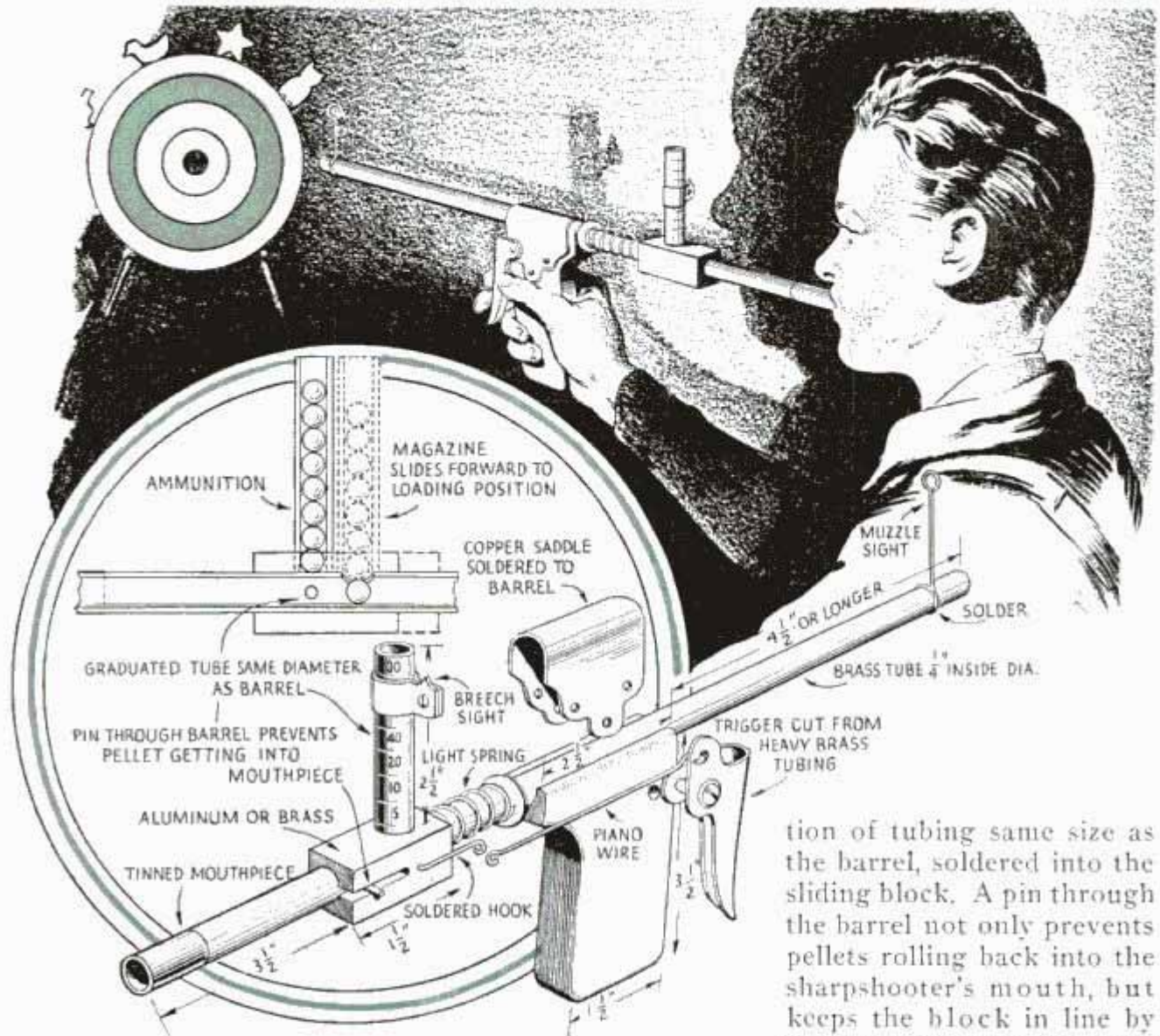
### Simple Spring Holds Key in Lock

To prevent the loss or removal of an inside door key from the lock, bend a short length of spring wire around the key and insert it in the lock. By compressing the ends of the spring downward, they may be forced through the key hole and will spread again on the inside of the lock plate. This installation is, of course, only advisable where the key is to be left in the lock permanently.





# This Super Bean Shooter Has a Magazine



Here is a long-range gun that almost gets into the naval class of artillery, and shoots a surprising distance with great accuracy. Although it falls in the classification of a bean shooter, it is designed to use pearl tapioca pellets for ammunition and is quite harmless, since these are neither as hard nor as heavy as beans. They are ideal for the purpose because they are round and slide easily through the  $\frac{1}{4}$ -in. barrel, which may be 24 in. long. The mouthpiece of the barrel should be tinned with solder because of the unpleasant taste of the brass tube. Mount the barrel on a wood hand grip as shown, after the magazine has been fitted. The latter consists of either a brass or an aluminum block drilled to fit over the tube so that it slides easily but without any play. The magazine is merely another sec-

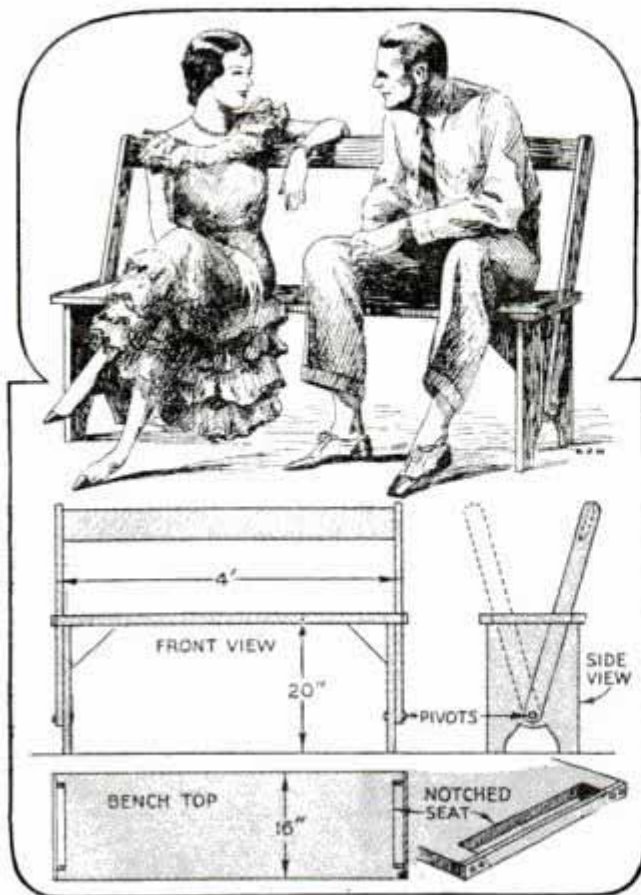
tion of tubing same size as the barrel, soldered into the sliding block. A pin through the barrel not only prevents pellets rolling back into the sharpshooter's mouth, but keeps the block in line by means of the slots. The hole in the barrel through which the ammunition feeds should be amply large enough to prevent jamming. Graduations for the rear sight must be marked by trial.

## Flat Spring Improves Stove-Lid Lifter



To prevent a stove lid from falling off of a lifter, rivet a flat spring to it as shown. The free end of the spring should be bent upward so that it will slip over the surface of the lid easily. The spring grips the lid and helps hold it, but not so tight that the lifter is hard to remove.





This Bench Can Be Made to Face in Opposite Directions by Merely Moving the Back Rest

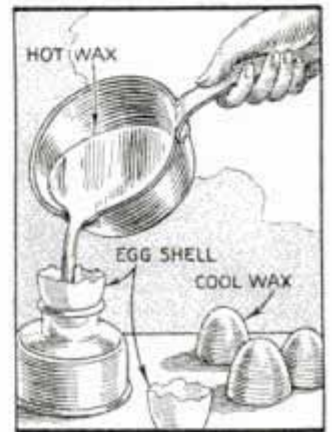
### Garden Bench Has Reversible Back

This bench can be faced in opposite directions by moving the back rest, which is a decided advantage where one wishes to have a stationary bench that can be used from both sides. It is made of 1-in. stock and can be any size desired. The novelty

lies in pivoting the uprights supporting the back rest so that it may be swung to either side. The ends of the seat are notched to provide swinging space for the uprights, and strips of wood or metal are screwed to the ends to prevent them from splitting. A couple of coats of paint or stain to protect the bench against the weather completes the job.—Thos. W. Benson, Philadelphia, Pa.

### Egg Shell Molds Ironing Wax into Convenient Shape

Housewives who use beeswax or paraffin as a smoothing polish for hot flatirons will find the wax easy to apply when it is molded into lumps of the shape indicated. This method also enables one to use odd pieces of wax that are left from canning jelly and jam. The molds for this purpose are egg shells broken in half. The melted wax is poured into the shells and is allowed to cool, after which the shells are broken away, leaving the wax in uniform lumps.—G. E. Hendrickson, Argyle, Wisconsin.



## 380 Blueprints for Home Craftsmen



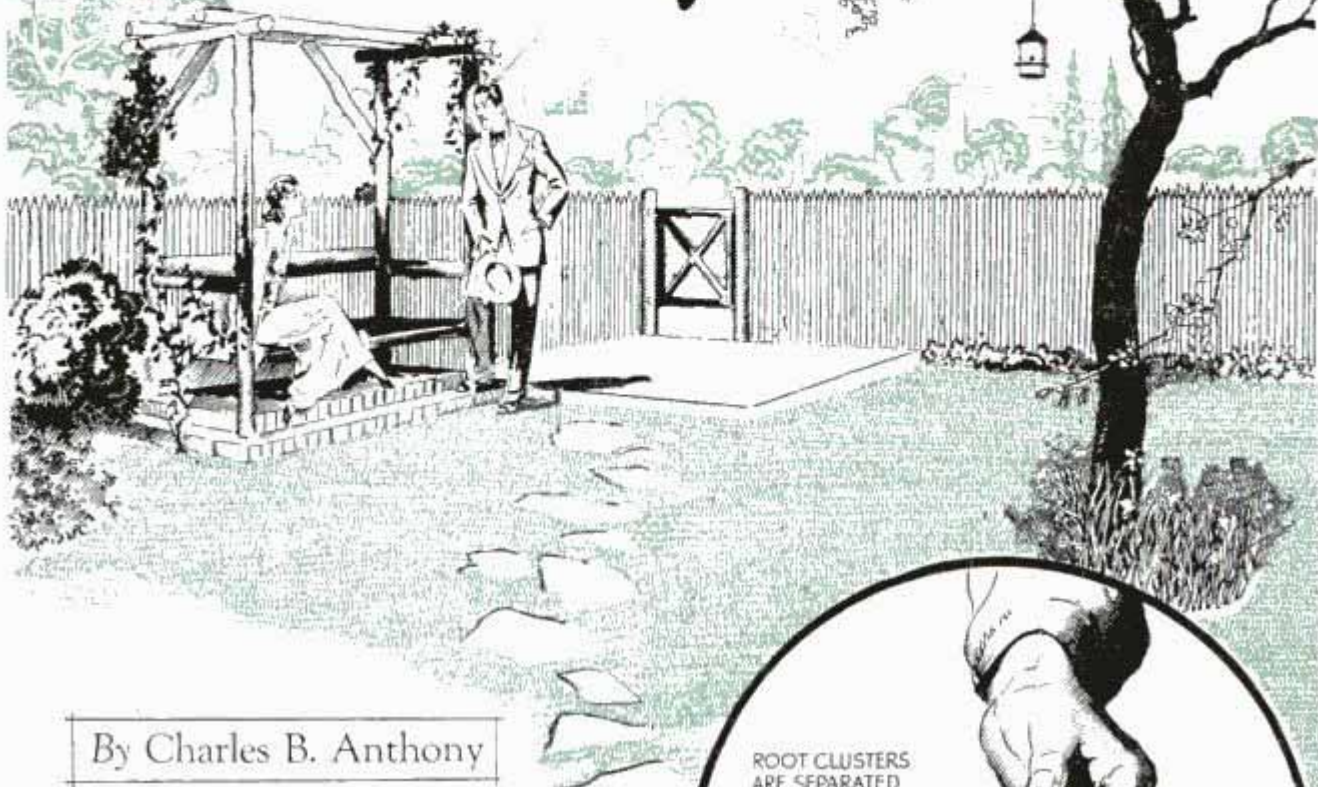
Masterpieces of American Furniture; **Governor Winthrop's Desk**, Nos. 846 to 848, incl. (3 prints). **Thomas Jefferson's Music Stand**, 871 and 872. **Benjamin Franklin's Chair**, Nos. 873 and 874. **Connecticut Sunflower Chest**, Nos. 875 to 877, incl.

Modelmaking Projects; **Sovereign of the Seas**, 828 to 835, incl. (8 prints). **Flying Cloud**, 709 to 714, incl. (6 prints). **DeWitt Clinton Train**, 800 to 809, incl. (10 prints).

Boats; **Roamer**, 16-ft. outboard cruiser, 765 to 770, incl. (6 prints). **Hi-Ho**, 14-ft. family outboard or inboard runabout, 840 to 845, incl. (6 prints). **Pop's**, Class-A outboard racer, 813 and 814. Complete list of all blueprints for 3c postage. Prints sell for 25c each or six prints (not projects) for \$1.00. Address Blueprint Dept.



# A Lawn of Velvet



By Charles B. Anthony

I AM proud of the fact that I now have one of the best lawns in our neighborhood. For a number of years I tried to make a lawn of velvety turf but the soil was so clayey that my repeated efforts were complete failures. Plant as much seed of the best kind, I had little results to show except a growth of hardy weeds. A visit to a friend of mine in a neighboring town, whose superb lawn of closely knit, velvety grass greatly impressed me, proved to be a stimulus to renew my efforts, which resulted in my present lawn of fine-textured creeping bent, the kind of grass used for golf greens. Of course, the initial cost of a creeping-bent lawn is more than that of an ordinary lawn, but certainly not nearly as expensive as seeding every year. Creeping bent is one of the hardiest of grasses and generally it can be grown wherever Kentucky blue grass is grown. The shaded portion of the map shows where creeping bent can be grown with success.

In about eight weeks' time you, too, can have a fairly respectable lawn of creeping bent, and in three months you will have a

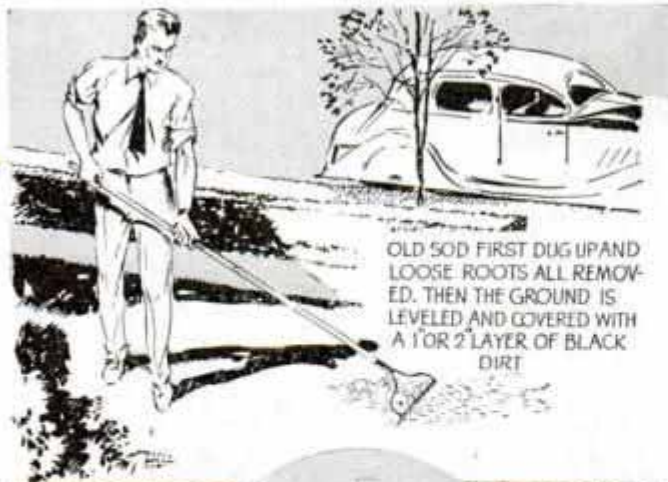


deep, thick, closely knit turf, which, properly tended, will never die and needs no seeding to fill any bare spots, although there will be none if the grass is well cared for in the early stages. Either the seed or the stolens—separated root clusters—may be planted. The latter method was the one I used so successfully. The stolens should be planted in early May. To plant earlier than this would jeopardize real success as the ground should be thoroughly warm and dry so that a good bed can be prepared. In my case I tore up the old skimpy lawn entirely, then broke up all the coarse pieces of clay sod with the rake, and then removed all the loose grass roots and

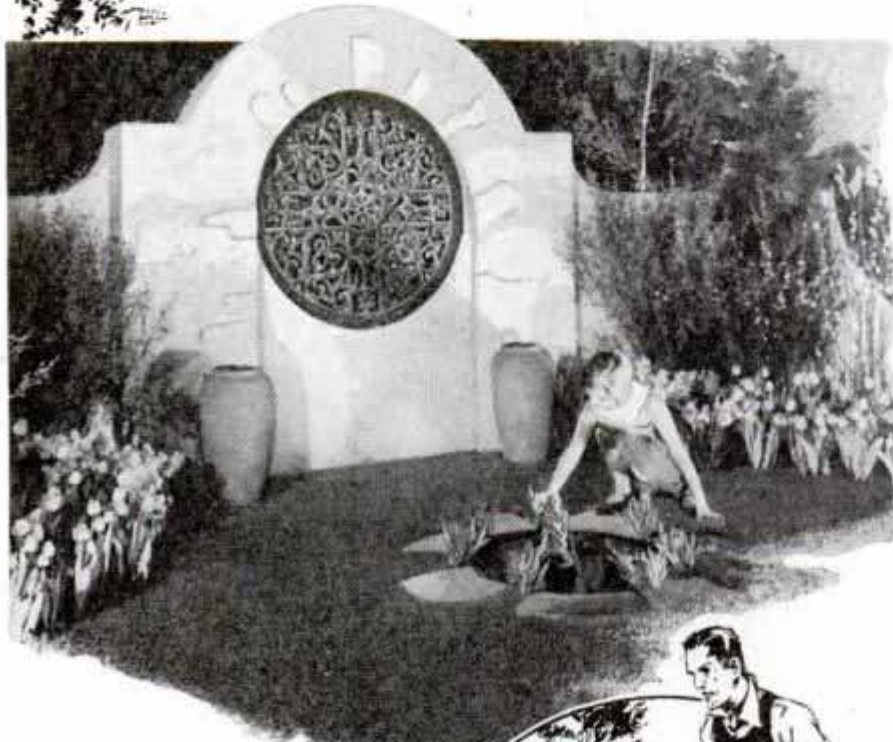
*also Breck's Nurseries, 85 State, Boston, Mass. Farmer Seed & Nursery Co., Fairbault, Minn.*

*Vaughan Seed Co., 10 W. Randolph, Chicago*





OLD SOD FIRST DUG UP AND LOOSE ROOTS ALL REMOVED. THEN THE GROUND IS LEVELED AND COVERED WITH A 1 OR 2 LAYER OF BLACK DIRT



weeds. After leveling the ground, I put a layer of rich garden loam over the clayey ground. A 2-in. layer is about right and if this makes the ground too high, some of the surplus ground should be removed. Of course, the addition of black dirt is not necessary if your ground is already rich and fertile. Then began the job of planting the stolens. I carefully broke up the sod which my friend had given me, and separated the root clusters. These I planted about 6 in. apart in the rich top dirt. This was rather laborious but well worth the trouble. Another way to plant the stolens, as I later found out, is to scatter

them over the soft soil and then roll them into the surface. My efforts, however, were entirely successful. Nursed by a few good rains, the bent grass grew profusely and in a short time the ground looked like a checker board, covered with humps of creeping bent. As the lumps seemed to rise after every rain, I rolled the lawn repeatedly to press the lumps down again. The healthy growth of creeping bent depends largely on an abundant supply of

water, and therefore you should not fail to water the lawn every day, especially during the early stages. It is best to use a fine spray over the entire surface, as a heavy stream will wash out the stolens. The precaution of sufficient watering is particularly important if the lawn has been started after the summer has well advanced. Stolens may be planted any time during the summer from May to October, but it is not a good idea to sow creeping-bent seed in midsummer. When seed is used instead of stolens, the sowing should be done in the early spring. The progress of a seeded lawn is naturally much slower than one in which stolens are planted.

One thing that impressed me as my lawn progressed was that weeds were almost entirely choked out. Now and then a few dandelions would bloom but

these were quickly removed. When the lawn is thick there is very little opportunity for the weeds to take root. At occasional intervals it is a good idea to scatter screened soil over the growing carpet. A layer not exceeding  $\frac{1}{4}$  in. should be applied, preferably less. Frequent mowing is good for the grass. Let the clippings lay



THE HUMPS OF GROWING GRASS MUST BE ROLLED TOGETH TO GET A SMOOTH LAWN



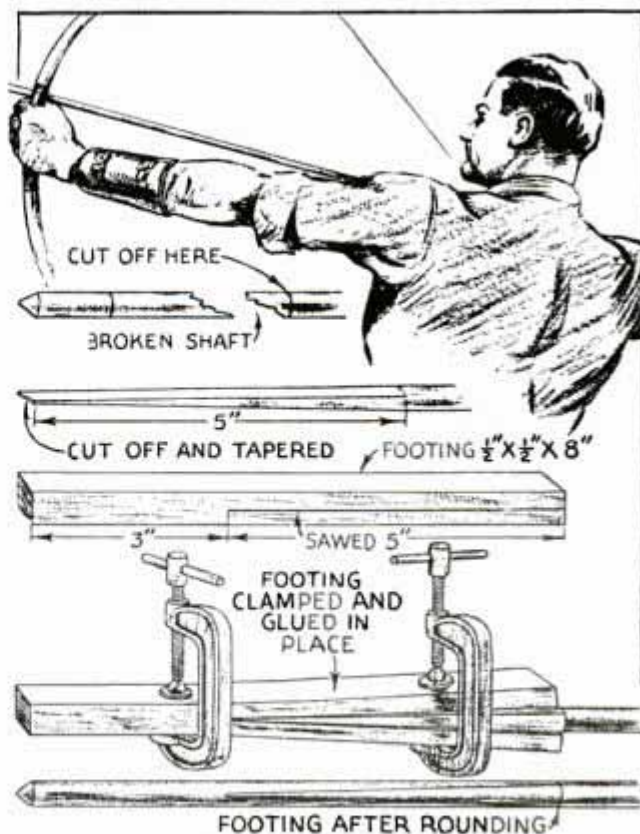


when the lawn is new and has bare spots. The mowing keeps it velvety and rich although it is not necessary to cut it as close as golf greens. To enrich the soil in order to provide more nutrition for the grass, any commercial fertilizer of reputable quality can be used, although an application of well-rotted manure just before the winter months is also profitable.

## Broken Arrow Shaft Repaired with Hardwood Footing

Arrows that have been broken just back of the pile or head can often be repaired and their durability improved with a hardwood footing. Beefwood is usually used for this purpose, but hickory, walnut, holly or any other close-grained wood will do. First cut the footing down to the size shown, and, with a fine-tooth saw, slot it centrally to within 3 in. of the head end, making the cut parallel with the grain. Then square the broken end of the arrow, and taper it back 5 in., leaving the apex the same width as the saw cut in the footing. The tapered end is then coated with glue and inserted into the slot, spreading the footing to allow it to go clear down where it is held by means of two C-clamps to dry. Be sure that the end of the arrow shaft butts snugly against the end of the slot, otherwise the flight of the repaired arrow may be affected. After the glue has dried, the clamps are removed and the footing is trimmed and sanded down to the contour of the arrow shaft. Care should be taken in gluing the footing and in sanding it down to see that it is straight and that it has the same taper as the original arrow. Attaching the head and apply-

ing shellac and wax finishes the job.—  
Jack Hazzard, Washington, D. C.



Hardwood Footing Glued to Broken Arrow Shaft Makes It as Good as New





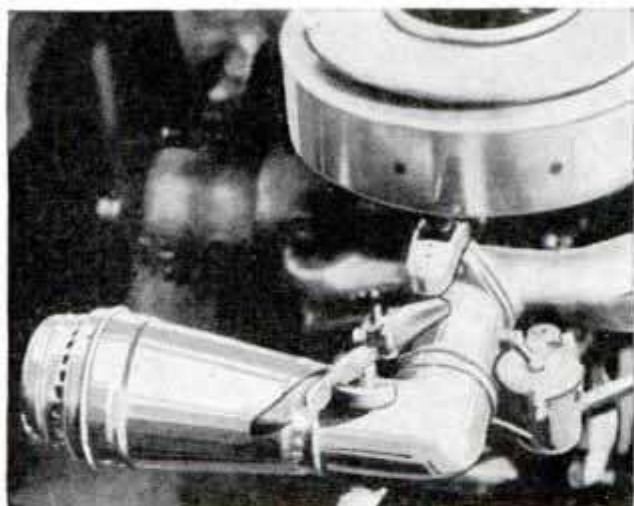


### Washing Powder for the Laundry

Stains that are little affected by ordinary washing soap are often readily removed by adding a cleaning powder to the wash water. A good powder that is easily made consists of a mixture of sodium perborate, 3 parts, borax, 4 parts and trisodium phosphate, 5 parts. The cleaning powder is simply added in small quantities to the soapy water. A liquid cleaner that serves the same purpose is made by dissolving sodium perborate, 5 oz., washing soda, 5 oz., and water glass, 2 oz., in water, 1 gal. To this may be added sufficient soap chips to produce a good lather when the liquid is added to the wash water.

### Muffler Silences Carburetor Air Intake on Outboard Motor

Boating may be made more pleasant by using a muffler to reduce the noise made by the carburetor air intake on an outboard motor. A good muffler for this purpose can be made from an aluminum drink mixer. First punch a number of small holes in the lid, as uniformly as possible for sake of appearance, and then cut off the base and slip the muffler over the air

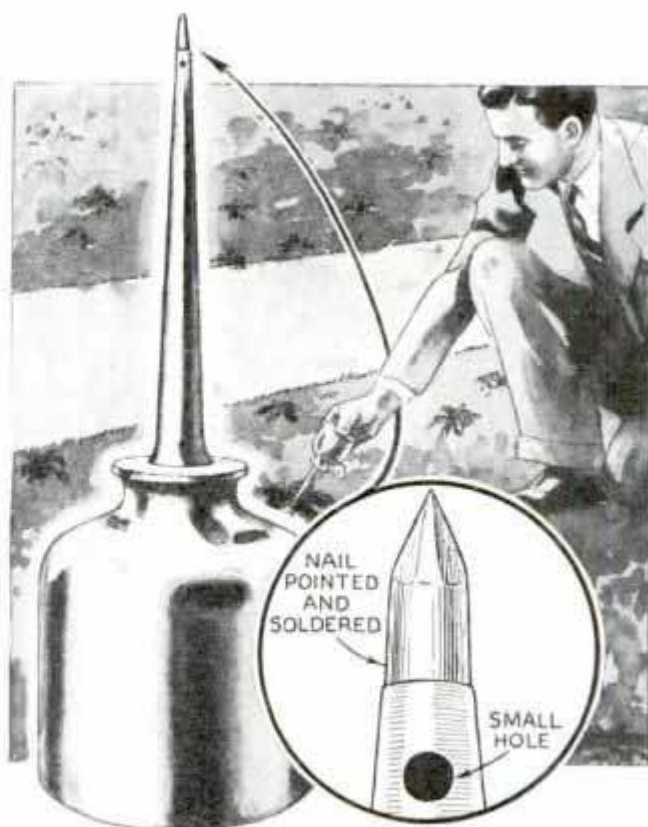


Muffler Made from Aluminum Drink Mixer Reduces Carburetor Noise on Outboard Motor

intake. The muffler also helps keep the boat clean as it catches some of the oil that sprays from the carburetor.

### Gasoline Rids Lawn of Dandelions

You can rid your lawn of dandelions by putting gasoline on them. To apply the gas effectively, get an oil can and solder

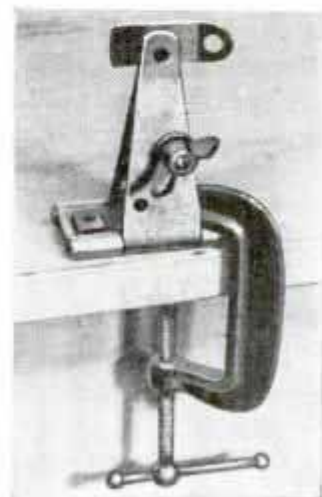


Specially Prepared Oil Can for Applying Gasoline to Dandelion Plants to Kill Them

the pointed end of a small nail into the end of the spout as shown. Then drill a small hole in the side of the spout near the end. After filling the can, plunge the pointed end of the spout into the heart of each plant and allow a few drops of gasoline to run down into the plant. Care should be taken not to squirt the gasoline over the grass.—J. R. Ward, Chicago.

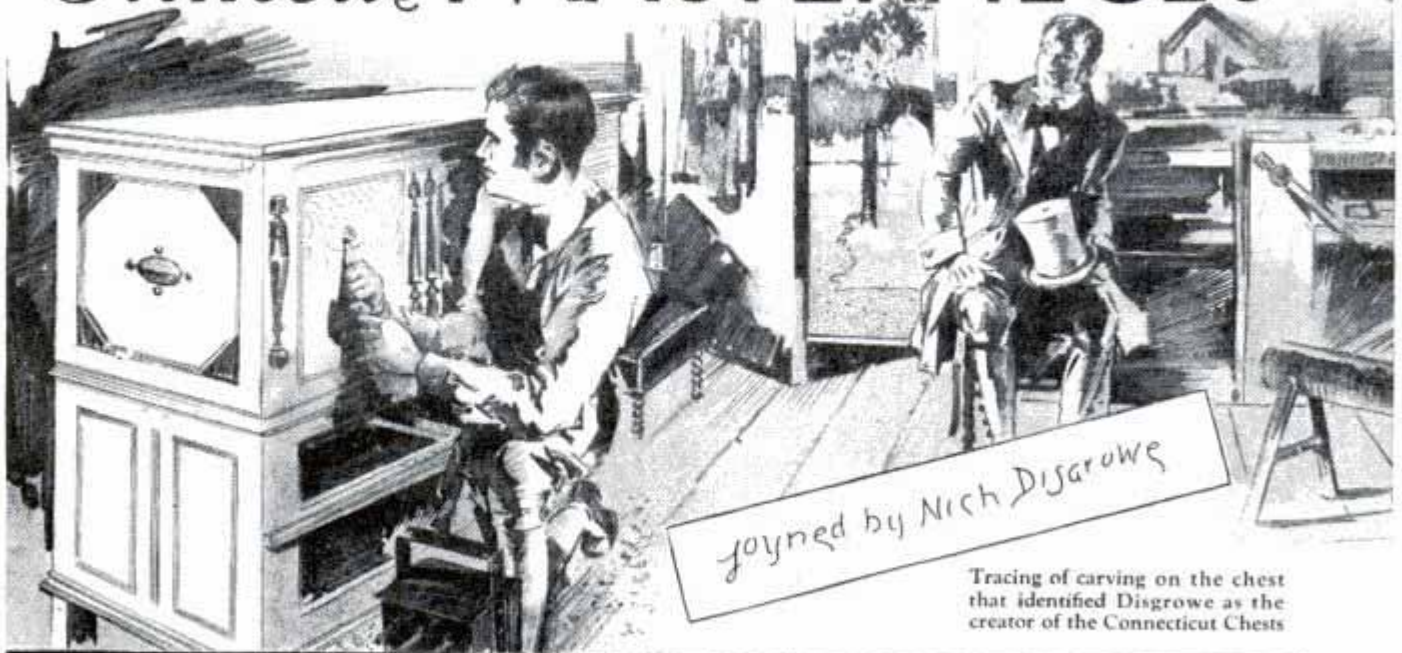
### Small Vise Improvised from Hinges

Two T-hinges can be used to good advantage as a small vise for holding light work. The short sides of the hinges are placed together as shown and are fastened to the edge of the bench top by means of a C-clamp. A bolt and wing nut provide the necessary tension on the jaws, which are bent slightly at the ends to present a large gripping surface against the work. —Raymond B. Wailes, Bethesda, Maryland.





# Famous MASTERPIECES



## The Connecticut Sunflower Chest

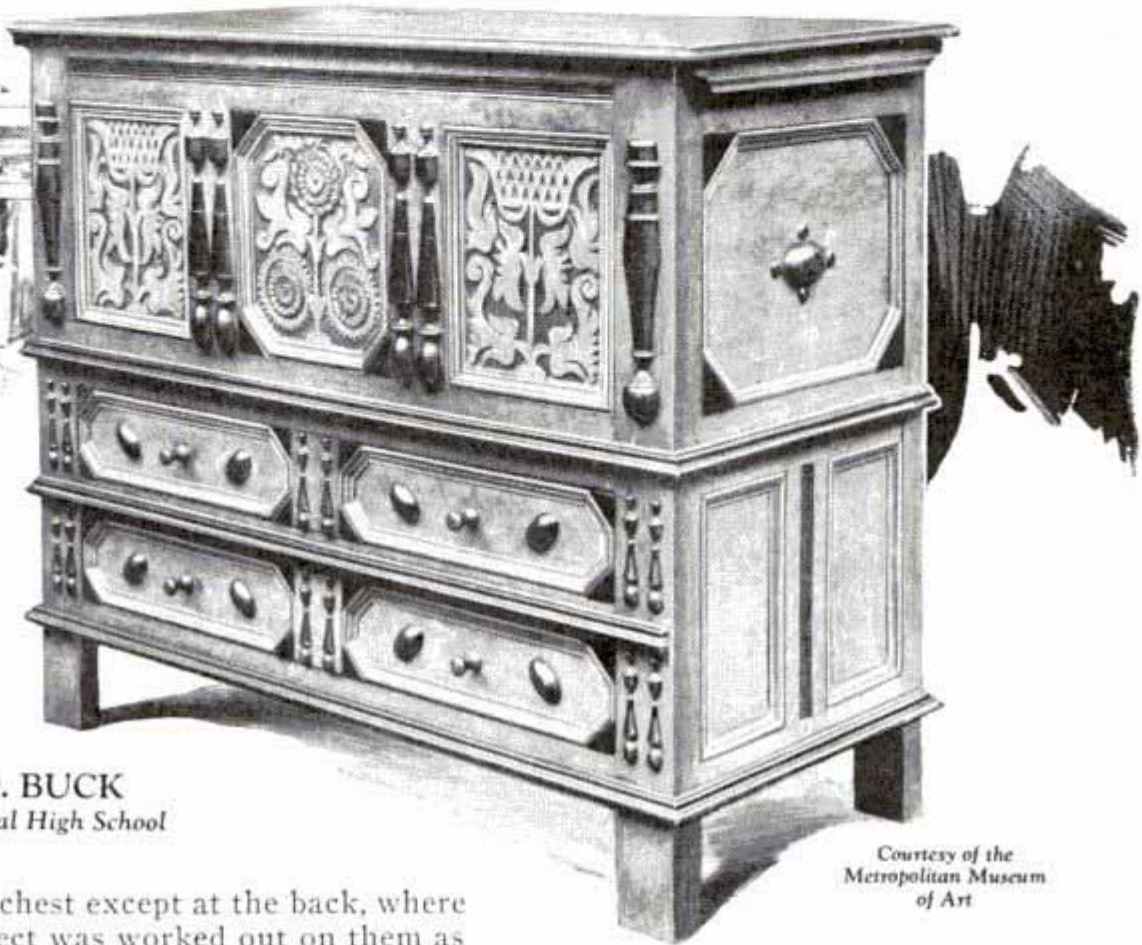
THE Connecticut Sunflower chests are perhaps the best known examples of early American furniture. They were the work of a small town cabinet maker named Nich Disgrowe, of Hartford, Conn. For many years the origin of these pieces was unknown although several of the chests were in existence. All of them are slightly different in details but had the same sunflower and tulip motif in the carving to establish the fact that they were the work of one man. All of them were also found in or around Hartford. Finally a chest came to light, having this characteristic carving, on which Disgrowe had carved his name, thus establishing the identity of all of them. The chest pictured here, which is the property of the Metropolitan Museum of Art, is considered the finest example of Disgrowe's art. It is supposed to have been built about 1670 or 1680. Like most American chests of this type, it was made of oak and pine in combination. The top, bottom and back of the chest and drawers are pine, while all other parts are white oak except the split turnings, which apparently are maple.

Fig. 2 shows the general construction, while Figs. 4, 5 and 6 show elevations. The corner posts, which extend from top to bottom, are rectangular in section. The upper or chest portion is divided by two stiles which house the three carved panels. The two outside panels, having the tulip motif, are practically identical. Half turnings and moldings are used to ornament the stiles and panels. The lower portion contains only two drawers which run the entire width of the chest although the paneling makes it appear as if there were four drawers. The end elevation shows a single panel above and two panels divided by a formed stile, below. Note that the corner posts are notched out  $\frac{1}{2}$  in. at the bottom. The top, which raises, is fastened to two cleats which extend over the sides to guide and reinforce it. The turned ornaments at the ends are probably a "throw back" to the time when all chests required handles. The back is divided into six panels and as all of them are  $\frac{1}{2}$  in. thick it was necessary to bevel them to fit the  $\frac{1}{4}$ -in. grooves in the stiles and rails. The beveled sides were placed toward the in-



B P 8 9 5, 6, 7

# of AMERICAN FURNITURE



By R. O. BUCK  
*Lane Technical High School*

*Courtesy of the  
Metropolitan Museum  
of Art*

side of the chest except at the back, where a raised effect was worked out on them as shown in the sectional view, resulting in a finished appearing back.

In constructing the chest, first make the four corner posts of oak and lay out the mortises and panel grooves on the posts. The rails are all set flush with the outside faces of the posts and are mortised into them. The use of draw pins not only holds the tenons securely but makes clamping unnecessary as the pins draw the joints up tight. The holes for the draw pins are bored so that the hole in the tenon is about  $\frac{1}{32}$  in. nearer the shoulder than if it lined up with the hole through the mortise. The chest compartment is separated from the drawers with a  $\frac{1}{2}$ -in. pine bottom, set into grooves in the rails. A dust bottom below the drawers is nailed into a rabbet as shown. Plywood panels were unknown at the time this chest was built and the dimensions, of course, are those of the original. For many purposes, such as the bottoms, draw bottoms and end panels, this material would be even better than the solid stock indicated and

need be only  $\frac{1}{4}$  or  $\frac{3}{8}$  in. thick, rather than  $\frac{1}{2}$  in. The method for sliding the drawers is very simple, yet durable. Oak runners are mortised into the front and back posts, as shown in the detail. These pieces slide in a deep groove cut into the oak drawer sides. The front ends of the runners are square so that they also serve as stops for the drawers. Be sure to set the drawer runners true and square.

After all of the framing pieces and panels have been cut and fitted in a trial assembly, we are ready for the carving. This is of a simple two-plane or shallow-relief type, so is not at all difficult to do. Fig. 10 shows the pattern for the center panel which has the sunflower motif, while Fig. 8 gives the pattern for the side panels, the design representing a conventionalized tulip. The design should be drawn full size on a piece of paper, marked off in  $\frac{1}{2}$ -in. squares, and traced onto the selected oak panels with carbon paper. The first step in carving is to score around the design



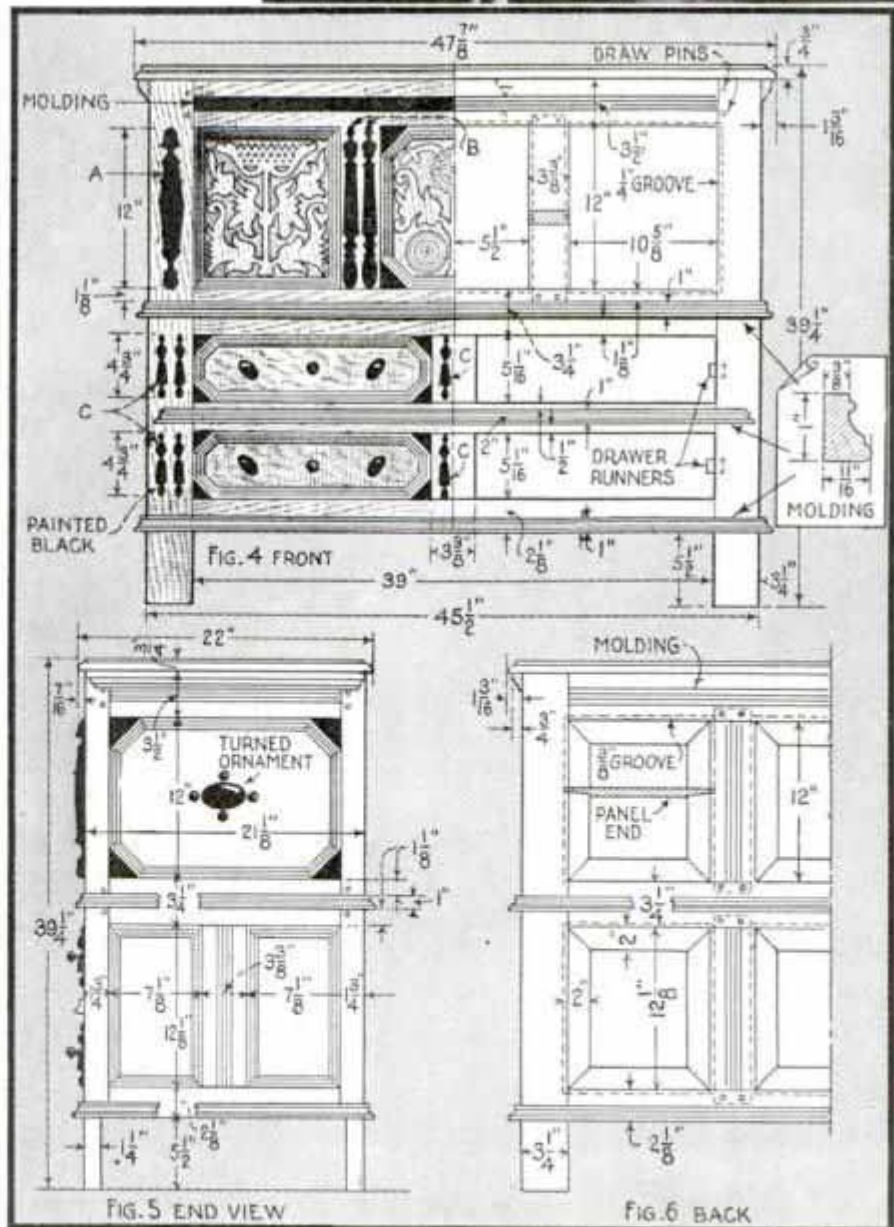
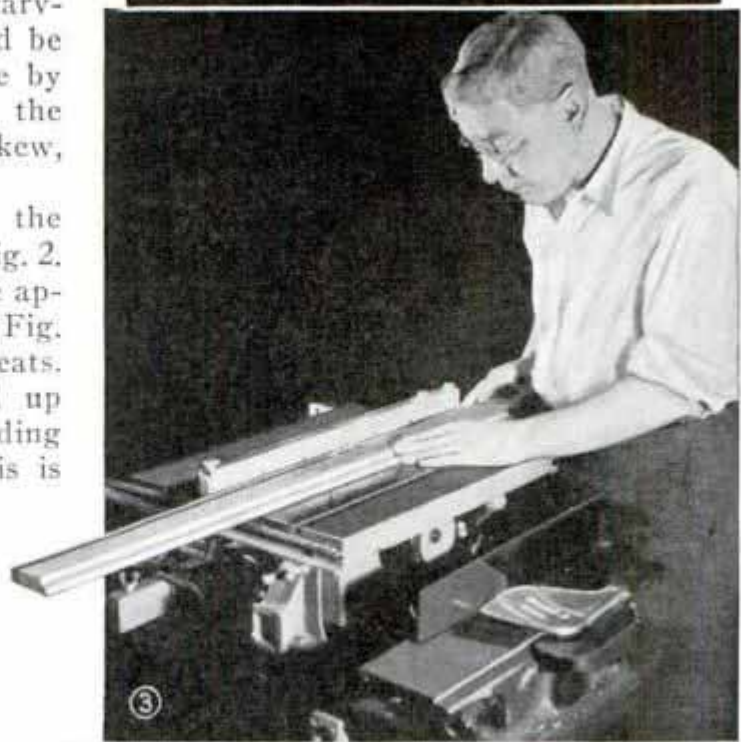




carved. In order to make the relief carving stand out, the background should be roughened. This can readily be done by making a series of scratches across the background with a veining tool or skew, as shown in Fig. 9.

After the three panels are carved the chest is ready to assemble. Refer to Fig. 2. All parts not shown in this figure are applied to the carcass after assembling. Fig. 14 gives the details of the top and cleats. The pine top will have to be glued up for width and the "thumb-nail" molding worked around the edges of it. This is best accomplished by cutting down the top  $\frac{1}{16}$  in. on the circular saw, then working out the curve with a plane and template. Of course, if you have a shaper or molding head for your saw, the matter becomes still easier. Be sure your cutters are sharp and the cuts light, when cutting the end grain or you may spoil your work. The cleats carry a molding along their lower edge and around the ends. If you are not equipped to make this and the other molding described, you may find something suitable in some millwork dealer's catalog and you can then purchase the molding ready made. In case of the cleats, a stock molding of similar design can be glued onto a  $\frac{3}{4}$ -in. square strip to form the cleat. The moldings on these pieces are carried around the ends by coping, as shown in Fig. 1.

The cleats are fastened to the top with three  $\frac{1}{4}$ -in. pegs, two of them set at angles converging toward the center and the third set vertical at the center point. The cleats are clamped to the top while the holes are drilled, and the pins glued and driven into place. The tops of the pins are then





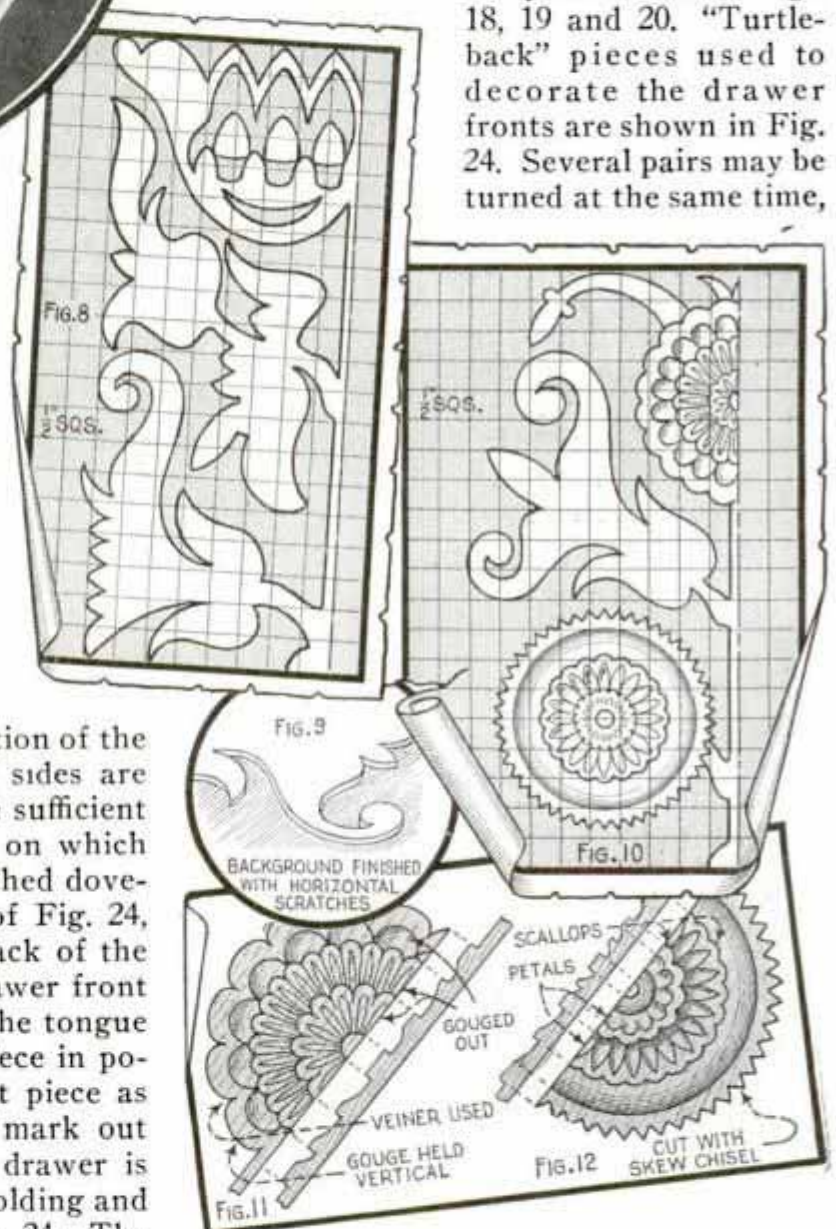


dressed off flush with the surface of the top, with a plane.

Fig. 17 shows how the top is pivoted on the chest in lieu of hinges. This old practice has the advantage of keeping the top in line when closed and also supporting it in the raised position by resting the back edge against the chest in the open position. Be sure to round the back edge of the chest as shown, to give clearance, or the pivots will be torn out when the top is opened. The construction of the two drawers is next. The oak sides are  $\frac{3}{4}$  in. thick so that there will be sufficient stock to cut the  $\frac{3}{8}$ -in. grooves on which the drawer slides. A single-toothed dovetail, shown in the right detail of Fig. 24, is used at both the front and back of the drawer. The dovetail on the drawer front is best laid out by first cutting the tongue on the side, then holding the piece in position over the end of the front piece as in Fig. 16. A knife is used to mark out the mortise. The front of the drawer is decorated with corner blocks, molding and half-turnings as shown in Fig. 24. The molding is so simple in section that any molding outfit or combination plane will make it. It is advisable to run the molding on both edges of a piece of your stock, then rip off the strips on the saw as in Fig. 3.

The maple half-turnings, Figs. 18, 19 and 20, are made in pairs. Two pieces of

stock are screwed and glued together to form a square section for the turning. As the turnings are slightly less than half round, a  $\frac{1}{16}$ -in. wood spacer is put between the pieces as shown in Fig. 22. After the turnings are completed they are stained black and French polished or waxed on the lathe, then split apart with a chisel. A layer of newspaper forms the parting line. The position of the half-turnings on the chest is indicated by the letters A, B and C in Fig. 4 and these pieces are similarly identified in Figs. 18, 19 and 20. "Turtle-back" pieces used to decorate the drawer fronts are shown in Fig. 24. Several pairs may be turned at the same time,

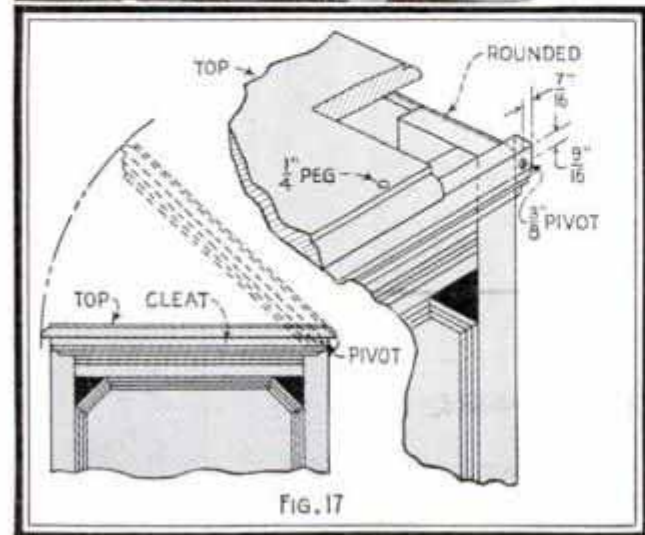
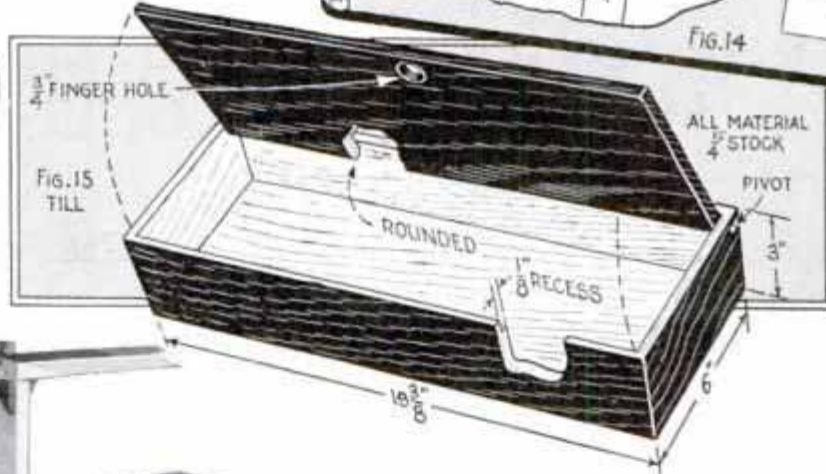
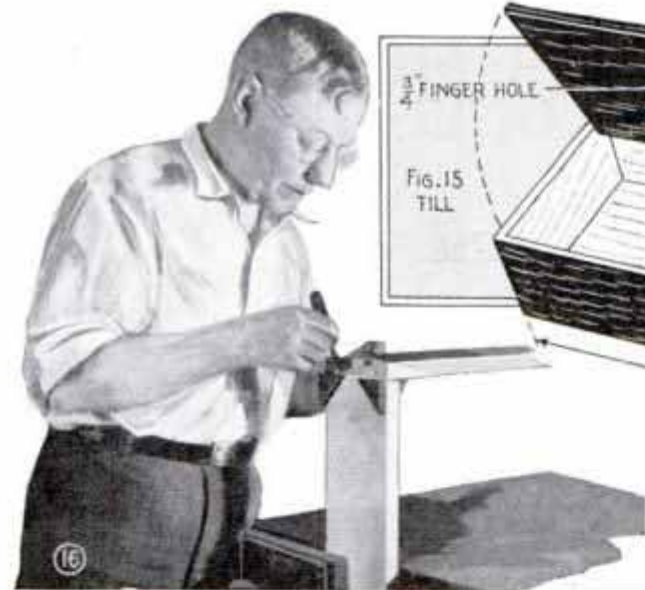
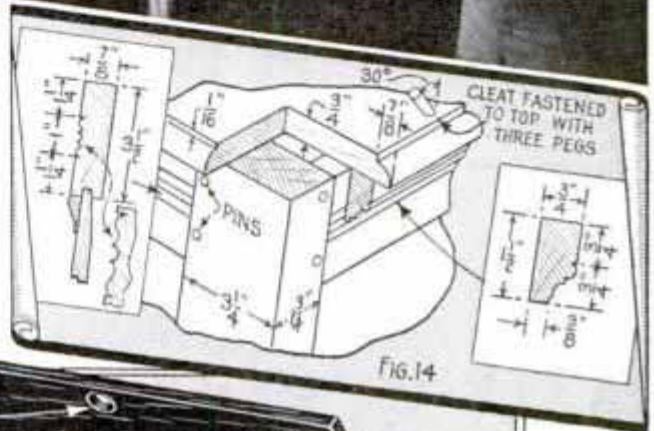
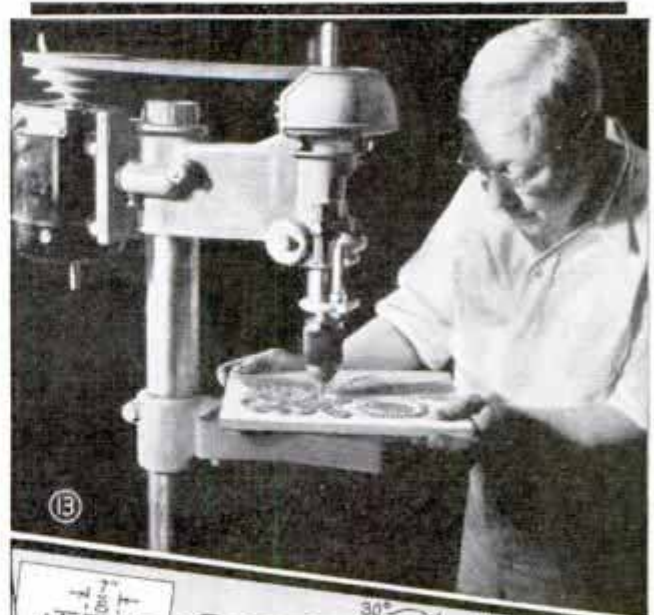


if desired, as in Fig. 21. These pieces and the triangular corner blocks are also finished black before attaching them to the drawer fronts. The end ornaments, shown in Fig. 23, are made in five pieces. All of the original ornaments were apparently fastened to the chest by means of small dowels. To do this, a template, with the



holes spaced out on it, should be used so that the holes in the ornament and on the chest will exactly coincide. Brads might be substituted for the dowels if desired, but this necessitates giving the pieces another coat of paint to cover the holes made by the brads.

The molding at the bottom of the chest compartment, at the base and between the drawers, is applied with brads. Note that the strip between the drawers is not carried around, as are the other two, but is coped off at the ends just as the cleats were. If you are unable to work out the exact pattern of this molding, some similar stock pattern may be substituted. The till, shown in Fig. 15, completes the cabinet work. This little tray, which was common to most all old chests, was probably used to store valuable papers or jewelry. The till slides on runners placed along the inside of the front and back rails, in the chest compartment. The usual



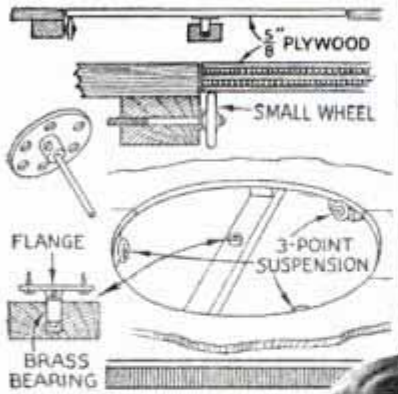
cleaning up and sanding prepare the chest for the finish. The triangular blocks, half-turnings and beaded molding in the rail just under the top, and also the stile used to divide the lower panels in the ends, are painted black. All other parts, both pine and oak, are finished a light antique brown. This effect is obtained by first applying a coat of a saturated solution of potassium bichromate and water to produce an aged appearance, then a light sanding, when the work is dry, to remove the "fuzz" which has been raised by the solution. This is followed by several coats of boiled linseed oil in which a small quantity of dark-oak oil stain has been mixed. Several times during the first year additional coats of the oil and stain mixture



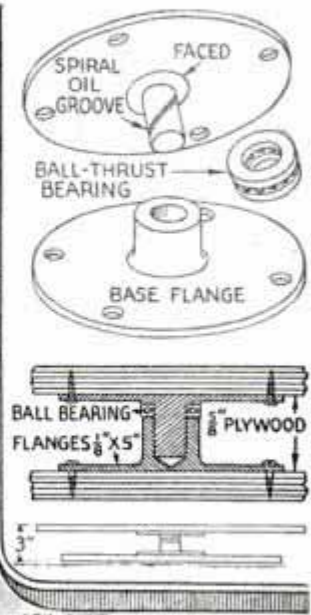




# Revolving Waiter on the Table Saves Passing



Two Simple Types of Revolving Waiters That Do Not Require More Space Than the Dishes They Hold



This revolving waiter in the center of the table is a great convenience as such items as bread, water, sugar, cream, salt and pepper and condiments, can be brought within immediate reach of the diner simply by turning the device. It occupies no more space than the dishes it carries and can be made attractive by carefully finishing it to suit your individual fancy. Two types are illustrated; a portable one to be placed on top of the table-cloth, and a built in design, adapted to a breakfast-nook table, and for use without a cloth. When a cloth is desired, however, it will lay smoothly over the disk, which is flush with the table surface. For the former, shown at the right, two flanges are required, one with a shank and the other with a socket to receive it. The shank and socket must be turned and bored respectively on a lathe so that the top will turn truly and without the slightest wobble. Use  $\frac{5}{8}$ -in. plywood for top and base, and cut with a fine-tooth band or scroll saw so that the edges will be as smooth as possible. A 20-in. disk is suggested, but a larger or smaller can be made to meet the demands of your dining table. An oil groove should be cut in the shank, and a thin ball-thrust bearing provided. The built-in job, shown in the left detail, is best constructed when making the table, although satisfactory results can be had if a perfect circle is scribed on the

table top and a thin keyhole saw is used to cut out the circle. This top rides on three model-airplane wheels having substantial hubs and solid rubber tires. In locating the axles, be sure that the rims of all the wheels are just high enough to keep the revolving top flush. The plywood disk is centered as shown with comparatively light parts obtained from a toy construction set. The load is carried in the rubber-tired airplane wheels.

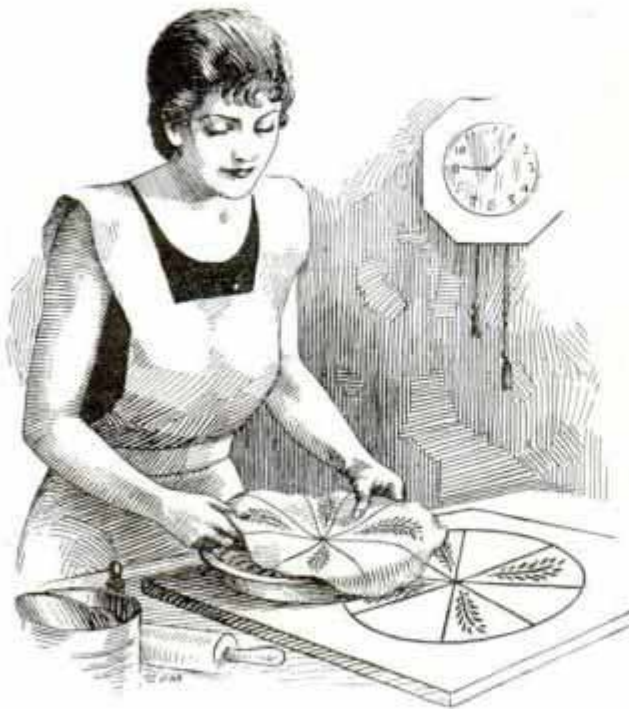
## Tool and Garden-Seed Carrier Made from Funnel



To prevent spilling seeds or mislaying small tools, when working in the garden, you can use this carrier. It is made by slipping a stick, shaped as shown, and pointed at one end, into a tin funnel, and may be set in the ground or moved about.

☛ An old oil drum cut in half lengthwise and mounted on a wheelbarrow frame makes a water-tight container for hauling liquids.





Design Cut in Pastry Board Is Transferred to Top Pie Crust as Dough Is Rolled Out

### Scored Pastry Board Saves Time When Making Pie Crusts

A Wisconsin baker adds novelty to his pie products by rolling each top crust on a pastry board that has a decorative design carved in its surface. This idea can also be used in the home. Trace the design on your pastry board and then carve it, using a sharp jackknife to make the light lines and a gouge to make the heavier ones.

### Sanding Device Rounds Holes in Wood

When large holes are cut or drilled in wood it is often desirable to have the edges rounded and smooth. This can be done quickly with a simple sanding attachment for use with a drill press. First cut a  $\frac{3}{4}$ -in. disk from heavy plywood, mark the exact center and drill a  $\frac{3}{8}$ -in. hole through it. This is then forced flush on the end of a dowel, glue being used to make it tight if necessary. Sanding disks cut  $\frac{1}{8}$  in. larger than the hole to be rounded can then be fastened to the bottom of the wood

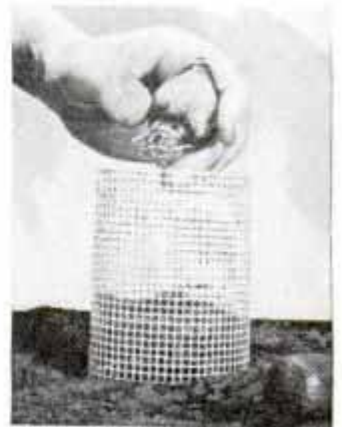


disk. Water glass makes a good cement for this purpose as it dries

quickly. The attachment is placed in the chuck of a drill press and is used in the same manner as a reamer.—Kenneth Murray, Sturgis, Mich.

### Protecting Flower Bulbs from Moles

Flower bulbs can be protected from moles and other rodents by planting them in small cylinders made of  $\frac{1}{4}$ -in. wire mesh, which are set in the ground. Each cylinder has the lower end closed with a disk of the wire mesh. In planting the bulbs, it is advisable to put a layer of coarse gravel in the bottoms of the cylinders after which they are filled with pulverized earth. The open mesh allows the roots of the bulb to grow in all directions.—Ray J. Marran, Kansas City, Mo.



### Identification Band for Fountain Pen

As a means of identifying my fountain pen in case it were lost, I took a half-moon spring from a typewriter-ribbon spool and scratched my name and address on it. The spring was then slipped over



Name and Address on Spring Band Slipped Over Fountain Pen Help Identify It

the cap, as shown in photo, where it fit snugly and did not interfere with the use of the pen.—Frank W. Bentley, Jr., Missouri Valley, Iowa.





# HEAT-TREATING IRON AND STEEL

THE natural properties of metals can be so greatly modified by simply heating and cooling under proper conditions that the success of many shop jobs is determined almost entirely by how well this part of the work is done. Heat treating of iron and steel to produce hardness, softness, springiness, toughness and the other properties required for construction purposes is not difficult if a few simple rules are followed.

Fig. 1 shows tests which may be used to classify iron and steel. The first and most conclusive test is made by lightly touching the metal to a power-driven grinder, and noting the quantity, color and form of the sparks emitted. All grades of iron and plain carbon steel have two things in



FIG. 1 EASY SHOP TESTS FOR IDENTIFYING IRON AND STEEL

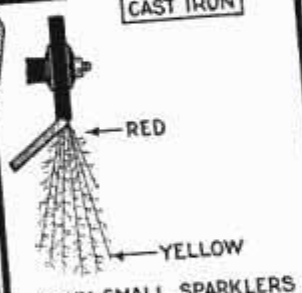
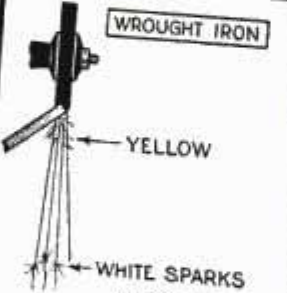
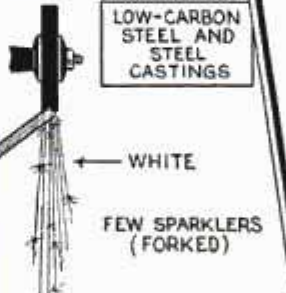
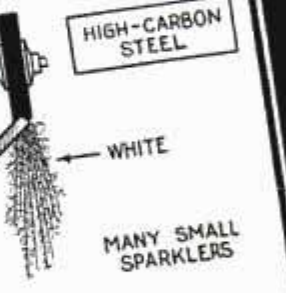
CAST IRON	WROUGHT IRON	LOW-CARBON STEEL AND STEEL CASTINGS	HIGH-CARBON STEEL
 <p>RED YELLOW MANY SMALL SPARKLERS</p>	 <p>YELLOW WHITE SPARKS VERY FEW SPARKLERS</p>	 <p>WHITE FEW SPARKLERS (FORKED)</p>	 <p>WHITE MANY SMALL SPARKLERS</p>
<p>A: VERY DARK GRAY B: CHIPS BREAK INTO SMALL PIECES LEAVING FAIRLY SMOOTH SURFACE ON WORK.</p>	<p>A: BRIGHT GRAY B: SOFT AND EASY TO CHIP. CHIPS USUALLY BREAK IN LARGE PIECES. CHIPPED SURFACE QUITE SMOOTH.</p>	<p>A: BRIGHT GRAY B: EASILY CUT LEAVING VERY SMOOTH SURFACE. CHIPS ARE LONG AND HAVE LITTLE TENDENCY TO BREAK UNDER CHISEL.</p>	<p>A: LIGHT GRAY B: DIFFICULT TO CHIP DUE TO HARDNESS OF METAL. CHIPPED SURFACE VERY LIGHT GRAY. CHIPS ARE LARGE.</p>
<p>A= APPEARANCE OF FRACTURED SURFACE B= CHIPPING WITH COLD CHISEL</p>			





Fig. 2, Colors produced during heating of steel

Color	Temperature
Very Pale Yellow - - - -	430° F.
Light Yellow - - - -	440
Pale Straw Yellow - - - -	450
Straw Yellow - - - -	460
Deep Straw Yellow - - - -	470
Dark Yellow - - - -	480
Yellowish Brown - - - -	490
Brownish Yellow - - - -	500
Spotted Reddish Brown - -	510
Purplish Brown - - - -	520
Light Purple - - - -	530
Full Purple - - - -	540
Dark Purple - - - -	550
Full Blue - - - -	560
Dark Blue - - - -	570
Pale Blue - - - -	600
Bluish Green - - - -	630
Bright Red (in dark) - -	725
Red (in ordinary room light)	885
Red (in full daylight) - -	1077

Note—Colors at different temperatures depend upon the amount of light in the room

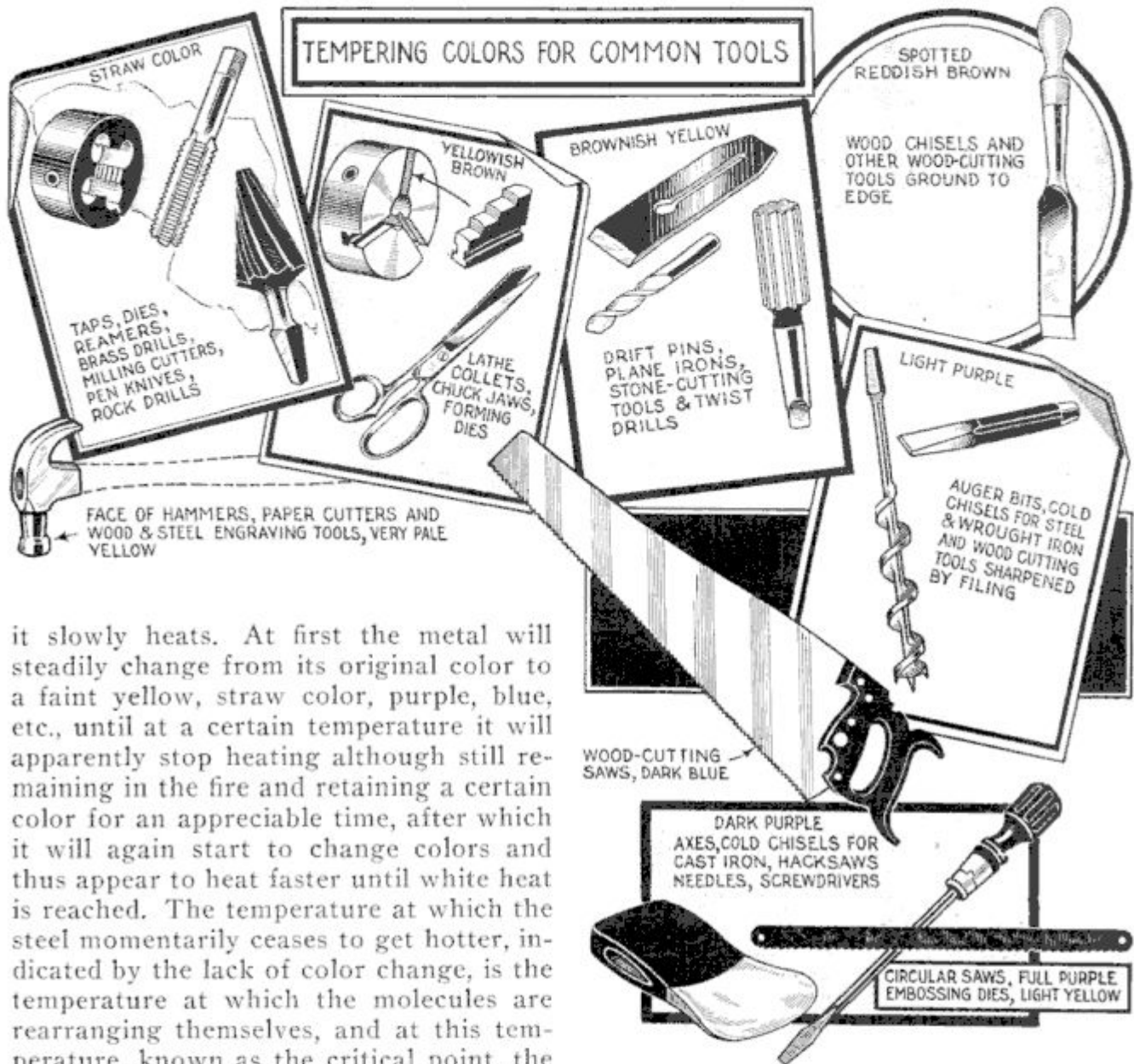
common; they contain iron and carbon. Ordinary cast iron contains the most carbon, wrought iron the least, and steels intermediate amounts.

Iron castings too hard for machining may be annealed by slowly heating them until red in a forge and cooling slowly while buried in ashes, lime or mica powder. A large box filled with well dried slaked lime or fine mica powder is handy for this purpose. If the work is well surrounded with lime or mica a day or more will be required for cooling. The slower the cooling process is, the softer and more workable will be the metal. Cast iron can be made somewhat harder and considerably more resistant to wear by heating it to a bright red color and immediately plunging into, or quenching, in water. The water is best kept in a large tub beside the forge. It is important that the quantity

be large so that it will not become hot too quickly. Wrought iron is much used in the forging of architectural ornaments and fixtures and it is easy to weld. After hammering and shaping wrought iron, it should be annealed by heating to a dull red color and cooling in air. Annealing relieves the strains set up in the metal by the hammer and renders it less likely to fail in use.

Different grades of steel contain varying amounts of carbon; those containing the larger amounts are called high-carbon or tool steel. Low-carbon steel is frequently termed mild steel. By observing the nature of the sparks produced when grinding, the approximate hardness of steel and hence its suitability for different purposes may be determined. Although every grade of steel has a definite temperature above which it must be heated for annealing and hardening, it is not difficult to tell when this temperature has been reached after performing the following experiment. Place a piece of steel over a lighted gas burner and watch the metal as



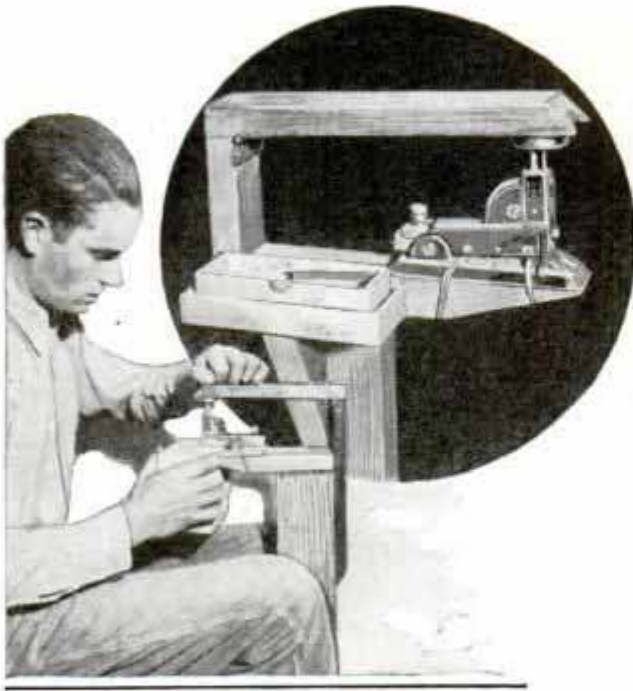


it slowly heats. At first the metal will steadily change from its original color to a faint yellow, straw color, purple, blue, etc., until at a certain temperature it will apparently stop heating although still remaining in the fire and retaining a certain color for an appreciable time, after which it will again start to change colors and thus appear to heat faster until white heat is reached. The temperature at which the steel momentarily ceases to get hotter, indicated by the lack of color change, is the temperature at which the molecules are rearranging themselves, and at this temperature, known as the critical point, the steel is actually absorbing heat without getting hotter. There is still another method which you may try for determining the critical point. While the steel is heating apply a magnet to the hot metal. At the moment the critical temperature is reached, the magnet ceases to attract the steel.

Before working steel it should be annealed by slowly heating to a temperature slightly above the critical point and then cooling in a lime box. If only slight softening is sufficient, the steel may be allowed to cool in air. If the steel is hammered, bent, or given other severe treatment during fabrication it should again be annealed before hardening and tempering. To harden steel, it is again heated slowly and evenly to a temperature just above the critical point and plunged into water. If only a part of the tool or metal is to be

hardened this portion only is submerged. The steel is left in the water until it ceases to hiss, after which it may be allowed to finish cooling in the air, or in an oil bath. Hardened steel is too brittle for most purposes, therefore tools must be tempered after hardening to give them toughness. Tempering is really a process of partly softening the metal. Too much softening, however, often defeats the purpose of hardening. Steel is tempered by heating it to a low temperature and allowing it to cool in air. For most purposes a small surface of the metal may be polished until bright before heating, so that the proper temperature may be determined by the color changes during heating. A chart of colors at different temperatures is given in Fig. 2. The work may be heated in a forge, over a gas flame or in sand.





Berry Boxes Quickly Stapled Together with Office Stapler Mounted on Suitable Wooden Support

### Office Stapler Used in Making Berry Boxes

Gardeners will find that an ordinary office stapler is a quick means of stapling berry boxes together. It can be mounted on a wooden support as shown, and either screwed or wired in place. The arm resting on top of the stapler is hinged at the rear end to permit rapid manipulation.

### Portable Light for the Farm

Handy for use around the farm where a strong light is often needed at night, this



portable electric lamp consists of a storage battery and an old auto headlamp. The battery is carried in a suitable wooden box to which is nailed a vertical frame for supporting the headlamp. It is a good idea to reinforce the upper corners of the frame with angle brackets so that the weight of the battery will not pull the frame members apart. A

snap or toggle switch and a carrying handle are screwed to the cross member of the frame. It is best to use a small size battery on account of its weight.

### Handy Data-Card Holder for the Shop

Screwed to a wall above a workbench, the metal binder from a discarded loose-leaf note book makes a good holder for keeping data cards handy in the shop. The expanding rings make it easy to add new cards or remove old ones. If it is desired to keep the data file clean, a couple of cardboard covers can be put on the rings on each side of the cards.—L. Young, Culver, Ind.



### Parting Clay Tile Evenly

Many workmen who have difficulty in cutting clay tile without breaking it unevenly will find the following method highly effective: First pack the tile inside with wet sand and then scribe a line where the cut is to be made. A few light taps with a sharp mason's hammer around the scribed line will break the tile off evenly. In the absence of a mason's hammer, a sharp cold chisel grasped in the hand and used in the same way will do the trick.

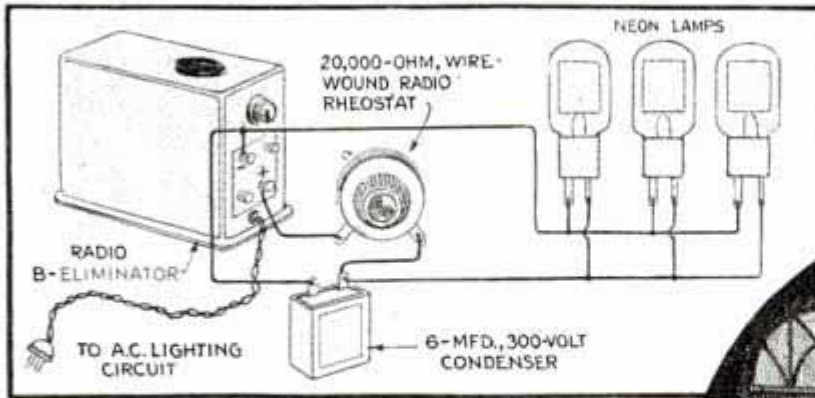


Tile Parted by Packing It with Wet Sand and Then Tapping It Lightly with Hammer

Never strike the chisel with a hammer as this is almost sure to result in an uneven break.—Ray Blain, Ft. Snelling, Minn.

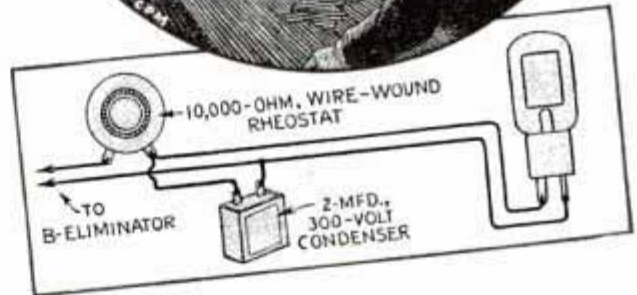


# Flashing Neon Sign for Your House Numbers



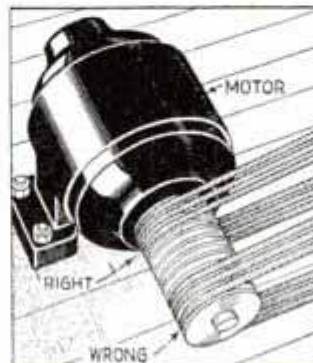
Distinctive from ordinary house numbers, your friends will easily find your home at night, if you have a flashing neon sign, which is both simple and inexpensive to make. The parts needed are a neon tube, a condenser, a rheostat and an old radio B-eliminator. By adjusting the rheostat, the number of flashings per minute can be controlled. The house numbers are cut out of a tin box, which is painted black, and a piece of frosted glass is slipped behind the cut-out letters. This gives the contrast necessary to see the numbers during the day time. One or more neon tubes are mounted inside the box. It is suggested that three tubes be used if you have three numbers. The tubes are held in regular four-prong radio-tube sockets, mounted on a wooden base that fits inside of the can. It is important, when connecting the tubes, to get their polarity correct. This is easily determined by connecting them to the eliminator; if the large plate does not glow red, reverse the connections. If the plate glows red but only over a part of its surface, the voltage is too low. Most tubes require about 135 volts for good operation. When the positive prong has been located by this method it should be marked so that no mistakes will be made when making the final connections. If your number has only two numerals, use two tubes and a 4-mfd., 300-volt condenser. For other sizes of signs, allow an extra 2-mfd. capacity in the condenser for each tube. The rheostat should be wire wound, as the carbon-pile type will not give good results.

Remove the burrs from the slots of screws after driving them into the work, as they are dangerous to the hands.



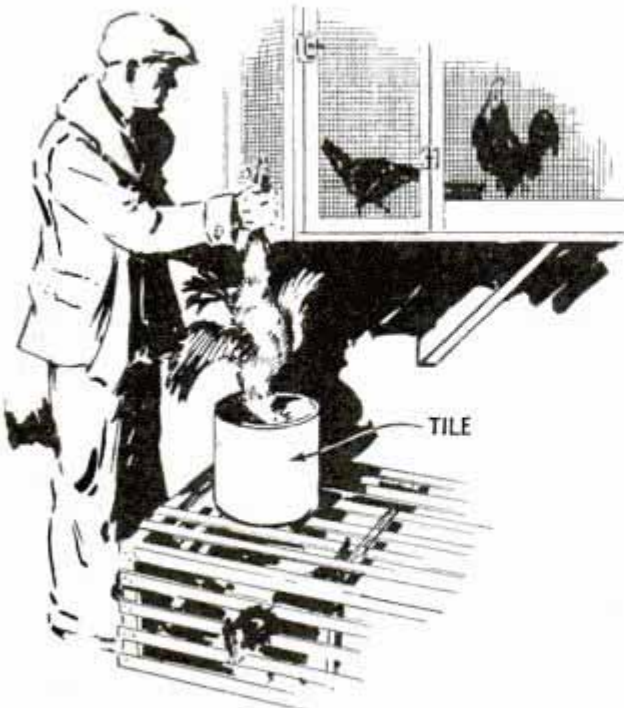
## Improving V-Belt Drives on Motors

The manner in which an electric motor is belted determines the life of the bearings to a certain extent. When a multiple V-pulley is used on the motor shaft, and only two or three belts are used, they should be run on the part of the pulley closest to the motor, as shown, as this puts less strain on the bearings than when



the belts are run near the end of the pulley. This holds true on any belt drive, which is one reason why double-ply belts are usually preferable to single-ply ones. The center of pull of a double-ply belt is closer to the center of the bearing.—W. F. Schaphorst, Newark, N. J.



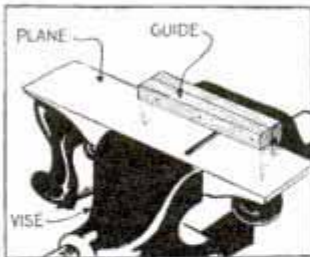


Placed over Opening of Poultry Crate, Drain Tile Helps in Crating Fowls for the Market

### Tile Aids in Crating Poultry

To facilitate crating his poultry for hauling it to the market, one farmer used a length of 10-in. tile, which he placed on end over the opening in the crate. A fowl can be conveniently lowered through the tile into the crate, but the size of the opening, together with the fact that the tile is glazed inside, prevents the birds from flying out.—G. E. Hendricksen, Argyle, Wis.

### Soft Metal Machined with Hand Plane

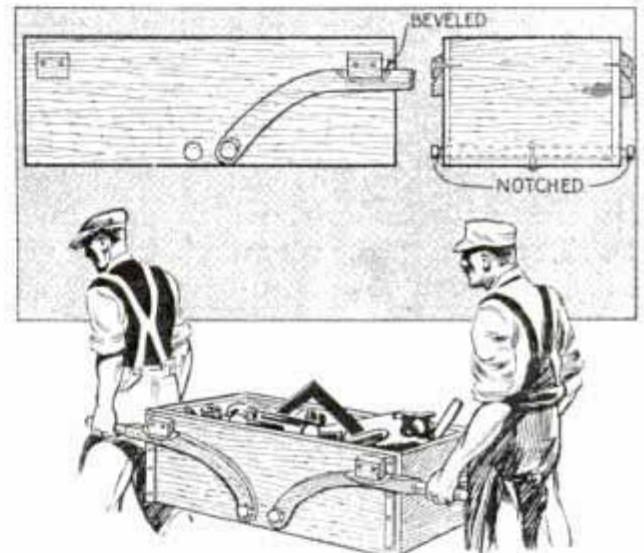


Strips of soft metal, such as copper or aluminum, that cannot be safely held in a shaper vise, can be machined with an ordinary hand plane. With screws, fasten a piece of metal to one of the jaws of a vise to serve as a guide for the work. Then invert the plane and clamp it in the vise. In use, the work is moved back and forth over the plane iron, which will have to be ground differently for metals. This can easily be determined by experiment.

☛ When casehardening for colors, using cyanide, do not bring the work above a bare red heat.

### Removable Handles on Tool Boxes

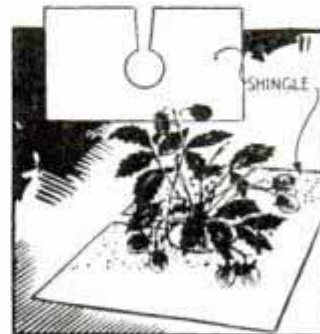
Carpenters and mechanics who have heavy tool boxes to carry will find this arrangement of removable hardwood handles useful. They are pivoted to the ends of two heavy iron rods, which are bolted to the bottom, inside of the box, and project through the sides. When the box is lifted, the handles rest underneath wood blocks, beveled on the inside lower edges to take the handles which are also beveled to fit the blocks. The weight of the box forces the ends of the handles into notches cut in the top surfaces of the rods. In this way, the handles are held rigidly when the box is being carried, yet they are quickly removed when it is set down.



Heavy Tool Boxes to Be Carried by Two Men May Be Equipped with These Removable Handles

### Roofing Shingles Save Strawberries

In wet weather many strawberries are lost by resting on damp ground where they decay before ripening. To prevent this, one grower used a quantity of tarpaper shingles which were cut as shown in the detail, and then placed around the plants. The shingles may be removed after the berries have been picked, if desired, but it has been



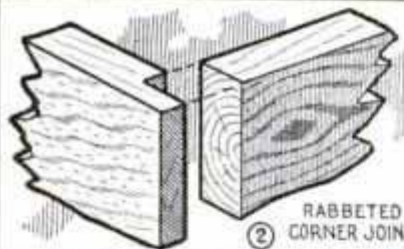
found that they are not much injured if left in, and they prevent weeds from growing close to the plants.



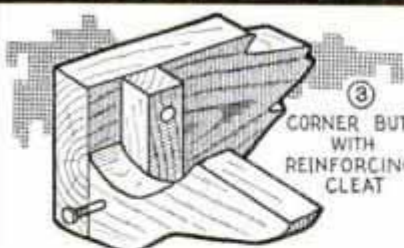
# Making WOOD JOINTS with Hand Tools



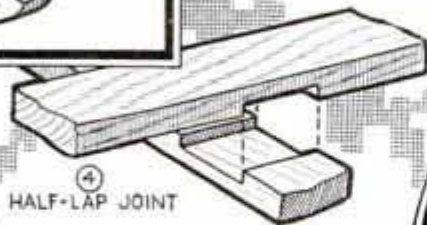
① NAILED BUTT JOINT



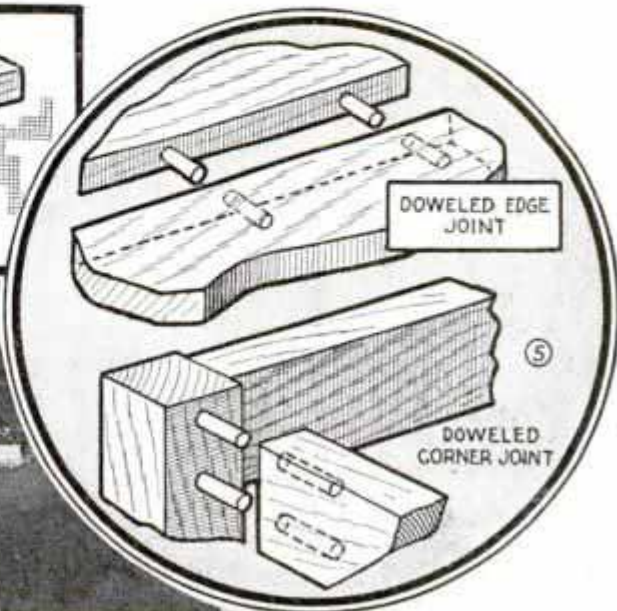
② RABBETED CORNER JOINT



③ CORNER BUTT WITH REINFORCING CLEAT



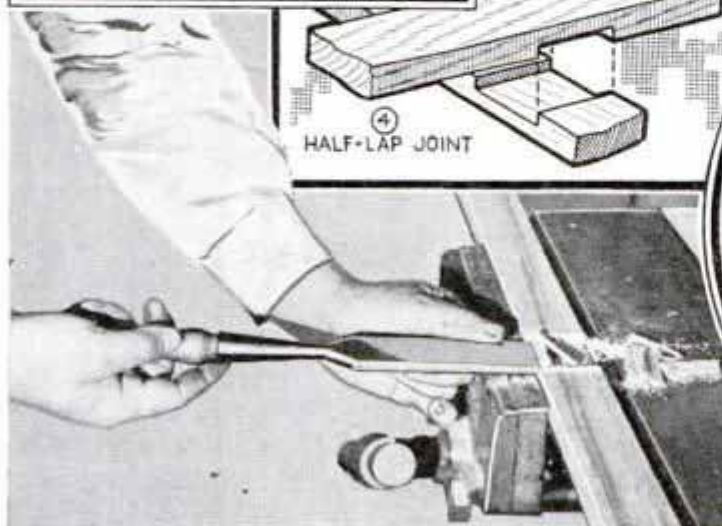
④ HALF-LAP JOINT



DOWELED EDGE JOINT

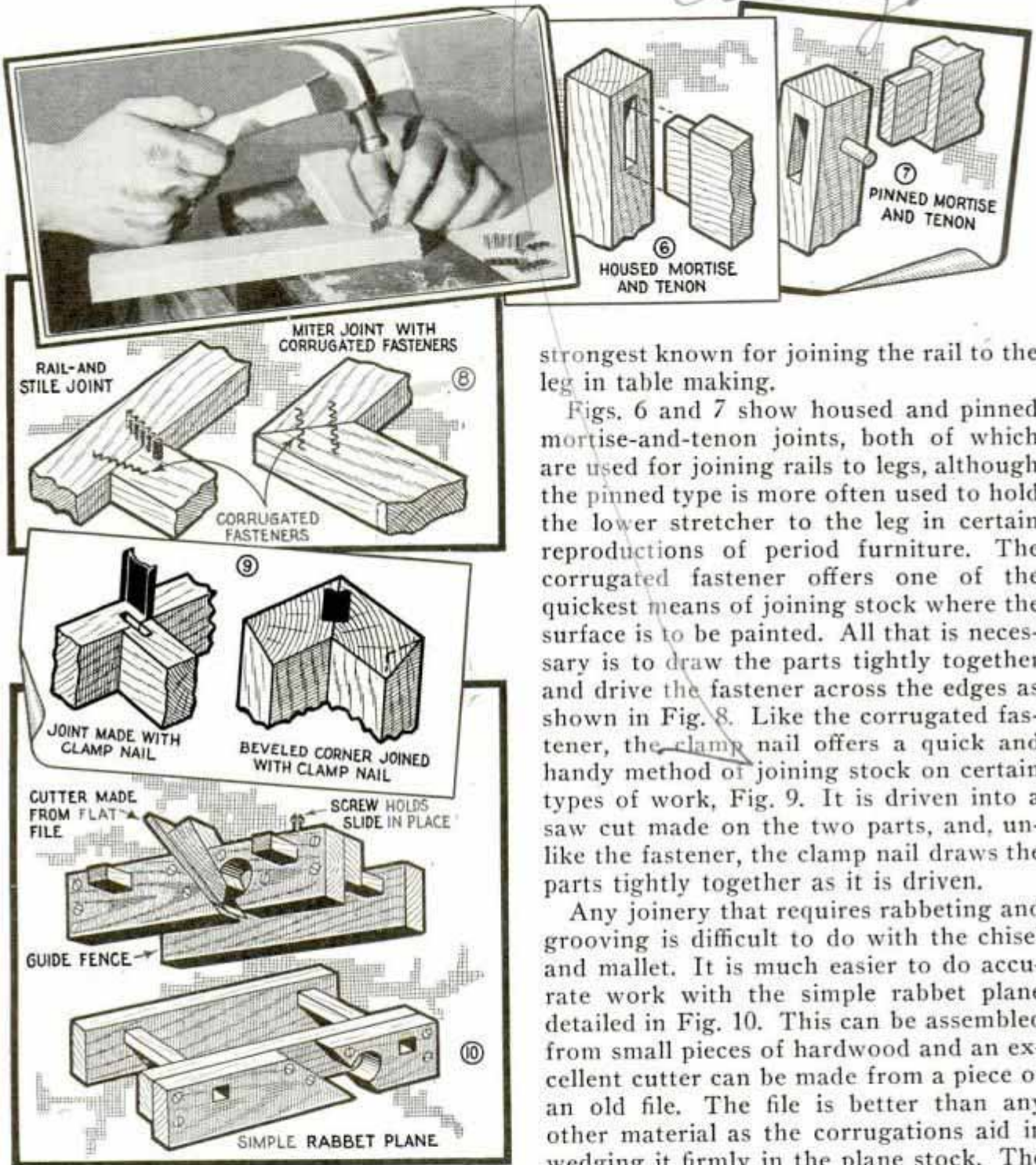
DOWELED CORNER JOINT

JUST what kind of a joint you should use, when making a piece of furniture or any other item in woodworking, depends on both the strength and the appearance desired. Figs. 1, 2 and 3 show joints used in box construction, framing for shallow wall cabinets and similar work. In the first the ends are merely butted together and nailed, while in the second one of the ends is rabbeted to take the other, the two then being held together with glue and screws. The third joint is stronger than a plain butt joint in that it has an extra cleat for reinforcement. The half-lap joint, shown in Fig. 4, is used chiefly for join-





*Clamp nail to  
454 Palmer  
Chicago*



ing two members of a cross frame or X-brace that must fit flush inside of a frame. Two types of doweled joints are shown in Fig. 5. In the doweled edge joint, which is effective for joining several narrow strips when making up table tops, drop leaves, etc., the dowels are centered lengthwise of the stock with a gauge line and they are flattened slightly before being inserted in the holes to permit the escape of glue and air when the dowels are driven home. The doweled corner joint shown in the lower detail, is one of the

strongest known for joining the rail to the leg in table making.

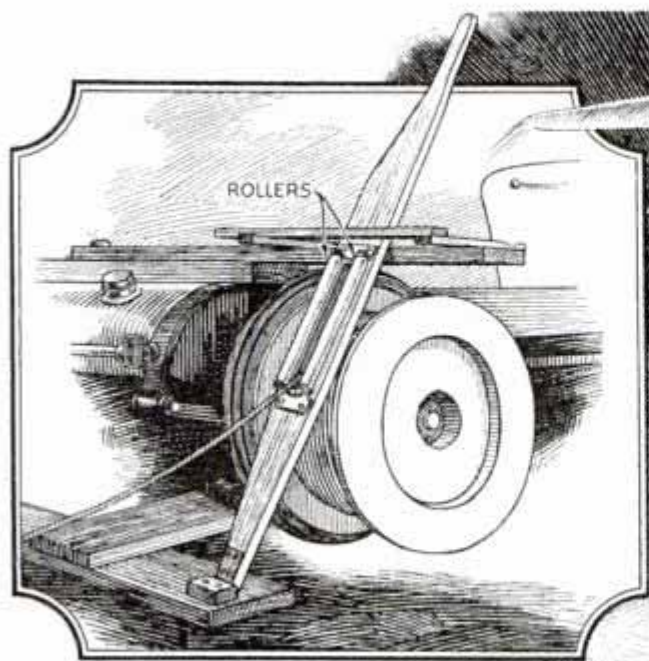
Figs. 6 and 7 show housed and pinned mortise-and-tenon joints, both of which are used for joining rails to legs, although the pinned type is more often used to hold the lower stretcher to the leg in certain reproductions of period furniture. The corrugated fastener offers one of the quickest means of joining stock where the surface is to be painted. All that is necessary is to draw the parts tightly together and drive the fastener across the edges as shown in Fig. 8. Like the corrugated fastener, the clamp nail offers a quick and handy method of joining stock on certain types of work, Fig. 9. It is driven into a saw cut made on the two parts, and, unlike the fastener, the clamp nail draws the parts tightly together as it is driven.

Any joinery that requires rabbeting and grooving is difficult to do with the chisel and mallet. It is much easier to do accurate work with the simple rabbet plane detailed in Fig. 10. This can be assembled from small pieces of hardwood and an excellent cutter can be made from a piece of an old file. The file is better than any other material as the corrugations aid in wedging it firmly in the plane stock. The guide fence is made adjustable so that grooves may be cut a considerable distance from the edge of the stock. The slides should be a snug fit in the sockets and screws turned up in the wood hold them securely when the fence has been adjusted.

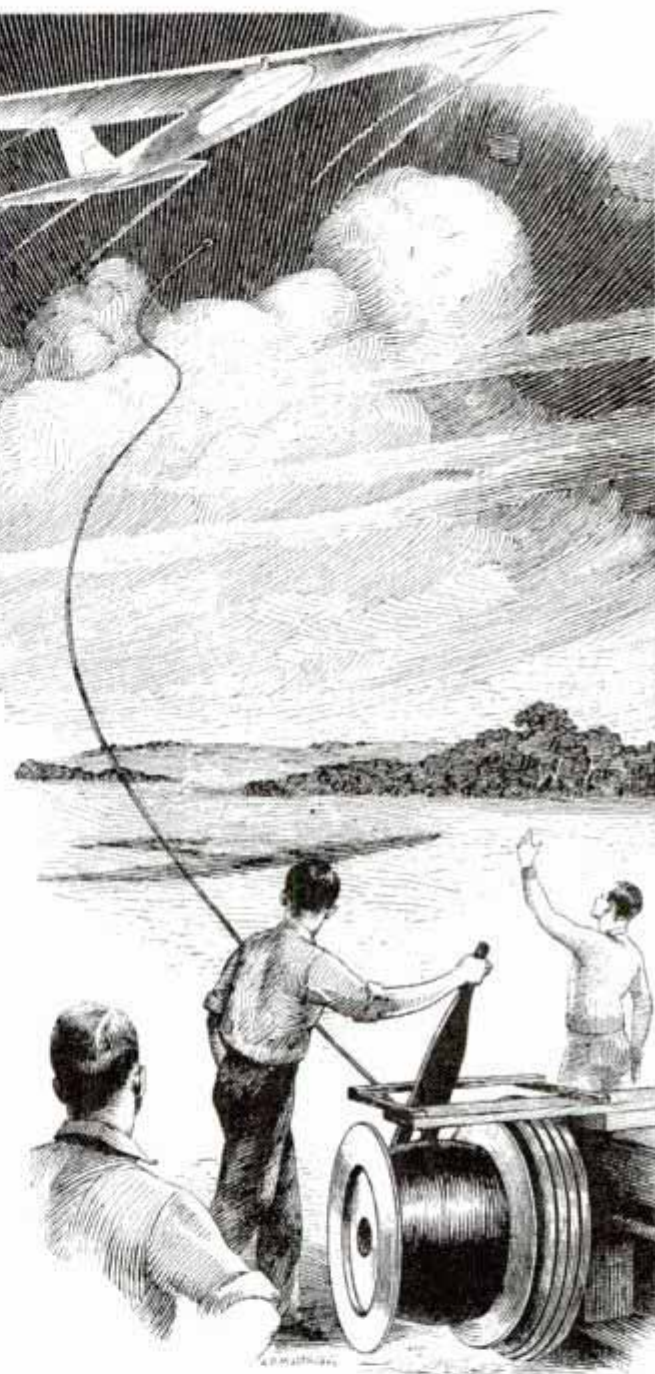
When duplicate details or designs are required on several tracings, time can be saved by drawing them on Cellophane, which is then placed in the correct position on the tracing at the time of making the blueprint.



# Winch on Auto Quickly Launches Gliders



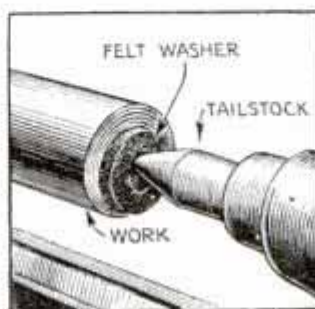
Launching gliders by pulling them with a rope that winds up on a drum attached to the rear wheel of an auto, is a method successfully used in an eastern glider club. The winding drum is held to one of the rear wheels by means of tire bolts, after which the rear end is jacked up and a support placed under the axle. The support has an extension on which a rope guide is mounted to enable one to wind the rope on the drum uniformly. A chock is placed behind the front wheels and the winch is then ready for use. The winch car is placed on the field to have the right wind direction for the glider, regardless of the ground train. About 2,000 ft. of  $\frac{1}{4}$  or  $\frac{3}{8}$ -in. rope is laid on the ground. One end is attached to the drum and the other end has an iron ring which is slipped into the glider release hook. When everything is ready a signal is given and the drum started, slowly at first and accelerating gradually until a speed of about 35 m.p.h. is reached. After this the speed is kept constant and the glider can climb about 400 ft. before the rope is released by the pilot. Thousands of flights have been made by this method without any accidents. The pilot never forgets to release the rope, but to eliminate danger from this source, the ground crew has a sharp knife handy, ready to cut the rope.—Frank Zaic, New York City.



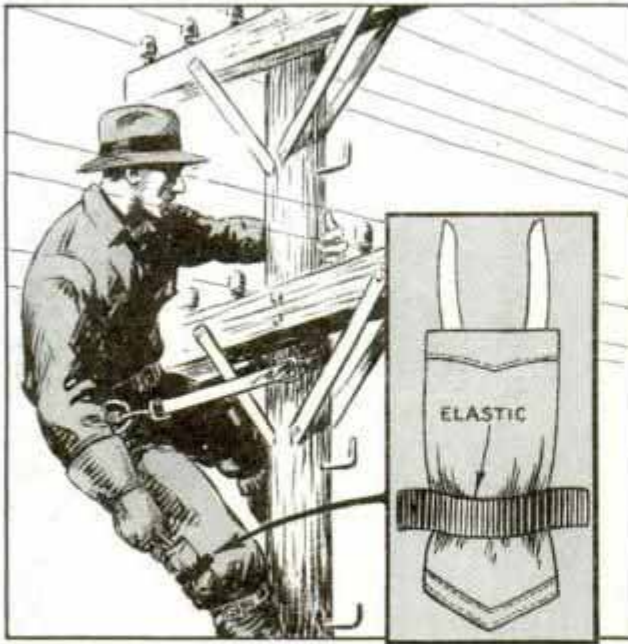
## Felt Washer Lubricates Lathe Tailstock Center

In operating a metal-cutting lathe, one may eliminate the necessity of repeatedly

oiling the tailstock center by placing an oil-saturated felt washer upon the spindle. On large jobs, it may be necessary to re-oil the washer occasionally.







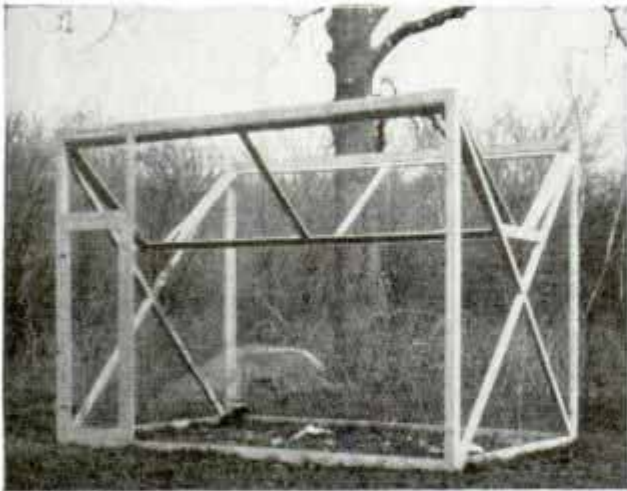
Elastic Band Prevents Pliers from Falling Out of Lineman's Trouser-Leg Pocket

#### Elastic Holds Pliers in Pocket

Linemen usually carry their pliers in the leg pocket of their trousers, and, when working on poles, the tools often fall out. To prevent this, fasten a short piece of elastic over the pocket an inch or two above the bottom and sew it to the trouser leg on each side of the pocket.

#### Wire-Mesh Trap Catches Crows

Members of a gun club in Fall River, Mass., have successfully reduced the number of crows in that section of the coun-



Baited with Broken Stale Eggs, This Trap Has Been Found Highly Successful in Capturing Crows

try by setting in the woods a number of traps of the type shown in the photo. Each trap is about 10 ft. square and consists of a wood frame over which wire

mesh is stretched. The birds enter the traps through slots at the bottoms of the V-shaped tops, and a door at one corner permits entrance to get the captured ones. Stale eggs broken on the ground inside the trap provide a tempting bait.—Omer Gandreau, Fall River, Mass.

#### Plug Keeps Dirt Out of Flag-Staff Thimble in Sidewalk

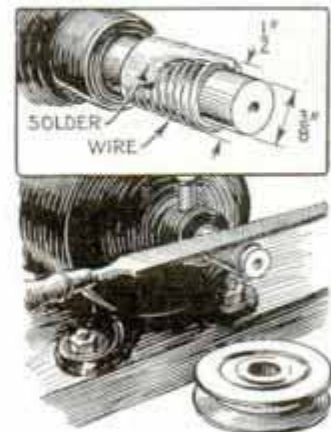
Storekeepers who have pipe nipples sunk in the sidewalk to support Christmas trees or flags will find that a short piece of rope wrapped with old inner-tube rubber makes an effective plug to keep dirt and ice out of the holes. The rope is knotted at the bottom end to keep it from pulling out



of the rubber when the plug is removed. The plug, of course, should not project above the surface of the sidewalk.—Frank W. Bentley, Jr., Missouri Valley, Ia.

#### Shaft Diameter Enlarged with Wire and Solder

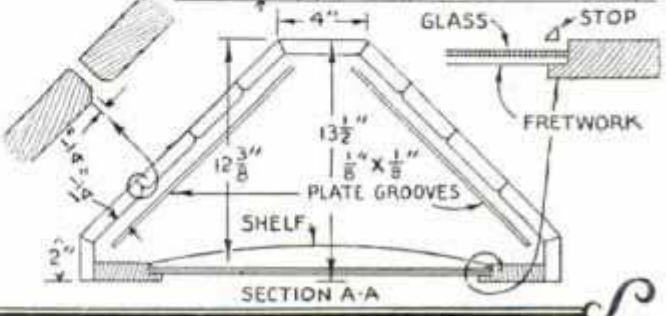
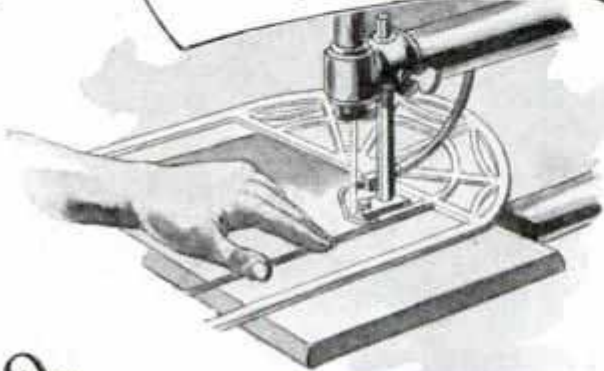
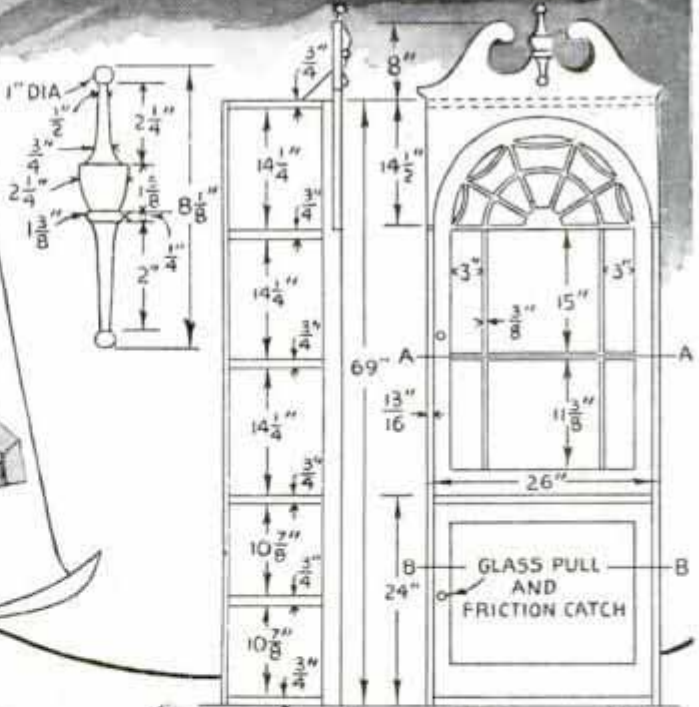
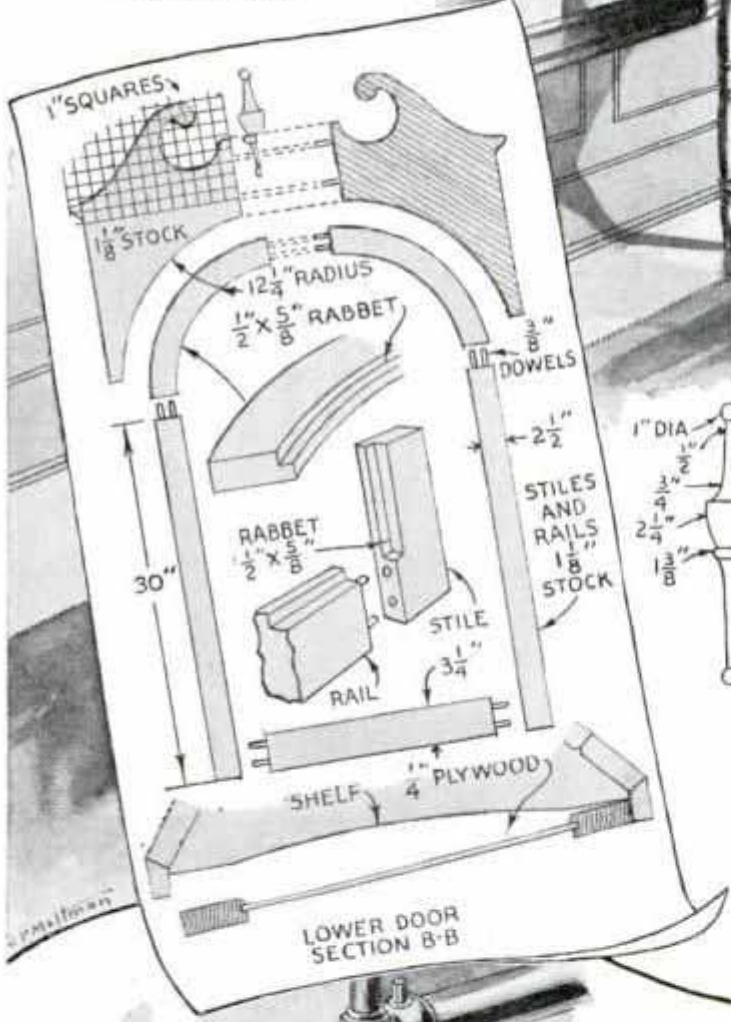
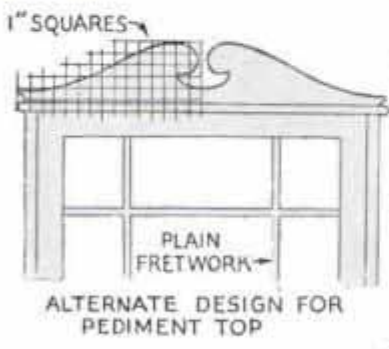
By wrapping a shaft with wire and then flowing solder over it, you can easily enlarge the diameter of a small shaft to take a larger pulley. This method was used to enlarge a  $\frac{3}{8}$ -in. shaft of an electric motor to fit a pulley which had a  $\frac{1}{2}$ -in. hole. The solder can be smoothed down and the surface of the shaft made to fit the pulley by holding a file on it while the motor is running.—Alfred Zappi, Amityville, N. Y.





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# Colonial CORNER CUPBOARD







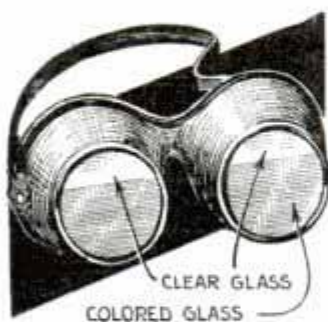
Paper Poster Rolled on Cardboard Tube Is Easily Applied to Billboard on Windy Days

### Cardboard Tube Aids in Posting Bills in Strong Wind

Billboard posters will find the following kink helpful on windy days. First roll the poster on a cardboard tube. Then prepare the billboard in the usual way. Now, starting the free edge of the poster at the lower edge of the board, take your brush and unroll the paper, pressing it against the board as you go. The tube will prevent the poster from being torn in the wind.

### Altered Lens in Welding Goggles Save Operator's Time

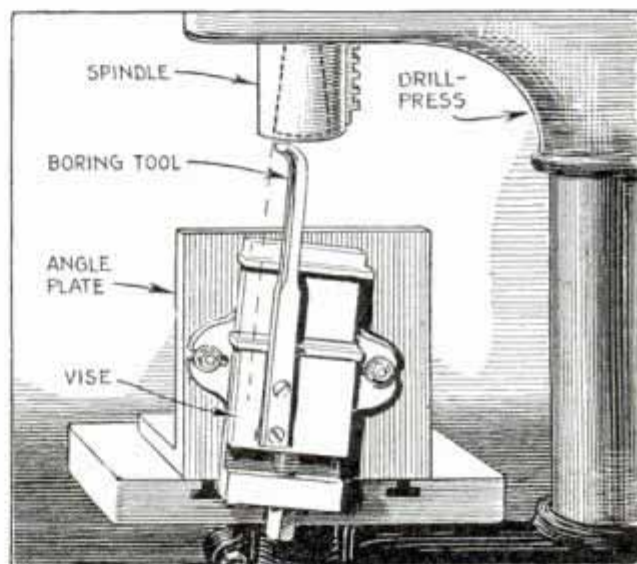
Ordinary goggles having colored lenses for welding-torch operators cause a considerable waste of time as they have to be raised above the eyes to see the welding rods and small tools. To eliminate this trouble, I cut out the proper portion of the lenses and



substituted clear glass. By tilting the head downward, I can see through the clear part of the lenses, which protect the eyes from flying bits of hot metal, while the colored portions afford ample protection against the bright light made by the torch flame.—M. J. Surofka, East Chicago, Ind.

### Drill-Press Spindle Hole Re-Tapered without Dismantling Machine

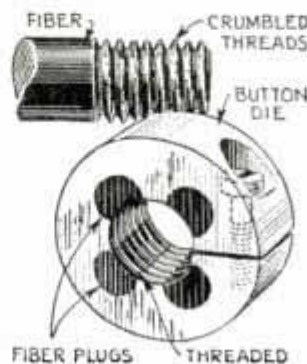
After purchasing a second-hand drill press, the owner of a small shop discovered that the hole in the spindle had the wrong taper to take the drills and collets he had on hand. Not having a lathe large enough to handle the spindle for re-tapering the hole to fit the drills, the job was done in the drill press as shown. A milling-machine vise was bolted to an angle plate, which was in turn set at the proper angle and was clamped to the drill-press table. After fastening a boring tool to the movable jaw of the vise, the drill press was started and the tool was fed into the spindle by means of the vise screw.



Hole in Drill-Press Spindle Re-Tapered by Using Boring Tool and Milling-Machine Vise

### Threading Fiber with a Button Die

While threading a length of fiber rod with an ordinary button die, I found that it crumbled the threads. In order to overcome this, the four holes in the die were plugged with small pieces of fiber, after which threads of the same pitch as those in the die were cut in the plugs.

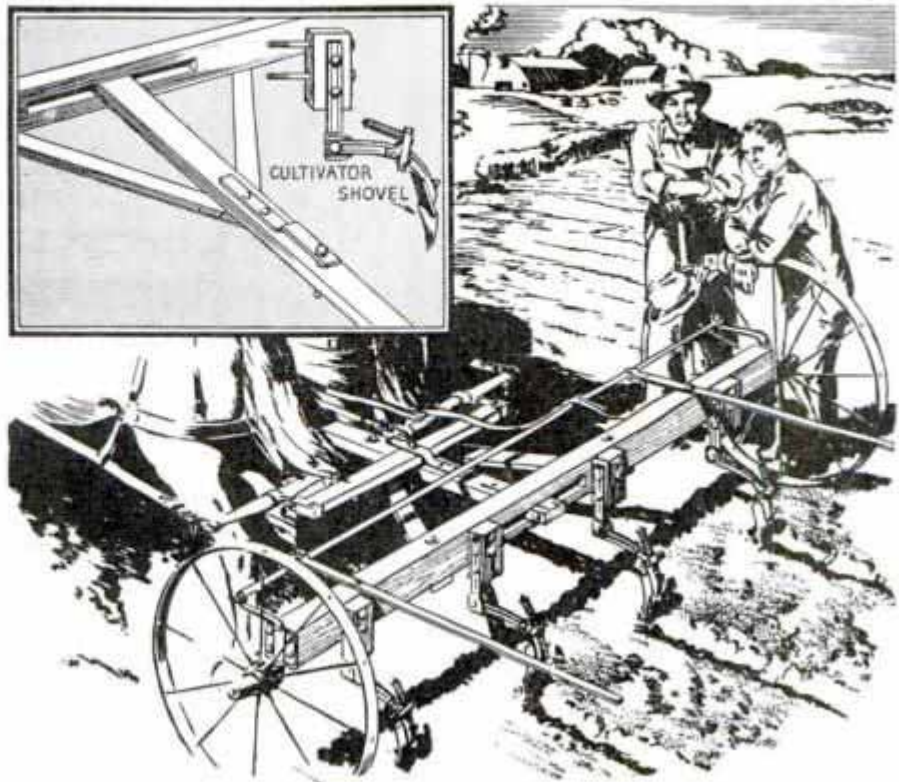


A brass threading tool should be used for this work, otherwise there is danger of damaging the die threads.—C. Kugler, Philadelphia, Pa.



# Row Marker Made from Riding Cultivator

Many farmers have one or more discarded riding cultivators, which can be used in making a good marker for laying off rows for cotton, corn, tobacco, truck crops, and crops that have to be transplanted. The wheels, completely assembled with steering arms and cast-iron braces, are attached to the ends of a 4 by 8-in. plank 12 ft. long. On top of the plank are mounted two steering handles, which are connected to a tie rod. This rod, made from a 1 by 4-in. board, connects the two steering arms on the wheels. Two handles are needed for steering as the operator must walk behind one of the wheels in order to drive straight. The four markers are made from the cultivator shovels, and are bolted to four wooden blocks, which are in turn bolted to the plank. In order to make the steering of the machine independent of the horses, a floating tongue is provided. Two braces, fastened underneath the plank, run forward at an angle and meet about 4 ft. from the plank. A long bolt is run through both braces and the tongue, one end of which extends through the slot in the plank.



Wheel Assembly and Shovels of an Old Riding Cultivator Used in Constructing a Crop Row Marker

## Walls Protect Trees from Smothering Due to Added Soil

In order to protect the roots of trees against smothering in a park where a deep fill was to be made, circular walls of brick were built around them to a height equal to that of the fill, as shown. While the space between the trees and the walls will fill up in time of its own accord, it will happen so gradually



that no harm will be done to the trees.—Dale R. Van Horn, Lincoln, Nebr.

## "Cellophane" Saves Painters' Oil Colors

When a can of sign-painters' colors in oil and Japan is opened, it is usually necessary to transfer the unused contents of the can to another container that can be



Air Kept Out of Opened Cans of Sign-Painters' Colors with "Cellophane"

tightly sealed. This extra work can be prevented by covering the mouth of the open can with two layers of Cellophane, which are held in place tightly with rubber bands.—John O'Curran, Ocean Park, Calif.

☐ If powdered graphite is rubbed on asbestos gaskets, they can be removed without damage.



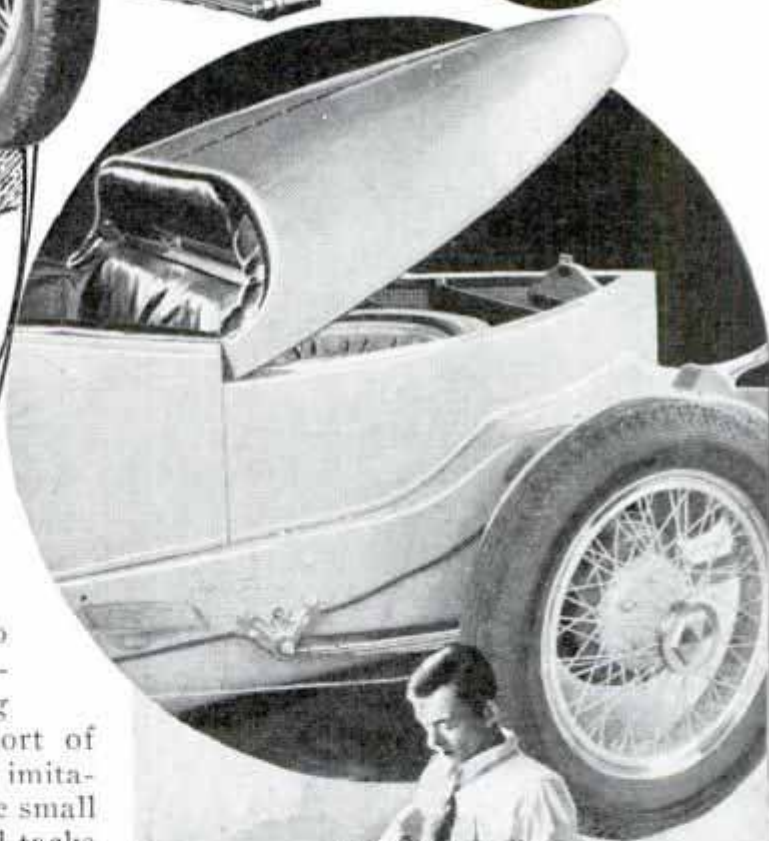
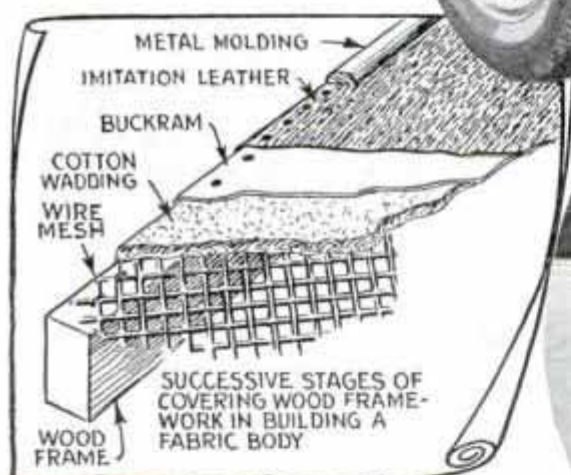
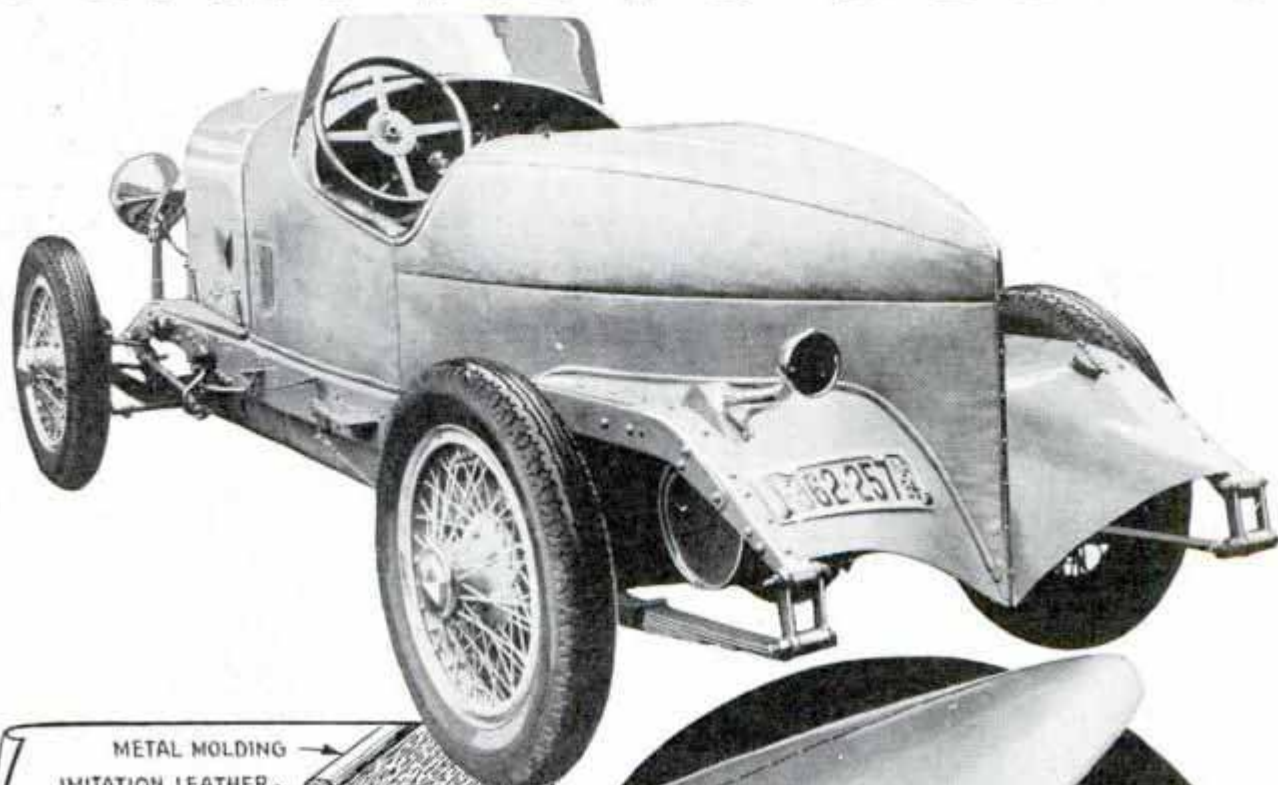
# Wire Mesh and Fabric to Streamline



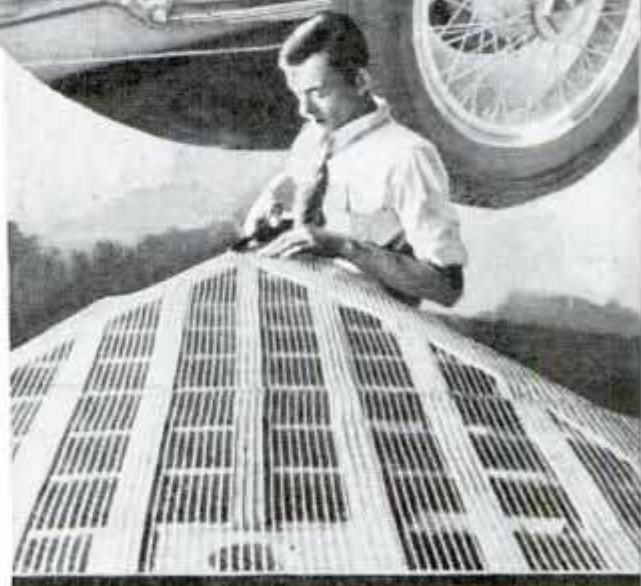
**S**TREAMLINED effects can be had in either boat or auto bodies by using wire mesh and fabric such as imitation leather. You can take an old car and convert it into a racy looking job that will in no way resemble the original. First build a suitable framework of wood. Pieces having a pronounced curve should be made in two parts with a hardwood spline glued into the butt joint as shown in the detail. After the framework has been completed, it is covered with  $\frac{1}{2}$ -in. galvanized-wire mesh. This gives the body a definite shape, although there may still be some small humps and hollows. Next comes a layer



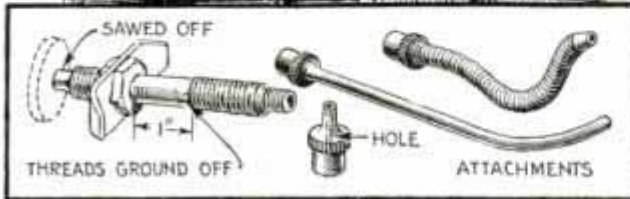
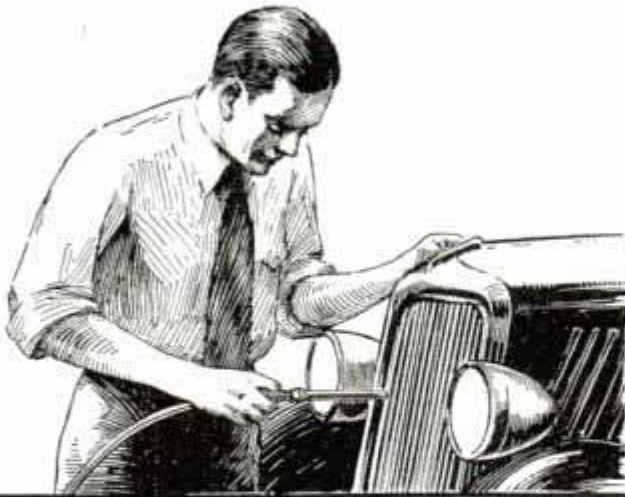
# BOAT and AUTO BODIES



of cotton wadding, thick enough to give the entire surface the uniformity of line desired. Over the wadding is placed a layer of buckram, a sort of heavy, stiff burlap, and finally the imitation-leather covering is applied. Use small staples to fasten the wire mesh, and tacks for the buckram and top covering. Be sure to carefully plan on which members of the frame the final covering is to be tacked. Try to have the tacked portions in narrow lines, well spaced, which will help to improve the appearance of the finished job. When applying the covering, also avoid wrinkles, which may require quite a bit of careful fitting and stretching. The tacked portions may be covered with metal molding or upholsterers' gimp.







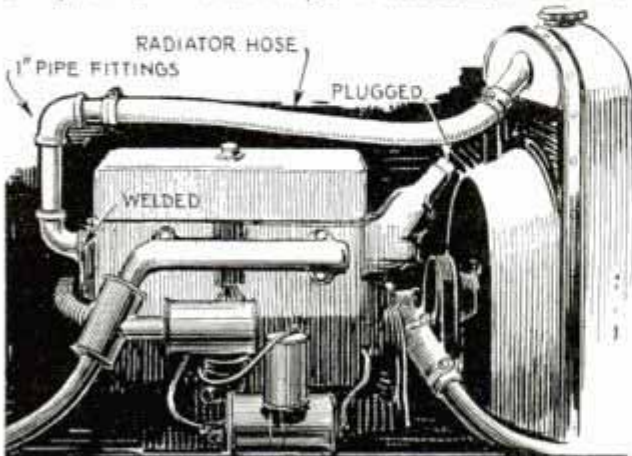
This Simple Compressed-Air Gun Is Quickly Attached or Removed from an Air-Hose Nozzle

### Quickly Detachable Air Gun Fits Any Hose Nozzle

Made from an old valve stem, this compressed-air gun will be found handy for removing insects from a radiator or for blowing dirt and grindings from places hard to reach. A finger grip for holding the gun against an air-hose nozzle is provided by locking the clamp plate on the stem with two nuts. The gun nozzle is a valve cap which has a hole drilled through the center. Various attachments for the gun can be had by soldering lengths of flexible or rigid tubing to valve caps.

### Altering Cooling System Improves Homemade Tractor

After converting an old automobile into a light farm tractor, I found that the wa-

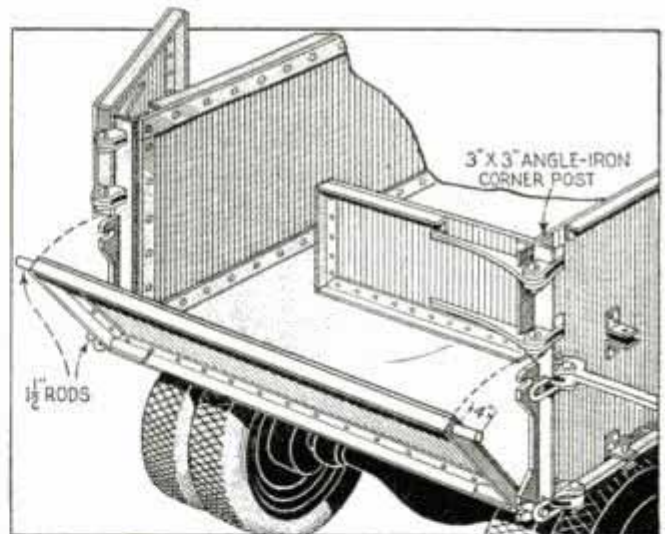


Auto Motor of Homemade Tractor Successfully Kept Cool by Altering the Cooling System

ter in the cooling system boiled on long pulls. To cure this trouble, I drilled and tapped a hole in the rear end of the cylinder head and welded a pipe elbow into it. The elbow was then connected to the radiator as shown by means of pipe fittings and a length of radiator hose, after which the original outlet in the head was plugged. With this arrangement, the water must circulate the entire length of the motor block and head before returning to the radiator.—Harold C. Male, Dundas, Ont., Canada.

### Simplified Endgates for Large Trucks

Here is an endgate in three sections that simplifies unloading of large trucks. The upper half consists of two steel sheets reinforced with angle iron and hinged to the corners of the steel body of the truck. The lower half is a single sheet also reinforced with angle iron. Short sections of 1½-in. steel rod, welded to the corners, project about 4 in. from the ends and fit



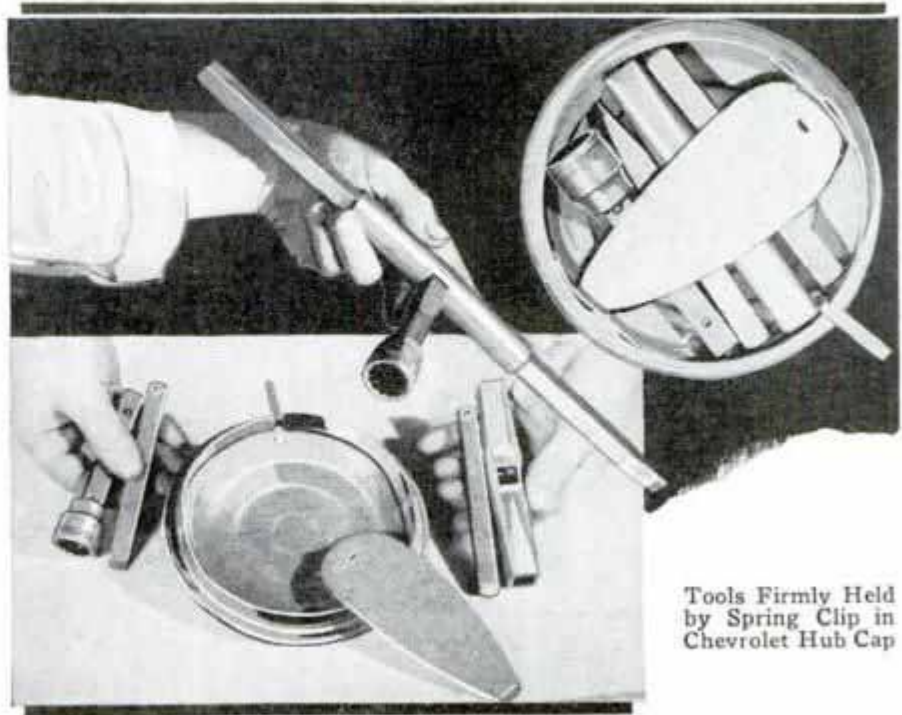
Endgate with Two Hinged Upper Sections and One Lower Section, Which Can Be Swung Up or Down

into notched plates welded or riveted to the corners of the body. The projecting rods support the lower half of the endgate, and are held in the notches by means of special clamps. These are pivoted off center and are fitted with loops to catch the projecting rods, and handles to pull them back. The free ends of the handles, when pulled back, fit between pieces of angle iron, which are drilled for a steel pin and then welded or riveted to the side of the body. This arrangement allows the lower section of the endgate to be swung up or down, or to be entirely removed.



## Hub Cap of Spare Wheel Holds Tire Tools

Owners of Chevrolets and cars that have similar hub caps will find that the spare-tire hub cap provides a convenient place in which to carry a homemade tire-tool kit, including a socket wrench of suitable size to fit the wheel nuts, three short extension bars and a short pipe to serve as part of the handle. The pipe is pounded square at both ends and a square hole is made in its center to take the end of one of the extension bars. One of the handles is ground off to form a tire tool. A piece of spring steel inserted under the splices on the cap rim keeps the tools from rattling, and there is little danger of losing them if the hub cap fits tightly, which can be assured by spreading the lip slightly.—W. L. Ward, Chicago.



Tools Firmly Held by Spring Clip in Chevrolet Hub Cap

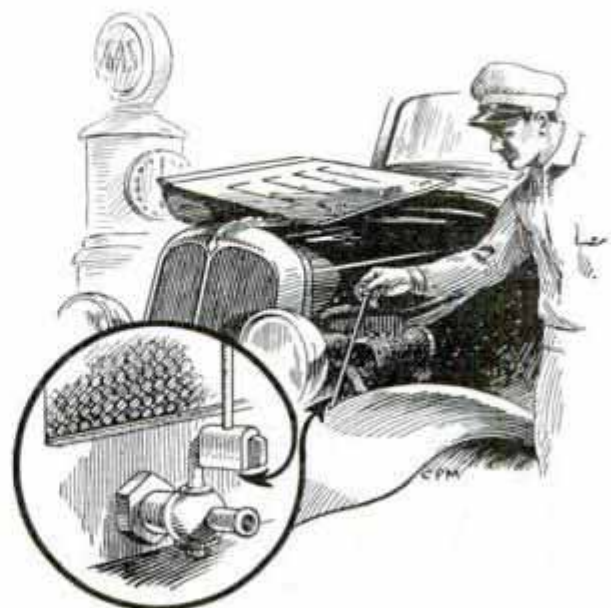
### Proper Care Prevents Water-Pump Trouble on Your Car

Most pump units will last the life time of the car, if they are kept well lubricated with a grease that will not be affected by the hot water of the cooling system. A small amount of lubricant at frequent intervals is better than a large amount two or three times each year, as the excess grease will get into the cooling system and coat the radiator tubes, which will cause the motor to overheat. Also use a well lubricated packing and keep the gland nut just tight enough to prevent leaks. Do not overdo the tightening as this squeezes the lubricant out of the packing so that it is quickly burned by friction, which may score the pump shaft. When re-packing the gland nut, remove all of the old packing before putting in the new. If re-packing does not stop a leak, remove the packing and examine the pump shaft for scoring. Also examine the pump bearings. If they are worn or the shaft is scored, it will be impossible to

prevent leaks until the trouble is remedied with new parts.—A. H. Vance, Chicago.

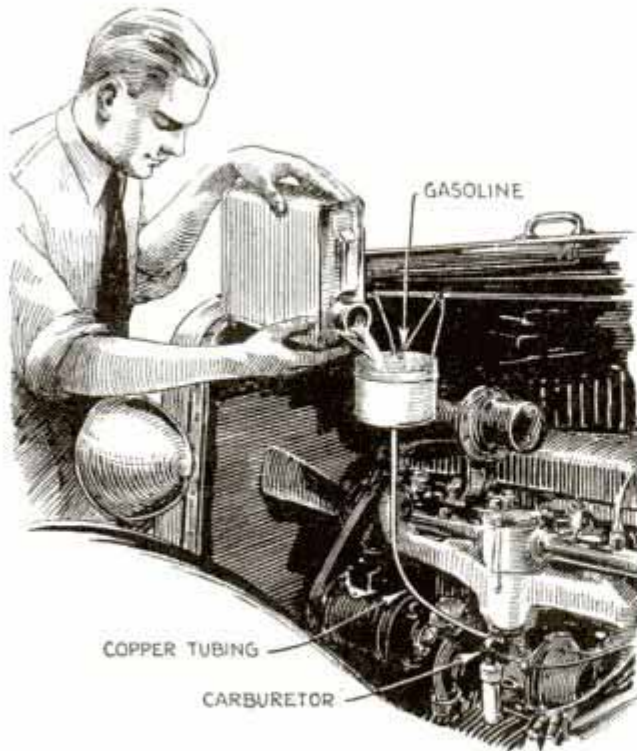
### Tool Opens Radiator Drain Cock

I have found that the key used to test the oil level of model-T Fords is a handy tool for opening the radiator drain cock on almost any car. If one of these is not available, a similar tool can be made by soldering or welding a U-shaped piece of metal on the end of a length of iron rod.—A. V. Rapp, Cuyahoga Falls, Ohio.



Gauge Key of Model-T Ford Makes It Easy to Open Radiator Drain Cocks





Small Gas Tank Connected into Auto Fuel System at Different Points Quickly Locates Trouble

### Auxiliary Gas Tank Helps Locate Trouble in Fuel System

Trouble in a fuel system of a car is quickly located with this small auxiliary gas tank consisting of a can and a 2-ft. length of copper tubing. One end of the tubing is soldered in a hole in the bottom of the can and the other end is fitted with a coupling. To trace the trouble, disconnect the gas line from the carburetor and connect the small tank in its place, bending the tubing and fastening the can in a vertical position so that it may be filled. Next disconnect the gas line from the fuel pump or vacuum tank and start the motor. If it does not run properly, the trouble is in the carburetor, but if it does, then the trouble is in the fuel line. In the same manner, the gas supply is connected at other points along the line, until the trouble is located.—R. J. Williams, Chicago.

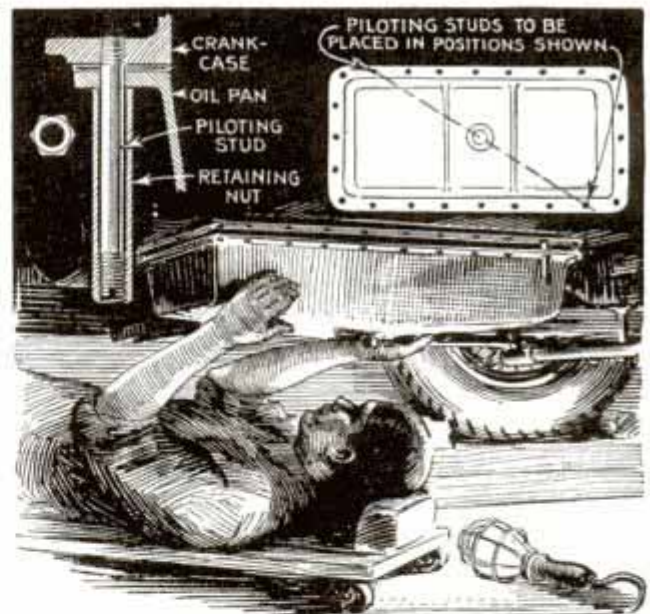
### Cleaning Dirty Carburetor Saves Gas

Ten cents for muriatic acid and one hour's time would have saved me \$46 on the cost of gasoline last year. My car had been driven 56,000 miles in three years and during that time the average mileage had dropped from 14.5 the first year to 12.85 miles per gallon the third year. A checkup on the motor showed that it was in good condition so far as compression

and ignition were concerned. The carburetor was then removed and was found to be encrusted inside with a scale that was insoluble in either gasoline or water but was removed with muriatic acid. After its removal, the parts were dipped in ammonia and then washed in water to prevent further action of the acid. The car has been driven 6,000 miles since cleaning the carburetor, at an average of 16.51 miles per gallon of gasoline, which is an increase of 3.66 miles per gallon.—S. V. Layson, Springfield, Ill.

### Piloting Studs Help in Replacing Oil Pan on Car Motor

The usual difficult job of replacing an oil pan on a car motor single-handed is made easy by using two piloting studs. These may be regular studs about 2 in. long, or they can be made from short lengths of drill rod threaded at each end. After the oil pan has been removed, the studs are screwed into the cap-screw holes at opposite corners of the crankcase as



Studs Screwed into Cap-Screw Holes at Opposite Corners of Crankcase Help in Replacing Oil Pan

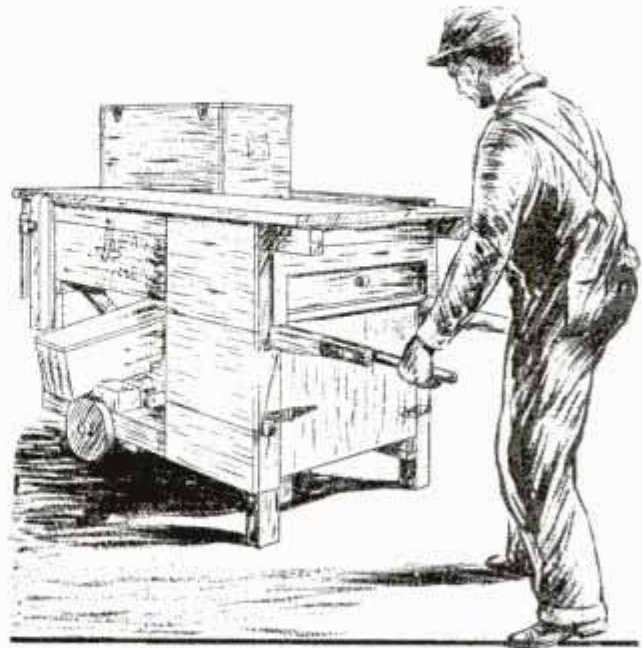
shown. When replacing the pan, it is slipped over the studs and is held by special retaining nuts until some of the cap screws are screwed into place. The studs are then removed and the remaining cap screws are screwed in and tightened.

☛ Stove polish rubbed on the exhaust manifold of a newly painted motor improves its appearance.



## Portable Workbench Saves Steps in the Shop

In a Los Angeles shop this portable workbench has been found just the thing for individual use of the workmen as it has storage space for all the tools and equipment needed on a job. A vise is mounted on one corner while the front side contains a large drawer under which is storage space for odds and ends. The rear end also has a small drawer and a compartment for large tools, the compartment being closed with a swinging door. Two wood disks near the front legs serve as wheels, while handles hinged to the legs at the rear end permit the bench to be pushed wheelbarrow fashion. The handles drop down when not in use. Two blocks should be screwed to the legs just above the handles to hold them firmly when they are raised in a horizontal position.—Jos. C. Coyle, Los Angeles, Calif.

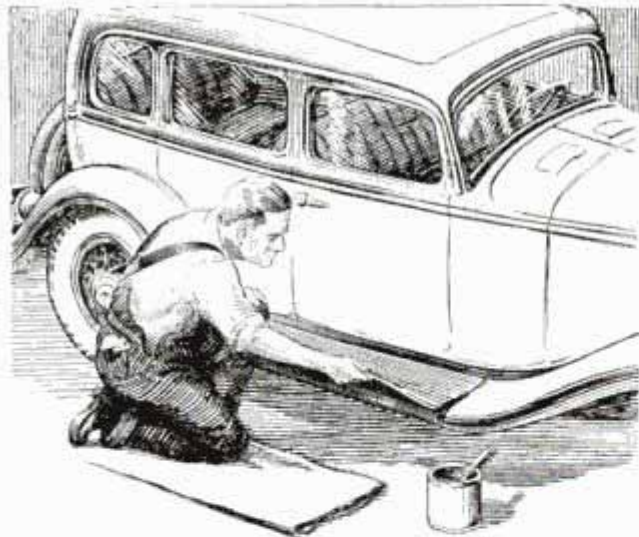


Portable Workbench Fitted with Folding Handles and Wheels Can Be Moved from One Job to Another

## Roofing Cement to Fasten Mats on Auto Running Boards

When new rubber running-board mats are put on, they sometimes bulge or wrinkle because the cement with which they

it is stepped on the firmer it grips.—William Heeley, Lancaster, Mass.

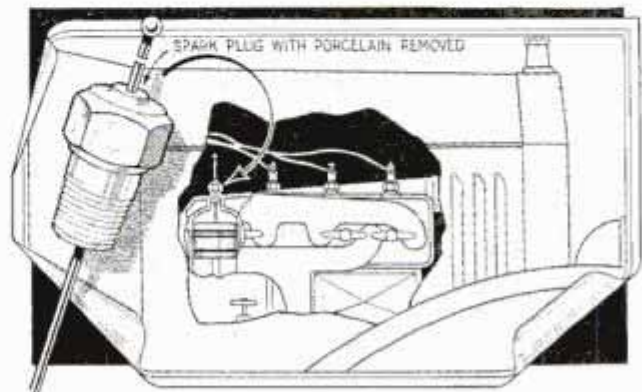


Running-Board Mats Applied with Roofing Cement, Which Is Flexible and Will Not Crack

are applied hardens brittle and breaks away from the metal. If you are having this trouble, go to your hardware store or lumber dealer and get a can of roofing cement, used to cement laps in composition roofing. Thoroughly clean the running board, apply a heavy coat of the adhesive, and then put on the mat. This cement is flexible, does not dry brittle and the more

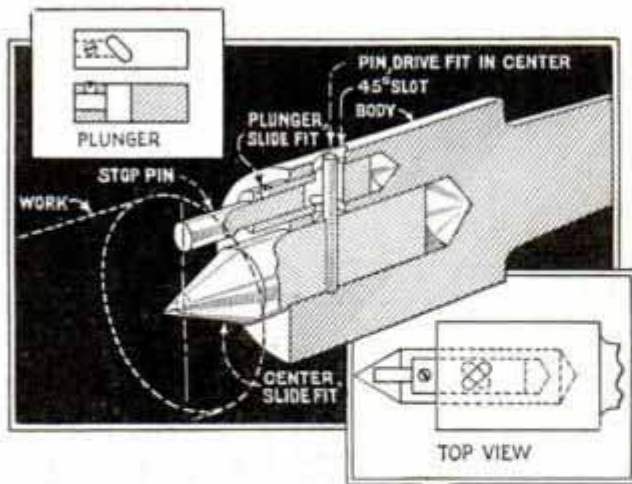
### Indicator That Aids in Timing Auto Motor

Utilizing the base of an old spark plug through which a small metal rod slides, this device aids in timing a motor as it shows at a glance the position of the piston in its cylinder. Break off the porcelain core flush with the top of the base and then insert the rod or wire, which should be about 8 or 10 in. long, so that it slides freely through the porcelain. In use, the spark plug on the key cylinder is removed and the indicator substituted. The lower end of the rod rests on the piston.



Old Spark Plug Base Fitted with Indicator Rod Shows Position of Piston When Timing Motor





This Tailstock Center Automatically Adjusts Itself to Allow for Expansion of Work Being Turned in a Lathe

### Self-Adjusting Tailstock Center

Substituted for the regular tailstock center, this homemade center automatically allows for expansion of work being turned in a lathe. It consists of a main piece, or body, tapered to fit the tailstock, and having two parallel holes drilled in it, one for a center and the other for a sleeve plunger, which carries a stop pin. The plunger and body piece have 45° slots cut in them in opposite directions, as shown, for a steel pin, the latter being a drive fit in a hole drilled through the center. In use, the center is adjusted to the work and the stop pin is set loosely against it.

## The Next Issue

### "ZIP"—A MODEL RACING YACHT

In this article, Mr. George Baron, nationally known in model-yacht circles, gives simple, detailed instructions for building a real racing model of the Marblehead class. The design of "Zip" is an improvement over the author's "Torpedo," which in 1933 took second place in the 50-800 National Championship Races in the Mid-West Association Fall Regatta held in Chicago.

### FOLDING TEA CART AND SERVING TABLE

These two items are highly convenient especially in a small home or apartment as they can be folded and stored in a small space, when not in use.

### BOX KITES FOR EVERY PURPOSE

Whether you fly them just for fun, or for floating advertising banners high in the air, this story will tell you how to construct them properly.

### HOW TO BUILD LOG CABINS

Building construction of a real log cabin clearly explained. Includes suggestive plans and method of making imitation log cabins with special siding.

### WHEN CARS OVERHEAT

The cooling system of your car needs occasional attention. Overheating on a long trip may mean serious damage to the motor and an expensive repair bill.

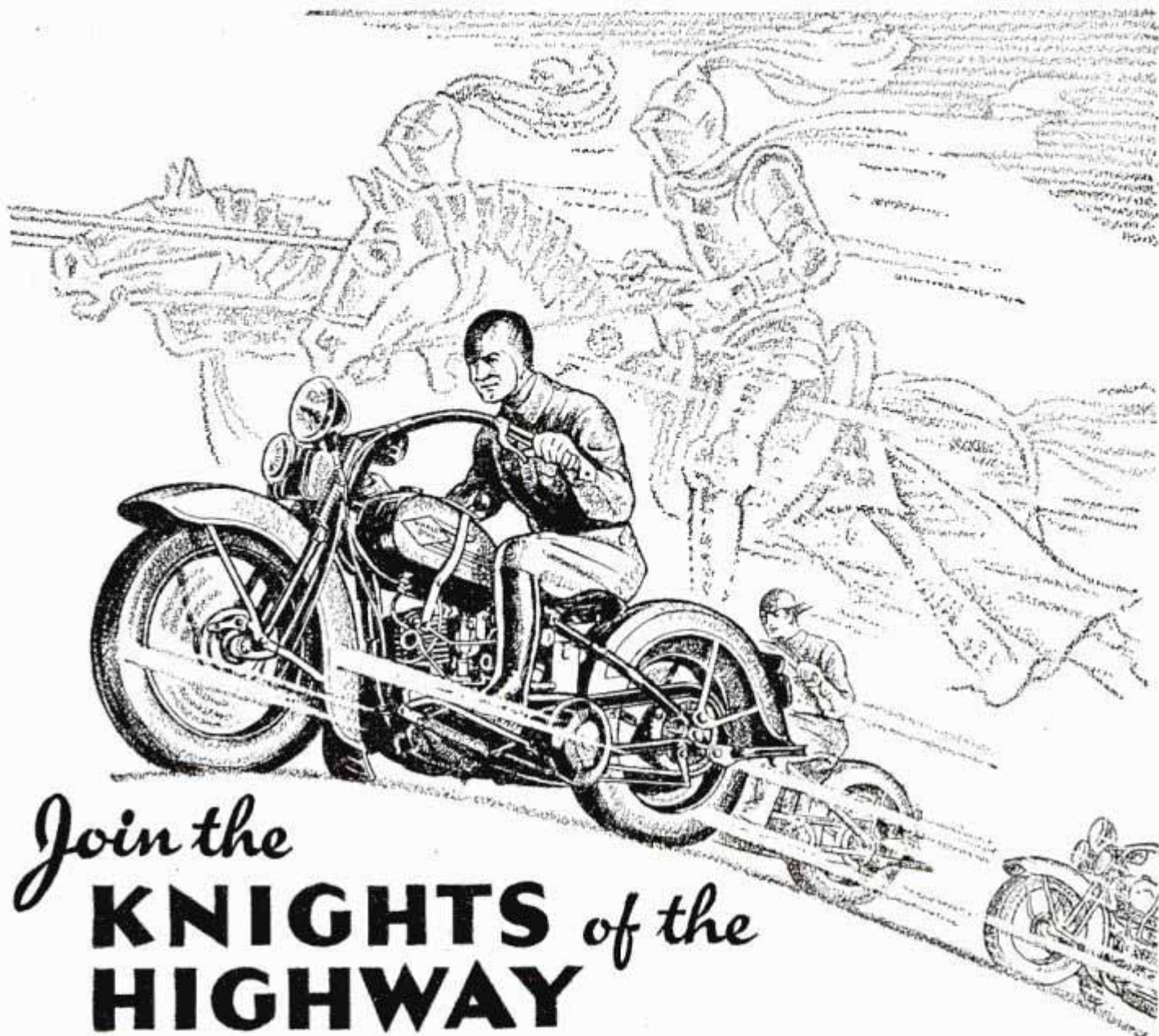
### USING COLD CHISELS

Various tricks and secrets of using cold chisels. Many of your metal-working problems can be greatly simplified if you know just how to proceed.

### "HALF-PINT"

A 9-ft. plywood sea sled for campers, fishermen, and for junior boatmen. Powered by a 1/2-hp. motor, it chugs merrily along at 6 miles per hour.





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**Costs but a few  
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It is very easy to give your hair that rich, glossy and orderly appearance so essential to well-groomed boys. Just rub a little Glostora through your hair once or twice a week—or after shampooing, and your hair will then stay, each day, just as you comb it.

Glostora softens the hair and makes it pliable. Then, even stubborn hair will stay in place of its own accord.

It gives your hair that natural, rich, well-groomed effect, instead of leaving it stiff and artificial looking as waxy pastes and creams do.

Glostora also keeps the scalp soft, and the hair healthy by restoring the natural oils from which the hair derives its health, life, gloss and lustre.

Try it!—See how easy it is to keep your hair combed—any style you like—whether parted on the side, in the center, or brushed straight back.

A bottle of Glostora can be bought for a trifle at any drug store and will last for months.



**Glostora**  
FOR THE HAIR



## WHY EXPLORE THE ANTARCTIC?

*(Continued from page 716)*

of the great ice caps. Since the time of the last period of widespread glaciation, about 30,000 years ago, the earth's ice-covered area has decreased from 12,000,000 to 6,000,000 square miles; and on that assumption we can safely say that the amount of water in the ocean has been increasing steadily.

Since the prospect of exploiting Antarctic land commercially is still remote, the real reasons behind the present expeditions are scientific ones.

Dr. Ellsworth, whose flight across the North Pole in the "Norge," met with great success, plans a similar flight across the Antarctica. What he hopes to do is to air-explore the vast unknown lying between the Ross sea and the Weddell sea.

There is as yet no evidence to the effect that Antarctica is really a single land mass embracing 5,000,000 square miles. The shores of both the Weddell and Ross seas are still vague, and there is a strong suspicion that these two bodies of water are actually connected by a narrow strait running clear across the Antarctic continent.

The recently discovered Edsel Ford mountain range, to the north of Little America, is another problem for explorers. If this range leads toward the American quadrant, in the region of the Antarctic archipelago, it may provide geologists with evidence they have been anxiously awaiting. They have sought to link South America's rocky backbone, the Andes mountains, with what might be considered its continuation in Antarctica.

Within the Arctic area, north of sixty degrees north latitude, there are more than 1,000,000 people and countless animals; within the Antarctic region, south of sixty degrees south latitude, there is not a single permanent human habitation, nor a single land animal larger than an insect. And not a single tree! The sole human industry in all this vast region is whaling; the annual value of the catch is \$12,000,000 to \$15,000,000. Out of approximately 5,000,000 square miles, less than 100 square miles are free from a permanent covering of ice.

Geologists know that the Antarctic once had a tropical climate, so it is conceivable that some day it may again become the home of flowers, trees and animal life.



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**BIG THRILLS  
 FROM LITTLE  
 NEGATIVES**  
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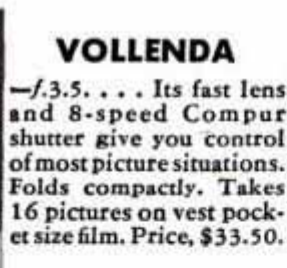
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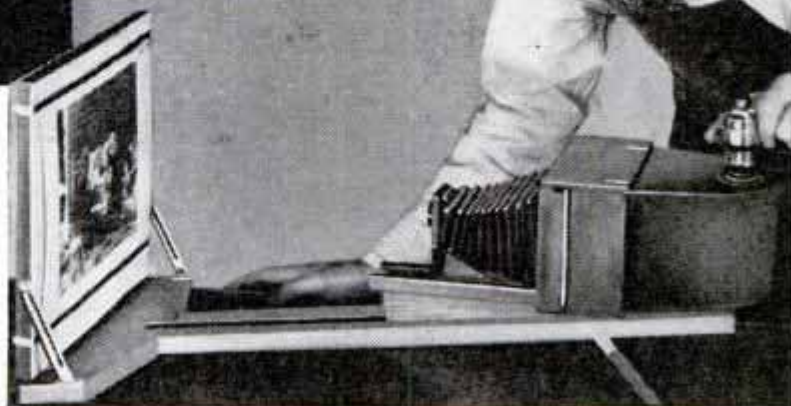
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## ROCKS WORTH MORE THAN GOLD

(Continued from page 724)

grounds, for water-worn rocks and pebbles when broken open sometimes prove to be minerals of striking beauty. Beach shores yield agates and thomsonites. The volcanic regions and the deserts abound in richly colored minerals. In the Mojave desert in California, for instance, are districts where deposits of silica, copper, turquoise and asbestos lie side by side.

"One gem collector in Arizona mines garnets from ant hills, finding them among the pebbles that the ants have raised to the surface in their digging. One of the best places to look for gems is in the deposits of heavy sands and gravels in stream beds. Most gem materials are heavy and after they have been eroded out of the rock they tend to collect near the bottom of a stream bed. That is why small diamonds are sometimes found by miners while working stream gravels for placer gold. Gems found in such placer deposits are usually free from flaws.

"It isn't always easy to recognize a gem in its natural state but usually a tint of the interior color shows through the surface. Sometimes a piece of worthless jasper looks more brilliant than a gem crystal. Many collectors have their own lapidary equipment and grind down and polish their specimens to show their beauty. After training, a collector is able to cut and polish his own gem stones so that they may be mounted in rings.

"One thing that collectors always hope to discover is a new mineral," Renshaw says. "No one believes that the present list is complete. Minerals sometimes change their substance upon exposure to the air, or after a fire occurs in a mine, giving rise to rare varieties. Well known minerals like copper and tin have been discovered in meteors, but other meteors contain minerals that have no known terrestrial occurrence. When a new mineral is found it is often named after the discoverer, accounting for such unexpected names as cohenite, merrillite, and weinbergerite."

Unusual minerals are sometimes valued by collectors more than rare ones. Alexandrite, for instance, appears green in daylight and red by artificial light. Nearly every mineral has a special crystal form which furnishes a positive identification of its type.



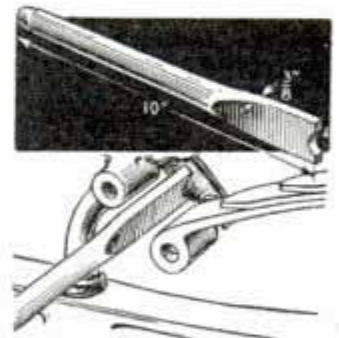
Tool Made from Old Valve Stem for Setting Rivets When Relining Auto Brakes

### Setting Tubular Rivets When Relining Auto Brakes

When relining certain types of auto-brake shoes, I have had difficulty in setting the rivets on a brake-lining machine. To eliminate this trouble, I made a tool from an old valve stem and set them by hand. The valve head was cut off and the end of the stem was filed or ground to a blunt point. Then, with a hack saw, six equally spaced slots were made horizontally across the end, allowing each one to run to the point as shown. In use, the shoe is set on a hard surface and the rivets are clinched by tapping the tool with a hammer.—S. T. Harper, Bluefield, W. Va.

### Improvised Tool for Removing Ford Spring Shackles

Rusted spring shackles on model-A Fords are difficult to drive out with an ordinary chisel or punch. A good tool for this purpose can be had by cutting a notch



in the edge of an old chisel to fit the rounded portion of the shackle. If a chisel is not available, a short iron rod can be flattened at one end and notched.—W. F. Lowder, Humboldt, Ia.



## A BLOW-OUT IN THE MAKING MAY BE IN YOUR TIRE RIGHT NOW



# A BLOW-OUT! WILL IT BE YOUR TURN NEXT?

## Play Safe with Goodrich Silvertowns, the only Tires with the Life-Saver Golden Ply

**U**NFORTUNATELY, the only warning a blow-out gives is BANG! Then it's much too late. Neither your steering wheel nor your emergency brake can save you. All you can do is hope for the best. For a nice, soft spot to land.

At today's high speeds, the heat generated *inside* the tire is terrific. Rubber and fabric begin to separate. A tiny blister forms. And grows—until BANG! A blow-out! But the Life-Saver Golden Ply resists heat. Blisters don't form. The great, unseen cause of blow-outs is prevented before it begins.

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Enjoy the priceless feeling of security every time you sit behind the wheel. Get more mileage than you ever got out of tires before. See your Goodrich dealer today about a set of Golden Ply Silvertowns for your car. *They cost not a penny more than other standard tires.*



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The Casein Manufacturing Company of America, Inc., manufacturers of CASCO Waterproof Glue, will pay cash to the builders of 25 projects for shop or homecraft work involving the use of CASCO Glue, submitted between April 1 and June 30, 1934. The awards will be divided as follows:

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  - Second . . . . 100.
  - Third . . . . 50.
- And 22 Awards of \$20. each**

There are no vague or tricky conditions to be observed. It is proposed to select the 25 most suitable projects, based on workmanship and design. Projects which do not receive an award will be returned.

All types of projects will be acceptable: Model Ships and Airplanes, Boats, Sports Equipment, Furniture—any article following the trend of popular appeal. Anyone is eligible to participate.

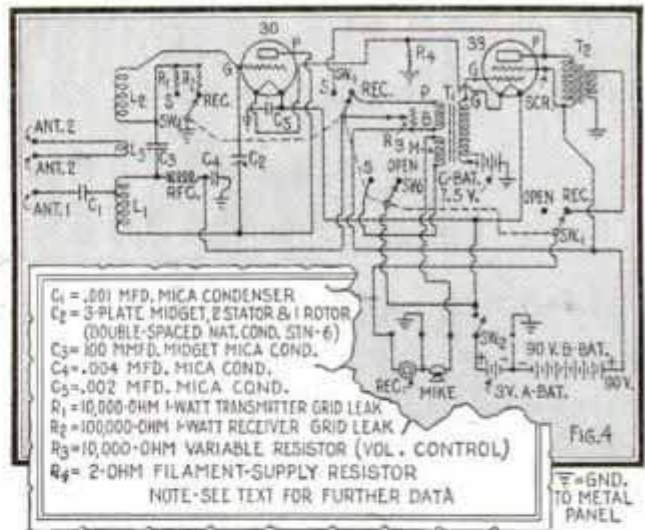
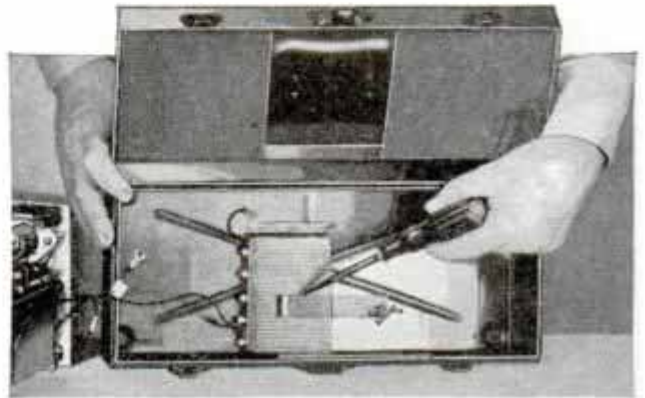
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## TWO-WAY FIVE-METER PHONE

(Continued from page 744)

knob for the four-pole double-throw jack-switch is at lower center; this switch changes the unit from a transmitter to a receiver. A National midget-type tuning dial is used and this is connected to the 3-plate condenser shaft with a flexible coupling and a bakelite rod to eliminate body capacity. Fig. 3A gives the construction details for a homemade Pickard-type antenna system. A manufactured demountable type that sells for \$2.50 is shown in the photo above. This employs



two lengths of brass tubing inserted in a wooden center section that contains the coupling transformer. This type is handy for portable purposes and may be suspended by means of cords fastened to the insulated center section as shown in the sketches.

For those who wish to make their own, as in Fig. 3A, the coupling transformer consists of three, 3-turn spiral-wound coils in series. The three coils are placed side by side and make an auto transformer of 9 turns, wound continuously in the same

(Continued to page 120A)

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**Stop this loss by having OXIDE  
COATING cleaned from ALL YOUR PLUGS**



It is unnecessary to let dirty or worn spark plugs waste gasoline—and rob you of new-car performance—when spark plug cleaning by the new AC method is so quick and thorough. Most motorists don't realize that their engines are missing intermittently—in acceleration, at high speed, or going uphill. Blame dirty or worn spark plugs for that—also for eating up one gallon of gas in every ten. Badly worn electrodes, or oxide coating, forming on the insulator of every plug, cause this waste and loss.

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and the spark gap adjusted, in a few minutes, and at low cost, by any AC spark plug cleaning station. Motorists who have their plugs attended to two or three times a year stop waste, save far more than cleaning costs and enjoy new-car performance.

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### Before Cleaning

After a few thousand miles, oxide film, soot or carbon coats spark plug insulators, wasting gas, impairing performance. This plug is worn, its spark gap too wide. This is an unretouched photo.



### After Cleaning

New AC cleaning method removes all oxide coating, soot and carbon. Insulator is clean as new, spark gap correctly adjusted, saving gas, renewing performance. This photograph is unretouched.



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While you are having your spark plugs cleaned, get an official entry blank entitling you to try for the new Plymouth, Chevrolet or Ford which AC is giving away each week. Laugh at Raymond Knight and the Cuckoos in the new AC Spark Plug Derby—NBC Network. See your newspaper for local station. Win a new car for yourself.





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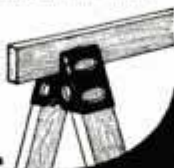
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## TWO-WAY FIVE-METER PHONE

(Continued from page 118A)

direction, with the 43-in. antenna wires fastened across the middle three turns. Ordinary No. 14 heavy rubber-covered wire, of the type used for house wiring, is suitable for this coupling coil. Start from the inside and wind a 3-turn spiral, taking a tap off at the outside for the antenna connection. The inside diameter should be about 1/2 in. and the outside diameter of the coil about 2 1/4 in. Continuing on in the same direction from this tap, winding inward, make another 3-turn coil beside the first and from the inside end of this coil take off the second antenna tap. Winding outward in the same direction, make the third 3-turn spiral. Place the three flat coils together and tie them securely with a string. The feeders may be any convenient length and are connected to the two ends of the completed coil. No. 14 flexible stranded wire may be used for the feeders. A large blueprint of all diagrams is available; those who wish it should specify blueprint No. R-197. The schematic diagram is given in Fig. 4; if there are any points not clear to the reader, the radio editor will be glad to explain them in further detail.

When placing the receiver in operation, a strong hissing sound should be heard in the earphone. When the outfit is working correctly as a transmitter, it should be possible to light a 6-volt dial-light bulb, connected in series with a small test loop, when the loop is placed in the field between coils, L<sub>1</sub> and L<sub>2</sub>. When the microphone is spoken into, this bulb should flicker.

## CONDENSER MICROPHONE OPERATES ON A.C.

(Continued from page 741)

ever, carbon hiss is always present. In the condenser microphone, Fig. 2, the diaphragm forms one plate of a variable condenser, separated from the back plate by a film of air. Capacity variations, that also vary the current, are produced as the diaphragm vibrates in response to sound pressure changes. Owing to the minute changes in capacity the variable currents are extremely small and additional amplification is necessary. However, because of its quiet operation it is a favorite for general purpose use.

D4514

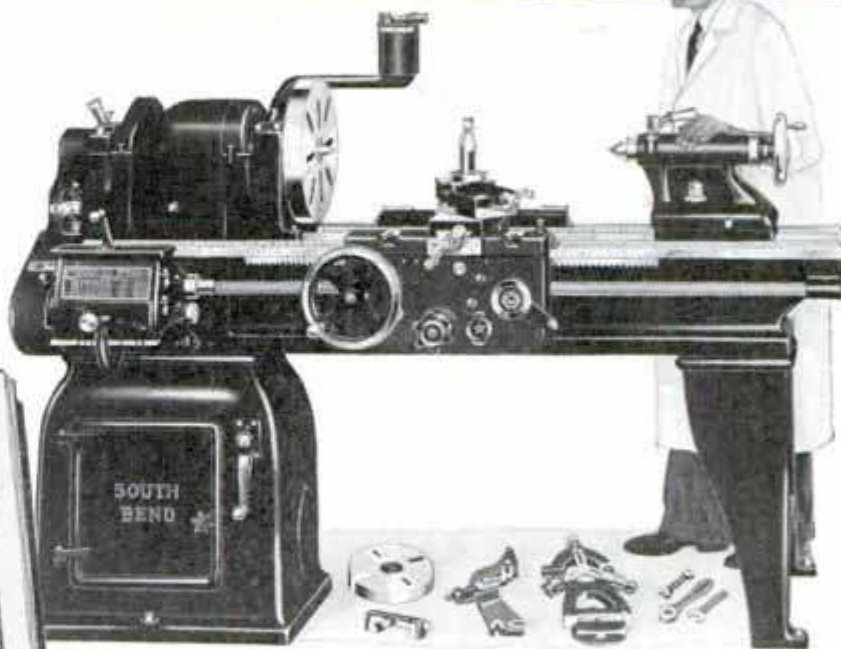


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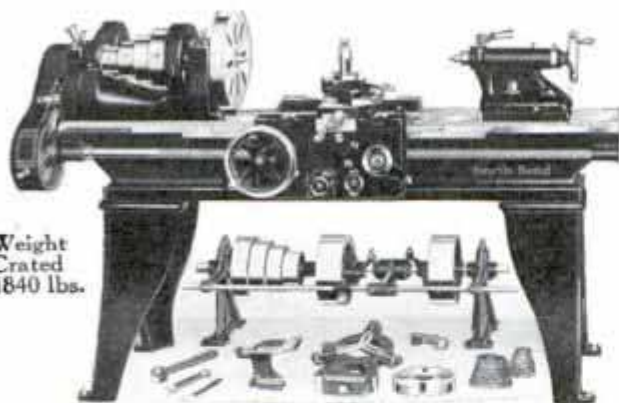
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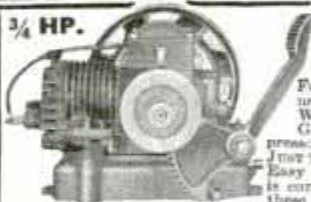
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## D224 THE NEW FLEET

(Continued from color section)

"West Virginia." Astern in column is the "Nevada." Steaming in a parallel line to starboard are other ships. Half a dozen cruisers and an aircraft carrier change formation as the fleet moves on. Squadrons of destroyers so far away they are invisible without long-range glasses patrol the horizon. A dozen airplanes do sentry duty overhead.

On the ponderous "Colorado" an observer receives the impression that the ship stands still and the ocean moves by, so silently and smoothly do the engines thrust the ship through the water. Only at full speed in heavy weather do 30,000-ton battleships roll and pitch.

At a word from Capt. R. P. Craft a marine steps to a microphone panel by the bridge and presses a button. "All hands. All hands. General quarters. Close all water-tight doors and shut the battle ports." Loud speakers carry his voice, accompanied by the clanging of the alarm gong, to every compartment of the floating fortress. Twelve hundred men scurry to their stations, worming their way into the turrets, swarming up ladders leading to the spotting platforms at the mastheads and clustering around the secondary batteries and anti-aircraft guns. Down in the engine rooms, magazines, in the radio rooms, coding rooms, and torpedo compartments every man is ready.

On the "Colorado's" stern a seaplane warms up and rests poised on its catapult. The pilot and observer adjust their safety belts, then rest their heads firmly against the backs of the cockpits. At a signal from the bridge, the plane roars across the catapult and tilts up into the air. Other planes from other ships assemble overhead and drone off in search of the "Brown" fleet.

Modern naval battles are fought at such great distances that from a battleship you see only part of the fight. In hazy weather the sixteen-inch shells are thrown farther than the eye can see. In extended formation a fleet may measure thirty miles from wing to wing.

Battleships like the "Colorado" are the most powerful single fighting units developed by man. Such ships carry eight sixteen-inch guns capable of throwing 16,000

(Continued to page 126A)

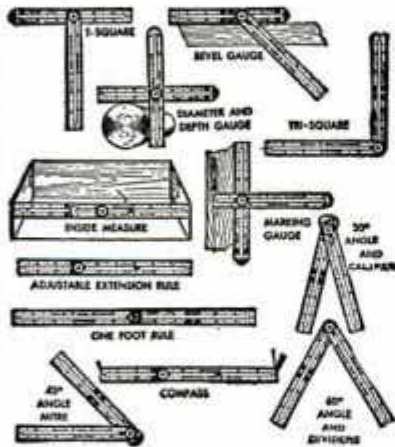


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Wired, ready to use, add	2.50	2.75
Special coils, per set of 4	1.35	1.35
Set of tubes	1.93	2.90

ASK FOR OUR NEW CATALOG 55C OF 10,000 RADIO BARGAINS



**WHOLESALE RADIO SERVICE CO., INC.**  
100 SIXTH AVE., Dept. PM-54 New York, N.Y.

## THE ELECTRICAL HOME

(Continued from page 700)

measuring the strength of the illumination in any room, the home of tomorrow contains a photomet, a small instrument designed to help prevent eyestrain.

By means of a device called "the doorman," the housewife may carry on a conversation with a caller at the door without leaving her work. She may talk from one of three stations to callers at the front or back door. Other features include an electrical device for producing antiseptic, electrical heating panels in ceiling and walls of the penthouse, radio control for opening and closing the doors of the garage, plug-in portable telephones, "remote control" handles for the door at the foot of the stairs to make possible the opening of the door without stooping and reverse refrigeration for heating water.

Engineers of the Westinghouse Electric and Manufacturing company, which built the home of tomorrow at Mansfield, Ohio, estimate that its equipment, if in production and available, could be installed in a \$12,000 home. The day of the all-electric home is not far away.

## IS THE AGE OF STEEL PASSING?

(Continued from page 682)

as magnesium and aluminum, serious competition in the field of materials for aircraft construction.

If the predictions of some engineers are realized and we are able to obtain the ultimate strength which they calculate steel contains, then a strength of one half million pounds per square inch—five times stronger than the steel thirty years ago and double the greatest strength obtained today—will be common. If this goal is ever reached, the dominance of steel as a structural material will be practically assured. The discovery which will lead to this may come tomorrow from some backyard laboratory—or it may come slowly over a period of a hundred years.

This country's scheduled air lines carried more passengers and express in 1933 than ever before. For the year, 493,141 passengers rode the air lanes, compared to 474,279 in 1932. Express amounted to 1,510,215 pounds for 1933, compared to 1,033,970 pounds in 1932.

*D284*  
*C1964*  
*U.S. Dept. of Commerce*  
*D320*  
*Air Commerce Bulletin*





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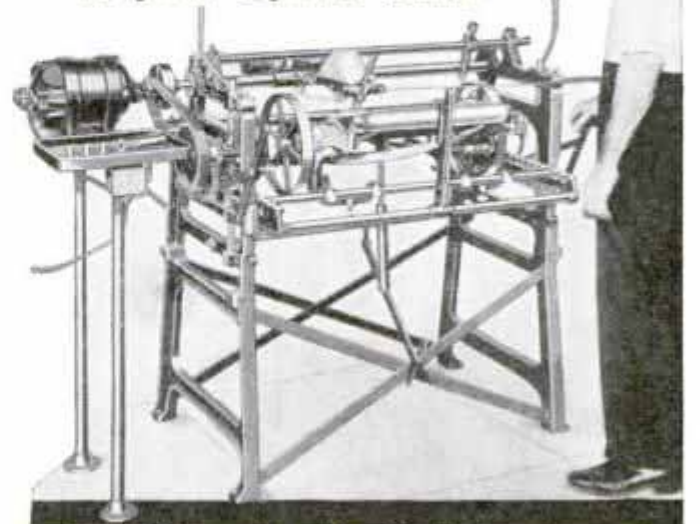
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### The Ideal Lawnmower Sharpener

Makes old, dull lawnmowers cut like new. It uses the correct principle of grinding the blades on a grinding wheel—the FACTORY method—and the method we have used for 30 years. This produces the proper bevel or clearance and is the only way old, dull lawnmowers can be perfectly sharpened. Mowers run easier—stay sharp longer—customers come back year after year.

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# Sergeant's DOG Medicines and Food

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## THE NEW FLEET

(Continued from page 122A)

pounds of steel seventeen miles every minute; fifteen five-inch guns to discourage submarines and destroyers; eight five-inch anti-aircraft guns that can fill the air miles around with flying steel; two twenty-one inch torpedo tubes, and three long-range airplanes that can land on the sea.

Because training takes times the United States is purposely building up a force of professional sailors. More than eighty per cent of the bluejackets "ship over" at the end of each enlistment period, most of them remaining in the service until they are retired after twenty years of duty. The result is an efficient, effective navy with every man on his job.

## DOG SCHOOL SECRETS

(Continued from page 734)

"It is harder for a dog to trail an assistant who is laying the trail than to trail a criminal," says the trainer. "This is because the criminal's fear of being caught causes his perspiration pores to work overtime, resulting in a stronger and different scent—of fear. The dog's nose and instantaneous recognition of fear tell it when the action is training and when it means real business. If you are afraid, no amount of bluff can help you, because the dog will scent your fear and will distrust you, even to the point of attacking unless well trained.

"Some people are under the impression that dogs, as well as other animals, are taught tricks by fear of punishment. That is ridiculous. In the Stein system, no dog is ever whipped and all training is accomplished through patience and kindness and rewards when the dog executes the command and obeys. A dog should never know fear in his work."

## ALUMINUM USED IN TELESCOPE

Aluminum will be used instead of silver plating on the mirror of a great 200-inch telescope planned in California. The surface to be plated is cleaned by bombarding it with electrons and ions. Plating is done in a vacuum chamber big enough for several workers. Aluminum is considered better than silver for telescope mirrors because it reflects ultraviolet light.

California Institute of Technology Pasadena  
D 303  
Science Service 2/19/34  
Mr. J. Strong.



# LOOK MEN

## MAGIC CASE HANDS YOU LIGHTED CIGARETTE

IMAGINE taking a light, compact, beautifully enameled case from your vest pocket. You press a magic button! A miracle happens. Automatically there is a spark... a flame! At the same time your favorite brand of cigarette appears. Then you put the cigarette to your lips. It slides easily from the case... delivered LIGHTED right to your lips. You PUFF and SMOKE. At last... science has accomplished the "impossible." This new, revolutionary, dynamic invention is HERE... perfected... guaranteed. It is just what every man has been waiting for. It is so amazingly low priced that every man can afford it.

### 15 DAY TRIAL OFFER

Say the word and we'll wrap up a Magic Case and send it to you for 15 days' trial at our risk. Write for details of this liberal offer.

### MAGIC CASE MFRS.

4234 Cozens Ave., Dept. E-378, St. Louis, Mo.

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Pro Tennis String Co., Dept. Q-3, Harmon, N.Y.

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### SAMPLE OFFER

Send twenty-five cents (stamps or coin) to cover cost of mailing and we will send two full size samples and money-making plan. Money back if not satisfied.



## SOUND GHOSTS HAUNT HIGH-SPEED FLYERS

(Continued from page 652)

to make the proper refinements and get double or treble the present speeds with the same engines.

But now with the figures all worked out on a full-sized airplane, the question arises: Will the materials stand it?

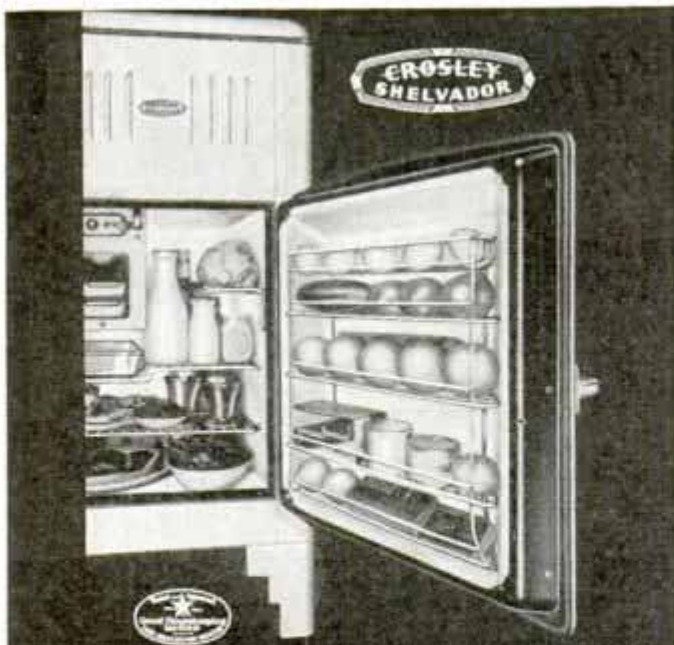
It is not a question of the materials standing up under pure strain and stress. This is easy to do. But something new has been discovered. It is sound vibration.

It has been discovered that parts of an airplane may "tune in" on each other and build up a resonance that no metal can stand. A wire or strut may tune in on the propeller and build up vibration in crescendo until one or the other breaks. It seems that the atoms or molecules are disturbed by this sonic vibration. It recalls the old theory that if a man can strike the right note on a violin and continue to play it, he can cause Brooklyn bridge to fall.

It seems that every piece of metal put into airplane construction has its own period of vibration. Whenever anything else happens to vibrate with the same pitch in that vicinity, it will vibrate too. Pilots are now being cautioned against the "critical" propeller speed of different planes. Speeds above or below these critical points are safe. The critical point is where the explosions of the motor or some other known period of sound tune in on the tone of the propeller at that speed. And the propeller may break at this critical point literally because of too much music.

Now the speed of the new airplane figured out by Mr. Stack will be in the neighborhood of that of sound. What effect will this sound vibration have on the airplane? Nobody knows yet. This plane may be so full of vibrations that metal parts may disintegrate as if crushed by the hand of a gigantic ghost.

On the other hand, this airplane may be free from sound-vibration effects. It is possible that traveling at a speed near that of sound, the tones may all be dampened down. Or the tones which arise from parts of the plane behind the propeller cannot reach the propeller because the plane runs away from the sound. This would make the propeller safe from the tuning-in effect of things behind it.



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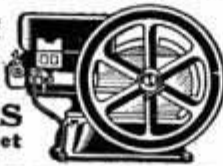
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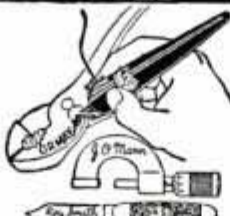
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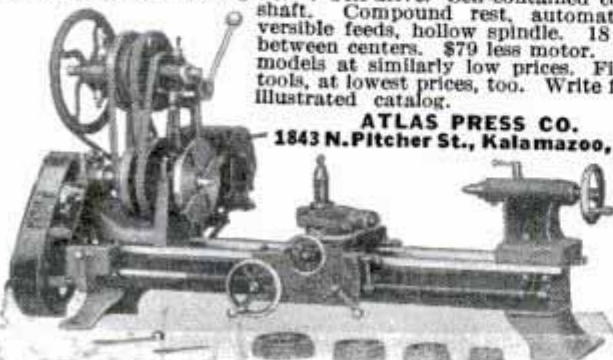
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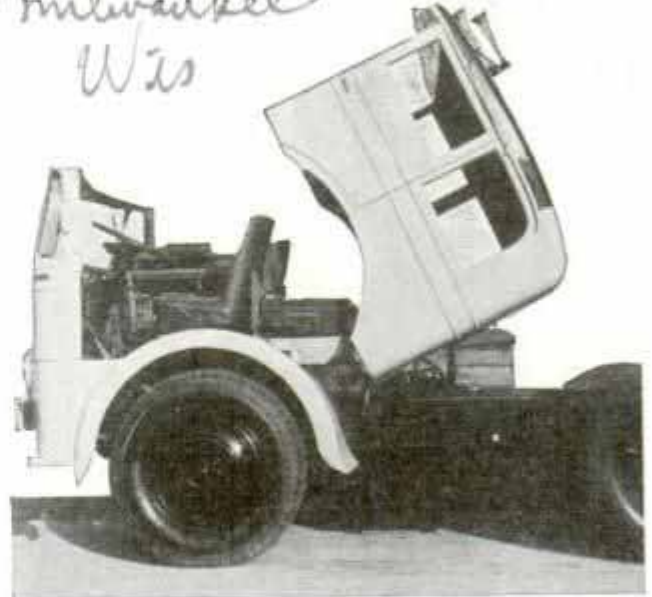
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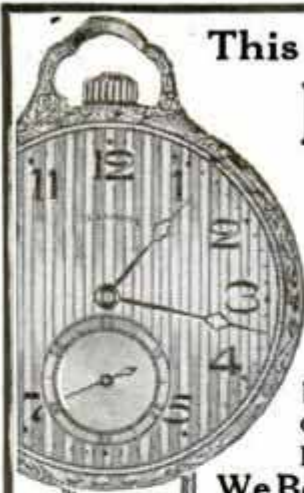
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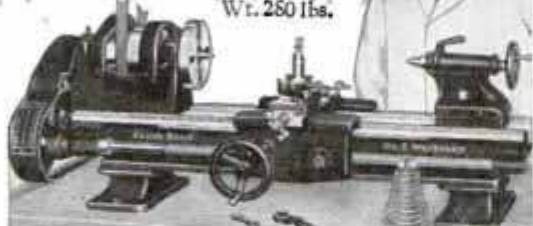
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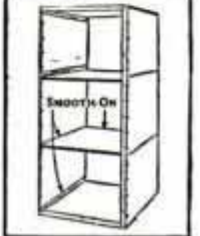
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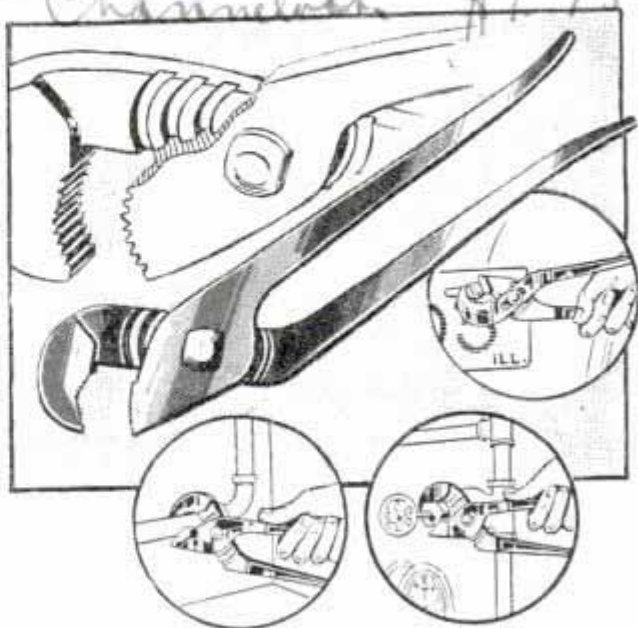
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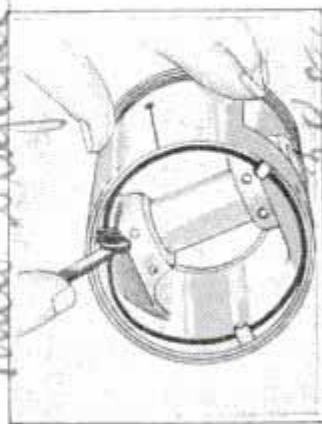
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 consists of a re-  
 sizer ring of heat-  
 treated steel with  
 a self-locking mi-  
 crometer adjustment nut. Adjustments to  
 the half-thousandths of an inch are possi-  
 ble. The resizer is easily installed and is  
 adaptable to thick or thin wall pistons.



*Sample Piston Ring*



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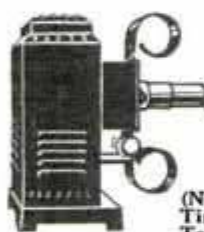
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The Key to the "Top of the Ladder" in Radio Broadcasting, Television, Talking Movies, Photo Cell Control Systems, Cathode Ray Tubes, Sound Recording, Acoustics

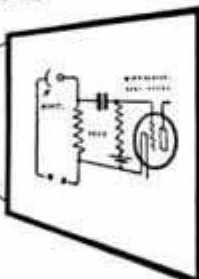
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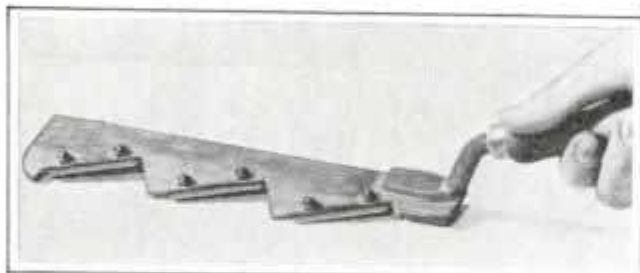
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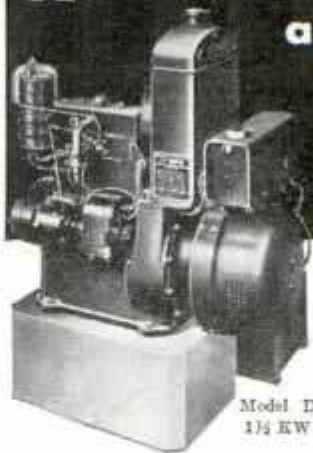
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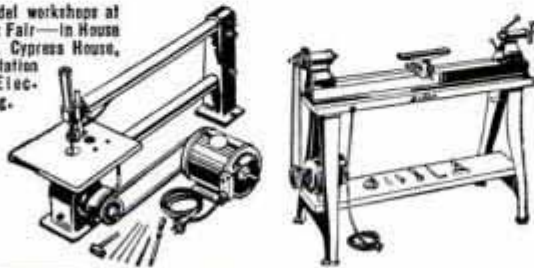
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Most

# SENSATIONAL Money-Making Machine



If you are a man of character—if you have learned the bitter lesson of the last few years and fully realize the uselessness and uncertainty of working for wages—if you have courage enough to start a business of your own—if you are able to stand prosperity and keep right on building a bigger business when you are already making more money than you ever did before, then my invention can easily mean for you the beginning of a glorious new life. To such men I have an offer to make that carries with it opportunities that leave you breathless—for my invention opens to serious men the opportunity that makes the money-making records of the past fade by comparison.

By A. H. Adams

**I** HAVE spent the better part of my life putting other men in money-making businesses. I have made money by doing it. They have made money—much more than I—by accepting my help. Years ago I built and installed the first potato chip machines. The men who bought and operated these machines paid \$1500 each for their start. But the market was there, the chips sold like wild-fire and many of these men cleaned up what they considered "fortunes."

### \$100 a Week on One Contract

Since then I have been responsible for various successful food machines. Just to list the names of those who have made their whole living the past four years with my machines would take several pages this size. Yet not one of my inventions has brought such BIG money to its operators as my potato chip machines. Two years ago I brought out a new potato chip machine. It had two important new features. 1. It produced 33% more chips from the same quantity of potatoes—increased the profit 33%. 2. It turned out a sensational NEW KIND OF CHIP. Undreamed of before my discovery, it made potato chips containing **nine** of the **most important minerals** in the diet. Millions of dollars have been spent advertising the necessity of these very minerals. Chips containing these nine minerals taste different, look different, are different. Sold under the copyrighted trade-mark and name "VITA-SEALD," these new chips were a sensational success right from the start. The machines that made them sold for \$385. Many who bought them have made money right through the worst years in American

history. They are making money today, this minute, as you read these lines. One of them, Riley, wrote just the other day to say that he had a contract for 500 lbs. a week in bulk at 30c a pound—a clear profit of 22c a pound or over \$100 a week on that one contract. If space permitted, I could tell you of many others.

### Finally—a DRY Chip

With the invention of my "mineral" chip, old fashioned chips took a "back seat." Still I wasn't satisfied. Potato chips still had one serious draw-back. They were greasy. Some people couldn't eat them because of their oiliness. It made them hard to digest and sometimes left a bitter taste in the mouth. It caused them to become rancid in the bags, often necessitating "takebacks" from the dealers. The greatest success of my career was the discovery of a process for **extracting excess oil**—actually whirling it off in the air. It gives you a MINERALIZED chip which is CRISP and DRY—free from excess oil—a chip that will undoubtedly sweep competition off the shelves—make money for hundreds of men.

### A \$7000 Business for You!

Now, what does this opportunity mean to you? Just this: I can put into your hands a business—complete in every detail. A machine that has two new automatic features—that turns out large quantities of this amazing new kind of DRY potato chip—complete plans for making and packing your product—exact instructions for getting stores all over your community to sell your chips in bags—exact plans for "cornering" the enormous bulk market. And I can now give you a flying start in this business with my biggest money-maker for the men who run it—at an investment of less than \$200.

### Investigate This Opportunity

Now I know that no reasonable man is going to enter a business without knowing all about it. I don't want you to order a machine. What I do want you to do is send for a book—fully illustrated—in which I explain how to turn \$4.85 worth of materials into \$20 cash in a few hours—how to make DRY, MINERALIZED

potato chips this new way—how to quickly get from 100 to 200 dealers organized—how to get the public to eating your chips, demanding them—how to build up your business and increase your profits—how to earn money right from the start—how at the same time to build a future for yourself that will make you absolutely independent of wages, bosses, time clocks and lay-offs or depressions.

### Cash in Now on Big Season

This book is free. Send your name and address, that's all. No money! Any serious minded adult can have a copy for the asking. No salesman will call. You will not be obligated. But don't delay a single day in sending for this valuable book. The biggest season is just starting. Bag sales are doubling and tripling. The enormous bulk market on bar and tavern sales is opening up right now. In the next few weeks contracts for thousands of pounds will be given out right in your community! Quick action now will enable you to "corner" a big share of this business. Send the coupon below or a telegram today. Get the book, quick. Investigate, analyze the proposition. Check up on my statements, then decide. It can mean much to you, for this is the biggest money-maker I have ever brought out.

A. H. ADAMS, SUITE 55  
500 N. Dearborn St., Chicago, Ill.

## FILL IN AND MAIL

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500 No. Dearborn St., Chicago, Ill.

Send me your illustrated book that shows how to make money at once by your new invention. This is FREE. No salesman is to call. I am under no obligation to buy anything. If I decide to enter the business after I investigate, I have or can get \$195.00.

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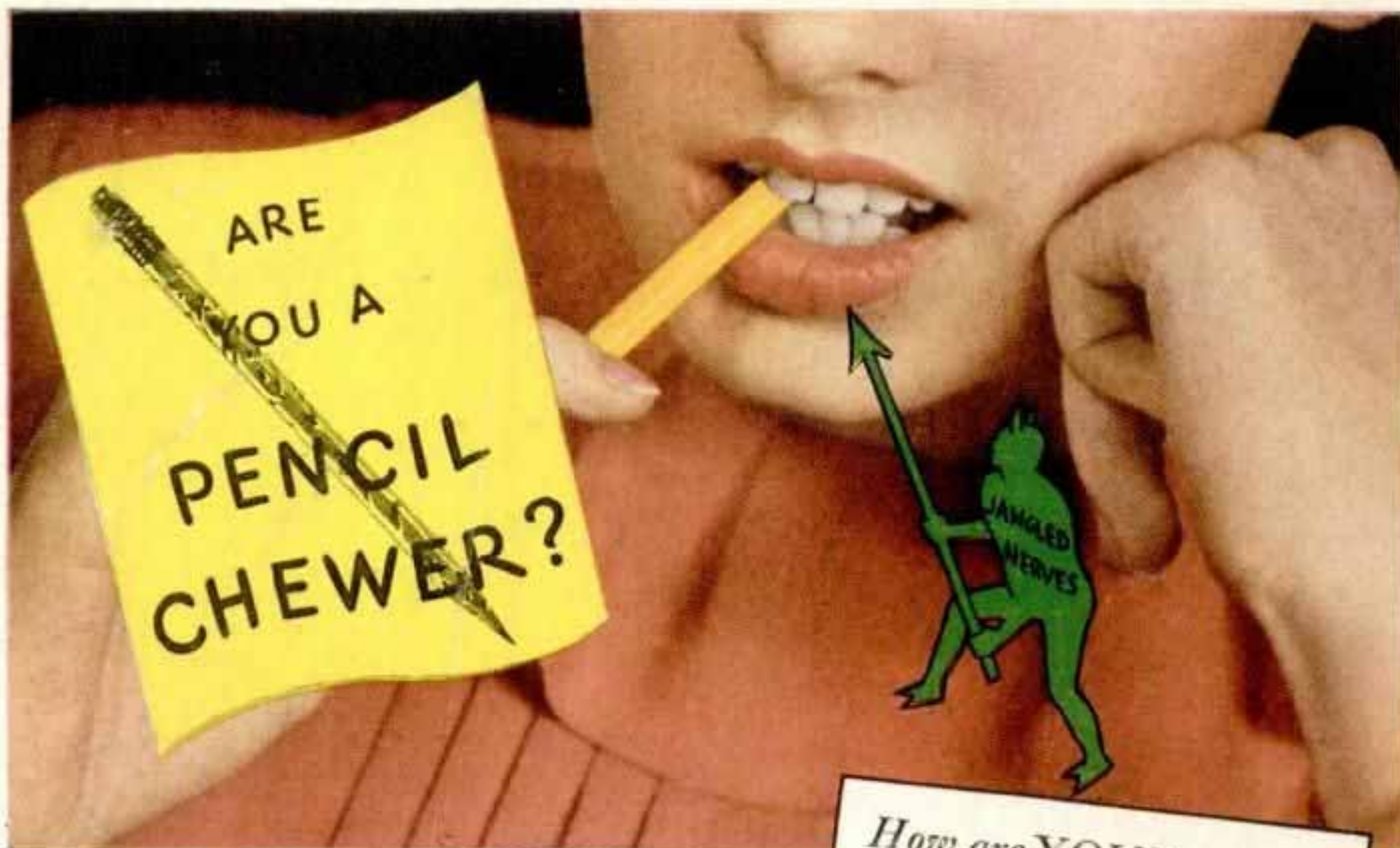
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NOTE: Mr. Adams is known as a man of excellent character, high credit rating and good standing. A successful business man himself, he has the success of many others to his credit. You can make no mistake in investigating his proposition.





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## Watch out for the telltale signs of jangled nerves

Other people notice them—even when you don't—little nervous habits that are the danger signal for *jangled nerves*.

And remember, right or wrong, people put their own interpretations on them. So it pays to watch your nerves.

Get enough sleep—fresh air—recreation—and make Camels your smoke, particularly if you are a steady smoker.

For remember, Camel's costlier tobaccos never jangle your nerves—no matter how many you smoke.

How are YOUR nerves?

TRY THIS TEST



See how speedily you can complete this test. With your left hand (or with your right hand, if you are left-handed) unbutton your vest, *beginning at the top*. Now button it again, *beginning at the top*. If you use more than one hand you are disqualified. Average time for six-button vest is 12 seconds.

Jack Summers (Camel smoker), national professional squash racquets champion, completed the test in 9 seconds.

## COSTLIER TOBACCOS

Camels are made from finer, MORE EXPENSIVE TOBACCOS than any other popular brand of cigarettes!



# CAMELS

SMOKE AS MANY AS YOU WANT  
...THEY NEVER GET ON YOUR NERVES