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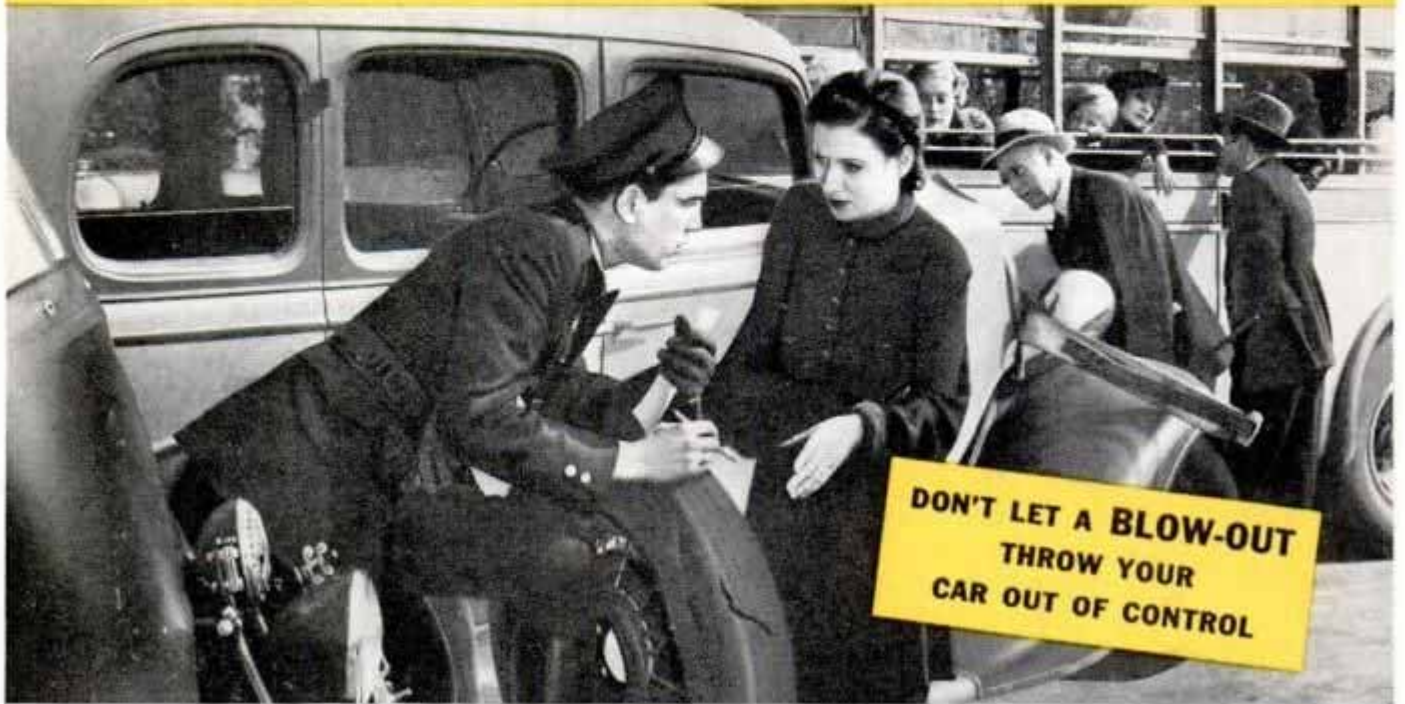


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# Tricks of the Speedboat Aces



# WARNING!



## SILVERTOWNS ARE THE ONLY TIRES WITH THE LIFE-SAVER GOLDEN PLY


**Woman Driver:** "All I remember, Officer, is hearing a BANG! Then the car ran crazy. I guess I'm lucky it wasn't more serious."

**Officer:** "I'll say you are. Do you know that thousands are killed or injured in blow-out accidents every year?"

\* \* \*  
Your brakes and your steering gear may be in perfect shape—but could they hold you on the road if a whirling tire suddenly blew out? The law of averages is all against you, unless you're properly protected.

Goodrich Safety Silvertowns have something no other tire

in the world has—the Life-Saver Golden Ply. This amazing Goodrich invention is a layer of special rubber and full-floating cords, scientifically treated to resist heat generated *inside* the tire by today's high speeds. By resisting *this* heat the Golden Ply keeps rubber and fabric from separating—keeps blisters from forming. And when you prevent the blister, you prevent the high-speed blow-out.

Isn't it better to be *safe* than sorry? Have your Goodrich dealer equip your car with a set of Golden Ply Silvertowns. *They cost not a penny more than other standard tires!* 

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BLOW-OUTS WITH THIS  
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With Life-Saver Golden Ply Blow-Out Protection



# NEW DELTA TOOLS

*will be out soon*

## New 1937 Line to Be Announced Shortly

Many important improvements and new tools of interest to all will be found in the 1937 Delta Line



The New Delta 10-inch Circular Saw, shown in the illustration above in combination with the new Delta 6-inch Joiner, is the largest, heaviest and most completely equipped circular saw yet offered for the home work shop, tool shop, pattern shop, contractor and builder. It has numerous exclusive features that make it the season's outstanding tool.

Year after year Delta engineers continue their work of improving existing models and developing new models of quality, low-cost, motor-driven tools. The coming 1937 season is no exception. Important announcements of new Delta Tools will be released shortly, announcements that will be of tremendous interest to all those who are contemplating additions to their shop. Before selecting new tools—be sure to see the 1937 Delta Line.

## SEND COUPON TODAY!

So Your Name Will Be on Our Mailing List

The new 1937 Delta Catalog will be off the press soon. It will contain full description, illustrations and photographs of the complete Delta Line, including the many new Delta Tools with improvements incorporated in the 1937 line.

Every man interested in low-cost, quality tools should see the new Delta Catalog. In order to make sure that your name will be placed on the mailing list to receive a copy, send the coupon below today. At the same time enclose only 10c for the new 1937 book of "Practical Delta Projects," Book No. 3 containing 32 pages of new and novel things to make, with many blue prints, working drawings, photographs, illustrations—and complete directions. Be sure to mail the coupon at once.

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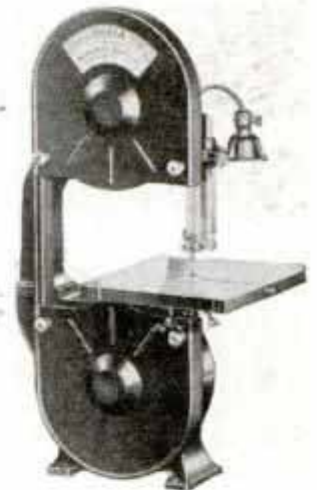
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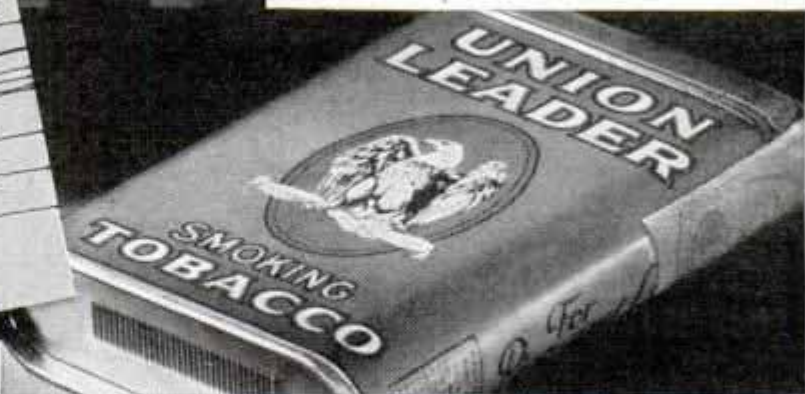




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# Popular Mechanics Magazine

H. H. WINDSOR, Founder

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

September, 1936

Vol. 66, No. 3

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## The New Era of Railroading

OUT of the night a vertical shaft of light moves swiftly toward the crossing, proclaiming the coming of the streamliner on its nightly thousand-mile race to meet the sun. Throngs stand breathless at the trackside, thrilled at its passing. On board, in the aluminum-paneled solarium, passengers check watches and a stewardess telephones the power car to verify the speed. Eighty-seven miles an hour! This is a new era on the railroads. Next month the first of two articles about this new era will take you aboard a million dollar streamliner, show you in eight pages of Coloroto pictures the trains of today and tomorrow, gay, colorful, swift.

## Next Month

EVER vision the day when the air would be so full of planes that stop-and-go lights would be needed to prevent traffic jams? Well, that day is here. Busy airports have so many simultaneous arrivals and departures that they use traffic control systems. Read how it's done next month in "Traffic Officers of the Skyways."

## Up and Down

MEN are looking up and down today into vast regions of mystery. Man-made devices have only traveled about twenty-six miles above the earth and about five miles below sea level. The earth is filled with wealth untapped and the sky above contains waves, "mirrors," radiations and substances vital to life on this planet. Read in October how the frontiers of height and depth gradually are being pushed back.

## The Fix-It Boys

IN EVERY calamity—flood, fire, earthquake or tornado—an "army of generals" goes into action to help restore order and keep things moving. They are the maintenance men of the telephone, electric power and gas companies. Each is a trained man who starts out by commanding himself and gathers his army of volunteers as he proceeds. Read of their heroism next month in "They Keep Things Moving."

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**MOTORISTS WISE**

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# HOW TO SELECT A BETTER SPARK PLUG

**C**HAMPION has recently had the great satisfaction of perfecting, through the use of Sillment, a compressed dry powder seal, what is, to the best of our knowledge, the first completely and permanently gas-tight spark plug. Remote as this development may seem from the average motorist's viewpoint, actually it represents an enormous step forward.

Years of constant research are back of this single advance, but it is only one of a score of similar developments in the last 26 years. All have involved great investments of time and money, in many arts and sciences, human skill and ingenuity, manufacturing and engineering equipment. The sole purpose of this is that Champions will give your car better, more economical and more dependable engine performance.

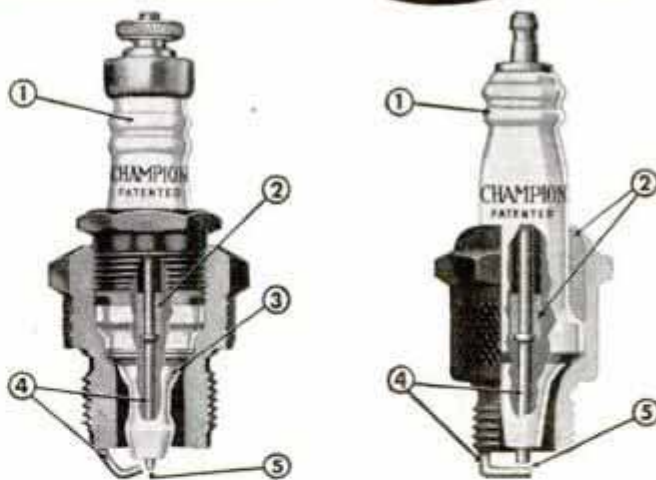
When you buy spark plugs consider the reputation of the maker. Today more than ever before there is no substitute for experience in designing and building spark plugs that will enable your car to perform up to 1936 standards.

Judge spark plugs by those who use them and you will choose Champions. Thirteen consecutive years of supremacy in racing throughout the world, prove conclusively Champions make every engine a better performing engine. In a like period Champions have enjoyed an ever growing preference among the majority of the world's motorists while over 150 makes of spark plugs have appeared on, and disappeared from the market. Today the majority of American automotive engineers as well as the motoring public specify Champion Spark Plugs.

**TO RID YOUR CAR OF MOTOR "BUGS"  
INSTALL A SET OF CHAMPION PLUGS**



**CHOOSE THE  
SPARK PLUG  
CHAMPIONS  
USE**



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**④ ELECTRODES**—Special alloy with catalytic agent to prevent bridging of gap—oxidation or carbon formation on the wire itself. Covered by broad and exclusive Champion patents.

**⑤ GAP**—The form of gap as well as machine operation employed in forming gap is patented.





Lou Meyer, left, Only 3-time Winner of the Indianapolis 500-Mile Auto Race, Receiving the Pyroil Silver Trophy from Frank Brisko, Competing Driver.

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# Plan Your Future

## Choose Your Field NOW For Success

Will you master fate or will fate master you? That's a question deserving your honest answer . . . right now! Actually it is all up to you. You can do with Life almost what you will. LaSalle will help you establish yourself for real success by providing you with the comprehensive, specialized training for which it is so famous. Choose your field . . . now! Check the coupon below for the free booklet you want us to send you. It can be your first step toward assured success.

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## For Clean-up King I Nominate . . .

By Lou Gehrig

*New York Yankee's Clean-up Ace Makes  
Novel Choice for All-Time Honor*

I DON'T need to tell baseball fans how important the "clean-up" (number-four) man is in the batting line-up. With three good hitters batting ahead of him, his wallops bring in the runs.

I have watched some of the most famous "clean-up" men in the history of the game. But the other day I had the pleasure of seeing the "clean-up" king that gets my vote for the "all-time" honors. Strangely enough, this "clean-up" king isn't a slugger at all. Instead of cleaning up the bases, this one cleans up faces.

While in Boston playing the Red Sox, I made an inspection trip through the Gillette Safety Razor factory. There I discovered that what is true of baseball is also true of Gillette Blades. In baseball, the pick of the raw material is tried out, tested, and trained for the big league teams. At the Gillette factory I found that they buy only the finest steel, and put it through gruelling tests before it is made into Gillette Blades.

For instance, like a rookie baseball player, Gillette Blade steel has to be hardened and tempered. To do this, Gillette uses electric furnaces, each one controlled by a device which can tell in an instant if the steel passing through the furnaces requires more heat or less heat. Faster than a speed-ball, the signal is flashed to a great battery of switches, and the heat is raised or lowered accordingly.

Then grinding machines, adjustable to 1/10,000 of an inch give Gillette Blades shaving edges so keen you can't see them, even with the aid of the most powerful microscope.

These are some of the reasons why I nominate the Gillette Blade for all-time Clean-up King. For when it comes to cleaning up on stubborn bristles, with the greatest of ease and comfort, Gillette hits a home run with the bases loaded.

*With these important facts before you, why let anyone deprive you of shaving comfort by selling you a substitute! Ask for Gillette Blades and be sure to get them.*

**GILLETTE SAFETY RAZOR CO.  
BOSTON, MASS.**

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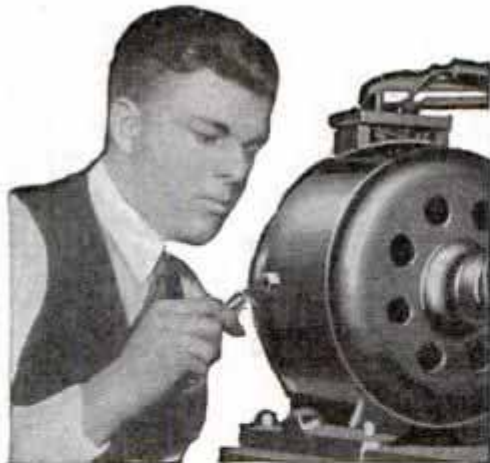
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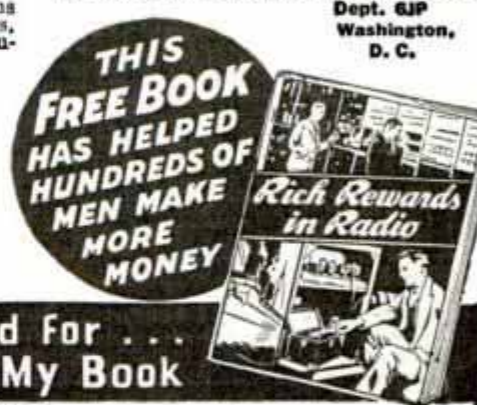
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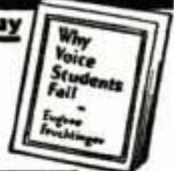
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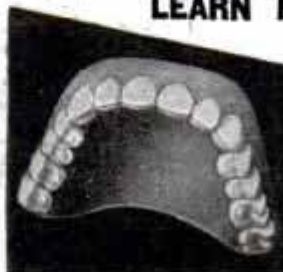
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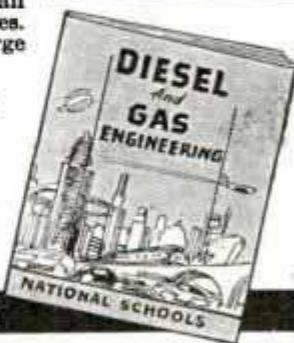
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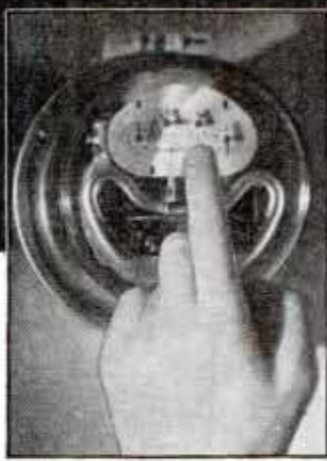
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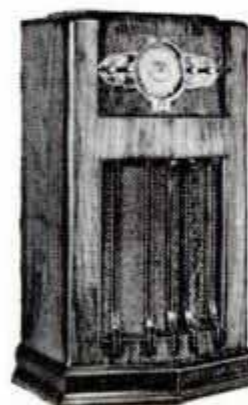
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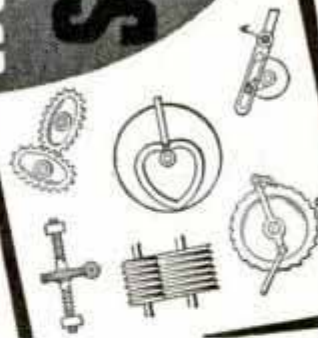
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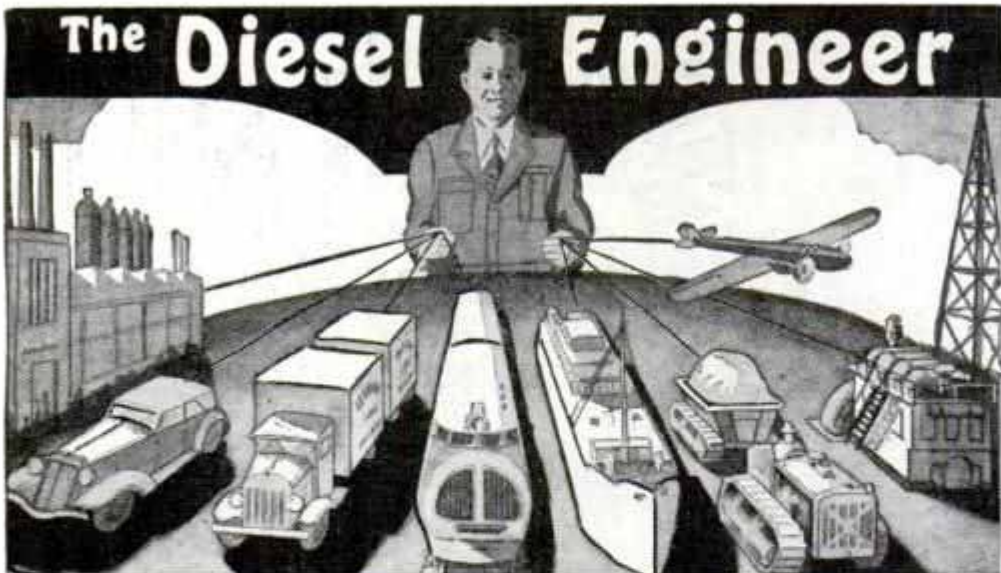
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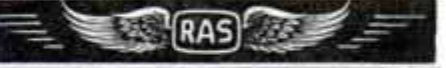
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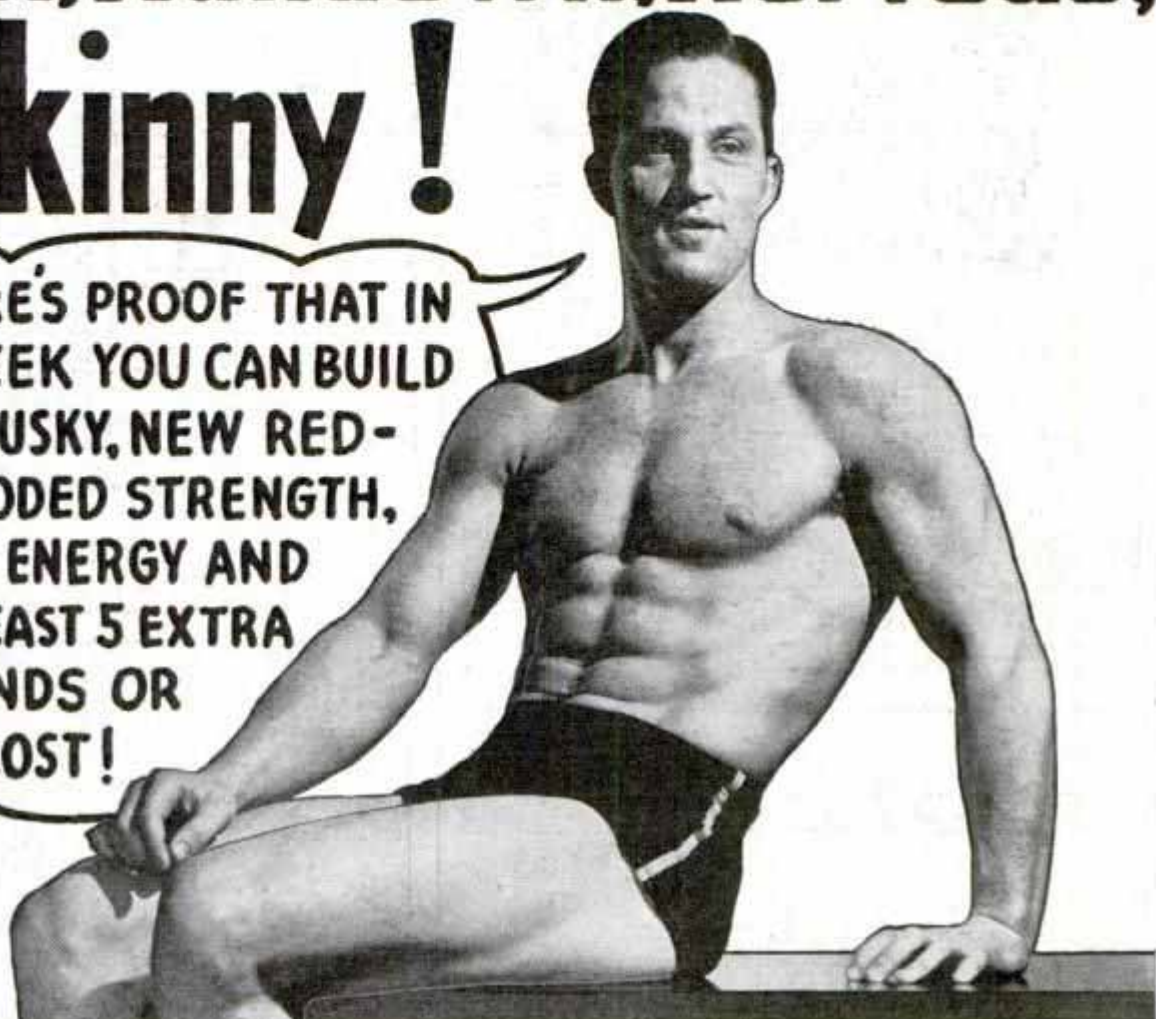
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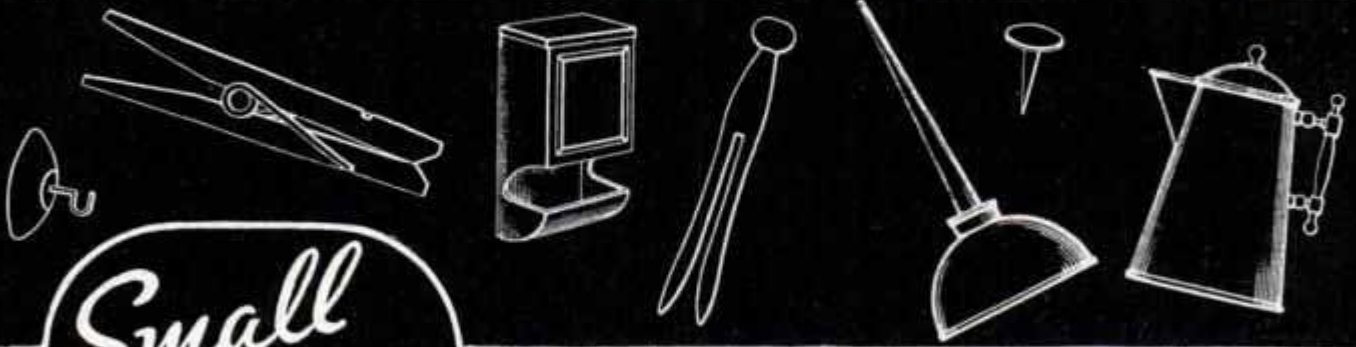
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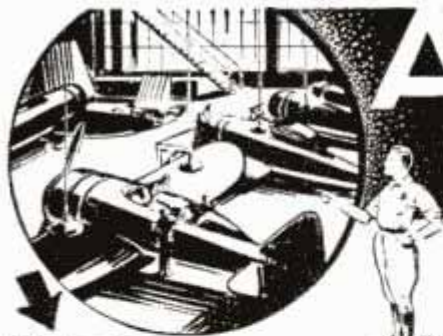
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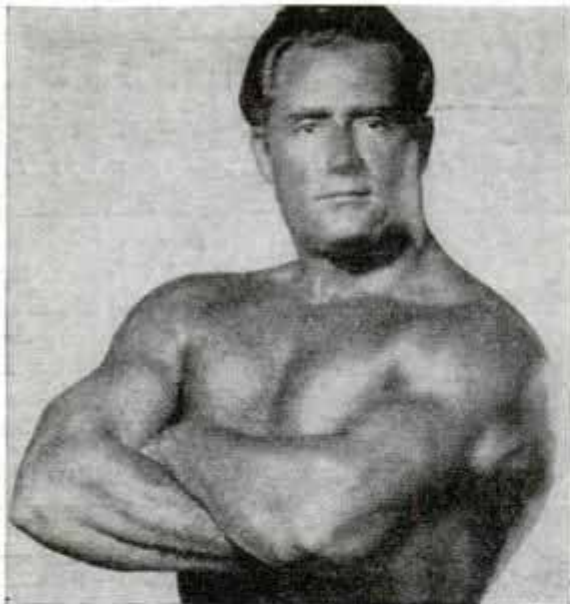
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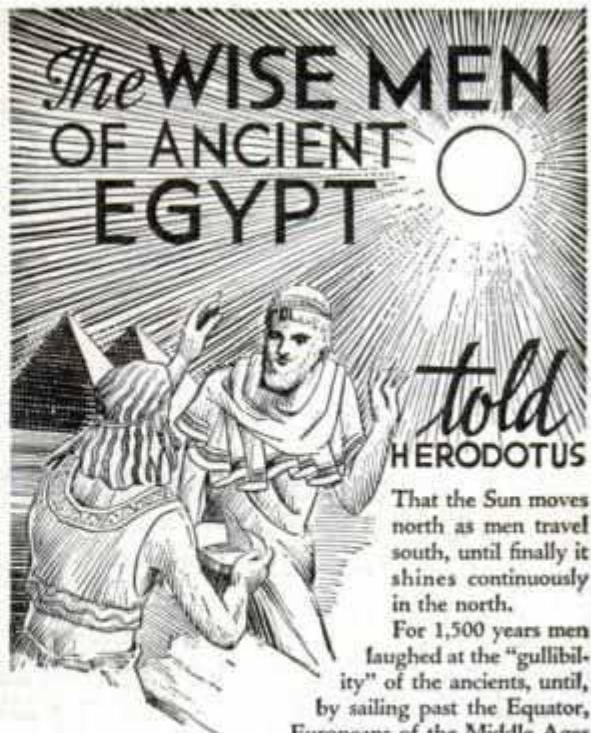
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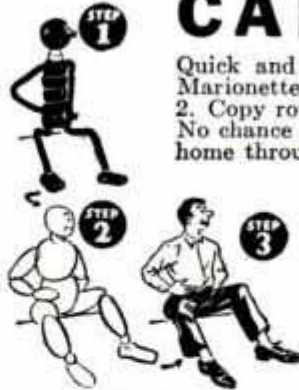
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(Continued to page 50A)



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# CLASSIFIED

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Popular Mechanics Magazine, Chicago, Ill.

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**PARTS** for the Popular Mechanics "Family Trailer" featured in the February, March and April issues. Everything you need—Axle, hitch, wheel housings, water tank, pump, toilet, sink, stove, wood parts, windows, screens lights, cushions, etc. Send for price list. Include 25c for our big catalog and Trailer Builders' Manual. Trailer Supply Co., 410 Grand Ave., Wausau, Wis.

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**PROPELLERS**, Stuffing boxes, gear pumps, bearings, etc. Wm. Baker, Pond St., Quincy, Mass.

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16MM BELL Movie camera \$6.95. Write today. Bytom, Park Ridge, Ill.

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SW CRYSTAL Set—4250 mile record. Instructions 18 distance models; "Radiobuilder" year; 25c. Laboratories, 151-C Liberty, San Francisco.



**RADIO** Engineering, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Ames St., Valparaiso, Ind.

**SHORTWAVE** One tube receivers. Powerful! Can receive foreign stations, police, amateurs, airplanes, etc. Also regular broadcast. Guaranteed results! Compact, easily portable. Inexpensive dry battery operation. Metal chassis, panel, and every part needed to build this amazing receiver. Only \$1.25, postpaid. Complete, simple instructions. Order today! Send stamp for illustrated literature. Ace Radio Laboratories, 1619 Broadway P-9, New York, N. Y.

**RADIO** Experimenters and set builders; parts and kits of parts for portable Superhet battery. Improved Little Giant four and five tube, Economy Three, 32 Volt, and Auto radio described by Popular Mechanics. Lund Manufacturing Co., 43 East Ohio, Chicago.

**RADIO.** All phases. Amateur, shortwave, experimenting, set building, broadcasting, servicing, etc. Complete list recommended books free. Popular Mechanics Press, Room (C36), 200 E. Ontario St., Chicago.

### MUSIC AND MUSICAL INSTRUMENTS

**LATEST** Song hits 30 cents postpaid. Catalogue free. Zerse Distributing Co., 210 Olive, St. Louis, Mo.

**SONGWRITERS!** Poems, melodies. Special offer. Studio PM, Guaranty Bldg., Hollywood.

**WRITE** A song. Home, love, comic, any subject. Send poem today for wonderful proposition. Richard Bros., 24 Hyde Park Bank Bldg., Chicago.

**SONG** Ideas wanted for radio, movies, etc. One good song may make your fortune. Write for free booklet of professional information for song-poem or melody writers today. Standard Song Service, 1412-F Great Northern Bldg., Chicago.

**POEMS.** Set to music. Published. Free examination. Send your poems. McNeil, Bachelor of Music, 1582-PM West 27th St., Los Angeles, Calif.

**PHONOGRAPH** Record of your song. \$2.50 postpaid. Rainbow Recording Studios, 210 Olive, St. Louis, Mo.

**SONG** Poems set to music. \$15.00. Includes free phonograph record. Zerse Bros., 210 Olive, St. Louis, Mo.

**SONGWRITERS!** Outstanding collaboration offer. Hibbeler, D1, 2157 No. Avers, Chicago.

**HARMONY** And music arranging in 20 easy lessons. Particulars free. Lew Gould, Peace Dale, R. I.

**MUSIC** Composed to song poems. Our published songs endorsed and featured by stage, radio, screen celebrities. Adelman Bros. Music House, Dept. 601, Washington, D. C.

**SONGWRITERS**—Send for free copy of booklet revealing Secrets of Successful Songwriting, free rhyming dictionary and market information. If you write poems or melodies, send for our offer today. MMM Publishers, Dept. E1, Studio Bldg., Portland, Ore.

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

**SONG** Poems wanted. 50-50 plan. Instruction book sent free. Song Bureau, Salem, Indiana.

**SONGS** Published, arranged and composed, royalty basis. W. Coast Music Pub., 942 Market, San Francisco.

**SONGWRITERS**—Get all inside facts. Free booklet by famous Broadway composer. Songwriters Institute, 1234C Broadway, New York.

**SONGPOEMS** Wanted. Your song published. National Songland, "PM," Thomaston, Maine.

**SONGS!** We compose, arrange, publish, sell. Superior Song Studios, 211 Hope Ave., Passaic, N. J.

**EARN** Your own musical instrument. Get free details and free attractive savings bank at your music store, or write Fred Gretsche Mfg. Co., 521½ So. Wabash, Chicago.

**WRITE** Songs. Big money and reputation. Write for information. J. Gordon Pub. Co., 201 N. Hoyne Ave., Chicago.

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

### BUSINESS OPPORTUNITIES

**\$7-\$30 DAILY.** Start own roofing business, 100% pure asphalt roof paint, ready to melt and apply, in 50 gallon drums only, for \$8.80 f.o.b. Guaranteed. National Pure Asphalt Co., Manteno, Ill.

**ARTIFICIAL** Marble sanitary flooring, instructions covering wood or cement flooring ½ inch thick, fireproof, all colors, low cost, ornamental casting, concrete, plaster, papier-mache, garden furniture, statuary, flexible molds, particulars free. Chris Mahler, Elmont, N. Y.

**MAKE** Fast selling products at home. Formula catalog free. Kemico, 54 Park Ridge, Ill.

**LEARN** Men's hat cleaning business, some have made a \$1000.00 a month cleaning hats. Full written course for \$2.00, with formulas and advice of men that have been in the business 30 years. Roselle, 111-E 6 St., Cincinnati, Ohio.

**PROFITABLE** Schemes, 10 formulas, other information. 25 cents. Wright, 816 West Florence, Los Angeles.

**VEGETABLE** Concentrates, powders, tablets, vitamins making fortunes. Mail order, local. Samples 12c. Gardena Laboratories, Drawer 1310B, Hollywood, Calif.

**START** Profitable mail order business. New way, inexpensive. Wonderful opportunity. Information for stamp. F. Jennings, 611 Washington Blvd., Baltimore, Md.

**"TURNING** Ideas into cash." Send for our free literature. Globe Trade Service, 135 West 17th Street, Anderson, Indiana.

**"LORD'S** Prayer engraved on your penny" will average you \$75.00 per day. Price of machine complete, \$160.00. Send 10c for samples and facts to "Blue Dot" Stamp Co., 124 E. Larned St., Detroit, Mich.

**BARGAINS**—Paint spray outfit, gasoline engine drive. Terms—trial. Helmic Paint Spray Exchange, M964, Troy, Ohio.

**NO Boss!** Sure cash! Silvering mirrors, autographs, reflectors. Combination outfit. Write. Sprinkle, Plater, 127, Marlon, Ind.

**MONEY** In mushrooms! Start now. In cellar or shed, get highest prices. Exclusive new process. Bigger, better, quicker crops. We buy. Books free. American Mushroom Industries, Dept. 679, Toronto, Ont.

**MAIL** Business. Start small. Everything furnished. Free details. Metromails, P-9 Cincinnati.

**MAKE** Big money. Home or traveling. Do ordinary lettering from patterns for merchants. No investment. Pays at least dollar an hour. Stamp for details. Allen, 912 South Ave., Plainfield, New Jersey.

**MOLD-MAKING** Free: Our new rubber composition. Quick set, produces high glossy face finish. Produces glossy casts from molds. Our new marble powder mixed with water produces imitation marble glossy flint-like hardness. Wonderful for novelties and building trade. Start independent business. Sample mold, cast and assorted samples. Send dime to cover mailing. Cowell Institute, Grayling, Mich.

**67 PROVEN** Money making plans, 25 cents. Frank Turack, 127 Starr Bldg., Export, Pa.

**SUCCEED** With your products. Formulas, processes, analyses. Catalogue free. B. Thaxly Co., Washington, D. C.

**HANDLE** Delectable noon dates. Write C. W. Clark, 4905 Meridian St., Los Angeles.

**BIG** Profits operating "route" penny peanut and gum vending machines. Start with \$100. Robbins Co., 1141P DeKalb Ave., Brooklyn, N. Y.

**LEARN** Real secrets mail order success. 6190 word circular free. Stamp appreciated. Steininger, 404 Cedar Ave., Pittsburgh, Pa.

**WE** Start you in business, furnishing outfits and instructions, operating "Specialty Candy Factory" home. Men and women, earn \$25.00 up to \$75.00 weekly, all or spare time. Booklet free. W. Hillyer Ragsdale, Inc., Drawer 4, East Orange, N. J.

**EARN** More money stenciling. Decorate walls, furniture, etc. Illustrated instructions \$1.00. Free stencils with order. Eisenmeyer, 3700P Frankford, Baltimore, Md.

**TIPS** Magazine, Paulding, Ohio, tells how to make money easily, quickly, honestly. 8th year; \$1.00; trial six months, 30 cents. Learn how! Win! Subscribe today!

**WHERE** To buy thousands of items at lowest wholesale prices; information free. Yorena, Box 312, Bayonne, N. J.

**MRS. M.** earned \$267, three weeks, raising mushrooms in cellar! Exceptional, but your cellar, shed perhaps suitable. We buy crops. Book free. United, 3848-A65 Lincoln Ave., Chicago.

**HOW** And where to obtain capital fully explained, particulars free. Star Service, Wapakoneta, Ohio.

**WONDERFUL** Opportunity in exterminating business. Be your own boss. Free details. Manager, Box 14, Clinton Hill Station, Newark, N. J.

**OPEN** New York office at Times Square for personal or business purposes. Increase sales, add prestige. Room number unnecessary. Mail forwarded promptly. Only \$1 monthly. Paramount Office Service-E, 130 West 42nd, New York.

**"KEY** To Prosperity." Particulars free. Jene Kreidler, 54 Garrison, Bethlehem, Penna.

**1000** MONEYMAKING Offers 25c. Dixie Mailers, King, N. Car.

**WE** Teach you new business, then buy your product. Write Superior Specialties, Springfield, Illinois.

**MAKE** Artificial marble, glazed tiles, uncanny. Tabletops, plaques, sanitary floors, whetstones, imitation wood. Inexpensive, fireproof. Unbelievably colorful tile and liquid rubber samples 3c. John A. Payn, 945 Grande Vista Avenue, Los Angeles, Calif.

**MECHANICS** Hand soap. (Powder form) formula \$1.00. R. Barton, 2403 Brownsville Rd., Pittsburgh, Pa.

**PROFITABLE** Sparetime business at home, dependable income. Particulars for stamp. Colonial, 7867 - 79th Lane, Glendale, N. Y.

**WHOLESALE,** Retail, complete instructions 50c. "Opportunity," 1351 Peachcourt, San Jose, Calif.

**I WILL** Send you a guaranteed plan for \$1.00 (coin) in which you can enter a lucrative business for \$5.00. Why work for someone else? Address J. C. Brookes, 1286 Sunset Blvd., Los Angeles, Calif.

**POPCORN,** Crispette, carmelcrisp, potato chip, salted nut machines. Long Eakins, 1960 High St., Springfield, Ohio.

**PROFIT** With new products. Make, sell, repeat. Analysis. Research. Guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, BD-1142 Sunnyside, Chicago.

**CORRESPOND** For newspapers; profitable, interesting. Easily learned. Write Publishers' Service Bureau, 4258-F Drexel, Chicago, Ill.

**COLD** Winter ahead! Earn \$50 weekly income by Thanksgiving. Easily possible with limited capital in practical, sensible, mail order business. Send dime for "Key to Self-Earned Wealth." Midas, 10 West 26th, Minneapolis, Minnesota.

**FOR** Sale or consolidate, big manufacturing machine shop, boiler shop, oil burners, water heaters, steam heaters, road machinery. Twenty-five thousand dollars required. Peerless Machinery Mfg. Co., 2020 E. 12th St., Oakland, California.

**"MASTER** Mail Order Plans" are profitable. Free. Naro, Frankford, Delaware.

**PATENT** Application, partner wanted—electricity. Charles Powers, San Mateo, California.

**WANT** A paying job? For particulars write Baker, 5509 Winthrop, Chicago.

**EXTRA** Money! A practical idea you can work at home. Clenco, Box 17, Verdun, Que., Canada.

**NEW** Beauty, barber shop products! Sell by mail! Henkle Products, Norwich, Conn.

**MAIL** All-profit cards; sample, article, 25c. Midget, Warmsprings, Ga.

**COMPLETE** Chemical service, analysis, formulas, processes, trade secrets. Particulars free. W. L. Cummings, 228 Gordon Avenue, Syracuse, N. Y.

**BECOME** An expert account collector. Exceptionally profitable. Write Cole Associates, Syracuse, N. Y.

**OPERATE** Chain world's finest money making vending machines. Sells four products—same time. Instant success! Small capital—profits immediately. No curiosity seekers. Penny King, 1233 Chouteau, St. Louis.

**BIG** Profit. Sell books, plans, by mail. Particulars stamp. Corcoran, 8224 Jersey St., Portland, Oregon.

**NEW** Interesting proposition. Make money without leaving your home. Details for stamp. R. L. Geeslin, Dept. PM, Wynnton, Columbus, Georgia.



**DOLLARS \$10,000—"Moore Made" it.** Plan 10c. "MooreMade," Lapeer, Michigan.

**NOT** Colossal, not stupendous, just ordinary sensible offers. My circulars convince you. George Walker, 81P School St., Brunswick, Maine.

**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. Brenner, 257 South 21st, Philadelphia.

**BIG** Mail 10c. Milton Boss, 2007M 34th St., Rock Island, Ill.

**"TURN** Ideas into cash." Free details. Martinez-PM, San Bernardino, Calif.

**POPCORN** Poppers, roasters, kettles, new, used. Salesmen wanted. Northayde, 2117-Harding, Des Moines, Iowa.

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

**"SCHEMER** Magazine." Alliance, Ohio, prints schemes, ideas, business starters, formulas—big winners; \$10,000 to \$50,000 reported. 38th year; \$1.00. Trial special: Six months only 30c.

**PLASTEX** Industries offers industrious men an opportunity to start a business of their own, manufacturing art goods, novelties, souvenirs, etc., in Plastex and marble imitation. 5c material makes \$1 articles. Rubber moulds furnished for speed production. Small investment brings big returns. You are just in time for the big 1936 business. Write for interesting booklet mailed free. Plastex Industries, Dept. A, 1085 Washington Ave., New York.

**FREE** Booklet describes 107 plans for making \$20-\$100 weekly, in home or office, business of your own. Elite Co., 214 Grand St., New York.

**GET** Lots of mail. Money making offers, etc. Your name in 10,000 directories, 25c. Roscoe, 4627 Glenshade, Cincinnati.

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

**I WANT** To send you proof of the wonderful pulling power of Popular Mechanics Magazine's classified pages. What's your proposition? Write me today. F. W. Johnson, Manager, Classified Advertising, 200 E. Ontario St., Chicago, Ill.

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

### MONEYMAKING OPPORTUNITIES

**10c BRINGS** Copy National Mail Order News, Box 1773-PMS, Roanoke, Virginia.

**HUGE** Earnings spare time. Big mails. Details for dime. Stuart Publications, 1457 Broadway, New York.

**SAWDUST** Chemicals makes colored marble floors. Plan \$1.00. Universal Supply, 777 Boulevard, Bayonne, N. J.

**MAKE** Money selling real estate without charging commission to either buyer or seller. Complete guaranteed instructions, forms, letters only \$1.00. Gommels, 1013½ West 21st, Oklahoma City, Okla.

**TEN** Mailorder opportunities. Circulars 10c. Mitchell, 1008 Commercial, Waterloo, Iowa.

**40 WAYS** To profit, 10c postpaid. Kent Specialties, Eldorado, Texas.

**TYPISTS**—Earn cash selling names. Stamp brings details. Miller Service, 462 Berwick, Easton, Pa.

**PROSPERITY** For home workers. 52 page magazine. Sample, dime. Sizemore, 4917 N. Kostner, Chicago.

**1000** MONEYMAKING Ideas, book 50c; literature free. Harvey Teeple, Decatur, Ind.

**150** OUTSTANDING Money-making ideas. Only 35c complete. Enterprise Bureau, Syracuse, N. Y.

**"HOME** Factory." Start in business for yourself. Details. Elyte Supply, Linden, N. J.

**SUCCEED** With your products. Make-sell them. Learn how. Formulas. Processes. Analyses. Catalogs, circulars free. B. Thaxly Co., Washington, D. C.

**BIG** Money at home plating auto parts, reflectors, mirrors, chandeliers, by late method. Experience unnecessary. Free particulars. Gunmetal Co., Ave. N., Decatur, Ill.

**FREE** Booklet describes 107 plans for making \$20-\$100 weekly, in home or office, business of your own. Elite Co., 214 Grand St., New York.

### FORMULAS, PLANS, ETC.

**FORMULAS**—Exterminate ants, roaches, mice, flies, etc. Baic, 1150 Leonard, St. Louis, Mo.

**GUARANTEED** Formulas—New fast sellers. None better. Lowest prices. Catalog free. Kemico, 49, Park Ridge, Ill.

**GUARANTEED** Formulas, two for one dollar. Special sealing compound for valves and piston rings, carbon removing liquid, automobile body polish, composition for fireproofing paint, tooth pastes, hair tonic, many other formulas. O'Neill's, 1475 Madison Ave., New York City.

**500** MONEYMAKING Formulas 25c. Descriptive literature free. Harvey Teeple, Decatur, Indiana.

**CHEMICAL** Analysis. Formulas. Mail sample. Dobin Laboratory, 1746 Roscoe, Chicago.

**BEAUTY** Formulas. Ten for \$1.00. Beauty Shop, 126 Lexington Ave., New York.

**ANY** Formula 30c or money back. Catalog free. Ogg Laboratories, Tampa, Florida.

**SUCCEED** With your products. Formulas, processes, analyses. Catalogue free. B. Thaxly Co., Washington, D. C.

**ANY** Formula, analyzing, assaying, chemical research. \$75,000.00 laboratory equipment. Formula Supply, 6138 Trumbull, Detroit, Mich.

**ANY** Formula \$.50, three \$1.00. Colo Laboratories, Bryant Pond, Maine.

**ANALYSIS.** Research. Newest guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson Chemist, BD-1142 Sunnyside, Chicago.

**CHEMICAL** Analysis. Reasonable. Reliable. David Bros., 541 West 68th, Chicago.

**500** MONEYMAKING Formulas 20c. Interesting literature free. Ideal Book Shop, Park Ridge, Ill.

**MECHANICS.** Make your own soap. Formula 25c. The Powell Co., 305 South 37th St., San Diego, Calif.

**ICELESS** Ice! Colder! Cleaner! Cheaper! Instructions, 25c. Duffy, Covington, Ky.

**EXTRAORDINARY**—Wealth using formulas. Large catalogue free. Brown's Formulary, 212 East Waters, Tampa, Florida.

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

**FORMULAS**—Latest money makers. Literature free. Belfort, 4042 N. Keeler, Chicago.

### CHEMISTRY

**SEND** 25c For new illustrated chemical experiment book with over 300 formulas and tests. Also receive 32 page illustrated catalog of apparatus, microscopes, telescopes and chemicals free. Z. Winn, 124 West 23 St., New York.

**SUPPLIES** For chemistry students. Catalogue 5c. Book catalogue free. Handbook for chemical experimenters, hundreds of instructive experiments, 50c. Reading Scientific Company, Reading, Penna.

**CHEMICAL** Analysis and industrial problems. Estimates free. Esco Laboratories, 2206 Lycaete, Detroit, Michigan.

**FREE** Chemistry catalogs. Supplies at 5c! Equip complete laboratory. Send 10c for postage and handling. Kemkit Corporation, 135P Johnson Street, Brooklyn, New York.

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

### AGENTS WANTED

**SOMETHING** New. A real opportunity selling and installing new mouldable firebrick material. In warm-air furnaces, repairs cracked firepots, sealing all cracks and holes; saves cost of new firepot castings. In stoves, replaces burned firebox castings or stove tile. Easily installed—you make \$10 profit on average furnace job. No competition. Start your own business representing AAI company. J. Edward Casey, 176 W. Adams St., Chicago, Ill.

**\$3.50** PEANUT Vendor! Make big easy money with America's leading low priced penny machine. Large manufacturer will show you how. Walzer Co., 426 Stinson Blvd., Minneapolis, Minn.

**NEW Cleaner**—Amazes everybody. Cleans everything. Washes clothes snow-white quickly. Spots, stains removed like magic. Startling demonstrator. Free samples make fast sales. Quick repeater. Immense profit. Write quick for "free sample." Super-X Cleanser Co., 11, Berwyn, Illinois.

**MANUFACTURER** Offers big daily commissions, steady employment, liberal cash bonuses. Complete new summer line tailored shirts, neckwear, dress and work pants, uniforms. Experience unnecessary. Part or full time. Outfit free. Write today. Packard Shirt Corp., Dept. 323, Terre Haute, Ind.

**GREETING** Cards wholesale. Liberal profits. Sery, 437 North 41, Milwaukee.

**THYDRO-X** (Extra miles). Fast seller! Brand new! Tremendous profits! Million dollar market waiting. \$20.00 premium offer free. P-Thermo Works, Peoria, Ill.

**PROFIT** With new products. Make, sell, repeat. Analysis. Research. Guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, BD-1142 Sunnyside, Chicago.

**MANUFACTURER** Wants local man—Represent line fine shirts with new Trubenzol starchless collars. Ties, underwear, hose also. Exceptional values. Maker to wearer. Large earnings daily; cash bonuses regularly. No investment. Expensive outfit free. Write Dept. P9, Quaker, Broadway at 31st, New York.

**ATTRACTIVE** Three color Roosevelt. Landon license plate emblems; 15c sellers. Transportation paid; big profits. Peegee Sales, 445 Riverside Drive, New York.

**CHRISTMAS** Cards—50 beautiful folders, name imprinted, cost 65c, sell for \$1.00. Samples free. New England Art, North Abington, 206, Mass.

**INITIALING** Automobiles biggest money maker today. New type requiring no varnish to apply. Write for samples. International Monogram & Transfer Co., Box 6365, Philadelphia, Pa.

**PLEASANT** Work, good pay daily. 25c household necessity. Southern Products, Enid, Okla.

**STRANGE** Ironing cord. Saves electricity. Abolishes scorching and kinking. For telephones also. 150% profit. Sales guaranteed. Big free offer. Neverknot, Dept. 9A, 4525 Ravenswood, Chicago.

**300% PROFIT** In new self-starting no-flint cigar lighter. Retail 50c. Sample 25c. Get details quick on wonder seller. New Method Co., Box PM-45, Bradford, Pa.

**EASIEST** 25c Seller. Has thousand uses. Simple demonstration gets the money. Sample 25c. Dozen \$1.50. Don't pass this up. Farmer, 645 West 66th St., Chicago.

**MAKE** More money selling shirts, ties, underwear, dresses, hosiery, raincoats, jackets, pants, uniforms. Sales outfit free. Nimrod Company, Department 8, 4922-28 Lincoln Avenue, Chicago.

**A BUSINESS** Of your own—Making sparkling chipped glass name plates, numbers, checkerboards, medallions, signs. Illustrated literature mailed free. E. Palmer, 254, Wooster, Ohio.

**AMAZING** New chemical discovery keeps trousers creased for entire month. Saves tailoring bills, gives crease knife-like edge. Write for sample and details. Prairie Gopher Co., Cleveland, No. Dak.

**EXCELLENT** Trouserpresser, stretcher, creaser, hanger \$1.00. \$7.00 doz. Perfect pants hanger stretcher 10c. 60c doz. Get circulars. Widness, 208 Van Buren St., Brooklyn, N. Y.

**\$6.85** HOURLY! Amazing No-Flatz fixes punctures without patching; makes tires puncture proof! Instantly—permanently seals holes made by nails, etc. Big seller. Free sample offer. No-Flatz, Dept. E-172, Cincinnati, Ohio.

**WISE** Home worker and spare time money makers will send immediately for free details of new "Silent System" business. No canvassing. Harry Julius, Amarillo, Texas.

**NO** Boss! Sure cash! Silvering mirrors, autographs, reflectors. Combination outfit. Write. Sprinkle, Plater, 128, Marlon, Ind.

**DO** You want agents for your proposition? Your ad in this space will place your message before hundreds of men seeking fast-selling products. My folder "How to Secure Agents" is filled with proof. I'll gladly send you a copy free. F. W. Johnson, Manager Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

**AGENTS** Wanted to sell Lik-Nu paint cleaner to home owners. Good profits. Lik-Nu Co., 6730 S. Halsted, Chicago.



**500% PROFIT** Automatic gas lighter. No flint. 25c seller to every home, office and restaurant. Free sample. New Method Co., Box PMG-43, Bradford, Penna.

**GOLD** Reflecting letters for store windows. Large sizes penny each. Free samples. Modernistic Sign, B-3004 Lincoln Ave., Chicago.

**CHRISTMAS CARDS!** Absolutely finest assortment. Big profits. Write for samples. Robinson Cards, 200 Orange, Clinton, Mass.

**IF** You want to get groceries and household supplies at wholesale, and a wonderful chance to make up to \$15 in a day besides, send me your name immediately. No experience necessary. New Ford sedans given to producers as bonus. Albert Mills, 2909 Monmouth, Cincinnati, Ohio.

**GUARANTEED** First quality razor blades. 100 double edge, \$.75. 100 single edge, \$1.00. Prepaid. Bonomo, Box 87, Sta. S., Brooklyn, New York.

**SELL** By mail. 100 choice plans \$1.00; 50-50c; 24-25c. Wholesale directory free. Voxco, B-923-M, Denver.

**CLEAN-E-ZE** Polishing cloth sells on sight, 12x12 sample 20c. Para-Sweet Co., Pleasantville, N. J.

**GUARANTEED** Double-edged blades 50c hundred up. If there's anything else you want, write us; we have it. Samples sent. Steven Spencer, 412 E. 51, Brooklyn, N. Y.

**EXTRA** Cash selling 21 folder \$1 Christmas assortment. 100% profit. Bonus. 10 other boxes. Experience unnecessary. Samples on approval. Schwer, Dept. 49M, Westfield, Mass.

**INTRODUCTORY 2 For 1 offer.** Co-Lubes—the super-lubricant—a life saver for automobiles and all high speed motors. Clean, convenient, easy to use. Send \$1.00 for two large tins, sell one, get your dollar back and have the other for yourself. Money back if not satisfied. Salesmen wanted. Territories open. Gracon Mfg. Co., Dept. 100, 2119 Gravois, St. Louis, Mo.

**SELL** Sensational presidential campaign auto emblems. Cost 7c, sell fast at 25c. Send quarter for your samples today. Brink, 1454 Gratiot Ave., Detroit, Michigan.

**ENGRAVED** Name plates, numbers, signs, etc., easily sold, profits large. Brett Bros., Winthrop, Mass.

**SELL** Colored folks: Hair beautifier, bleach cream, perfumes, incense, 300 products. Write for free samples. Big money making offer. Valmor, 2241-SN Indiana Ave., Chicago.

**SUCCEED** With your products. Formulas, processes, analyses. Catalogue free. B. Thaxly Co., Washington, D. C.

**SELL** Latest \$1.50 housewife's deal. Particulars. Raymond Schwarting, South Amana, Iowa.

**500% PROFIT!** Gold and colored sign letters for windows, offices, trucks, signs. Monograms. Easily applied. Neonite, Akron, Ohio.

**WHOLESALE** Catalog free. 500 best sellers. Paty Co., 1167 Broadway, Somerville, Massachusetts.

**BIG** Commissions selling personal Christmas cards and stationery. New 21 folder \$1 assortment. 100% profit. Bonuses. Free samples. Wallace Brown, Inc., 225 Fifth Ave., Dept. 210, New York.

**SELL** Novelty fun cards, novelties, etc. Samples, list 10c. National, Box 500M, Cincinnati.

**MEXICAN** Feather pictures. Unusual novelty. 25c (stamps) bring \$1.00 worth sample, details. Mexican Art, Apartado 1593, Mexico City.

**NEW** Autoists account book pays big profits. 25c brings sample and particulars. Idealso, Muncy, Penna.

**JUST** Out—Drews steam pad, simple device for steaming the beard before shaving. Agents coining money. Hurry. Drew & Co., Dept. M. Puente, Calif.

**NEW** Name plate slide in metal letters, (patented), deliver at time of sale. 100% profit. Naymon Plate Company, Lowell, Mass.

**ELECTRIC** Or gasoline portable lamp kills insects automatically, indoor or outside. \$1.75 up. Literature free. Sauer Bros., East Oakland, California.

**AGENTS:** Smash go prices! Santos coffee 12c lb. 100 sticks chewing gum 12c. Christmas cards, 21 in box, 14c. 150 other bargains. Premiums. Carnation Co., PO, St. Louis, Mo.

**COSTS** 1c—Sells 25c. Make non-explosive cleaner from benzene crystals. 1c gallon. Sample 10c. Literature free. Western Reserve Laboratories, 6615 Denison Ave., Cleveland, Ohio.

**SALESDOARD** Men—New put and take jars. Details, samples free. Tom Thumb, Dept. PM, Nauvoo, Ill.

**GENUINE** (Not imitation) gold leaf sign letters and script signs. Largest and finest assortment styles and sizes. Consolidated, 416-V So. Dearborn, Chicago.

**ARTISTIC** Window sign letters. Lowest prices. Enormous profits. Stalbrite Co., 44 West 30th, New York. Established 1905.

**NEW** Amazing foot powder. Has relieved thousands. Guaranteed. Fast, easy seller. Good profit. Positive proof free. Shoemaco, Bellevue, Ohio.

**TRANSPARENT** Day and night signs, 8"x14"; 4c, retails 25c; over 1000 designs; sample free! Lowy, Department 648, 8 West Broadway, New York.

**MAN** In each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers, by late method; experience unnecessary. Simple plan of manufacturing at home starts you in big money making business. Free particulars and proofs. Gunmetal Co., Ave. H, Decatur, Ill.

**MAKE** And sell your own products. Employ agents yourself. We supply formulas and full instructions for making toilet preparations, perfume, flavoring extracts, soap, household specialties. Valuable booklet free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

**WANTED**—Direct purchasing agents. No experience or money required. Write Purchasing Manager, 174 N. Halsted, Chicago.

**AGENTS** Mosco corn and calous remover will build you a steady repeat business. Send today for pocket-size trial outfits. The Moss Company, 64 Searle Bldg., Rochester, N. Y.

**GOLD** Reflecting letters for store windows. Easily applied. Large sizes, penny each, free samples! Atlas Sign Works, 7941 Halsted, Chicago.

**100 PROFITABLE** Mail order and local business plans. A. Pruitt, Elburn, Ill.

**AGENTS**—Opportunity to make money; book containing 107 successful business plans; home or office; send for free introductory booklet. Elite Co., 214 Grand St., New York.

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

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

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

**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.

**NEW** Cleaner! Washes clothes quickly. Cleans everything. Premium deals. Free sample. Bestco, 5007 Irving Park, Chicago.

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

**15,000 PROFIT** Making formulas. Following and many others: Accidents and emergencies, agriculture, alloys and amalgams, artist's materials, beverages, cements, glues, pastes, mucilages, bleaching, renovating, coloring metals, dyeing glass, heat treatment of metals, household formulas, ice cream, confectionery, chewing gum, lapidary work, exterminating vermin, lubricants, paints, varnishes, photography, condiments, canning formulas, rubber, soap, candles, soldering, toilet preparations, perfumes, waterproofing, fireproofing, writing materials. \$5.50 postpaid. Popular Mechanics Press, Room (C36), 200 E. Ontario St., Chicago.

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**BIG** Money for you with Jackson clothes. Sell all wool suits. Made to individual measure, \$15.95. Free suit to you with every 6 you sell. Get many free suits; besides you can make up to \$8.00 extra daily. Newest styles. Scores of handsome all wool fabrics. Celanese linings. Big, powerful selling outfit free. Write Jackson Tailoring Co., 316-18 W. Van Buren St., Dept. P-9, Chicago.

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

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**BRAND** New grab-bag deal. Going big everywhere—big profits—swift sales—fast repeats. No restrictions. All dealers buy. Act! K&S, 4347-A Ravenswood, Chicago.

**OUR** Famous Lucky 7 sells for 99c! Beats all flavor and spice deals out; sure, quick daily profits; men and women wanted. We start you. Free catalog. Imperial Mfg. Co., 2144 E. 15th, Kansas City, Mo.

**BIG** Money, acting as distributors for large paint manufacturer. Artist Color Co., Detroit, Mich.

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**EXCLUSIVE!** Attractive adv. book matches. Mfrg. direct. Marvelous repeater. Full or part time. Big comm. Samples free. Dept. E-9, Match Corp. of America, 6041 Grand, Chicago.

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5000 ENVELOPES. Letterheads, statements—\$8.75. 1000—\$2.50 postpaid. Jennings-Pohle Press, Honesdale, Pa.

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## The Editor's MAIL BAG

(Continued from page 36A)

some corrections. The water tank furnishes water to miners and homesteaders and the room below houses nothing but a public shower bath. The sign 'City Hall' was originally scrawled on a rough board by a local wag and the joke was so good that the owner later had a sign painted and erected. Incidentally, the 'town' of 29 Palms (referred to in the story) is just a thriving little desert community, with real gold in 'them thar hills' located in the Little Colorado desert."—E. H. Abernethy, Long Beach, Calif.

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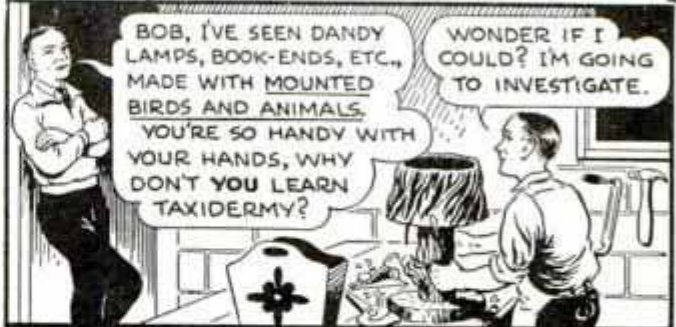
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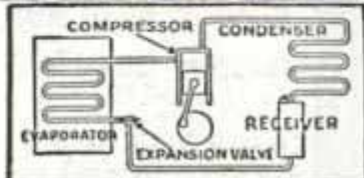
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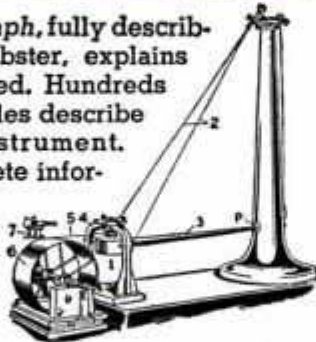






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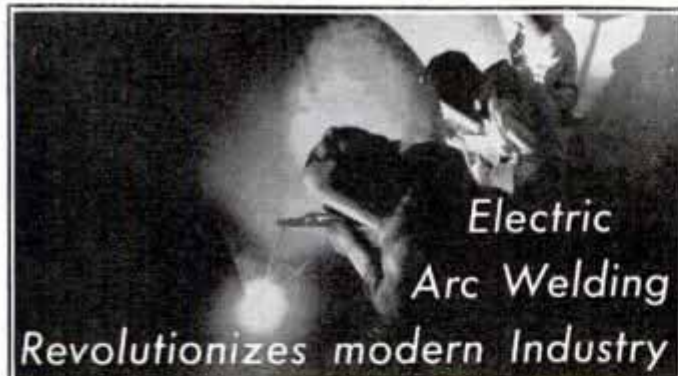
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# Popular Mechanics Magazine

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WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 66

SEPTEMBER, 1936

No. 3

F889

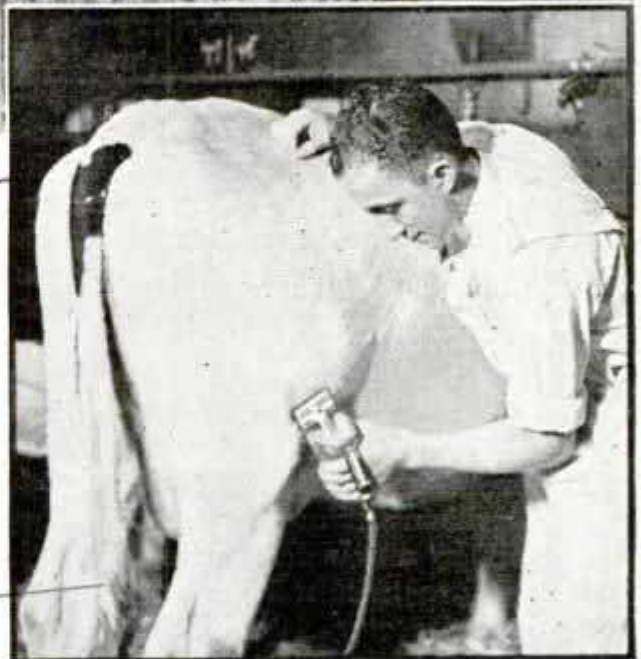
## MAGIC FARM Runs Itself



*Dosedale Farm*

A "MAGIC farm" where everything is done by electricity—where screen doors electrocute flies, electric bug catchers kill orchard pests, electric hay loaders and choppers take care of the hay crop, electric machines grade eggs, sort apples, sterilize and bottle milk and give ultra-violet-ray treatment to little chicks and turkeys—is operated by J. M. Hughes and his sons, at Herndon, Va.

The rural electrification administration is using it as an electric-farm demonstration project. The "march of the kilowatts" across the farm is astounding. There are over 200 uses to which they are applied, doing man's work and assisting him with

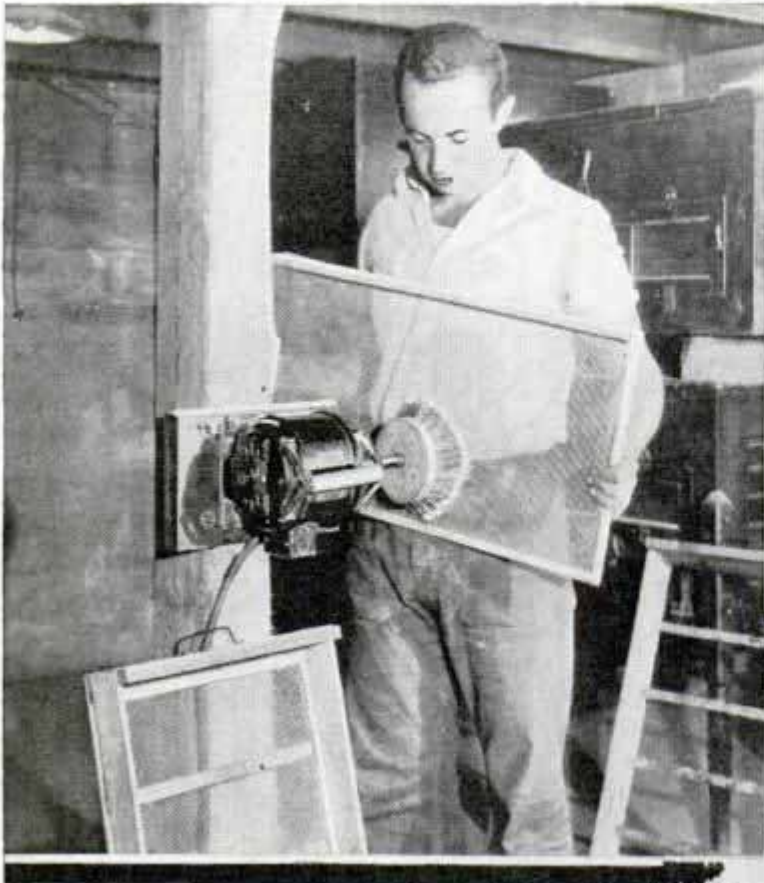


Giving "Bossy" a haircut with electric clippers, and electric-motor washer for vegetables

*cont. John L County Box 4608, Anacostia, D.C.*

*cont. John L County, Box 4608, Anacostia, D.C.*





hay electrically so it can be run into the barn loft ahead of a thundershower.

Electrified fly screens keep flies out of the house and dairy. The cattle barn is kept clean by water from an electric pump and fresh air is supplied to cows in their barn by electric fans. An electric corn sheller and feed mixer prepares food for the livestock.

Getting small chicks and turkeys past the baby stage has always been difficult but science found that these babies, when sprayed with ultraviolet light

their energy. The bug catcher for use in orchards is simply a big, bright light over a pan of water. Around the light is an electrified screen. But the mesh is too small for the bugs to crawl through, so they are electrocuted in the attempt. Automatically they drop into the pan of water and later are fed to the ducks.

In the kitchen of this old farm, in cultivation since pre-Revolutionary days, stands an ancient fireplace. Opposite it is a modern electric range, electric refrigerator, dishwasher, food mixer, ventilating fan and electric water heater. In the wash house is an electric washer, ironer and flatiron. In the front of the house is a radio, electric clock, electric lamps, cigar lighter and many other small appliances.

In the dairy and on the farm proper electricity runs rampant. All the buildings are electrically lighted. There is current for milking machines, cooling the milk, sterilizing it and bottling it. Eggs are sorted by an electric sorter and in the hen house are great bulbs to keep the hens fooled. The mower blade is sharpened by electricity, the hay is run through an electric chopper and then blown into the loft by power. It is even planned to dry the



*Electric insect-pest trap, and cleaning incubator screen with electric-motor brush*

rays, developed with astonishing rapidity. So the poultry house is an electric affair entirely. The hens lay under artificial light, the eggs are candled and graded under it, the chicks are hatched in electric brooders and the babies are kept warm and healthy by electricity.

An example of how electricity helps grow farm and garden crops is supplied on this farm. In a long, shallow basin of redwood, metal or concrete, is placed a bottle

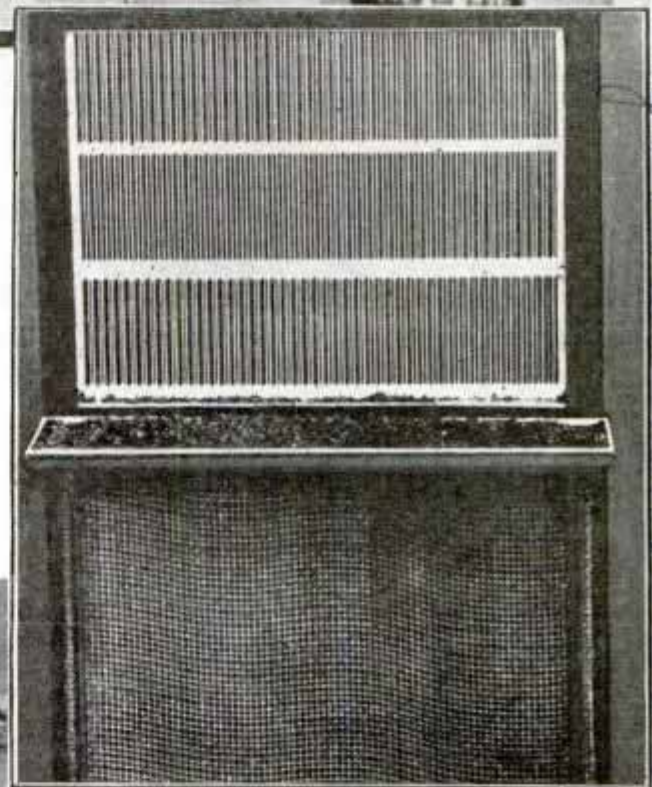
*submerged*



*Philadelphia Hotel*

*Washoe, Nev. Venturing Park Ave and 14th St. Photo by*

of nutrient salts. To create diffusion of the contents, the bottle has two glass tubes protruding through the cork. Across the floor of the basin are laid soil-heating electric cables and the basin is filled with water. The entire tank is covered by a wire mesh over which is placed a layer of excelsior, peat moss or straw. On this bed the seeds or seedlings are planted. Their roots draw nourishment from the warmed water and salts below while their weight is supported by light wires. Set out in December, plants cultivated in this manner begin to ripen late in April and continue to bear fruit until the following December. These electrical devices for plant culture can be used as hotbeds for nurturing seeds and young plants for early gardens and for testing the germination of many field seeds during the winter months.



Top, electric machine grading eggs. Center, electric insect killer in door. Bottom, electric hay chopper and blower being used to fill dairy barn

*not on farm see dip*

*See how it works. 1100*



# 'Cellophane' Balloon Signals from Stratosphere

To test the practicability of making observations in the stratosphere by "remote control," Jean Piccard sent aloft an unmanned Cellophane balloon from Minneapolis, Minn. It carried a radio transmitter which automatically signaled the readings of the observation instruments. These were packed in cotton floss for protection.



Jean Piccard listening to automatic radio signals from his free balloon in the stratosphere, and the Cellophane gas bag being inflated in the University of Minnesota stadium before the takeoff

While the balloon was in the stratosphere the ground crew listened to its radio reports and could, by triangulation, check its course. The balloon landed in a treetop in the Ozark mountains of Arkansas, 800 miles from the takeoff. The Cellophane bag, used to eliminate contraction and expansion with temperature changes, was inflated with hydrogen.

## Round Slide Rule with Magnifier Stows Away in Coat Pocket

Simple to operate, a circular slide rule equipped with a magnifying glass is now available. With it one can compute problems in multiplication and division, interest, percentages and proportions and similar mathematical formulas. The circular rule consists of two



disks numbered from ten to 100 and a transparent finder, all containing logarithmic scales. Diagonal black lines working in cooperation with the finder in red permit hairline registration readings.

## Two-Hundred-Mile Shadow Cast by High Mountain

Two hundred miles across land and sea falls the shadow of El Titor, a mountain on the island of Tenerife in the Canary group. The island peak rises abruptly 12,200 feet from the Atlantic ocean, and at sunrise and sunset it casts the long shadow that has actually been measured at 200 miles.

7863

cont. Kenneth P. Wood, 110 249th St. ...

Del. Webster 7781

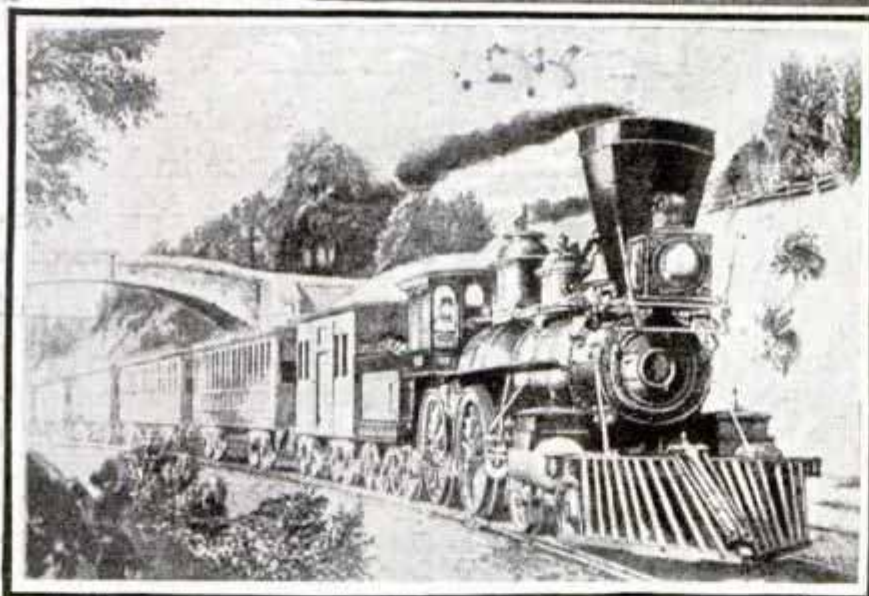
cells direct.

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Streamline Cowcatchers 'Ease' Cars Off Track  
 Rounded Design Intended to Push Autos Off Right of Way



The line of locomotives above shows how the cowcatcher has gradually disappeared behind a solid wall of steel as streamlining has advanced. Left, an early cowcatcher

High-speed, streamline locomotives still retain the cowcatcher, a distinctly American contribution to railroad design, although its purpose is no longer to catch cows. The "iron fence" at the front of the modern locomotive is intended primarily to cope with automobiles. As a result, the cowcatcher, like the rest of the iron horse, has been streamlined, partly for appearance, but also because it has been found that this streamline design pushes obstructions off the right of way with less damage than the old-fashioned set of bars. Modern cowcatchers present a smooth, rounded steel surface, almost like a snow-

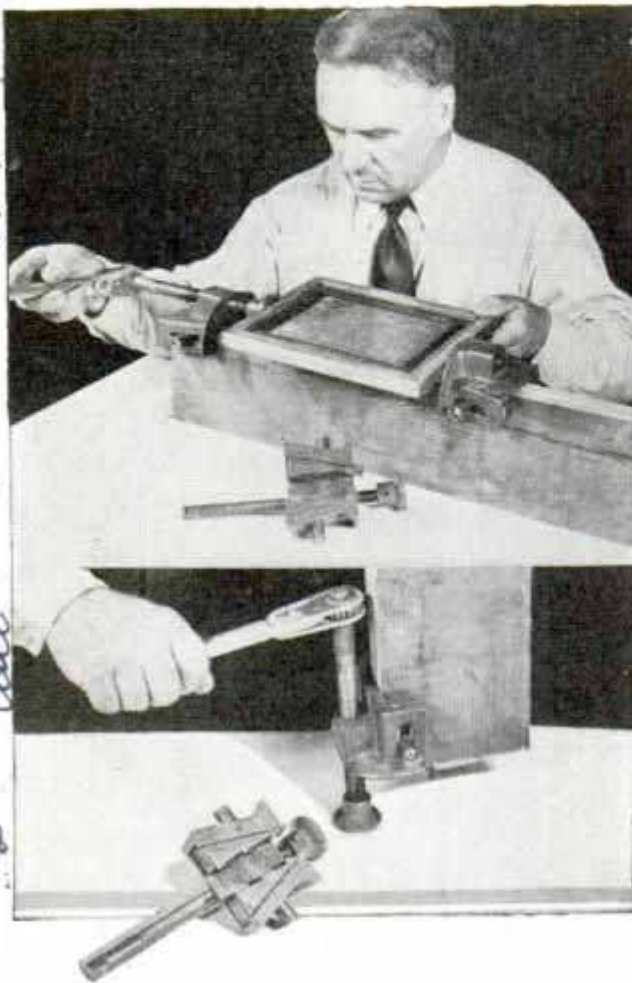
plow. When an obstacle is struck it is pushed aside, rather than tossed into the air. Coupling blocks, which often jammed into an auto and held it until the car was ground under the wheels, are being inclosed and, when not in use, covered by sliding doors. Some locomotives hide real old-fashioned cowcatchers back of solid steel plates but the guard remains in one form or another. The cowcatcher is about 100 years old and was intended not to "catch" cattle, but to push them from the tracks. Early light locomotives suffered almost as much damage when they struck a heifer as the animal itself did. Early cowcatchers were mounted on two wheels and extended far in front of the engine. Strangely enough, as locomotives became heavier and faster, the original design did not change greatly until the era of streamlining arrived.

*Handwritten notes at the bottom of the page, including "must also" and "not make" with arrows pointing to the text.*

*Vertical handwritten notes on the right margin, including "2047 N. Park Ave. Phila." and "325".*



### Clamp and Jack in One Tool Solve Workshop Problems



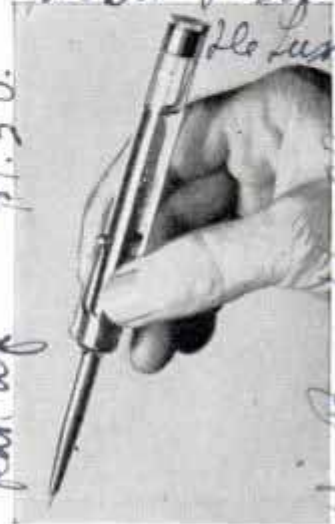
Clamp which accommodates work of any length and which also may be used as a jack

Many home workshop problems are simplified with the aid of a clamp which can be adjusted to accommodate work of any size, from an inch up to several feet, and which also can be used as a jack. The clamp is composed of two saddles, each equipped with two wedge-shaped jaws containing diagonal teeth which bite into a length of two-by-four wood stock or other material which serves as a base. One saddle is equipped with a feed screw and the other is tapped for a screw. Attached to the back of each wedge is a reversible pawl which can be made to engage teeth in the side of the saddle. Thus the saddle remains in the same position on the bar while being used as a clamp or jack. The pawls can be pulled out and turned one-half around, in which position they still hold the wedge jaws in place, but enable the user

to remove the clamp part as soon as the stress is removed. By reversing the clamp parts, the tool becomes a jack for forcing work apart. Also, it can be used as a jack to lift a heavy weight.

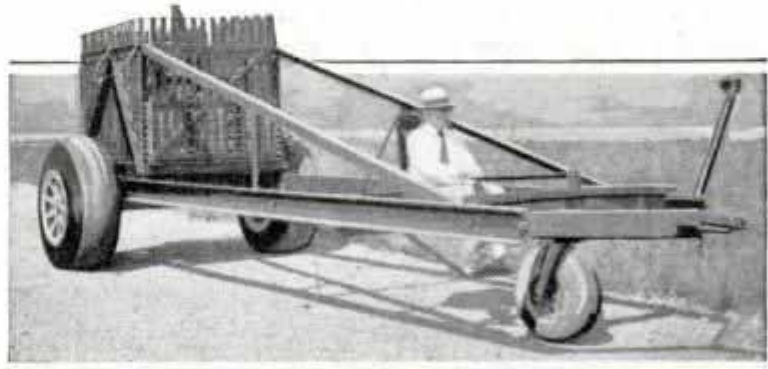
### Oiler Like Fountain Pen Shows Supply at a Glance

Handy for carrying in the pocket, a new oiler has a transparent barrel which shows the oil level at a glance. It is about the size of a fountain pen and is equipped with a clip. A screw cap prevents leakage and a patented feature dispenses oil without waste.



### Rig for Testing Airplane Tires Shows Performance in Mud

Airplane tires are tested for proper design, weight and inflation by means of a special rig at Wright Field, Dayton, Ohio. The vehicle to which the tires are attached is loaded with 30,000 pounds of lead and represents the approximate weight distribution of an airplane. The "pilot" steers by means of a bar extending to the leading wheel. Between a tractor and the vehicle a dynamometer is attached to provide a record of the amount of pull required under specific conditions. The vehicle is drawn over plowed ground and in other tests the ground is flooded.



Rig for testing design, weight and inflation of airplane tires. It is pulled by a tractor

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# Magicians of Lighting Create a Wonderland

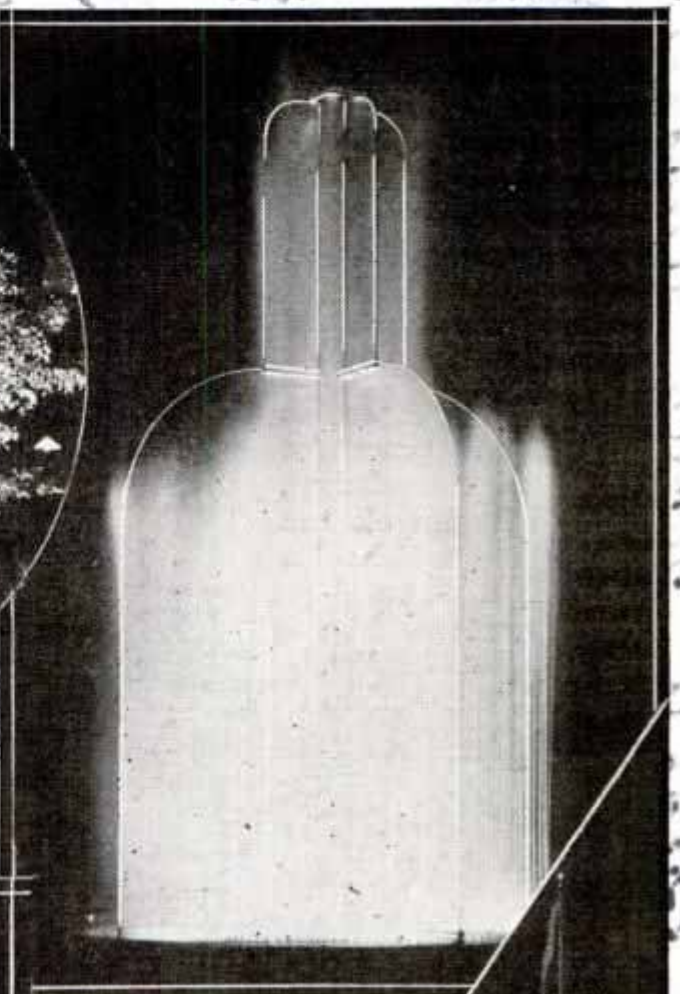
*Winkle Clark Electrical Contractors*

*F. S. W. Westinghouse Electric Co. East Pittsburgh, Pa.*

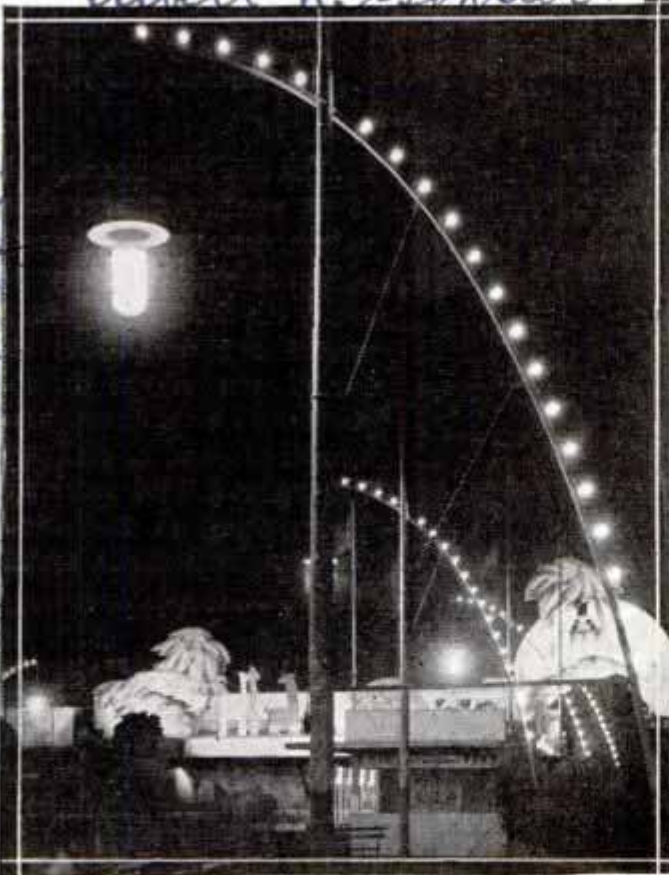


Above, startling effect obtained by using mercury light to bathe tree in beautiful green at night. Right, fountain at Cleveland's Great Lakes Exposition is a riot of changing color

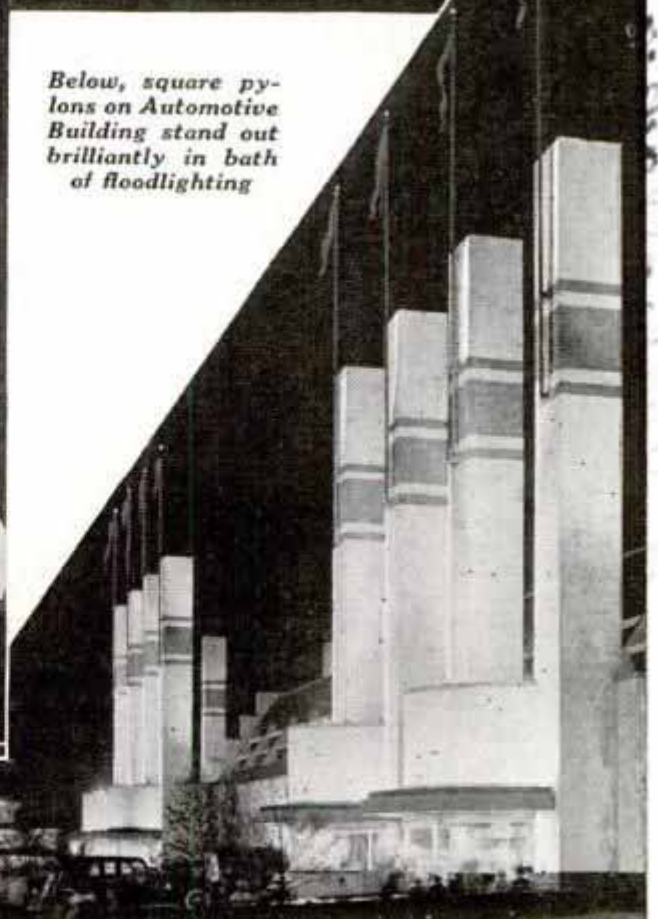
*alter h. isonson*



Below, square pylons on Automotive Building stand out brilliantly in bath of floodlighting



Ship's davit light standard, created for Cleveland exposition by Westinghouse engineers, is another bit of illumination magic which helps turn the exposition into a wonderland



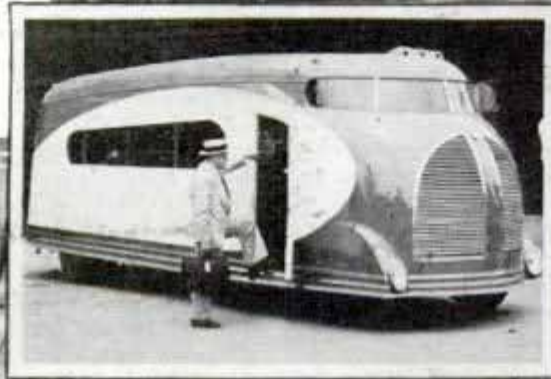
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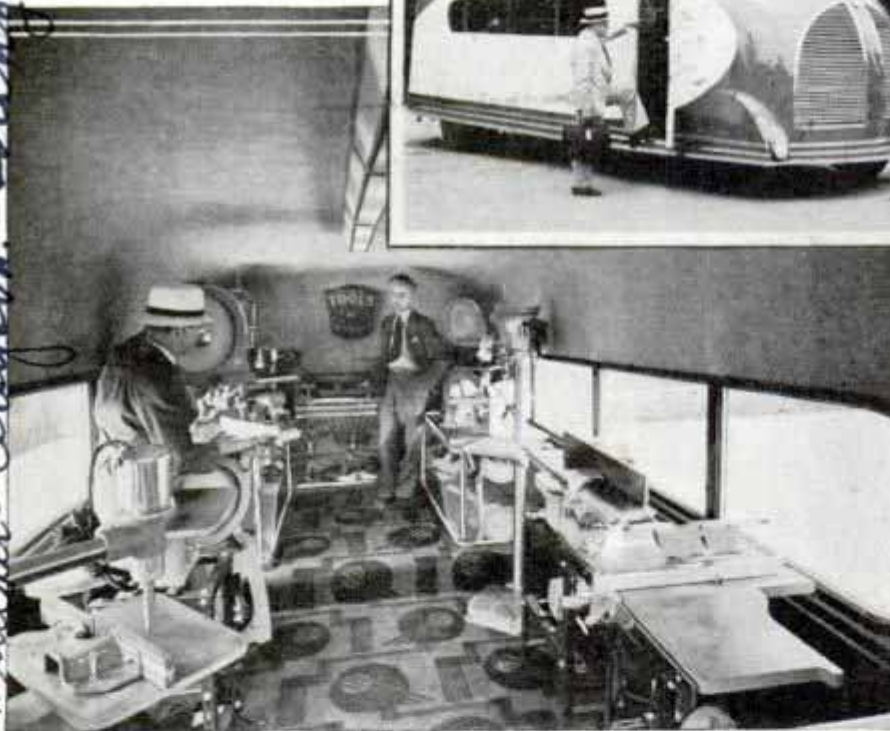


# Streamline Bus Is Home Workshop on Wheels

Heated and air-conditioned, a complete "home workshop on wheels" has been installed in a motor bus that bears a striking resemblance to one of the transcontinental streamline trains, with its high cab and rounded nose. Arranged on each side of its spacious cabin are drills, saws, lathes, presses and all the equipment for a mechanic's workshop, operated by an electric power plant which also runs the air-conditioning system. The bus is steam-heated. Called a "Show Shop



Top, a view from rear of the "home workshop on wheels," showing the driver in his cab mounted above the engine. In the center picture, observe similarity to streamline train. Below, view from the front



for Home Mechanics," it is in reality a traveling salesroom used by a metal products company to show its complete line of machinery and tools for home workshops to department stores and hardware dealers throughout the country. The ceiling of the show room is six feet six inches high.

## Static Shock at Bridge Toll Box Eliminated by Ground Wire

When the Delaware river toll bridge opened at Philadelphia its managers found an unexpected problem on their hands. Every time a motorist paused to pay toll he received an electric shock. A passenger would insert his coin in a metal collector held by one of the guards and a spark would jump, shocking the passenger. Static electricity would be built up in

the car as it crossed the bridge and would discharge through the motorist when the coin touched the box. Finally the bridge tenders drove a seventeen-inch rod into the pavement and extended an eighteen-inch wire from it so that the wire brushed the fender of the automobile just before toll was collected. This discharged the static electricity.

Invented by Horace J. Stradley  
Toller Delaware River Jan 20

Designed by J. L. Pedgley  
Builder - Chrysler Corp.  
Chief Engineer  
404 8000 Chicago

882  
Amen. Metal Products Co.  
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F 543



379

*Frank Benson*  
**BLOCKING** the hot glass  
 by thrusting it for an in-  
 stant into a hollowed  
 block of cherry wood to form it  
 into shape before it is  
 given to the blower.

*Chas. L. & Esler*

# NEW TASKS *for* GLASS

F 543



T543



Cleveland Glass Co.  
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330

**BATS** of fibrous glass used to insulate buildings, glass thread and yarn, a fiber-glass air filter and a glass rug.

By H. W. MAGEE  
PART II

**V**ISUALIZE a city of shining glass. You walk to work on glass pavements, enter a skyscraper of colored glass, are whisked upward in a glass-enclosed elevator shaft, enter an office with glass floors, walls and ceiling—and perhaps doff a topcoat of fibrous glass before sitting down at a glass desk.

Glass today is playing an increasingly important part in architecture, both as a structural and ornamental material, as a

result of the development of glass bricks, tiles and other building products. Some architects see the city of the future composed of steel or aluminum framed structures with walls, floors and ceilings entirely or chiefly of glass.

As a building material, glass offers the hardness of steel, the durability of granite or marble and, in addition, it provides a new medium enabling the architect to use walls, ceilings and even floors in his lighting scheme. There are two glass houses in Manhattan, both occupied by architects. Glass bricks have been used widely to replace plate glass



+ 543



336

in store fronts and shop interiors, colored glass tiles are being used for service stations which are illuminated at night from within, and a New York theater is veneered with glass tiles which reflect the sparkle of sunlight by day and artificial lights at night.

Carved glass panels for decorative purposes have been replaced by molded glass

*Mr. George V. McCauley Corning, N.Y.*

PHYSICIST of Corning Glass Works testing 200-inch disk which will be reflector for giant telescope. Below, all-glass laboratory of Owens-Illinois Glass Company.

*Islands Packaging Research*

blocks with relief designs on them. A building in Syracuse, N. Y., has exterior pilasters of pressed molded panels. A Pittsburgh store has a glass ceiling which





*Inland Valley Works  
6101 W. 65th  
Chicago  
Frank Jensen.*

**G**LASS gatherer removing a white hot ball from the melting furnace for the blower. Temperatures of from 2,400 to 2,800 degrees Fahrenheit are required to melt the mass of sand and other raw materials which compose glass.

332  
is a part of the artificial lighting system and the Cincinnati railway terminal uses luminous glass in the main waiting room. Thus in many fields glass is providing an expressive medium for the architect, enabling him to reduce heat loss since glass is a good insulator, and assisting him in designing new and better lighting effects.

As a structural element, glass is commonly used in block form, either hollow or solid, the hollow blocks having very low heat conductivity while the solid blocks have greater strength. The solid blocks are molded to shape while hollow blocks are made by fusing two halves after pressing them in a mold with a

plunger which dishes out the centers. Hollow blocks also have been produced by blowing them to shape with compressed air, the blocks being placed within a mold for this operation. Tiles are made by pressing or rolling.

The development of heat-resisting glass resulted, among other things, in the production of glass ovenware. Now, by a new process, glass cooking utensils for use directly over the flame are being made. Most of this ware is molded and one great advantage is that the housewife can observe each food as it cooks and transfer foods from the top of the stove to the oven without changing containers.

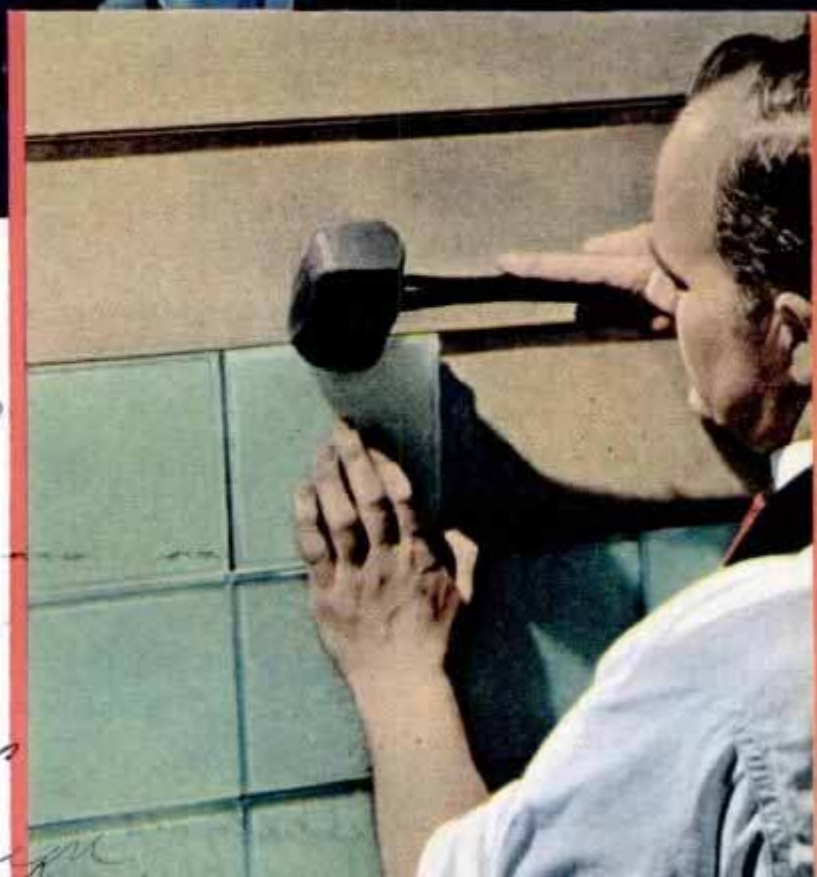




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 Glass Co  
 Toledo, Ohio

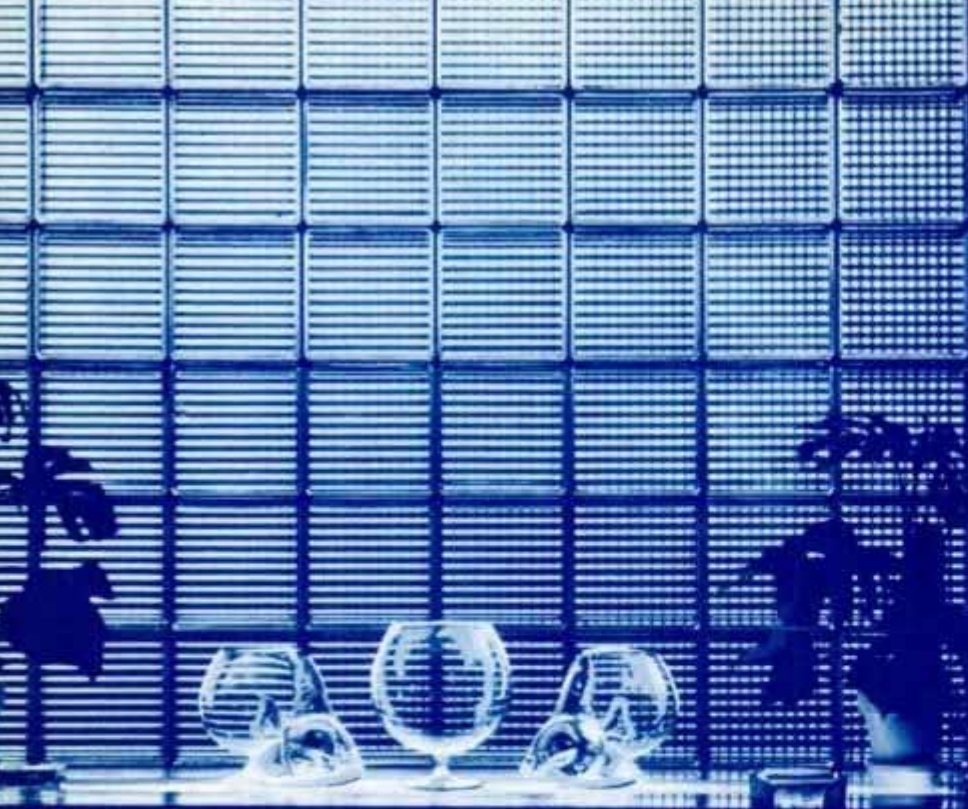
THE photograph, above, was made in a darkened room, the only light coming from an adjoining room, separated by a wall of glass blocks. The blocks diffuse the light rays. Below, installing glass tiles on a wall surface.

Avenus. Illinois  
 Glass Co  
 Toledo, Ohio



3 2 2





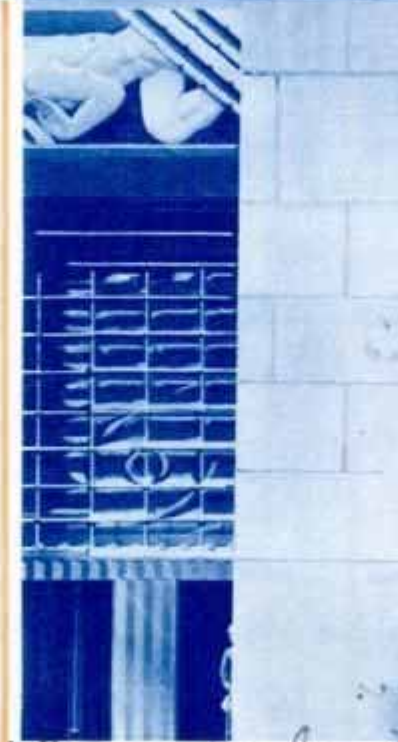
1543 Dining room  
in home of Morris B  
Sanders, architect.  
Pipes.

*Corning Glass Works, Corning*  
LUMINOUS glass wall through  
which the sunshine filters to  
flood the room with soft light.  
Below, entrance to RCA building  
in Rockefeller Center,  
showing huge glass screen  
modeled in high relief. The  
screen replaces the usual metal  
grille which obstructs light  
whereas the glass admits the  
light.

Tableware - Stephen  
Aled. Corning  
Glass Works, Corning



334  
One of the greatest scientific  
achievements of the glass industry  
has been the casting of the  
twenty-ton, 200-inch disk which  
will form the reflector for the  
great telescope to be located on  
Mount Palomar in California.  
Months were spent in preliminary  
preparation and in melting the  
glass. After it had been poured  
into a mold, other months went  
by while the disk slowly cooled  
in an annealer with electrical  
temperature controls. Recently  
the big piece was shipped by train  
to California where years probably  
will be required for grinding and  
polishing its concave surface.  
With its aid, astronomers expect  
to see what exists in regions  
1,200,000,000 light-years distant.



Designed by Lee H. Hawes  
American sculptor





*Wm. Johnson*

*336*

*Inland Glass Co  
6101 W. 65th Chicago*

DECORATING glass is a fine art in itself. Here a craftsman is cutting a penciled design on a glass goblet with the aid of a stone wheel.

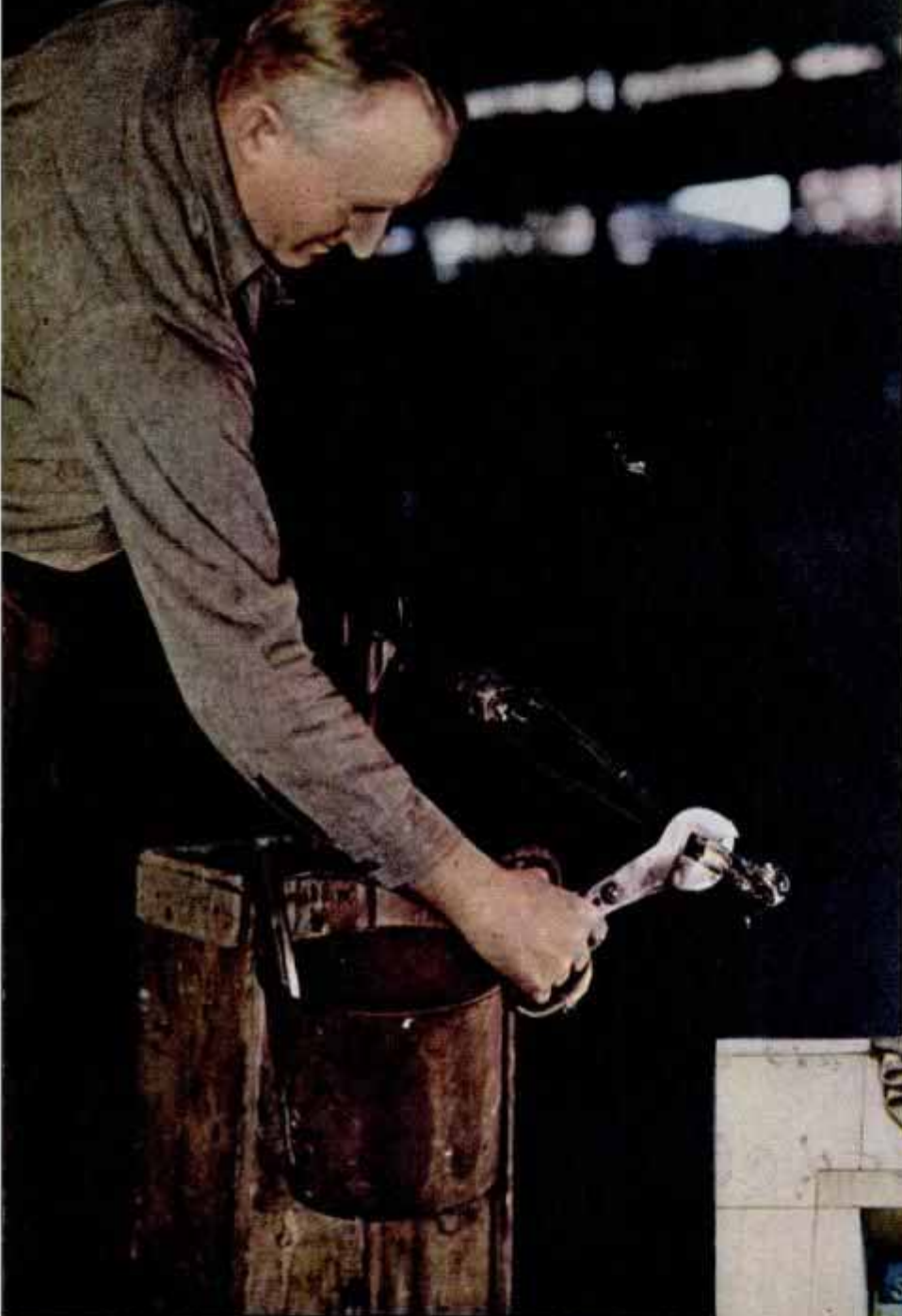
The glass-lined tank car and truck tank have largely made possible the bulk hauling of milk products. The metal tanks are sprayed with a special kind of glass enamel, then placed in huge furnaces where the enamel is fused to the metal, giving the interior surface a smooth, glossy, continuous finish.

Glass blowing is one of the oldest of the industrial arts and the skilled craftsman and his blowpipe still form many of the shapes taken by glass articles. Standard and simple forms are blown with the aid of a mold, but intricate shapes, such as are used in laboratories, are blown offhand by men who have practiced the art for from twenty to fifty years. Contrary to popular belief, it's not how hard you blow, but the way you blow that counts. The breath required for blowing a piece of glass is not much more than that needed to extinguish a match held at arm's length. The real trick is to keep the molten glass from running off the end of the pipe.

Glass bottles and other glass containers are not new, but they are taking new forms, new colors and new finishes. Bottles are made in blow molds and today are being produced in almost any shape and many colors. Names or designs in color can be applied to containers and stippled, frosted or sandblasted finishes are often applied. Stippled finishes are produced in the blowing operation, frosted glass is made by allowing hydrofluoric acid to dissolve the surface and iridescent ware is obtained by spraying certain salts on the hot bottles.

New shapes, new brilliancy and new patterns and designs and methods have been applied to table glassware and art glass objects. Decorative glassware includes colored glass, made by adding a chemical salt to the glass batch; cased glass, made by fusing a layer of colored glass to ordinary glass and cutting or engraving through the colored part; engraved glass, produced by carving a design in glass with copper wheels revolving

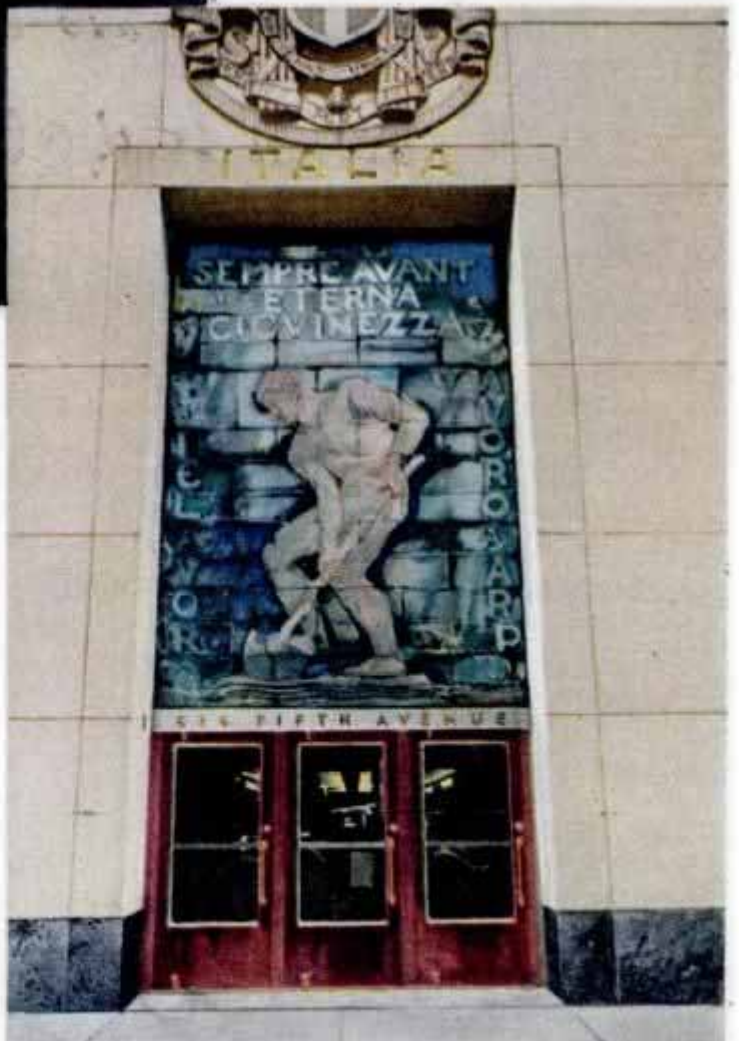




T 543

**G**LASS in plastic form. The worker is cutting off the surplus glass, preparatory to blowing and placing it in a mold. Below, sculptural glass panel ten feet wide and sixteen feet high over main entrance of Palazzo d'Italia in Rockefeller Center. The panel portrays the contribution of labor to the progress of civilization.

*Created by  
Attilio Piccarelli*



376

on a lathe, and heavy cut glass, made with a carborundum stone wheel on a lathe, water and pumice acting as abrasives. Brilliancy is obtained by polishing but similar effects, though not so brilliant, are obtained with acids.

Rock crystal is a term applied to finer cuttings, made with copper or stone wheels and polished by brushes or with acid baths. Molded glass is made by pouring or blowing the hot glass into molds, and thread glass is formed by applying lines of glass like threads or rods to crystal glass at the furnace. In plate etching, the design is engraved, etched or photo-engraved  
(Continued to page 132-A)







Laboratory  
Engineer.

# Song of Wild Bird Recorded by Focusing Sound on 'Mike'



By turning this "sound bowl" toward the wild bird, its song can be concentrated and focused into the microphone

Records of the songs of wild birds can now be made at such a distance that the bird does not fly away in alarm. The song is caught by a bowl-shaped concentrator mounted on a tripod. A microphone is poised at the focal center of the bowl, which intensifies the sound of the unsuspecting bird sufficiently to record it on photographic film.

## Lightning Made in Laboratory Shatters Pole Like Real Bolt

Man-made lightning with all the violent, destructive force of lightning in nature has at last been demonstrated in the laboratory. Heavy wooden poles were split and splintered, steel plates bent and insulators cracked by bolts from three-million-volt generators synchronized with a 150,000-ampere current generator through a microsecond switch. High voltage has long been within the engineer's power, but it was not until the microsecond switch made possible combining high voltage with heavy current that the

fury of natural lightning was reproduced. As the generator is building up 2,500,000 to 3,000,000 volts, at a certain point this voltage flashes and fuses a high-resistance element of the microsecond switch, which reacts in millionth-seconds. Within two to seven microseconds—the engineer's term for a millionth of a second—the current generator begins full discharge and lightning results. Lightning-proof equipment for transmission lines can now be given thorough tests with this lightning maker in the laboratory of the Westinghouse Electric and Manufacturing company at Sharon, Pa.

## Water Fed to Rubber Pad for Washing the Car

Washing the car is simplified by using a rubber sponge fitted with a tube which, when connected to a garden hose, supplies the sponge with running water. The sponge is attached to a rubber mitt for the hand and the water flows through the pores of the sponge to the



Rubber sponge for washing car is supplied with water by attaching tube to garden hose

Western Electric Co. 196 Broadway

129 S. 2nd Brooklyn, NY

7841

The motorist's friend

Agap Products Co. 1444 N. 1st St. Philadelphia, Pa.



*Jolley Mfg Co 1437*  
*Jolley Bldg. 11 Main*  
**Can Opener Serves as Holder**  
*St. N. 6*  
**When Emptying the Container**  
*7804* *Minneapolis*

surface, cleaning it from the inside and supplying the surface being washed with a steady flow of clean water. The sponge can be shaped around corners and the flowing water prevents grit and dirt from accumulating under it. The sponge also can be used for washing windows.

*7869*

**Billions of Dollars  
 Damage Caused  
 by Insects**

Estimates by the U. S. department of agriculture indicate that insects cause an annual damage of about two billion dollars in this country alone. This sum is calculated from the known toll of \$900,000,000 taken by thirty-four of the more important insect pests. For example, the boll weevil exacts an average yearly toll of \$164,000,000 and the corn ear worm which attacks cotton, tomatoes and corn causes damage amounting to \$104,000,000. The world has more than 700,000 kinds of insects which have been named and described and new ones are being found from time to time. In North America there are 50,000 kinds of insects, 6,500 of which are consistently destructive year after year. No one region is especially subject to insect infestation. Sometimes insect pests are worse in the cotton belt, at other times in the grain belt. Naturally they are the most costly in regions where crop values are highest.

*Bureau of Entomology and Plant Quarantine*



*Above, using can opener as holder. Center, removing top by turning crank. Bottom, lifting can from hot water and removing rectangular top*

So easy to operate that a child can work it, a can opener equipped with a cutting wheel moved by turning a crank also serves as a handle to hold the container when emptying the contents after the cover has been removed. The opener works on square or rectangular tops as well as round ones. Gripping the handle of the opener closes its jaws on the side of the can and converts it into a holder. The utensil is suited particularly for handling hot cans.

*Copyright 1939 Jolley Mfg Co. 1437 Jolley Bldg. 11 Main St. N. 6 Minneapolis*



F717

# HORSES-What's their Limit

Cmt. James Mc Dyeney, 20 W. Dartmouth Road, Kansas City, Mo.



Vic Fleming, an expert reinsman, and, below, Sep Palin driving Greyhound, hailed as one of the greatest trotters of all time

to be a world record in harness racing

EVER since sportsmen first became interested in racing horses, they have conjectured on their limit of speed and today many turf authorities believe the running horse has about reached this limit.

It is difficult for them to conceive of greater race horses in the future than Hindoo, Ormonde, St. Simon or Man o' War. Of course, the experts do not overlook the likelihood of some super-horse galloping to a new world mark at some particular distance. But that's not likely

to happen often. In light-harness racing, however, the peak has not been reached. Each season, new marks are made in the two and three-year-old races, while at intervals, some outstanding horse whittles a second or two off the world's record.

Any Englishman who knows thoroughbreds will tell you Tetrarch, who raced in England a few years ago, was the fastest horse that ever lived. In seven starts as a two-year-old, this horse was never beaten. On one occasion, after being left at

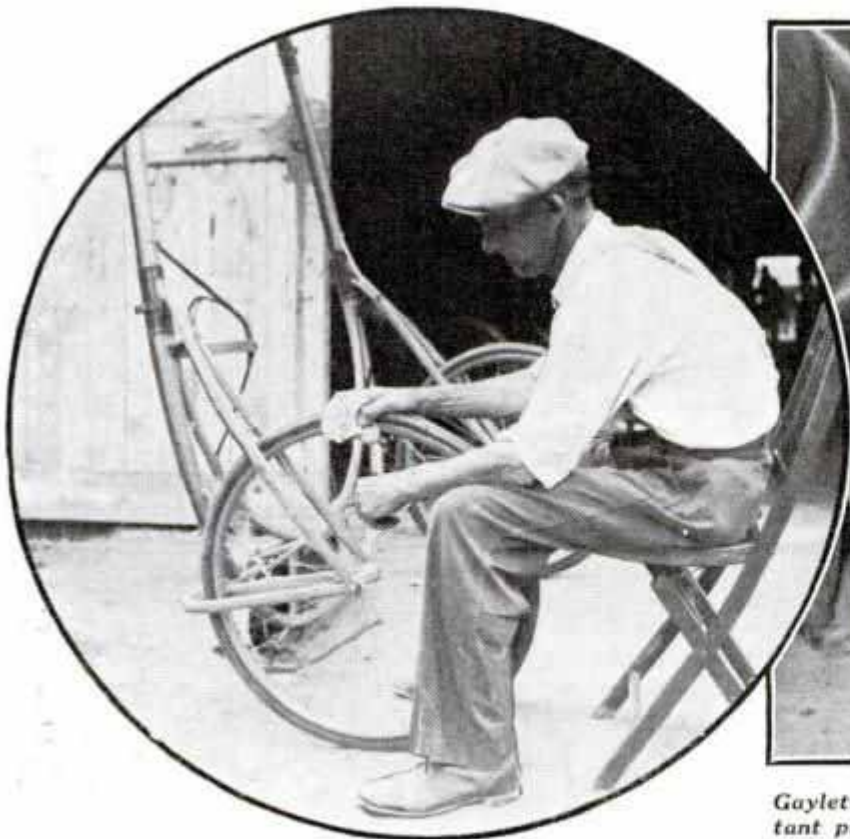


# of SPEED ?

the post, he overcame a 100-yard lead to win. Tetrarch was too fast for his own good. When he galloped his legs are said to have gone out of control, the hoofs of the one cutting and slashing the fetlocks and shins of the other. His legs were so battered after his campaign as a two-year-old that he had to be retired.

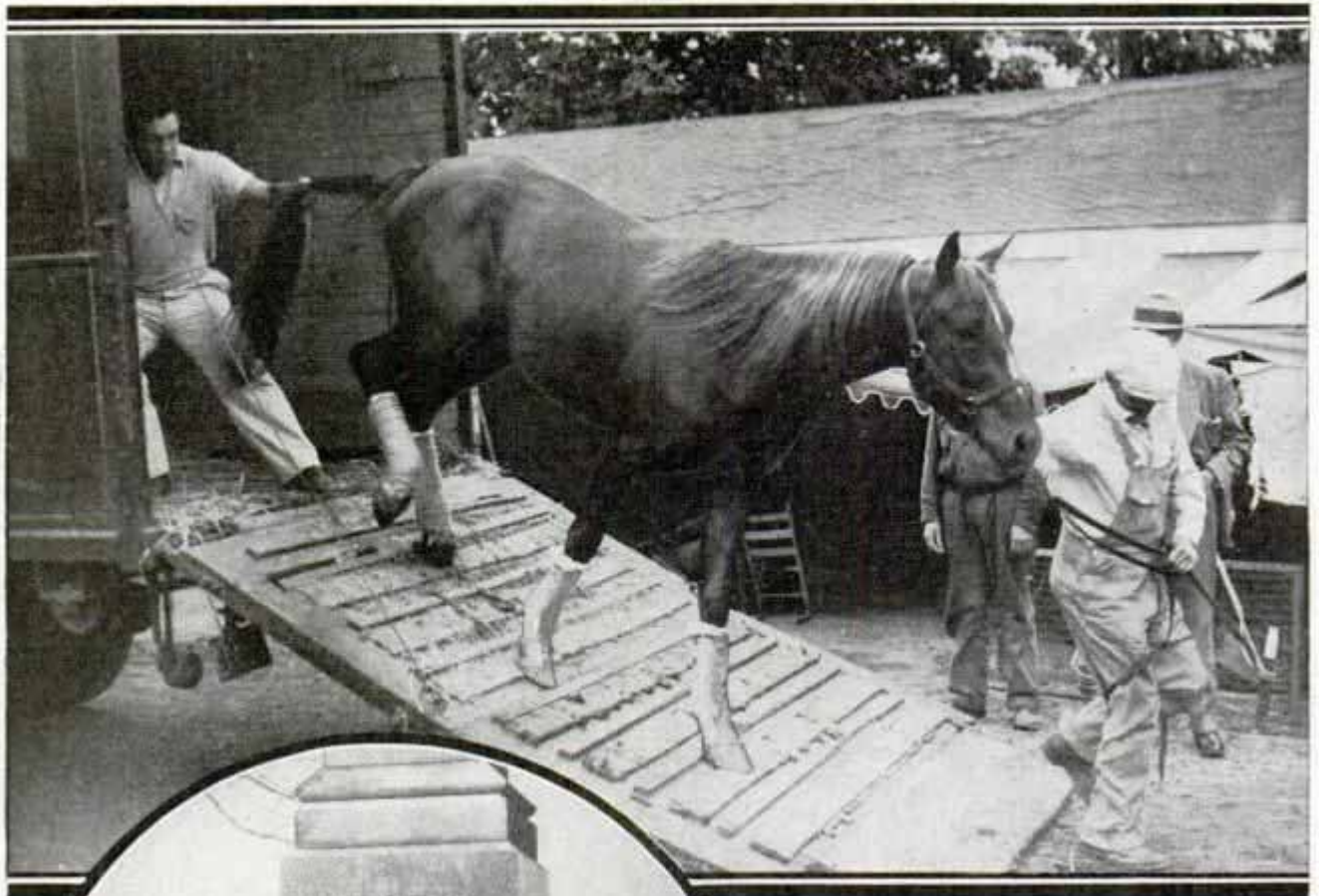
Perhaps the fastest horse ever foaled in America was Man o' War, who set five world's records as a three-year-old without being pressed to any appreciable extent. He was a super-horse in every sense of the term. A great strider, Man o' War was capable of winning at any distance, in any weather, and over any track.

It has been estimated a running horse steps between fifty and sixty feet per second, depending on his rating, the distance, and the condition of the track. The latter is of primary importance because



*Gayleta, three-year-old filly, and, below, two important preliminaries to the race—fitting proper shoes and oiling the running gear. Correct shoes are of outstanding importance*





*Above, the trotters travel in style. Below, the grave of Hambletonian, "great father" of 19,000 trotters and pacers*

on layouts designed for speed a top-notch can run a mile in 1:35 or better, while on an ordinary track his time may be four or five seconds slower. Frank Menke, sports authority, points out that the average race horse is over eight feet long with neck stretched out, and if he is traveling fifty-four feet per second, he negotiates nearly seven times his own length in one second. As a four-year-old carrying 128 pounds, Equipoise ran a mile

in 1:34 $\frac{2}{3}$  seconds, or approximately 56.1 feet per second. Competing against Equipoise in this race, the average track horse would have been beaten by more than 300 feet.

An interesting sidelight on equine speed is the elaborate cinematographic devices employed in determining the winners in close finishes. The latest camera takes 165 pictures per second, showing exactly what happened at the finish line and indicating to one-hundredth of a second when the line was crossed by a particular horse. Four minutes after the race has been clocked, the judges are given a photographic print of the last few frames of the race.

Strictly speaking, the trotter is an American product developed and trained in this country. Although descending originally from the thoroughbred, Messenger, more than two centuries ago, trotters and pacers have become a separate breed. By nature, the light-harness horse is no different from any other horse. He likes to gallop when traveling fast. Only through train-



7919

ing can he be taught to trot or pace. And an incalculable amount of time, patience and money is spent each year in doing just that.

Both trotters and pacers get off their stride. When this occurs speed and rhythm are lost. The trick of getting all the speed possible out of a swift harness horse and at the same time keeping him from losing stride is one of the principal lures of the game.

The difference between trotters and pacers is in their gaits. The trotter's right front leg and left rear go forward and backward in unison. A pacer, on the other hand, works his right front leg with his right rear leg. Normally, the pacer is the faster. The pacer, Dan Patch, negotiated the mile in 1:55¼. Peter Manning, a trotter, holds the mark for his class, 1:56¾. They never race trotters against pacers, however, except in Australia and New Zealand.

It is impossible for a breeder to tell which gait his prospect is to follow. Frequently, a horse is trained for the trot and for no apparent reason will swing into the pacing gait, and never trot another step. Some pacers must wear hobbles, leather straps circling their legs, to keep them at that gait and prevent them from breaking or galloping. Others are called free-legged pacers because they maintain their "wiggling" gait without the straps.

Mechanical aids and improvements in track equipment have been vital factors in lowering light-harness speed marks.

When the sport was young shoes of twenty-six ounces were not uncommon. This weight on a trotter's or pacer's feet helped maintain his gait. Today, however, the average shoe weighs about two ounces. Over long periods, the racer has become more used to its manufactured gait of

(Continued to page 126A)



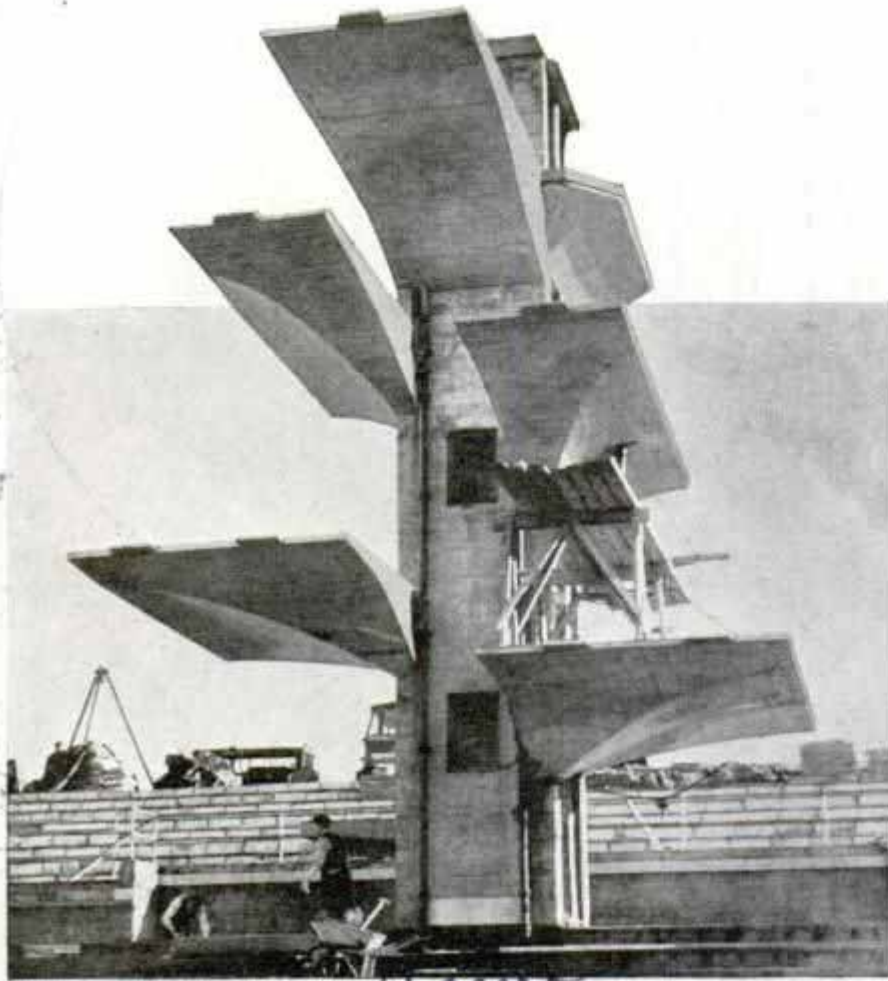
Top, bandaging a leg. Center, Calumet Evelyn, double-gaited mare. Bottom, the kitten mascot

22  
3106 S. 4th St. Louisville  
Becker + Clumber  
Hobble -

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**Modernistic Diving Tower  
Has Five Concrete Boards**



Diving tower of Edinburgh's new \$400,000 swimming pool is built along modernistic architectural lines with five concrete diving "boards"

Borrowing ideas from modern architecture, the builders of Edinburgh's new swimming pool erected a concrete diving tower with five platforms, all of concrete, "staggered" up from the base to the top, thirty-two feet high. The diving "boards" are broad enough to accommodate several swimmers. The pool, fully equipped, cost more than \$400,000.

top by a concrete slab. Under each pier twenty-four piles had been driven deep, and cut off three feet below the mud line. First the wreckers blasted off the concrete slab. Then a diver washed away the mud with a high-pressure water jet, and cut off the piles one at a time with a cross-cut saw. The diver was in constant danger of the piers falling upon him, and the tide slowed his work by filling the excavation with mud. When the piles had been cut, the diver passed a heavy cable under each pier and, at low tide, the cable was made fast to a big barge. As the tide rose the barge lifted the pier; then it was towed to deep water and sunk.

**'Rain-Barrel Boom' in Radio Stopped by Air Vents**

Shout into an empty rain barrel with your voice low-pitched and it booms back to you. This same "booming" from radio receivers during speeches, or when an orchestra is playing low notes, has been one of the toughest problems of radio builders. The dynamic loud-speaker in a radio receiver produces as much sound from its

back surface as from the front, and this back wave of sound flowing into the cabinet "boomed" like the voice in the rain barrel. In large auditoriums this effect can be controlled by large baffles. For the small receiver the engineers have

*Magic Voice*



**Diver Risks Life to Cut Piling after Bridge Is Wrecked**

Condemnation of a big bascule bridge at Tacoma, Wash. left a ticklish task for a diver and plenty of problems for the engineers. After the steel work was cut loose and floated away on a barge, the concrete pier on which it had rested was a menace to harbor traffic. This pier was formed of four piers set on wood piles, joined at the

*Conk Mus. O. W. Districtally 9/14 Wash. R. C. A. Victor Pasadena 7/9*

*Scotland 310 e. ...*

*F 826 344*

*F 825*



C. Manufacturing and designer.  
(Inventor of the eye)  
562. 5th Ave  
New York

solved the problem by sealing the receiving cabinet, front and back, so that the wall of the room does not add to the "rain-barrel" effect; then placing acoustical neutralizing tubes at the bottom of the cabinet so that the back wave from the loud-speaker can flow out of the cabinet in phase with the front wave.

7774

### Artist's Ink Holder Stays Level on Tilted Drawing Board



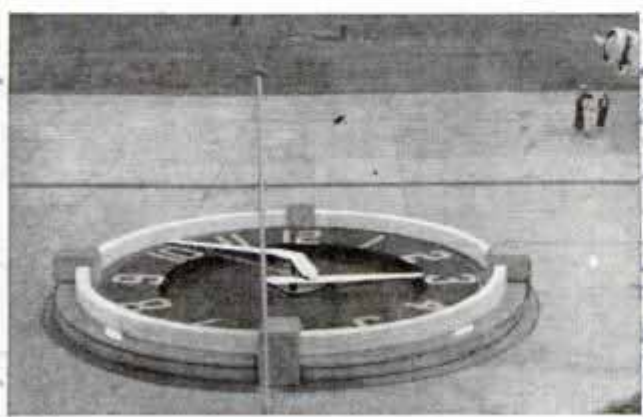
Regardless of the angle at which his drawing board is tilted, an artist can keep his ink bottle upright in a holder now manufactured. The inkwell "floats" level inside a Bakelite container fastened

to the drawing board with a thumbtack. A small hole is provided to hold the quill and stopper when the bottle is in use.

7824

### Ground Clock for Aviators Seen from 3,000 Feet

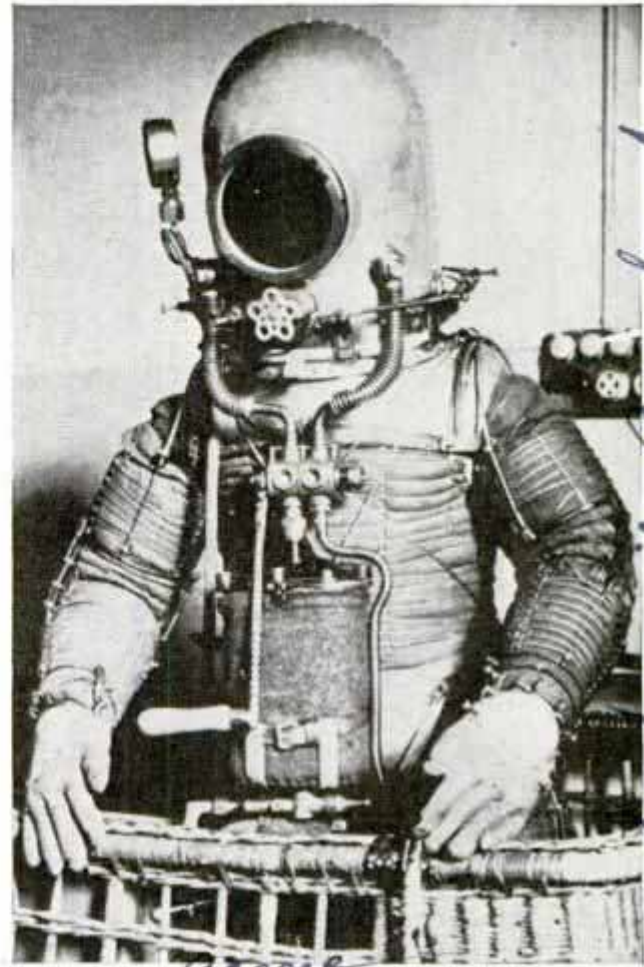
Airmen flying over Johannesburg, South Africa, can make no mistake about the correct time for coming down to earth. A huge clock has been set in the concrete pavement at the Rand airport, and aviators can tell time easily from 3,000 feet overhead. Operated electrically, the clock is thirty feet in diameter and has a minute hand seventeen feet long and an hour hand twelve feet long.



Thirty-foot electric clock set in concrete at Johannesburg airport is visible to flyers 3,000 feet up

Capt. H. Attmar  
Bureau of Information

### Suit for Stratosphere Flyer Tested in Airless Chamber



Stratosphere suit which supplies wearer with oxygen and also protects him from cold

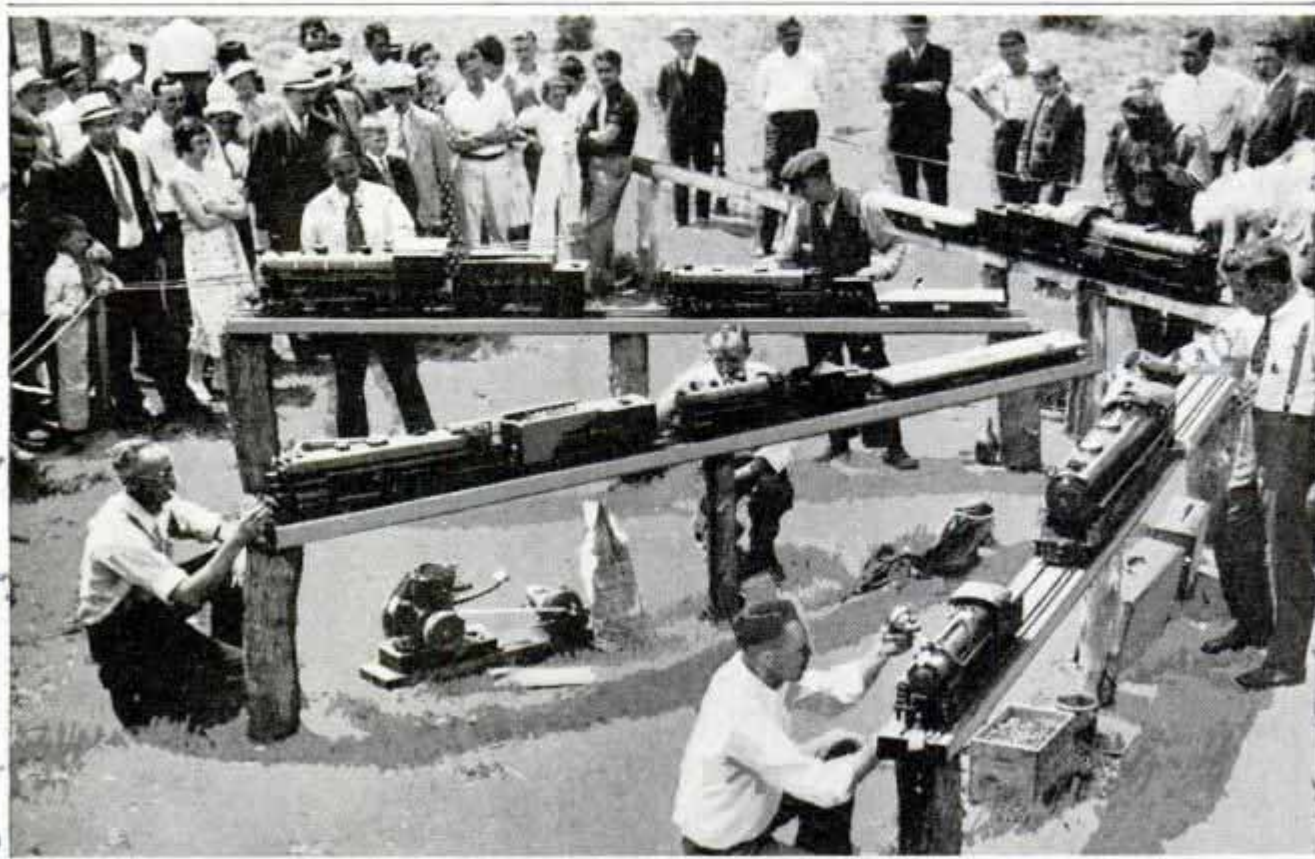
Intended to protect stratosphere flyers from the intense cold and the rare air of the upper atmosphere, a special stratosphere suit recently underwent successful tests for two and one-half hours in an airless chamber with the temperature seventy degrees below zero. Lieut Col. Emilio Herrera, Spanish flyer, who expects to use the suit in proposed flights to the stratosphere, made the test in the airless chamber and reported he was quite comfortable and suffered no ill effects despite the sub-zero cold and the rare air in the test compartment during the entire period.

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

Alfred...  
Schmidt, Spain



# Tiny Engines on Toy Railroad Burn Soft Coal



Each of these midget locomotives is copied after a real engine and burns soft coal to generate steam in its boiler. The temporary "roundhouse" was set up during a convention of model railroad builders

There's always a good audience when model railroaders get together. A fleet of real steam locomotives, burning soft coal, was exhibited recently at a meeting of toy engine builders in Maine. Each locomotive was an exact scale reproduction of a real engine.

*national Model Steam locomotive meet.*

## Rustproof Material Like Iron

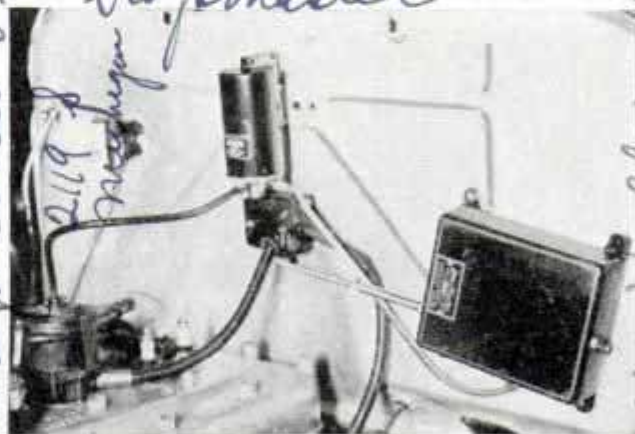
### Made by Smelting Stone

Smelting stone in an open-hearth naphtha furnace, a factory at Moscow is producing a rustproof material that resembles and rings like iron. During experimental stages ordinary paving stone was smelted, but the raw material now used is diabase. After the heating process it is drawn off into sand molds for slow cooling in a rotating oven, otherwise the product would be black glass. The smelted stone slabs are used as building material, as an acid and heat-resisting substitute for porcelain in chemical and electrical industries, and are molded like metal into water pipes and bedplates for heavy machinery.

*1848*

## Time Stopper for Idling Motor Saves Delivery Truck Fuel

To stop the wasting of gasoline by drivers who let the engine run while the truck stands idle at the curb, an automatic stopper has been developed. It is a time switch which goes into operation whenever the gear is in "neutral," and, after a fixed time has elapsed, turns off the motor. The time interval is set by adjusting a



Flexible shaft links gear shift with stopper to halt engine when it has idled past specified time

*Dr. Ford June 1936*

*Phillipsburg, N.J.*

*Compressed Air June 1936*

*1848  
Stopsmaster  
2119  
Machinist  
Jewett-Cordis Piston Pump Co.*

*Her. New England  
Piston Co. 915  
W. B. Phillips  
Piston Co. 915  
W. B. Phillips  
Piston Co. 915  
W. B. Phillips*

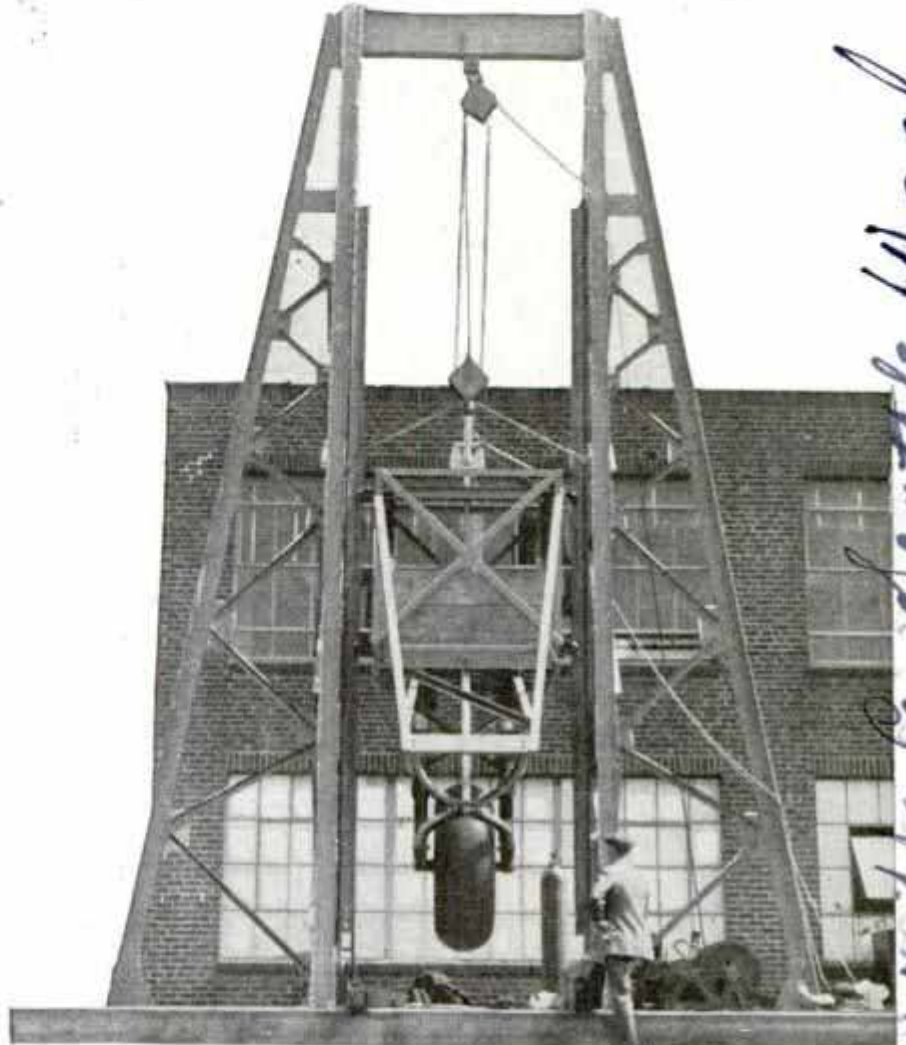


screw and can be fixed at any idling period the truck operator desires. Tested with a fleet of milk delivery trucks, the time stopper saved fifteen per cent in gasoline during one month and it is expected to result in less motor wear also.

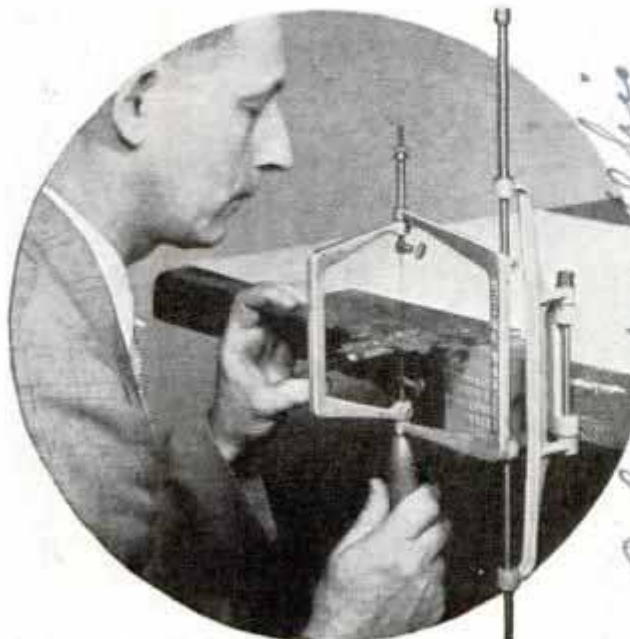
185  
**Scroll Saw Pivots in Double Frame Fixed on Bench**

Guiding a scroll saw that moves and pivots freely in a double frame is easy work, for the operator is relieved of attention to the position of the saw and is able to concentrate on the pattern. The inner or saw frame allows clear vision of the work, and pivots within the outer frame as the blade follows curved lines. The outer frame moves up and down with the saw. The entire unit clamps on the edge of the work bench, and there is a removable clamp which holds the work in place.

7 703  
**Landing Gear of 'Flying Fort'  
Proves Strength in Drop Test**



Landing gear of bombing plane in thirty-foot jig ready for drop test to prove its strength under forty-ton impact



Cutting intricate pattern with free-turning saw

Load factors of the landing gear to be installed on the giant four-motor Boeing bombers being constructed for the United States air corps are determined with the aid of a huge drop-test jig thirty feet high and constructed of steel on a cement foundation. Loads are placed on a moving carriage guided by large ball bearings fitted around a track which runs the vertical length of the jig. Tests have shown the landing gear for these "flying forts" will withstand a load of about eighty tons as compared to the bomber's gross weight of sixteen tons. In these tests, a load of 16,000 pounds was placed on the jig carriage and dropped two feet to produce an impact on the one wheel of approximately forty tons. Thirteen of these big, speedy, long-range bombers are being constructed for the air corps.

*Answers to Q. Seattle, Wash.  
Columbus, Ohio*

*Woodcraft Inc. Myg*



F931

Fairchild Aerial Camera Corp  
270 W 88th

# SHOOTING 'EM

recorder

cont. Mrs A. L. White Stratford Arms Hotel  
170 W 88th St. New York City



RECENT photographs taken from an altitude of 72,395 feet and depicting the earth as it appears from the stratosphere show the modern possibilities of aerial photography, which had its beginning about 1918 when an inventor first applied the three principles that aerial cameras must be as accurate as fine scientific instruments and as rugged as any other piece of aviation equipment; that camera parts must be standardized and interchangeable, and that distortion may be obviated by the use of between-the-lens shutters.

By the use of modern light metals and through progress in mak-



Fairchild aerial camera for taking vertical pictures, and a view of Riverside Drive in New York as recorded by the flying photographer and his aerial camera

K30

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F731

# from the SKY

*cyclops*

Making an oblique shot with an aerial camera over the side of the plane. Vertical shots are taken through a well in the floor



View of the Empire State building in New York City made with aerial camera. A special "skyscraper camera" eliminates the "leaning" effect

F-8

ing standardized, interchangeable parts, aerial cameras have now been developed into scientific instruments with ruggedness and accuracy as great as the finest astronomical or geodetic survey instruments. Certain conditions make aerial photography entirely different from other photography. The camera operates from a moving support which vibrates and there may occur a deviation or "crab" of the longitudinal axis of the airplane from the line of flight. Light filters must be used in order to penetrate aerial haze. Atmospheric conditions vary. But aerial cameras have gone with Admiral Byrd to the South Pole, with Wilkins to the North Polar regions, with expeditions into Peru's high mountains, the tropical Amazon regions, and Yucatan, and have been used for mapping areas in Alaska and Porto Rico. Cameras had to be developed that would operate with equal efficiency in polar cold, tropic heat, desert aridity or seacoast humidity.

In order to keep the proper adjustments and to balance changes because of contraction or expansion in each metal, seventeen different metals have been used in the shutters. Careful tests were made to



Fairchild F-8

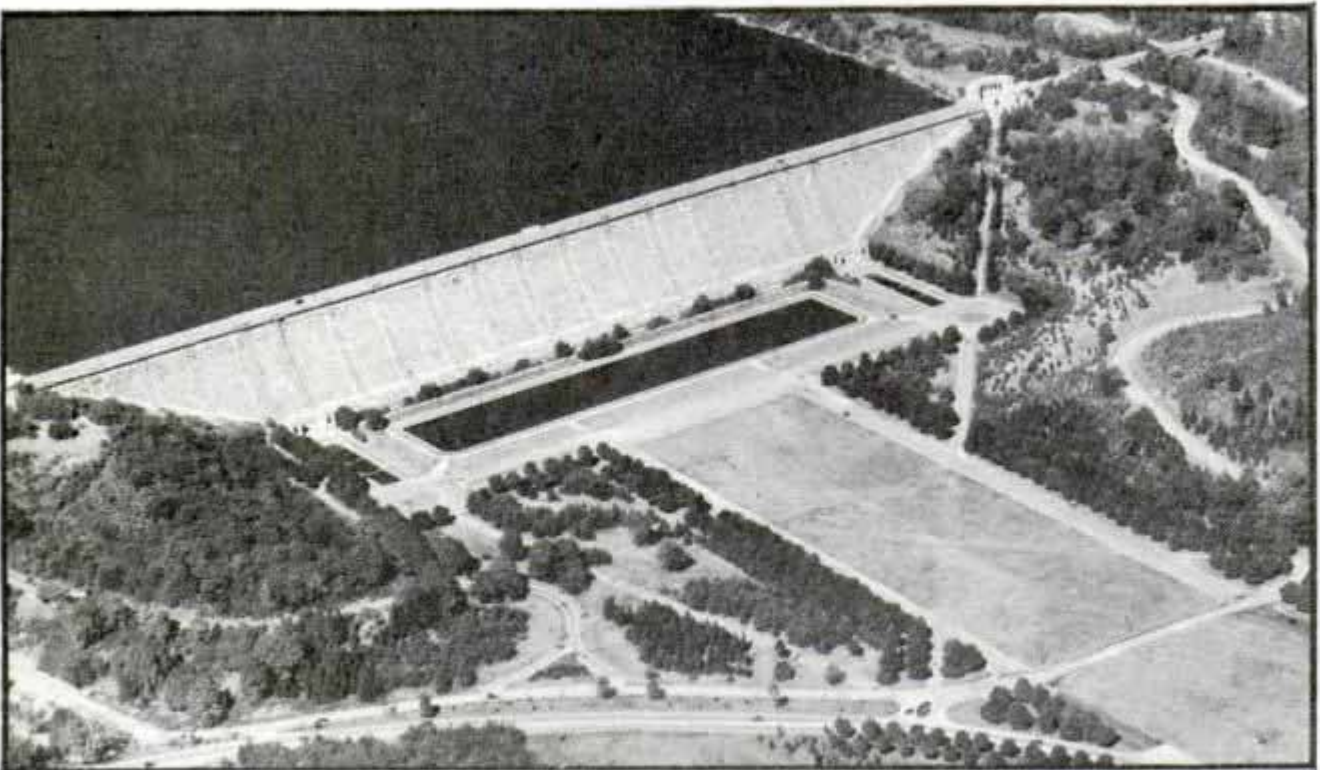


ascertain the range of shutter speeds that would meet all requirements, and the elimination of useless speeds permitted simplification of design and increase of ruggedness and reliability. Two types of shutters are used. The focal plane shutter consists of an opaque curtain so arranged in front of the film that it will travel from side to side across the face of the film, successively exposing the various portions through a slit in the curtain. This type is recommended for oblique-view photogra-

phy and for mapping operations of small and medium scope.

The between-the-lens shutter consists of overlapping leaves arranged between the elements of the lens and opening so rapidly that less than one-thousandth of a second is required for clearing and closing. As this type eliminates distortion it is of particular importance in connection with mapping operations and military intelligence photography.

Light filters are used to select certain



*Aerial view of a glacier in Alaska, showing a plane in flight above it, and an oblique photograph taken with a Fairchild aerial camera*

K-38



F773

see June 1938 849

wave lengths of light and to reject other bands of color from the light arriving at the lens. In one picture taken from the stratosphere, the camera was able to photograph the horizon 330 miles away, and to show the earth's curvature and the boundary between the troposphere or "dust sphere" and the stratosphere. Because of the filter placed in front of the camera lens and a particular type of infrared sensitive film, no visible light reached the film and the photograph was taken wholly by means of light the human eye could not see.

Since at the higher levels the air is more even and there is less danger of "bumping," the picture planes usually fly high. To get clarity of detail in high altitudes

(Continued to page 114A)

### Eight-Seated Car for Touring Travels on Highway or Rails



Hauling up the flanged wheels, the driver of this eight passenger car steers away from rail to highway on rubber tires

Swains Co. Union Electric. mech.

Switzerland  
Leningrad  
Palazzo  
Beust  
H. V.

### Auto with Rear Engine Carries Baggage under the Hood

Spare tires and luggage are carried under the hood at the front of a streamline rear-engine automobile produced in Europe. The car has an eight-cylinder, V-type, air-cooled motor, makes a speed of 100 miles an hour and provides ample room for six passengers.

Tatra



Back and side views of rear-engine car

Wherever the highway or rails lead, the latest thing in automotive transport will take you. It is an eight-passenger car that roams over the highways on pneumatic tires, or, at the touch of a lever, drops its flanged wheels down and speeds along the railway. It is equipped with small tables suitable for writing, for games or dining, and an electric refrigeration system is available for touring.

F780

### Leather Case for Cartridges Speeds Up Target Shooting

Target practice is speeded up by using a cylindrical cowhide ammunition case with a zipper fastener. The leather case contains a plastic block with holes to accommodate fifty 22-caliber cartridges in groups of five. The cartridges are held upright so they are easy to pick up. A slot under the block provides space for a roll of gummed target-patching tape.



Nesslader Case Shootakraft Products



*6/27/36*

# Hunt for Hidden Radio Set Is Sport for Short-Wave Fans



*Wide World*

Equipped with portable receiving set, two participants in new game are trying to locate hidden short-wave transmitter

Amateur radio enthusiasts have invented a new game—a hunt for hidden radio sets. Told that a short-wave transmitter is hidden in a certain area, groups of radio fans converge on that section at the appointed time and, with their portable receivers, try to locate the concealed sender from its signals. In one organized hunt in a wooded area near Kirkland, Wash., two short-wave sets a quarter mile apart confused the hunters and it was nearly two hours before the hunt ended.

## X-Rays Test Many Materials for Hidden Defects

Looking inside of all sorts of materials is becoming a common task for X-rays. Foundries and welding shops use the equipment to control and inspect metal

because the rays reveal hidden defects. X-rays have helped to solve problems in connection with ceramics, concrete, mica, coal, asbestos, foods, tobacco, plastics, paper, leather, wood and other materials. In building the giant hydraulic penstocks for Boulder Dam, 270,000 feet of X-ray film were used for examination of welded joints. Radioactive substances, such as radium, which are more powerful than X-rays, are being employed for non-destructive testing of materials.

## Gem Cutter for Amateur Aids Fascinating Hobby

Anyone can make gem cutting his hobby with a tool now available for amateurs. Invented by a Missouri man who is an enthusiastic amateur, this motor-driven tool has a faceting attachment calibrated for cutting two types of gems, locking the stone in position to cut each facet. It is designed for home or club use, and also for teaching classes in geology, mineralogy, and vocational and manual-training work. Only one type of abrasive is required, and the cutter is furnished complete for grinding and polishing gems.

*pat. app. \$8.55*



Grinding and polishing facets on semi-precious stone with the gem cutter

*John. Fred. ...*

*... ..*

*7868*

*The ...*



# Diesel Engine Air Liner Convertible for War

*Es-38*



*dent.*  
German passenger-carrying air liner driven by Diesel engines at low cost. The big ship is said to be convertible for war purposes with very little alteration

Driven by Diesel motors at low cost, the latest German passenger-carrying air liner is said to be convertible for war purposes. It uses crude oil, resulting in eco-

nomical operation. Other features of the big ship are the passenger compartment arrangement in the base wings and the two pairs of landing wheels.

## Germ-Killing Rays Sterilize Air and Stop Mold Growths

Mold spores and bacteria in the air which contaminate foodstuffs and cause spoilage are exterminated with invisible germicidal rays produced by a radiation lamp developed recently by the Westinghouse Lamp company. The germ-killing lamp consists of a slender glass tube con-

taining a small quantity of a special gas. When electricity is passed through the gas, ultraviolet radiations of a type which do not produce sunburn or blistering are given off. These rays kill germs although the lamp operates as a "cold" source, its temperature being only a few degrees above its surroundings. Many industrial applications are expected to be found for the lamp, including the sterilizing of air passing through air-conditioning systems, preventing mold on the surface of meats aged at relatively high temperature and high humidity, and retarding the growth of mold on bakery products. Because meat can be aged faster and at higher temperature with the aid of the lamp, there is a possibility that in future it can be "tenderized" while in transit between Chicago and New York. Exposure to the rays lengthens the mold-free life of bakery products by as much as two days, tests have shown. The lamp also may be found useful in insect control as the radiations repulse fruit flies, roaches and grain weevil which refuse to enter the area of exposure, and even house flies are killed if exposed long. The lamps are inexpensive, both in first cost and in operation.

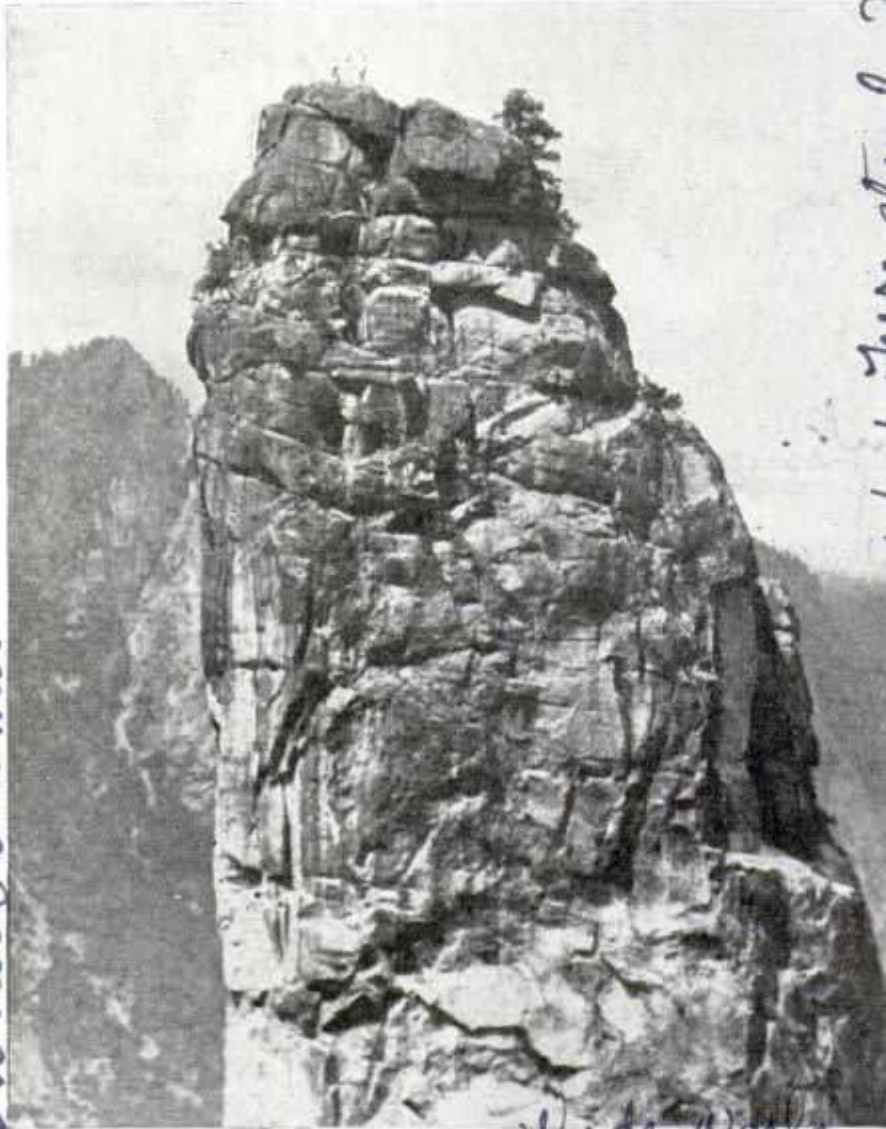


Some of shapes taken by tubes which emit invisible germicidal rays to kill mold growths

*see June 1938 p. 31*  
*Robert J. Lawrence*



# Climbers Scale High Spires in Yosemite National Park



University of California climbers atop the Cathedral Spires in Yosemite. They conquered the 2,115-foot shaft in four hours

While vacationists watched in breathless suspense from the valley below, three University of California climbers recently scaled the needle-like rock formations in Yosemite national park known as the Cathedral Spires. The climbers, training for an expedition to Mount Washington, conquered the 2,115-foot shaft of rocks in four hours. Their stay on top, however, was cut short by a sudden snowstorm.

## High Voltage Generated by Disk with Few Wearing Parts

High voltage at low cost is the promise of an improved generating method devel-

oped by Dr. Odd Dahl of the Carnegie Institution at Washington. His apparatus involves a whirling disk, rotating 1,350 times per minute, which passes through an area of ionized air from a corona discharge and carries the electrical charge to the storing terminal. There is no rubbing contact, and the only wear is the normal wear of bearings and disk shaft. With his compact equipment Dr. Dahl produced 220,000 volts and currents of ten to thirty milliamperes. For million-volt charges several disk units could be linked in tandem. This generating system offers a way to develop cheap voltage for breaking down atoms.

## Flashing Bulbs Test Accuracy of Watch in One Minute

If your watch is losing ten seconds a day, you can detect it in a minute's observation with an electric timer which utilizes sixty-cycle alternating current. Flashing neon bulbs synchronized with the movement of the balance wheel tell the story. The watch is placed on the regulating table with the balance wheel visible through the eyepiece of the timer. If it is beating five times to the second, the timer's neon bulbs are set to flash at that rate, regulated by circuit breakers connected with the shaft of the synchronous motor. By turning a knob, neon bulbs and balance wheel



Science Service  
6/18/36

Edward P. Carter  
The Chronoscope Co

Jules Eckhardt Morgan Harris  
Kenneth Adams

Depth of structural magnetism  
all

Wide walk

Berkeley Calif

\$35.00 - per set



# Music Broadcast from Train by Philadelphia Symphony

are brought together so that the image of the wheel through the eyepiece is distinct. If it is indistinct after one minute, the knob is turned to right or left until it is again clear, indicating lights and balance wheel are synchronized. Then the dial reading shows the minutes the watch is gaining or losing in twenty-four hours. The minute dial is subdivided into ten-second divisions.

F 792

## Junk Pile Supplies Parts for Tractor for Light Work

Some old automobile parts and a reconditioned one and one-half horsepower engine were assembled into a small tractor by a California man who started out to build the vehicle as a plaything for his son, then found he had done such a good job that he uses the tractor to pull light loads on his farm. The front and rear axles of an old car were cut down to the desired width and a junk auto frame also was cut down for the tractor. Two transmissions between the engine and differential give the necessary reduction in speed.

Joe Holbach, Traabridge



Small tractor constructed of old auto parts. It does light hauling about the farm

Carl Ray Cainer  
F 71  
Clayton Max Hoffer



Philadelphia symphony orchestra broadcasting a concert from a speeding train. The baggage car was fitted up as a studio

Denver people heard the Philadelphia symphony orchestra coming to that city for a concert long before the musicians arrived. While the train carrying the orchestra sped westward, the musicians broadcast a concert from the baggage car which was fitted up as a combination studio and short-wave transmitting station. Receivers were installed on a 200-foot grain elevator at the city limits and on the roof of the Denver union station, both connected to the control room of KOA in Denver by special telephone wires.

F 837

## Quinine Compound Is Tasteless

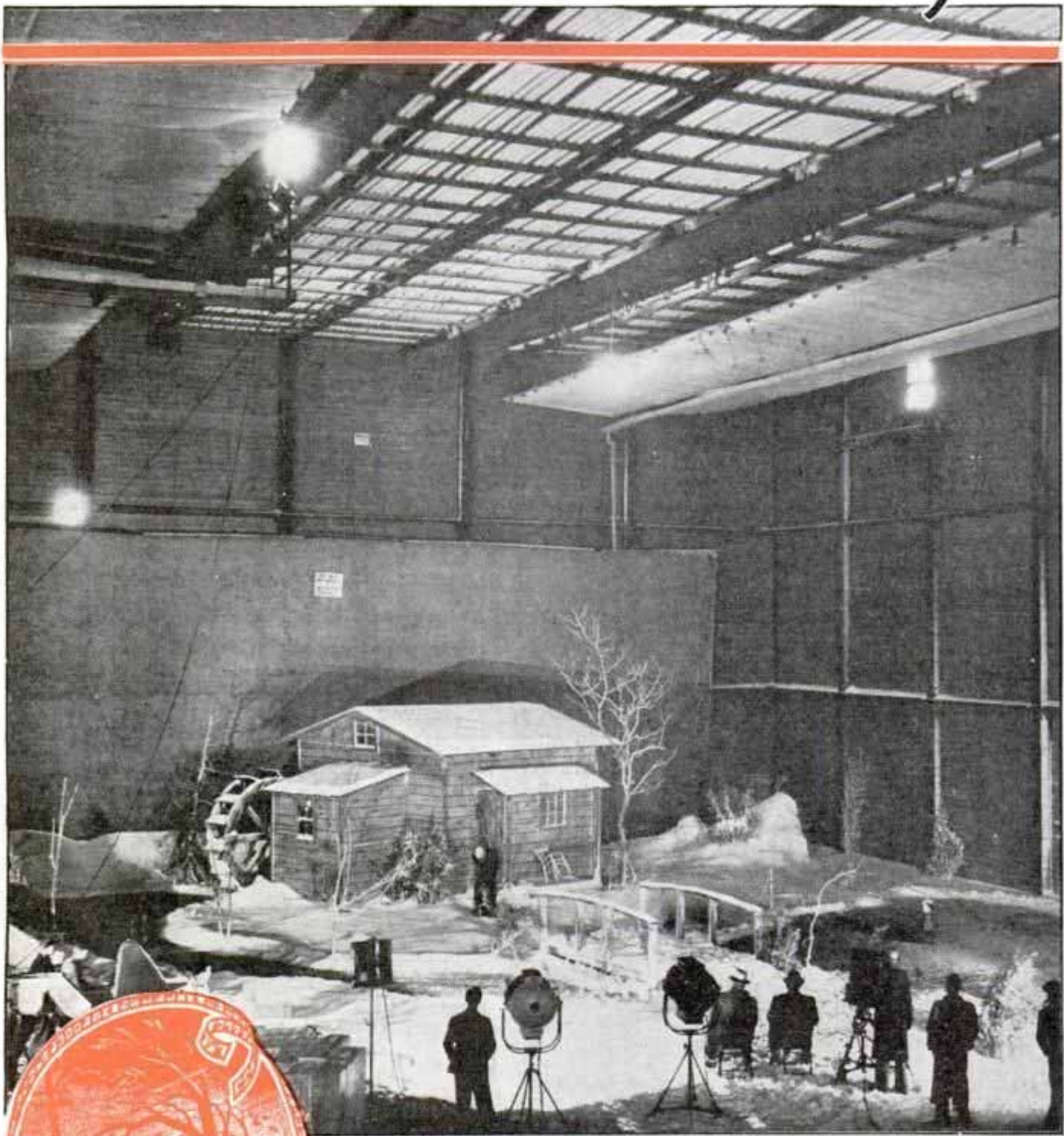
Tasteless quinine is being produced in a compound for which a patent was granted recently. It is made by combining quinine with a naphthalene compound. In the naphthalene compound there is present a chemical related to acetic acid, which is found in vinegar. The chemical union between the quinine and the naphthalene compound takes away quinine's bitter taste, it is claimed.

Edwards Service



T 546  
 10555  
 Holman Co  
 Los Angeles, Calif

# The SECRETS of



*Shooting winter scene in a refrigerated studio with temperature below freezing. Note the overhead refrigerating pipes*



WHEN a motion-picture director wants weather—any kind of weather from a sandstorm to a sirocco—he orders it just as you order an ice-cream soda. On the Twentieth Century-Fox lot he sends for Lou Witte.

"Lou," he says, "I want a rainstorm with a heavy wind on Stage 4 this afternoon. And I hope that you'll be able to arrange for a good blizzard on the Alaska set in

*Special Effects Dept.  
 9/19/35*



F 54 6127

# MOVIE WEATHER

the morning." If you should visit Stage 4 you will find the actors wearing slickers and rubber boots. In Hollywood the weatherman makes the weather behave and rain and snow can be turned on or off. As soon as the actors and technical staffs are ready the director raises his hand.

"Okay! Start the rain," he says. "Harder! Now give me the wind. Make her howl!"

The stage lights are softened so there are no hard shadows, and rain begins to drum on the stage floor. To the camera the scene appears to be a small town street on a rainy afternoon. Mud puddles begin to fill with water as the wind drives the rain slantingly across the street.

Every detail of this man-made weather was worked out with engineering accuracy ahead of time. Water pipes strung across



Grace Bradley watching property man restore a real icicle in refrigerated studio. Below, stage rain for "The Green Pastures"





the top of the stage provide the rain. The water pours down under ninety pounds pressure to duplicate the force of a sudden shower. The tiny nozzles are of a special design to eliminate the slightest hiss that might be caught by the sound microphones. The wind machine that can create an artificial hurricane of 100 miles per hour is also soundless. In pictures the scream of a gale is duplicated with a paddle wheel that gives off an eerie howl when it is whirled in the air.

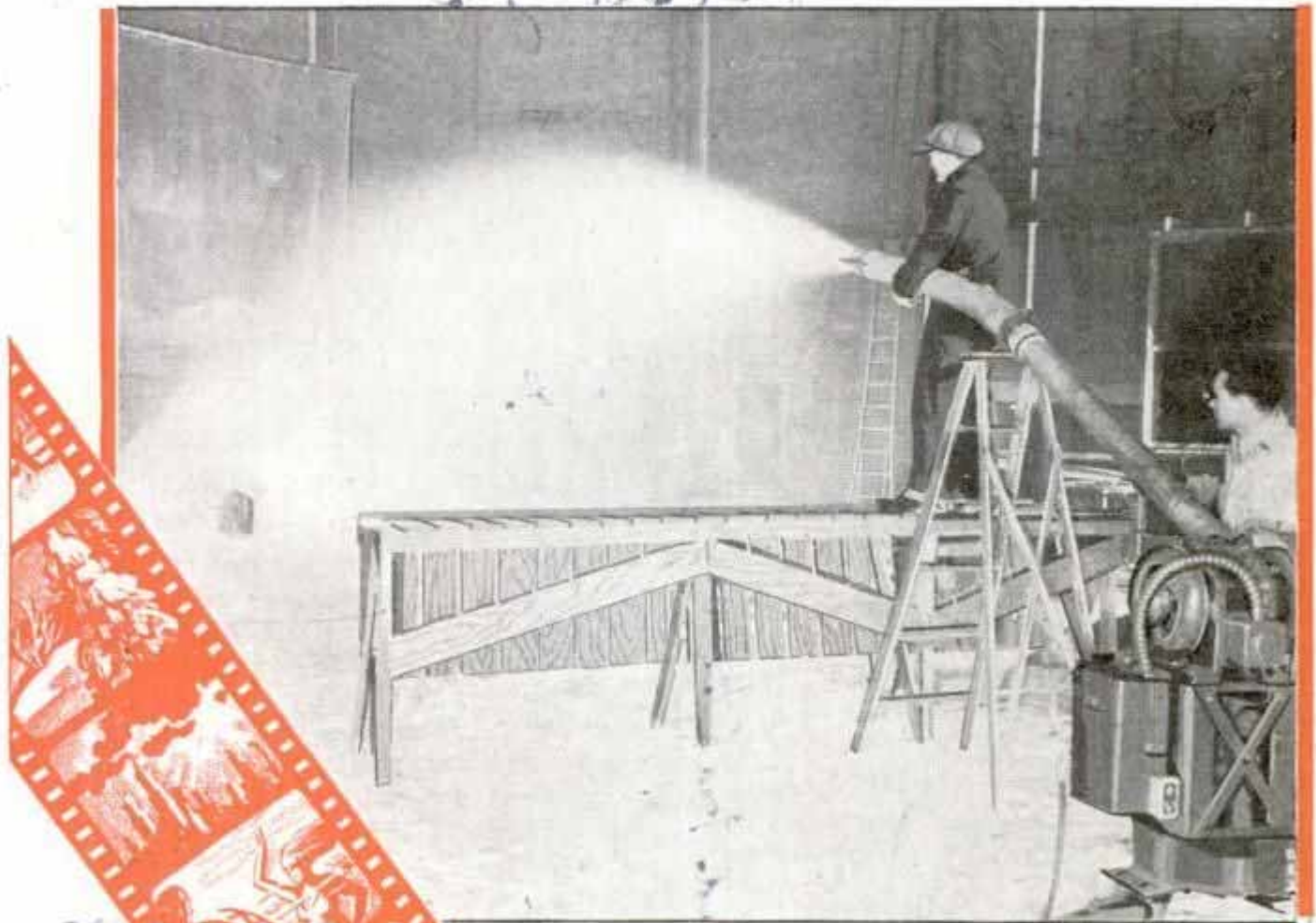
Recently Witte was called upon to duplicate waves that dashed against a rock sea wall while a tropical storm raged overhead—all inside a sound stage. The scene was to show a gun crew firing a cannon from the low rock parapet of a fort while the waves beat over them.

"For this scene," Witte recalls, "we used nearly every weather effect in the book. A large tank of water with the parapet at one end represented the ocean. A wave machine that consisted of a huge wooden paddle produced the effect of normal surf. The paddle was pulled up and down in the water by half a dozen men at one side of



*Blizzard fan in Twentieth Century-Fox studios which is used in creating storm effects. Below, applying mineral oil perspiration to actors at Paramount studios before they face the cameras*





*Blower shooting a stream of artificial snow made of crushed ice over a movie set*

the camera. Now and then a large wave that nearly engulfed the gunners on the rocky ledge was produced by tripping the gates of large spill tanks that released thousands of gallons of water at the same instant into the tank. We had a long baffle board at the base of the parapet that produced realistic spray when we turned a fire hose against it.

"Meanwhile, of course, rain was beating down from overhead. Wind gusts were created by large turbine fans. Occasionally lightning flared up, created by pulling the electrodes of a high voltage spark gap apart. The gunners shot blanks from their cannon to produce the noise and smoke of actual shots. The fog and clouds in the

scene consisted of vaporized mineral oil ejected under pressure from fog machines."

The electric lightning machine is not powerful enough for exterior scenes and when Witte is asked to create a lightning flash out-of-doors he sets up a device that blows a charge of aluminum powder past the flare of an open pilot light. The result is a momentary but brilliant flash.

At Warner Brothers full-size marine storms are created in a pool that holds 4,000,000 gallons. A motion-picture ship is anchored in the middle of the pool, its center resting on a universal joint. Then it may be rocked by hidden wires operated offstage. Two storm towers, one on each side of the ship, are manned by crews of men who operate dump tanks that spill floods of water alternately toward each side of the ship.

Few screen stories call for exactly the same weather conditions and the Hollywood weather makers must be ready to reproduce almost any natural phenome-

(Continued to page 128A)



66 Mr. Nelson, St. Louis, Mo  
Pershing

# Wood-Veneer Steel Table Is Impervious to Burns

Steelwood



Steel under wood veneer dissipates heat so fast that lit cigarette does not mar finish of table

So highly resistant to burns is a wood-veneer table introduced to the furniture trade this year that a burning cigarette can be laid on it without marring the finish. The veneer, one eighty-fifth inch thick, is laid on a twenty-gauge steel core. The steel dissipates heat so rapidly it protects the wood from charring.

# "Dried Up" Oil Wells Revived by Simple Chemicals

Simple chemicals, such as hydrochloric acid and sodium fluoride, when properly emulsified and injected into an oil well, will revive spent or "dried up" wells. A patent covering a "process for increasing the productivity of wells" has been issued. What happens to many oil wells, the in-

ventor says, is stoppage of output as a result of the accumulation of solid deposits of wax or inorganic salts in the pores of oil-bearing rock. The chemical mixture is intended to dissolve these deposits, thus releasing more oil, and to eat new openings in the rock, increasing the number of holes or pores. One advantage of the mixture is that it remains inactive until it reaches the clogging minerals, thus preventing corrosion of oil-well machinery.

F 692

# Voice Alarm for Fire Stations Replaces Old Gong System

Invented by two radio technicians, a new voice-alarm system for fire stations has been installed at Bridgeport, Conn. A signal over the system is heard by every man on duty in all stations, instead of going to only one man at a telephone and then being sounded by the old bell system. The central control desk is located beside the telephone switchboard at headquarters. In addition room units are located in each station for receiving signals from the central office microphone. When an



Sending out fire alarm to all stations by means of new voice system

alarm comes in by telephone, a siren sounds, placing every man on the alert in every station. Then the dispatcher delivers the alarm, giving the location of the fire and the companies due to respond. In

Washelate Corp  
Grand Rapids, Mich

Robinson and Perkins

Talbot

Radio and Sound  
Technicians  
13 Radio Road

F 770  
vener  
service 6/5/36

Pat # 2 038, 720  
Assigned to Wilson

Capt. Thomas  
Magnier, 16 3/4  
Bridgeport

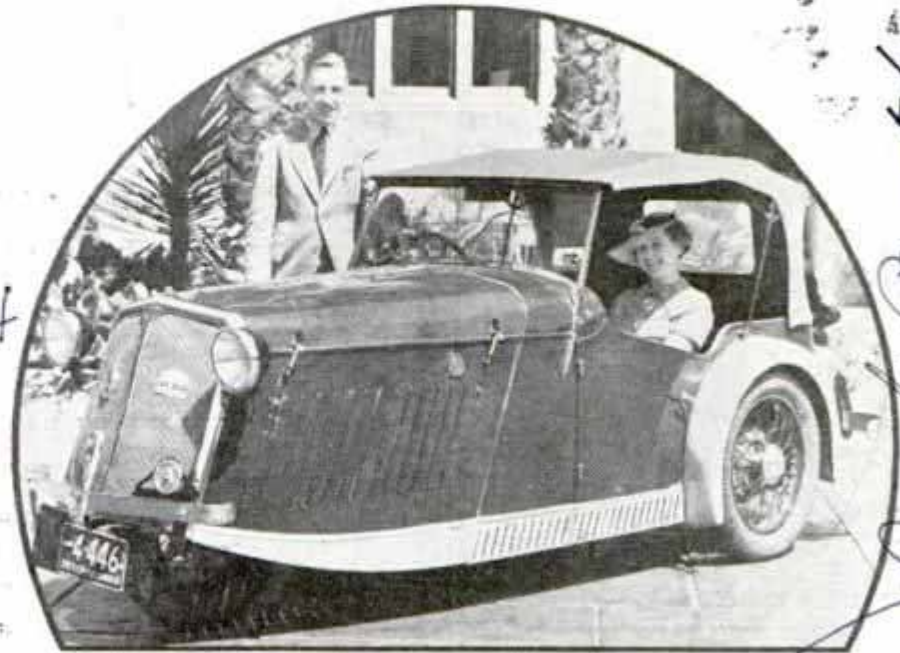


# Three-Wheel Car Travels Sixty Miles to the Gallon

the event of an alarm from a street corner box, the dispatcher sends the signal with the announcement: "Alarm coming in from box (giving the number). Covering companies respond." The system may eliminate confusion over similarity of street names because all firemen will hear the alarm instead of only one.

## Photograph Is Seen as if Enlarged in Cabinet

To show exactly how your snapshot would appear if enlarged, a photo-enlargement demonstrator has been developed. You simply open a small door, place your print against a glass, close the door and press a button lighting the interior. Looking into a hood you see the original photograph enlarged by three diameters, or nine times its area. What the observer sees is a projected image. Two 200-watt lamps in metal tubes illuminate the photograph, its image passes to a mirror and is reflected through an f.4.5 lens to the white screen seen through the hood.

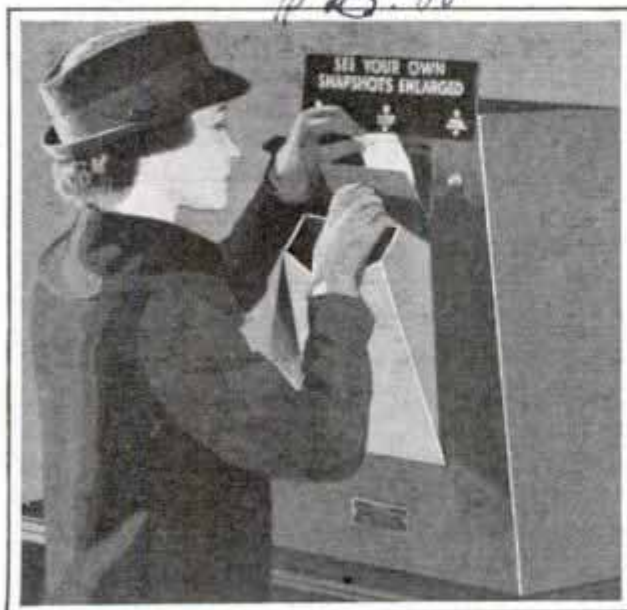


Three-wheeled auto which weighs 950 pounds, travels sixty miles on the gallon of fuel and goes seventy miles per hour

Californians were intrigued recently by a three-wheeled automobile in which a Vancouver, B. C., couple are touring this country. Such cars are used in England to circumvent the heavy taxes assessed against four-wheeled vehicles. Weighing only 950 pounds, the car travels sixty miles on one gallon of gasoline and has a top speed of seventy miles per hour.

## Cleaner for Battery Terminal Restores Taper of Post

All traces of corrosion and irregularity on battery terminal posts can be removed by a small spring cleaner designed for the purpose. Inserted over the top of the post, it is pressed downward with a turn to the right and then withdrawn with a further turning movement, leaving the post clean and restoring its original taper. This saves the battery and prevents loss of current.



Placing photograph in cabinet and pressing button, you see it in mirror as if enlarged nine times

F 74 1 / S. A. Cycles Ltd. Small Death Birmingham England.

Jack Co. at the street...

F 73 7

Bird. 35 and

Wagon of Buffalo, N.Y.

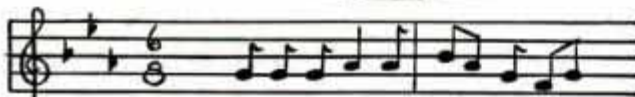
Eastman Kodak Co.

Birmingham 5-43



*Lamp Development Dept  
Westinghouse  
Cleveland, Ohio*

### Song Dictionary Indexes Tunes by "Contour Map" of Melody



Inventor of melody dictionary explains his method of indexing song by its "contour"

If the latest popular song hit is a "steal" from some melody that was the rage in the "gay nineties," a scientific song dictionary recently invented and compiled by Dr. Sigurd B. Hustvedt will detect the plagiarism. Dr. Hustvedt, professor of English at the University of California at Los Angeles, devised a card index of tunes based upon the "contour map" of the melody. The rising and falling pitch of the tune is represented by symbols. For example, the opening line of "Drink to Me Only with Thine Eyes" would be represented in his index by "12BAB2," each character denoting a melodic interval, each number an ascending interval and each letter a descending interval. The purpose of the dictionary is to prevent plagiarism and help simplify cataloguing of music.

### Steam So Hot It Burns Paper Generated in Electric Bulb

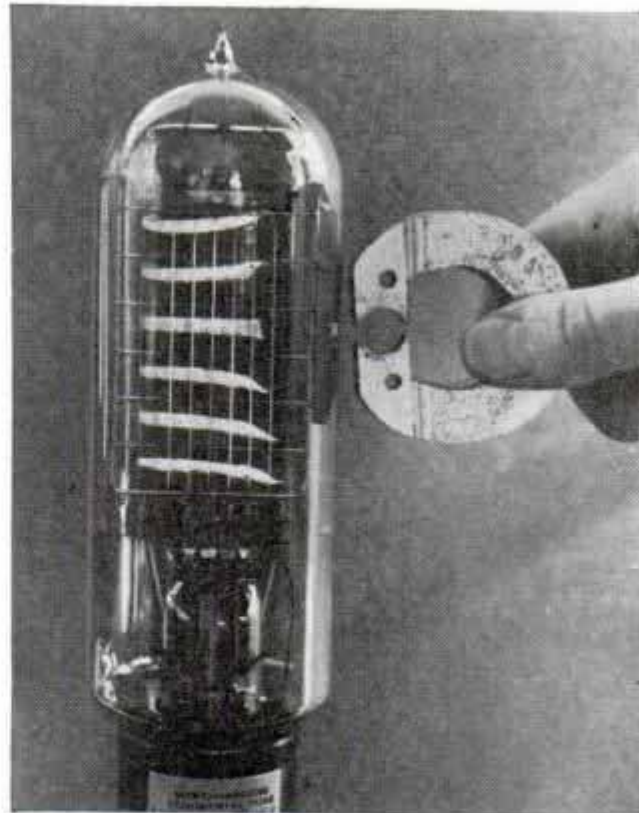
Steam so hot that it chars paper to black ashes is generated in the copper coil of an

electric bulb that is the latest product of the research laboratories. Its purpose is the destruction of bacteria to protect public health. Somewhat similar to a large house lamp, the steam bulb has a copper coil set like a hood over its tungsten filament. Both ends of the bulb are sealed, one end by the usual base holding the filament, the other by a metal door to which is attached, inside the bulb, the copper coil. Intake and output ends of the coil pass through the metal door, and water runs through the intake. The filament reaches a temperature of 4,000 degrees Fahrenheit and the copper coils, welded with silver, would melt if left dry a few seconds. The steam jet, about the size of a pencil, is ejected at a temperature of 600 to 750 degrees for sterilization purposes.

*F734*

### Light Tube "Sees" Electrons and Aids Science

Study of electronic phenomena is simplified by a tube developed recently in the laboratories of the Westinghouse Lamp company. Electrons, whose electrically charged particles are important factors in the atom and exist in all matter, can be



Demonstrating effect which magnet has on electrons. Note change in path of light

*Westinghouse Lamp  
159 Broad St.*

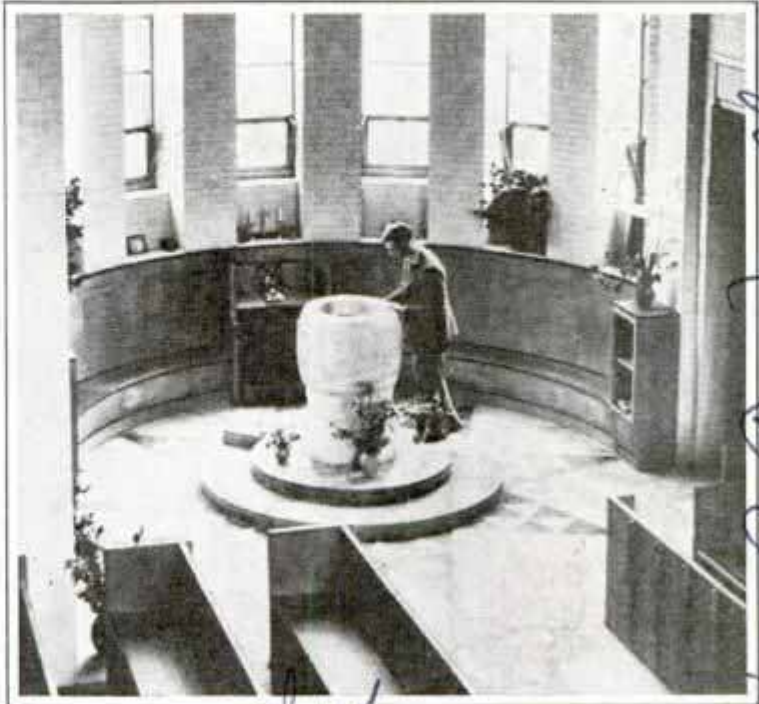
*Cont. Andrew J. Hamilton, 2316  
Madison Ave.  
New York*

*Chicago Tribune  
11/13/24*



"seen" by the tube. A fluorescent coating on the plate in the tube emits visible radiations when the electrons strike it, giving evidence of the presence of the particles. The fluorescent plate has luminous bands of varying width. As the voltage on the grid is varied, the number of electrons passing through is changed by a corresponding amount, in turn resulting in changes of the light bands on the plate. If a large number of the particles is permitted to pass the grid, the entire plate becomes luminous. Since they are extremely minute, the electrons passing through the plate, which is two by four inches, number in the billions. A magnet held alongside the tube affects the path of the electrons. In comparison, holding a magnet alongside a similar tube in radio transmission equipment would garble the music and voice. Electronic tubes are used for sound amplification in loud-speaker systems and for reproduction of radio waves into audible tones.

**Stained Glass and Filigree**  
 ↓ 705 **Missing in Modern Church**

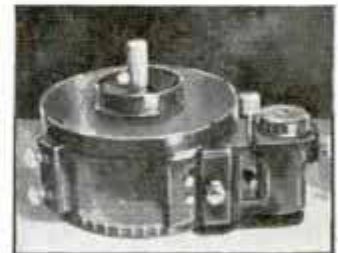


Tall, rectangular windows lend modern accent to new church at Manchester, England. Baptismal font is shown above

Bold departure from the traditions of England's great Gothic cathedrals is the new Church of St. Christopher at Withington in Manchester, built in the modern architectural style. Its windows are lofty rectangles admitting long shafts of light, in striking contrast with the familiar stained-glass windows of ancient as well as most present-day churches. Absent, too, are Gothic carvings and filigree.

↓ 771  
**Daylight Developing Tank for Miniature Films**

Thirty-five millimeter film used in the miniature "candid" cameras can be developed, washed and fixed in a small daylight tank which obviates the use of a dark room. The film is placed in a small chamber just the size of its magazine, and is wound into a larger tank by turning a milled knob. Even development is assured with little chance of scratching. The tank is of Bakelite.



↓ 736  
**Thumb Brake on Casting Reel Helps Angler Hold Big Ones**

Big ones don't get away so easily when the fisherman has a thumb brake on his casting reel. A reel developed recently requires only the pressure of one thumb on a beveled flange to hold the line, leaving the hands free to play the rod.



Fisherman checks line by pressing right thumb against flange of reel, which acts as brake

Edw. John H. Warner

Architect: G. A. Miller  
 Liverpool, England  
 means of the City of Manchester

Keen Kaster Reel Co  
 15 1/2 St. Paul  
 Memphis  
 Arnesen

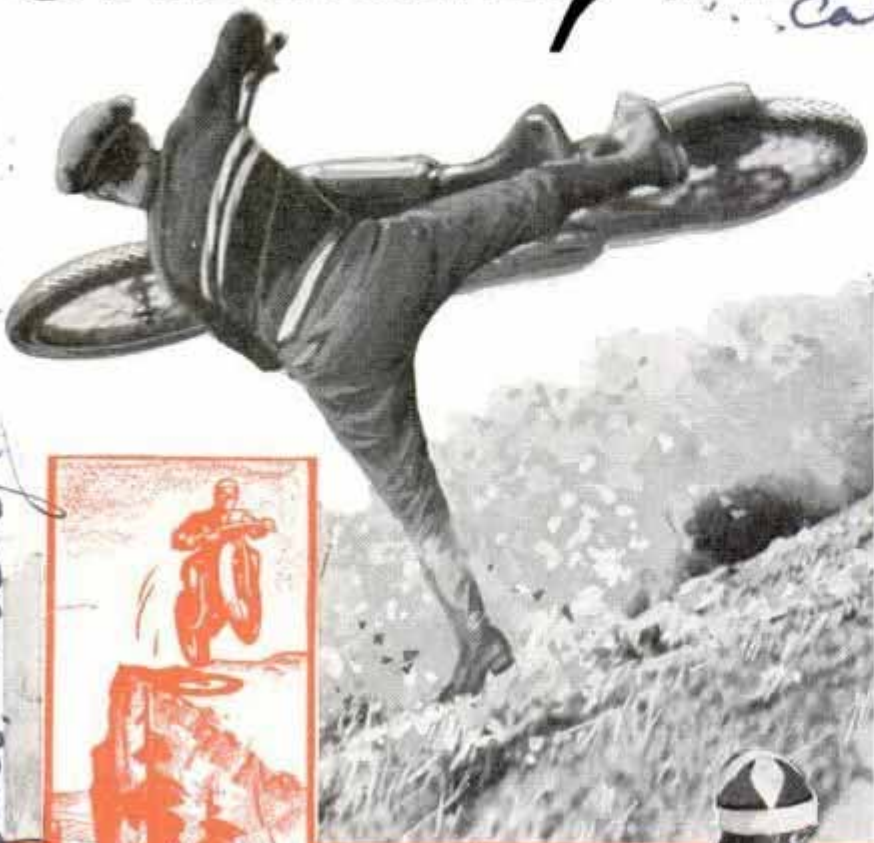


F 595

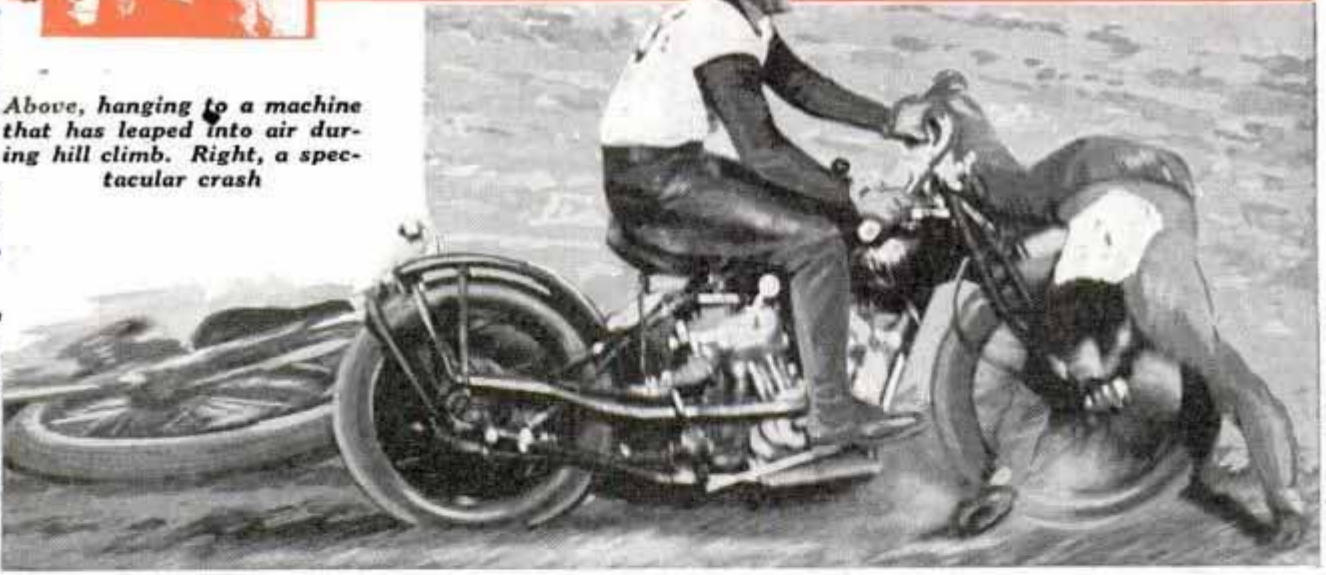
Mr. Thomas G. Stinson Jr.  
10555 Holman Ave

# Cheating <sup>Los Angeles Calif</sup> DEATH

Walton 726 Selden Ave  
Berkeley Calif  
Melvin 10555 Holman Ave



Above, hanging to a machine that has leaped into air during hill climb. Right, a spectacular crash



they hit soft dirt. They attain speeds of sixty-five miles per hour even on the short tracks. They ride part way around and the machines drag them the rest of the way because the quickest way to make a turn is to broadside sideways and let the left foot and probably the knee drag in the dirt. Racing motorcycles have no pedals on the left side.

Spills are frequent because the drivers ride in a cloud of dirt, rubbing elbows and handlebars. A hole dug in the track by spinning tires, a pile of soft dirt brushed out of a

THEY call them "murdercycles" because it is one of the toughest sports in the world. Races are only a few laps because no one can stand the terrific punishment for long. Most riders average an accident a week and sometimes a race is called off because everyone in it has wrecked his machine.

Riders hold on mainly with a "knee hook" on the right side that keeps them from being tossed over the handlebars if

hole, or a slight misjudging of a slide may cause a pile-up any second. A rider also must be prepared to "throw" his machine any minute. If someone spills in front of him and there isn't room to go around, the only thing to do is lay the machine right down in the dirt. It takes nerve to do that at fifty miles an hour but it usually prevents a more serious crackup.

Motorcycles are a little faster than the midget automobiles that race on the same

Vertical handwritten text on the right margin, possibly a name or address.



# on a MOTORCYCLE



one-fifth or one-quarter mile tracks. The riders have little protection because they are mounted on stripped-down skeleton racers. In spite of the heavy armor he wears, a rider rarely finishes a race without some marks. Gravel thrown by a machine in front pounds through the leather jacket and heavy sweaters. He protects his head with a composition crash helmet padded on the inside with sponge rubber. Heavy goggles sometimes broken by the flying gravel go over his eyes

*Start of a road race and a driver attired in goggles, crash helmet, heavy gloves and jacket which protect him to some extent from injury when he encounters trouble*





five spills in the five-month summer racing season. Not many of the wrecks are serious but all of them are spectacular.

Sometimes a rider takes a spill and holds on to his motor while it tears up the dirt. Then he throws a leg over the saddle and is back in the race almost without a pause. If he overslides and finds he has spun around, a burst of the throttle kicks the machine the rest of the way and he starts to make up lost time. Occasionally a rider going into a turn has so much momentum he slides into the vertical crash wall and



*Drivers "plowing ground" on a turn in a road race and, below, three drivers on heavy motors rounding a curve during a race*

and the rest of his face gets some protection from a rubber mask that tucks under the goggles. A set of goggles may not last through a week of racing because of the sandblasting action of the dirt.

The riders wear gloves, leather pants and heavy knee-high boots. Leather flaps fit over the laces to keep them from being cut by the gravel. A steel toe and sole fits over the left boot and on his left knee he wears a pad built up of leather and sponge rubber. This outfit usually protects him from anything more serious than sprains and bruises. Most riders average twenty-

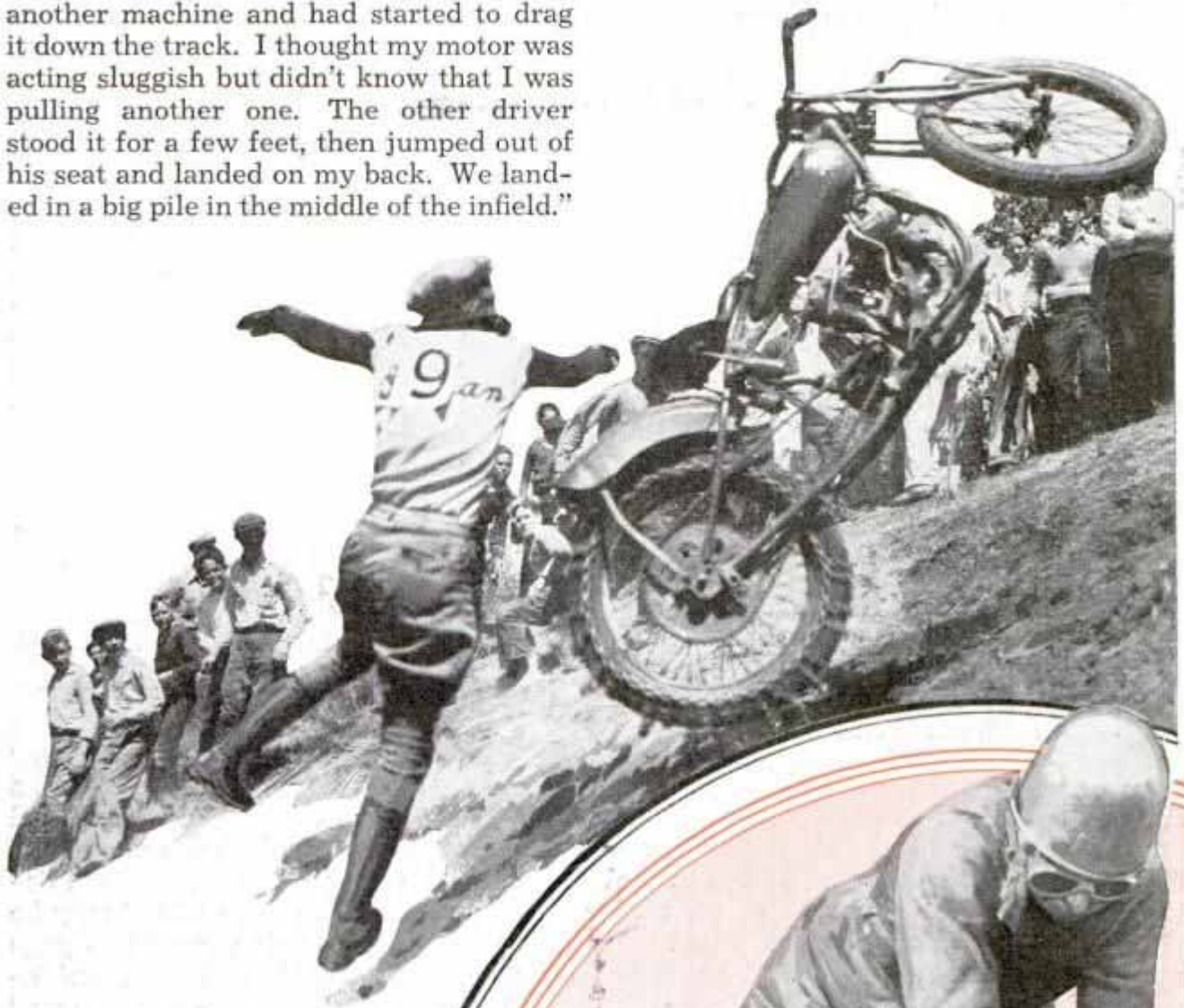
rides on it in a horizontal position. The chances are he will spill off the wall but a rider with good control may get back to the dirt without losing his place.

Miny Waln, crack Pacific coast rider, in seventeen years of competition has had nearly 200 spills. He finds it hard to pick out his biggest thrill.

"It must have been in one race when someone suddenly lit on my back and wrapped his arms around my neck," Waln recalls. "It just about scared me out of my wits. Coming out of a turn, I had hooked my pedal into the front wheel of



another machine and had started to drag it down the track. I thought my motor was acting sluggish but didn't know that I was pulling another one. The other driver stood it for a few feet, then jumped out of his seat and landed on my back. We landed in a big pile in the middle of the infield."



It takes courage to race a motorcycle but nerve alone doesn't win many races. Just as important is the ability to think fast, judging slides, spotting holes and getting through them and dodging wrecks. The pace is so nerve-racking that even the best riders have their slumps. A rider may win consistently for a week or two and then slow down while someone else takes the lead.

During the first few races on a program the pole position is usually best. After that the drivers ride a little higher because they have swept the surface gravel away from the rail, leaving a surface too slick for controlled "broad-sliding." Waln gets around a track fast by making two sharp corners at every turn



*Above, motorcycle running wild during a hill-climbing contest. Below, rider throwing his machine to prevent piling into wreck*

instead of one wide slide. He drives to the end of the straightaway wide open, then throws the motor sideways and shuts off for a second. This skids the machine around and he makes a short straight dash across the turn of the track. Another sharp

(Continued to page 134A)



# Helicopter's Wing Revolves after Ship Leaves the Ground

*Mr. Leonard P. Hennick  
7 W. 28th St. New York*



*Acme*  
Vertiplane is designed to hover in air supported by upper wing which rotates after gaining altitude

Equipped with upper wing which is rigid for the takeoff and which revolves later to support the craft in the air, a new helicopter is ready for test flights. Called the vertiplane, it closely resembles an airplane. The difference is noticed when the upper wing begins to rotate. The ship is expected to make almost vertical takeoffs and to hover in the air. The upper wing is twenty feet long and the lower one twenty-five feet. A 125-horsepower engine supplies power.

most accidents do not occur at high speed, there is an indication that the more serious wrecks happen at excessive speeds. For the protection of inexperienced, youthful drivers, the governor is recommended by safety experts. One governor now available has a lock and key for the dual purpose of adjustment and for positively locking the entire mechanism against tampering. So far as gas mileage is concerned one small eight-cylinder automobile, tested on the proving ground, obtained nineteen miles to the gallon at a speed of thirty-five, but only fourteen miles per gallon at sixty.

## Frame to Exhibit Picture Combined with Album

Snapshot album and picture frame are combined in a unit now offered for amateur photographers. It is a twenty-page book with spiral binding and a leather frame into which the album can be inserted, open to any picture it is desired to exhibit. Thus the album may be used on desk or wall to show a full-page enlargement in handsome frame. To facilitate mounting, small stickers gummed on both sides are available.

## Motor Governor Saves Money

*\$7.01* and Reduces Danger

By equipping the motor with one of the efficient, virtually tamper-proof governors now on the market, the owner of truck, bus or automobile can save money and be certain that the vehicle is not operated at excessive speeds. It is a known fact that better gasoline

and oil mileage will result from operation below forty miles per hour. Above that point, tire wear is much greater. While



*Snapshot and Snapshot Frame 95c*



Photo album can be opened to any page and slipped into frame to exhibit picture on desk or wall

*Hoop Products Co  
162 N. Franklin*

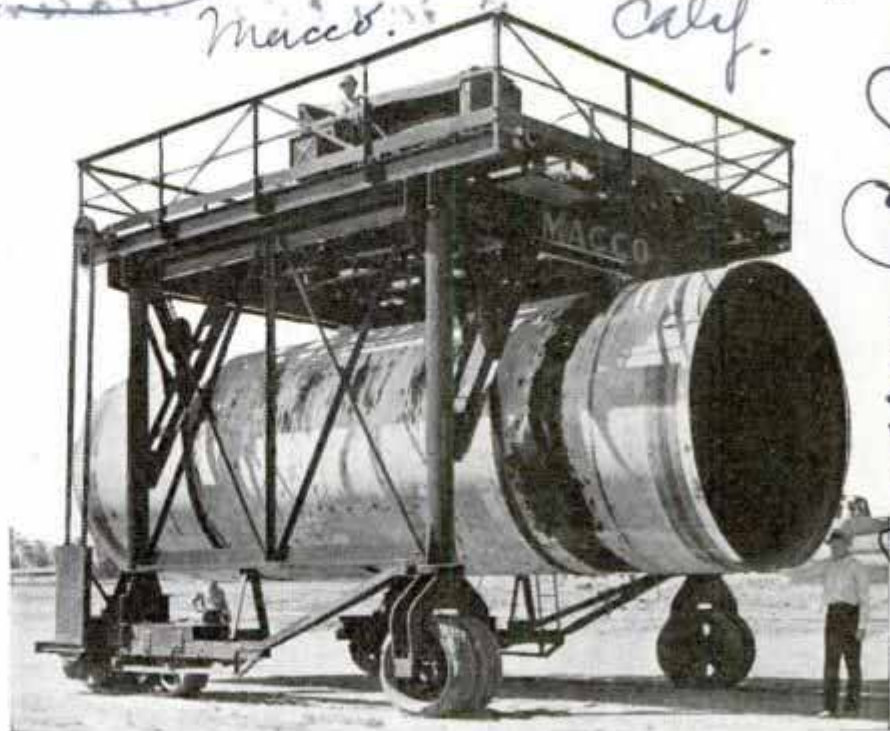
*Eastman Kodak Co  
Rochester, N.Y.*



*Macco Construction Co. Los Angeles Calif.*

# "Spider" Truck Straddles Ditch to Lay Pipe

Like a huge spider pouncing on its prey, a long-legged truck used in pipe-laying operations crawls over its load and hugs a 33,000-pound section of pipe with steel straps slipped from its "belly." Then this tall tractor carries the pipe to its place in line, straddles the ditch and lowers the section into the trench. Its front wheels turn, and its "hind legs" move on tractor treads driven by chains leading to the shaft of the engine, mounted on the platform. The operator rides behind his motor and drives the tractor like an automobile.



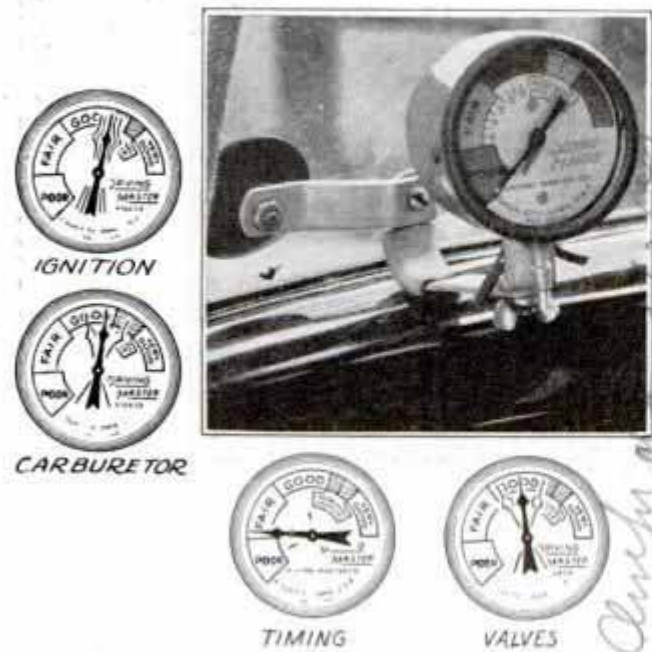
Tractor on stilts carries heavy pipe in a sling. Notice the chain drive for the rear tractor treads leading to engine mounted on top

*Anwar G. B. B. 151 Broadway Los Angeles, Calif.*

# Gasoline Mileage Gauge Analyzes Efficiency of Motor

Installed on the windshield directly in front of the driver, a small gasoline mileage gauge serves the additional purpose of analyzing the automobile engine. The gauge has a red indicator which shows the mileage received by different methods of driving and under varying speeds and

conditions. By driving the car in such a manner as to keep the black indicator in the position marked "Good" or "Very Good," the gas mileage will be improved. Steady, fast vibration of the black indicator reveals bad points, weak spark plugs, defective wiring or loose connections in the ignition system. A periodical or uneven fluctuation of the indicator is evidence of improper adjustment of the carburetor, while a steady, even fluctuation at regular intervals shows that one or more valves may be sticking. If the indicator rides below the proper idling point in "Good" or "Fair" position and holds steady, it is evidence of bad rings, slow timing or poor compression due to leaking gaskets or rusted and defective heat riser in the carburetor. It requires only a few minutes to install the gauge.



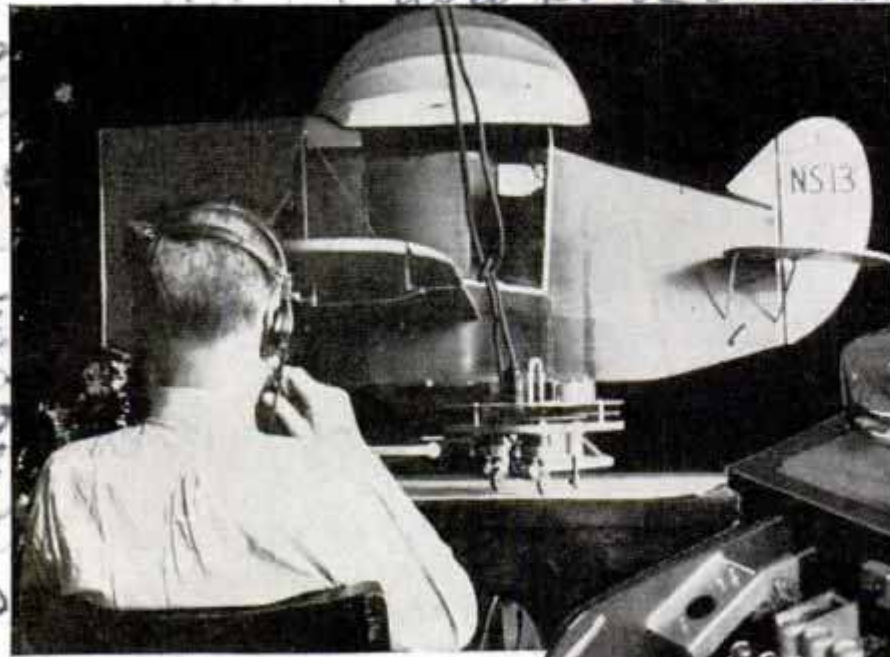
Dial on windshield shows operating efficiency of auto at various driving speeds and conditions

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

*Shuning Master Co.*



# Student Pilots Fly Blind Without Taking Air

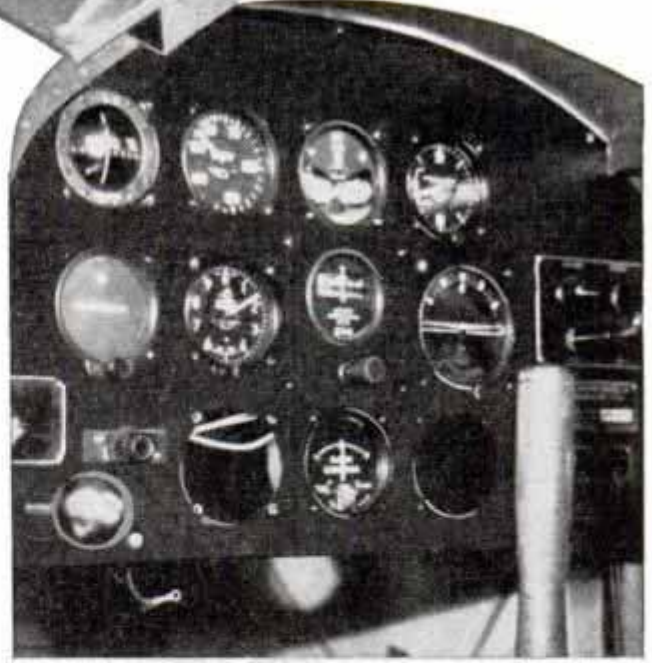


Left, instructor directs student pilot by telephone as he watches maneuvers of model plane. Below, radio and phone set with which instructor simulates actual flight signals. Bottom, instrument board of plane

*Left Trainer*



In the cockpit of a model plane in the office of the Bureau of Air Commerce at Washington sits a student flyer, watching the instrument panel, listening to simulated radio signals, manipulating the controls as if in actual flight. Without leaving the ground, with none of the risks of a training flight, he is learning to fly "blind." His ship is a replica of a single-seater plane, hooded for instrument flying, mounted on a pivot so that it can move in any direction and must be "flown" constantly. On the instrument board are dials showing air speed, rate of climb, turn and bank, directional gyro, artificial horizon, radio compass, flashing light to indicate passage over the cone of silence marker, and sensitive altimeter. Movement of the controls causes a corresponding change in the instrument readings. There is also a throttle, and a telephone set connected with the instructor, who sits at a desk facing the student, gives him directions and problems to work out, and transmits simulated radio range beacon and marker beacon signals for the student to follow. An automatic recorder nicknamed the "crab" traces the changing positions of the plane on its imaginary flight across the country and at the end of the instruction period the student's report on his route must tally with that traced by



the crab. The instructor may start the student on his route and then cut off communications, "lose" him, introduce simulated air pockets, and let the pilot find his way to the airport destination as radio signals are resumed. The Bureau of Air Commerce is using the model robot plane to train its flying personnel. A course in blind flying can be completed in twenty

*cmi. A. A. J. Felder is div. 39 U.S. Patent office, Washington, D.C.*

*Left Trainer*  
*also sent aviation lenses*



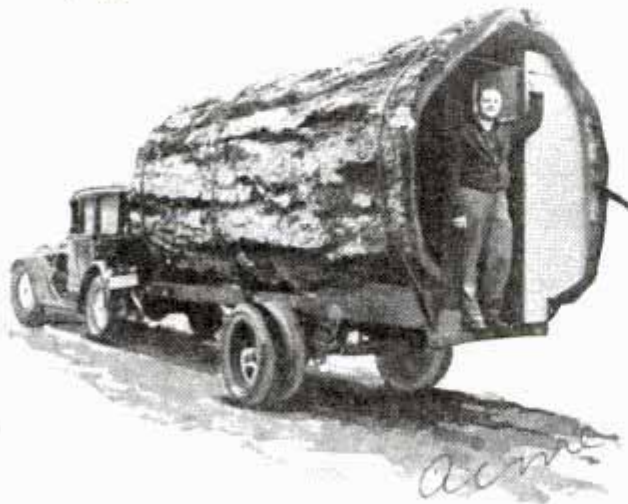
hours with safety and economy, the cost of operating the model plane being about five cents an hour for current compared with about a dollar a minute for taking up a transport plane.

### Electricity in Man's Blood Cells Would Light a Lamp

If the electrical charge in the red-blood cells of a man could be collected and sent through a twenty-five watt light bulb, the lamp would burn for five minutes. This estimate was made by physicists studying blood electricity at the Biological Laboratory at Cold Spring Harbor, N. Y. They found that red-blood cells of man have at their surface an effective electrical charge equal to 15,000,000 electrons. In certain cases of anemia it appeared that the cells could preserve the normal surface electrical charge despite wide variations in the surface area incident to the disease.

### Hollow Tree Trunk on Wheels Is Used as Photo Studio

Two photographers are touring the country in a mobile studio which combines the ancient and the modern in a thoroughly practical manner. The studio is the hollow trunk of a 1,000-year-old tree, mounted on a trailer attached to their car. The trunk is sixteen feet long and eight feet in diameter and serves as a darkroom for developing photographs and as a storage compartment for photographic equipment.



Hollow tree trunk on a trailer provides studio and darkroom for traveling photographers

### Camp Grill Broils Both Sides at the Same Time



Grill which broils on both sides while other cooking is done on top. Fuel boxes are in sides

Meat is broiled on both sides simultaneously in a folding camp stove, the top grid of which may be used at the same time for other cooking. A folding wind-shield can be so arranged as to preserve nearly all the heat on the top cooking surface. The wire broiler has a folding handle and hangs vertically on hooks between the fuel compartments which form the sides of the stove. The inner surfaces of the fuel compartments are composed of fine wire mesh. The fuel is dropped into the compartments through hinged doors in the top and adjustable air vents in the bottom and sides provide draft as needed. As there are no hot coals directly underneath, grease drippings cannot cause the fire to blaze up and scorch the food. The stove burns wood, charcoal or charcoal briquettes and packs into a compact carrying case when not in use. It also can be used in the fireplace for indoor picnics and marshmallow roasts.

Master Metal Products Co

Ocean vessels must go into drydock every six or eight months because of barnacles, fifty to 300 tons of the pests collecting on the hull every year.

Seems better June 18.

Cheng Van Lengerber + Anshme

F843 \$7.50

Chicago 29  
Metal Products Co  
Chicago 29

Bob Wren, Centales Wash



# Building the WORLD'S

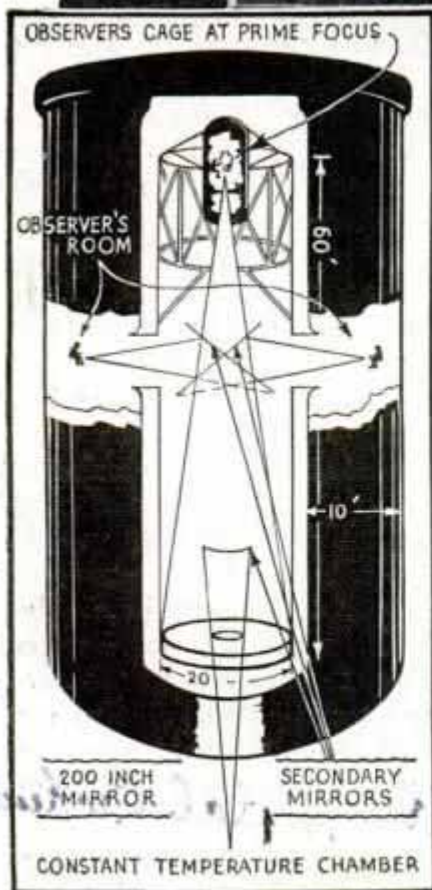
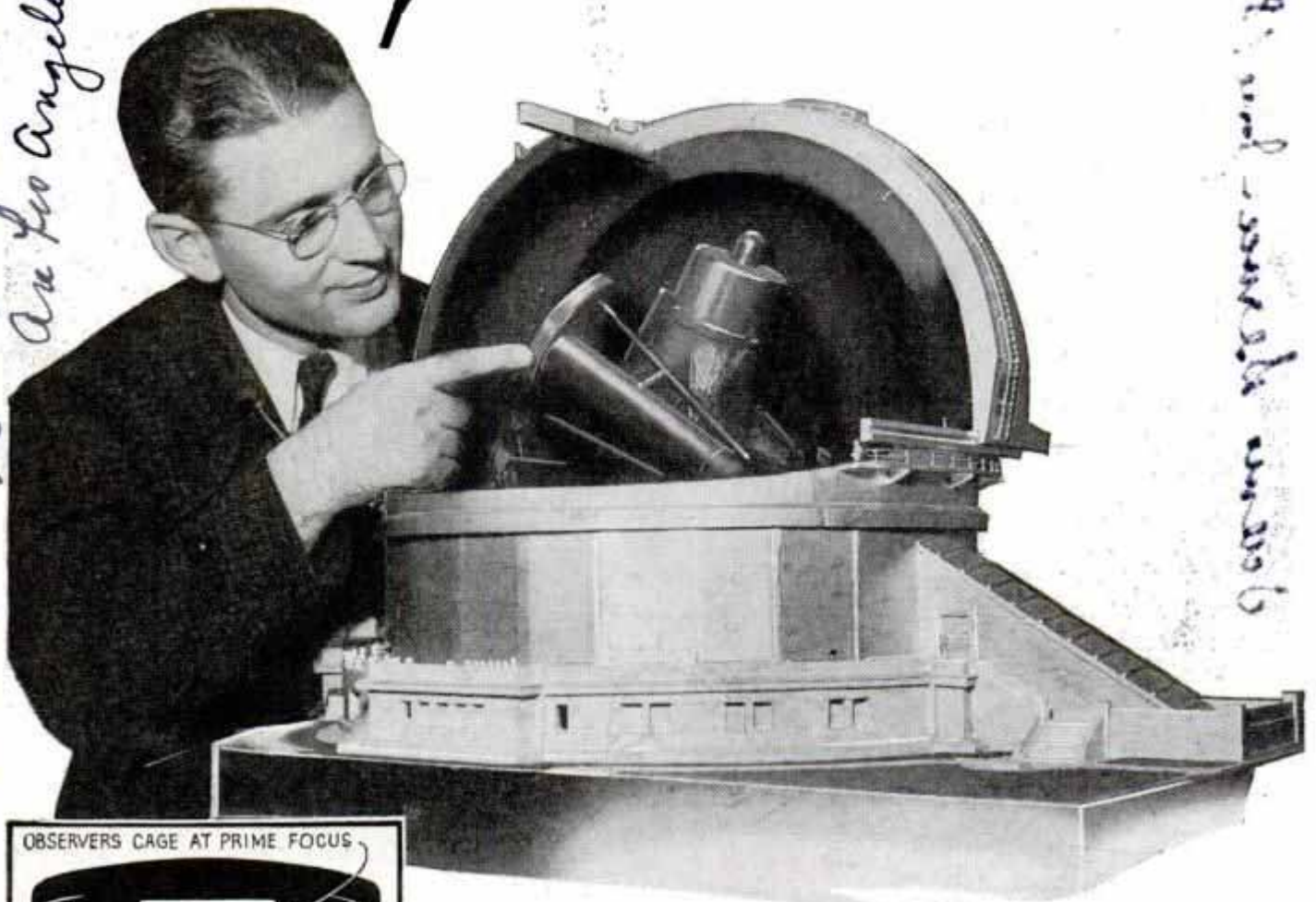


Diagram of telescope and cutaway model of observatory, showing the telescope inside

**I**MAGINE a telescope so powerful you could see clear across the United States. Standing in New York, you could reach past Chicago and San Francisco and watch ships moving in the Pacific, reading the names painted on the bows as easily as if they were across the street.

If you should turn the telescope eastward you might see cars chugging along English roads or watch airplanes flying above the streets of Paris. A second later you might turn south and watch people in Mexico City or reach past the Canal Zone and observe the surf on South American beaches. From Los Angeles you might peek at Honolulu and then swing northward for a close-up of Alaska.

Fantastic as it seems, that will be the power of the super-telescope under construction for the California Institute of Technology in Pasadena. Of course, it could never be used for purposes like these because clouds, mountains, and the curvature of the earth make such sight-seeing impossible. Besides, it will have much more important work to do. The closest object toward which it will ever be pointed will be the moon.

This titan of telescopes will have twice the range of the world's present largest instrument, it is expected,

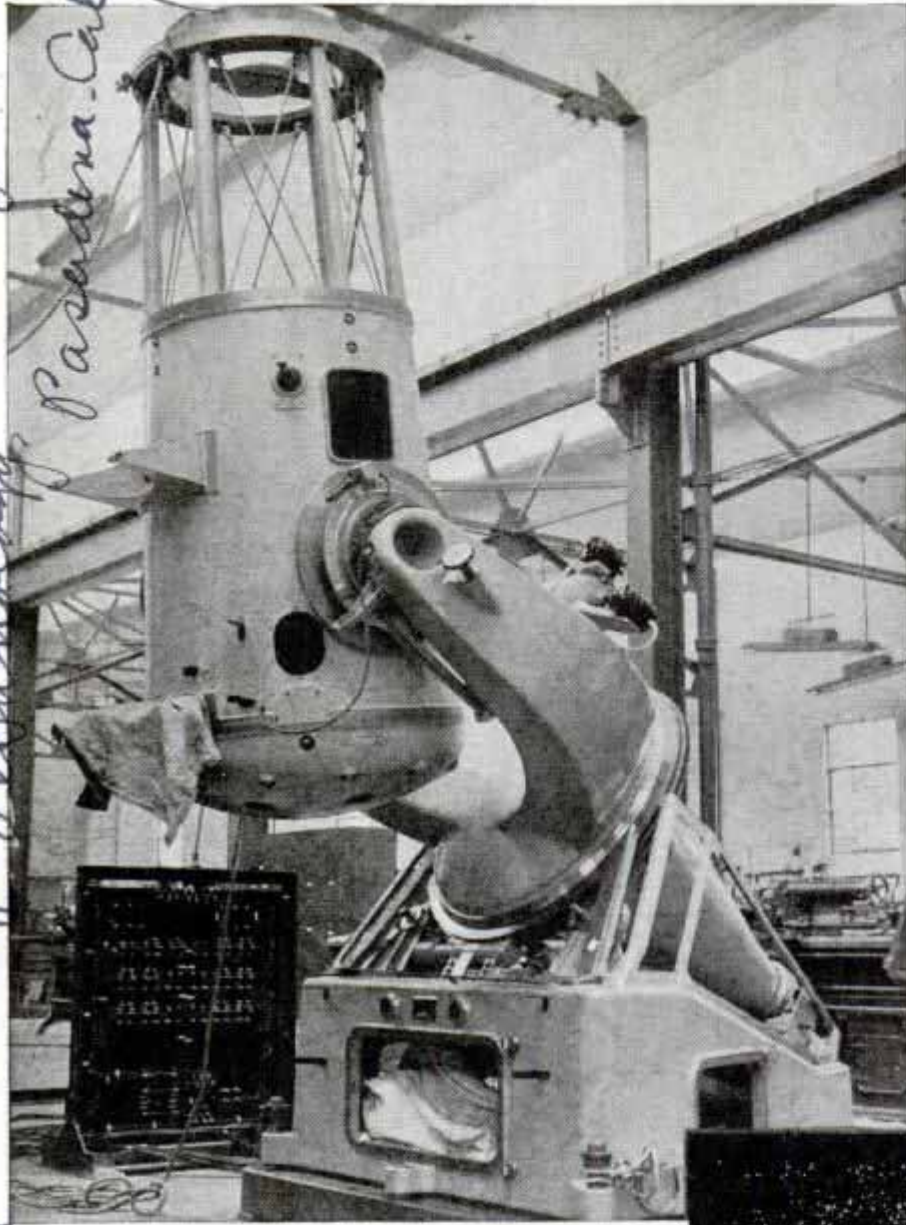
*Handwritten notes:*  
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Astrophysics Bldg. California Institute of Technology Pasadena-Calif.



of standing beside it, astronomers will ride inside the instrument.

The skeletonized barrel is to be twenty feet in diameter and fifty-five feet long, with the reflecting mirror fixed at its lower end. Suspended inside the upper end of the tube will be a small bullet-shaped house. Through an opening in the floor of this room astronomers will photograph the star pictures reflected from the mirror far below. Of



eling 150 miles per hour would need seventy years to fly from the earth to the sun. For practical purposes we think of light as being instantaneous but the starlight the astronomers will study started on its journey about the same time the earth was born.

Dr. John A. Anderson, active head of the project, and his staff of astronomers and engineers are encountering many new problems in building something never before attempted. In simple terms, the telescope will be merely a large curved mirror that reflects starlight to one point, together with a mechanism to turn the mirror toward any part of the sky. Actually, construction of this newest wonder of the world is involving brand new research in mechanics, physics, chemistry, and optics. The telescope will be so huge that instead



Camera telescope to be used as auxiliary for 200-inch telescope, and one of the star "cities"

course, this house will cut down the amount of light falling on the mirror, but the gathered light would otherwise have to be reflected outside the tube by a diagonal mirror that would cut down the rays.

For some types of research, using other focal lengths, the astronomers will work in rooms inside the hollow steel arms that support the telescope barrel, using diag-



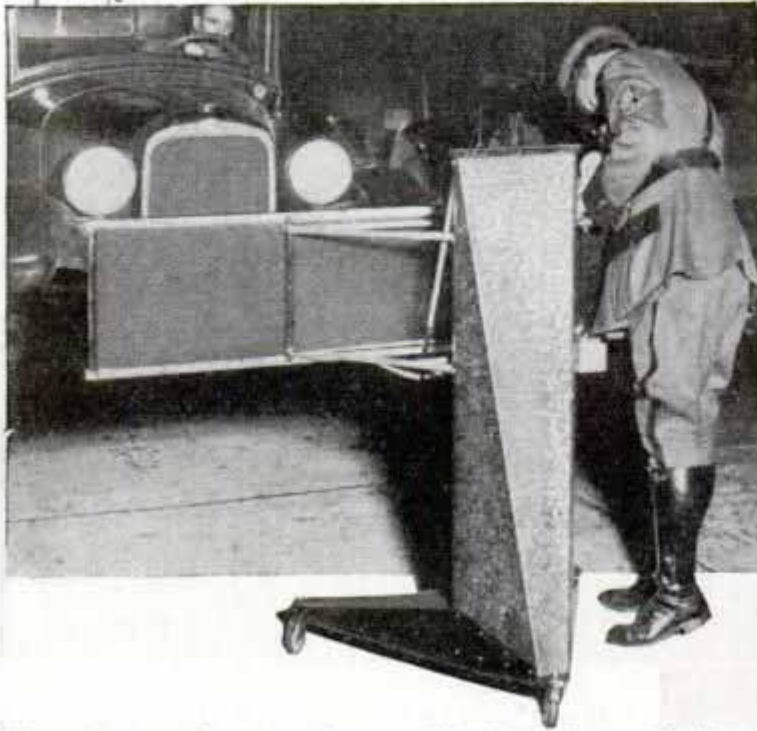




Science Service 6/5/36

### Quick Tester for Auto Lights

## F76 Aids Safe Driving Campaign



Measuring candlepower of automobile headlights with photoelectric tester, a process requiring only a few seconds

By using a photoelectric headlight tester, highway patrolmen of the state of Washington are able to test three cars per minute for efficiency and glare. The equipment is set up in a lane adjacent to the state highway. Part of the traffic is diverted into this lane where one officer makes the tests and two others keep records. This procedure makes possible the testing of 180 cars an hour. The equipment permits measurement of the actual candlepower of the headlight beam, thus making enforceable the state's law establishing a minimum of 7,500 candlepower properly aimed down the road in a manner preventing glare in the eyes of approaching drivers.

### Why Roots Avoid Each Other

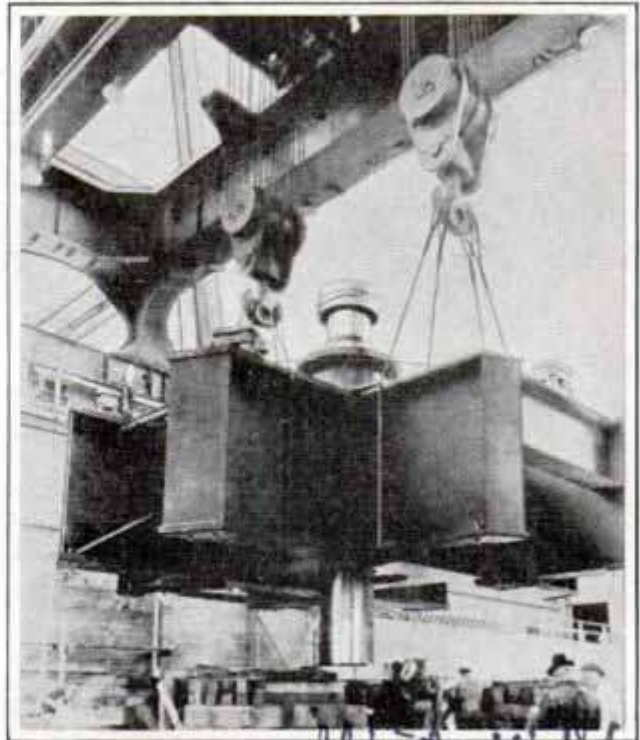
#### F790s Mystery of Nature

That the roots of trees and plants avoid invading territory already occupied by others has been established by Prof. M. A. Raines of Howard University, but why they do is one of nature's mysteries. Prof. Raines has a method by which the root systems of plants are made visible throughout their entire growth. Against a sloping

sheet of glass he lays a sheet of dark paper or other absorbent material, kept moist by wicks dipped into a supply of water. Roots from seeds placed at the top edge of the sheet grow down the moist paper and can be studied in detail. The professor has found that in growing two young plants side by side, the young tips approach but never actually make contact, each bending aside a little and then growing parallel. When the tip of a young root approaches the trunk of an older root running across its path, it also bends aside before touching it. Prof. Raines thinks that this may be due to secretion of some repellent chemical compound.

### F749 Giant Crane Is Operated by One Man

Only one operator is required for the big double-trolley crane handling large units at Wheeler dam, which is being built by the Tennessee Valley Authority. The crane swings units weighing up to 270 tons into place at the powerhouse as the dam nears completion.



Loads as heavy as 270 tons can be handled with ease by this double-trolley crane at Wheeler dam

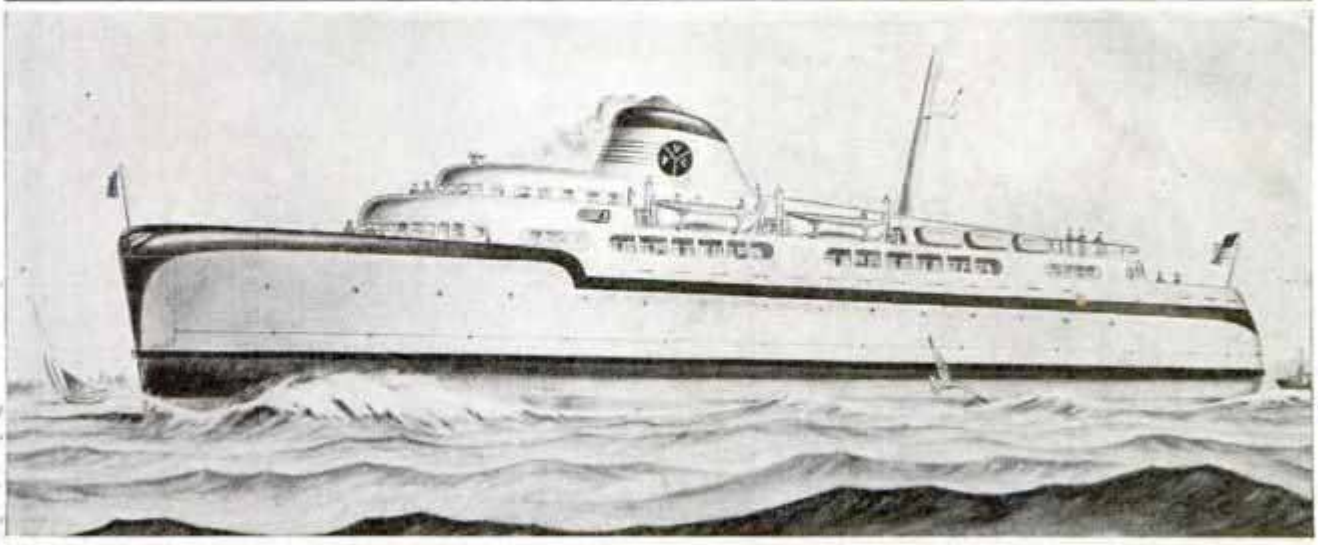
Science Service 6/5/36

Washington, D.C.



7694 Sun Shipbuilding Corp  
 Chesapeake Co. Chester Pa.

# Ocean-Going Ferry Designed in Wind Tunnel



This drawing shows some of the features of new ferry. Note extent to which streamline design is carried, even to the funnel. A conditioning system keeps air clean, despite the inclosed decks

Presenting a virtually unbroken line from bow to stern, an ocean-going ferry designed in a wind tunnel has been completed recently. It operates across the entrance to Chesapeake bay. The design was selected after exhaustive tests by Raymond F. Loewy with models. Every possible weather condition that the craft would encounter was duplicated artificially in the tunnel. After the best contour for the superstructure had been chosen, other problems were solved by the same method. These included requirements that the ferry carry sixty to eighty autos and trucks in six lanes of traffic and that there be proper space for passenger quarters, dance floors and special cabins for truck drivers. Vehicles are driven in through doors in the bow and out through doors in the stern. The doors in the bow are operated electrically but those in the stern are controlled by hand. The inclosed decks are supplied fresh air by an elaborate ventilating system. The ferry is 260 feet long. Its engines propel the craft at eighteen miles per hour.

## Trick Dance Scenes Filmed as Camera Dolly Rolls

Closeups of dancers as they move through the intricate routine are photographed for the movies by a camera set up on a rubber-tired platform called a dolly. A crew of two or three men, called "dolly horses," rolls the camera carriage to and fro as the dancers move. A one-foot variation between camera and actors will throw the entire scene out of focus.



Rolling this camera dolly back and forth keeps the dancers in proper focus. A twelve-inch variation calls for a retake

Carl George H. Eckhardt  
 New York

11/11  
 Central  
 and 7th Ave  
 Hotel, 53rd St. N.Y.C.

Radio Pictures, 41 Park

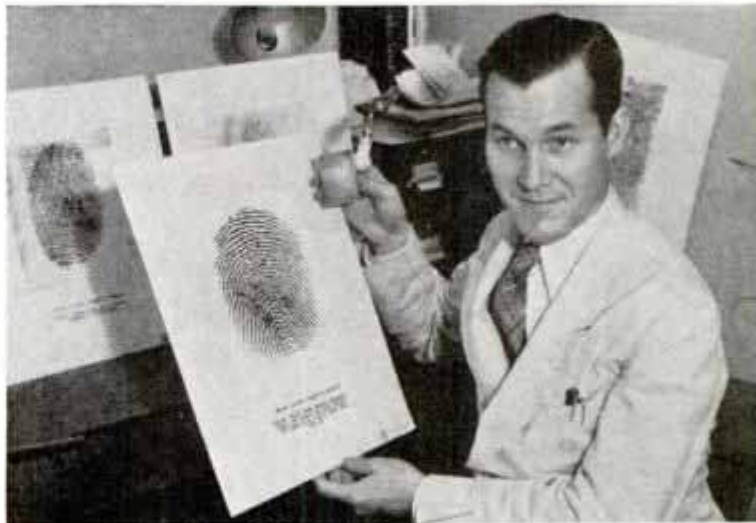






smooth out kinks in automobile fenders and bodies and work equally well with such soft metals as aluminum. The mallet weighs six and one-half pounds and strikes 6,000 blows a minute at a pull of the trigger. Its strokes are quickly adjustable from a hard blow of three-eighths inch to a fine vibration, such that repairs can be made without injuring the paint. The mallet operates on 120 pounds or more of air pressure, and uses only about two cubic feet per minute.

### Fingerprint on Silver Sheet Provides a Permanent Record



Enlarged fingerprint obtained by spraying surface with iodine and applying silver sheet

### Water Cools Refrigerator as It Evaporates

For the small home without ice or electricity, a refrigerator is being produced which uses nothing except water in cooling. Panels of porous ceramic clay extend into a water bath in the base and act like wicks to draw up moisture. Evaporation sufficient to lower the temperature of the box and its contents considerably is brought about by the warmth and movement of the air in the room.



Refrigerator which uses water for cooling

Fingerprints now can be obtained from greasy surfaces and other difficult places with the aid of an iodine-silver transfer process developed by a consulting chemist of the Pasadena, Calif., police department. The fingerprints first are developed by applying iodine vapor with a gun made for that purpose. A silver sheet then is placed in contact with the developed fingerprint after which the sheet is exposed to strong light. The resulting image is permanent. The process may be repeated many times without injuring the original print.

### China Lamp Clock Shows Time on Two Revolving Faces

Doubling as timepiece and lamp, an electric clock recently developed tells the time as its upper parts revolve past a fixed needle. The upper needle points to the minute, the lower to the hour. Made of china, it is illuminated by an electric bulb which is turned on and off when desired without affecting the operation of the clock itself.



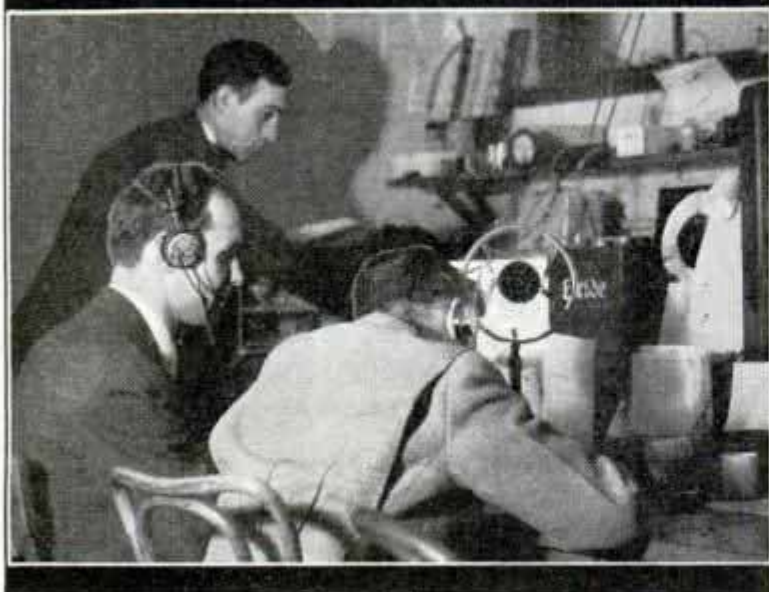
*Handwritten notes in blue ink:*  
- 7833 (top center)  
- 7807 (left margin)  
- 7828 (left margin)  
- John Mc Morris (right margin)  
- The Surgeon (bottom left)  
- The Filson Co (bottom center)



F745

Western Union  
1950 roadway. *height*

# "MINUTE MEN"



THE radio amateurs constitute America's emergency communication system when disaster threatens. Fires, winds, floods and earthquakes may put power lines out of commission and silence the big broadcasting systems, disrupt telephone and telegraph services and stop trains, but the natural elements don't stop the "hams."

When floods last spring swept from Maine down the east coast into Pennsylvania and through the Ohio river valley to the Mississippi, the amateurs went into action. From Johnstown and from other stricken communities "QRR" began sounding from dot-and-dash keys and radiophones.

"QRR" meant nothing to the average person listening to his short-wave radio when the first signals went out, but to "Q-men" located in every part of the United States it had the same significance as "SOS" at sea. This combination of letters is the official land SOS of the American Radio Relay League, an organization which is the nucleus for the amateur radio network spread over this and foreign countries.

Like the SOS, the QRR signal is used only in an emergency. Therefore, it arouses to alertness all amateur radio operators. To those operators in and near the trouble zone, it calls for use of transmitters and receivers in rounding up relief agencies and relaying emergency messages. To other "hams," as the amateur operators call themselves, it is an order to "stand by," a difficult command to obey because it means remaining silent while other operators carry on the thrilling work of rescue. But the ham obeys, keeping his transmitter off the air and thus clearing the way for emergency messages.

Top to bottom, W7MY and daughter, W7JPE and W7XT operating "ham" stations in flood crisis

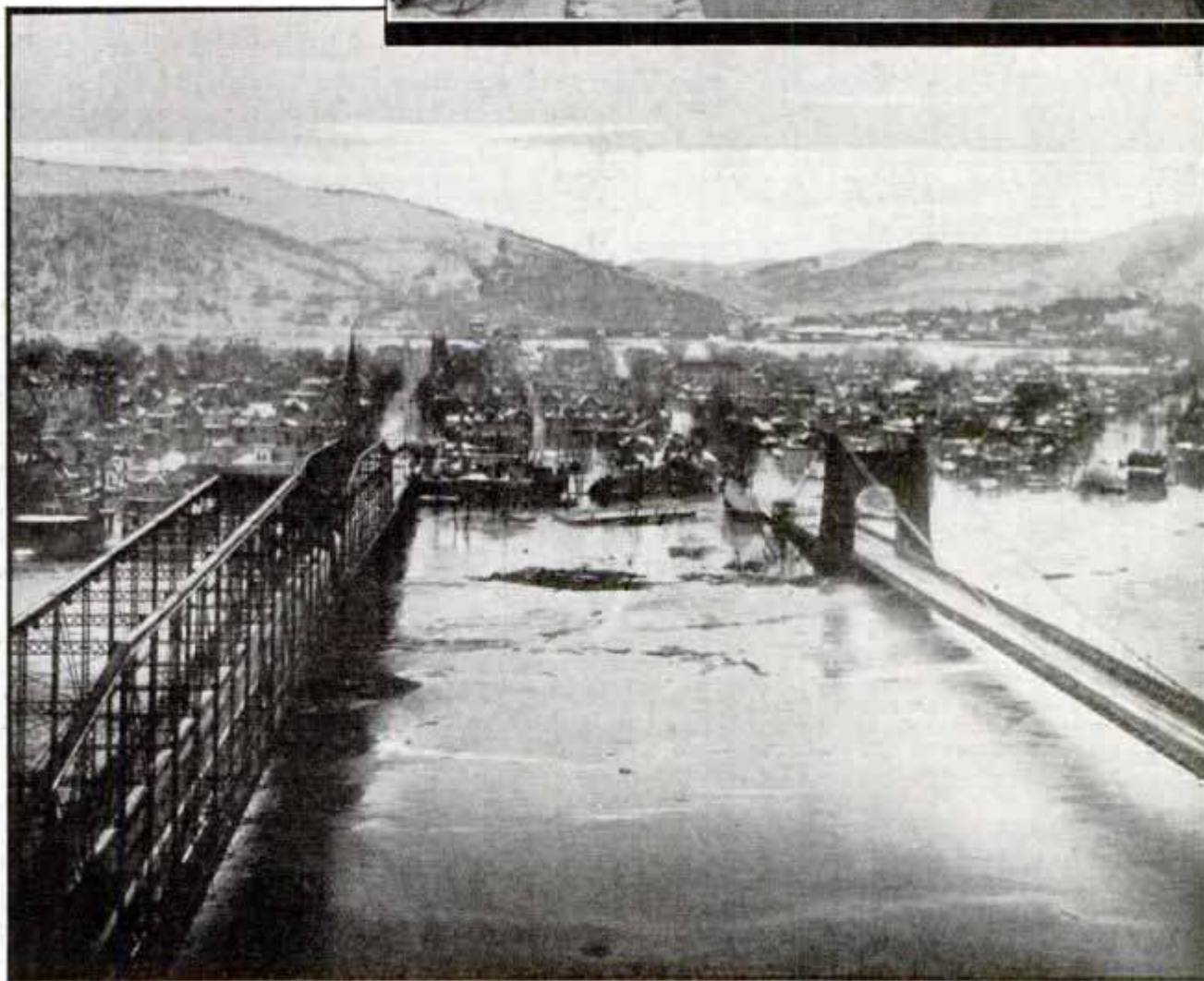
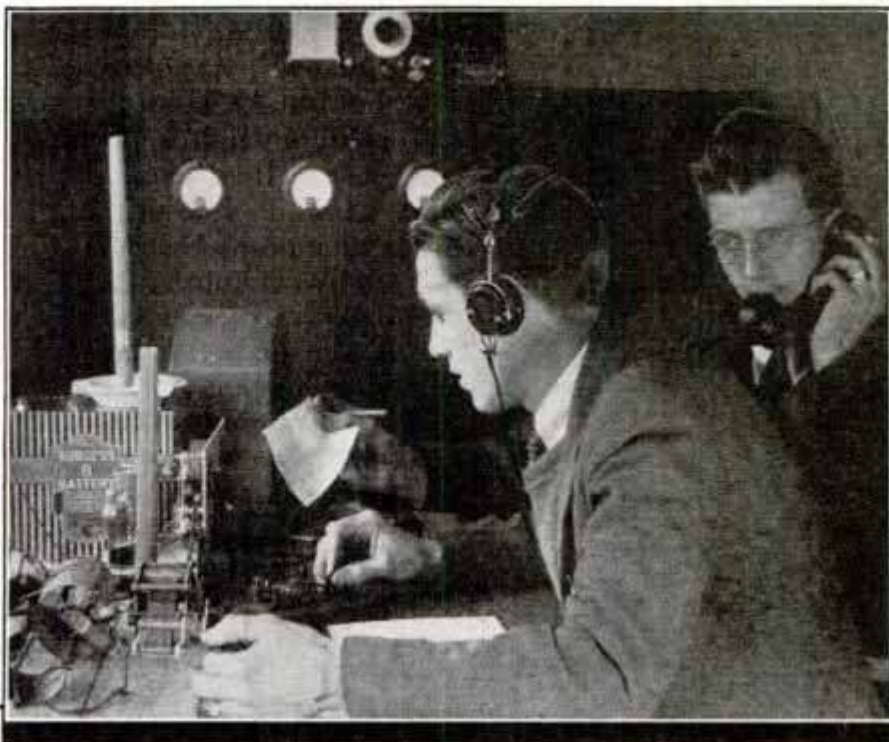


# of the AIR

West Hartford Conn + 1943

Within the American Radio Relay League, whose members might be called Q-men because of their frequent use of the "Q" signals in communication, is a select little group of hams about whom the outside world knows little or nothing. This organization is the Emergency Corps, each member of which is required to have transmitting and receiving equipment which will function

Bottom photo courtesy Western Electric Co.



Top, W7INF of West Hartford, set up for emergency operation after power supply failed. Bottom, flooded bridge at one end of which police car served as radio headquarters for rescue boats





Photos courtesy Western Electric Co.

*Top, police operating two-way radio in cruising car during flood. Center, dispatcher flashes alarm to squad car. Bottom, as police cars answered flood alarms, each was turned on its side to show number left for emergency*

in emergencies. This apparatus must be designed to operate from auxiliary power, such as batteries and private generators, as well as from commercial electrical lines, because hurricanes, floods and other disasters frequently disrupt power company service and the ham cannot wait until service is restored.

Ready to go into action at a moment's notice, the Emergency Corps literally is composed of "minute men of the air." They must have their equipment so arranged that it may be set up quickly, either at the home station or at another location where its operation will be of most value in the emergency. They are expected to, and do, offer their services to police departments, military units, railroads, Red Cross officials, newspapers and other rescue and relief agencies.

That first Johnstown call went out from W8DYY, one of the city's seven amateur stations. An hour earlier Johnstown's telephone and telegraph services and broadcasting station had gone out of commission and power was off in most sections, due to the rising flood waters. W8FRC, another Johnstown station, attracted national attention by frequent messages telling of the flood. W8KRF handled emergency traffic and originated the "flood patrol," a network of ham stations whose operators worked almost without rest through the emergency.

At Punxsutawney, also in the flood area, W8BWH operated continuously for thirty-nine hours, then with two hours rest, for twenty hours more. The operator is credited with putting in ninety-five hours of emergency work without relief, catching an occasional nap beside his equipment but always ready to go on the air. This same station twice transmitted word pictures of flood conditions over a national hook-up.

Pittsburgh, with its famous Golden Triangle under water, turned to the ham when power and all means of communication failed. All amateur radio stations used batteries or generators.

H. W. Irving, chief operator of Pittsburgh's broadcasting station, KDKA, was on duty constantly during the emergency, on a seventy-five meter radiophone, using KDKA's power on W8DBC. Operator Irving effected rebroadcasts of W8FRC's descriptions of conditions at Johnstown.

When Renovo put in a plea for help,



F746

### Paper to Mask Car for Painting Is Easily Shaped to Fit Body

W8DPY's operator loaded his Emergency Corps equipment on a truck and fought his way with Red Cross workers from Coudersport to that stricken community. For 130 hours, this rig was in service at Renovo, until telephone and telegraph facilities could be restored. Two-thirds of Williamsport was inundated and for three days the only means of communications was the ham. Practically all of the city's amateur operators either manned their own stations or operated equipment set up at the broadcasting station. Down the river at Lewisburg, the only link with the outside world was an amateur station operated at Bucknell University by students.

Throughout the far-flung area devastated by high water the story was the same. More than 400 amateur operators went to work at the first sign of danger, providing effective communication facilities for warning authorities, speeding up evacuation of threatened communities and hurrying relief to communities already under water. To the ham goes the credit for having prevented a greater loss of life.

Of growing importance in such emergencies is police radio. At Manchester, N. H., a two-way radio system provided fast and effective means for gathering information of impending danger and spreading warnings throughout the vicinities imperiled by flood waters. As a result the inhabitants of many communities had ample time to reach high ground. Some marooned on upper floors and rooftops were rescued by police whose work was directed by the two-way radio. When flood waters began to undermine some of the structures at Goffs Falls dam, in the same area, it became apparent that dynamiting would be required and a hurry call was sent to find the city surveyor. In two minutes, he was located by police radio.

Rising waters of the Merrimack river swept away the last remaining bridge connecting the eastern and western parts of Manchester, marooning one police radio car on the far side. For several days following, this car was the only means of communication between the two parts of the city. The two officers relieved each other at the continuous task of transmitting and receiving emergency messages. Even after flood water receded, the police

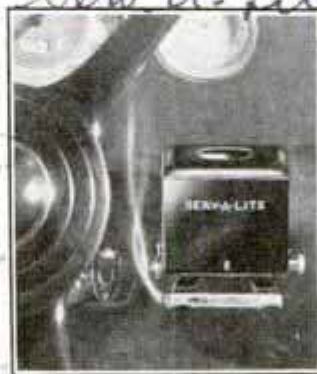
(Continued to page 124A)



Adhesive tape which leaves no mark holds crepe paper protecting body of car while painting

Special crepe paper to mask an automobile while painting it is now made so flexible that it is readily shaped to fit the contours of the car without cutting. It is fastened to the body with adhesive tape which requires no water nor heat, and when removed by a slight pull leaves no marks, scratches or gummy spots.

### Lighted Cigarette Served to You from Push-Button Dispenser



Mounted on the dashboard of the car, a cigarette holder serves a lighted cigarette at the push of a button. The motorist need not fumble in his pocket for his pack, nor take his hands from the

wheel to light up. This holder acts as humidifier, dispenser and lighter as well as ash receiver. It can be installed in three minutes with a special clamp.

DAMECO Co, Inc.  
 260-5th Ave New York  
 Telephone Carls

F760

Handwritten notes at the bottom of the page, including the word 'SERVA-LITE' and other illegible scribbles.



F852

Moltestrasse 2,  
Berlin-Steglitz, Germany

# Autos Travel to Europe in Garage on Liner's Deck



Hoisting tourist's automobile by crane to deck of ocean liner, where it is stored in garage during trip

So many transatlantic voyagers are taking their automobiles to Europe that garages have been built on the decks of the "Bremen" and "Europa," North German Lloyd steamers. Cars are loaded with a crane which sets them down in an open area between the funnels, then they are driven into the deck garage. Twenty-five to thirty automobiles can be accommodated in the covered space, well protected from the weather and salt air.

Australia. The kookaburra is protected by law in Australia, the only place where it is found, for it is credited as a champion killer of rats and snakes and its song has brought the bird great popularity. It is about the size of a crow, colored a rich chestnut-brown and brownish-white with wings slightly checkered with light blue.

## Detector Indicates Sour Notes Played by Music Student

Sour notes played by music students are revealed instantly by an instrument known as an "oscillograph," a machine something like a lie detector.

It not only detects the bad note, but the instrument or voice which produced it, thus making it a valuable aid to the music instructor.

## Australian Laughing Bird Sings for Radio and Movies



One bird song is heard daily around the world—the laughing song of the Australian kookaburra. Every overseas radio broadcast from the island commonwealth is introduced by the gurgling, almost human chuckles of the "laughing

jackass," and the bird sings an introduction to every motion picture dealing with



Music student playing beside instrument which is able to detect and register sour notes

Vertical handwritten notes on the left margin, including "590-2-27" and "C. J. ...".

Vertical handwritten notes on the right margin, including "Le Paul" and "m. Chicago".

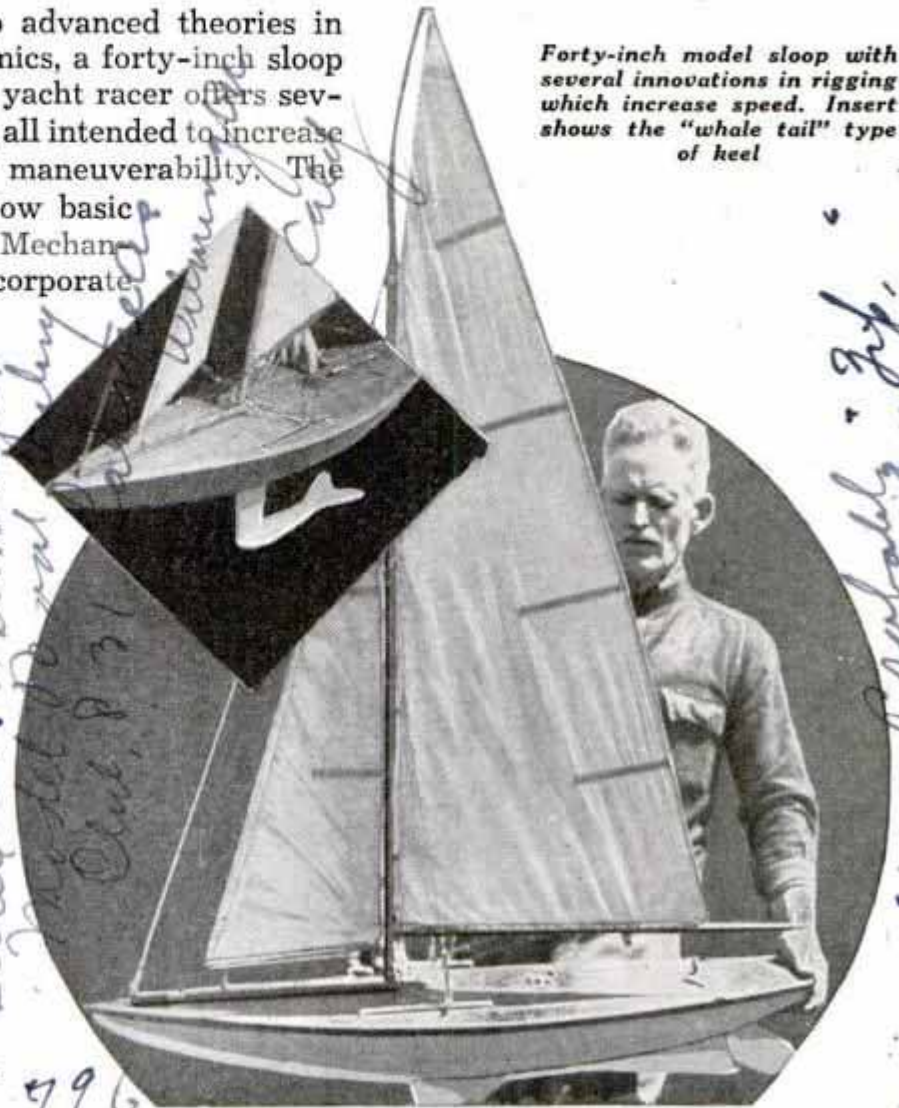
Handwritten signature at the bottom left: "Capt. Ewen R. Patterson".



# Model Sloop Rigged for Speed Like Big Yacht

Constructed according to advanced theories in yacht design and aerodynamics, a forty-inch sloop built by a California model yacht racer offers several new features in rigging, all intended to increase speed and provide greater maneuverability. The design and general rig follow basic plans appearing in Popular Mechanics Magazine, but also incorporate many theories advanced for adaptation on large seagoing craft. One feature, which has been included in plans for larger boats, is a "whale tail" type of keel which lies at an angle opposite to the line of progress and, in a strong wind, diverts pressure from the rudder. Other features include a forward-sloping rudder stock, a tiller spring rack with three angles for inclining the tiller, sliding rigging with seven-inch scope, a Dionne gear or five-purpose guy spring, and an arrangement to retain the sails at the same set to the wind, regardless of mast angle.

Forty-inch model sloop with several innovations in rigging which increase speed. Insert shows the "whale tail" type of keel



*Designed by August Loebel*  
*Street for Wilmington*  
*Oct. 8 1931*

*1421*  
*Probably Zip*  
*June 1934 = 926*

# Paint or Rust Easily Removed by Surface Cleaning Tool

*Pat. # 1,648,888*  
*1,894,930*



Paint, rust and scale can be removed easily from metal or other hard surfaces with a cleaning tool which does the work faster than by wire brushing or hand-scraping methods. The cleaner, made in two models, electric and pneumatic, consists of two bundles of hardened-steel cutters mounted on each side of a gear housing. These bundles revolve at high speed, causing fourteen-gauge points to be thrown outward and to strike the surface. This action cleans without injuring the permanent surface as the depth of the cutter contact can be regulated. The pneumatic model has a rotary type air motor drawing twenty cubic feet of air per minute and operating on an air pressure of seventy to 100 pounds. The electric tool operates on 110 volts, a.c. or d.c.

Removing rust with handy surface cleaning tool

*Berg Cleaning Tool Co.*  
*Concrete & Abrasive Machinery*

*Cincinnati, Ohio*



F541

Mr. Thomas P. Gammson, Jr.  
10555 Hillman Ave.  
Los Angeles, Calif.

# TRICKS of the

U.S. Coast Guard Lt. Los Angeles Calif



A. L. Bobrick and mechanic roaring down the course in his hydroplane, "El Torbellino," a fourteen-foot torpedo driven by a 400-horsepower airplane motor

San Marino, Calif

**F**OR a real thrill on the water take a ride in a "two-twenty-five." Dress in goggles and a padded life jacket and squeeze into a tiny cockpit with the driver.

The V-8 at your back roars into life and the boat shudders under the drive of power. The first bites of the propeller dig a great hole in the water and the bow tilts sharply toward the sky. It's only a few

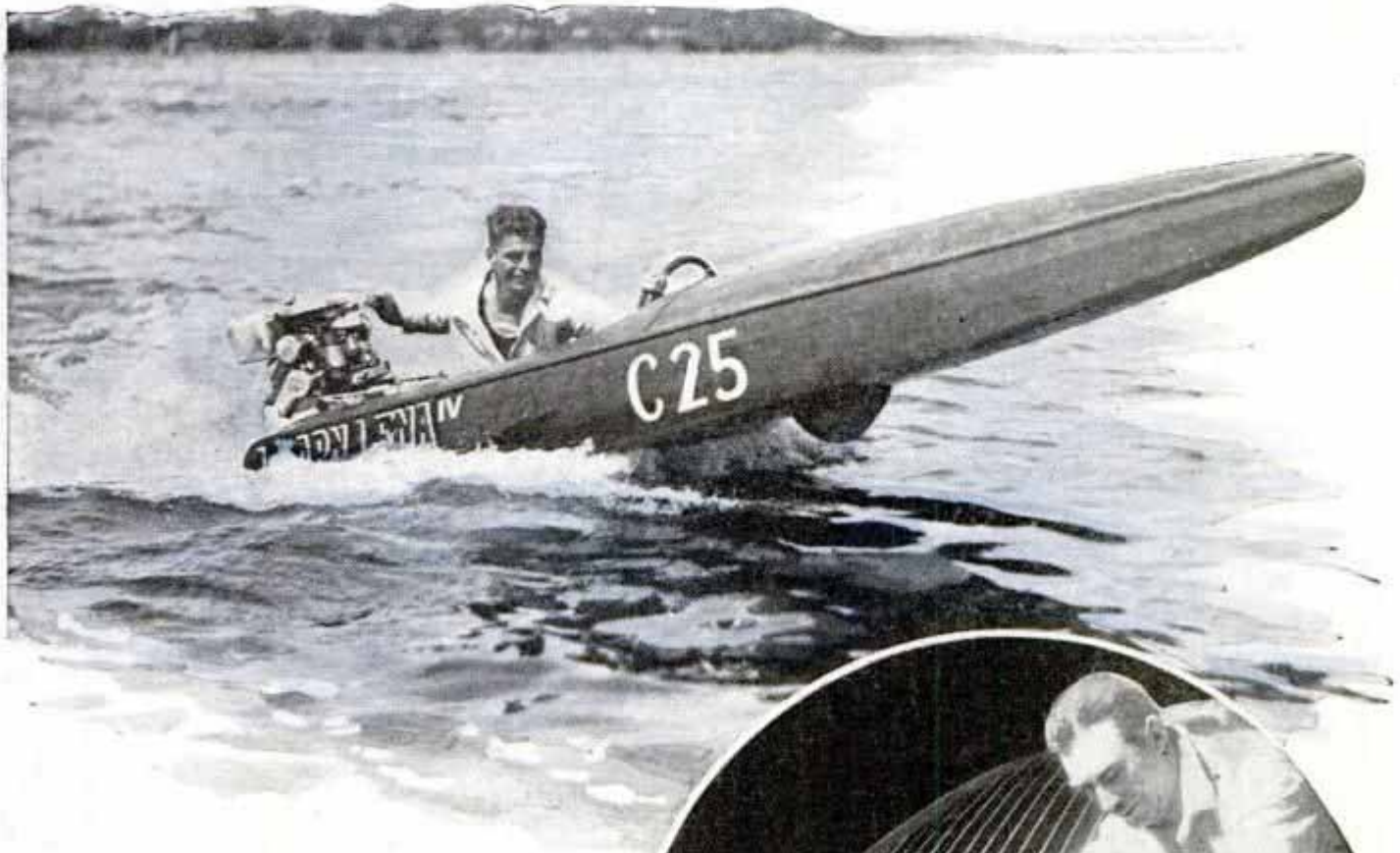
seconds from a dead standstill to full speed but in that time you learn a lot about this sport of hurtling across the water like a cannonball.

Those shattering jars are the little ripples on the water. At this speed the ripples seem to be made of concrete. There's a buoy ahead. The driver bends the wheel a little and we begin to slide for the boat



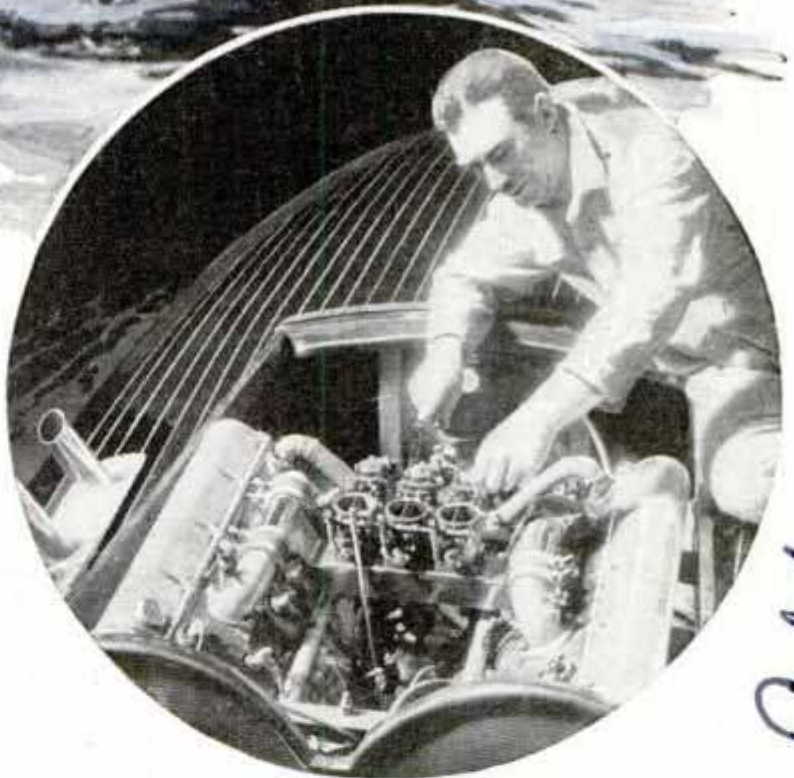
1427 T541

# SPEEDBOAT ACES



is going too fast to make a normal turn. So we broadside through the water, kicking up sheets of spray. If the motor should stop dead at this speed the boat would go one way and you another. If the rapid-fire hammering should wrench the fin from the keel there wouldn't be time to slow down before a wild yaw threw you out. If the boat hits the wake of another at the wrong angle it will flip and the same thing may happen on a turn if the boat buries her bow in a chance wave. Or a floating piece of driftwood may skin the bottom out of the hull.

But speedboating is called a safe sport. It's safer than it looks although you may not think so when you see an outboard racer stand on its stern and spin like a top or watch a boat that has skidded around a turn too sharply start backing down the course. But the worst that usually happens is a wetting and the job of drying out the boat and engine. Racers who forget to wear a life jacket may



Engine pushing bow in air at start of race and, below, checking power plant of a heavy speedboat

be "beached" by their racing committee.

The "225's" are coming to the front because they provide all the thrills of the big racers at comparatively low cost. They are not outboards. The hulls must be at least fifteen and one-half feet long and the engine cannot exceed 225 cubic inches in displacement or cost more than \$700. Superchargers and air foils are prohibited but aside from these restrictions you have

*Carley*  
*Arcadia*

*D. L. Gunnison*





a free rein. The Ford V-8 engine is a popular power plant.

The class is still so new that racing is largely experimental. Owners are just beginning to make their boats fast. The record is only sixty-three miles per hour, about six miles under the unlimited outboard record. But speeds of seventy-five and eighty miles per hour may be achieved this year. Owners are revamping

stock engines with special racing heads that boost compression pressures as high as eleven to one. One carburetor for every two cylinders, special high-lift cams, and larger valves are expected to "hop up" the engines to 175 or 200 horsepower.

The hulls are marvels of lightness and strength. "Miss Arcadia," for example, is built like an airplane wing. The interior is bulkheaded and cross-braced at short intervals and the hull was put together with 12,000 screws. The whole boat is streamlined except for the tiny cockpit in front of the hooded engine at the stern. The bottom is only three-eighths of an inch thick and the deck is one-eighth of an inch thick. It is built of tested aviation plywood with ash ribs and weighs 250 pounds without the engine. At high speeds only one quarter of the boat's sixteen feet



Top, outboard speedboat riding on "step" which reduces drag of water. Below, 225-class speedboat with V-8 engine in rear

may be in the water. A fast hull may cost around \$400. The boat steers like an automobile and the driver uses a foot accelerator because a hand feed is too slow for split-second jockeying with other boats. Winning a speedboat race is rarely a matter of speed alone.

Rough water makes rough riding but it also makes a boat faster. The "fastest" water is a heavy chop with waves about a foot high and a yard apart. On such a surface the light hulls skip from crest to crest and are out of the water nearly all the time.

A few years ago owners of heavy speedboats were trying to go faster by making their boats plane over the water with only the sterns touching the surface. The latest wrinkle is to get the boats to leap completely out of the water in a series of





porpoise-like jumps. This is a spectacular kind of racing hard on the boat and driver. One trouble has been that while the boat was in the air engine torque tended to turn it over. One owner overcame this by building his boat slightly off balance so it tends to tip over the opposite way while in the air. Then engine torque keeps it level and he has full control as soon as he strikes the water.

Top, boats finishing turn. Note how mechanics "ride on deck" to help balance craft. Below, driving boat with 300-horsepower engine

Most lessons in speedboat design have come from the small outboard hydroplanes. If the rules say a certain class of boat must have a specified minimum weight the owners usually build their hulls much lighter than the rules allow and make up the difference with two heavy hardwood stringers that they bolt to the bottom of the cockpit. This ballast puts most of the weight at the stern and can be moved to provide the right balance.

Nearly every new design of hull has "bugs" that must be eliminated. Shaving a quarter of an inch from under the stern, or slightly changing the underwater contours, may make a difference of ten miles per hour. The first thing to do before buying or building a racing boat is to consult a successful driver or builder for tips that will start you right.

Occasionally a racer finds a plank in the bottom of the hull split open or a small section entirely missing after a finish. Smashing into the waves or striking a floating object accounts for some of these accidents. Lately they have found that under some conditions a fast moving boat contains a vacuum under it that may wrench away part of the hull. The wood may actually burst downward from the negative pressure caused by the propeller pulling the water away so fast. A step that helps to circulate air under the hull relieves the vacuum and helps give additional speed.

One company spent \$15,000 in research and built glass windows in a speedboat hull to learn what went on in the water underneath. They found that even an

(Continued to page 136A)

R. V. Collins,  
219 E. Florence

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# Huge Sundial at Washington

## Is Made of Sculptured Bronze



Child playing inside this sculptured bronze sundial at Washington, D. C., gives an idea of its immensity

Beautifully sculptured in bronze, a sundial large enough for a man to stand erect within its circumference is admired by visitors at Washington, D. C. The dial, accurately designed and ornamented by a noted sculptor, cost \$31,199 to erect. It rests on an octagonal pedestal of green, polished granite at the entrance to Meridian Hill Park in the capital city.

### Memorial Is Erected to Insect for Fighting Prickly Pear

For saving Australia from a plant pest, a lowly caterpillar is being honored by the erection of a memorial. A century ago someone brought cuttings of prickly pear from South America and it became fashionable to raise the cactus in flowerpots and hedges. Before long the plant became the worst pest Australia has known, and

in 1925 it had covered 65,000,000 acres of valuable land and was spreading at the rate of a million acres a year. Then scientists went to South America to find an insect enemy of the prickly pear and brought back from Argentina 2,750 pear-eating caterpillars, the *Cactoblastis cactorum*. Bred in Australia and liberated, they have since cleared 40,000,000 acres of the plant pest and won themselves a monument.

### Pull Cord Starts Airplane Motor Like Outboard

Starting the engine of a light British plane is accomplished with a cord in the same manner that an outboard motor is made to function. The light ship is fitted with a small motor which drives the plane at a cruising speed of seventy miles an hour and at an estimated cost of less than one cent

a mile. The plane weighs only 286 pounds, but is sturdily built, and costs about the same as a medium priced automobile.



Using pull cord to start engine of British plane in same manner as outboard motor is started

Designed by George W. Peckee, 1228 Conn. Ave. N.W. Washington, D.C.

Created by Earth and Center types, 1409 N.W. Washington, D.C.

Designed by

Starts like outboard motor

single

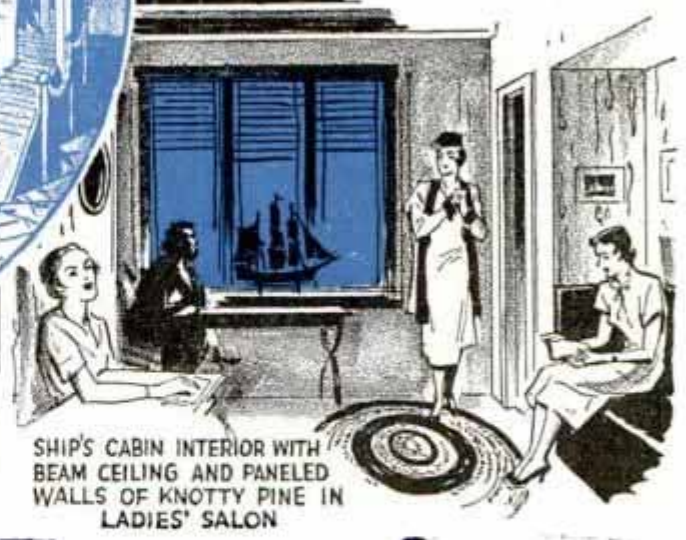
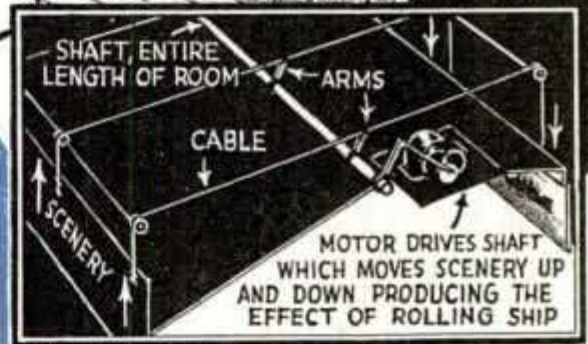
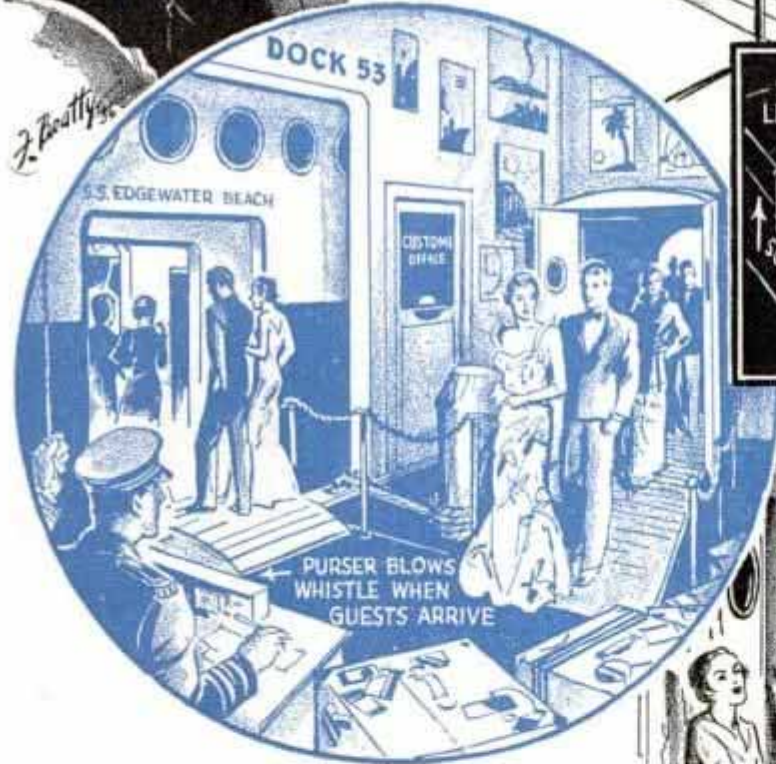
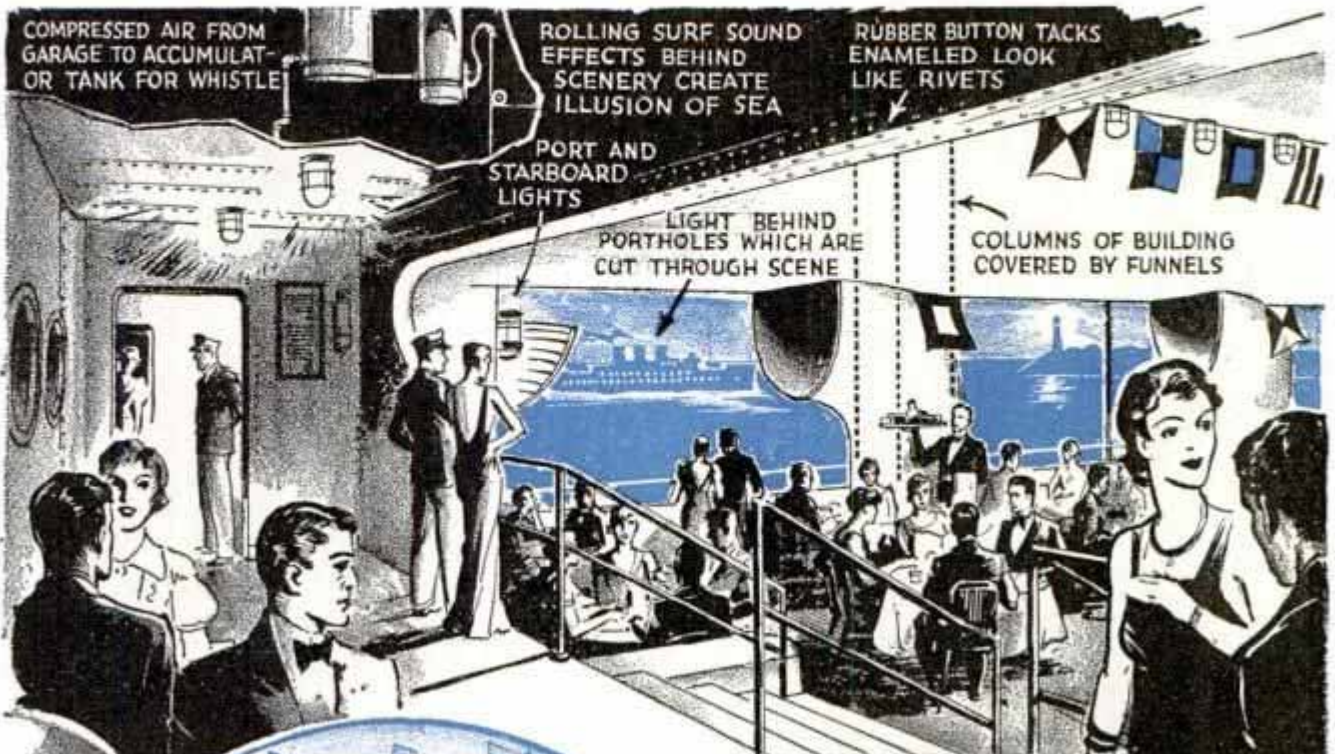
Route Anny me Israel, Belgium

Even K. Patterson Audyard, Wash D.C.

17/12. 538 Van Ness Ave. New York



# Dry Land Ship "Rolls" as Sea Scenery Moves



Complete from gangplank to moving scenery which produces the effect of a rolling sea, a dry land "ship" has been created in the cafe of a middle west hotel. The guests, or passengers, enter by gangplank and are greeted by the purser who blows the ship's whistle. The whistle is operated by compressed air from the hotel garage. Columns of the room are concealed by mock funnels and on the walls are maritime scenes which move up and

down, giving the effect that the ship is rolling. An electric motor drives a long concealed shaft for moving the scenery. The ladies' salon resembles the interior of a ship's cabin, with beam ceiling and paneled walls of knotty pine.

*Edgewater Beach Yacht Club*



# Automatic Signals Control Attic Railroad



Thirty feet behind the Chicago and North Western way freight, which has halted on the main line to pick up a merchandise shipment, the fast passenger train is roaring around a curve. But there will be no rear-end collision. Automatic signals are set, and when the passenger train reaches the adjoining block on this attic railroad the power will be shut off automatically and the train will stop. There are 856 feet of track on the line, built in their Bellwood, Ill., home by Bill and Bob Haverly and



*Eight-track roundhouse and turntable of model railway and the main line and yards. In circle, going over blueprints of cars in basement shop*

their father, a railroad man. The rails are brass, laid on tiny wooden ties and held with miniature spikes. Eight model engines—the only part of the system not home-built—draw power from third rails, and haul a fleet of thirty passenger and

120 freight cars, built to one forty-fifth scale of wood, with bronze trucks, the passenger coaches having roller bearings. In front of an eight-track roundhouse is a turntable, and there are coaling and watering stops, passenger and freight stations,

*Handwritten notes and signatures at the bottom of the page, including "Bill Haverly" and "Bob Haverly".*



an icing depot and stock yards. Switches and block signals are being equipped with solenoid controls throughout. A crew of four boys mans the railroad from various division points, exchanging orders and reports by a telephone system.

### Scaffold Elevated by Crank Is Time Saver for Decorators

Pat. # 1,902,498



Elevating scaffold for painters and decorators with platform which is moved up or down by turning two cranks. It can be assembled or knocked down in less than an hour

### Sun Blast Detector Gives Clues to Radio Failures

By using a device which reveals the occurrence of gaseous explosions at regular intervals on the surface of the sun, Dr. Robert S. Richardson of Mt. Wilson observatory has been able to establish a connection between the explosions and the failure of short-wave radios. Dr. Richardson finds that when the radios are put out of commission about every fifty-four days, the solar blasts are taking place at the same time and at the same interval. These blasts, the scientist says, are accompanied by a decrease in the intensity of the earth's magnetic field. The device used in the study is a spectrohelioscope by which Dr. Richardson is able to observe masses of exploding gases on a seven-inch image of the sun.



Instrument which reveals occurrence of gaseous explosions on surface of the sun

Painters and decorators save much time and effort on interior work by using an elevating scaffold, the platform of which can be moved up or down by turning a crank at each end. The scaffold can be moved about on roller-bearing wheels, the portable and elevating features making it possible to swing the platform above office furniture without moving the latter in many instances. The platform is raised or lowered with the aid of a patented lifting jack at each end. The jacks are equipped with a safety locking device to prevent danger of slipping, one support always remaining in position while a second is moved up or down until it locks in place and takes the load.

When the liquid starts to boil over in the distilling of turpentine, a hotter fire is built to make it boil down instead of up.

Reading Club  
I 784

Vertical text on the right side of the page, including "Elevating Scaffold" and "W. Williamsford, Calif." and "Ann' Anthony Smith".

W. Williamsford, Calif.



# Perfumed Air Is Delivered by Cooling System

*James McIlenny, 20 W. Dearmouth Road, Kansas City, Mo.*

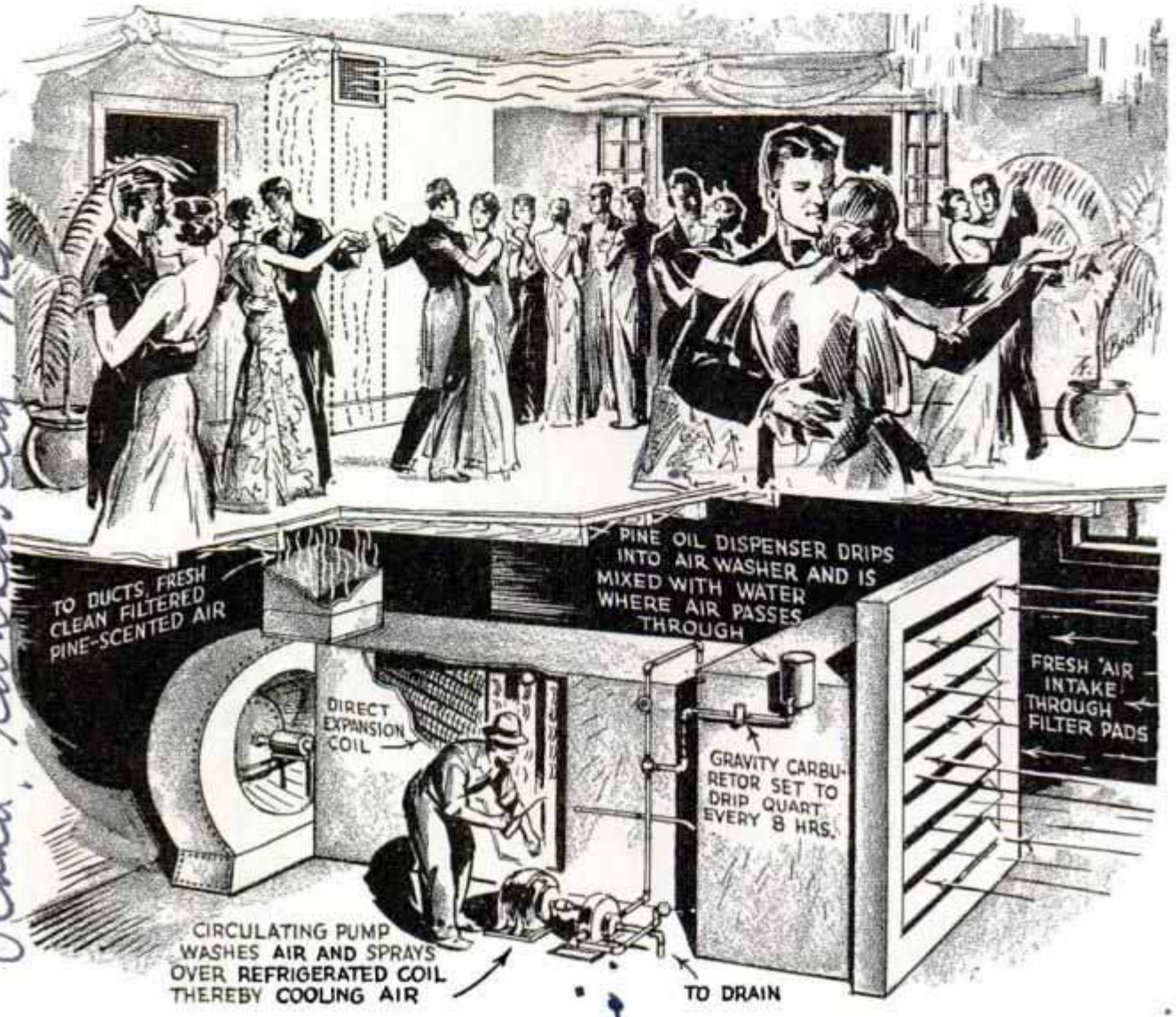


Diagram of air-conditioning system for ballroom which supplies pine-scented air by introducing small amounts of pine oil into the air as it is washed and cooled

Dancers in one Chicago hotel ballroom breathe the tangy air of the north woods as they waltz, an innovation made possible by introducing a pine-scenting unit into the air-conditioning system. The air is drawn through filter pads, washed and cooled. A dispenser with a gravity carburetor allows a pine oil to drip into the air washer, the oil being mixed with water as the air passes through. A quart of pine oil scents the air for a period of eight hours. There is nothing complicated about such a scent unit and it could be installed in any home or office air conditioner operating on a similar principle.

## Milk That Doesn't Cause Rash Safe for Sensitive Persons

Treated milk which sensitive, or allergic infants and grown persons, who suffer with a rash when they drink ordinary milk, can imbibe with safety is described in a patent recently granted at Washington. Whole milk, skim milk and cream all can be made non-allergic by the method. It is claimed, and the desensitized milk can take the place of egg yolk in making mayonnaise for the consumption of people sensitive to eggs. Proteins contained in milk are blamed for inducing allergic symptoms in children and adults. Giving milk a special heat treatment, it is claimed, eliminates or reduces the allergy-inducing tendencies. In applying this heat treat-

The Swiss fire explosive shells at Alpine slopes to dislodge snow where it might collect and cause a dangerous avalanche.

*W. J. ...* *S. M. A. Corp* *11614 Prospect*



ment, ordinary pasteurized milk is poured into containers which are sealed to keep air out, and the sealed milk is heated to 240 to 242 degrees Fahrenheit for about two hours. Acids may be added to the non-allergic milk without clotting the casein, which is an advantage in the feeding of infants.

### Snap-On Garden-Hose Coupling Fits Standard Faucets

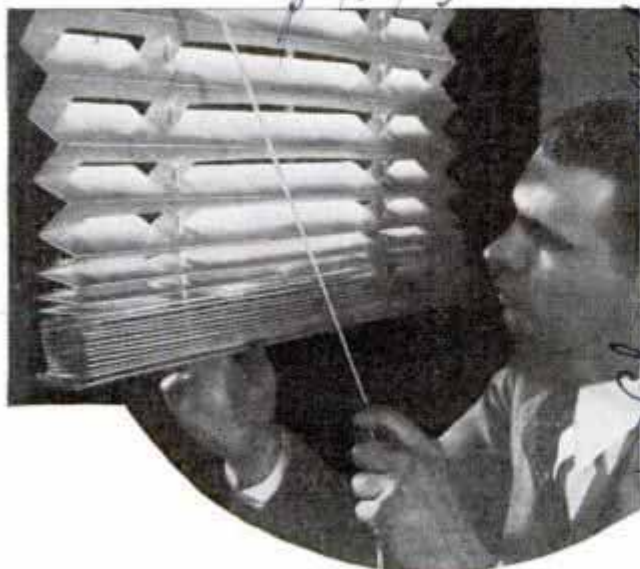


Quickly attached to any standard threaded faucet by snapping on, a new hose coupling gives a water-tight connection without using tools. It has a swivel action which eliminates kinking of hose.

*Bendix Red Cap*  
*60 cents*  
*I 759*

### Venetian Shades Made of Paper Are Inexpensive and Washable

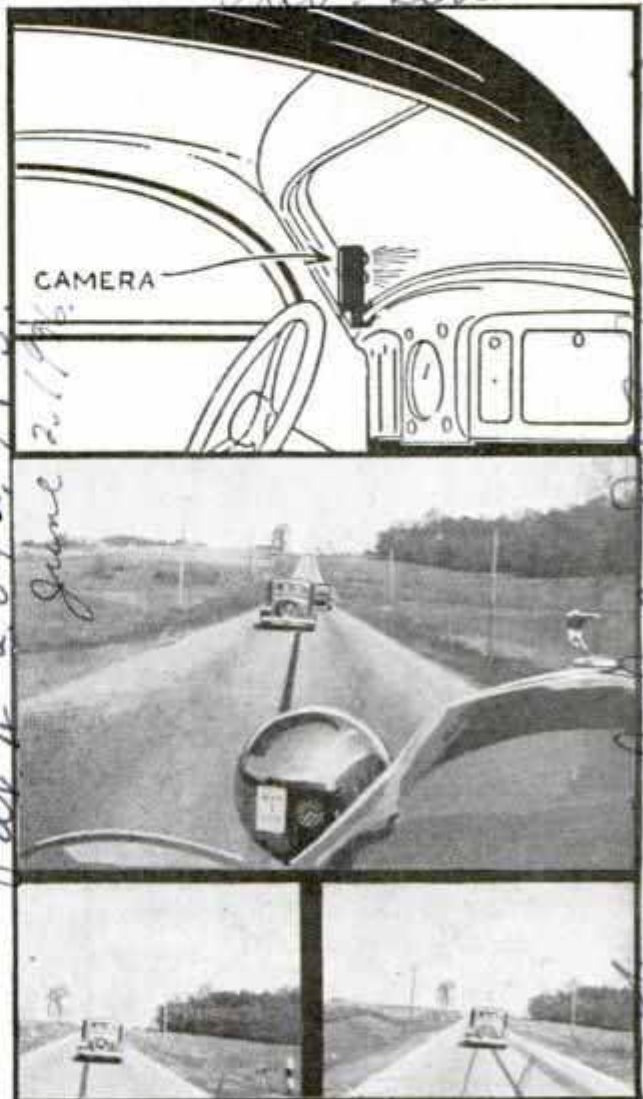
Venetian window shades made of a heavy sheet of paper, accordion pleated and cut to admit air and light, are inexpensive and easily kept clean. Being glazed, the surface can be washed with a damp cloth. The horizontal vents for light give the effect of slats, which do not close or tilt, but the entire shade can be raised and lowered with a draw cord.



Vents admit light and air through glazed paper shade which folds like accordion when cord is drawn

*Huber, Lute Co.*

### Camera Set on Windshield Snaps Traffic Violator



Drawing shows camera mounted on windshield to take pictures below. Note timer on headlight

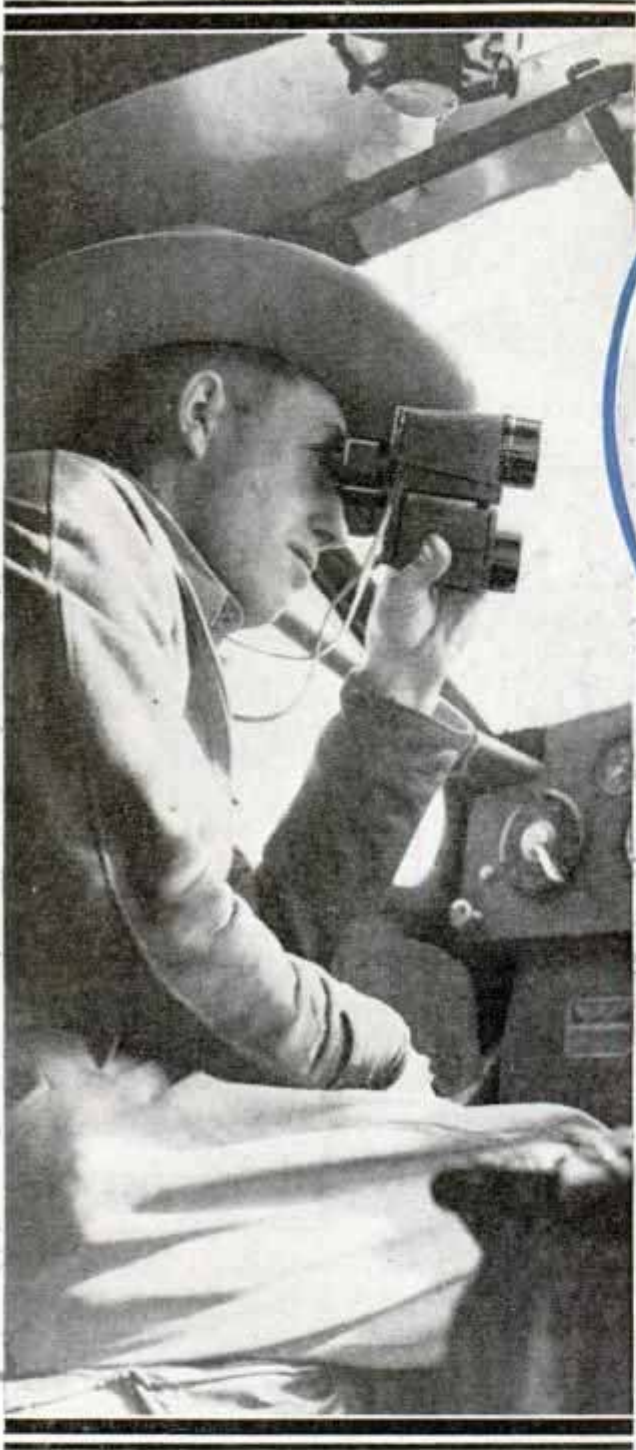
Reckless motorists should be certain the fellow behind is not equipped with a windshield camera before they straddle traffic lanes or pass cars on a hill. Photographic evidence of traffic violations can be taken with a three-lens camera that records on a single film three views of the car ahead. Mounted at the lower left corner of the windshield, it needs only a touch of a button to snap the pictures. One portion of the film will show a broad view of the road and the offending automobile. Other views show a close-up of the offender, disclosing the license number, and record the time and date by photographing a clock and calendar which are mounted on the back of the headlight in front of the camera.

*June 2, 1936*  
*Pat # 2,042,993*  
*I 707*  
*100 Chicago - all direct*  
*H. C. Churchill 807 N. Main St. Elizabethton, Tenn.*



F 585.

Charles J. Belden  
Pitchfork, Wyo



# WINGS OVER THE WEST

All photos © Charles J. Belden

*Bill Monday, cowboy pilot, locating wild horses from cabin of his plane.*

cabin ship, and the old place began to hum. Then Tom Arnold, operator of the 100,000-acre XU ranch in northwestern Nebraska and South Dakota, bought one, too. So did Leonard Keys, another prince of the prairies.

But it remained for Charles J. Belden, stockman and rancher of Pitchfork, Wyo., and an amateur photographer and nature student as well, to show them how to have real sport aloft. On the vast Pitchfork ranch, some 4,000 pronghorn antelope live and glory in exhibitions of speed. No legs can outrun theirs. Nor has any animal such an inquiring mind. When Belden and his friends sail over one of these herds in a plane, the antelope look up in astonishment. Then they begin to run but never take their eyes off the strange bird overhead. Thus while fleeing at a mile a minute, they obligingly look right into the cameras above.

Ranch flying combines serious business and sport. When Frances Arnold, daughter of Tom Arnold, fell from a horse and suffered a skull fracture, she was put in her dad's plane and rushed to Omaha—450 miles, or thirteen hours, away by rail, but only 300 miles, or three hours, by air. Her life was saved by the trip. But when

**T**HE modern cowboy has swapped his horse for an airplane. Up-to-date ranches are using planes to round up wild horses, locate stray calves, ride fences, bring buyers, rush emergency supplies, and when business is done, to take the owner coyote hunting, or run races with the fleet-footed antelope.

Harry Minor of Hyannis, Neb., began it a decade ago when he went home from the state university to show his dad how a ranch really ought to be run. With a couple of oil barrels he marked off a landing field on the side of a sand hill, bought a

...the ...





Ranch plane flying over cattle on range, a quick method of checking the work of cow hands. Below, baby antelope raised on ranch ready for an airplane ride to the zoo

7-6-85  
a plane arrived at Meeteetse, Wyo., a cowboy willing to ride anything hopped astride the tail while the pilot wasn't looking and remained there as the ship took off. Those inside the cabin couldn't see their stow-away, but the ship was so tail heavy that the pilot suspected something was wrong and one glance at the excited crowd below gave him a good idea. He swung around and landed as gently as possible. The cowboy scrambled off, unharmed.

Some ranchers pilot their own planes, others hire pilots. Plenty of young fellows leap at a chance to be a cow pilot, working with the other hands when there's no





*Airplane used to frighten wild horses out of bad lands of Wyoming and move them into open country where cowboys herded them into corrals. Some of animals can be seen*

flying to be done. There's plenty of wind on the plains at times and the boys at Alliance, Neb., boast they use a log chain for a wind sock. More accurate testimony as to sand-hill wind comes from Bill Manning, a cow pilot who made a record run from Belle Fourche, S. Dak., to Hyannis, Neb. In a ship with a cruising speed of only seventy-five miles an hour, he covered 250 miles in one hour and twenty minutes, which means his plane was going 180 miles an hour, virtually all the distance, aided by the wind.

In the mountain country, flying becomes still more hazardous, but because of the very roughness of the terrain, it is an even more valuable aid to the man whose wealth is scattered there. Modern ranchers deal in terms of thousands, whether it be acres, cattle or sheep. Much of the property often lies far from headquarters, yet they must be constantly in touch with it in all kinds of weather. Take the Arnold property, for instance. Headquarters are in South Dakota, but much of the grazing land lies in Nebraska. In addition to 35,000 acres which he owns, Arnold leases thou-

sands more. He also runs cattle on a nearby government forest reserve.

It's no small responsibility keeping track of so much territory, so many cowhands, such big herds. But when saddles, branding irons, spools of barbed wire or any other items are needed down in Nebraska, the boss can send a cowhand flying with them from the home place in South Dakota in no time at all. Personally, he can supervise the work in a dozen different places. His plane, through the spring and summer, enables him to see that wells are kept going, fences repaired, and calves looked after.

In the fall, when the cattle are ready for market, the plane again pays dividends. The big western ranchers sell nearly all their livestock to small farmers who buy the range-fed animals and fatten them for the market. In the old days, these cattle were shipped to a central market and re-sold there. This involved shrinkage in the animals themselves, and there was also a middleman's fee. Now, Arnold and his pilot hop into a plane, fly to Iowa and bring back three or four prospective buy-





ers in a single day. They show these farmer-guests the stock and sell it to them on the spot. Then they ship it direct to the feeder.

In the winter, too, the plane has an advantage over the cowboy's pony. After a heavy snow, cattle often become caught in pockets of the hills and mountains. Finding them on horseback may take so long that the cold will cause many fatalities. But from a plane flying low, such animals can be spotted instantly. Frequently, too, planes can get through with food or other supplies for men or beasts when roads are impassable.

The traditional foe of the cattle kings, the sheep men, also have been converted to flying. Often a shepherd and his flock will be sent from headquarters in the desert areas with orders to go wherever feed can be found. Soon the owner may not have the slightest idea where his sheep are located. A plane runs them down in a few hours whereas it might take several days by any other mode of travel.

Last winter a sheepherder of the Cody, Wyo., region, was saved from death by Cowboy Pilot Bill Monday. The herder had been lost in a blizzard for three days



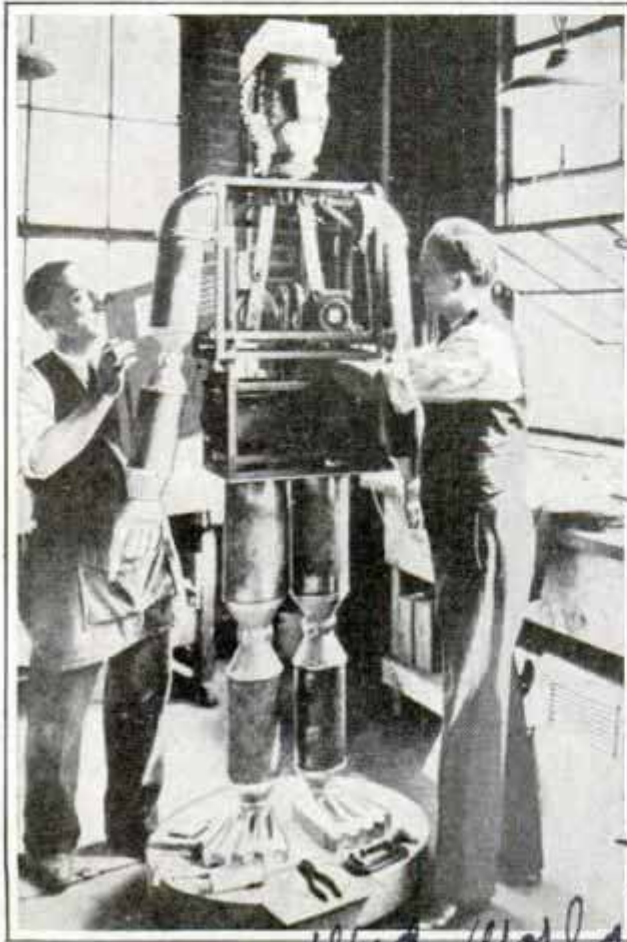
*Antelope fleeing from plane, shadow of which can be seen.  
Below, plane ready to round up wild horses*

but finally made his way to ranch headquarters. His feet and hands were frozen and he was suffering from exposure, but drifted roads made it impossible to get through to Cody. Pilot Monday responded to a telephone summons after a runway at the Cody airport had been cleared of snow. He landed on comparatively level benchland not far from the ranch house. Teams scraped away the snow to make a runway for the big plane to take off. Then it was a short trip to Cody where doctors were available.

(Continued to page 122A)



# Robot "Four-Minute Man" to Lecture on Machines



Putting together the mechanical man who gives "canned" lectures at Texas exposition

Four-minute lectures by a mechanical man are a feature of the exhibit by the U. S. department of labor at the Texas Centennial Exposition. The robot, constructed in a Pittsburgh factory, has a "built-in" speech on men and machines with which to entertain his audiences.

## Vertical Sundial with Photo Is Set in Picture Frame



Mounted in a glass-faced picture frame, a photo-sundial that is ornamental for the indoor garden, solarium, sun porch or other sunswept place in the home is read like a clock. It is the

vertical type. The sun strikes it from the rear and the shadow appears through translucent glass, indicating the time on a clockwise dial. A circular photograph may be mounted on the dial plate by means of four triangular prongs.

## Barnacles Shocked off Ship by Weak Electric Current

Barnacles and other growths of plant and animal life can be prevented from forming on the hull of a ship by passing a weak current of electricity through the hull, it is claimed by a Danish inventor who has devised a method for doing this. He says his method costs little and can also be applied to piling and other submerged structures attacked by barnacles.

## Barricade Drags Auto to a Stop Protecting Workmen in Street

After several employees of a Chicago gas company had been injured by automobiles crashing through temporary street barricades, a heavy steel barrier which drags the car to a stop was devised. It stands three feet high and is slightly wider than a car. When the automobile strikes



When this steel barricade tackles an automobile it doesn't take long to drag it to a halt

it, the front wheels engage the sturdy base and shove it a short distance to a stop. It is placed far enough from the men at work to check any car out of control.

*Handwritten notes:*  
Copenhagen Denmark  
clear service  
F 836  
F 728  
Mrs. Martin King  
1243 Webster Ave  
1222

*Handwritten notes:*  
Mrs. Martin King  
1243 Webster Ave

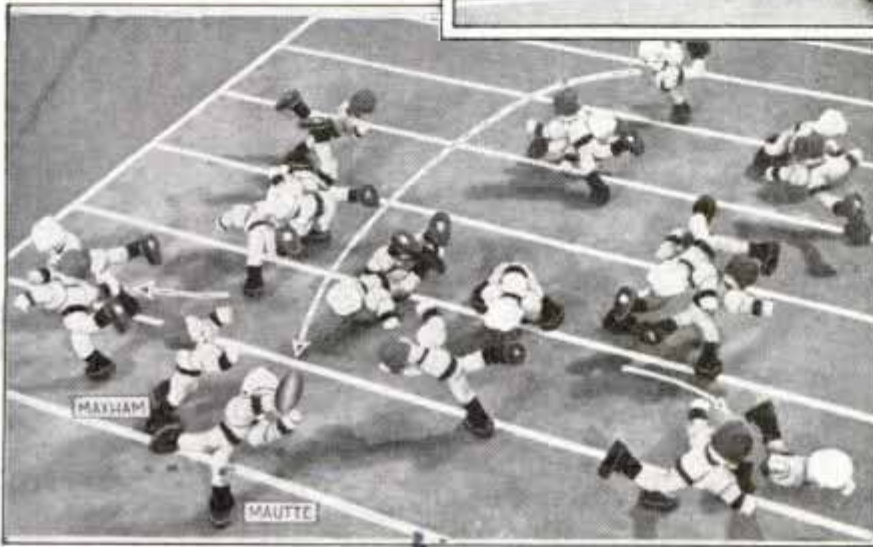
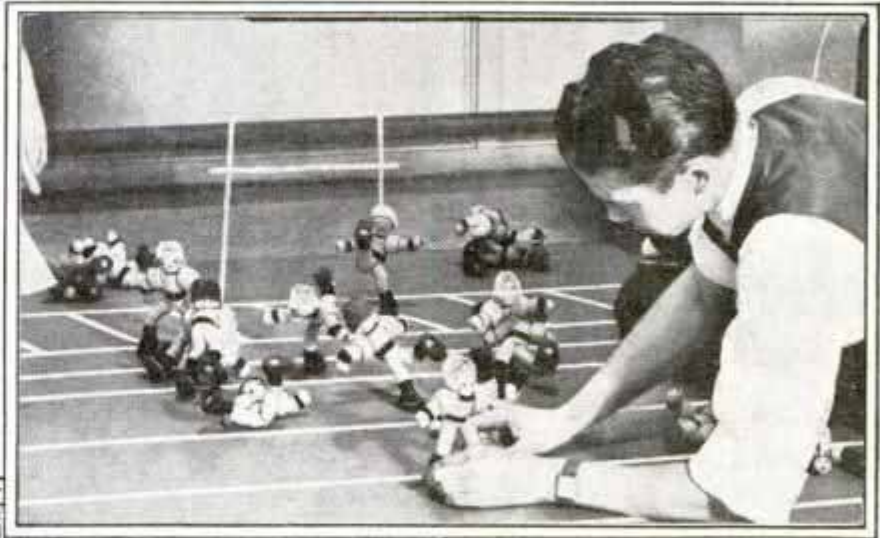


7/23

Genl. Clark A. Martin,  
Secy. to Es. H. Lynn

# Midget Players Pose in Scenes from Big Game

Midget football stars fashioned of felt and wire take the part of real grid-iron players in posing for the camera of the Buffalo, N. Y., Times. A description of thrilling plays in the big game is flashed over the telephone or telegraph to the Buffalo newspaper office. Staff artists and sports



Above, newspaper editor poses midgets in scene of football game according to description received by wire. Player is punting from goal line. Left, midgets illustrate forward pass play which resulted in touchdown

writers pose the tiny players on a midget football field lined to scale, contorting the dummies into lifelike action illustrating the play. The cameraman shoots the scene, and a few minutes later the presses are rolling out newspapers with the account of the game illustrated dramatically by pictures of the midget teams. The dolls are made of felt rings and bands of various colors strung on wire rigid enough to be poised in any position. In other sport seasons they are used to illustrate hockey, baseball and other games. When photographs of an airplane accident in the south failed to reach the newspaper in time for publication, the editor used the midgets with a model plane in a scene drawn by staff artists to represent the actual disaster as described by wire. These photodiagrams give the newspaper reader a "picture" of the event faster than actual photographs could be obtained.

## Soldering Pliers Hold Work as Jaws Apply Heat

Flameless soldering pliers, the jaws of which heat when the tool is connected to an electrical outlet, permit the operator to work without goggles, in greater safety than is possible when open-flame torches are used. The jaws of the pliers hold certain types of work



firmly, at the same time applying heat. The tool is especially useful on such jobs as making sweated joints on the new type of solder pipes and connections. It also may be used for soldering wires and terminals and thawing frozen pipes.

deal Communist

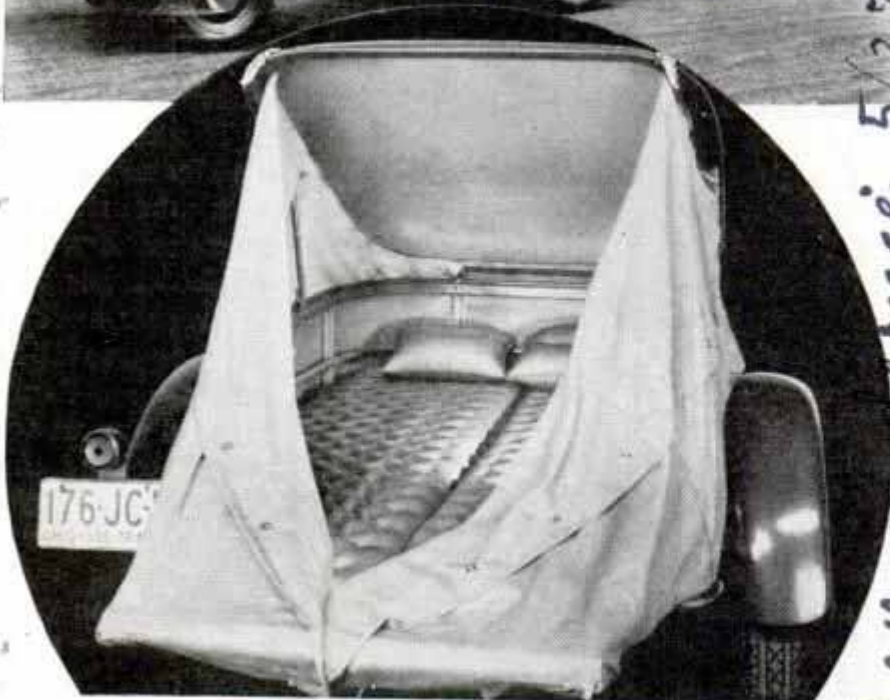
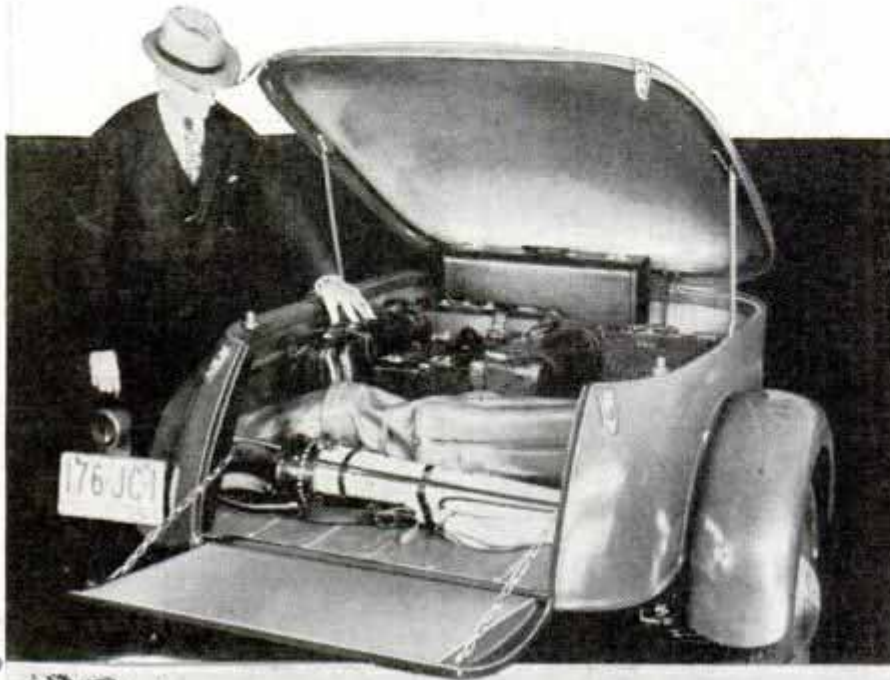
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# All-Steel Utility Trailer Has Hinged Cover

Capable of a maximum load of 1,200 pounds, an all-steel utility trailer is being prepared for introduction through auto-

mobile dealers. It is mounted on two standard auto wheels and tires and has the standard tread of fifty-six and one-half inches. The list price will be low, according to the manufacturers. Equipped with a hinged cover and tail gate, the trailer's lines will conform to those of the modern automobile. A large amount of baggage can be carried and at night the trailer may be converted into a sleeping compartment by using air mattresses. A canvas cover attached to the upraised hinged cover gives privacy for the occupants. The trailer is eight feet long over-all and forty-seven inches wide. It is expected to meet the needs of many tourists, sportsmen, merchants, vendors and farmers.



Top, storing baggage in trailer. Center, on the road. Bottom, trailer arranged for two to sleep. Note protective curtains

## 'Heavy' Ice Is Made in Five Forms by Pressure

In addition to the ordinary ice, which is lighter than water, five other kinds of ice are produced by applying extreme pressure at varying temperatures. The solid crystal of ordinary ice is formed by the molecules arranging themselves in orderly fashion, layer upon layer. Water molecules have a random makeup. When ordinary ice is squeezed, the molecules "shrink" and revert to the random arrangement and the ice melts. Applying further pressure carries the molecules to a point where another

*\$119.50 for Salem.*

*5/27/36*

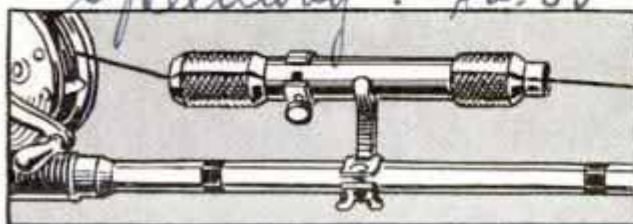
*7-3-2* *Phillips Mfg Co* *Salem, Ohio*



orderly structure, another solid crystalline form, becomes feasible. This kind of ice is heavier than water and therefore sinks. Pressure necessary for this ice is nearly 100,000 pounds per square inch at thirty-two degrees Fahrenheit. In Germany, prior to 1903, Tammann produced two new varieties, and later published evidence of another, by using temperatures of twenty to thirty degrees below zero at pressures up to 50,000 pounds per square inch. In 1912, P. W. Bridgman of Harvard discovered two new modifications by using pressures six times as high as Tammann's. One of these can exist at temperatures of boiling water, provided high enough pressures are available.

7766  
**Fishing Line Dried by Reeling through Wax Cartridge**

Preserving your fishing line in good condition is a simple operation with a wax cartridge which clamps on the fishing rod. It is attached with a small clasp which can be left on while fishing. At the end of the day the line is drawn through the cartridge to the reel and dried, waxed, and tested for weak spots. Soft rubber plugs squeeze out water and excess wax composition. The cartridge can be refilled with wax, goose grease or a special compound. It is chrome-plated.



As line is reeled in, it is squeezed dry and waxed while passing through cartridge clamped on rod

**"Mercy Tank" Speeds Relief to Storm and Flood Areas**



Two views of "mercy tank" plunging into swamp and on dry field. It hauls provisions and rescue equipment into disaster area

Whether its rescue mission is in swamp-land or hill country, the "mercy tank" built by Donald Roebling is designed to "take it." Its purpose is to carry emergency relief to scenes of disaster when other means of transportation are blocked by flood, wreckage and impassable roads. The tank is four feet high and eight feet wide, with room for fifty persons or a large cargo of provisions and rescue equipment at the rear. In front is the pilot's cabin. With traction like an army tank it can navigate water or land.

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

Clearwater, Florida.

Col. & Mor Product Corp. City 28



F648. Mrs. Thomas D. Damsen, Jr.  
10555 Hollywood Ave  
Los Angeles.

# Adventures of

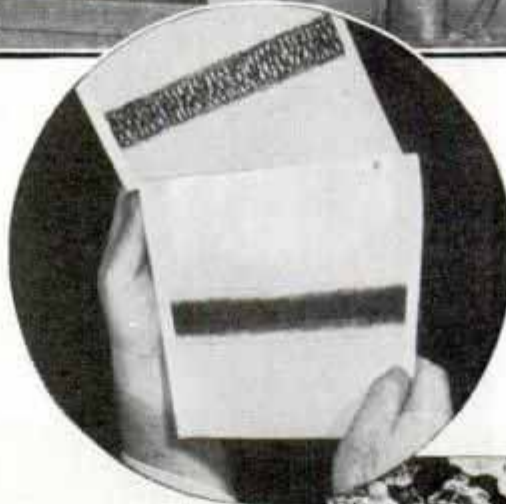


**R**ECENTLY fire detectives hidden behind an office partition heard this amazing conversation.

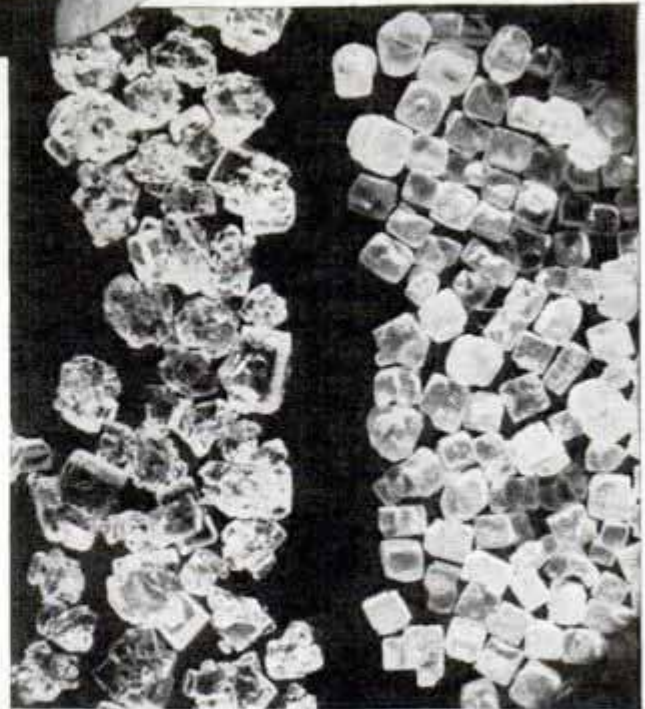
"I'll give you any kind of fire you want," one of the voices said. "I'll burn the store to the ground or blow it up with an explosion. Or, if you prefer, you may have a smudge fire that causes plenty of smoke damage, or a flash fire that singes everything in sight."

The detectives were listening to a professional "torch" arranging to fire a store so the owner could collect insurance. The "fire insurance racket" is widely spread these days and firebugs guarantee to create any type of fire. For smudge fires they use a smoldering chemical that deposits its heavy soot on everything around, and for flash fires they use a combustible gas that destroys the value of goods without completely burning them.

Most people would say a fire destroys every trace of what caused it or helps it to spread, but arson squads work miracles with a few pieces of burned wood. Cracks and check marks on the charred surface tell them the approximate temperature at which the wood burned and from this in-



formation they decide whether a chemical was used to start the fire. Then they can tell whether a fire was accidental or whether it was touched off. One might think that an explosive time bomb that



*Making photomicrograph of evidence found at fire. Center, enlarged photos of rabbit and fox hairs which solved fire. Below, chemical crystals found embedded in charred woodwork*



7648

# the FIRE DETECTIVES

consists entirely of chemicals would leave no trace of itself but when this method was tried in Los Angeles the arson squad dug microscopic traces of the chemical out of the woodwork and traced it back to the man who had purchased it and built the bomb. Even when an invisible gas is used, detectives can find telltale evidence in the ruins of the building. Ten years ago firebugs were destroying a million dollars worth of insured property in Los Angeles each year but now the annual arson loss is only one-tenth as much. The reason is that Paul Wolfe,



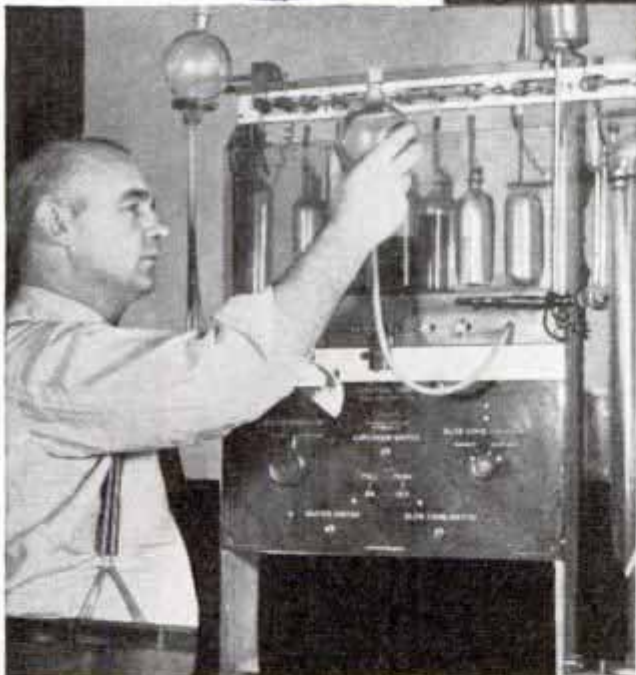
Los Angeles Fire Dept.  
219 S. Hill St.

Capt.

head of the arson squad, has scientific ways of finding out how fires start.

One of the tools of fire detectives is the microscope. With photomicrography they can tell exactly what was burned in a fire and sometimes this leads to finding the cause. A fur merchant whose stock was only partly insured lost his business in a blaze. The fire wiped out a fortune in silver fox furs. The fire detectives found a few strands of hair in the ruins and put them under the microscope. A strand of real silver fox hair looks like a black line with white borders but these samples had a dark beaded appearance. The fire detectives searched their microscope library and found that the hairs were actually those of a rabbit. That enabled them to prove the merchant had substituted rabbit pelts for his expensive furs and had set the store on fire in the belief that he could collect his insurance money and still have his expensive fox skins.

Some incendiarists try to allay suspicion by writing threatening notes to themselves or setting the stage to make the fire appear to have been an accident. A favorite trick is to make it appear that the owner loses money when a fire occurs in spite of his insurance. Once Wolfe investigated the burned premises of a clothing mer-



Top, examining flatiron and switch used to start fire. Center, analyzing gas samples from fire. Bottom, a firebug "plant" that failed





chant who had a batch of large rush orders in his safe. Business apparently was so good that the fire was a real calamity. The orders were bona fide, Wolfe found, but had been given because the merchant had been offering goods at one-third his regular price. He would have lost money if he had been forced to fill the orders, yet their presence seemed to show there was no reason for a fire.

"Another kind of fire is the fake burglary type," Wolfe says. "In such cases the owner removes some of his valuables, scatters a handful of burned match ends around the house, sets the place on fire and calls the fire department after the fire has a good start. The chances are the fire will be extinguished before the place is completely destroyed. Then the owner finds some of his valuables are missing. Coupled with the burned match ends in the unburned part of the house, this lays suspicion on some prowler.

"Real fires from such a cause are unusual, so it's easy to discover how the fire was really started. One firebug even cut the screen of a back window to help carry out the idea of burglars. I borrowed his pocketknife and put it under the microscope. Still adhering to the blade were

some of the lead and iron scrapings from the screen.

"The firebugs often think up intricate schemes to make it appear impossible that they could have set a fire. Last year a woman's house was set on fire by a burglar who accidentally tipped over a lamp after he had bound and gagged her. She managed to escape from the burning building only at the last moment. At least, that was her story. But we found she was wearing very tight slippers that she could not have gotten in-



Top, electric plate used by one firebug to start blaze. Below, evidence gathered at scene of one fire

to while her arms were bound. The cloth gag, she claimed the burglar had taken from his pocket had her own laundry mark on it. She had tipped over the lamp and started the fire and had then gone outside where an accomplice tied up her arms."

One of the arson squad's toughest cases involved a large residence that was almost gutted by fire one night while the family was away. A fire had been left in the fireplace and apparently this had started the blaze. But in the middle of the room one of the detectives discovered a charred pine knot to which several feet of wire was attached. This slight clue led to uncovering an intricate scheme. He found the family dog always slept in a box in the

(Continued to page 116A)



# Air Conditioner Cools Glass-Walled Office

Less expensive than air-conditioning an entire room, a small cooling unit can be installed in a glass-walled "office within an office." The glass sides of this office area extend perhaps six feet high, with the top open to assure circulation of fresh air. The unit installed on one side supplies a current of cool air which settles to the floor, driving the hot office-air upward. It can be regulated by turning a knob. Two or three desks can be accommodated in the walled area cooled by one small air-conditioning unit.



Glassed-in office space, open at top, is an "oasis" of comfort on hottest day as an air-conditioning unit suspended on side supplies cool air

# Waterproof Silk Plastic Bag for Picnic or Airtight Storage



Watertight and airtight, a transparent zipper-sealed bag is finding a multitude of uses at home and touring, on the beach and at picnics. You can pack your lunch in it and find the sandwiches fresh hours later. On the beach it keeps sand and moisture out of handbags, and is handy for stowing away wet bathing suits and towels. It furnishes a mothproof container for small furs, and because it resists ultraviolet and infrared rays it is a useful wrapper for valued photographs, papers, and garments that might fade. In traveling, the bag serves as a carryall for toilet articles and first-aid kits. At home it keeps cigars, cigarettes and tobacco fresh, and is a handy bag for sporting clothes and equipment on the way to golf course or tennis court. The bag is made of silk impregnated with oil and a plastic material, and may be washed or dry cleaned. It is unaffected by grease, acid or heat.

Above, picnic lunch is kept fresh in the airtight bag, which does not absorb odors. Right, during beach party, handbag and other belongings are stowed in bag to keep out of sand and water

Chicago Fred's Hardware

Standard Products Corp.

1139 Broadway New York

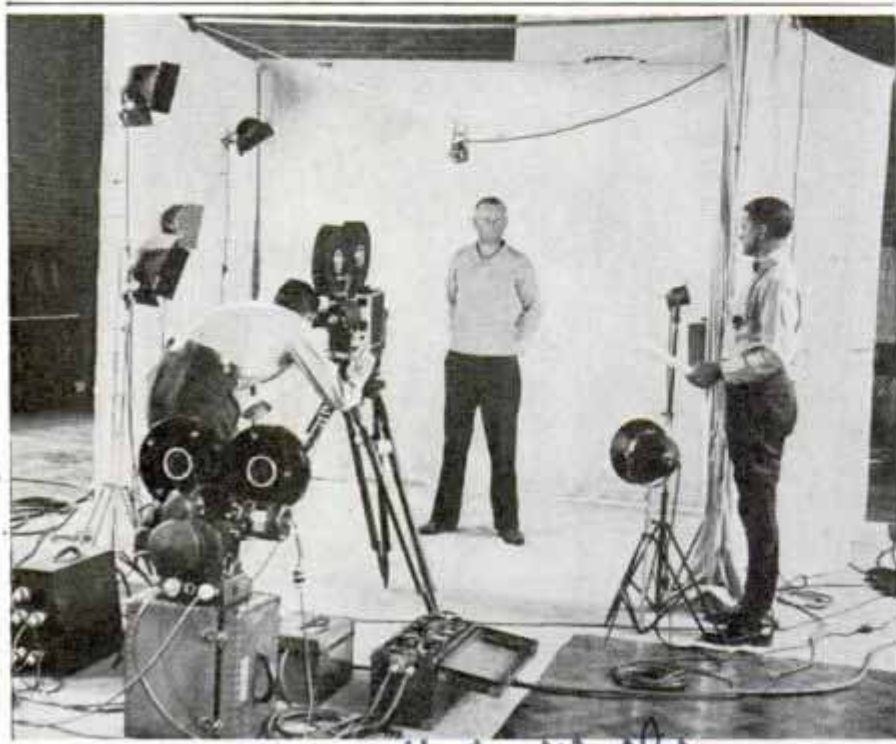


# State Troops Use Sound Film for Identification of Criminals

mit the weight of the tractor to be carried from one cleat to another, thus reducing vibration. Spokes are attached to the inner rim, leaving the dirt free to fall through the wheel and onto the ground. All joints are arc-welded and the width and thickness of the steel rim vary with the weight of the tractor on which they are used. It is said the wheels offer better traction in hard or loose dirt and thus save fuel.

## Laboratories on Wheels Help Cheese Maker

Giving the smallest cheese producer a chance to take advantage of scientific processes developed by the U. S. department of agriculture, two



New Jersey state police demonstrating their method of identifying criminals by making sound motion pictures in their studio

Talking motion pictures are the latest ally of the state in apprehending criminals. It is proposed to make a sound-film record of the criminal routine procedure by the police, as a permanent means of identification. The method is being tried out by state troops of New Jersey. It was instituted by Col. H. Norman Schwarzkopf, former head of the state police.

traveling cheese laboratories are touring Wisconsin and Ohio. The laboratories, mounted on automobile chassis, have hot and cold water on tap and electricity from

## Open-Tread Wheels on Tractor Do Not Pack Ground



Self-cleaning tractor wheels which do not pack the ground and also remain free of dirt have an open-tread design with side rims angled toward the center circumference and spiraled cross cleats so spaced as to per-



Scientist in the mobile laboratory shows how cheese should be manufactured

storage batteries. Incubators in which the temperature is controlled hold pure cultures of bacteria and microscopes and oth-



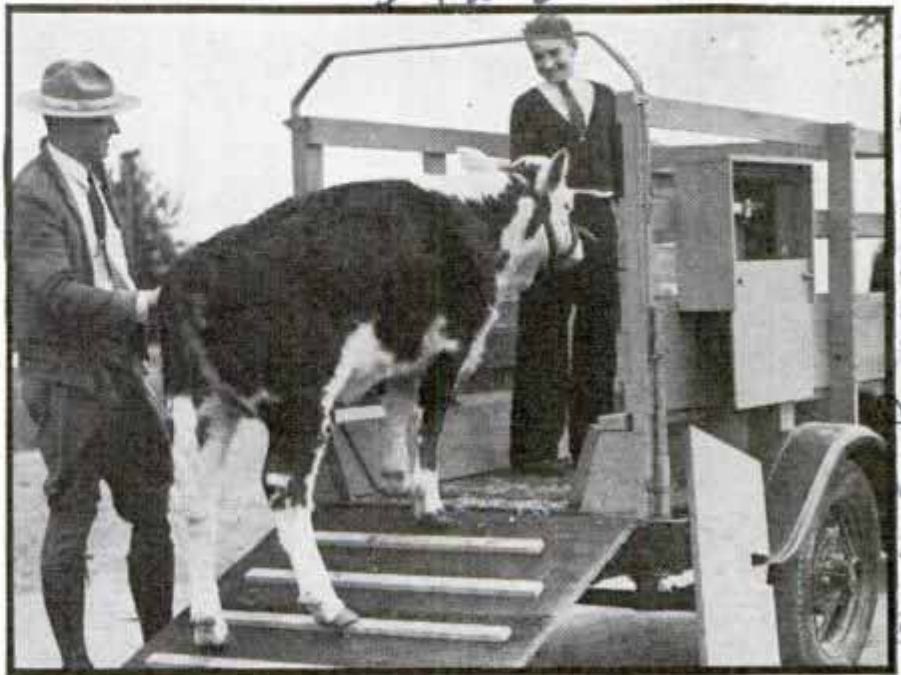
# Auto Trailer Carries Scales to Weigh Animals on Farms

er instruments are carried in padded compartments. Any cheese maker can have his cultures examined by the traveling laboratories and can learn the reason for any trouble he may be having with bacteria.

7695

## Four-Wheel Yacht Built of Old Auto Sails Dry Lake

"Landlubber" sailors skim over a dry lake in California in a four-wheeled sailing vessel that is part yacht, part automobile. With a mast mounted above the front axle of an old auto chassis and a bowsprit like a wagon tongue, this desert schooner takes the wind in her sails and rolls along at forty miles an hour. When the sun raises heat waves over the sand, the sails seem to be scudding on a real lake.

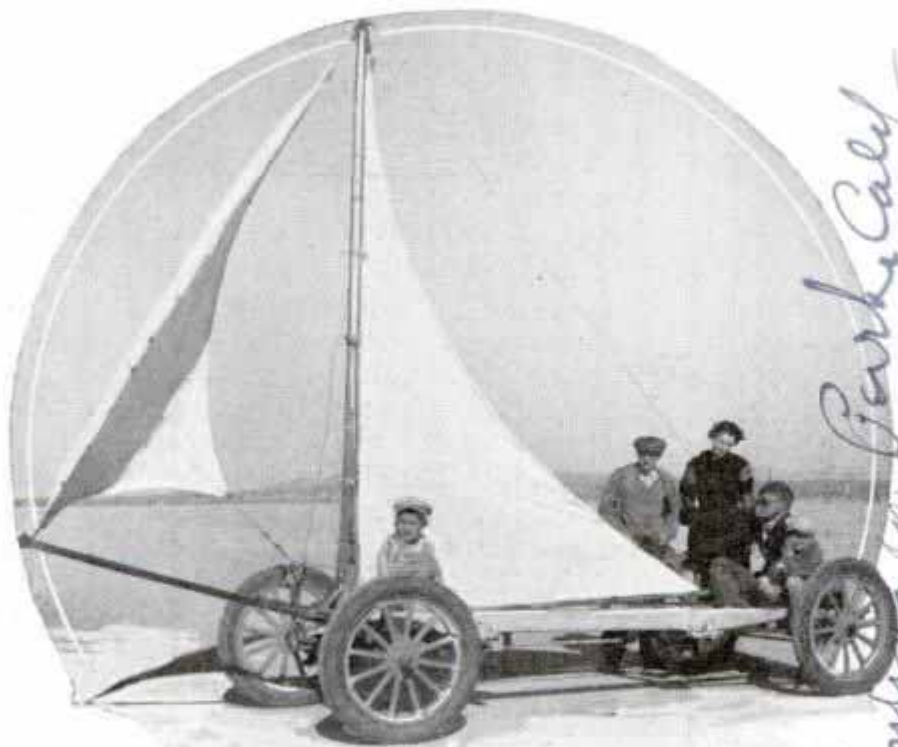


Traveling scales call at the farm to weigh livestock. Floor of trailer serves as weighing platform and scales are in box mounted on side

Portable scales mounted on a trailer behind the agricultural agent's car are being used to weigh farm animals in Oregon.

Corvallis

The trailer covers a circuit of nine counties every month, weighing animals for members of baby beef clubs and enabling them to keep account of weight gains and costs. The scales platform forms part of the floor of a two-wheeled trailer, which has adjustable legs on each corner that drop down to make it rigid while in use. The rear gate is lowered to form a cleated ramp, both ramp and platform being covered with fine mesh screen to keep the animal from slipping. The scales beam is in a box at the side of the trailer. The weighing trailer was built by faculty and students in the agricultural engineering department of Oregon State College.



This is California's version of the up-to-date prairie schooner, an old auto chassis that sails on the smooth bed of a dry lake

Cont. L. L. Hyde Colburn

Agricultural Engineering Dept. Oregon State College

Handwritten note: *Handwritten in Park Calif*

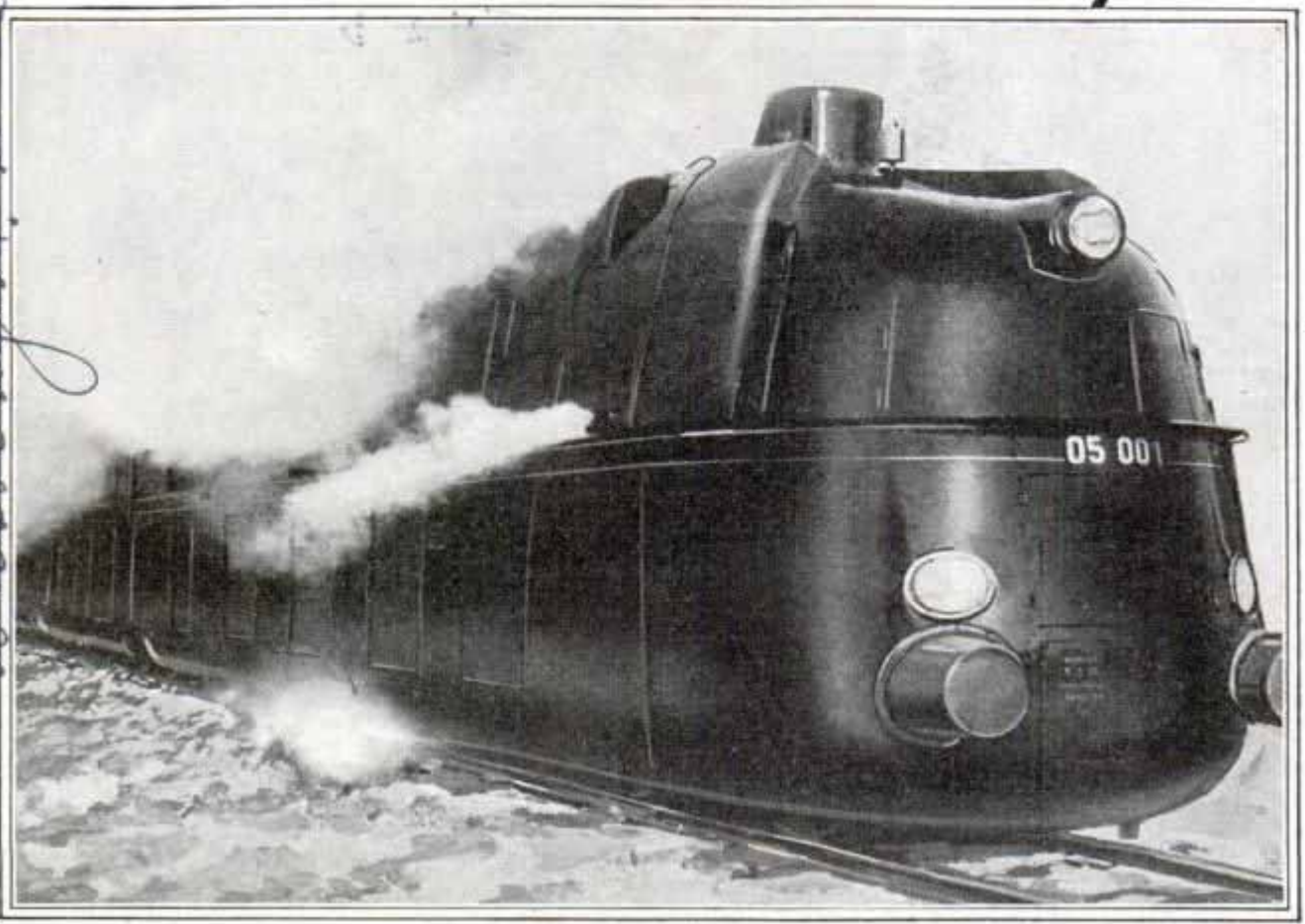


T625

Mr. C. S. ...  
814 Connecticut Ave.  
Washington, D.C.

# Featherweight

Mr. S. van Dusen, 814 Connecticut Ave., Washington, D.C.



Forerunner of the "61,001" on a trial run. This train, with three coaches, weighed 250 tons and made 100 miles an hour. The new one, with four coaches, weighs only half as much and makes 112 miles per hour

**S**UPERSTREAMLINE speedsters, just completed and tested to satisfaction in Deutschland, represent all types of motive power. Most of the new Teutonic locomotives are lighter in weight than any hitherto known. For example, there is the "61,001" locomotive with its four standard-size coaches. This entire train weighs fifty to 100 tons less than a single steam passenger engine of the latest type now operating on the Union Pacific, and not much more than one of our standard Pullman sleeping cars.

Two years ago German engineers of railway equipment decided to conduct a series of secret tests, their major aim being the increased efficiency of the steam engine. Results have been notable. Though weight has been sliced down materially, power has been increased to an astonishing degree. What is the secret? In the case of steam locomotives the procedure has been simple. The generous use of al-

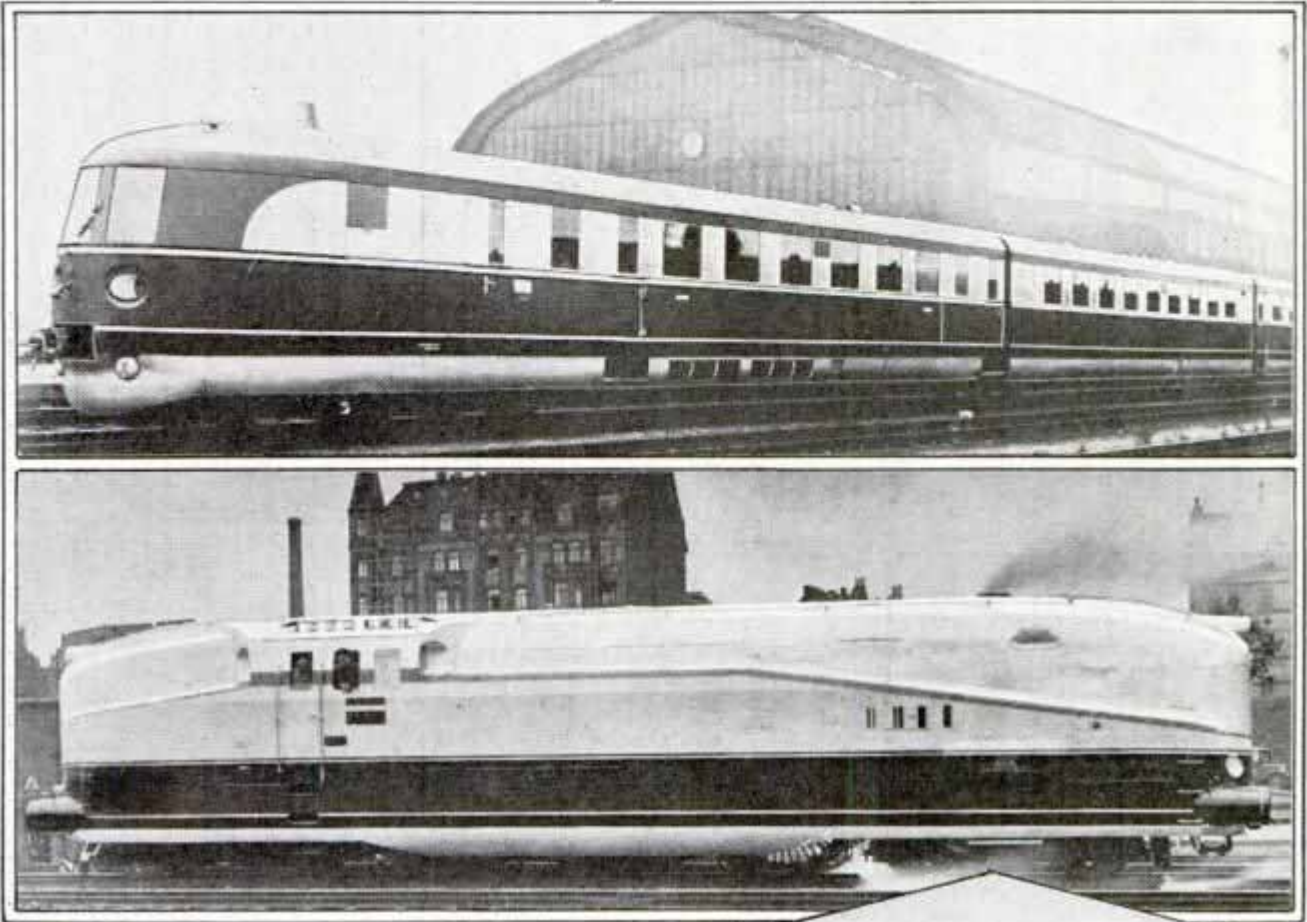
loy steel cuts the weight almost a third, and numerous pre-heating devices raise the temperature of the water to the boiling point before it is delivered to the feeding dome of the boiler.

The new pre-heaters are being built in front of the firebox and the exhaust steam is turned into valuable power. The Germans, with pardonable pride, now announce that the use of this steam-saving system, together with a superheater which operates at 752 degrees Fahrenheit, plus a three-cylinder driving gear, enables the new "61,001" to develop 3,000 horsepower and a sustained speed of 112 miles an hour.

German designers have not, by any means, neglected other forms of motive power. Two new types of Diesel-operated passenger units have just been developed. The first, equipped with two Maybach motors of 600 horsepower each, has a supercharger to decrease fuel consumption and weight. Another kind of three-car Diesel-



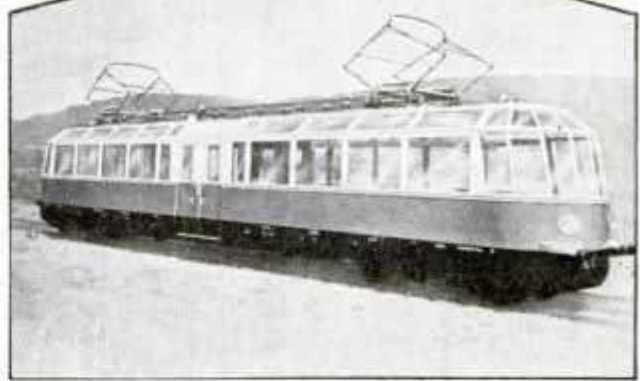
# FLYERS *of the* RAILS



equipped train employs a giant engine, which, with compressor in operation, develops 1,400 horsepower. The train also carries a "baby" Diesel engine of only 120 horsepower, which furnishes power for air brakes, light generator, ventilating equipment and magnetic brakes.

New developments also have been announced in all-electric engines. It was found, after exhaustive tests, that the direct, or electric driving gear was most efficient for starting and low speeds. Accordingly, some of the newest electric engines are being equipped with a two-speed hydraulic gear, similar to the automatic overdrive in the modern American automobile. The high-speed second gear of the hydraulic transmission cuts in at sixty miles an hour and carries the electric train to its top speed. The lower gear is used in starting.

Today the most famous of all the German all-electric locomotives is the "1-Do-1." It develops 4,800 horsepower, which is 180 more than the giants of the Pennsylvania



*Top, two 600-horsepower Diesels drive this German flyer. Center, side view of the "61,001." Below, glass coach driven by motors in trucks*

railroad that haul the "Congressional Limited," the "Senator" and other famous Washington to New York speedsters. The German locomotive is not quite so fast as its American counterparts, however. Also in the all-electric category is the new "all-glass coach." It is a single-car unit driven by motors located in the trucks, and drawing its power from overhead. With the exception of the floor and a couple of feet of the sides, the body is made mostly of





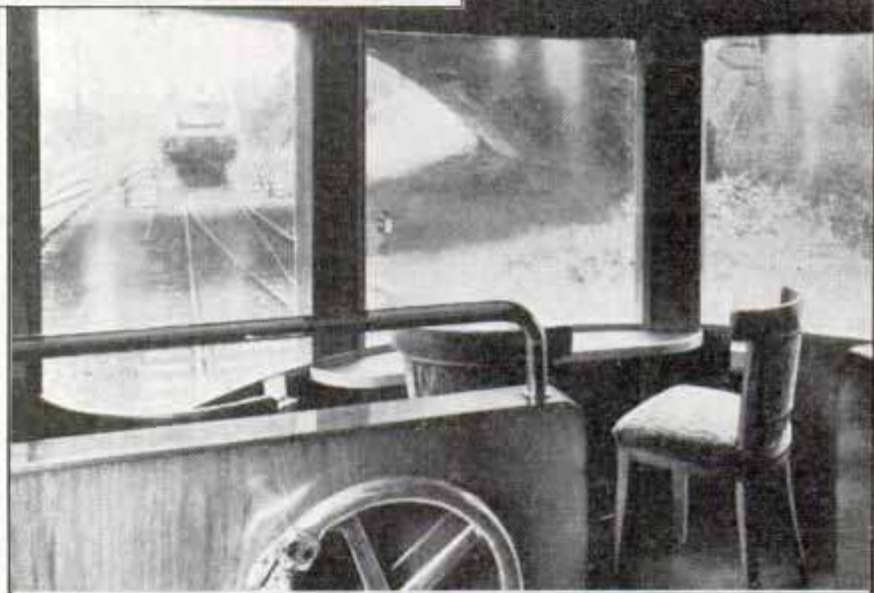
*Left, the "61,001" traveling 112 miles per hour. This German coal-burning streamliner, light in weight and fast on its "feet," is making the celebrated "Flying Hamburger" seem slow by comparison*

*Right, interior of observation car of the "61,001" with the famous locomotive showing in the background*

shatterproof glass. It is designed for sight-seeing.

Increased speed of German trains has called for considerable advancement in braking equipment. This resulted in the development of the "magnetic brake." It is used in addition to the standard brake. The bar of the magnetic brake rides normally above the rails, but when quick stops are necessary, it is lowered into contact with the rails, holding to them by magnetic force. In the case of the Diesel and steam locomotives, the power is supplied by electric storage batteries but in electric locomotives, the power is available from the same source that runs the engine.

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



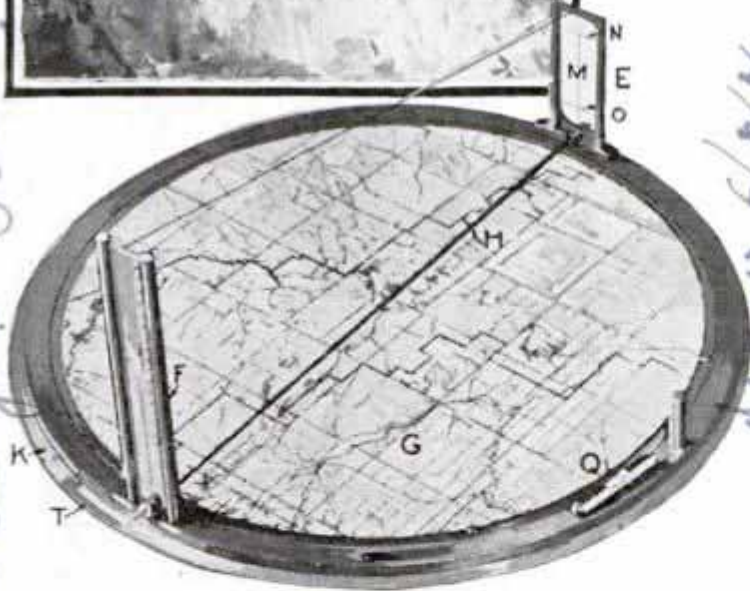
*Dining car of the German lightweight train, the "61,001," with double tables on one side and singles on the other*



*Los Angeles Pasadena Calif*  
*Food 40 81000 Pasadena Calif*  
*Cal. Polytechnic*

# Radium on Fire Finder Aids Lookout at Night

Radium compound applied to the fire finder used by the government's forest service helps lookouts to locate fires at night in the forest. The compound is used on the numerals of the azimuth and the cross threads of the azimuth and the cross threads



Top, fire lookout station and, circle, observer at work. Bottom, fire finder with radium-covered cross threads

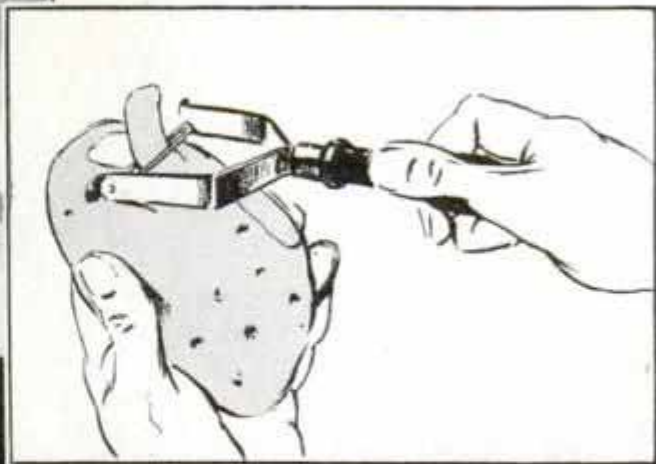
of the fire detector, enabling the lookout to make fire location readings without the aid of lantern or flashlight. Reflections of artificial light against the windows of the lookout stations have handicapped observers making readings at night. Under the radium treatment, the numerals and wires on the detector show up like the face of a luminous dial watch.

## Air Sterilized for Operation by Germ-Killing Rays

Tubes which deliver a barrage of germ-killing rays into a hospital operating room are being used to make surgical operations safer at Duke hospital, Durham, N. C. The tubes, of particular value in cases of chest surgery, have been found to reduce operating-room infections and it is said patients suffer less severe after effects from operations when the germ-killing rays are used. Open plates of germ culture media placed near the center of radiation of the tubes for an hour during a chest operation collected enough germs for only three germ colonies. Plates exposed the same way when the tubes were not used collected enough germs from the air for nearly 100 colonies. The surgeon and his assistants in the operating room are protected from the rays by goggles of plain glass and hoods of starched cloth.

*7-11-36*  
*Science Service 6/20/36*  
*and. Westinghouse Lamp Co. 150 Broadway New York*  
*Dr. Cheryl Hart.*





Left, electric sprayer which dampens clothes for ironing, thus eliminating the usual "finger-shaking" or "bottle-squirting" methods. Above, cabbage shredder and vegetable peeler which follows the contour of the vegetable or fruit because the blade pivots. A litter removes eyes and bad spots

*Making*

# HOME TASKS

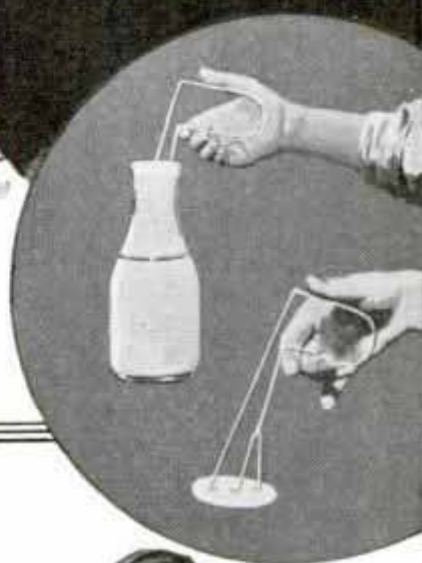


Left, oil-burning heater with adjustable shutters to direct heat where desired. With shutters open, radiating heat is supplied, and with shutters closed, the heat is circulated. It burns fuel oil without requiring machinery, wick or lighting ring to atomize the oil. Above, aluminum mixing bowl with electro-hardened finish. Note the grip under which the hand slides

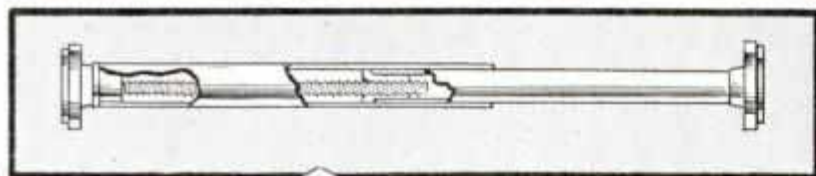




*Left, steam pressure double boiler which saves time in cooking and prevents food from burning. Inner and outer vessels clamp together. Below, wire frame and rubber disk which separate cream from milk right in the bottle*



# *a pleasure*



*Above, adjustable rod which provides extra hanger space in closets. It is installed without nails, hooks, screws or tools by expanding it to proper length, then turning outer tube which causes an internal screw to expand it so the rubber-faced ends are forced against the walls. Right, electric ironer which folds into a neat cabinet when not in use. The cabinet is on casters, so it may be moved easily to any convenient location*





### Street Brush Built of Odd Parts Cleans Pavement for Painting



Revolving brushes on homemade street cleaner sweep line where traffic lane is to be painted

Before painting traffic lines on the streets of Lincoln, Nebr., the police crank up their home-built sweeper and clean the pavement. The sweeper has a little of everything in it—an automobile generator, a pair of wire brushes, two "scooter" wheels, the gasoline engine from a washing machine and some odd parts. The rotating brushes at the bottom of a vertical shaft loosen the dirt, and as the sweeper moves on, the exhaust of the engine blows away the dust. The shaft rises and falls with the irregularities of the pavement. The handle is made of one-inch tubing.

### Micrometer with Comparator Replaces Set of Gauges



Designed to serve the combined purposes of an indicating micrometer and a comparator, a new tool replaces a whole set of solid tolerance gauges and provides a means of making measurements

quickly on inspection work. The indicating dial is calibrated in .0001 inch. In measuring, a spindle is turned down on

the work until the indicating hand rests at zero, thus giving the correct measuring pressure and eliminating all element of "feel" or sensitiveness of touch. Only one reading is necessary. The tool may be used as a comparator or snap gauge for quick checking of pieces in quantities. For inspection for roundness, the work is rotated and any deviation is shown by variations of the indicating hand. Taper is detected by sliding the work lengthwise between the anvils of the tool. Special sizes of the tool up to thirty inches can be obtained, but the regular models are one and two-inch tools. An outstanding feature is that it requires little skill to operate.

### Forest-Fire Fighters Directed by Observer in Plane

Watching the progress of a forest fire from an airplane high above the conflagration, the flying forest ranger charts the attack and marshals fire fighters by radio to strategic spots. This up-to-date method of checking the devastation of our forests by flame is used in the eastern states as well as the heavily forested western



New Jersey officer surveying scene of forest fire from plane and directing the fight by radio

mountain regions. When 100 square miles of the pine forests of southern New Jersey were swept by fire recently, Col. Leonidas Coyle went aloft as observer and directed the ground army of 2,000 fire fighters by radio telephone.

Shively, 1601  
Paul  
George of Chern 6  
New York  
128



T3556  
 Scott Radio  
 Laboratories 4450  
 Rosewood

# Radio



## 40 Tubes and 5 Speakers

**P**ERHAPS you have not considered the interesting possibilities of a receiver using forty tubes and five loudspeakers; however, several of these super de luxe installations are now in use. The set consists of two major units designed by E. H. Scott, a Chicago manufacturer. It weighs 620 pounds and includes an automatic record changer and complete recording equipment.



Three separate audio channels are incorporated in this receiver which is said to bring in program selections from all parts of the world with astounding clarity. The first channel reproduces the low frequencies from 30 to 125 cycles, which are heard through the large 18-in. speaker. A second channel is used for the medium frequencies from 100 to 1,600 cycles, through slightly smaller dynamics; the third covers the high frequencies through two special H.F. speakers, one of which the young lady is holding in her hands.

A separate cabinet, shown in the center photo, is used to house and properly baffle the five speakers. The full-range high-fidelity receiver, power-supply units and phonograph turntable are installed in the specially designed console cabinet which appears at lower left.

A separate cabinet, shown in the center photo, is used to house and properly baffle the five speakers. The full-range high-fidelity receiver, power-supply units and phonograph turntable are installed in the specially designed console cabinet which appears at lower left.









# for your ALL-WAVE RECEIVER.

essary voltage directly from the screen prong of the tube. The red lead goes direct to the usual antenna, or to one side of a doublet antenna system. A green lead is run to ground or to the other side of a doublet; the black wire is fastened directly to the metal chassis base of your receiver. A remaining yellow lead is then connected to the regular antenna post on the set and you are all ready to go after new foreign stations for your log.

All parts are assembled on the simple sheet-metal base detailed in Fig. 1 and arranged as shown in Figs. 3-A, 3-B and 3-C. A schematic diagram is given in Fig. 2 and the simplified wiring diagram appears in Fig. 3. It will be noted that this last diagram shows all parts and connections as viewed from the underside of the base.

Coils  $T_1$  and  $T_2$  are available already assembled in shield cans with trimmer condensers  $C_1$ ,  $C_2$ ,  $C_3$  and  $C_4$ . In fact all wiring shown within the dotted lines in Fig. 2 is completed by the manufacturer. This insures correct short lead lengths, a feature of utmost importance in short-wave work. These coils have been carefully designed for this particular pre-amplifier and do away with plug-in coils and complicated wiring.

The ganged tuning condenser is

(Continued to page 140A)

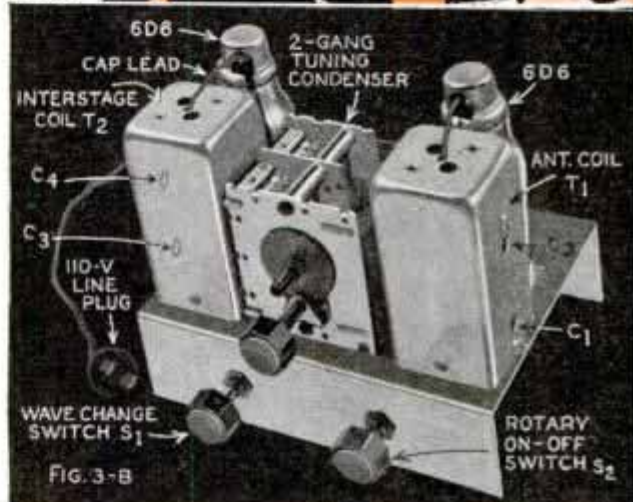
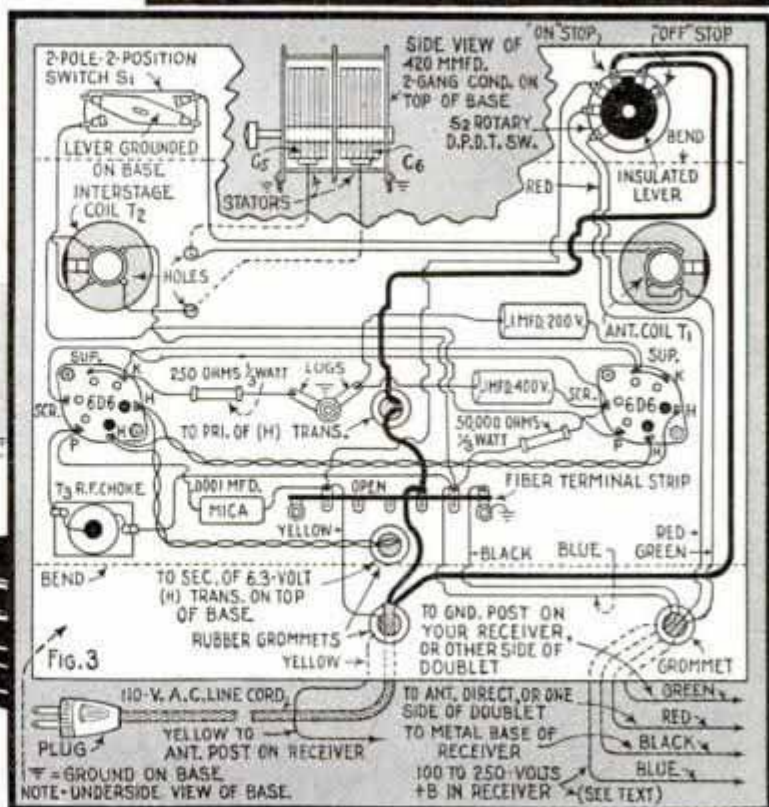


FIG. 3-B



ITALY  
2RO



# One-Tube Set Works on Six Flashlight Cells



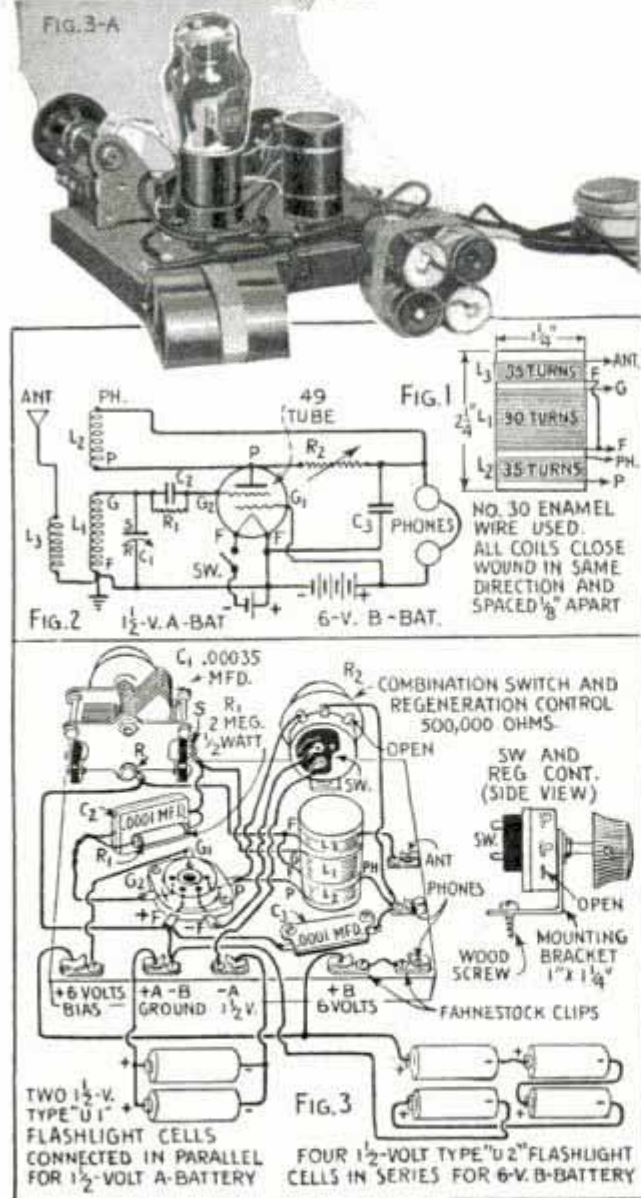
SIX flashlight batteries of the variety available in the five-and-ten-cent stores, will operate this little one-tube receiver. The outstanding features include unusually low cost, crystal-set simplicity, space-charge detector and good DX tube set performance. Beginners, graduating from the crystal stage of radio experimenting, will find this an easy set to build and the space-charge detector is of special interest.

The method of using a space-charge detector, although not new, has seen little use. Now, thanks to the experimental work of a Canadian amateur, VE4EA, who demonstrated the practicability of

using a type-49 tube as a space-charge detector in a portable 2-tube short-wave receiver, the hook-up is gaining favor rapidly. As far as can be determined, this is the first time that the principle has been applied in the construction of a simple one-tube broadcast receiver.

In the set to be described, the type-49 tube is employed in a regenerative circuit with resistor control of regeneration. A positive bias is applied to the inner grid of the tube, thus permitting the tube to operate efficiently with only six volts of plate voltage. The filament supply is 1½ volts; this may be obtained from two type-U1 flashlight cells connected in parallel as shown, or a single No. 6 dry cell may be used. Four type-U2 flashlight cells connected in series, furnish the bias and plate voltage.

Coil-winding details are shown in Fig. 1; it is important that all three windings be made in the same clockwise direction and the connections should be made as shown. The original coil form used was the cardboard cover removed from an old type-U1 flashlight battery. The start and finish ends of each coil winding are anchored by passing the wire through two small holes punched in the cardboard tubing with a pin. Be sure to leave the wires long enough to reach the various points where they are to be soldered as indicated in diagram Fig. 3; the coil form is glued to the base-

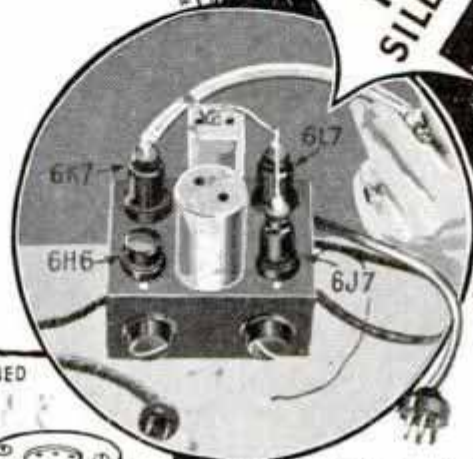


(Continued to page 142A)

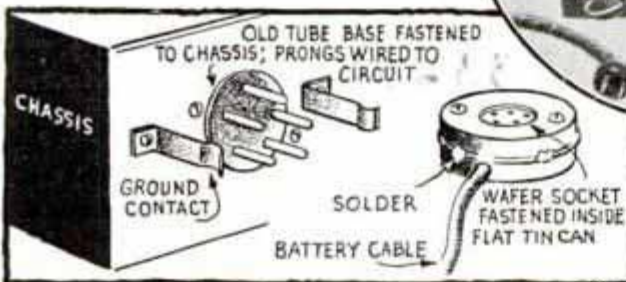


# Hints for Radio Experimenters

It is no longer necessary to worry with man-made static if you have an all-wave, or short-wave, superheterodyne receiver. The noise silencer, shown in the insert photo, employs the new Lamb circuit in an easily assembled unit available in kit form for from six to eight dollars. Used with your receiver, it will enable you to eliminate troublesome motor noises and similar forms of interference



NOISE SILENCER



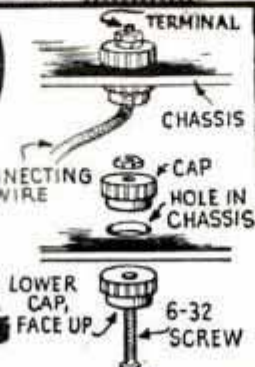
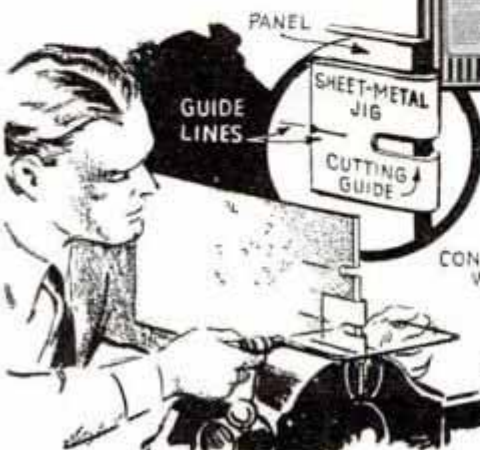
Below, simple locking arrangement for filament switch, made from two pieces of brass strip. The small lock prevents casual tampering which often results in rundown batteries in portable receivers and transceivers



Above, plug-in connection for power-supply unit, made from an old tube base, wafer-type socket, small flat can and a few odds and ends. With a shielded cable this plug-in arrangement is suitable for receivers and public-address amplifiers. Below, handy jig helps to locate screw slots accurately in panels for rack mounting



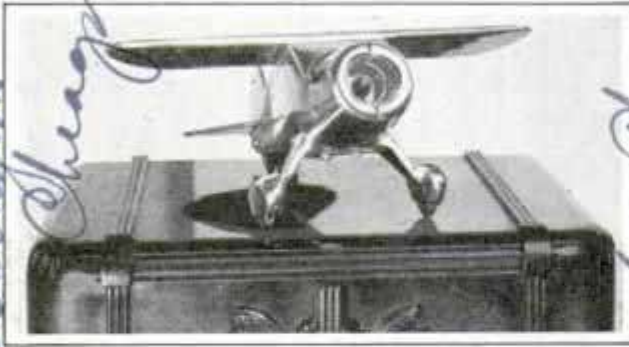
Left, heavy-duty A and B-batteries for operating 2-volt receivers in locations where battery-charging apparatus is not available. Below, rotating mounting for microphone transformer, easily adjusted to best point for eliminating hum



Left, neat and efficient insulating bushing made with Bakelite screw tops taken from tooth-paste tubes or small bottles. Sketch shows method of drilling and assembling on machine screw to bring high-voltage lead through hole in metal chassis



### Cathode-Ray Tuning Unit in Model-Airplane Ornament



This handy tuning aid can be mounted on top of your radio cabinet or placed on a convenient table near the set. Connections to the receiver are made by slipping cable loops on the prongs of two tubes and there is one additional connection from the cable which goes to the receiver ground. It is available for use with any set that has automatic volume control and operating with 2½ or 6-volt tubes. The cathode-ray tuning tube, housed in the unit, makes visible the process of tuning the receiver to resonance with the desired broadcasting station. This visible effect is observed on a fluorescent target in the dome of the tube which is mounted in a horizontal position facing the operator.

I 3563

### Clock Indicates World Time



Correct time in all parts of the world, is claimed by the inventor of this longitudes time clock which is designed for DX short-wave listeners. Available in both electric and spring-operated models, the hands show local time while the corresponding

time for over 2,000 cities, in various parts of the world, is indicated opposite the arrows radiating from the center of the dial.

I 3562

### Labyrinth Extends Speaker Range

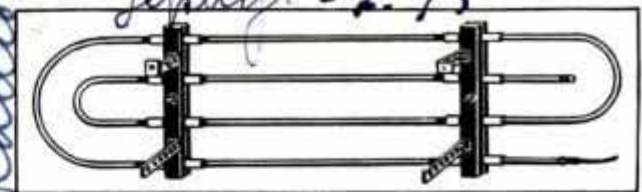
Unnatural boom is removed from radio voices and music in a well-known make of console receiver by means of a long winding passage-way lined with a special acoustical material. These panels, indicated with the letter A, absorb unwanted sound waves from behind the speaker. Letters B show the path of air column which is tuned to increase bass response; C indicates the exit point for the lowest bass notes.



I 3565

### Antenna for Turret-Top Cars

Easily installed under the running board of any make of car, this compact and well insulated auto antenna provides a means for good signal pick-up in cars having all-



metal bodies, or turret-type tops. The perforated brackets enable the owner to adjust the antenna below the running board for proper clearance to meet the requirements of his particular installation.

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; material lists are available without charge on receipt of postage.

**NEXT MONTH—How to Build a Portable All-Purpose Hearing Aid.** This compact and easily built amplifier will reproduce voice and music with surprising volume and clarity even when the small microphone is used some distance from the source of sound. Also—How to Read Radio Symbols in Common Use

Empire Radio Corp. 1217 W. Washington St. Wash. D.C. \$12.00 & \$16.00 \$9.00 \$10.00

Stromberg-Carlson 564 Yucca St. San Francisco

Stanley Coppen Optical Co. 845 Washington, Boston



*Brass tubes - The Kuempel & Sutterberg, Iowa*



# DOORBELL CHIMES

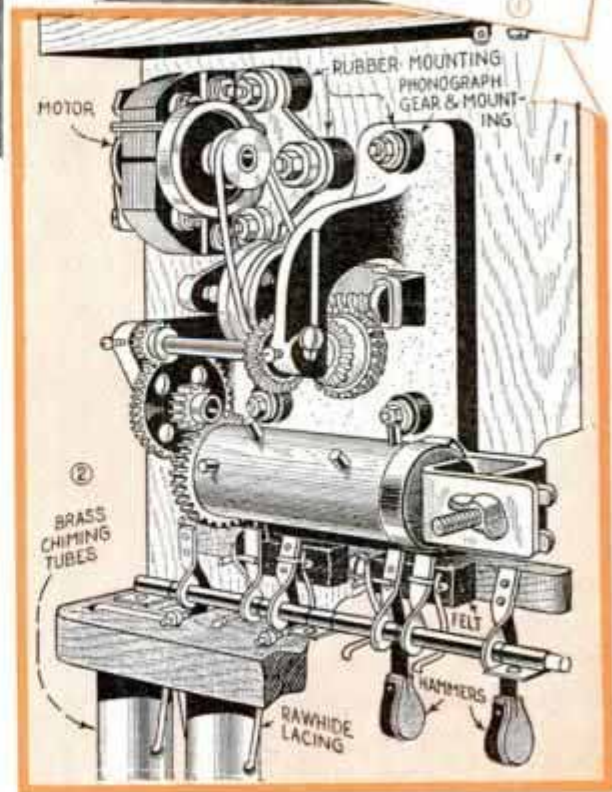
By A. L. Mills

WHEN callers press your doorbell, their presence is announced by soft, melodious chimes. The original model from which these drawings were made has four chiming tubes, each of which is struck twice in the sequence shown in Fig. 1. The hammers are raised to a striking position by means of pins on a hardwood drum which is rotated slowly, one revolution in about 15 seconds, motive power being furnished by a small 110-volt electric motor connected to a gearing mechanism to reduce the speed as desired. In this case, part of an old phonograph was used for the purpose. Fig. 2 shows the assembly as it looks when ready for action.

Now, you will be able to discover just how the device works automatically when the doorbell button is pressed. The pushbutton and doorbell transformer are connected to a solenoid, the plunger of which moves up quickly when the coil is energized, striking a trip lever. This allows a pivoted mercury switch to drop to the position indicated by the dotted lines in Fig. 3. As the doorbell circuit is closed only momentarily by pressing the pushbutton, this relay action is needed to start the motor and keep it running until the chime cycle has been completed. When in the position indicated by the dotted lines, the mercury flows to the lower end of the tube and forms an electrical path for 110-volt current between two contacts, keeping the motor going until the end of



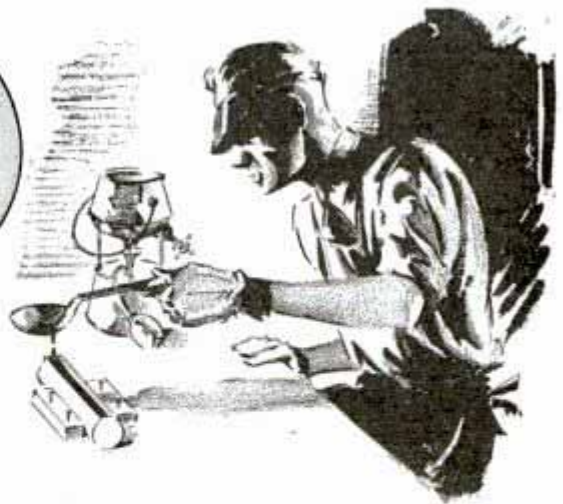
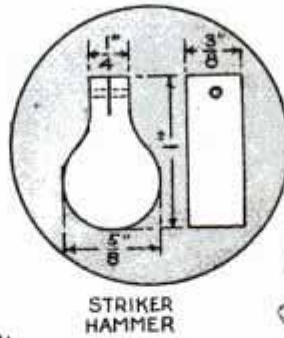
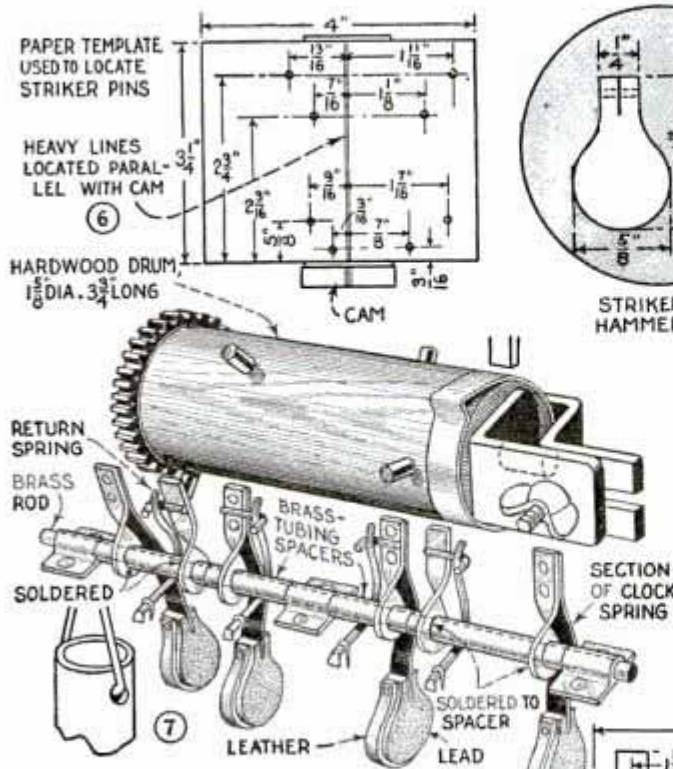
*and blueprints.*





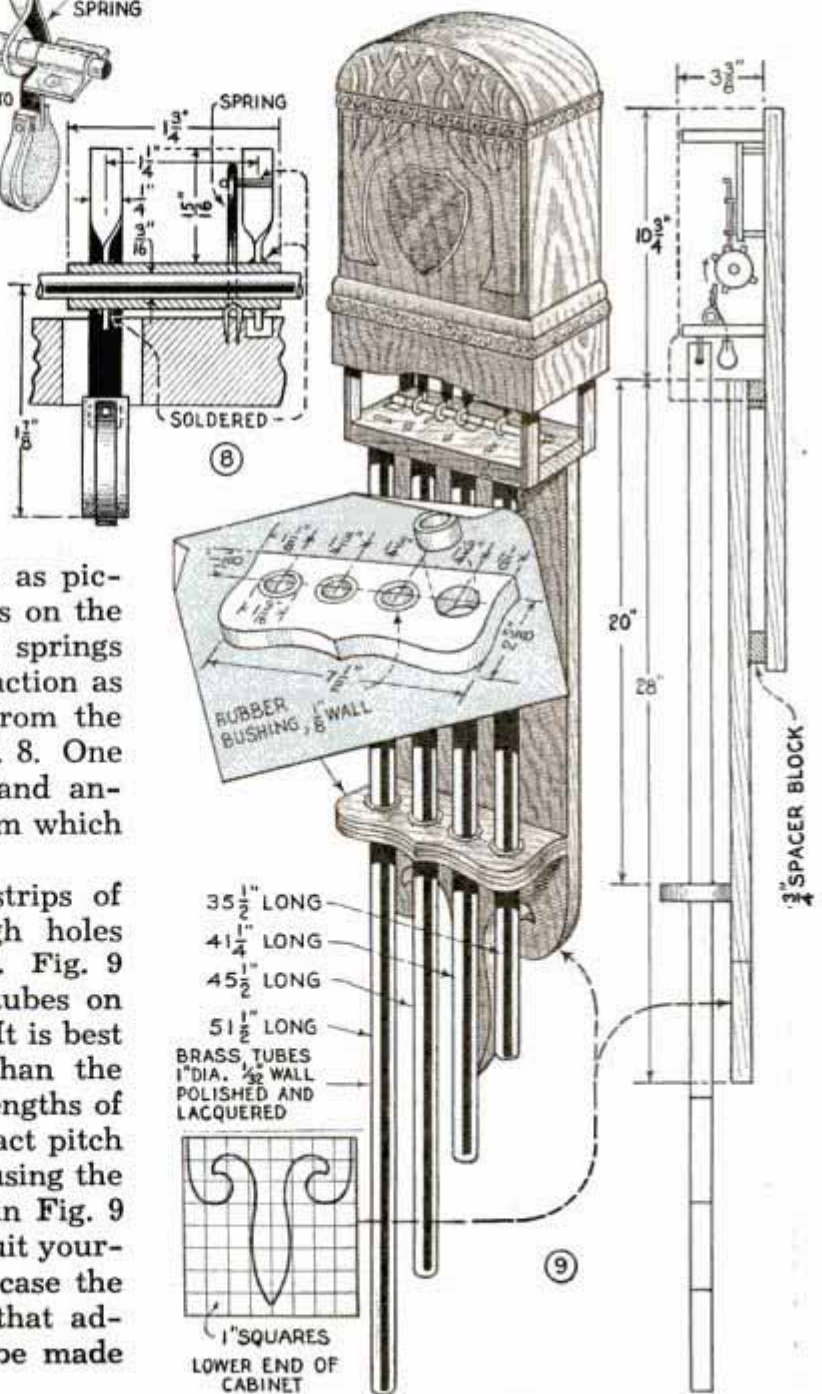






cations punched. Hammers are cast from lead to the shape shown in the circular detail of Fig. 6. They are covered with strips of leather and suspended from the No. 16-ga. brass strikers with lengths of clock spring riveted on. The strikers are soldered to short lengths of brass tubing, which are slipped on a rod supported by three bearings as pictured in Figs. 2 and 7. Wire arms on the strikers pull against small wire springs which give the hammers a snap action as soon as the striker is released from the pin on the striker drum. See Fig. 8. One end of each spring is flattened and anchored in the wood crosspiece from which the chiming tubes are hung.

The tubes are suspended on strips of rawhide lacing passing through holes exactly 1 in. from the top ends. Fig. 9 gives the finished length of the tubes on the original chimes after tuning. It is best to cut the tubes 1 in. longer than the lengths given after which short lengths of each tube are cut off until the exact pitch is obtained. As to the cabinet housing the striking mechanism, that shown in Fig. 9 is merely a suggestion. You can suit yourself as to the design, but in any case the cabinet should slide upward so that adjustment of the mechanism can be made easily.





## Tray on Beach-Umbrella Handle Holds Small Articles



*Tray for small articles is quickly removed when umbrella is folded for carrying*

Those who have beach umbrellas can keep keys, matches and other small items from being lost in the sand by providing a small tray that hooks on the umbrella stand. The tray is a wood disk, preferably plywood, drilled to slip over the standard and then sawed in two. Hooks to fit under screw heads hold the two halves of the tray together and also hold it on the standard. A narrow width of wire mesh can be tacked to the edges of each half of the tray to serve as a small railing.

## Food in Refrigerator Baskets Is Readily Accessible



The problem of placing vegetables, fruits, etc., in a refrigerator so that one item can be removed without disturbing the others is solved by keeping the smaller items in wire baskets. File baskets, available from office-supply

stores, are just about the right size for this purpose. They are easy to handle and allow free circulation of air around the food.

## Glue Brush Hooks over Bottle to Keep Handle Clean

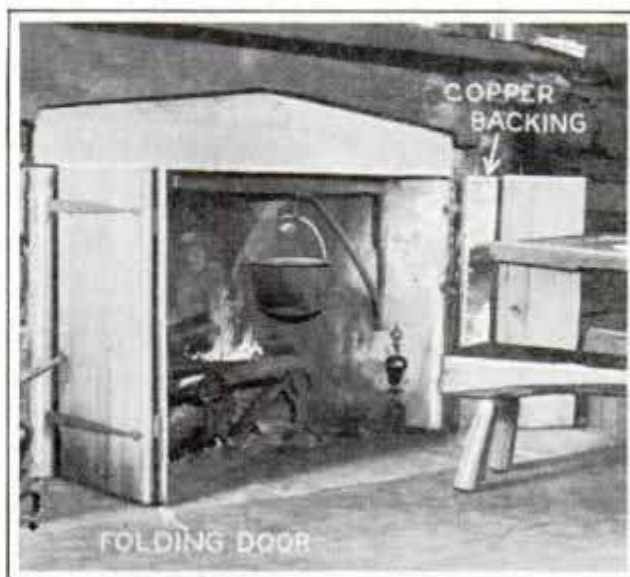
Do you get your fingers sticky every time you use a little glue because there is no place to put the brush, and you just slip it into the bottle? If so, a small wire clip soldered to the brush handle about the center,



so that it can be hooked over the mouth of the bottle, will avoid this trouble.

## Effective Fireplace Damper

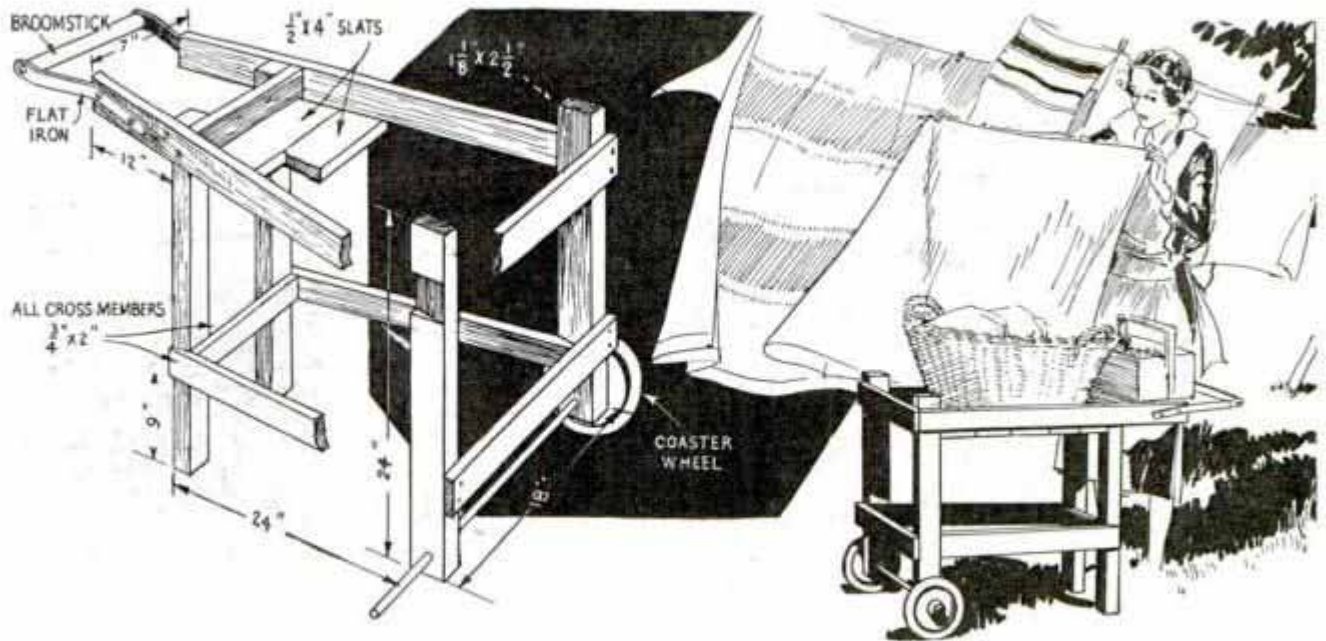
Here is something unusual in the way of a fireplace damper that is used in the cabin of a New York architect. Folding oak doors, with a copper backing, are used to close off the fireplace at night after the fire has burned nearly out. This eliminates any smoke that might come into the room from the dying embers if a throat damper were used. Also, it prevents the inflow of cold air down the chimney into the room. During mild weather, the doors can be lifted off the hinges and stored.



*Folding oak doors with sheet-copper backs close off fireplace at night*



# Laundry Cart Wheels Wash to Clothesline



Assembled from odd pieces of lumber and two coaster-wagon wheels, this cart saves the work of carrying heavy wash baskets from the laundry room to the clothesline. It accommodates one basket and a box of clothespins, and is high

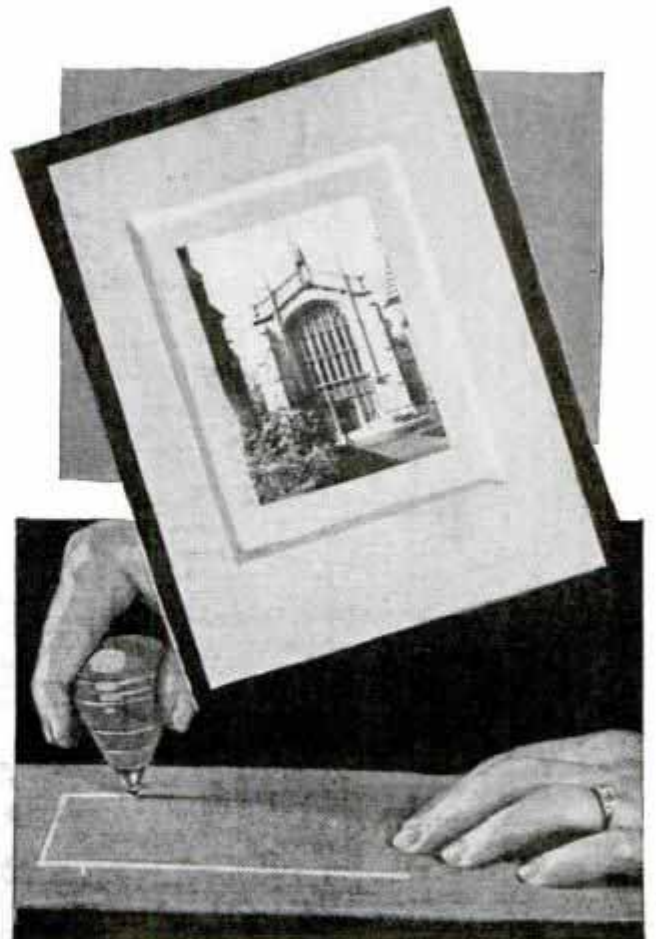
enough to eliminate stooping for each garment as the wash is hung on the line. If more space is desired for hauling larger loads, the lower cross members may be bridged over to hold small baskets or buckets of washed clothes.

## Mounts for Photographs Are Plate-Sunk with Boy's Top

Anyone can plate-sink photo mounts with a boy's top and a piece of thick cardboard. After determining the size of plate mark, cut the cardboard to this size and place the mount to be embossed face down on it. The top is used in the same manner as an embossing tool, the mount being pressed down all the way around the margin of the cardboard underneath. The effect is that the surface on which the print is mounted is depressed below the edges.

### Coating for Battery Terminals

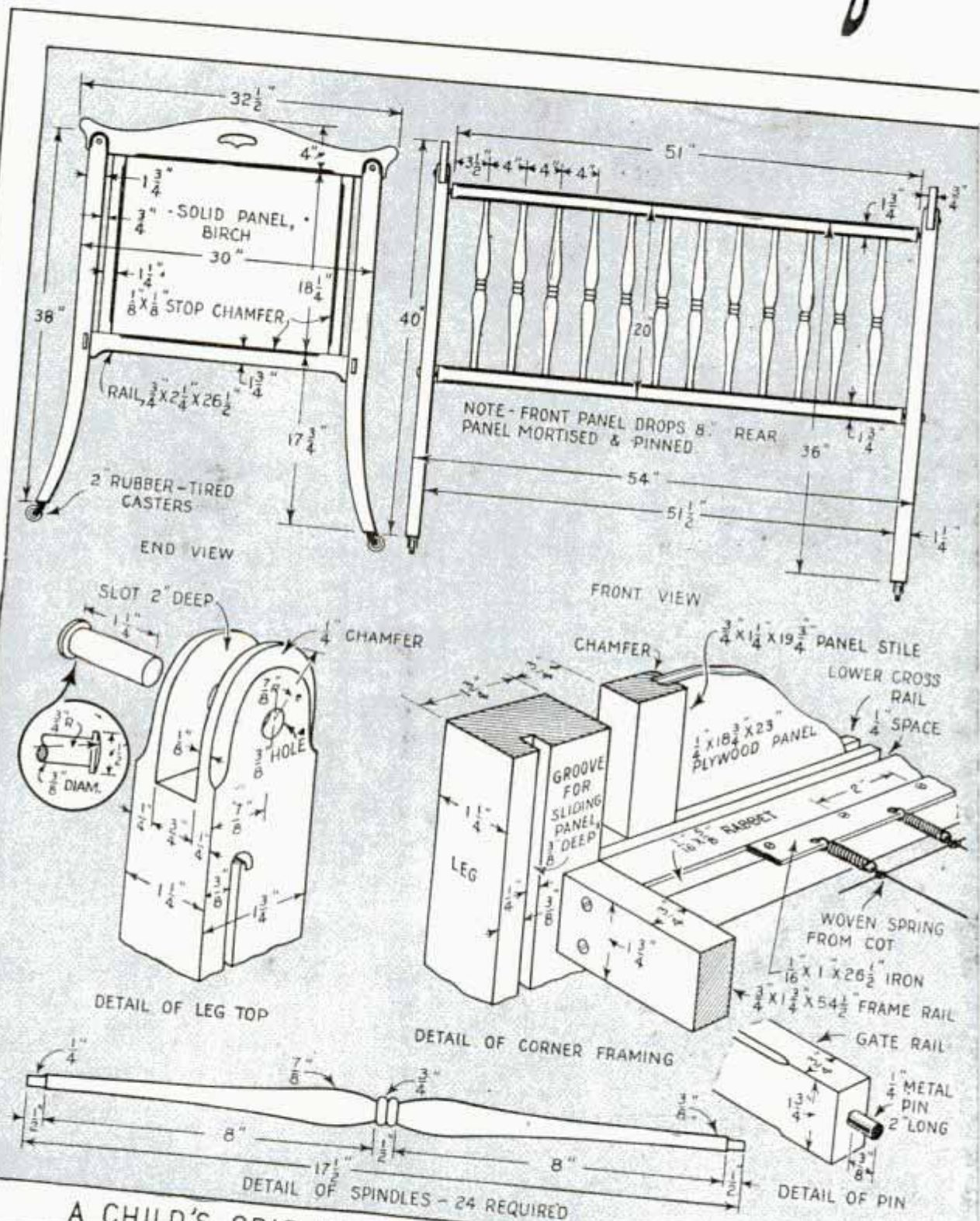
A mixture of diglycol stearate, 12 oz., and water, 15 pts., applied to the cleaned terminals of a storage battery makes a wax coating that is highly effective in preventing corrosion at these points. Heat the ingredients together until the diglycol stearate has completely melted. While molten, mix at high speed, off the fire, until the preparation has cooled to approximately room temperature. This product may be packed in tubes or cans, and it is cheap to make.



*Lglyco Product Co., Inc.*  
 9140 Pa. ...



# CHILD'S CRIB *of*



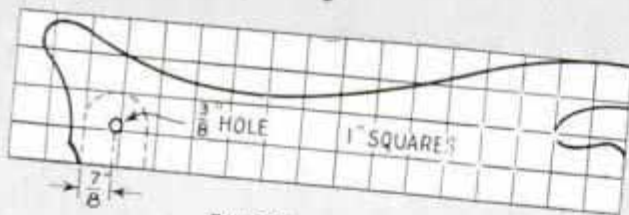
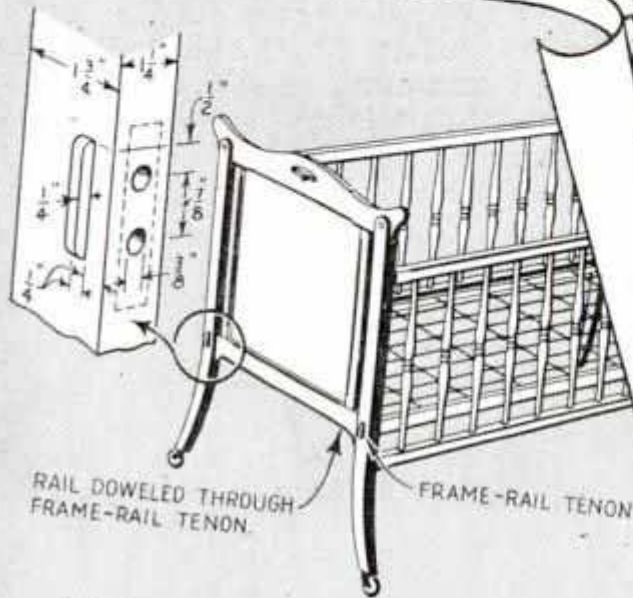
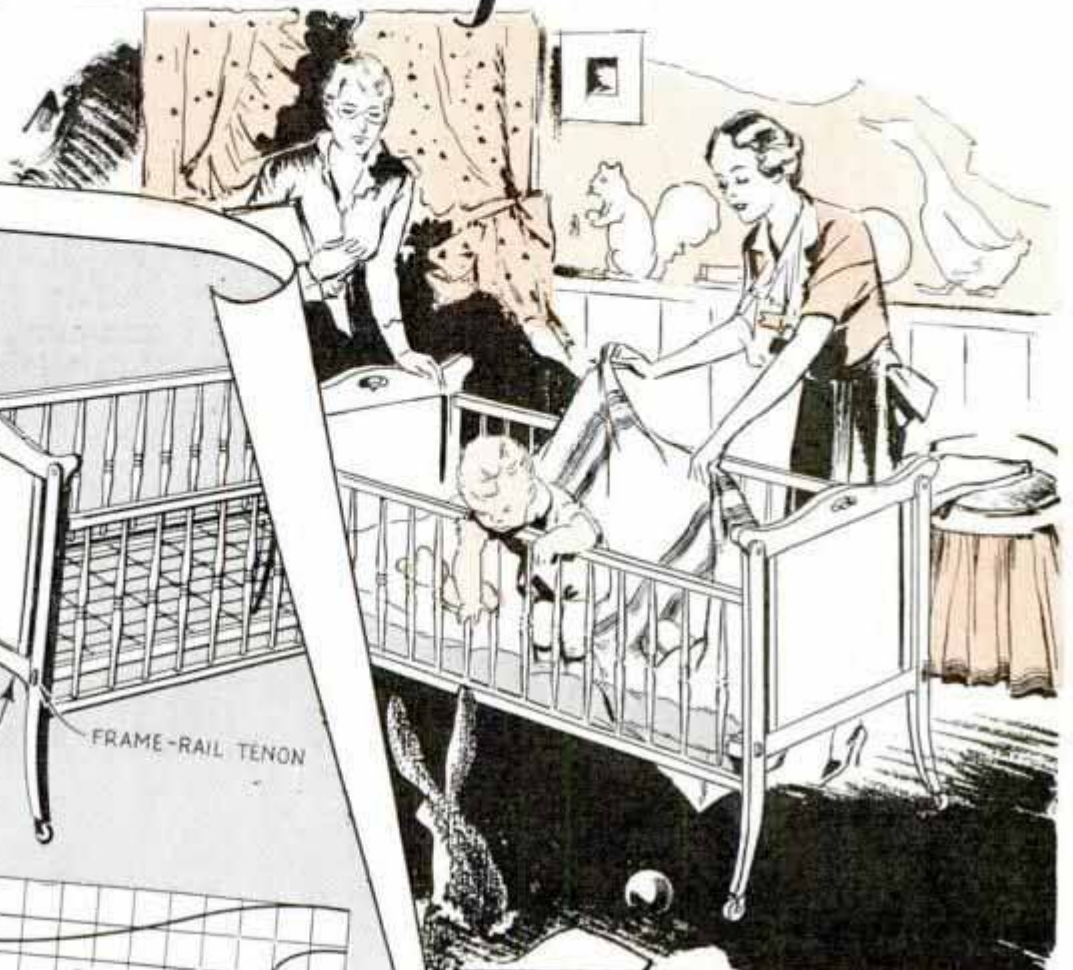
SC  
DES  
DRA

Roomy enough to take care of the youngster's requirements until four years old, this sturdy, well constructed crib takes mattress and blankets of standard size, has solid end panels and a side panel that can be raised and lowered conveniently on a pair of simple slides

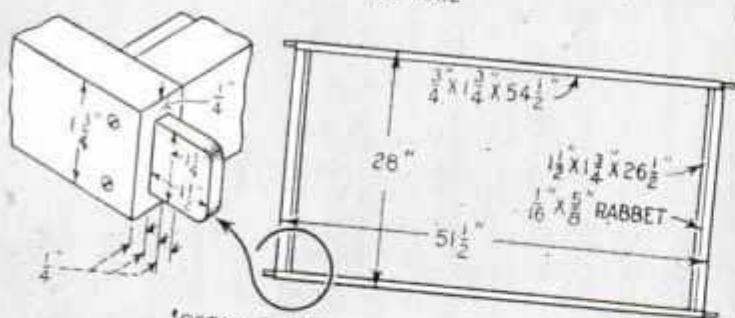
**POPULAR MECHANICS**  
MAGAZINE



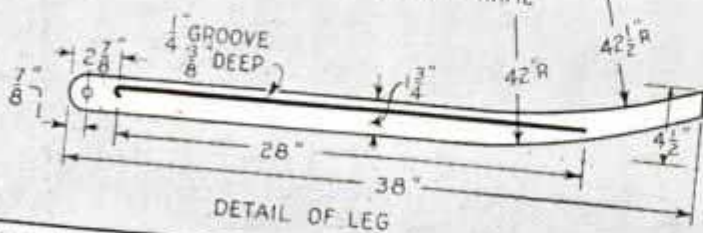
# MAPLE *has graceful lines*



PATTERN OF TOP RAIL



\*DETAIL & PLAN OF SPRING FRAME



DETAIL OF LEG



SHEET NO. 1

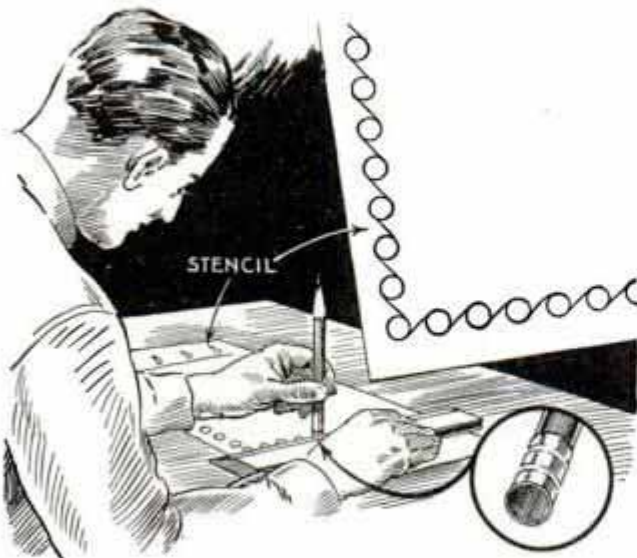
POPULAR MECHANICS

ISSUE

200 E. ONTARIO



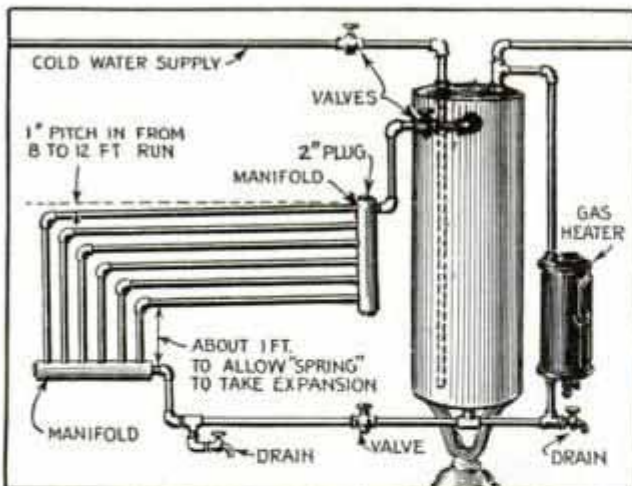
## Mimeograph-Stencil Borders Cut with Lead Pencil



A series of circles cut to overlap or spaced and connected with straight lines makes neat borders.

Simple, novel borders may be reproduced on mimeographed work by cutting them on the stencil with the ferrule end of a lead pencil from which the eraser has been removed. A ruler held along the edge of the stencil serves as a line and spacing gauge for the work. By overlapping the circles, or spacing them apart and connecting them with straight lines, a series of novel patterns may be composed.

## Installing Solar Water Heater



Manifolds at ends of coil offer less resistance than return bends to water circulation in solar heater.

In localities where solar heaters are often used as a cheap means of heating water in the home, many of them have been unsatisfactory because they were improperly installed. The installation

shown is recommended by a plumber with 30 years experience. He suggests the "mitter" or manifold type of coil instead of the continuous-pipe type as it offers less resistance to the circulation of water. The coil should be made of  $\frac{3}{4}$ , 1 or  $1\frac{1}{2}$ -in. pipe, all other pipes being  $\frac{3}{4}$  or 1 in. in diameter. Although the outlet pipe from the heater is shown leading to the side of the supply tank, it is better to lead it directly into the outlet line from the tank, using a tee above or below the one shown attaching the gas heater to the line in the drawing. Be sure to install valves in the inlet and outlet lines to the heater so that it can be shut off and drained when not in use.—C. F. Herrick, Massillon, O.

## Cellulose Tape Protects Labels



Transparent cellulose tape is especially useful for protecting labels on bottles as it is non-absorbent and does not stain readily. The tape should overlap the label on all sides. Narrow labels can be

sealed with a single strip of tape, while larger ones can be covered completely if the strips are overlapped.

—E. L. Brokaw, New York City.

## Pot-Lid Repair Knobs Attached to Last a Long Time

As most pot-lid repair knobs soon loosen because the nut turns or the tin washers rust, it is best to substitute copper washers and use a lock washer under the nut. In this way, the assembly can be



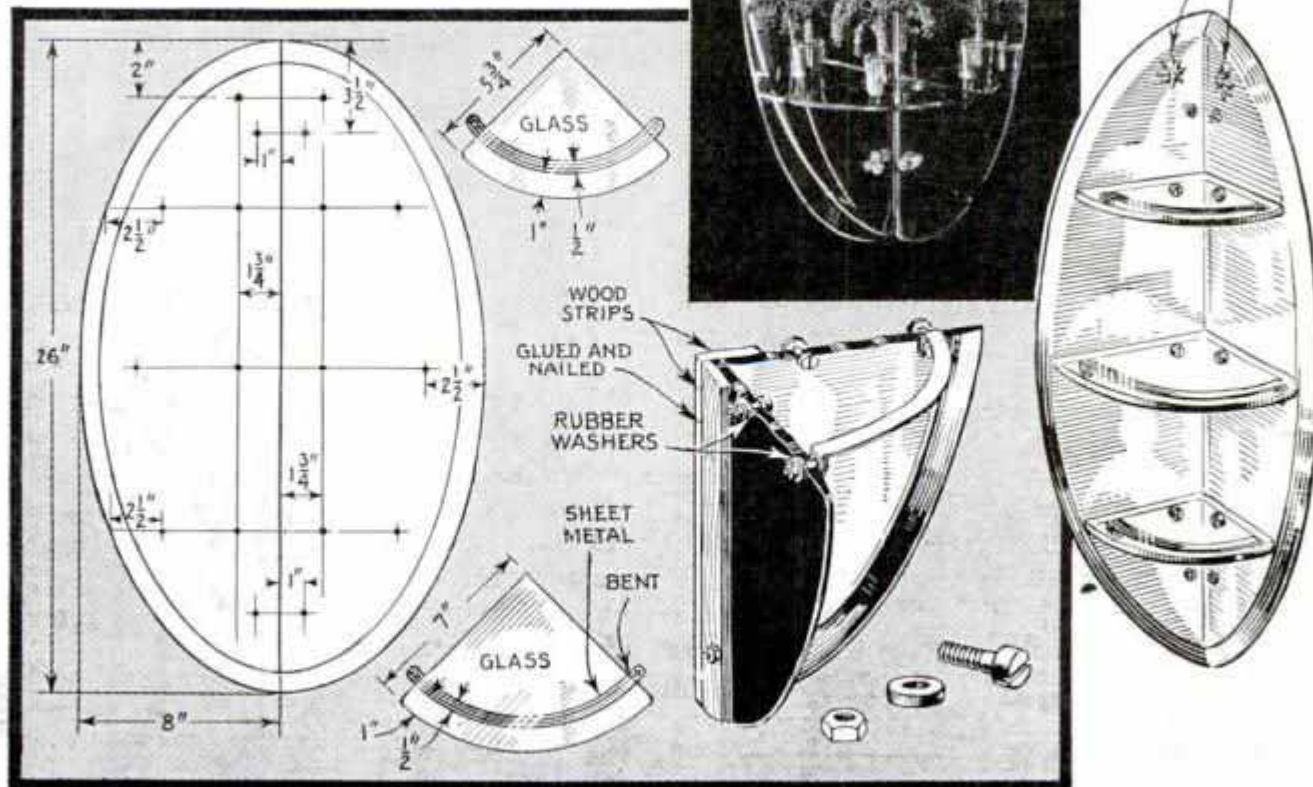
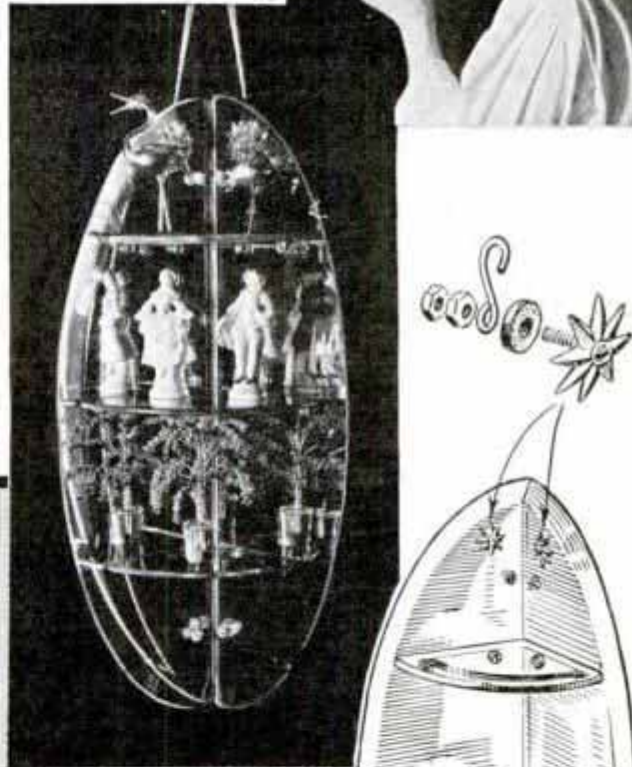
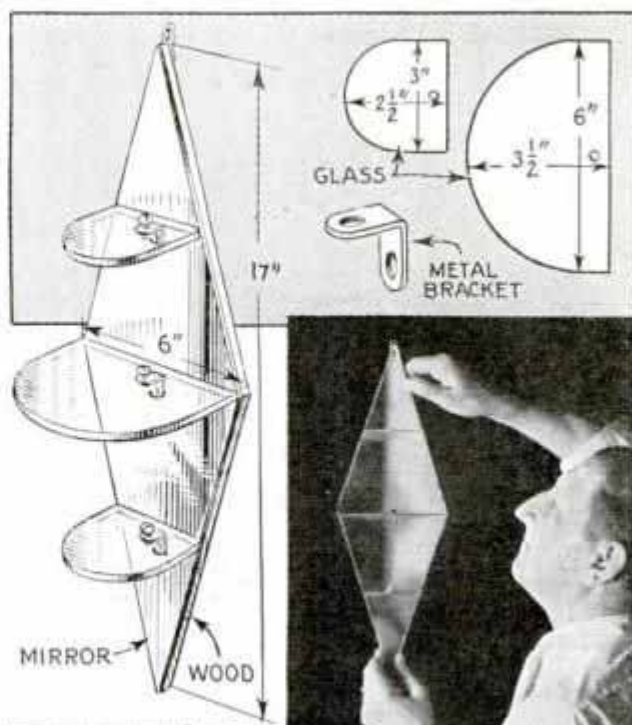
drawn up more snugly than is possible with the cupped tin washers, which bend out of shape easily under pressure.



## Neat Bric-a-Brac Shelves from Old Mirrors

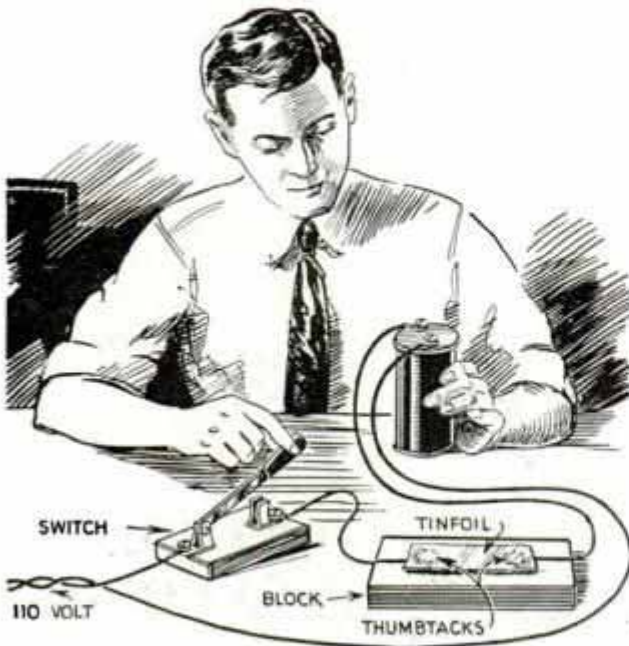
Denni  
DuPon  
Hy-Sil

If you have some old mirrors available, why not convert them into bric-a-brac shelves? The work consists mainly of cutting and drilling glass, but this is not difficult if you go at it carefully. A mixture of turpentine and camphor provides a good cutting fluid when drilling the glass. For the drill, you can use a triangular file, with the end ground to an angle of 45°. When shaping the front edges of the shelves don't attempt to break the glass on a curved score, but run several scores at a tangent to the curved one to the edge of the glass. Then you can break off the glass in small segments and true up the curved edge with an emery stone, finishing with pumice stone and water. The rear ends of the shelves are supported on the heads of machine screws, while the front edges rest on strips of tin angle bent to the proper curvature and attached to the mirror with screws. To suspend the shelves, use two glass rosettes at the top as shown. The flat wall shelves are made from mirrors backed with thin plywood, each shelf being supported by a single bracket attached to the shelf and back with machine screws as shown in the upper detail.—J. Kuptz, Chicago.





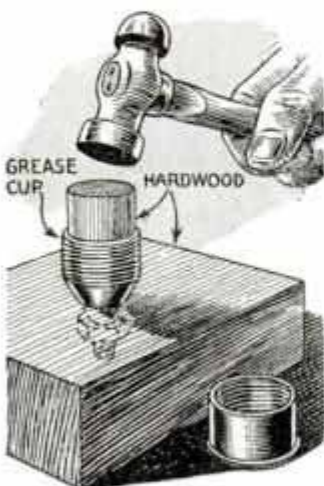
## Auxiliary Fuses Made of Tinfoil for Experimenter's Bench



A strip of tinfoil inserted in one side of the line protects house fuses

For the experimenter's bench where electrical gadgets of questionable current capacity are tested, a saving in blown fuses can be had by using a fuse improvised from a piece of tinfoil in one side of the line as shown. You can cut the tinfoil into different widths to carry various currents. A soft-wood block makes a good fuse holder. Thumbtacks pushed through the tinfoil fuse and through eyes on the ends of the line wires form the connection.—A. Glynn, San Francisco, Calif.

## Worn-Out Grease Cup Enlarged to Make Threads Hold



When threads on a grease cup have become worn so that the cap will not hold, a repair can often be made by enlarging the bowl of the cup with a tapered wood plug as shown. The plug is turned or whittled down to a diameter just a little larger than the inside diameter of the cup, after which it is tapered slightly

so that it can be driven into the bowl. Setting the cup in a small hole drilled in a hardwood block will prevent damaging the threads on the lower end.

so that it can be driven into the bowl. Setting the cup in a small hole drilled in a hardwood block will prevent damaging the threads on the lower end.

## Powdered Abrasives Applied with Salt Shaker

Ordinary ten-cent salt shakers come in handy around the shop for sifting various abrasives on work when rubbing down the surface. They are especially useful in sifting pumice stone on wood turnings in a lathe when filling and French polishing with the shellac-and-oil process.

—L. C. Ferguson, Manteca, Calif.



## Sprinkling Head for a Few Cents



Here is an inexpensive method of making a number of lawn-sprinkling heads. Just screw a pipe cap onto a nipple of a size that will slip into the end of the hose. Then make a hack-saw cut in the end of the cap at an angle as shown. The finished head will spread a fine spray of water over a wide area.

—L. H. Georger, Buffalo, N. Y.

## Thimble Is Always at Hand on Cork Holder

When a thimble is tossed into the machine drawer, among spools, buttons, etc., it may be difficult to locate when wanted. If a small cork is glued to the inside of the drawer, the thimble can be slipped over it.





## Removing Paint from Brush

To remove excess paint from a brush easily, before cleaning it, take a length of heavy steel wire and bend it double, giving it an extra turn at the looped end to form a sort of a spring to keep the free ends of the wire open. In use, slip the brush between the wires, squeeze them tightly and pull out the brush. Repeat this operation a few times, which will squeeze out most of the paint so that the brush can be cleaned without undue waste.—Opie Read, Jr., Chicago.



## Stencil-Templates Save Time and Assure Accuracy



*Hinged stencils used instead of templates to lay out mortises, grooves, dovetails and similar work*

## Liquid Transferred from One Jug to Another Without Waste

When pouring liquid from one jug into another, the level in the funnel can be maintained constant to avoid spilling by simply immersing the neck of the inverted jug into the liquid. The principle is the same as that in common poultry water fountains, which operate on the vacuum system.



## Celery Is Cleaned Quickly with Hack-Saw Blade



The tedious job of cleaning celery is greatly simplified by using a piece of hack-saw blade, the teeth of which reach into the tiny grooves in the celery stalk.

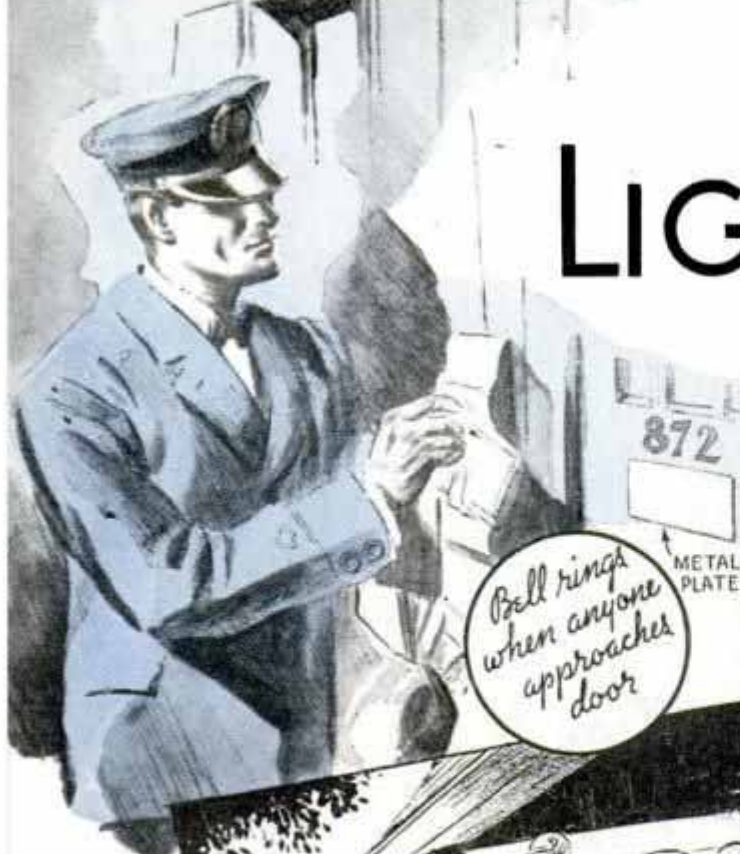
A short piece of broomstick makes a good handle for the knife, or you can wrap several turns of tape around one end.

As the usual paper or metal templates used for laying out mortises, grooves, shoulders, joints, etc., vary in accuracy according to the sharpness or bluntness of the pencil used to trace them, it is better to stencil the layout on the work. Such stencil-templates may be made of metal, but heavy paper or cardboard is usually substantial enough. Details A and B show a hinged stencil for marking mortises and rungs on two sides of a table or cabinet leg. Two sheets of cardboard are hinged together with a strip of gummed tape, folded with the tape inside and the cutting marks laid out on one of the flaps. Detail E shows a similar hinged stencil for cutting a door to apply a lock, while a different type of stencil for marking a slanting mortise is shown in C and D. The dotted line in C indicates the edge of the work. Small triangular guide tabs are glued on the underside of the stencil and should be fitted along the edge of the piece to be cut as shown at F. Detail G shows a similar stencil for marking a toothed joint. If the stencils are made of cardboard, they should be given a thin coat of shellac before using them.

☞ To fill cracks and holes in pottery, use concentrated phosphoric acid, 1 oz., and aluminum phosphate, ½ oz., mixed to the consistency of putty with zinc oxide.



# LIGHTS *and* BELLS



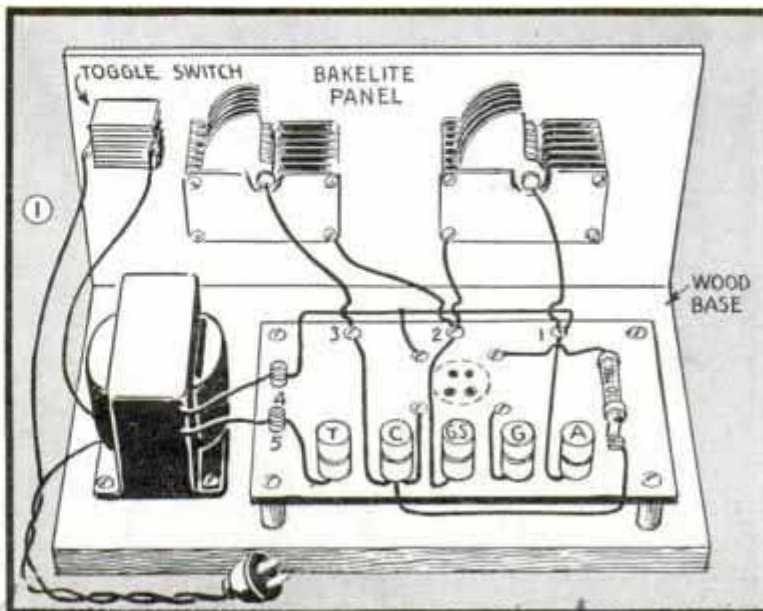
By C. A. Crowley



Announcing arrival of car at filling station

or operate any other type of electrical alarm. The same principle can be used to light up a door or window sign, the message being illuminated at someone's approach. And, if you wish to operate some electrical device, by remote telephone control, a microphone is placed next to the ringer box and is connected to the grid-glow unit, which in turn controls the current that runs the device. Lights may be made to go on just while the bell is ringing, or any electrical device may be started and kept in operation if a stick relay is used. Of course, it must be remembered that with such a hook-up, any ring will start the mechanism, taking the

MANY interesting and practical applications are possible with the use of a grid-glow relay. The postman or a caller who approaches a door which is equipped with a metal plate connected to the relay unit, will be announced by the automatic ringing of a bell. A similar plate or a number of tinsel strips may be placed over the driveway of a filling station to notify an attendant when a customer arrives. For window displays, a plate may be placed on the inside of the glass so that persons on the outside may start and stop an animated display by merely holding a hand against the window, over the control plate. When such a plate is located on a window sill, the passage of an arm or hand over it may be made to turn on the lights, ring a bell,



*Grid-glow kits \$9.50 available other types available*

*Westinghouse Electric Supply Co*



# OBEY YOUR VOICE

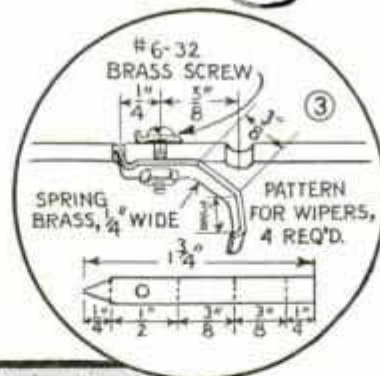
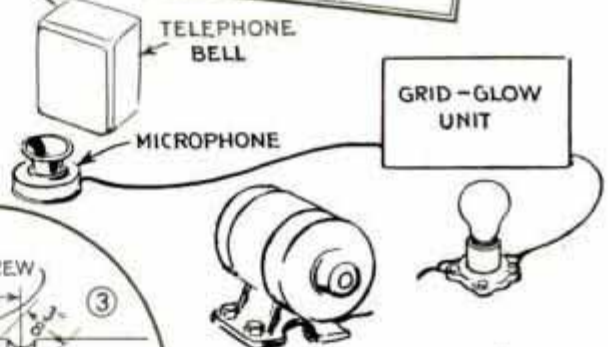
*or Warn of Intruder's Approach*



*Merely reaching inside puts on lights!*

matter out of your full control unless a strictly private telephone line is employed.

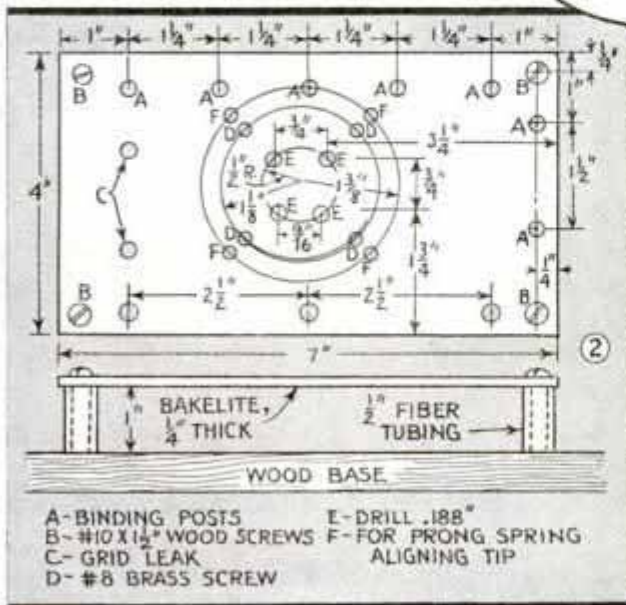
The apparatus described is for use on alternating current only, either 25 or 60 cycle, and will not work on direct current. Although grid-glow tubes are made in a large variety of forms, the one selected is of the type known as KU-618 and will operate on almost any transformer from an old radio B-eliminator or electric radio. The unit is assembled on a board as shown in Figs. 1 to 4, so that it can be used for a large variety of ex-



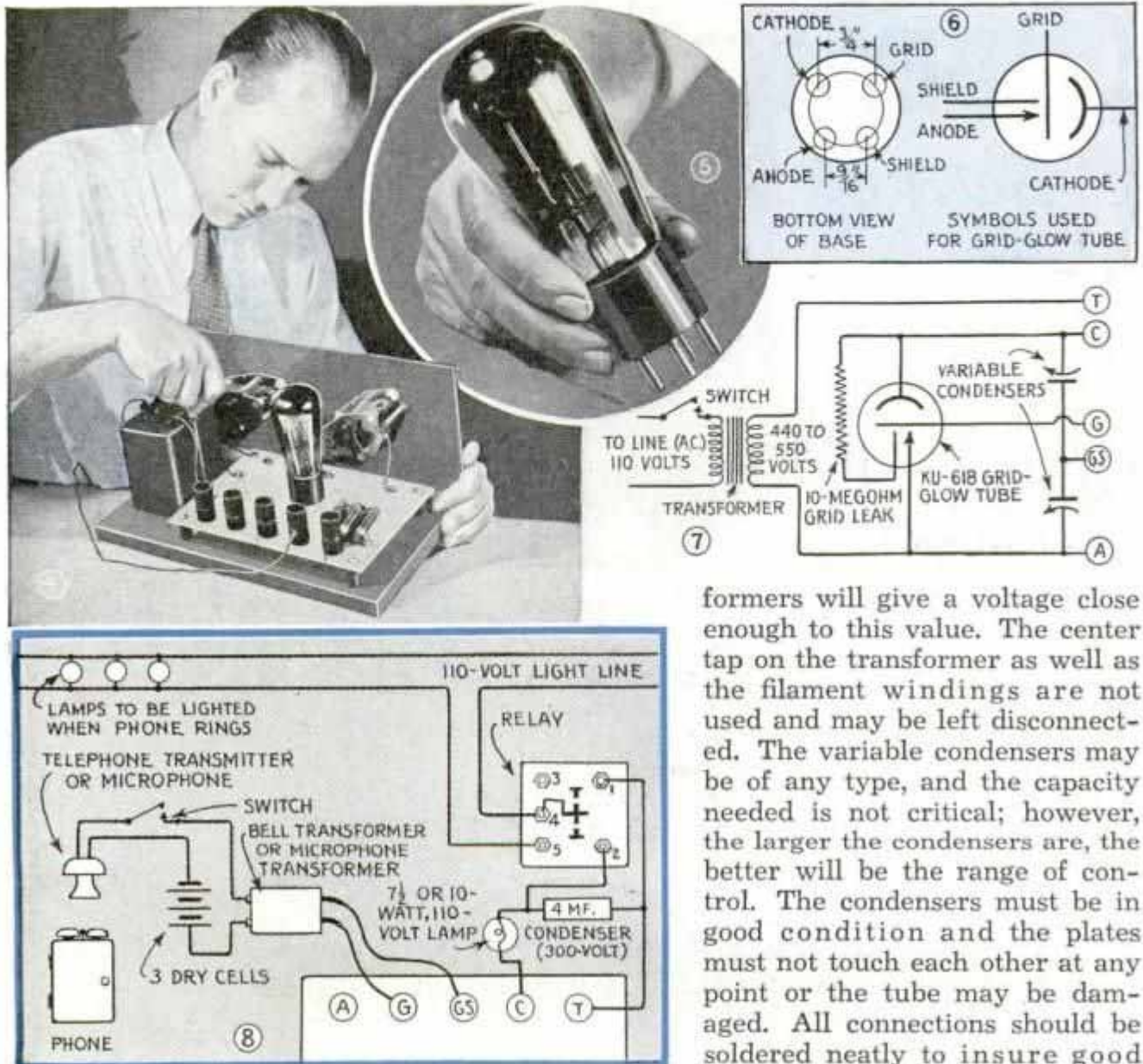
*Starting electrical devices with a phone call*

periments by simply changing connections to binding posts.

As the grid-glow tube will not fit into a standard radio tube socket, it will be necessary to build a special socket unless you prefer to purchase an industrial tube socket No. 411. Fig. 2 gives dimensions for drilling a piece of Bakelite so that it will serve as both tube socket and mounting base for the required binding posts. The four large holes at the corners are for mounting the socket panel on the wooden base. Fig. 3 gives the dimensions and method of mounting the brass wipers onto the socket panel to make connections with the tube when it is inserted into the prong holes. The prong holes are of two sizes, and the drill sizes indicated should be followed so that the







tube cannot be inserted incorrectly. Fig. 5 shows the tube, Fig. 6 pictures the parts inside, and Fig. 7 shows how it is connected in the circuit.

As much of the wiring as possible should be run under the socket panel for the sake of a neat-appearing job. The grid leak should be located on the panel in a regular mounting clip, obtainable at a radio-parts supply store. The value of the grid leak used is from 4 to 10 megohms. The 10-megohm size will usually give best results for average experiments, but with the grid clip in a handy position on the panel, you can easily change from one value to another.

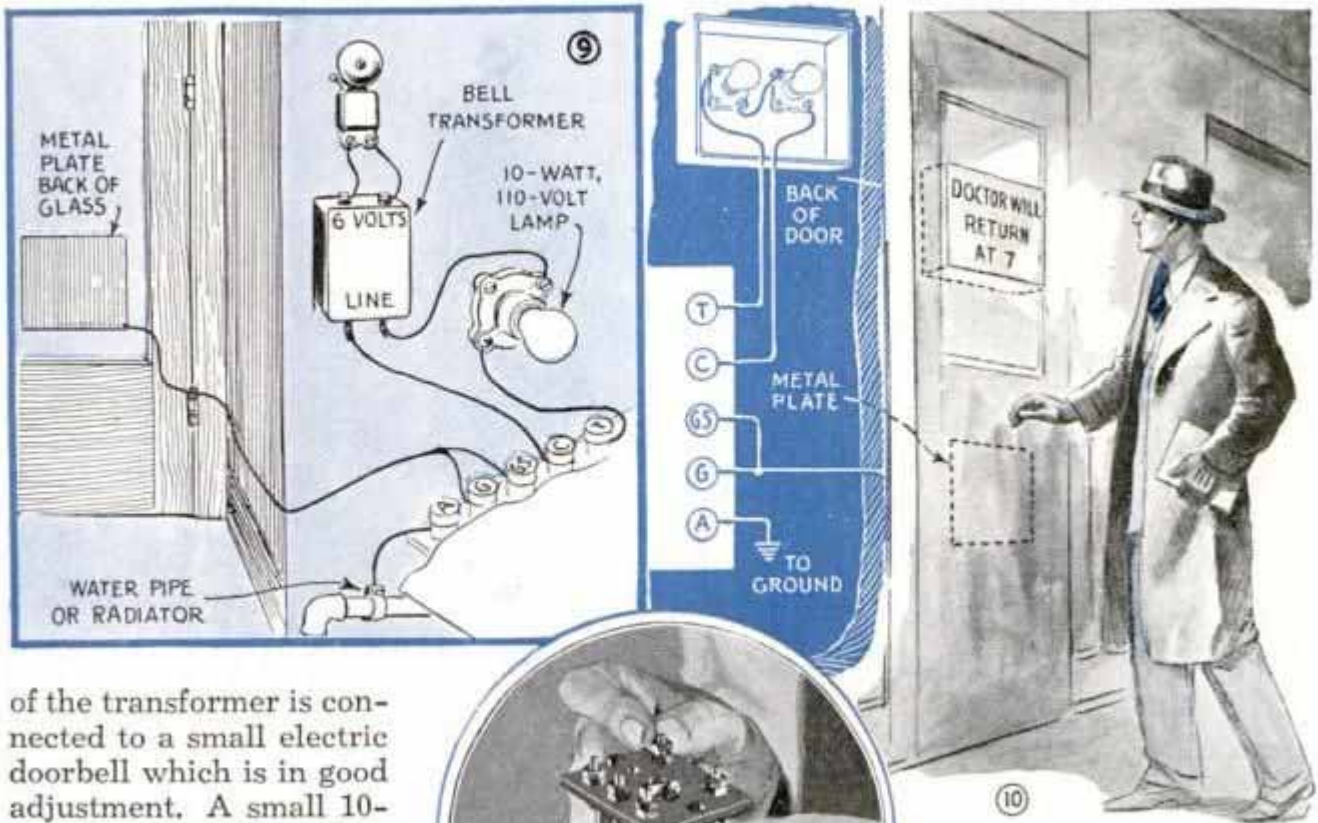
The transformer used should give approximately 440 volts. If the voltage is as high as 550 the transformer can still be used. Most B-eliminators or radio trans-

formers will give a voltage close enough to this value. The center tap on the transformer as well as the filament windings are not used and may be left disconnected. The variable condensers may be of any type, and the capacity needed is not critical; however, the larger the condensers are, the better will be the range of control. The condensers must be in good condition and the plates must not touch each other at any point or the tube may be damaged. All connections should be soldered neatly to insure good performance. With apparatus of

this kind, troubles of faulty operation can often be traced to poorly soldered connections. Therefore the importance of well soldered joints, electrically and mechanically tight, cannot be over-emphasized.

After the grid-glow relay has been assembled completely, you are ready to try it out on some of the spectacular stunts. Fig. 9 shows a simple arrangement which is almost uncanny in what it will do. A sheet-metal plate about 8 or 10 in. square, is placed against the glass on the inside of a door and connected to the grid-glow relay as indicated. The post marked A is grounded to a water pipe or radiator, and a doorbell transformer is connected to the binding posts marked C and T as shown. The side of the bell transformer normally connected to the electric-light line, is connected to these posts. The bell-ringing side





of the transformer is connected to a small electric doorbell which is in good adjustment. A small 10-watt lamp is connected in the circuit as shown to prevent injury to the grid-glow tube in the event of trouble with the transformer or bell. With these connections made, and no one near the door, adjust the condensers so that the bell rings. Next, turn one of the condensers slightly until the bell just stops ringing. Then approach the door and if the adjustment has been made properly, the bell will ring until you leave the door. If it does not work the first time try several adjustments systematically until the best effect is produced. If the hand is placed on the glass opposite the plate the bell will sound even with a poor adjustment.

The plate may be placed inside a window to serve as a burglar alarm, or as indicated to announce the arrival of callers before they have an opportunity to sound the regular bell. When used in a gas station to announce customers the metal plate should be fastened to the roof of the car runway, but insulated from it, and have attached a number of tinsel strips which will rub against the car. A similar arrangement is shown in Fig. 10.

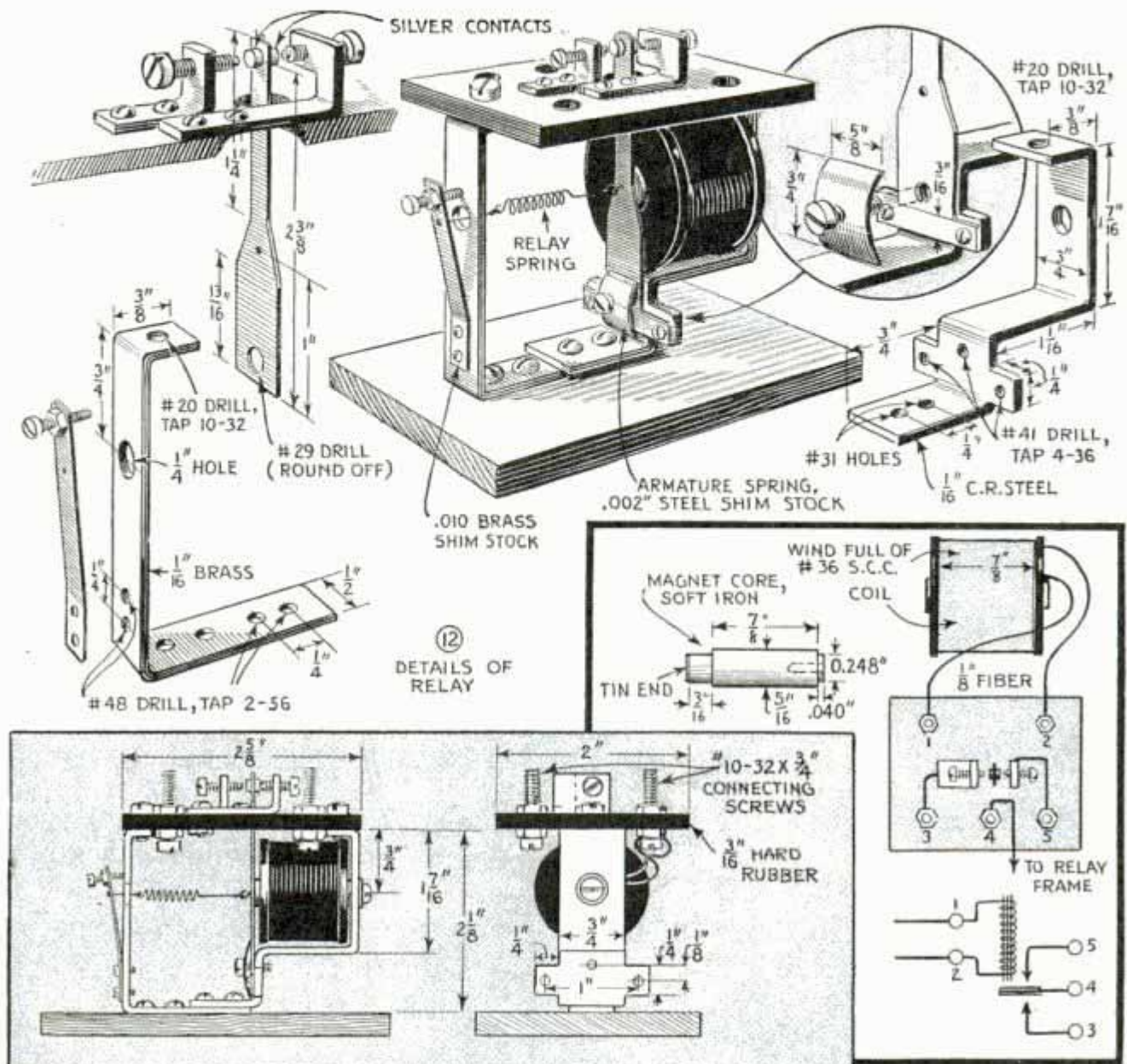
The illustration shows an application for a physician's or dentist's office. The plate is placed inside the door and the lamps as

indicated are placed inside a box behind the glass. The sign itself may be of opaque paper on which the letters have been lettered neatly and cut out with a razor blade.

The paper is placed between the glass panel of the door and the lamps. The sign will be invisible when the lamps are off, but will become visible when a caller approaches. Lamps larger than those indicated in the illustration should not be used otherwise the glow tube will not give its normal long life.

A simple and unique system of providing burglar protection is shown in Fig. 8. The grid-glow relay is connected to an ordinary telephone transmitter or microphone as indicated. The transformer may be either a bell-ringing transformer or a standard microphone transformer. If a bell-ringing transformer is used the line side should be connected to the G and GS binding posts as shown. The transmitter is placed so that its mouthpiece faces the bell of the telephone. The C and T binding posts are connected to a relay whose contacts are hooked up to turn on lights. A suitable relay for this purpose is shown in Figs. 11 and 12. The condenser connected across the coil of the relay should





have a capacity of 4 mfd. and a rating of 300 volts. With this circuit all the lights that are controlled by the relay unit will go on when the phone rings and go out the moment the phone stops ringing. Like the arrangement previously described, the condensers in the relay unit are adjusted for best performance.

### Renovating Leather Purses

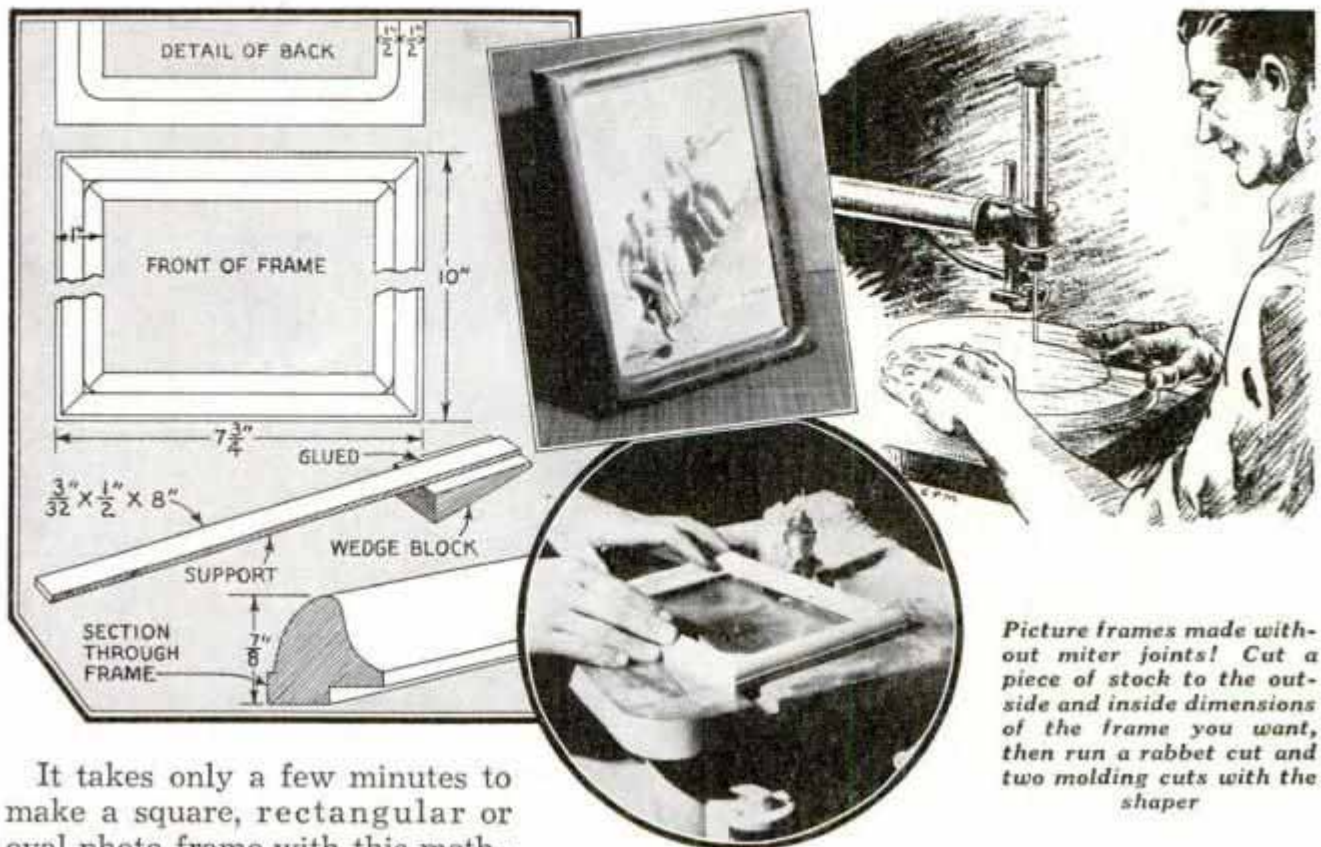
Wallets and other leather goods that have a worn, discolored appearance can be made to look as good as new by cleaning and dyeing them. For black leather, which gradually wears to a brown in spots, sponge sparingly with a strong solution of washing soda and warm water until the leather is soaked. Then apply a coating of black stain. Allow the article

to dry and repeat the process. When dry, wipe off the surplus stain with a damp cloth and apply the white of a stale egg. A touch up with the latter at intervals will keep the leather in good state of preservation. If desired, bookbinders' varnish may be used instead of the egg white. For brown leather that is worn and has a faded appearance, wash it with warm water and soap, using a soft brush. Wash again with clean water and, while still wet, sponge it with a weak solution of oxalic acid and water. Allow the leather to dry and then apply a brown stain of the desired shade. When this has dried, give the leather a final polish with a neutral polishing cream. The effect of patent leather can be obtained by applying a smooth, even coat of leather varnish with a soft brush.

—James R. Knox, Irvington, N. Y.



# One-Piece Picture Frames Made on Shaper



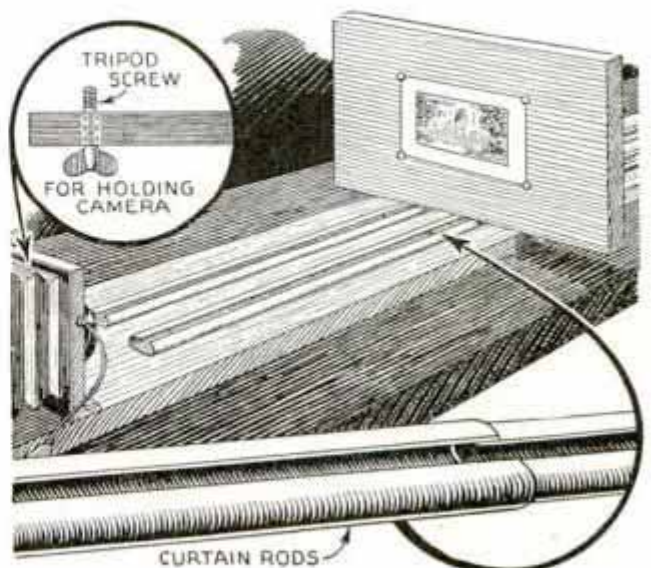
It takes only a few minutes to make a square, rectangular or oval photo frame with this method. Any piece of close-grained wood will do. On this you lay out the inside and outside dimensions of the frame, then cut away the waste with the jigsaw. Now on the shaper, the first setup is made to cut the rabbet on the back of the frame. You'll have to chisel the corners square after running this cut. Molding both the

inner and outer edges of the frame on the face side is a matter of choice. An attractive frame can be made by running one cut on the inside edge, leaving the outer edge of the frame square. Ebony oil stain and a coat of shellac and wax make a good finish.—Dale R. Van Horn, Lincoln, Nebr.

*Picture frames made without miter joints! Cut a piece of stock to the outside and inside dimensions of the frame you want, then run a rabbet cut and two molding cuts with the shaper*

## Easel for Photo Enlarger Slides on Curtain-Rod Track

Amateur photographers who want an adjustable easel for an enlarging or copying camera, can make one easily by using telescoping curtain rods for the easel track. Just fasten the larger sections of the rods to a base, such as a length of 2 by 8-in. stock, with small brass screws. Then cut off two small pieces from one of the smaller sections of a rod and screw them to the lower edge of the easel. Counter-sink all the screw heads carefully and slip the easel on the track. The base is drilled near one end to take a tripod screw for mounting the enlarging camera.



*You can make this adjustable easel for the price of a short plank and two curtain rods*

☛Tents will not be affected by mildew if the canvas is impregnated with a saturated solution of slaked lime in water.

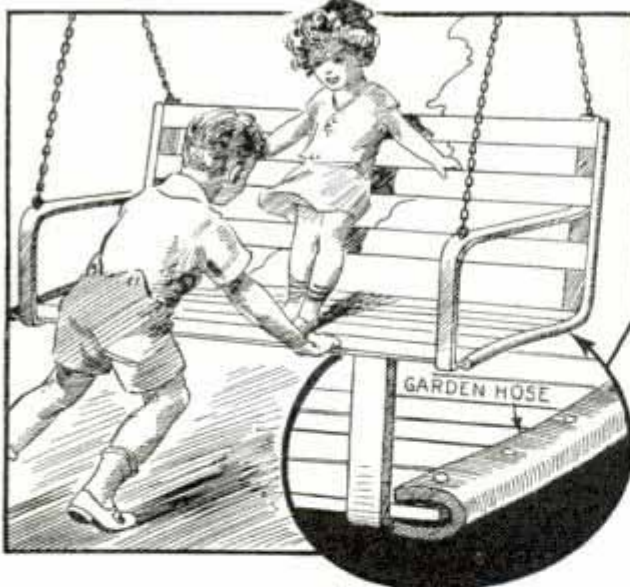


## Shielding Inner-Tube Valve Stem for Bather's Use



When an inflated inner tube is used by bathers, accidental injury from the projecting valve stem can be avoided by pushing a small, hollow rubber ball over it. A hole in the rubber slightly smaller in diameter than the valve stem, assures a tight fit so that the ball will not come off easily.

## Edges of Porch Swing Covered to Prevent Marring Furniture



Rubber bumper on the edges of your porch swing prevents marring the walls or furniture.

If you have a slat swing on your porch it's a good idea to cover the edges of the slats with a piece of garden hose as shown, especially if there are small children around. Then, when playing on the swing,

they are not so likely to mar the furniture or painted walls. Small screws driven through the top and underside of the hose will hold it in place.

## High-Top Boot Laces Protected with Rubber

Those who wear high-topped boots will find that they can keep the ends of the laces from tangling in brush or weeds and becoming untied by using two pieces of inner tube as shown. Perforate the pieces along two edges so that they can be slipped over the hooks at the top of the boots.



## Milk-Bottle Caps Removed Easily



If the tabs on your milk-bottle caps tear off after the cap has been removed a time or two, cut off the handle of a tea-spoon, bevel the small end with a file and bend it to the shape shown. Then you can slip the beveled end under the wire staple in the cap and take it off without any trouble.

## Tent Stakes Reinforced by Rivets to Avoid Splitting

Tent stakes that are notched at the upper ends to take the guy ropes are less likely to split when driving them, if they are reinforced with long rivets or bolts as shown.

Such rivets or bolts are inexpensive to buy and it takes only a short time to put them in a number of stakes.



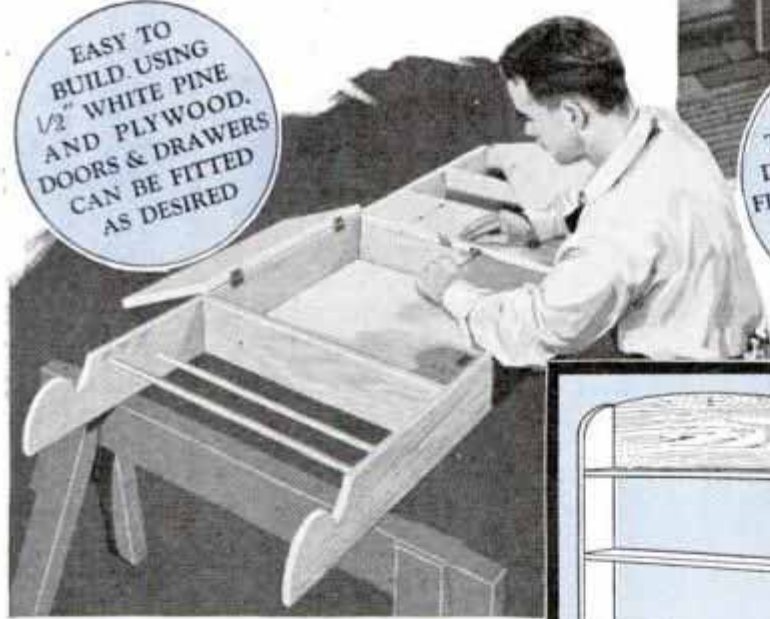


# Practical DOOR SHELVES

WHETHER you live in a small apartment or in a large house, the added closet space furnished by these attractive door shelves solves the problem of storing numerous small items. Construction involves  $\frac{1}{2}$ -in. white pine and  $\frac{1}{4}$ -in. plywood. The side pieces should be made first, then the shelf stock is cut to length. It is best to groove the side pieces to take the shelves, although for the light load which they will carry, plain butted joints will do. Plywood forms the back although it does not extend full length of the shelf. It can be butted flush, or can be fitted into



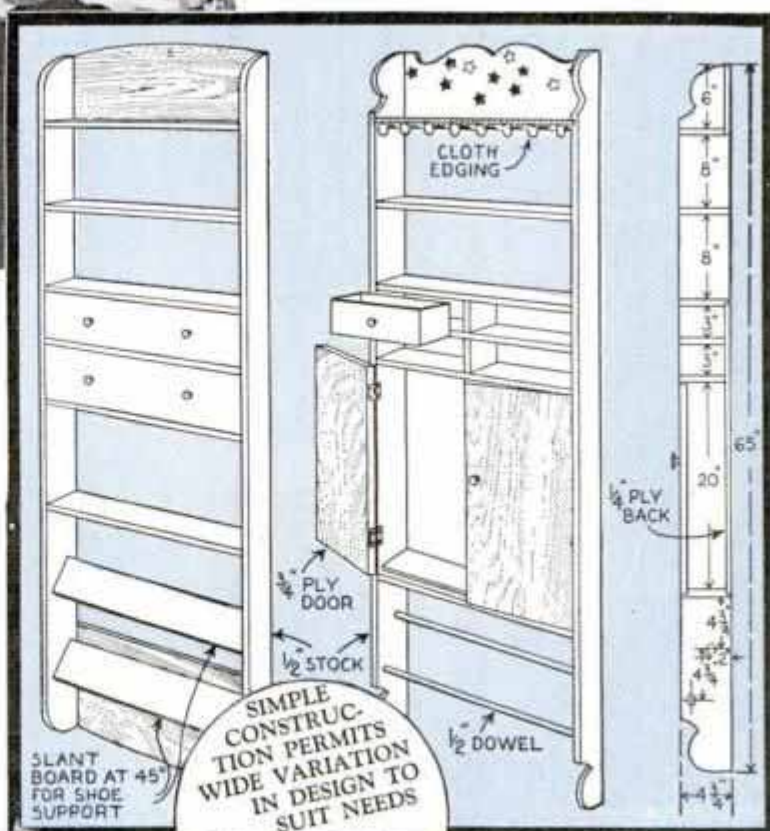
EASY TO BUILD USING  $\frac{1}{2}$ " WHITE PINE AND PLYWOOD. DOORS & DRAWERS CAN BE FITTED AS DESIRED



SCREWED TO ANY CLOSET DOOR, THE SHELF FITS FLUSH IN JAMB SPACE WHEN DOOR IS CLOSED

a rabbet cut on the back edge of the side pieces. The drawing shows two typical styles and average dimensions. Of course, the arrangement can be varied to suit individual needs, the hinged compartments and drawers being placed where most convenient. The shoe rack can be made from dowel rods or of solid stock set at  $45^\circ$  angle as shown.

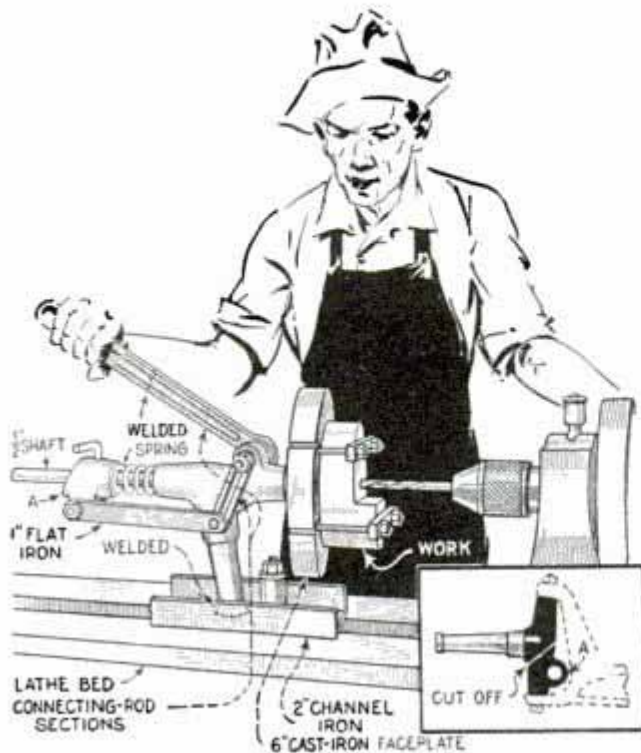
Ⓒ A bead string which cannot be broken easily may be made from dental floss or silk violin string.



SIMPLE CONSTRUCTION PERMITS WIDE VARIATION IN DESIGN TO SUIT NEEDS



## Drill-Press Attachment for Lathe or Grinder Head



*Assembly for a grinder head is similar, but the method of mounting will vary*

An adjustable drill-press attachment on a lathe or grinding head, can be made from model-T Ford front spindles and connecting rods. A spindle, fitted with new bushings and a shaft, is welded to a 6-in. section of 2-in. channel iron so that the shaft will be in line with the lathe headstock spindle. Two pieces of connecting rods welded together form a handle for feeding the work to the drill, the handle being connected to the shaft through a linkage, which is attached rigidly to the handle shaft. Part A is cut from the lower end of a spindle and is fitted with a set screw for adjusting it on the shaft to change the spring tension to pull the work back when the handle is released.

## Threads on Small Containers Repaired with Spool

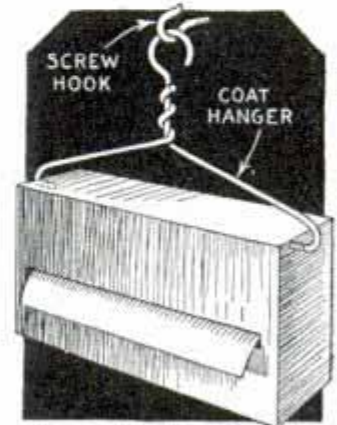


If the threads on an aluminum salt shaker or similar container are dented or bent so that the cap cannot be screwed on, they can often be

reshaped with an empty thread spool. Hold the cap or container on a flat surface and run the tapered edge of the spool over the damaged threads as shown, applying plenty of pressure.

## Cleansing-Tissue Box Is Hung on Wall for Convenience

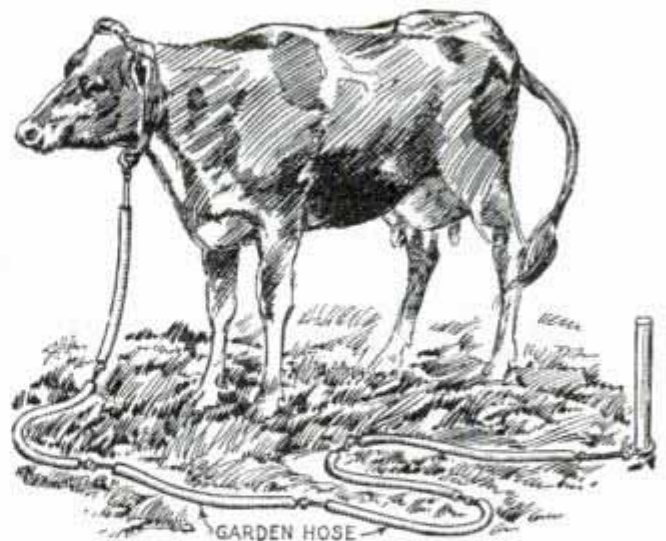
Instead of placing a box of cleansing tissues on a table or shelf, why not hang one on the wall within easy reach and then pull out the tissues as needed? Just get a wire coat hanger, remove part of the horizontal wire



and then punch the remaining short ends into the sides of the box near the top. It's easy to find a handy place to hang it.

## Tether Prevented from Tangling by Pieces of Garden Hose

Those who picket milch cows on unfenced grazing land will find that slipping short lengths of garden hose on the tether will help to prevent it from tangling



*Several lengths of old garden hose slipped on tether and tied in place keep it from tangling*

around the animal's legs and the stake. Knots in the rope keep the pieces of hose separated, giving the tether plenty of flexibility.—A. H. Waychoff, Tempe, Ariz.

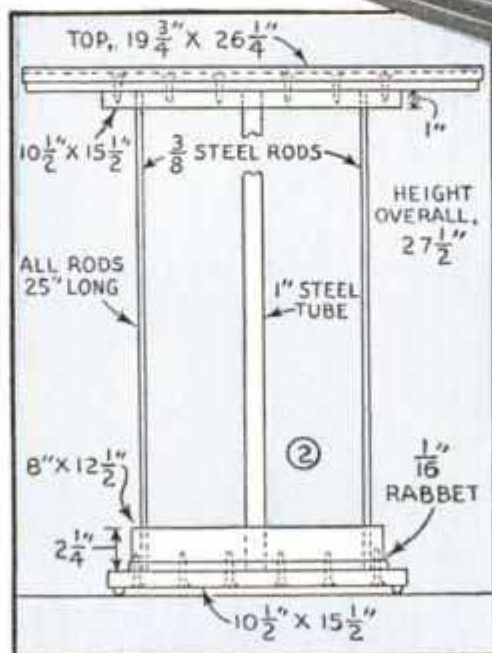
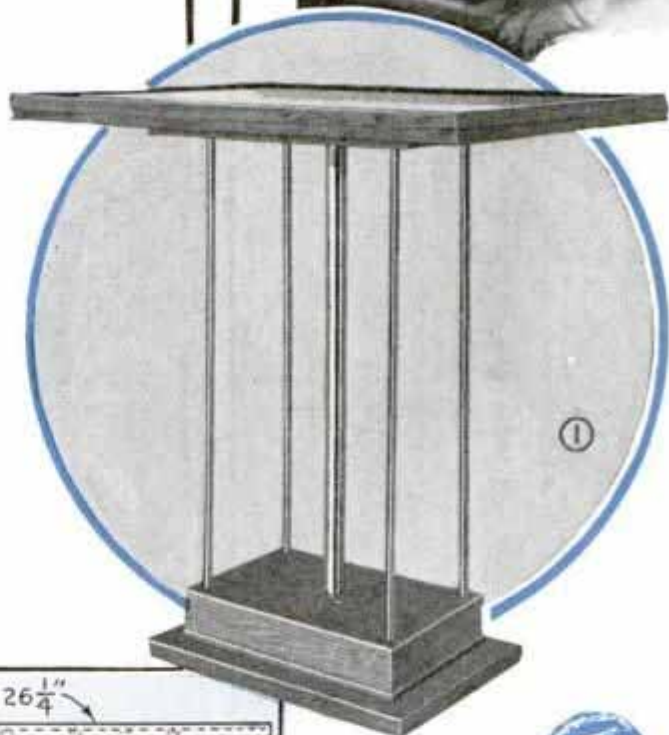


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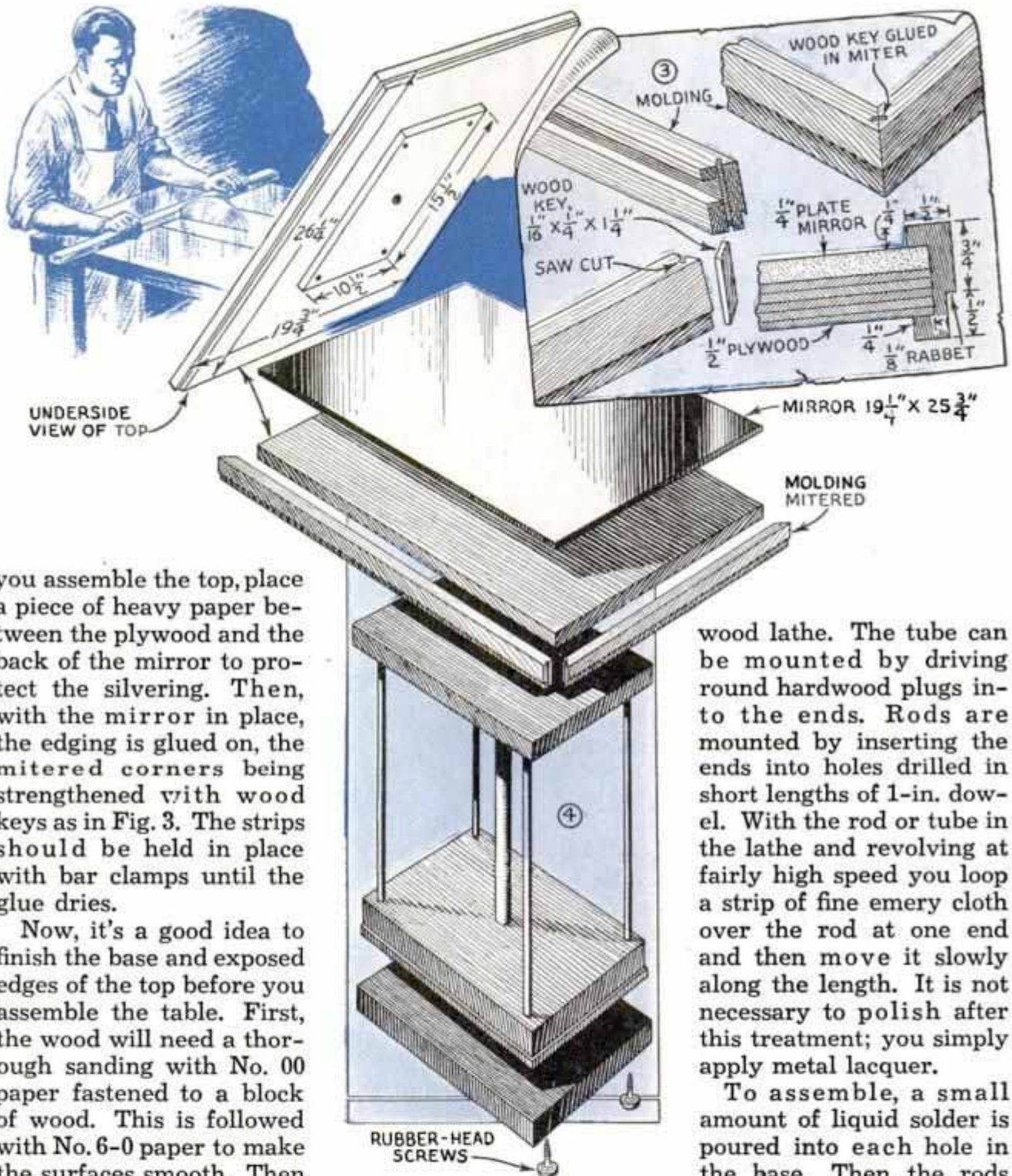
# WALL TABLE *of Modern Lines*

**P**OLISHED steel rods, rising from a plain, stepped base of hardwood, support the mirror top of this modern wall table. Mahogany is the best wood to use in the construction of the two-part base, and all other exposed parts. The top section of the base can be made from a solid piece of wood or it can be built up as a rectangular box and inverted over the  $\frac{13}{16}$ -in. bottom piece, to which it is fastened with screws and glue. A  $\frac{1}{16}$ -in. rabbet, just the width of a single saw cut, is run on the four edges as in Fig. 2. A piece of  $\frac{13}{16}$ -in. solid stock is cut to the same size as the top of the base and on this the location of the holes for the four rods and center tube is laid out. After boring the holes, this piece is used as a jig to bore the same size holes in the base. These are not bored clear through, only about halfway into the lower member.

The top, which forms a backing for the mirror, is a piece of  $\frac{1}{2}$ -in. plywood, cut to the same size as the glass, Fig. 4. The piece used as a jig for boring holes in the base is screwed to the underside of the top, the center being located equidistant from the four corners. Four strips are cut from  $\frac{1}{2}$ -in. solid mahogany and grooved  $\frac{1}{4}$  by  $\frac{3}{4}$  in. on the inside face. The ends are mitered to an exact fit at the corners of the plywood top. A  $\frac{1}{8}$ -in. rabbet is run in  $\frac{1}{2}$  in. on the lower outside corner of each strip as in the sectional view, Fig. 3, and saw cuts,  $\frac{1}{8}$  in. deep, are run across the mitered ends of each strip, at right angles to the face of the miter and equidistant from the edges. When







you assemble the top, place a piece of heavy paper between the plywood and the back of the mirror to protect the silvering. Then, with the mirror in place, the edging is glued on, the mitered corners being strengthened with wood keys as in Fig. 3. The strips should be held in place with bar clamps until the glue dries.

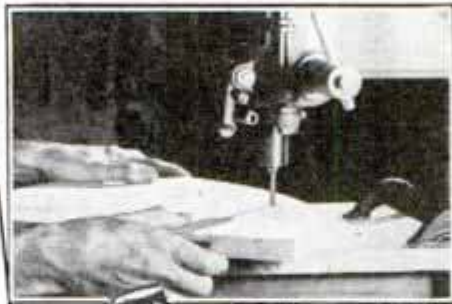
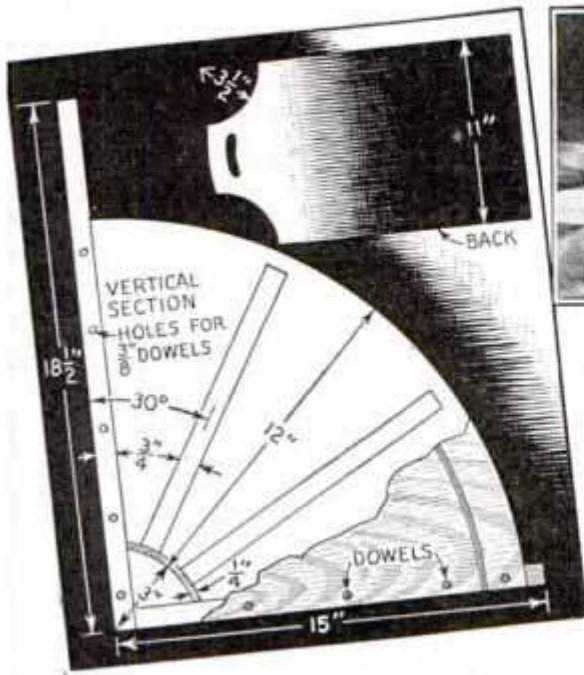
Now, it's a good idea to finish the base and exposed edges of the top before you assemble the table. First, the wood will need a thorough sanding with No. 00 paper fastened to a block of wood. This is followed with No. 6-0 paper to make the surfaces smooth. Then several coats of paste floor wax are rubbed on, ample time being allowed for drying. The last coat is polished to a satiny luster with soft flannel cloth. The four steel rods and 1-in. center tube require a careful polishing with fine emery paper. You can, of course, use brass or copper rods and tubing if you wish. They are polished and then coated with clear metal lacquer to prevent tarnishing. Another way to get an attractive finish on the metal rods and the center tube is to mount each one between centers of the

wood lathe. The tube can be mounted by driving round hardwood plugs into the ends. Rods are mounted by inserting the ends into holes drilled in short lengths of 1-in. dowel. With the rod or tube in the lathe and revolving at fairly high speed you loop a strip of fine emery cloth over the rod at one end and then move it slowly along the length. It is not necessary to polish after this treatment; you simply apply metal lacquer.

To assemble, a small amount of liquid solder is poured into each hole in the base. Then the rods and center tube are pressed into the holes. Any solder that is forced out should be wiped off quickly. The solder is allowed to set, then the process is repeated in setting the upper ends of the rods into the top. The latter, of course, should be inverted, with several layers of paper between the wood and the bench top to prevent marring the finish. Once the rods are forced in place the solder should be allowed to set before the table is moved. Fig. 1 shows the finished job in mahogany combined with steel rods and center tube.



# Simplified Magazine Rack from Waste Stock



*Odd pieces of wood, left over from other woodworking jobs, soon provide enough material for this magazine rack. The sides and partitions are duplicates, and nails, screws or dowels and glue are used to join the parts*

## Photographic Background Is Painted on Window Shade

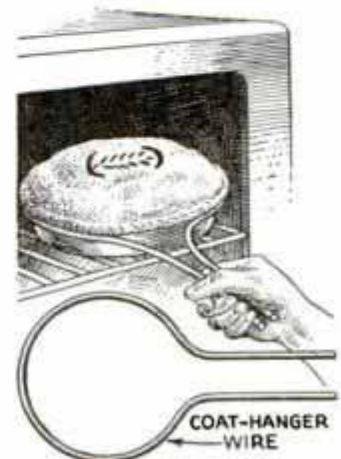
Utilizing an inexpensive window shade, the amateur photographer can make a dandy background with which to greatly improve the appearance of his photos. Shades of the oil-painted type should be



selected. First, sketch on the shade, or a piece of paper, the general effect of light and shadow areas you wish on the background. Then take some black and white flat wall paint and mix several different shades of the color in separate dishes, ranging from almost white to a very dark gray. Give the entire shade a coat of the lightest color. Then, while this is still wet, work in the other shades, finishing up with the darkest; making the shadows almost black. Clouded backgrounds can be used, or a scene may be painted in. Remember to subdue the shades, giving a soft rather than a contrasting effect.

## Improved Pie-Pan Lifter

Here is a pie-pan lifter that anybody can make in a few minutes, and it costs nothing. Just take a wire coat hanger, cut off the hook, straighten out the wire and then bend it to the shape shown in the illustration.





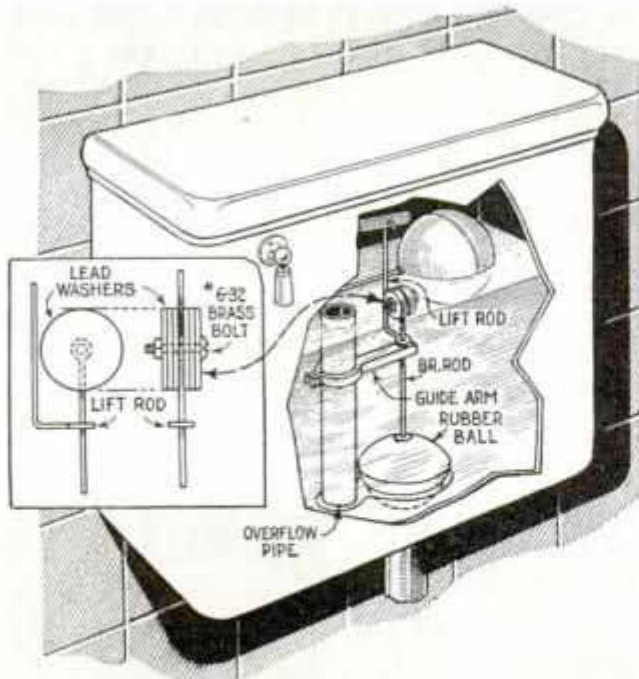
## Rubber Nipple Is Ideal Funnel for Pouring Acids



*Cut off the tip of a rubber nipple and you have a handy funnel for use in the home laboratory*

For pouring solutions which must not come in contact with metal, a small funnel is made quickly by cutting off the tip of a large rubber nursing nipple. Such a funnel is safe for most chemicals, and has the advantage of being unbreakable.

## Waste in Flush Tank Avoided by Weight on Ball Valve



*Weight on stem of ball valve closes latter quickly after it has been tripped*

If the rubber ball valve in a bathroom flush tank has a tendency to stick, or does not close quickly after being tripped, a

small weight on the ball stem will help. Such a weight can be installed by clamping three lead washers on each side of the eye at the upper end of the stem with a brass bolt as shown.

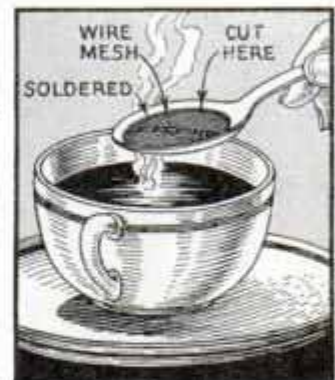
## Tablespoon Tack Puller

A handy tack puller, which is not only easy to handle, but will also collect the tacks as they are withdrawn, may be made from an old tablespoon. A small portion at the end of the spoon bowl is filed away and a narrow V-shaped notch is cut in it, after which the flattened end of the bowl is ground to a sharp edge so that it will slip under tack heads easily. After doing this, a receptacle to receive the pulled tacks is formed by wrapping several turns of tape around the spoon bowl, the space between the tape and the bottom of the bowl serving as the receptacle. This arrangement is particularly useful in removing tacks from walls or other vertical surfaces.—Goeffrey Archbold, Shaker Heights, Cleveland, O.



## Small Strainer Made from Spoon Has Many Uses

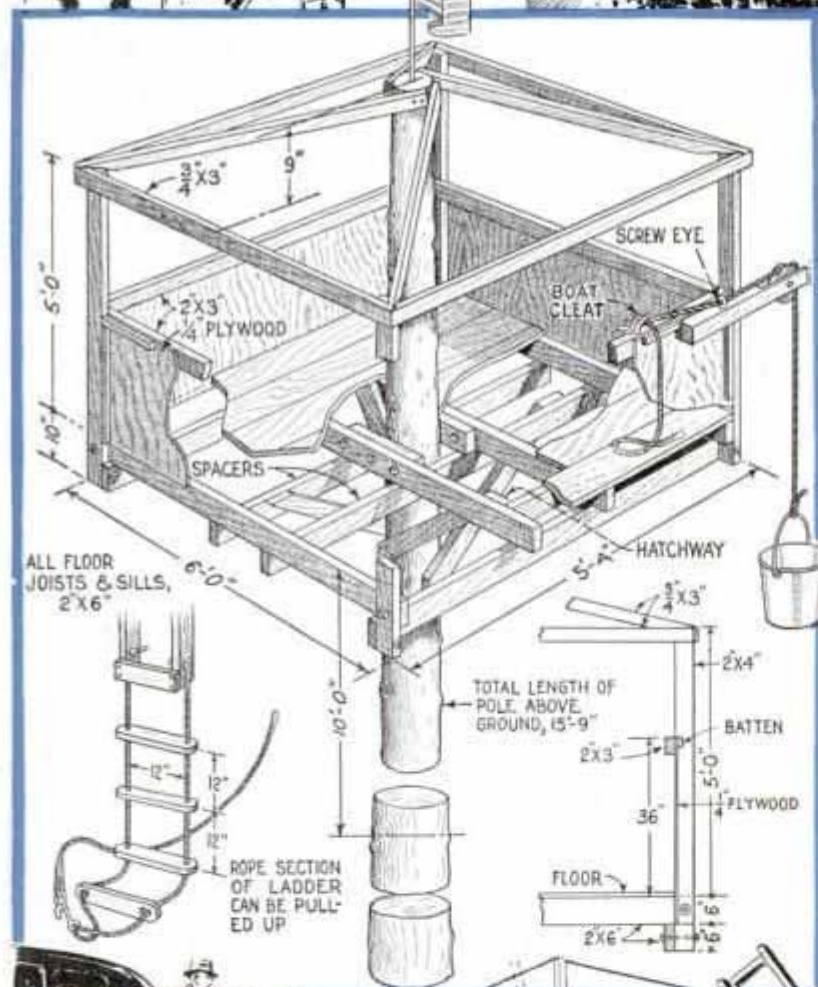
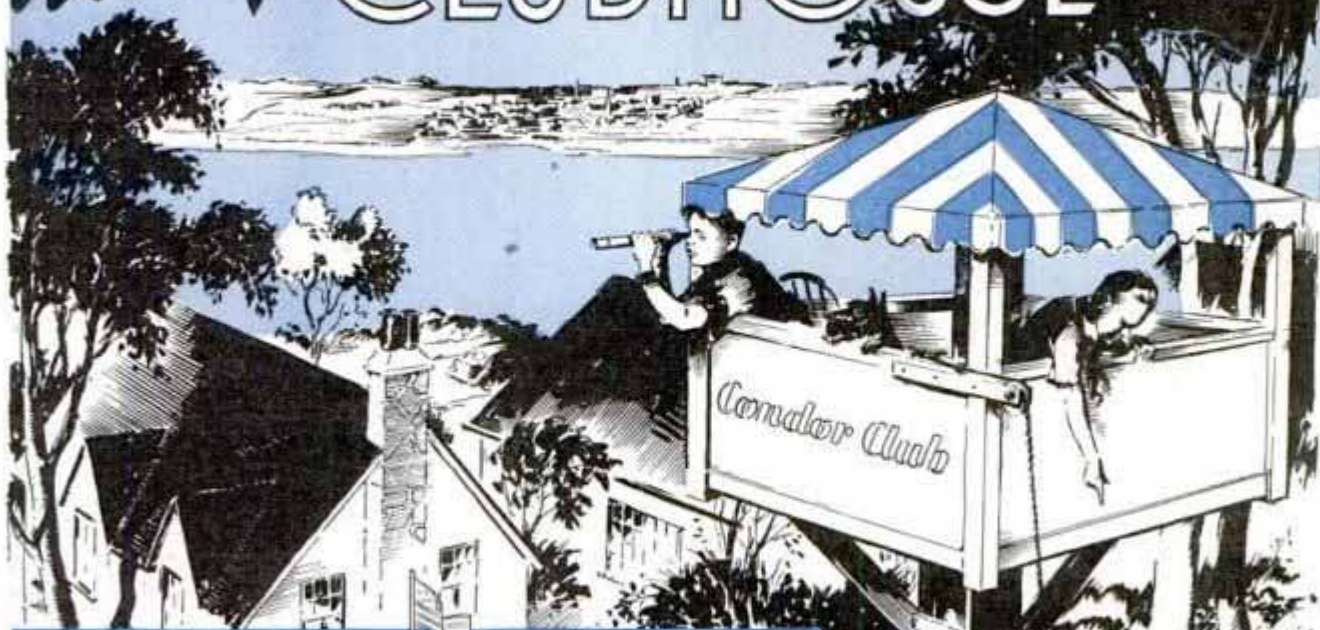
A teaspoon with the bottom of the bowl cut out and a piece of fine-mesh screen soldered over the opening makes a dandy strainer for removing small objects from the surface of liquids. In addition to being handy for removing bits of tea leaves or coffee grounds from a cup, you will find many other uses for such a strainer.



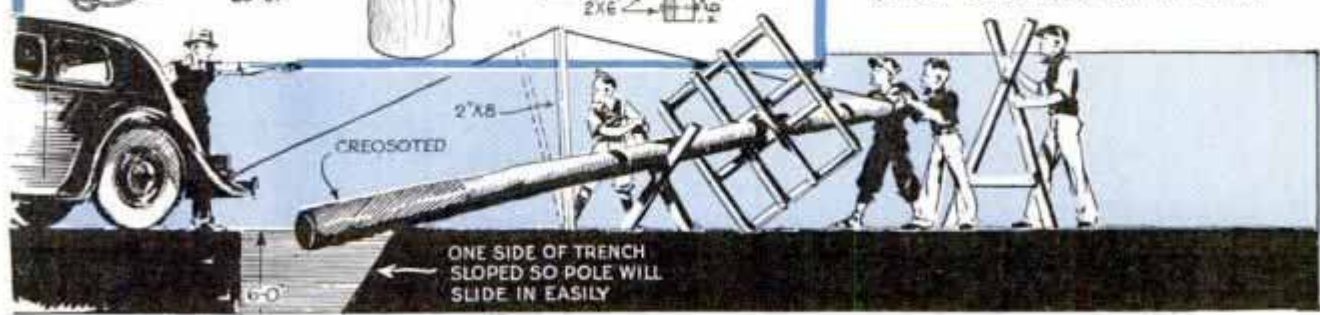
☛ To keep the bottom of a garbage can from rusting and to make it easy to clean, cover it with  $\frac{1}{4}$  in. of melted paraffin.



# Aerial CLUBHOUSE



Perched on a sturdy pole, this clubhouse gives you all the thrills of a ship's crow's-nest. Entrance is made through a trap door, reached by a ladder, part of which is rope, and can be pulled up to keep out intruders





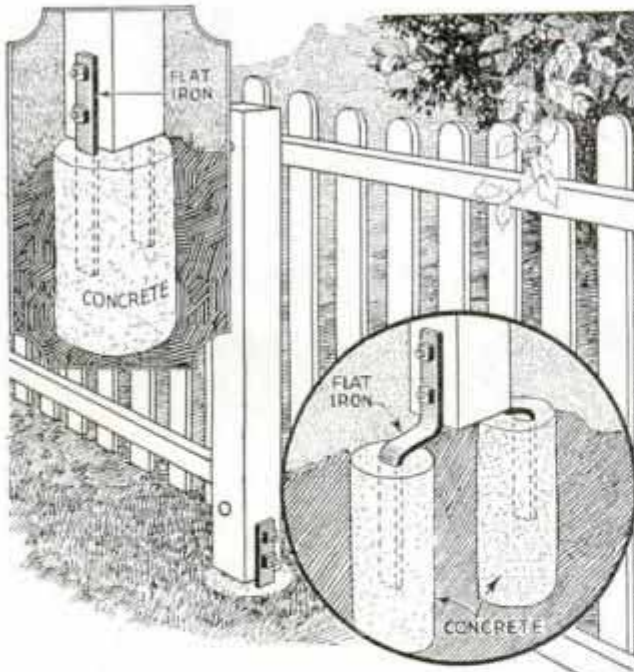
## Painting Behind Radiator Easily with Shoe-Polish Brush



*Restricted places behind a radiator are easily painted with a shoe-polish brush*

Instead of trying to paint behind a radiator with a regular brush, use a shoe-polish brush attached to an extension handle as shown and you can reach into the restricted places easily.

## Rotted Posts in Picket Fence Repaired by Iron Legs



*A fence with the posts repaired this way will last indefinitely if kept well painted*

When the posts of my picket fence started to rot off at the ground, I repaired them so that they were as good as new. Each post was sawed off just above the

ground and the stump was dug out, after which lengths of flat iron were bolted to the post. These extended down into the hole, which was then filled with concrete. In some cases, I bent the supports as shown in the circular detail, making a small hole in the ground for each one. This method saved concrete as the holes were only 3 or 4 in. in diameter, yet the over-all distance between the legs was greater and therefore a more rigid support than when the legs extended straight downward.—C. A. Veburg, Omaha, Nebr.

## End of Trunk Padded at Handle to Protect Knuckles



It's a simple matter to pad a trunk behind the handles so that you won't injure your knuckles when carrying it. Just hold a pad of cotton against the trunk and tack a square of inner tube, oilcloth or

similar material over it. Use brass-head tacks as they make a neater job than ordinary carpet tacks.

## Wax Cork in Glue Bottle Won't Stick

If you have trouble with glue-bottle stoppers sticking, substitute pieces of paraffin or wax candle for the regular stoppers. Taper the candle to fit the mouth of the bottle, and it will close the opening

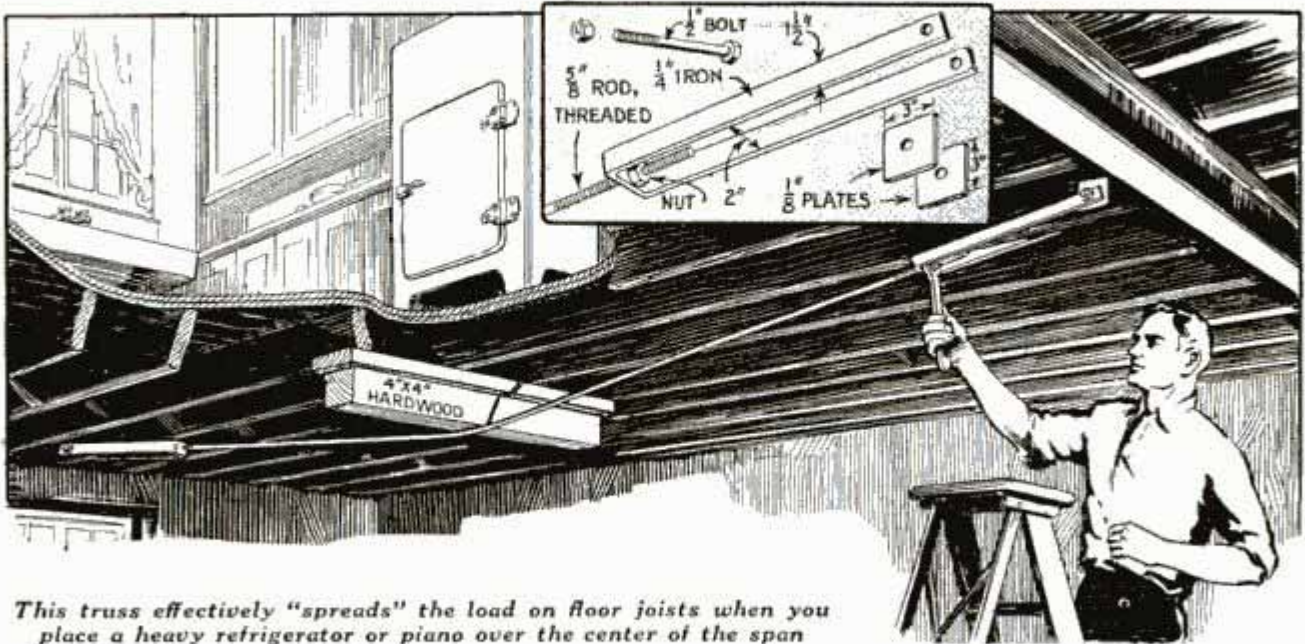


tightly, yet is easily removed as glue will not stick to the wax. Such stoppers can be used also for bottles containing acids.

☐ Washing linoleum with a stiff-bristled brush will destroy its luster; use a soft brush and mild soap and water.



## Floor Trussed to Support Heavy Refrigerator



*This truss effectively "spreads" the load on floor joists when you place a heavy refrigerator or piano over the center of the span*

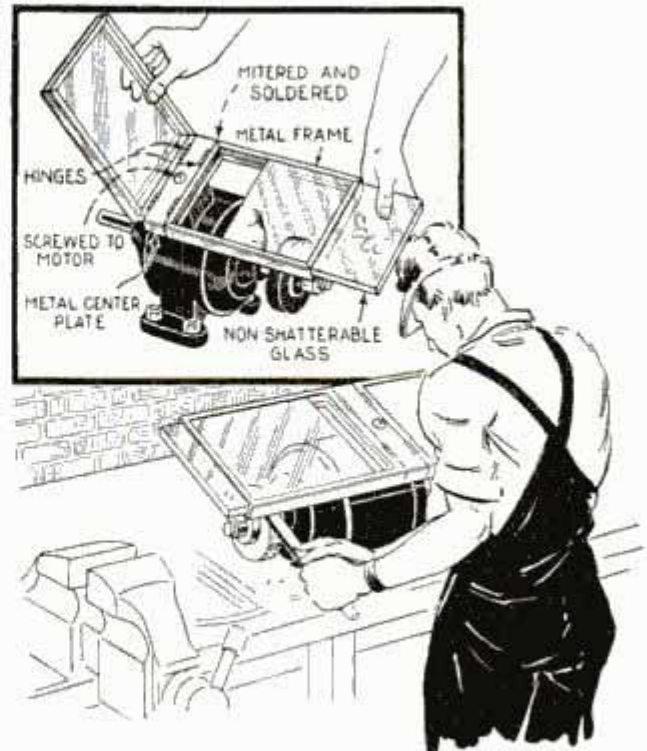
Where convenience makes it necessary to place a mechanical refrigerator or other unusually heavy piece of furniture at the center of a floor span, the weight is likely to cause sagging of the floor joists. To offset this possibility you can install a truss like that shown. When supporting a refrigerator, for example, the crosspiece,

which is held in place by the truss rod, should bear on at least four joists in order to properly distribute the weight. If the span of the joist is more than 14 ft., it is better to install two rods of the same length. In this case, the crosspiece should bear on six joists.

—L. H. Georger, Buffalo, N. Y.

## Hinged Eye Shield on Grinder Lifts to Change the Wheels

Many amateur craftsmen do not realize the importance of protecting the eyes against flying particles of abrasive when using a motor-driven grinder. Just one tiny particle getting into the eye may not only result in severe pain, but it may injure the eye permanently. To avoid such accidents, anyone can make up this simple protector. It is two light channel-iron frames hinged to a center plate, which is mounted on the motor housing. Each frame holds sections of non-shatterable glass.



*It takes little work to make this shield, which may save you a badly injured eye*

## Exterminating Cockroaches

An effective non-poisonous powder which will destroy cockroaches, water bugs and similar pests is made by thoroughly mixing borax, 9 oz., cornstarch, 2½ oz., plaster of paris, 2 oz., and cocoa, 1½ oz. In using any bug exterminator, it is a good idea to continue its use for several days after the bugs have disappeared.

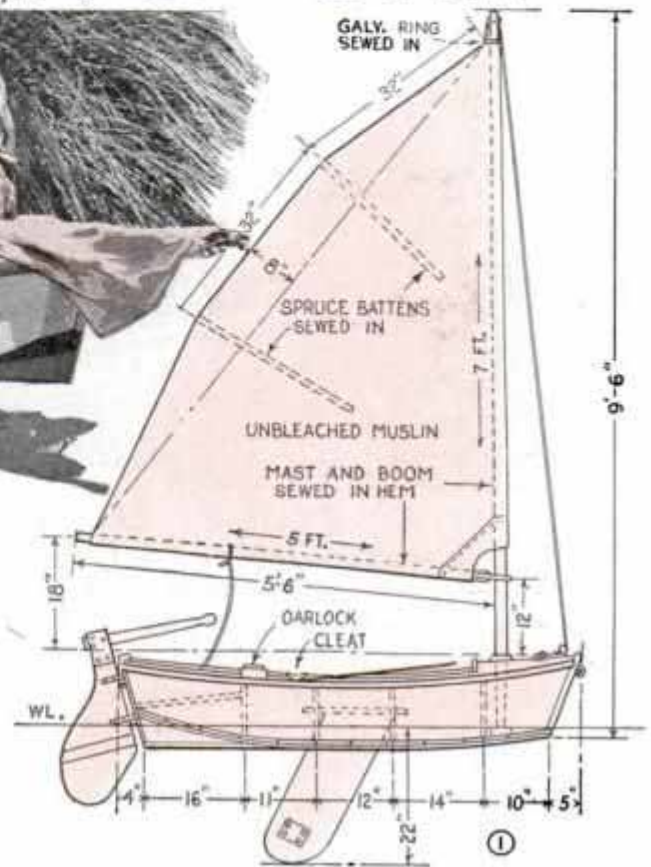


# "TRAINING SHIP"



**T**HIS tiny, 6-ft. craft is not only an excellent sailer but is so light that it can be hauled to the water on a coaster wagon. Or, if the rudder and mast are removed, one adult can carry it. Designed and built by Stephen T. Crosby, of Balboa Island, California, for his children to learn the art of sailing, it accommodates two passengers, and has all the necessary equipment of a full-size sailboat. General dimensions are given in Fig. 1. From this you will note that the boom is located high above the cockpit to give the skipper full vision, and also to prevent the boom from dragging in the water when coming about. The deck plan in Fig. 2 shows the exceptionally broad beam, lessening the possibility of capsizing.

To build the boat, first make the stem, Fig. 5. You will need only the hard-pine block at first, the oak nosepiece being screwed on later. Next, make the form shown in the lower detail of Fig. 4, around which the cedar sideboards are bent. Then comes the transom, or stern piece, Fig. 6. This is a single piece of  $\frac{3}{4}$ -in. mahogany or oak with hardwood cleats on the ends. To shape the sideboards, which should be about a foot longer than needed, wrap them in burlap sacks, one at a time, and pour several teakettlefuls of boiling water over them. After the water has had a chance to soak in, and while the boards are still warm, assemble them as shown in Fig. 4. At the ends nail temporary cleats notched on the ends and draw the boards together with a rope. Set in the transom and draw the sideboards up to it by twist-



*From this detail you will get a general idea of overall dimensions. The mast is made from a  $1\frac{1}{2}$ -in. curtain pole—the boom from a squeegee handle. The sail is hemmed to the mast and boom*

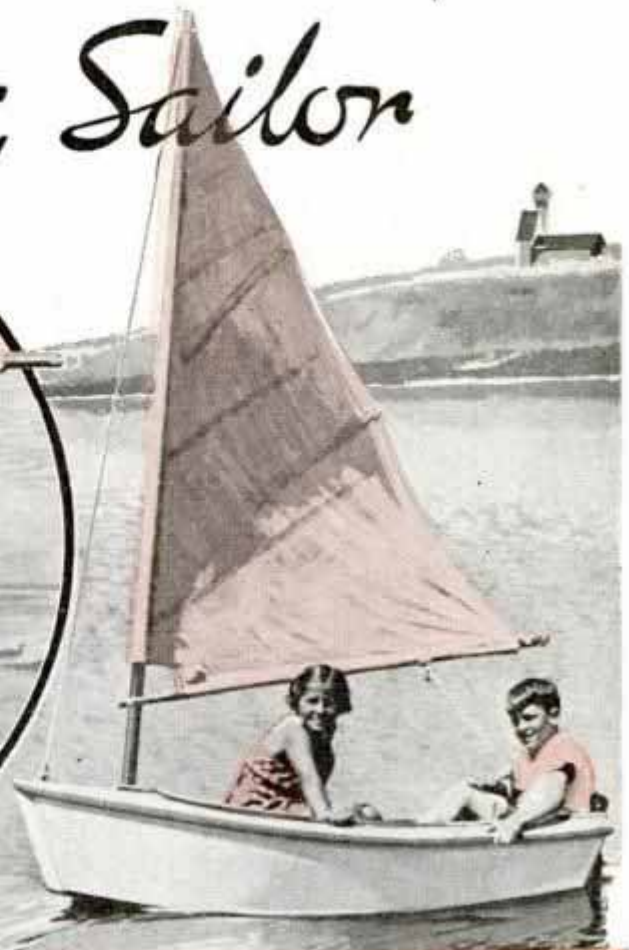
ing the rope with a stick. Then screw the boards to the cleats on the transom, using flat-head brass screws.

The completed job will appear as in Fig. 4, after which the sideboards should be cut as indicated by the dotted lines in Fig. 3. A curved cross member to support the deck, as in Fig. 6, should be put in temporarily 15 in. from the top of the stem, to keep the sides spread at the bow. A form can be made for this purpose if you wish, and be removed later. Constructional details are given in Fig. 7. While the forms are still in place, the chine battens should be put on. These are of  $\frac{3}{4}$  by 1-in. oak. The stern ends should be steamed or soaked for bending approximately to the curve of the sideboards. The battens are fastened in place with flat-head brass screws spaced  $1\frac{1}{4}$  in. apart. Then the edges of the chines and sideboards are planed off flush to get a good bearing for the bottom boards.

Now turn the boat upside down and put



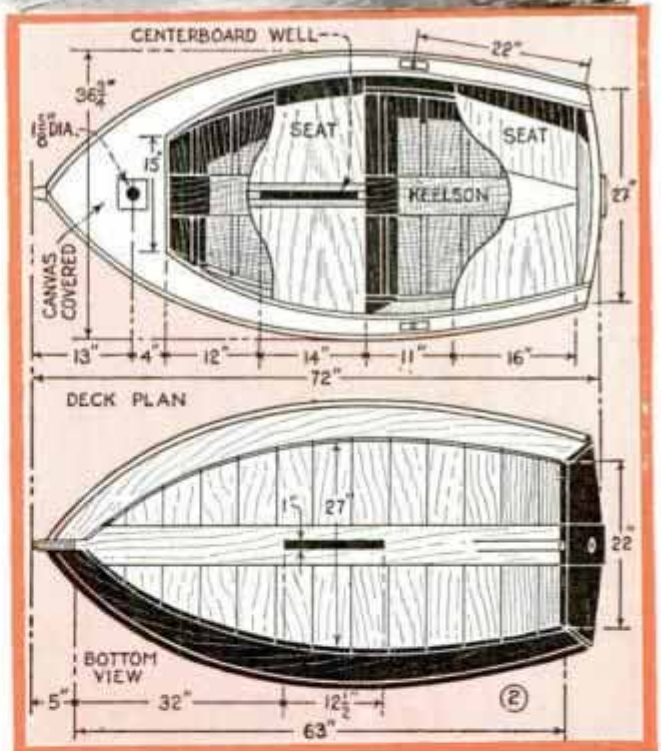
# for the Young Sailor



*Ambitious young skippers soon learn the art of sailing with this trim little craft. It can be hauled to the water on a coaster wagon, accommodates two passengers, and has all the necessary equipment of a full-size sailboat*

on the  $\frac{3}{8}$  by 5-in. bottom boards—tongue-and-groove stock. The tongues and grooves are removed by planing and the edges of the boards are beveled slightly so that when butted together a narrow V-joint is formed, which is later filled with cotton caulking and marine glue. The boards should be slightly longer than the width of the bottom so they can be trimmed evenly after they have been installed. Before nailing them down, lay a strip of muslin along the chine and coat it with marine glue to make a watertight joint.

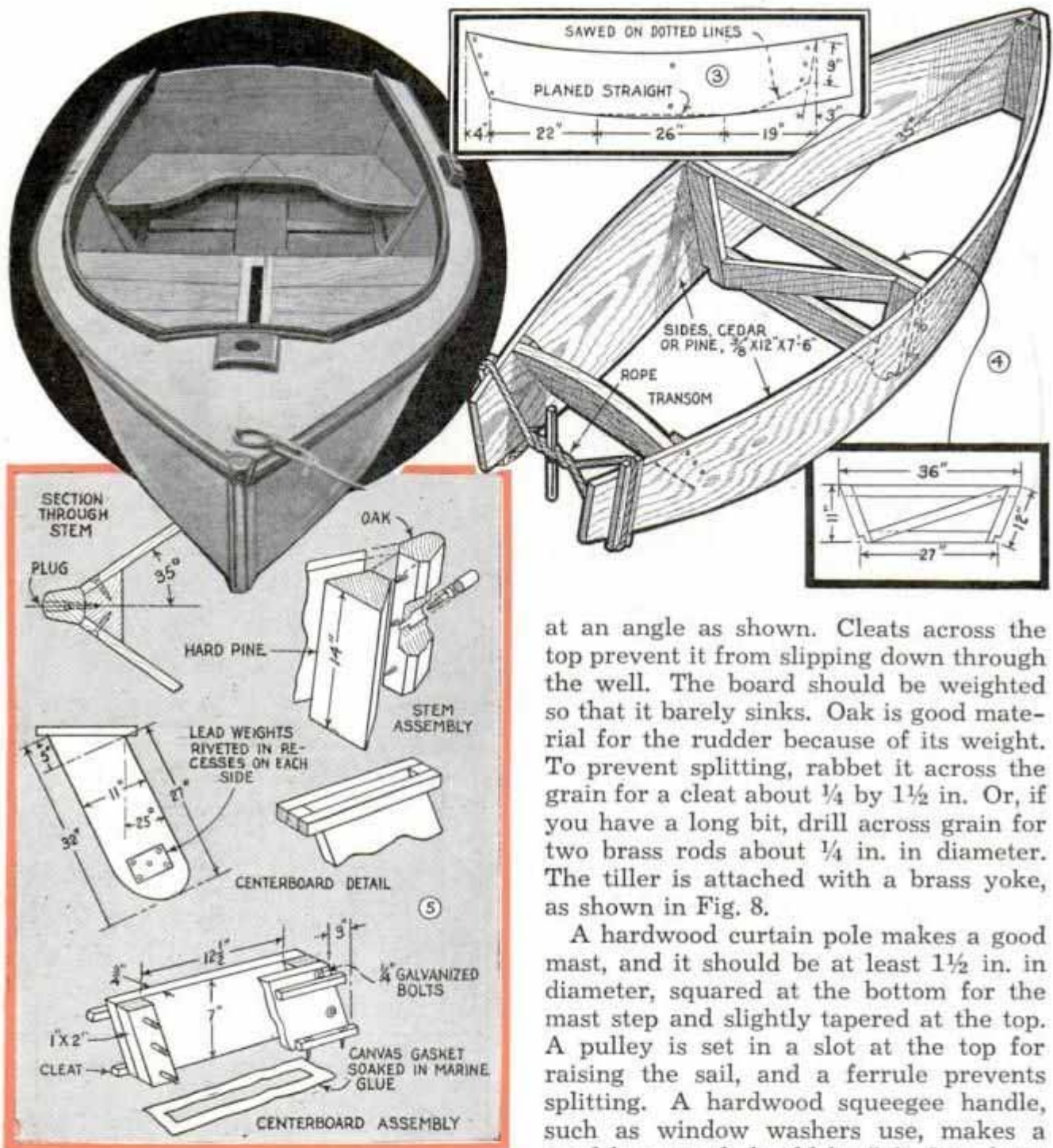
After this has been done, the boat is placed right-side up to install the keelson and battens or cleats. Use galvanized shingle nails and clinch the ends. Force cotton caulking firmly into the V-grooves with a blunt cold chisel and pour warm marine glue upon it. The keel and skeg are next. Note how the keel is sawed at the stern so that a strip continues on along the bottom of the skeg. The center cleat on the transom also has a strip continued down over the end of the skeg. Install the



ribs, inwales, deck planks and the blocks, which help support the coaming, Fig. 6. Seat risers and mast step are installed also, and a slot is cut for the centerboard. Location of this is given in Fig. 2.

The deck is laid and is covered with canvas, which is tacked along the gunwale and coaming. Molding covers the tacked





*Sides of the hull are formed from  $\frac{3}{8}$ -in. cedar planks screwed first to the stem piece, then to the transom with a spreader frame amidships*

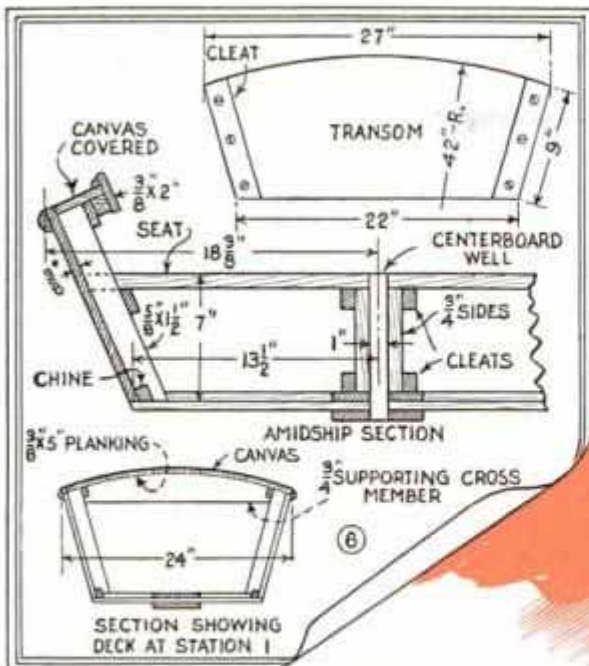
edges. The centerboard well is made as in Figs. 5 and 6, with marine glue in the joints and hardwood cleats at the top and bottom. A canvas gasket should be cut and soaked in marine glue for the joint on the keelson, and the inside of the well should be given three coats of paint before assembly. The amidships seat is built around the well as shown in the deck plan. Make the centerboard, or more accurately, the "daggerboard," of a single  $\frac{3}{4}$  by 11-in. board 32 in. long, and cut the top

at an angle as shown. Cleats across the top prevent it from slipping down through the well. The board should be weighted so that it barely sinks. Oak is good material for the rudder because of its weight. To prevent splitting, rabbet it across the grain for a cleat about  $\frac{1}{4}$  by  $1\frac{1}{2}$  in. Or, if you have a long bit, drill across grain for two brass rods about  $\frac{1}{4}$  in. in diameter. The tiller is attached with a brass yoke, as shown in Fig. 8.

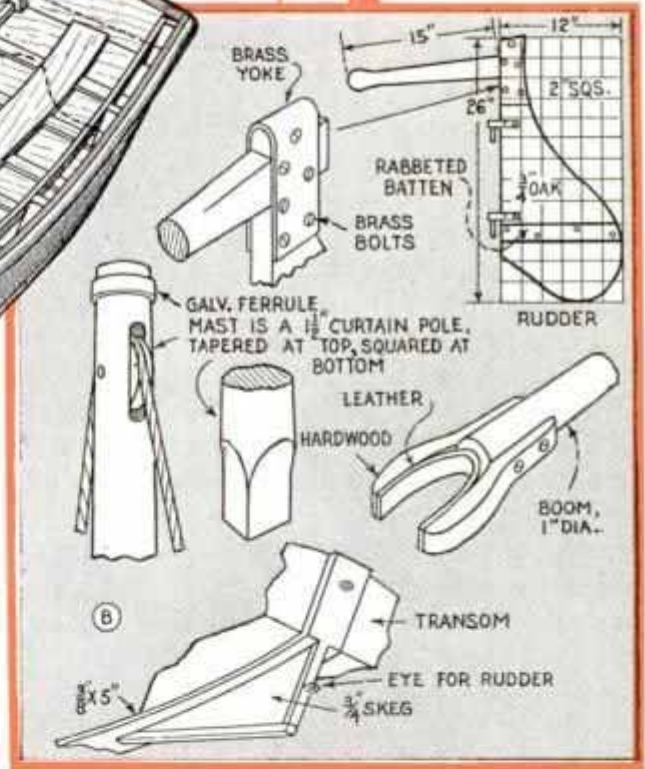
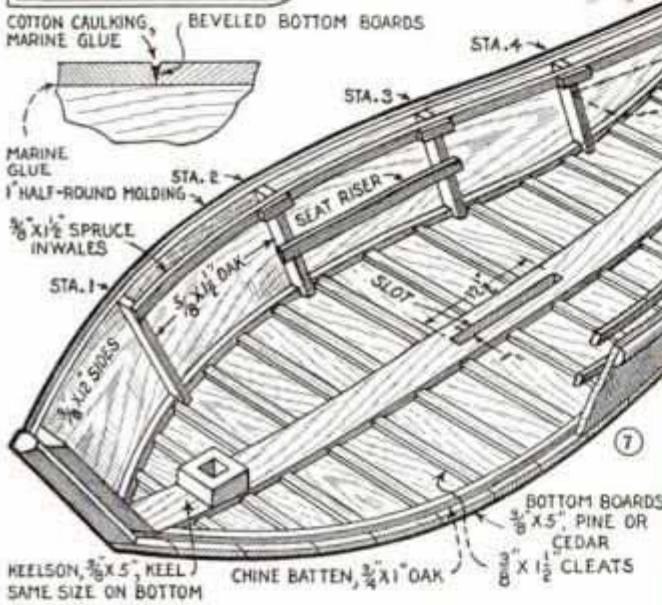
A hardwood curtain pole makes a good mast, and it should be at least  $1\frac{1}{2}$  in. in diameter, squared at the bottom for the mast step and slightly tapered at the top. A pulley is set in a slot at the top for raising the sail, and a ferrule prevents splitting. A hardwood squeegee handle, such as window washers use, makes a good boom and should be 5 ft. 6 in. long, exclusive of the yoke. This is of hardwood, lined with leather. Use small brads to fasten the leather on, and drive the heads in well. Unbleached muslin is satisfactory for the sail, which is cut as indicated in Fig. 1. Note that no rings are used, the mast and boom sliding in wide hems. The sail should be reinforced with canvas gussets at the corners and a galvanized or brass ring sewed into the peak. Spruce battens  $\frac{1}{8}$  by 1 by 24 in. are sewed into the sail at the points indicated.

With pulley, cleat, ring bolt and oarlocks installed, the boat is ready for painting. On the bottom use a copper bottom paint,





The V-joints between the bottom boards are caulked with cotton and sealed with marine glue



which comes in red or green, and give the sides two coats of white. The last coat may be an easy-brushing mixture of white lead and turpentine which will dry "chalky" and wash away slowly as the boat is used, thus keeping the hull cleaner and more attractive. All parts of mahogany and the oak tiller should be finished in their natural color with two coats of spar varnish. The centerboard and rudder are painted a bright red. A coat of green or grey is suitable for the inside.

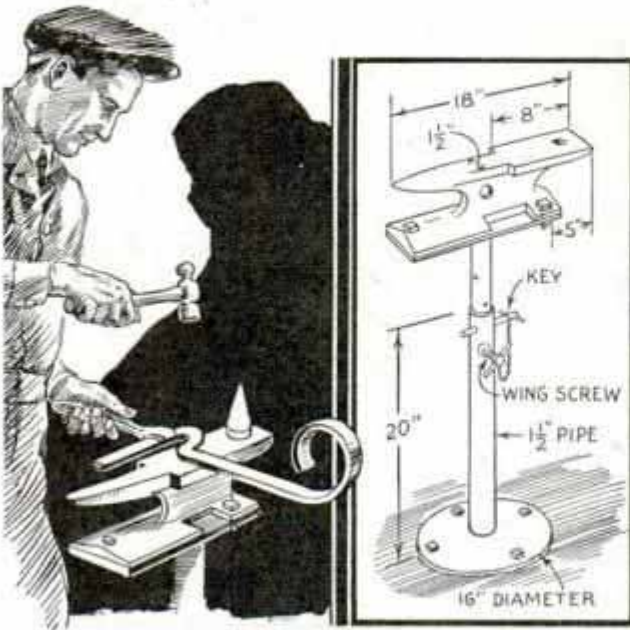
### Soap for Dry Cleaning

A soap which is soluble in naphtha and therefore can be used in ordinary dry-cleaning solutions to add to their effectiveness, is made by thoroughly mixing oleic acid (red oil), 10.7 lbs., butyl cello-

solve, 2.7 lbs., and dry-cleaners' naphtha, 2.5 lbs. This mixture is inflammable and should be heated carefully over a water bath temperature of 140° F. In another container, prepare the following solution: Potassium hydroxide, .85 lb., and water, 1.35 lbs. When dissolved, add triethanolamine, 1.97 lbs. After stirring thoroughly, this solution is heated to 140° F. and poured into the first solution while stirring vigorously. The stirring should be continued leisurely until an even and fairly clear solution is obtained.



## Anvil Mounted on Pipe Standard Is Adjustable in Height



Made from a section of railroad rail, this anvil will be found handy for a variety of light work

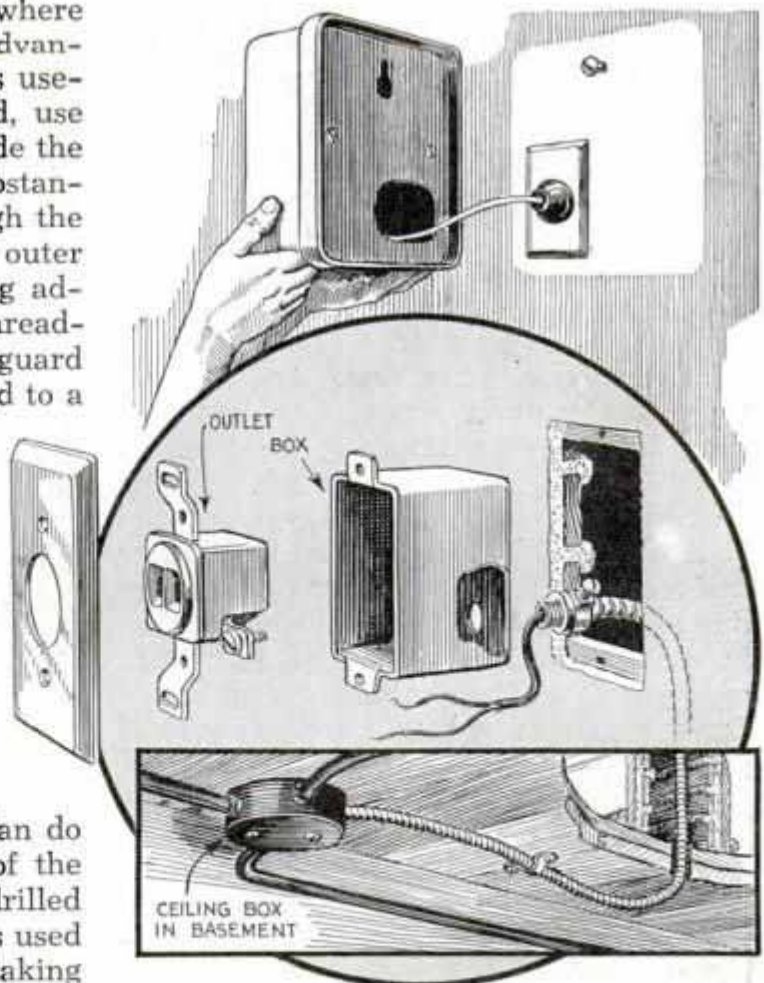
Mounted on a stand which is securely bolted to the floor, this anvil was made from a piece of rail. Note the long, projecting flat end, the narrow center where U-bolts and clips can be bent to advantage, and the slender horn, which is useful in forming rings. For the stand, use two lengths of pipe, one to slide inside the other, and weld the column to a substantial base. Drill pairs of holes through the inner pipe and one pair through the outer one to receive a key pin, permitting adjustment for height. A wing screw, threaded into a boss on the stand, is a safeguard against vibration. The anvil is bolted to a piece of  $\frac{3}{16}$ -in. sheet stock welded to the top of the standard.

## Connecting Electric Clock to Conceal Cord

Why run the cord from an electric wall clock to a baseboard plug when a much neater installation can be made by providing a wall outlet directly behind the clock? It's best to have an electrician do the work. After marking the size of the outlet box on the wall, holes are drilled and an old fine-tooth, keyhole saw is used to cut through plaster and lath, taking care to avoid chipping the plaster outside of the space marked. Then, from the

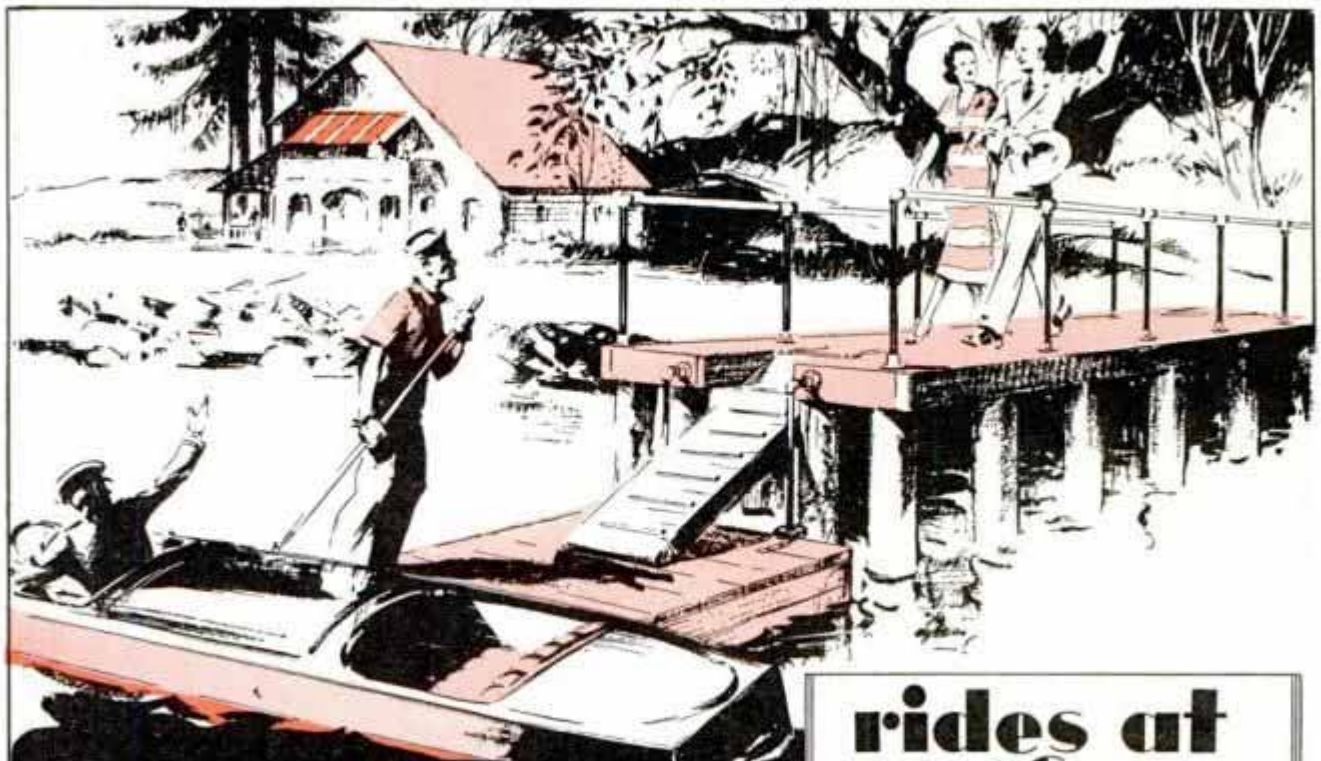
basement, a hole is bored up through the subfloor and partition plate, exactly between the same studs where the hole has been cut in the wall above. Next, one end of a length of furnace chain is dropped into the wall hole, this end being "hooked" from below with a 12-in. length of wire, and brought through the hole. With the chain, a length of flexible metal-covered cable, with the rubber-covered wires extending about 6 in. from the metal at each end, can be pulled up through the partition. The cable should extend from the wall box to an outlet box in the basement. Then the wall box is permanently installed; it can be held in place either with special spreaders for the purpose, which hook behind the plaster on each side of the box and are then drawn up tightly by means of a screw, or the box can be attached to the lath with screws through the lugs. Then the flush receptacle is installed and lastly, after turning off the main switch, connections are made and soldered at the basement outlet box.

—J. E. Dekker, Chicago.



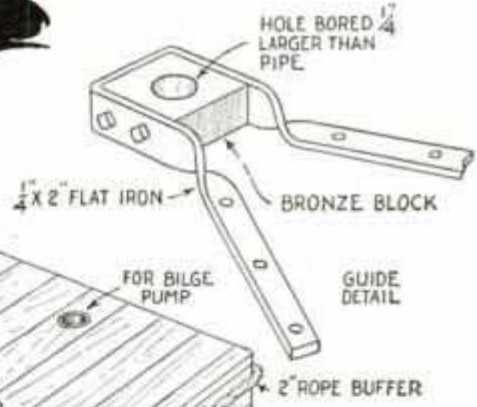
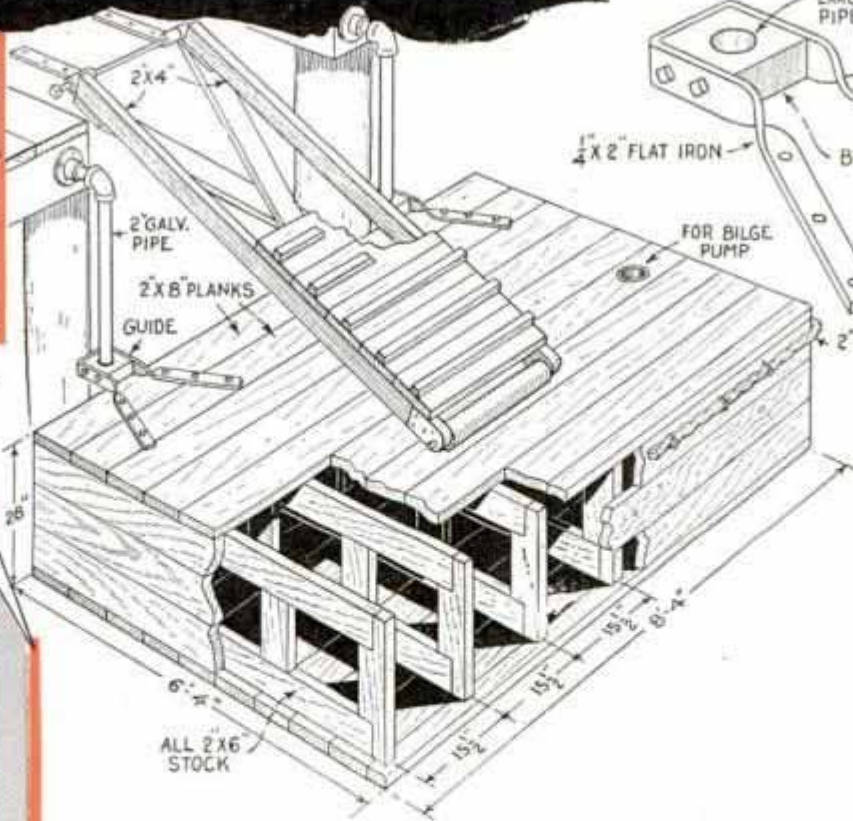
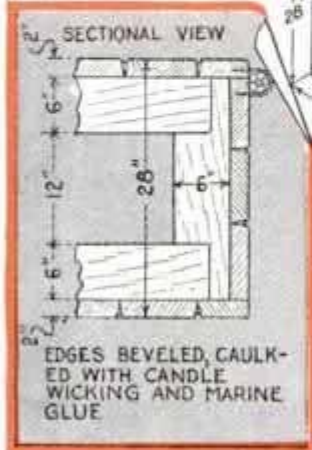
It's no trick to run an armored cable from the basement to a flush receptacle hidden behind the clock





# floating BOAT PIER

rides at uniform height.



Whether this pier is located on a river, lake or on salt water, it will rise and fall with the water level, which makes boat landing convenient. To tow it away for beaching during winter, simply unbolt the guides attached to the dock



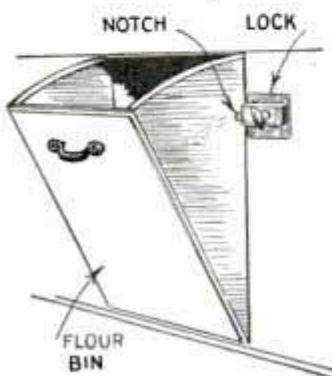
## Float for the Young Fisherman Resembles Boat



The flag on this fishing float rises suddenly when a fish takes the bait

Many fishermen like to take their young sons along on a trip to teach them the clean, healthful sport of angling, but the experiment often ends in failure because the boys cannot sit still very long waiting for a bite. A float or bobber resembling a toy boat with a flag that raises when a fish bites has been found successful in preventing interest from lagging. A boat 6 or 8 in. long, sawed out of a couple of wood blocks and rigged up as shown, will do the trick. Set the flag so that it balances perfectly. It must stay down when the line is in the water. A pole is unnecessary; just tie a line to the boat and let it drift.—Edward Drake, Chicago.

## Tilting Flour Bin Held Open by Night Latch

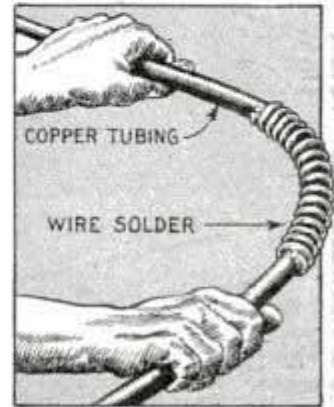


If you have an old night latch at hand, it can be used to keep a tilting flour bin open. Just screw it onto the cabinet directly beside the bin, locating it so that the bolt will be pushed back as

the bin is pulled forward. Then drill a hole for the bolt to drop into when the bin is in the open position. It's a good idea to provide a piece of sheet metal on the side of the bin for the end of the bolt to bear against so that it will not scrape on the wood. A turn of the lock will release the bin.—M. J. Jung, Minneapolis, Minn.

## To Bend Copper Tubing

To bend a length of small copper tubing at an angle, without causing it to kink or break, first wrap it tightly with wire solder as indicated. The coil of solder will bend with the tube so that it will keep its shape.



## Padded Thimble Easy on Finger



Should your thimble make your finger sore when you sew, get one that is a little large and line it with thin felt. Rubber cement or any of the various household cements on the market can be used to hold the felt in place.

## 'Gathering' Thermometer Liquid

When the column of liquid in a thermometer separates, it may be brought together by packing the bulb in Dry Ice. This will draw all the liquid down into the ball, and is much safer than attempting to gather the liquid by shaking or heating it, which may burst the glass.



—C. E. Packer, Chicago.



*Julien P. Frey & Sons,  
63 Baltimore St. and*

# Wind-Velocity GAUGE

**Carried in Your Pocket**

THIS little instrument, commonly called an anemometer, will tell you the speed of the wind at a glance. As it is small enough to be carried in a pocket, it is especially useful to sailors and riflemen. Questions of reefing or windage allowance need not be in doubt when it is used.

The working parts, Fig. 2, consist of a screened wind tunnel, a moving vane suspended on a fine torsion wire, and a pointer and scale. The wind tunnel, Fig. 3, is a 1 $\frac{3}{4}$ -in. length of brass tubing, 2 in. in diameter. A slot,  $\frac{1}{4}$  in. wide and 1 in. long, is cut in the wall of the tube. This provides an opening for the pointer which is shaped from a 4 $\frac{1}{4}$ -in. strip of bamboo. The pointer is fastened to a mica vane with ambroid cement as in Fig. 2. Now before you go farther, make up the bearings and pivot points detailed in

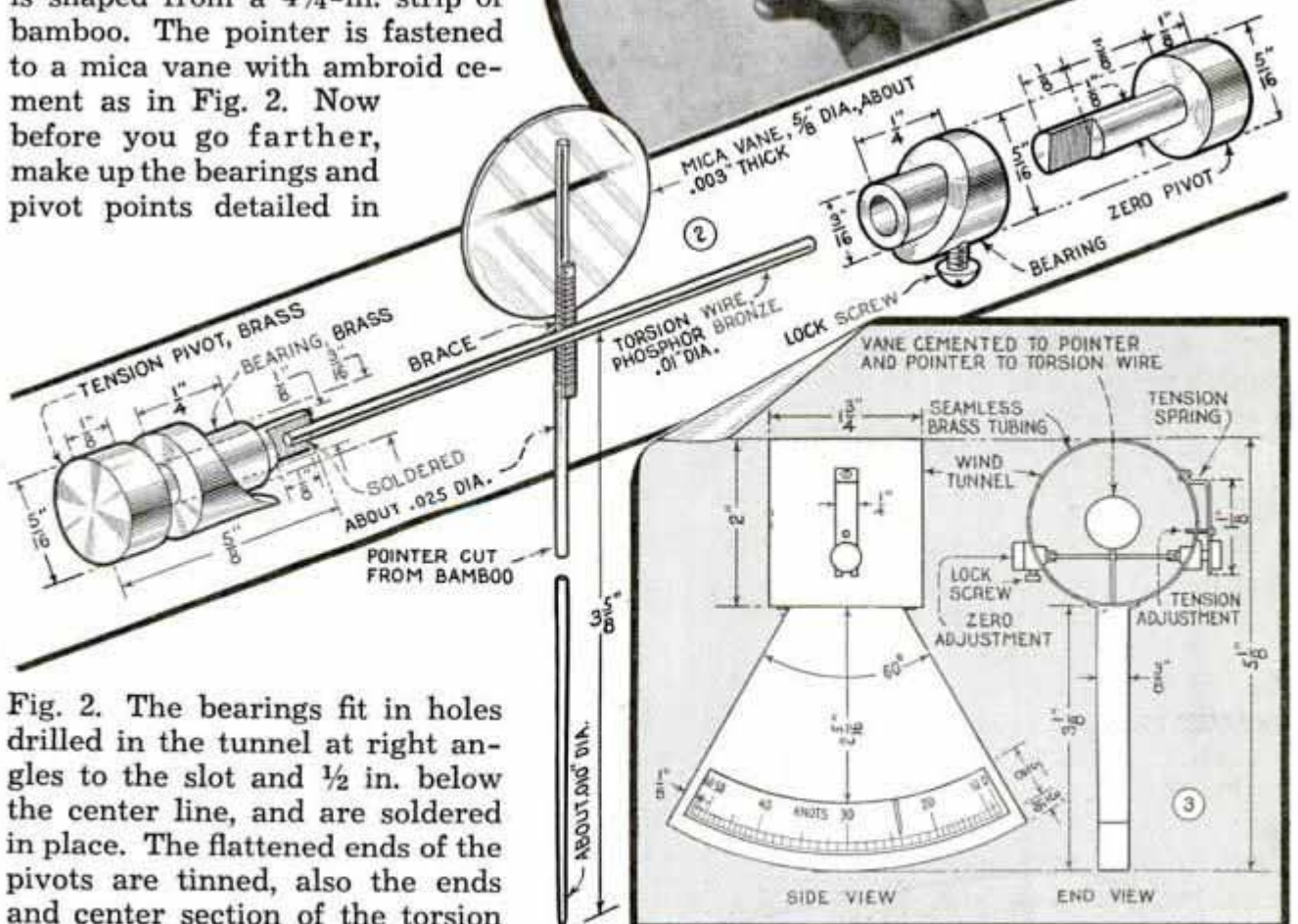
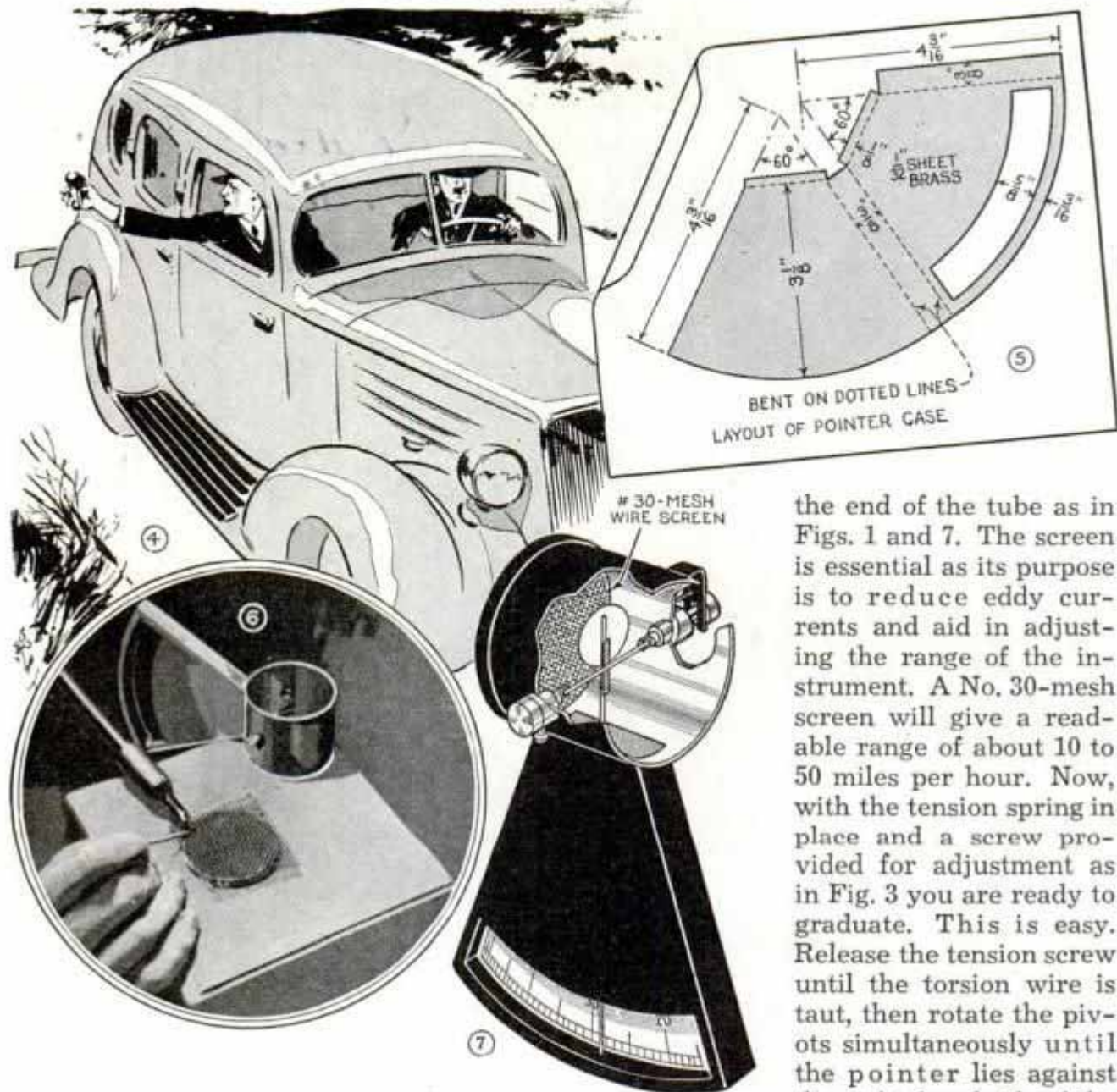


Fig. 2. The bearings fit in holes drilled in the tunnel at right angles to the slot and  $\frac{1}{2}$  in. below the center line, and are soldered in place. The flattened ends of the pivots are tinned, also the ends and center section of the torsion





the end of the tube as in Figs. 1 and 7. The screen is essential as its purpose is to reduce eddy currents and aid in adjusting the range of the instrument. A No. 30-mesh screen will give a readable range of about 10 to 50 miles per hour. Now, with the tension spring in place and a screw provided for adjustment as in Fig. 3 you are ready to graduate. This is easy. Release the tension screw until the torsion wire is taut, then rotate the pivots simultaneously until the pointer lies against the right-hand side of the

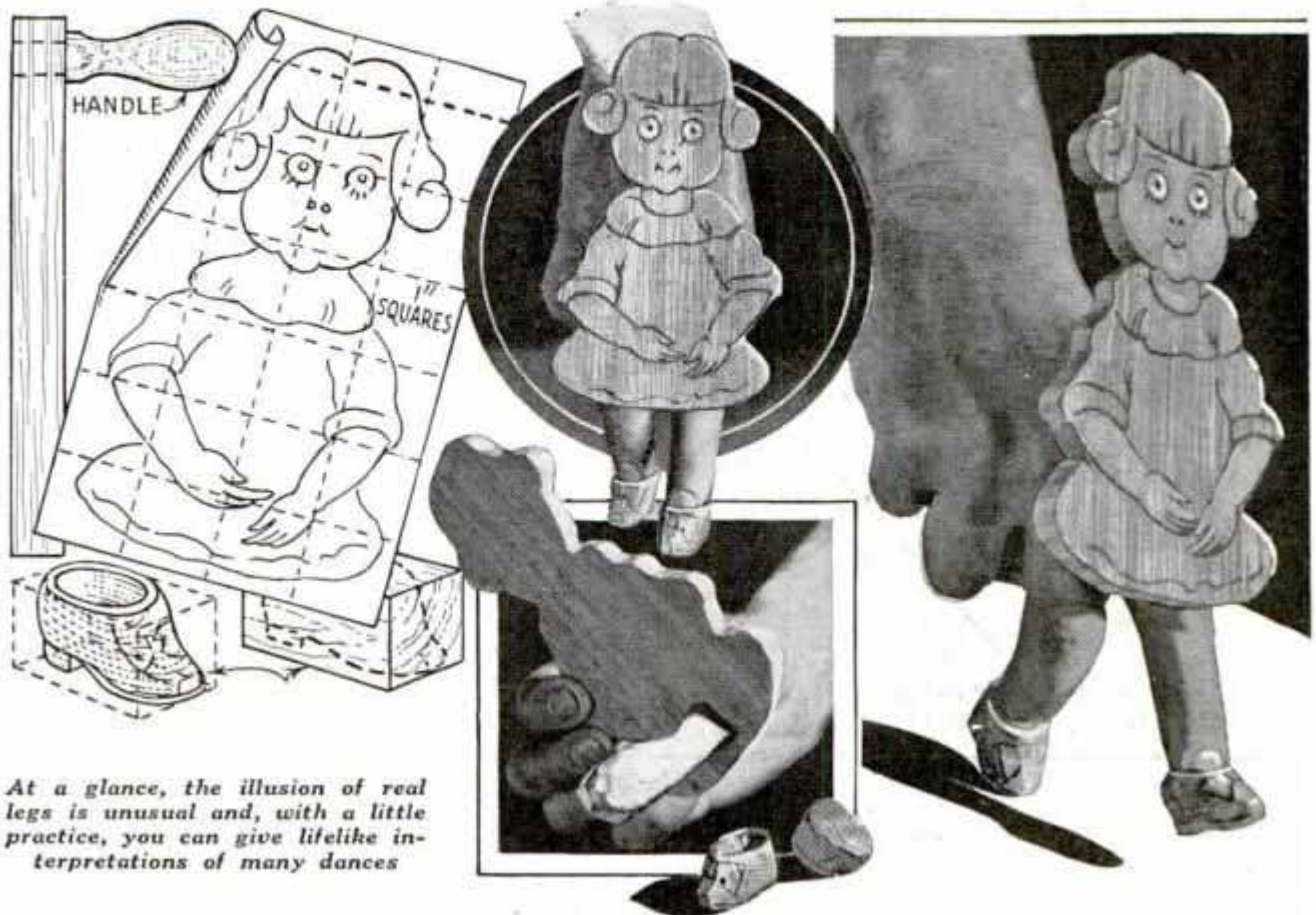
wire. A short strip of brass is soldered to the torsion wire, and to this the bamboo pointer is lashed with fine silk thread wound in ambroid cement as in Fig. 2. Then the pivots are set in the bearings and the torsion wire is soldered to the flattened ends.

Next, the pointer case is cut out as in Fig. 5, and a piece of blank paper glued to the back opposite the pointer window. The case is bent to shape and soldered to the tunnel tube in such a position that the pointer is free to move through a  $60^\circ$  arc without touching the case at any point. A strip, of the same material as the case, is soldered on the bottom. You finish the assembly by soldering a piece of No. 30-mesh wire screen to a brass ring made with a lap joint as in Fig. 6. This fits over

case. Tighten the lock screw. Have a friend drive the car on a calm day at various steady speeds, while you hold the meter as in Fig. 4. Note the positions of the pointer at various speeds with pencil marks on the paper inside the pointer case. While this is being done, it is necessary to check the car speeds carefully so that you make no error in the graduation. It is advisable to drive on a road where a given car speed can be maintained constant for a sufficient interval of time to enable you to be sure of the position of the pointer. When the record is complete, ink the scale and cement a piece of celluloid over the pointer-case window to protect the paper scale. The adjustments should not be changed at any time after graduating the instrument.



# Jigging Puppet Uses Your Fingers for Legs



*At a glance, the illusion of real legs is unusual and, with a little practice, you can give lifelike interpretations of many dances*

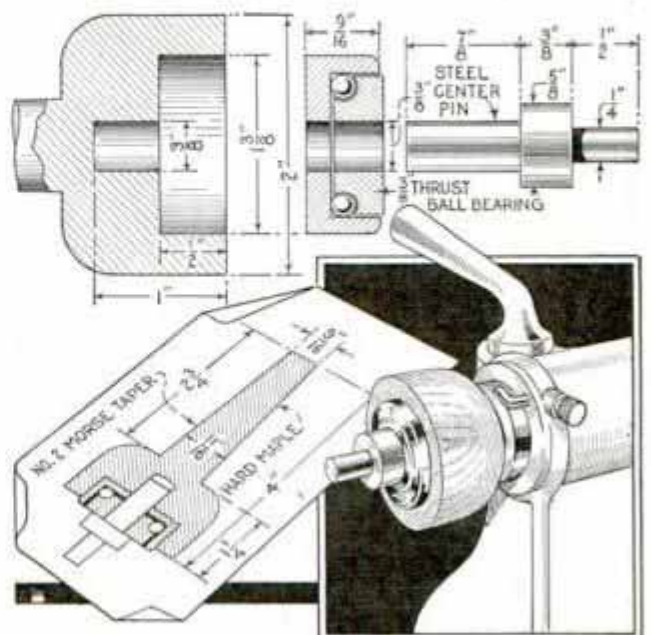
Just a simple jigsawed cutout of  $\frac{1}{4}$ -in. plywood, with hands and face outlined in pencil on one surface, this doll walks with the aid of legs formed by the first two fingers of your hand. Two shoes are carved from small blocks of wood and recessed

to fit tightly on your finger tips. A short handle glued to the back of the doll, as shown in one of the photos, wedges between the fingers and supports the figure. Hands, arms, face, eyes and clothing are easily outlined with black paint.

## Ball-Bearing Lathe Center Handles Metal-Spinning Jobs

For spinning metal in your home workshop lathe, and for some special jobs in wood turning, you will need a rotating tailstock center, fitted with a ball thrust bearing. Such a center can be made from a block of hardwood, an inexpensive thrust bearing and a short length of  $\frac{5}{8}$ -in. steel rod from which the center pin is made. By turning down the wood block to the dimensions indicated, you get both an arbor and a housing for the thrust bearing. The latter should be a snug fit in the housing, which is counterbored for the center pin. You can get the correct taper on the center to fit the lathe by carefully turning it to the measurements of the regular center and then sanding it to a smooth finish.

—Willy Schmidt, Chicago.





## Lettering Guide Quickly Adjusted to Any Height



Guide lines are eliminated and uniform work is assured when you use this lettering guide

Made from two rulers and a couple of sheet-metal strips, this guide assures uniform lettering and saves time as it is unnecessary to rule guide lines, which must be erased when the work is finished. The sheet-metal strips are riveted loosely near the ends of the ruler while holes, bored in the other ruler in a position corresponding to that of the rivets, carry small bolts or machine screws, which slide in the slotted strips. Wing nuts on the bolts lock the adjustment when the guide is set.

—W. H. Neufeld, Gretna, Man., Can.

## Installing New Window Shades

When you buy new window shades, it is a good idea to get them about 9 in. longer than the window casing. Then, after they have been pulled down, there will still be enough material on the rollers to ease the strain on the tacks and avoid tearing.

# Plenty of Fun at a Safe Speed



*This small car, having a 58-in. wheelbase and 28-in. tread, is very easy to operate and may be powered by a 1/2 to 3/4-hp. gas engine of the washing-machine type. It is equipped with effective brakes and pneumatic tires. Plans show three alternate methods of body construction. Easy to build. Our blueprints Nos. 906 to 909 incl. give you all the information necessary. This set will be sent postpaid on receipt of \$1.00.*

**"ROAMER"—765 to 770:** Outboard cabin cruiser. 16 ft. long, 66 in. beam. Requires outboard motor of 20 to 36 hp. Set of six prints \$1.00.

**12-FT. ROWBOAT—707:** Flat bottom. Can be used with small outboard motor. 25c.

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**LAWN CHAIR—529:** Plain sawed from 3/4-in. stock. Easily made with hand tools. 25c.

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**VENETIAN BLINDS—926 and 927:** Three different styles covered on two prints. 50c.

**LAWN AND GARDEN FURNITURE—920 to 922:** Collection of designs for arbor-and-seat combinations and swings. (3 prints) 75c.



*Any six of these blueprints will be sent postpaid upon receipt of \$1.00. For an additional 12c we will include a copy of our 80 pp. booklet, "What to Make," which completely describes Popular Mechanics plans, besides giving valuable information on where to obtain hard-to-get materials, how to read blueprints, saw filing, etc.*

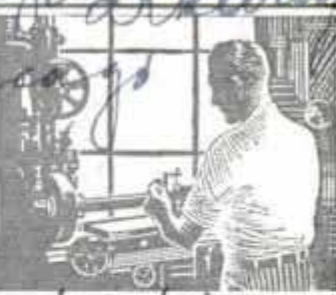
**POPULAR MECHANICS MAGAZINE, 200 East Ontario Street, Chicago**



*Aluminum Co.  
- Allen L. & Johnson,  
2442 S. Parkway  
Chicago*



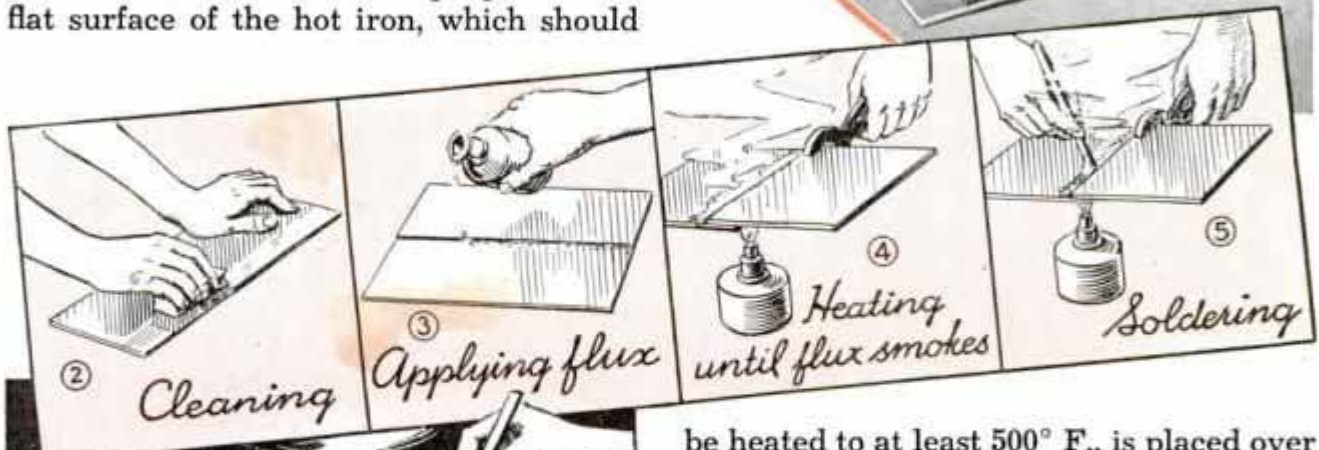
# SHOP NOTES



*2241 S. Indiana*

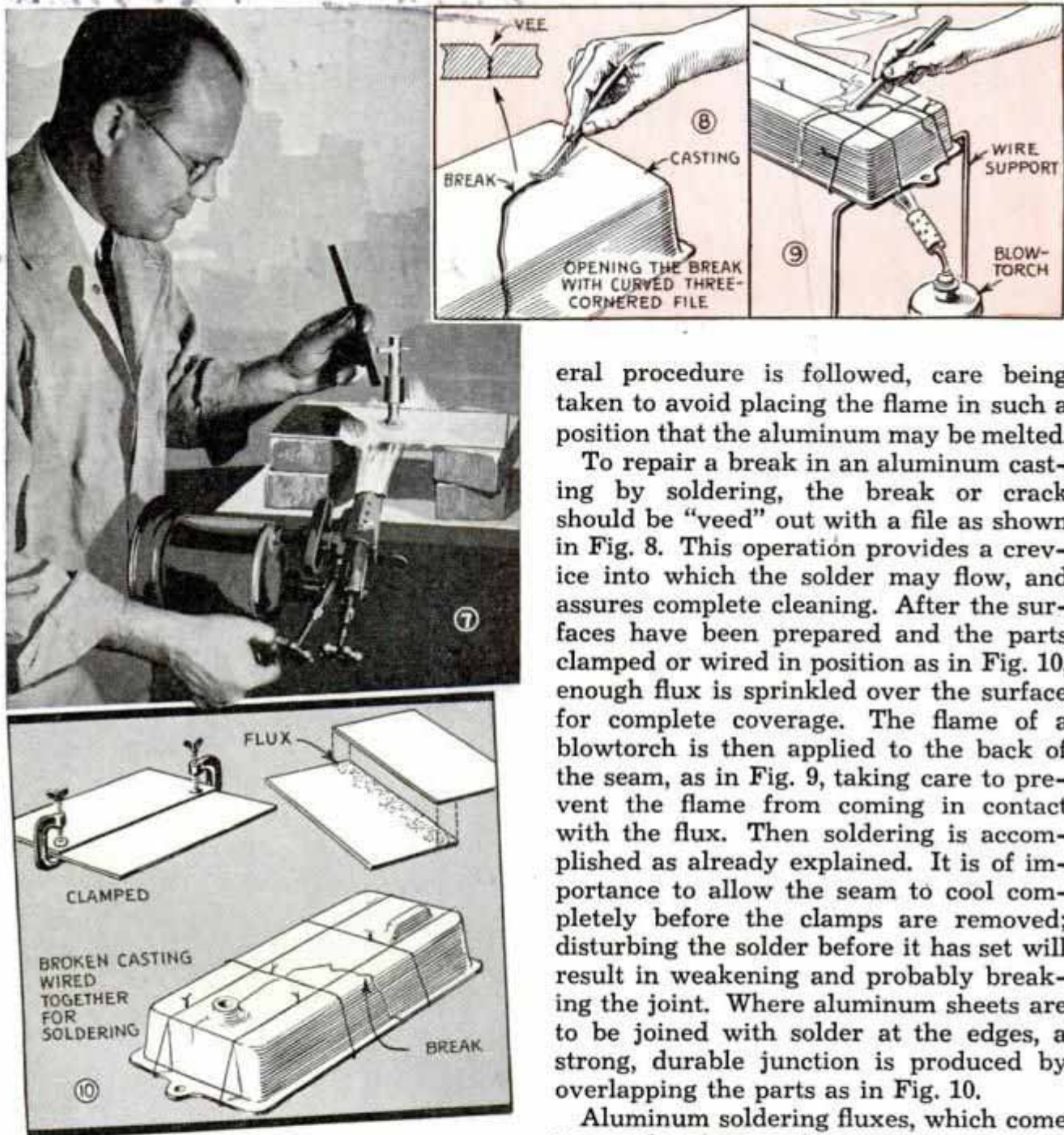
# SOLDERING ALUMINUM

**E**ITHER ordinary or special aluminum solder can be made to adhere to aluminum with ease if the metal is properly cleaned and a flux is used that will chemically react with the surface film of corrosion or oxide. An aluminum article to be repaired is first thoroughly cleaned of all grease and dirt and then the surface to be soldered is scratched with a stiff wire brush as shown in Fig. 2, to remove the surface oxide which is always present on aluminum. Therefore this step is highly essential in all cases. Immediately after scratch-brushing, special aluminum soldering flux is sprinkled over the cleaned surface, Fig. 3, and a very large, hot soldering iron is applied. Electric soldering irons of ordinarily available sizes are useless on aluminum and accordingly cannot be recommended for this purpose. The flat surface of the hot iron, which should



be heated to at least 500° F., is placed over the point where the solder must flow, and is held in this position until the flux boils vigorously and gives off smoke, which is the indication that the last traces of oxide are being removed chemically. Heating of the work can be accomplished effectively also by means of a gasoline torch or a small alcohol lamp as in Figs. 4 and 5. In





many cases, you can even do the work over a gas plate as in Fig. 6. But no matter what method of heating you use, it is important to wait until the flux smokes, and not before, to apply the solder. If an iron is used, the solder is applied to the iron and allowed to flow from it onto the surface of the metal, without moving the iron. After tinning, added quantities of solder may be applied in the usual manner to fill holes, cracks and crevices. Should a poor job of tinning result, the fault lies in the cleaning operation, which should be repeated. When a blowtorch is employed for heating as in Fig. 7, which is preferable on large work, the same gen-

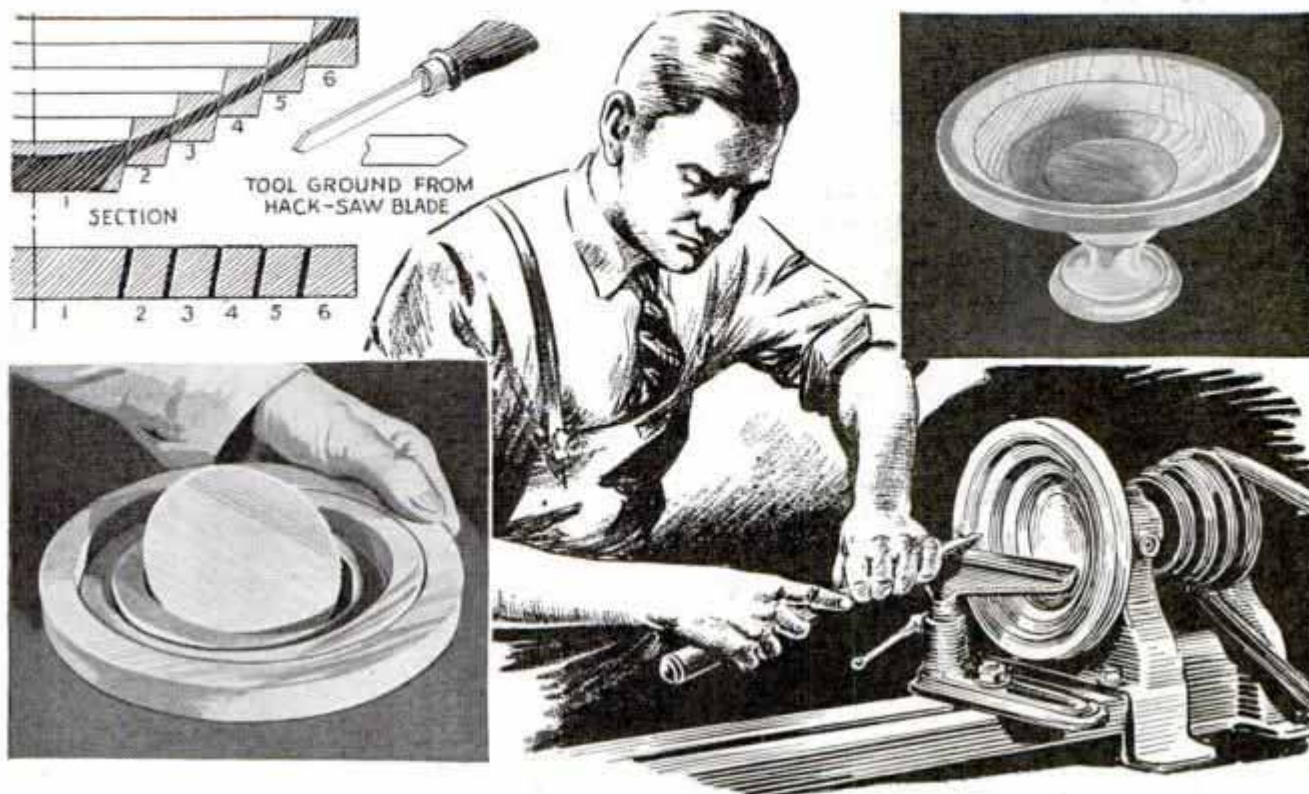
eral procedure is followed, care being taken to avoid placing the flame in such a position that the aluminum may be melted.

To repair a break in an aluminum casting by soldering, the break or crack should be "veed" out with a file as shown in Fig. 8. This operation provides a crevice into which the solder may flow, and assures complete cleaning. After the surfaces have been prepared and the parts clamped or wired in position as in Fig. 10, enough flux is sprinkled over the surface for complete coverage. The flame of a blowtorch is then applied to the back of the seam, as in Fig. 9, taking care to prevent the flame from coming in contact with the flux. Then soldering is accomplished as already explained. It is of importance to allow the seam to cool completely before the clamps are removed; disturbing the solder before it has set will result in weakening and probably breaking the joint. Where aluminum sheets are to be joined with solder at the edges, a strong, durable junction is produced by overlapping the parts as in Fig. 10.

Aluminum soldering fluxes, which come in powdered form, have the property of taking up moisture rapidly from the atmosphere and becoming useless. Therefore the container must be kept tightly closed at all times, except when it is being used. Flux, which has taken on moisture, is very difficult to use and in many cases entirely useless. Also, as the fluxes used for soldering aluminum are all somewhat corrosive if left in contact with the metal, the finished job should be thoroughly cleaned after soldering. Ordinary water may be used for this purpose. After removing the excess flux, the finished surface may be filed flush with the surrounding surface. On irregular work use emery cloth to finish the joint.



# Bowls Formed with Telescoping Wood Rings



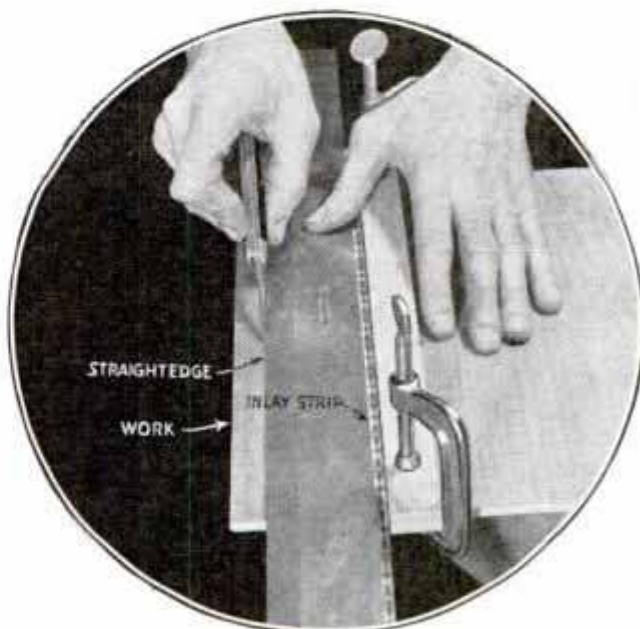
Wooden bowls can be turned easily from a single disk of  $\frac{7}{8}$ -in. hardwood. First, you make a parting tool from an old hack-saw blade and fit it with a handle as shown. Then mount a disk of hardwood on the lathe faceplate and turn down to the diameter you want the bowl. Now, with the improvised parting tool you make a series of equally spaced cuts on the face of the disk, running these very nearly

through at an angle of about 7 degrees. A single, light cut across the back of the disk will remove the rings thus formed. The work is then taken off the faceplate, glue is spread on the edges of each ring, and they are slipped one inside the other, telescope fashion. Forcing the rings apart binds the beveled edges tightly. When the glue is dry, the work is again mounted on the faceplate and turned to form.

## Grooves Cut in Wood Surface Accurately for Strip Inlays

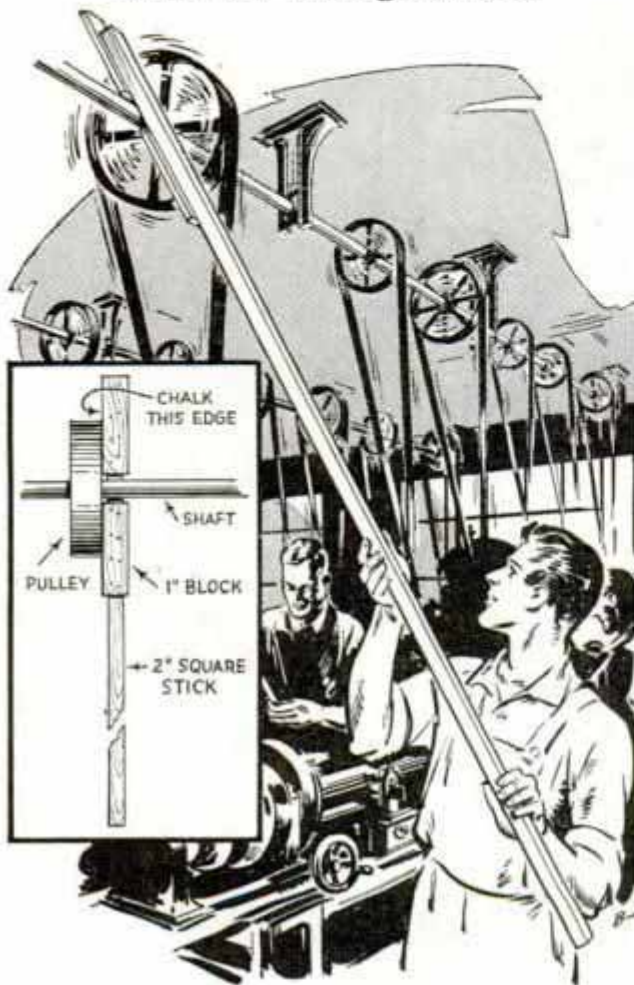
Here is an accurate method of marking off grooves in wood for strip inlaying. With the aid of a straightedge, I make the first knife cut at the correct distance from the edge of the work. Then, holding the straightedge firmly in this position, the inlay strip to be used is butted against the rear side and another straightedge is butted firmly against the strip and clamped in place. To make the second cut for the groove, the inlay strip is removed and the two straightedges are pushed together. If the loose straightedge does not slip and the knife blade is held against it in the same position to make both cuts, the groove will be exactly the same width as the inlay strip.

—Thomas E. Owens, Cleveland, Ohio.





## Line-Shaft Pulleys Measured Without Using Ladder



*Diameter of ceiling pulley found by holding chalked edge of stick against it as it rotates*

Before changing the source of power in a large plant, it was necessary to measure the diameter of the line-shaft pulleys. To do this two pieces of wood were nailed to one side of a long, square stick, spacing the abutting ends to straddle the shaft snugly. One edge of the wood pieces was chalked, after which they were held against a rotating pulley as shown. The diameter was readily found by measuring between the two marks made by the pulley on the chalked surface.

## Form to Lead Cast-Iron Joints

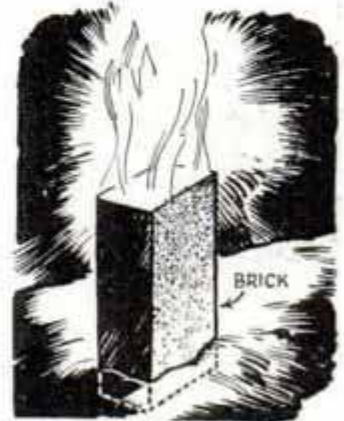


If you have a small job of laying cast-iron pipe and do not have a regular form for filling the joints with lead, one can be improvised

from a piece of auto tire about 1 in. wide. Clamp the rubber over the joint by tying the beads together with a wire as shown, leaving an opening between them in which to pour the lead.

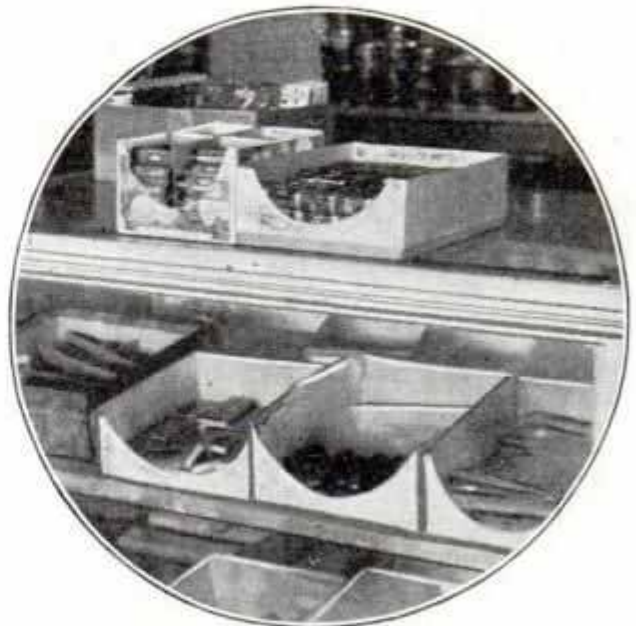
## Warning Flares Are Bricks Soaked in Kerosene

Lacking sufficient flares for safety beacons on a large construction job, one contractor used a number of common bricks, which had been soaked in kerosene. When set on end in the ground, as shown, and ignited, they burned with a bright flame for several hours.—G. E. Hendrickson, Argyle, Wis.



## Cutaway Boxes Sell Candy

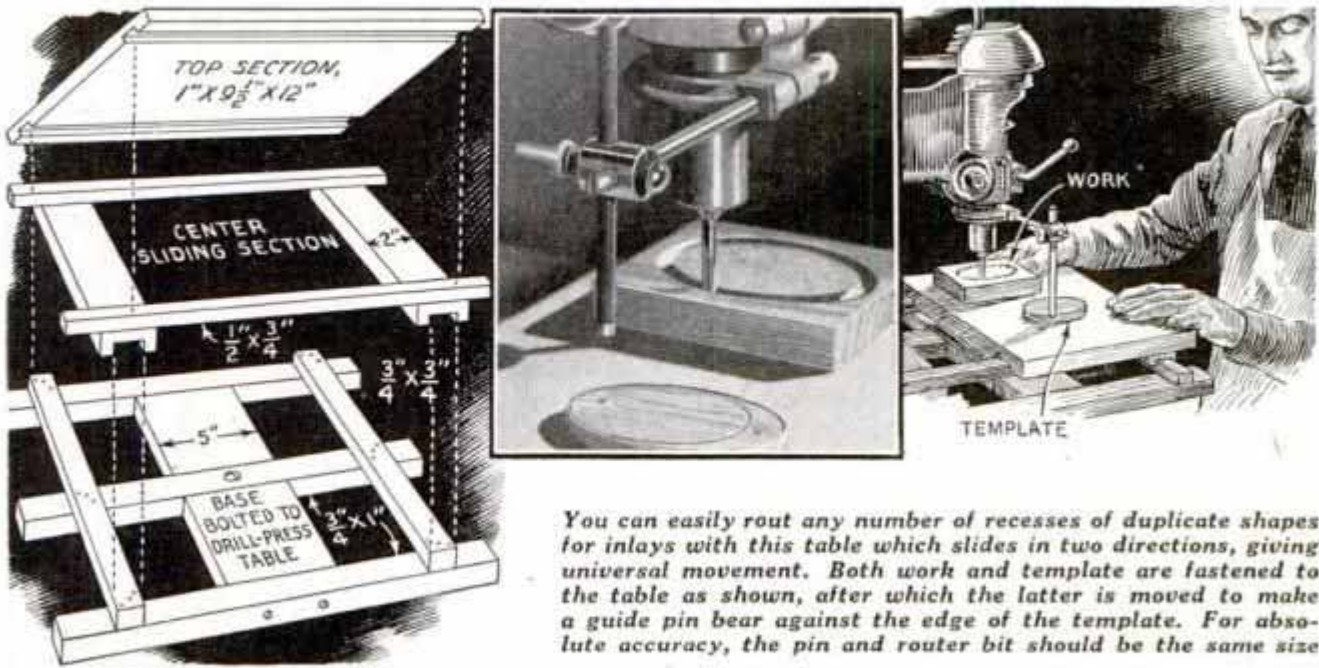
Store owners can increase the effectiveness of their candy displays by cutting away the front of half-empty boxes so that customers can get a better view of the contents. Uniformity in appearance is obtained by using the semi-circular piece removed from one box as a template when cutting the others.



*An Arizona storekeeper alters candy boxes in this manner to give display more attention value*



# Duplicate Routing on Drill Press from Pattern



You can easily rout any number of recesses of duplicate shapes for inlays with this table which slides in two directions, giving universal movement. Both work and template are fastened to the table as shown, after which the latter is moved to make a guide pin bear against the edge of the template. For absolute accuracy, the pin and router bit should be the same size

## Lettering on Wood Signs Produced in Relief by Burning

It's a simple matter to make these novel signs, which will attract attention and arouse the curiosity of many as to how the burned effect was produced. The secret lies in laying off the letters and then coating them with asbestos paint. When the flame of a blowtorch is directed against

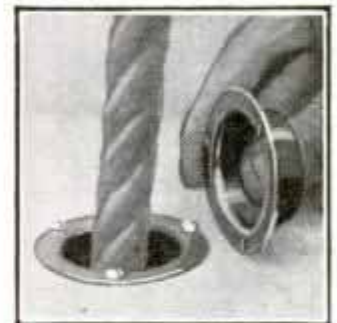
the sign, or it is held over a fire, the wood around the letters chars deeply, while the letters, protected by the paint, remain unburned and stand out in bold relief. The asbestos paint can be removed and the letters enameled, bronzed or finished in any way desired. If the sign is to be exposed to the weather, it's a good idea to protect the charred portion with two coats of clear lacquer.



Lettering coated with asbestos paint is untouched while surrounding wood surface is deeply charred

## Non-Chafing Thimbles for Ropes

When ropes used in the operation of elevators and conveyors pass through a wall or floor, curtain-rod sockets, of the type shown, make good thimbles to shield the ropes where they pass through the holes. The sockets are made of smooth, strong metal, and will take a rope up to 1½ in. in diameter. They can be used on each side of the hole if necessary.

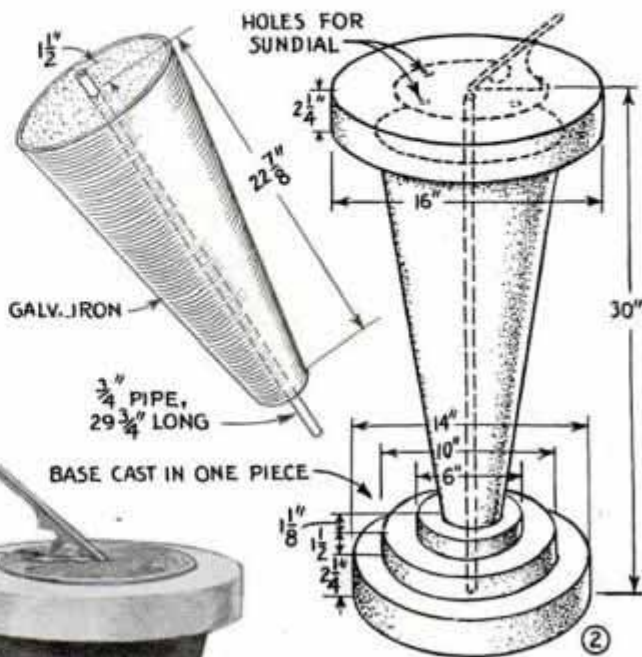


After scoring glass with a regular cutter, break it under water. This usually results in a "clean" fracture.



no no. 8?

# BIRD BATHS and

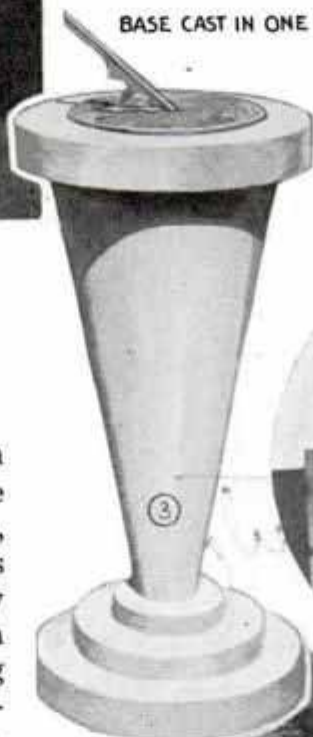


## PART III

### Casting Round, Fluted and Tapered Columns

**C**OLORED cement has opened up a new and interesting field to the home craftsman, who can cast durable, attractive garden ornaments, such as bird baths, sundial pedestals and many other objects of a similar nature, with very little expense. To speed up setting and curing you can add a small quantity of calcium chloride to the mix, which will cause it to set sufficiently overnight so that the form or mold can be removed.

The cone-shaped sundial pedestal, shown in Fig. 3, is especially suited to the use of colors. A pastel shade of green on the top and base with a blending of greens and yellows on the cone-shaped standard is effective. This effect is obtained by simply applying white cement to which enough mineral color has been added to produce the desired shade. Blending is accomplished by brushing patches of a contrasting color over a wet coat. It is advisable to cover the freshly painted work with burlap or canvas, Fig. 9, as soon as the color has set enough so that it will not run when water is applied. The piece should be wetted down thoroughly and the burlap kept damp for a day or two to assure a good bond. Fig. 2 gives the general dimensions of the three units that make up the pedestal. These

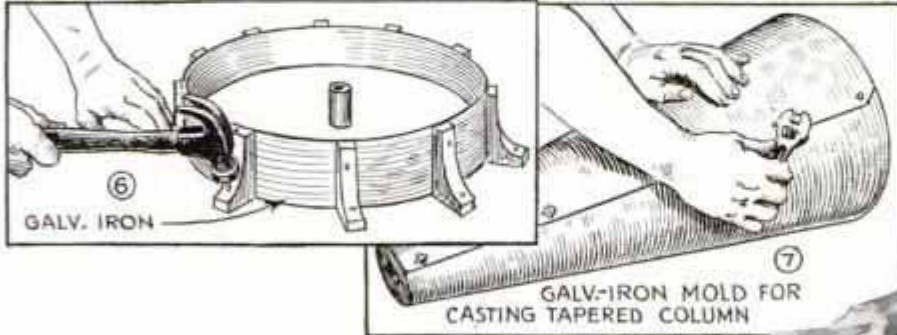




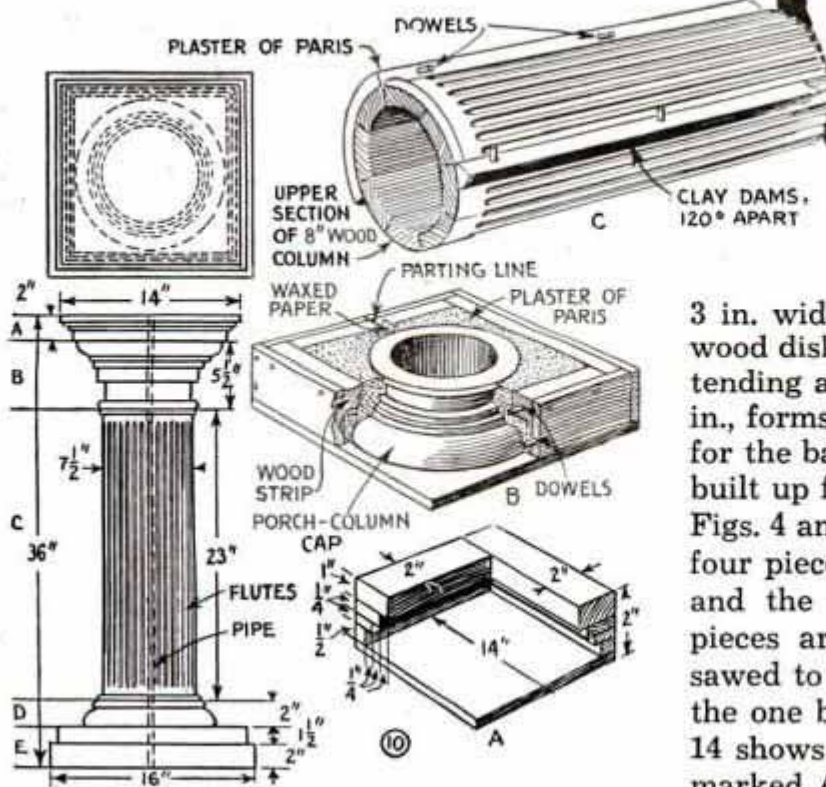
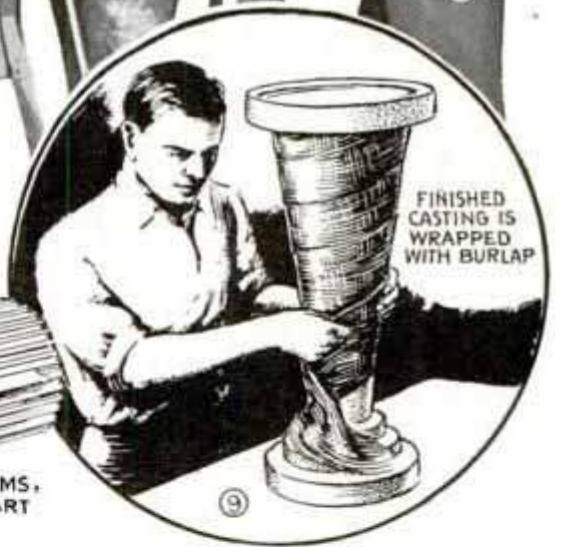
see July 19 36, 1936  
*Archives of Mineral Colors*

# SUNDIAL PEDESTALS

*in Colored Cement*

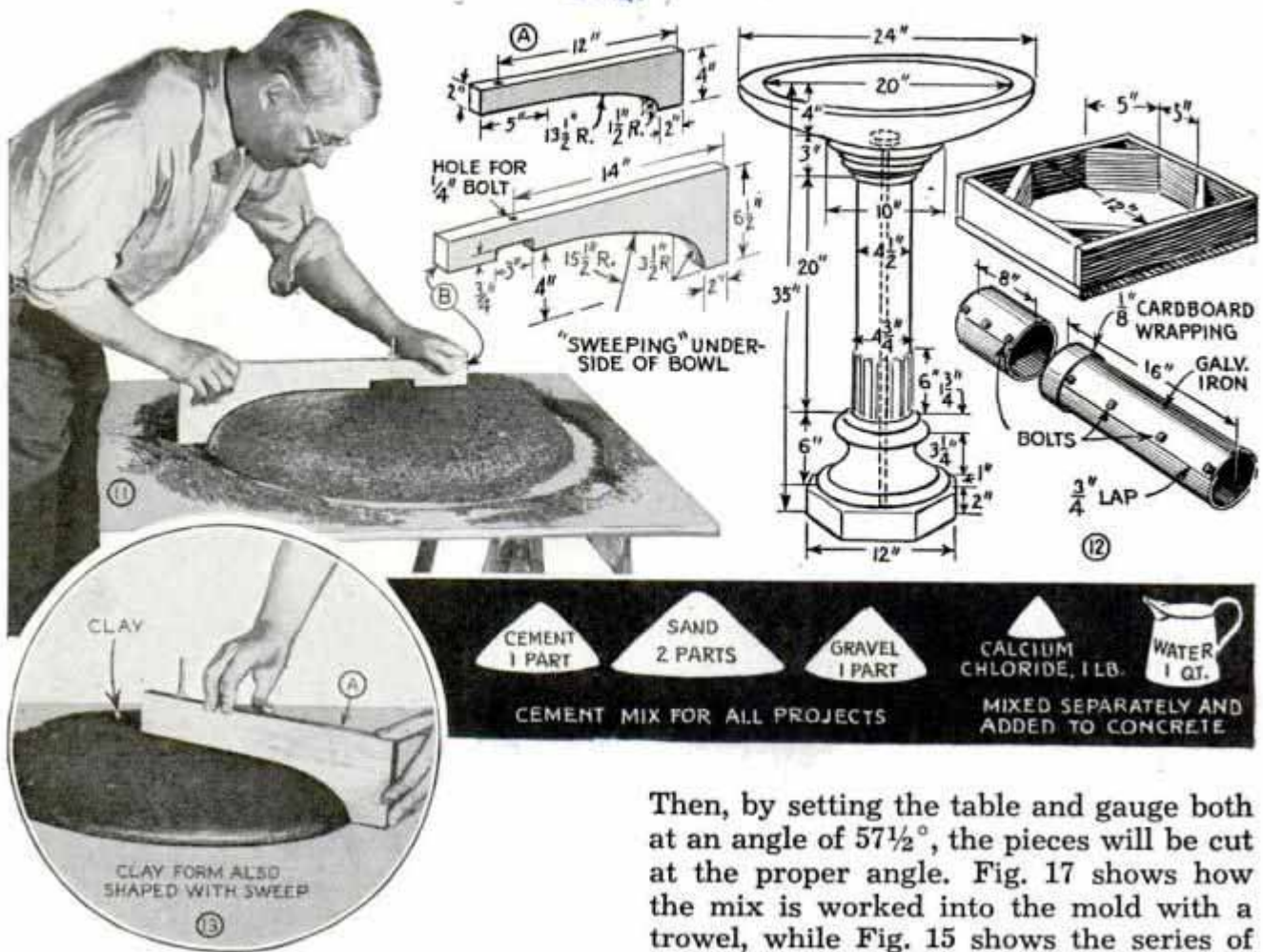


are held together by means of a piece of pipe, which also serves to reinforce the cone. It is advisable to put pieces of wire in all of the units as this adds greatly to their strength. Dimensions for laying out the cone form on galvanized iron are given in Fig. 14, the form being closed with a tapered wood plug, which is bored in the center for the pipe. The lap joint on the metal cone is fastened by oval-head machine screws with the nuts to the outside, Fig. 7. The cone can be supported as in Fig. 8 which also shows how the concrete is "struck off" level. The mold for the top disk is made from a strip of sheet iron,



3 in. wide, formed around a  $\frac{3}{4}$  by 16-in. wood disk as in Fig. 6. A piece of pipe extending above the bottom of the mold  $1\frac{1}{2}$  in., forms a hole in the casting. The form for the base, which is cast upside down, is built up from layers of wood, as shown in Figs. 4 and 14. Starting at the bottom, the four pieces are mitered, tacked into place and the circle scribed, after which the pieces are removed and the arcs band-sawed to shape. Each layer is fastened to the one below it with finishing nails. Fig. 14 shows the shape and size of the layers marked A and B. The top view gives the





dimensions for the layers marked C. The inside surfaces of the three concentric circles are lined with strips of sheet metal.

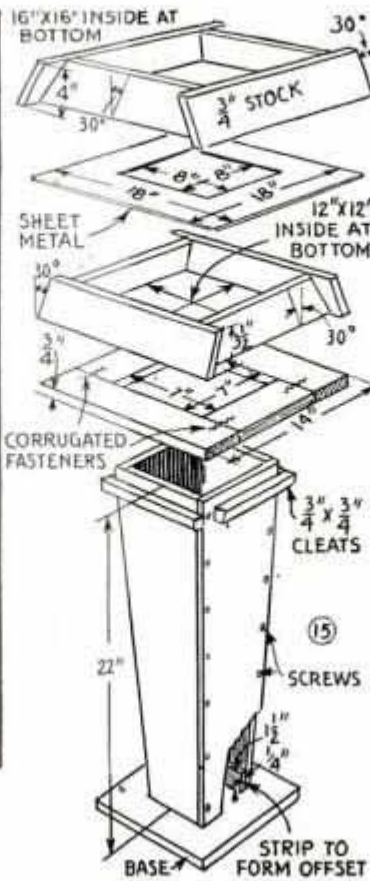
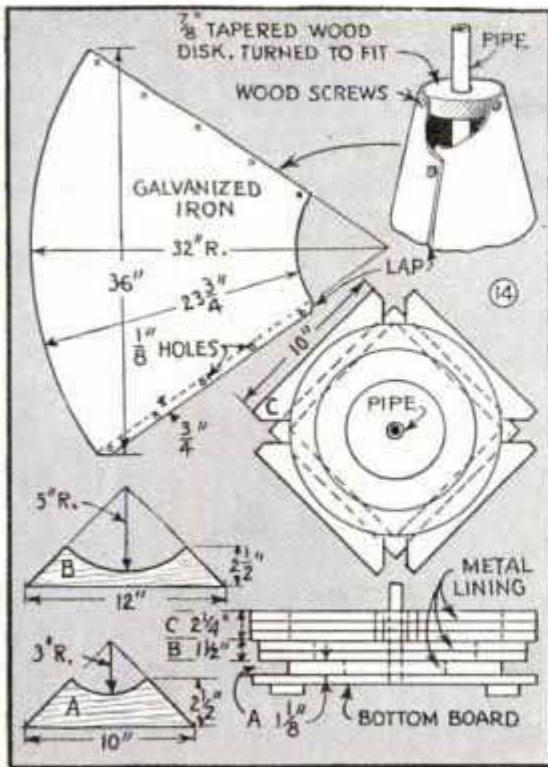
Surfaces of the molds that come into contact with the concrete should be given two coats of shellac, then oiled thoroughly just before filling. The mix for all of the projects described should be in the proportion of cement, 1 part, sand, 2 parts, and fine aggregate, containing pebbles no larger than  $\frac{1}{2}$  in. in size, 1 part. Calcium-chloride, 1 lb., is added to water, 1 qt., and stirred until it is thoroughly dissolved. This quantity of the solution is sufficient for one-half bag of cement when added to the mixing water, the quantity of the latter being cut down to allow for the added volume of the solution.

A modern bird-bath design is shown in Fig. 18, the sharp reversed angles producing a striking effect. Strong blues, reds and yellows are suggested for effective contrast. Construction of the tray involves compound miters, which can be easily cut on a circular saw by first setting the table at an angle of  $47\frac{1}{2}^\circ$ , Fig. 16, to cut the bevels on the edges of the pieces.

Then, by setting the table and gauge both at an angle of  $57\frac{1}{2}^\circ$ , the pieces will be cut at the proper angle. Fig. 17 shows how the mix is worked into the mold with a trowel, while Fig. 15 shows the series of units which go to make up the pedestal and base mold, and the order in which they are assembled. The base pieces are set at an angle of  $60^\circ$  with a miter cut on the ends of only two of the pieces in each set. The saw table should be set at  $71\frac{1}{2}^\circ$  and the gauge at  $60^\circ$  for these cuts. Success of the work depends on thorough tamping and ample reinforcing with wire and four  $\frac{1}{4}$ -in. rods which run from top to bottom near the corners. As screws are used throughout, it is only necessary to take the form apart after the concrete has set thoroughly.

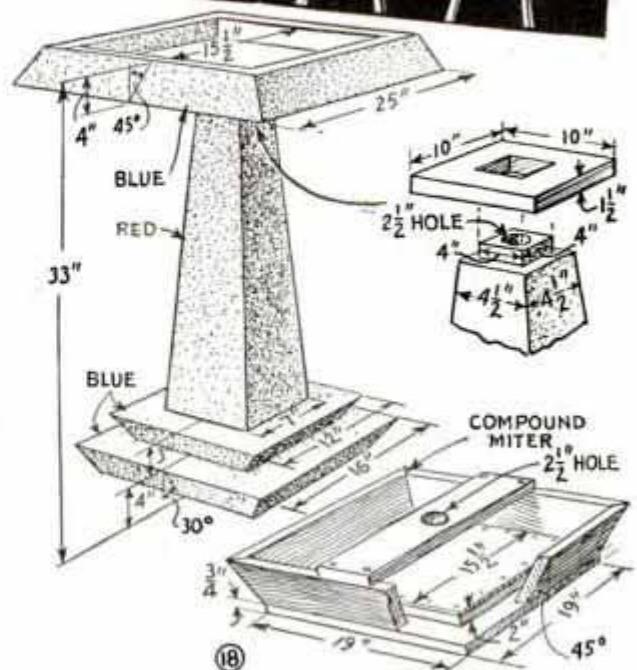
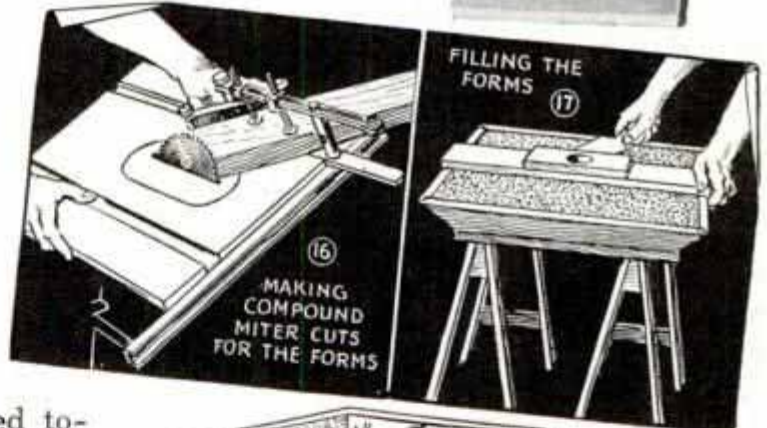
If you are interested in the classic type of ornament, refer to the design shown in Fig. 1, which is exceptionally beautiful when finished in pure white cement. The pattern for the column of this piece, the dimensions of which are given in Fig. 10, is made from a section of fluted porch column. A plaster cast of the column C is obtained by forming clay dams  $120^\circ$  apart on the column, producing a three-part mold in this manner. As soon as one section has set, the clay is removed, the column is turned and another section cast in the plaster. A strip of burlap should be





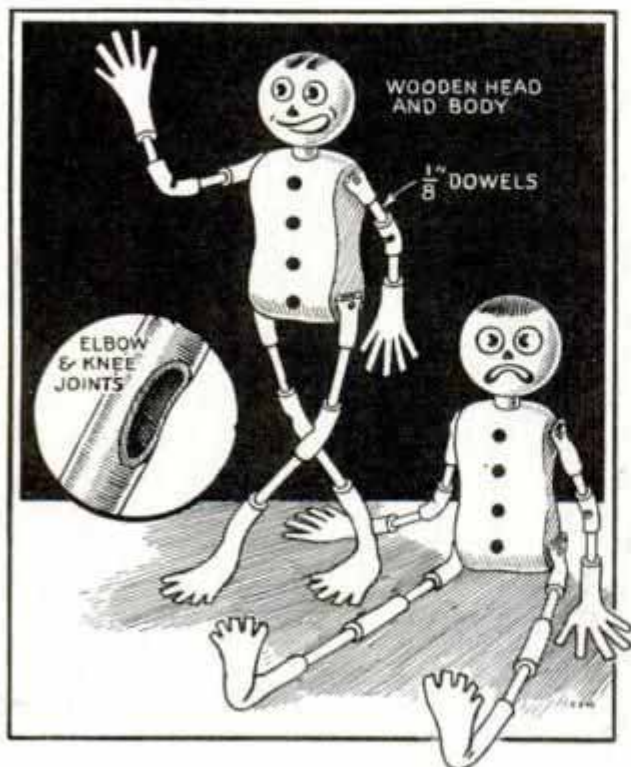
embedded in each section of the cast to strengthen it. The circular portions shown at B and D, which can also be obtained from the column or turned out to suit, are cast in plaster, the mold being arranged to part at the center. Remember that all patterns and inside surfaces of plaster casts must be shellacked and oiled just as for a cement mold. The top and bottom sections marked A and E are cast directly in a wood mold. The various units are then fastened together with a piece of pipe and rich cement mortar.

The circular bird bath shown in Fig. 5 is cast in five units. The bowl is formed by means of the sweeps A and B, shown in Fig. 12. A clay form of the inside of the bowl is shaped with a sweep as in Fig. 13. This is covered with concrete, the larger sweep substituted and the outer surface formed as shown in Fig. 11. The scheme for forming the column is shown in Fig. 12. Metal tubes are used to cast the piece, after which the ornamental lines are scraped in with a triangular file ground to a V-point on the end. The octagonal base is cast in a wood form, Fig. 12. The remaining sections must be turned in wood and a plaster mold formed as previously described.





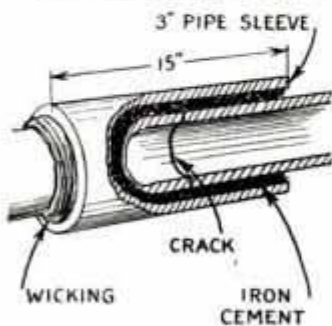
## Comic Figures for Store Displays Have Rubber-Tube Joints



Made from dowels, wood and rubber tubing, these figures assume many comical positions

Needing a number of comic figures for display purposes, one store owner had them made up from dowels and rubber tubing. The feet and hands were made by slitting one side of the tubing as shown, which was then flattened and placed between two sheets of paper and a hot iron set over it for about 2 min. This caused the rubber to remain flat. The legs and arms were attached to the bodies, which were shaped from pieces of wood, with small, double-pointed tacks driven through the upper ends.

## Repairing Break in Pipe Line



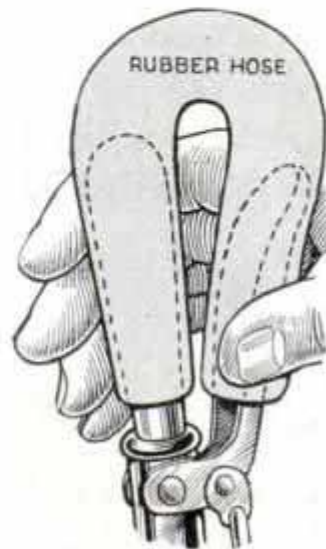
If a pipe line suddenly breaks and new couplings and unions are not at hand, costly delays can often be avoided by making the repair shown. This consists of slipping a

short piece of larger pipe over the break in the line and filling the space between the pipes with iron cement. Be sure the

cement is tamped in tightly, and then heat the sleeve thoroughly to set the cement before turning on the pressure in the line.

## Hose Replaces Broken Spring on Lever Pawl

When a spring weakens or breaks on the type of lever shown, a temporary repair may be made by slipping a short piece of rubber hose over the end of the lever and movable grip. The tendency of the hose to straighten causes the movable grip to operate the pawl.



## Nails Dispensed Easily on Job by Inverting Keg

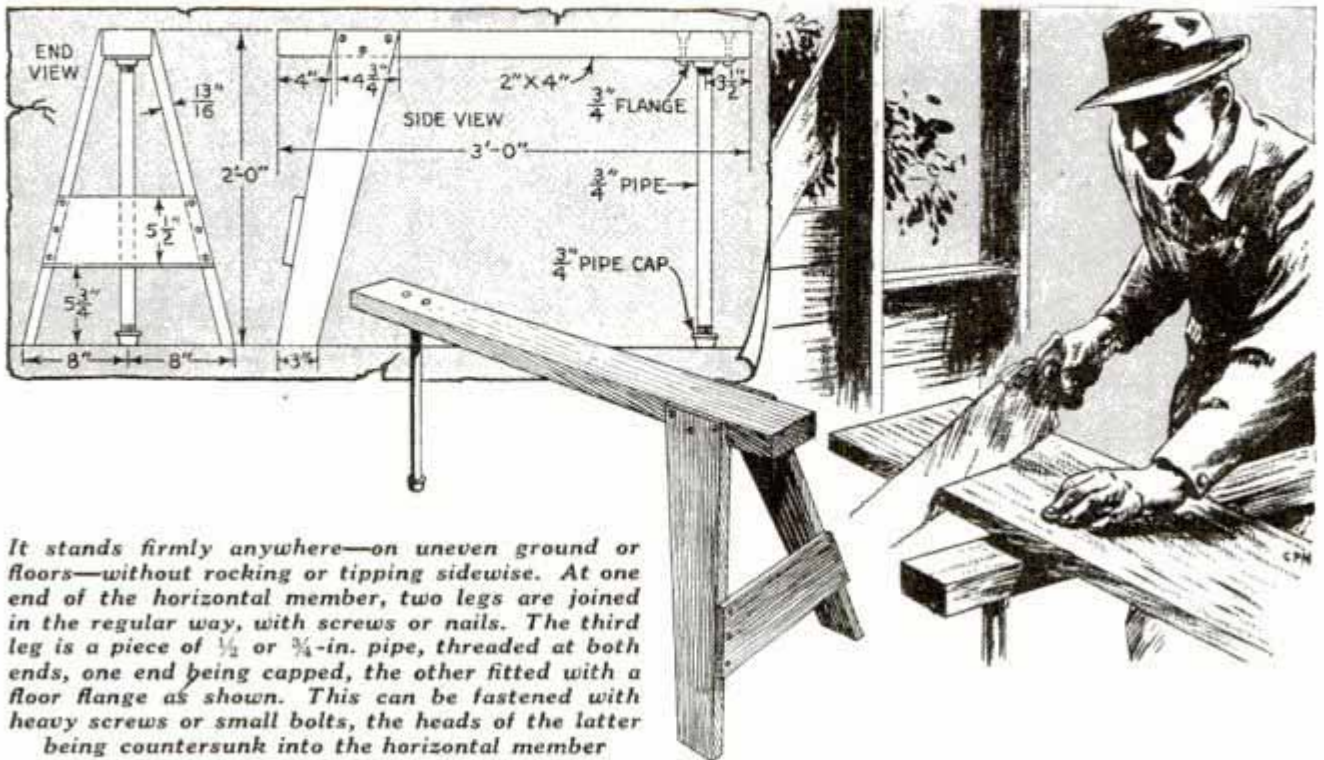
A contractor, noting the difficulty his carpenters experienced in getting nails out of a keg, placed a square piece of canvas over the opened end and inverted the keg on a workbench. Then, by rocking the keg slightly, the nails spilled out onto the canvas where they could be gathered without difficulty. If any quantity of nails remains after the work is completed, it is only necessary to lift the canvas and empty them back into the keg.



Carpenter quickly fills his apron when nails roll from inverted keg on canvas-covered bench



## Sawhorse Stands Firmly on Uneven Floors



*It stands firmly anywhere—on uneven ground or floors—without rocking or tipping sidewise. At one end of the horizontal member, two legs are joined in the regular way, with screws or nails. The third leg is a piece of  $\frac{1}{2}$  or  $\frac{3}{4}$ -in. pipe, threaded at both ends, one end being capped, the other fitted with a floor flange as shown. This can be fastened with heavy screws or small bolts, the heads of the latter being countersunk into the horizontal member*

## Swivel Drawing-Board Stand of Pipe Costs Little to Make

If you are looking for a neat, sturdy easel or drawing-board stand that can be adjusted to any convenient position, and one that anyone can make at small cost, this one should fill the bill. Pipe and fit-

tings, preferably of the 1-in. size, are used. The standard consists of two lengths, one of which slides inside of the other and is held securely at any height by means of a thumbscrew. The detail shows the arrangement that permits tilting the board at any angle to suit the requirements of the user. For those who do much sketching, a roll of paper may be mounted at the top of the board, between two angle-iron brackets which are screwed to the edges. The paper is passed under flat-iron cross-pieces at the top and bottom, so that it is held firmly on the board. The lower cross-piece serves the purpose of a straightedge to tear off the sheet after it has been pulled down. Then an unused portion of paper is always left on the board.



## Checking Evaporation of Benzol

Surface evaporation of benzol and similar highly volatile liquids can be slowed considerably by adding melted paraffin, 4 oz., to each gallon of liquid. Do not get the paraffin any hotter than necessary and stir it slowly into the liquid. The paraffin does not mix with the liquid but forms semi-liquid crystals on the surface.



## Mail Carrier's Folder Has Pockets for Each Boxholder

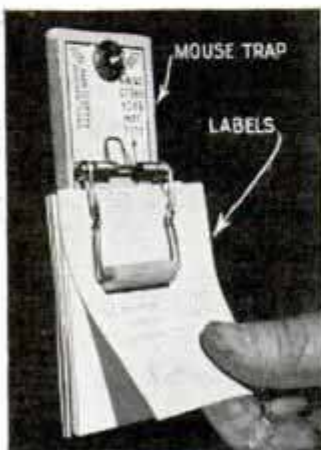


Rural carrier sorts mail directly to canvas folder, which rolls into compact bundle

By using this canvas folder, rural mail carriers not only save the work of handling the mail twice at the postoffice, but they have it well protected in a neat bundle. Instead of sorting the mail into pigeon holes at the postoffice and then transferring it to a pouch, the mail is sorted directly to the pockets of the folder, placing that for the first boxholder on the route in the first pocket, mail for the second boxholder in the second pocket and so on. Buckles and leather straps hold the folder when it is rolled up.

—Elmer A. Vandrey, Truman, Minn.

## Labels Held in Mousetrap Always at Hand

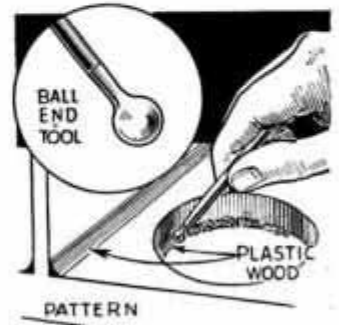


One druggist keeps his labels separated neatly by putting them in a mousetrap as shown. Part of the trap jaw is removed and a small wood roller is inserted between the severed ends so that the top label can be re-

moved by giving it a slight jerk. A trap is altered for each set of labels and is tacked to the wall or counter close at hand.

## Casting-Mold Corners Rounded with Ball-End Tool

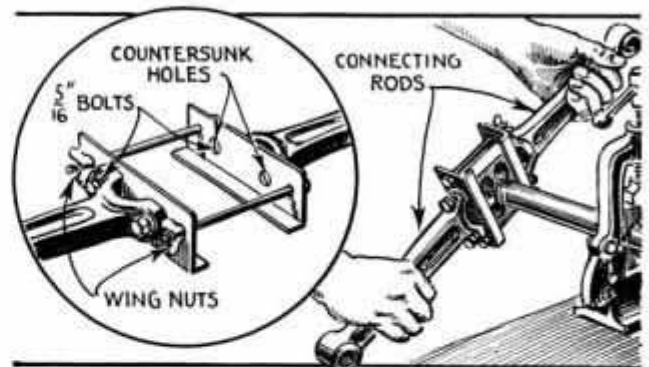
When making aluminum castings, I find that a very neat job can be done by rounding the corners of the mold with wood putty, which I spread evenly and smoothly with a ball-end tool. This is made by soldering or brazing a  $\frac{3}{8}$ -in. steel ball to one end of a small steel rod as shown in the drawing. If the tool is moved over the plastic with a twirling motion, you will get a uniform job.



—W. H. Woodward, Saskatoon, Sask., Can.

## Die Holder from Connecting Rods

Made from two pieces of angle iron and a couple of car connecting rods, this simple holder will handle all standard dies. It is best to clamp the pieces of angle iron together and drill both of them at the same time so that the bolt holes will line



up. If very small dies are to be used in the holder, it will be necessary to saw off part of the angle on one side so that they do not come together before the die is clamped tightly.

—Henry Cloutier, Ware, Mass.

When a large number of photo prints are to be made from a negative, cover it with a sheet of Cellophane to avoid wear and scratches.

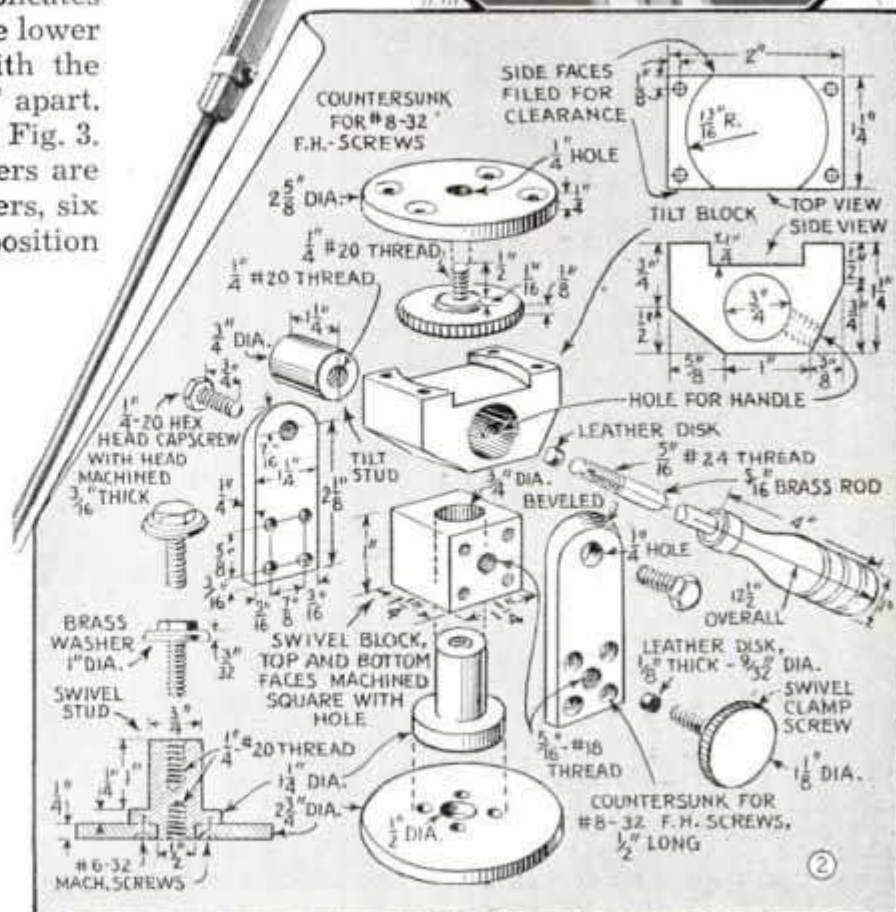


# Universal TRIPOD for Still and Movie Cameras

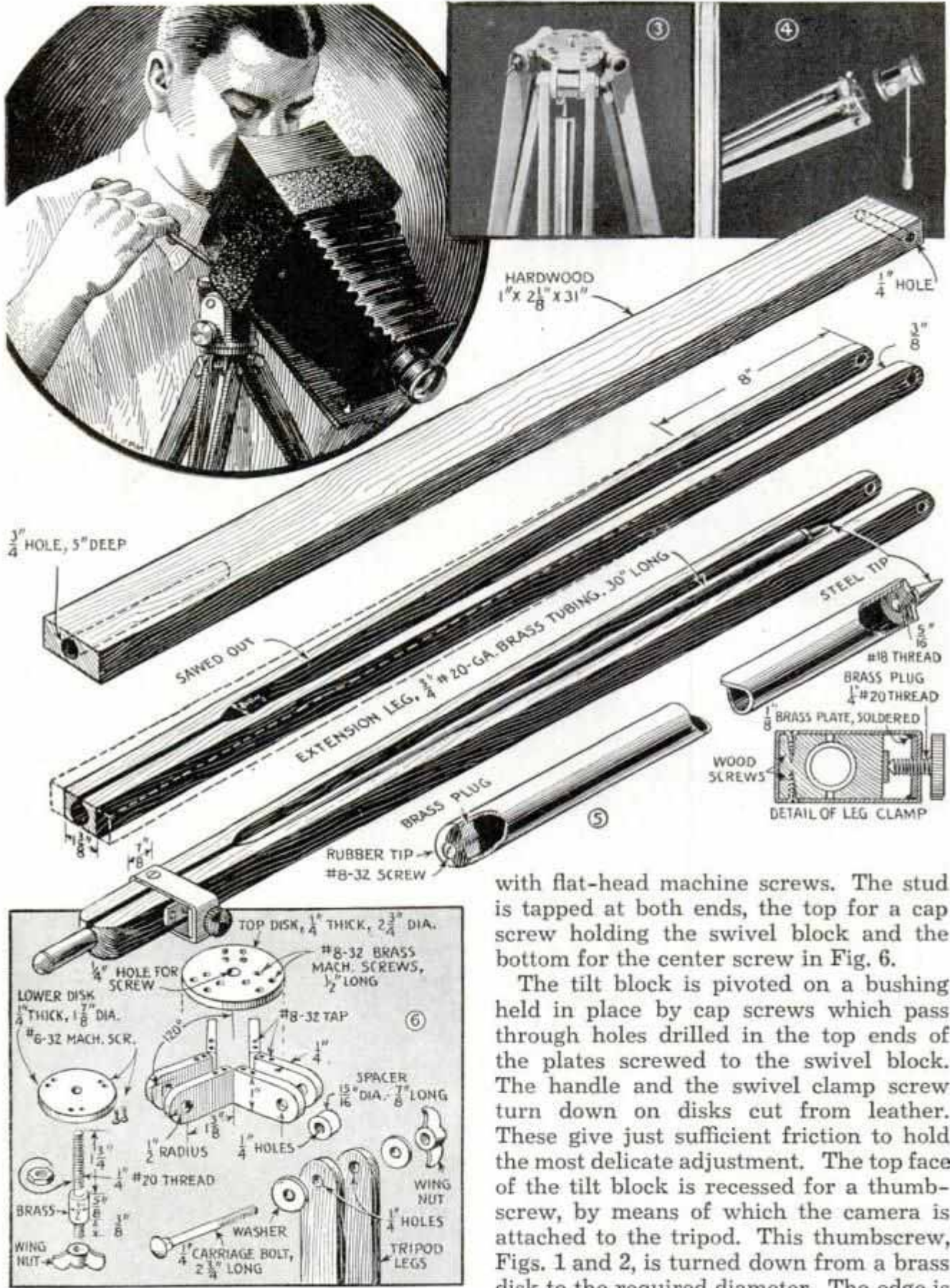
By J. D. Brubaker

FOR "still" shots and time-exposure work indoors and out you need a steady tripod with a universal head. This one supports any camera of ordinary size and at the same time gives that delicacy of adjustment so essential in a tripod.

Figs. 2, 4 and 6 picture how the universal head is made, while Fig. 5 shows the formation of the legs. The upper section of each leg is made from a single piece of wood, a portion of the center being cut out to allow room for the sliding extension, and at the same time form the arms which are hinged to the lower half of the head as shown in Fig. 3. An extension, made of brass tubing as in the lower details, Fig. 5, fits between the halves and is held with a clamp made of flat brass and fitted with a thumbscrew for adjustment. The remaining two legs are duplicates of the first. Fig. 6 shows the lower half of the head made with the hinge members spaced  $120^\circ$  apart. This is shown assembled in Fig. 3. All flat parts and the spacers are of brass. The hinge members, six in number, are held in position between two brass disks. The center screw is simply a  $\frac{1}{4}$ -in. brass rod, threaded at both ends and fitted with a bushing  $\frac{1}{2}$  in. in diameter and  $\frac{5}{8}$  in. long. It passes through both disks, being held in place with a nut, bearing on the lower disk. The upper half of the head, shown detached in Fig. 4, is detailed in Fig. 2. This is also assembled between two disks. All parts are of stock brass, with exception of several cap screws. A swivel stud is attached to the lower disk







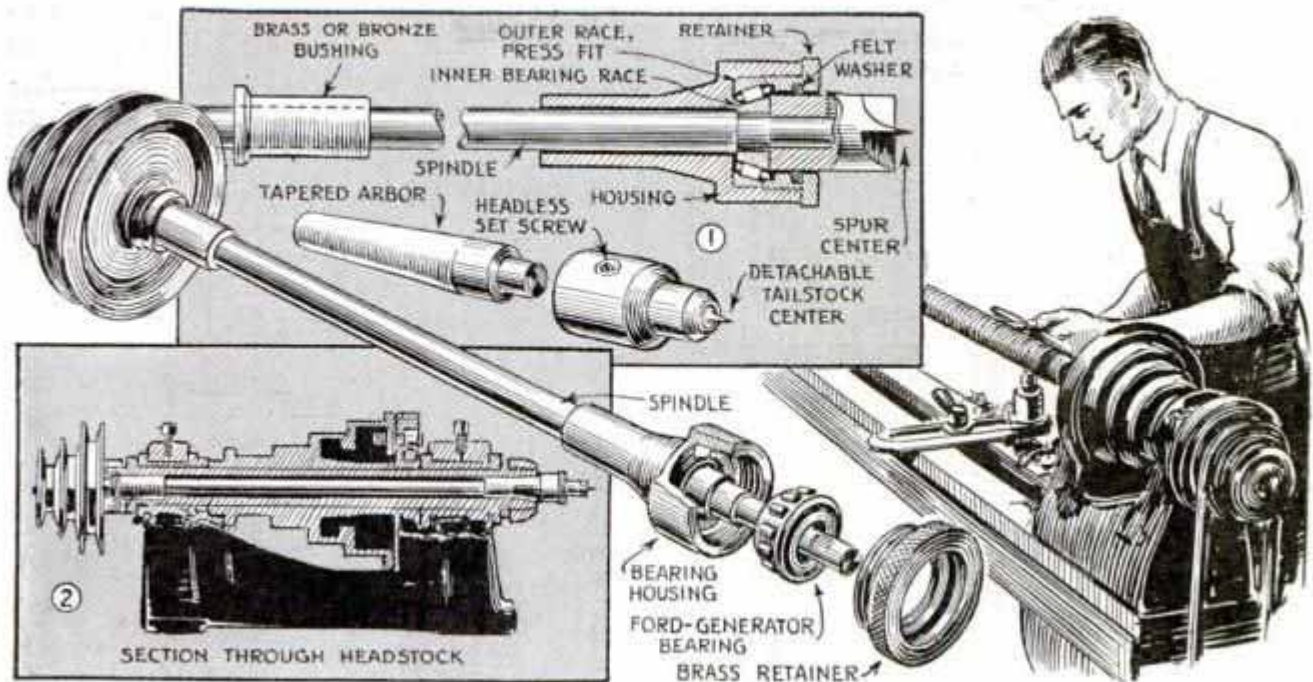
*This tripod telescopes into a compact bundle for carrying, yet when extended, it is sufficiently rigid to support any ordinary camera. The universal head gives a very delicate control of the camera when focusing or following a moving object. Set screws provide a positive means of locking any vertical or horizontal adjustment*

with flat-head machine screws. The stud is tapped at both ends, the top for a cap screw holding the swivel block and the bottom for the center screw in Fig. 6.

The tilt block is pivoted on a bushing held in place by cap screws which pass through holes drilled in the top ends of the plates screwed to the swivel block. The handle and the swivel clamp screw turn down on disks cut from leather. These give just sufficient friction to hold the most delicate adjustment. The top face of the tilt block is recessed for a thumbscrew, by means of which the camera is attached to the tripod. This thumbscrew, Figs. 1 and 2, is turned down from a brass disk to the required diameter. The edge is knurled and the center drilled and tapped for a 1/4-in. stud, which is made by threading a short length of brass rod. The stud is turned into the disk and solder is flowed into the threads.



# Spindle Adapts Metal Lathe to Turn Wood

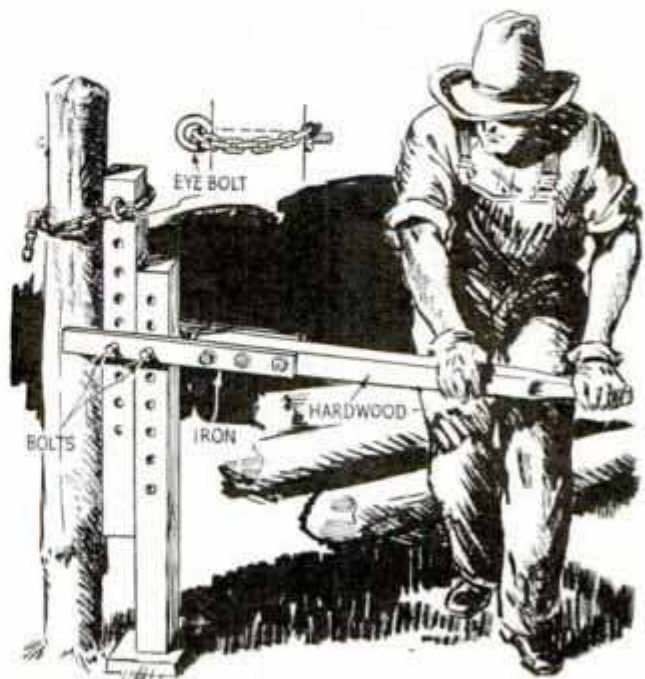


If you would like to do a little wood turning in your metal lathe, just slip this easily made spindle into the headstock, and you can do the job without any danger of damaging the lathe by the high speeds necessary for turning wood. In this arrangement the spindle fits in the lathe just like a draw-in collet chuck, the turning thrust being taken on a tapered roller bearing which is fitted into a bell-shaped metal housing and is held in place with a

brass retainer. The bearing carries the forward end of the spindle, while the rear end turns in a flanged bronze bushing, the body of which is turned to the same diameter as the hole through the lathe spindle. The inner projection of the housing is machined to the same taper as the forward end of the lathe spindle, Fig. 1. A pulley keyed to the spindle as in Fig. 2, gives the range of speeds for wood turning. A tapered arbor carries a tailstock center.

## Hand Jack Exerts Powerful Lift to Pull Large Fence Posts

This jack makes short work of the tedious job of pulling old fence posts. It consists of three hardwood parts; a handle, a movable or lifting member and a stationary member. The last two are cut to the same length and an equal number of holes are bored in each one. Two pieces of flat iron are bolted to the handle and holes are drilled in these for heavy bolts which pass through the holes in the stationary and lifting members. A short length of chain, run through an eye bolt at the top of the lifting member, is looped about the post.—George Janser, Rockford, Ill.



☞To protect the hands against chemical and photo-developer stains, rub them with a solution of gutta-percha, 1 oz., and benzene, 1 pint.



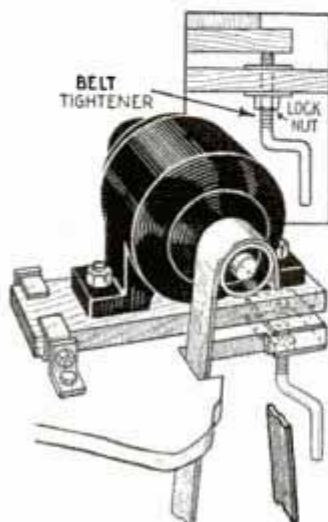
## Cue Chalk Is Always at Hand on Leg of Table



*Cue chalk kept on leg of table is not lost or unintentionally carried off by the players*

To avoid waste or loss of cue chalk, one owner of a billiard parlor puts it in a wood receptacle, which is strapped to the leg of the table. Then, instead of the players laying the chalk around on the table, they just press the tips of the cues against it as shown. The receptacle is made from a wedge-shaped block of wood with a mortise at the upper end to hold four or five pieces of chalk.

## Mounting for Electric Motor Is Adjustable



Here is an adjustable mounting for electric motors that also serves as a belt tightener. It is especially suited to overhead motors. The pivoted end of the mounting is held between two flat-iron brackets by a long bolt, which passes transversely through the

base, the edges of the latter being reinforced by two U-shaped pieces of flat iron pressed tightly in place. The crank or adjusting handle is threaded into a thick iron washer on each side of the base support, and the end bears against an iron plate screwed to the bottom of the base. A lock nut on the crank holds the adjustment.

## Round Paintbrush Improved by Rubber Grip

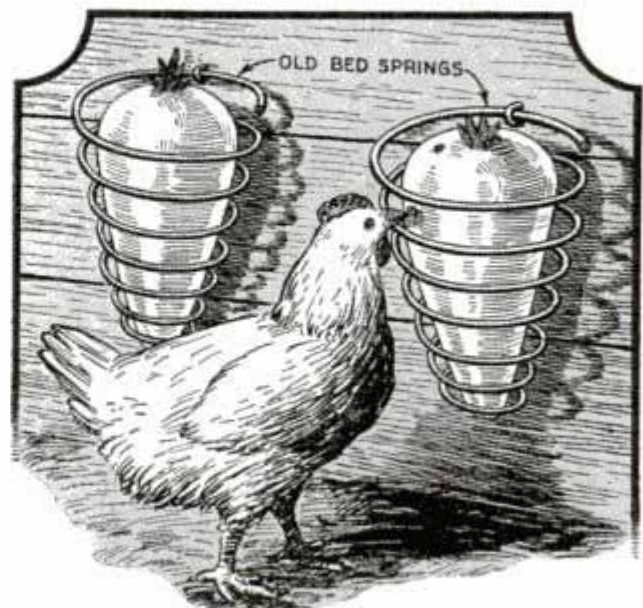
Slipped over the handle of a small, round paintbrush, a rubber anti-rattler for the hood of a model-A Ford provides a good grip for the fingers in turning the brush to keep the bristles bunched while painting close to edges of work. The rubber also keeps the wet bristles from touching anything when the brush is laid down.



## Vegetables Fed to Chickens in Spring-Coil Holders

When carrots, turnips, beets, etc., are fed to poultry, coils from an old bedspring, fastened to a post, stake or wall, are just the thing for holding the vegetables to avoid waste. Stretch the coils a little so that the birds can get at the feed easily.

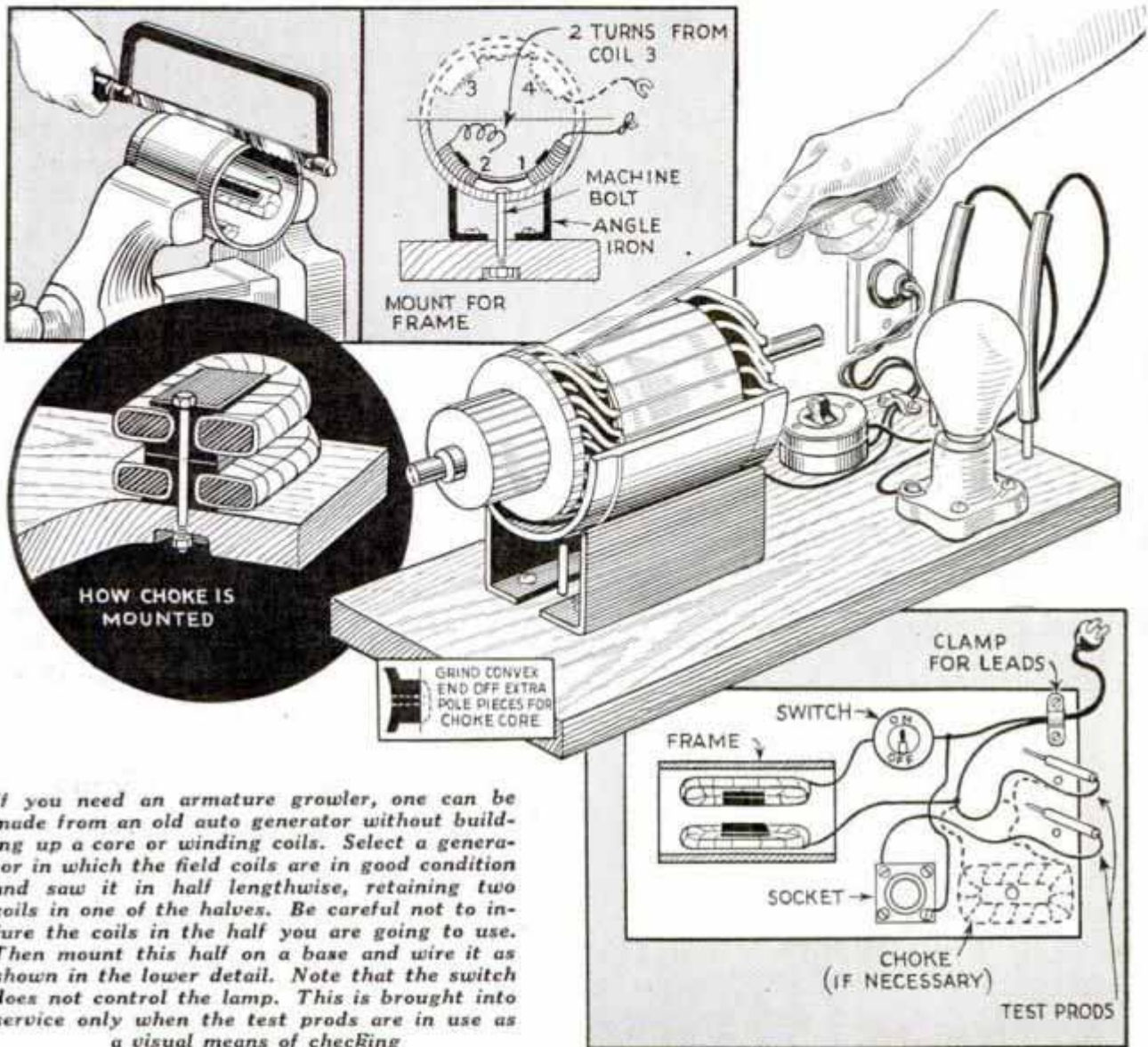
—A. S. Wurz, Jr., Rockyford, Alta., Can.



*Chickens will consume raw vegetables without waste if these food holders are used*



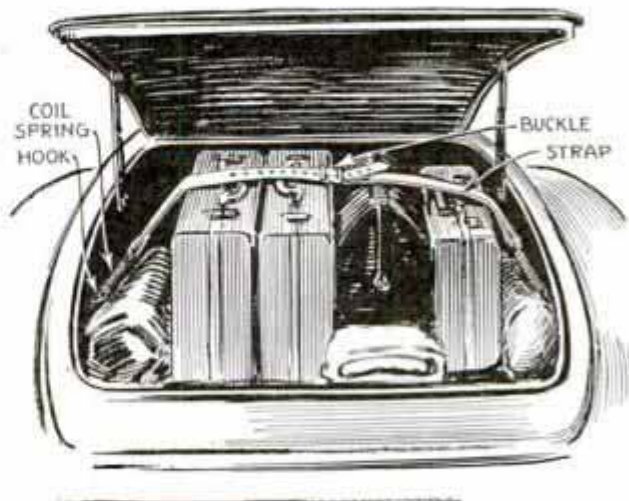
# Armature Growler Made from Old Generator



If you need an armature growler, one can be made from an old auto generator without building up a core or winding coils. Select a generator in which the field coils are in good condition and saw it in half lengthwise, retaining two coils in one of the halves. Be careful not to injure the coils in the half you are going to use. Then mount this half on a base and wire it as shown in the lower detail. Note that the switch does not control the lamp. This is brought into service only when the test prods are in use as a visual means of checking

## Luggage Held Snugly in Compartment by Spring Straps

On long trips where several suitcases, bags and packages are carried in the luggage compartment, and it is advisable to keep them from bouncing around in case the compartment is not filled, they can be placed side by side and held securely by means of straps. These are slipped through two rings previously attached to the bottom near the sides. It is also a good idea to use coil springs between the rings and ends of the straps to maintain a tension on the luggage.

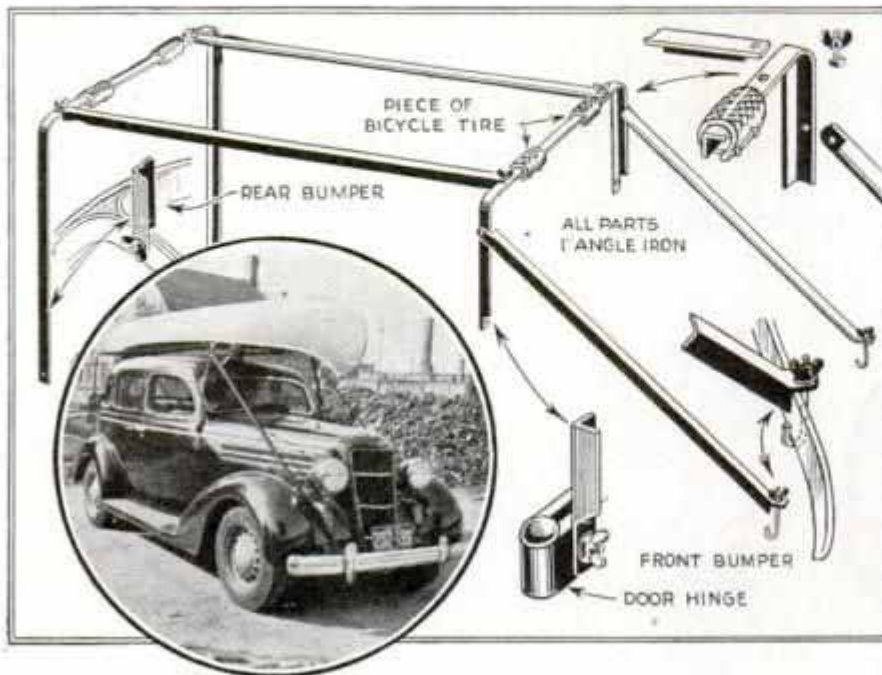


Springs fastened to rings on the body and to the lower ends of the straps keep a tension on the luggage

☐ To regulate the size of a line made by a striping brush, slip a short piece of rubber tubing down over the base of the bristles to limit their spreading.



## Rack to Carry Canoe on Car Rests on Hinges and Bumpers



*It takes only a few minutes time to remove or attach this canoe rack, which bundles easily for storage*

Quickly removed or attached to your car, this rack will enable you to transport a canoe safely. As the rack is supported by the upper front-door hinges and the two bumpers, there is no strain on the car top. The rack is made of 1-in. angle iron, two lengths of which are bent to a wide U-shape to form the vertical supports. One of these is bolted to the rear bumper brackets, while the other one, which is much shorter, is bolted to the front halves of the upper front-door hinges, using flat-head bolts to avoid interfering with the hinge action. From the front support, braces reach to the front bumper where they are fastened with hook-head bolts. Short sections of old bicycle tire laced to the supports cushion the gunwales of the canoe when it is turned upside down on them. The canoe is lashed to the supports at four points through the gunwale. In my garage, the canoe is suspended from the ceiling so it can be lowered onto the rack.—E. C. Wright, Jr., Kansas City, Mo.

### Ford Radiator and Oil Pan Quickly Removed

When installing a model-A Ford oil pan, it is unnecessary to go to the extra work

of removing the splash guards from the side of the motor; just take out the two cap screws that hold them to the motor. Then, with a screwdriver, push them away from the motor and up so that they rest against the block. Take out the rest of the cap screws and drop the pan. To install the pan, set the slot in the pump shaft to mesh with the upper shaft. Double a Ford bearing shim and insert it with the pump-shaft housing in the hole. When the housing is all the way in, tear off the part of the shim that is left outside. The shoulder that comes against the block will keep the shim from coming out if it gets loose, which is not

likely. The oil pan can then be installed single-handed. There is also a very simple way to remove the radiator. First take out the four bolts that hold the shell to the radiator and lift it off. The radiator hold-down bolts can then be quickly removed.

### Rear-View Mirror Is Curtained to Stop Light Reflection



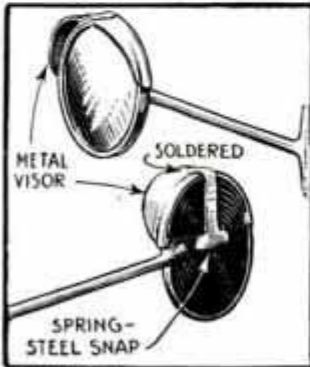
*Curtain quickly drops over mirror to protect your eyes against car lights in the rear*

One motorist who was often bothered at night by bright headlights of cars behind being reflected into his eyes by the rear-



view mirror, rigged up a small curtain, which he could drop over the mirror. The curtain was fastened to the header board behind the mirror and the lower edge was weighted to keep it in place. During the day, when the mirror was needed, the curtain was tucked behind it.

### Truck Mirror Shielded by Visor Does Not Blur in Rain

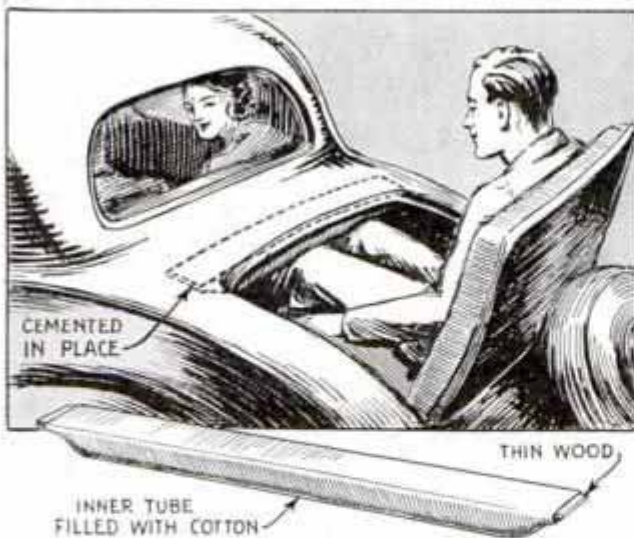


A visor, cut from tin and clipped over the rear-view mirror on a truck, was found effective in shielding the mirror from rain, which blurs the reflected image. A spring-steel clip or snap

may be soldered onto the visor, as shown in the illustration, to hold it in place.

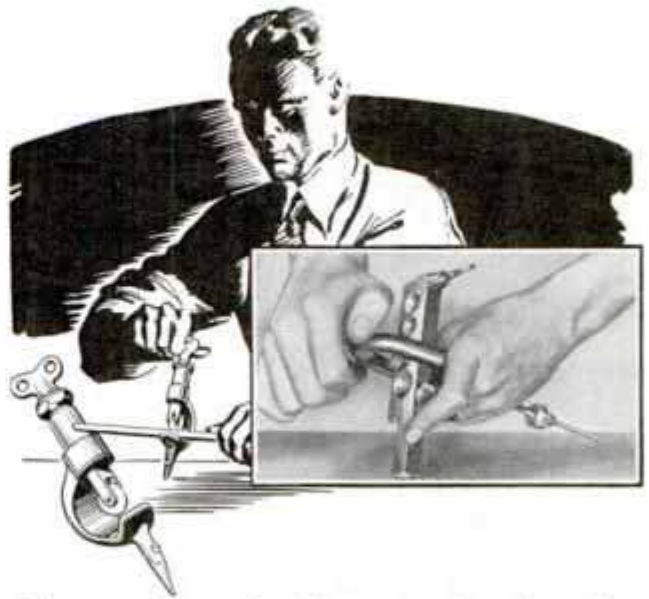
### Edge of Rumble Seat Padded to Protect Rider's Knees

If passengers bump their knees getting in your rumble seat, a rubber pad installed in the position shown will provide an effective cushion. To make the pad, slip a



section of inner tube over a thin board, which fits inside the car as indicated. Cement the tube to the upper side of the board, pack it with cotton and then close the ends. Construction of the car body determines how to attach the pad.

### Copper Tubing Cut and Bent in the Garage



*It's no trick to work with copper tubing if you have a flaring tool and a pipe cutter and reamer*

Auto mechanics can take a lesson from refrigerator repairmen when it comes to handling copper tubing. Two tools are used; a combination pipe cutter and reamer and a flaring tool. These handle the standard sizes of copper tubing used in oil and fuel lines on cars. After severing the tubing with the pipe cutter, use the steel reaming blade to cut away the turned edge formed by the cutter. Place the tubing in the flaring tool and clamp the beveled pressure screw tightly on the end of the pipe. This turns the rim on the pipe which makes a tight fit. Always place the coupling nut on the pipe before flaring the ends as it will not slip over the turned edge.—J. P. Kennedy, Chicago.

### Business Papers Always at Hand on Instrument Board

Salesmen, drivers of small delivery trucks and others who have to carry a number of bills, invoices, etc., will find a couple of spring

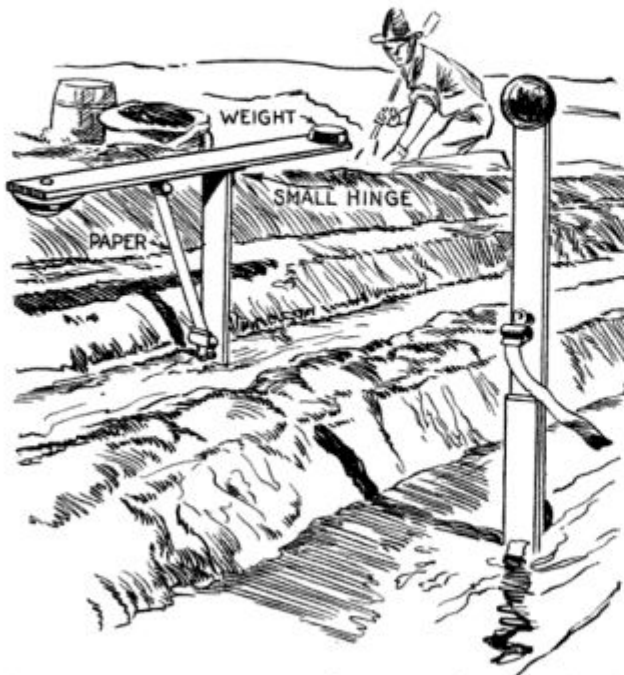


paper paper clamps on the instrument board convenient for keeping the papers at hand. One handle of each clamp can be fastened under a screw on the instrument board.

—John A. Blaker, West Auburn, Mass.



## Automatic Signal Aids Ranchers in Irrigating Long Rows



*Paper trigger separates when water level reaches it and trips signal at far end of irrigation ditch*

Entailing a minimum of material and time to make, this signal automatically trips when the water reaches a certain

level in an irrigation ditch, and will save farmers many useless steps in walking to the far end of a ditch to see if it is full. The signal consists of two lath hinged together as shown, one being pointed and set in the ditch to support the other one. The latter lath carries a small counterweight at the lower end and a flag or red reflector at the upper end. To set the signal, the pivoted lath is held in a horizontal position by a strip of newspaper, which separates when the water level in the ditch surrounds it, allowing the weight to tip the lath to a vertical position.

## Bright Dip for Iron and Steel

An excellent bright dip for iron and steel consists of sulphuric acid, 7 oz., slowly added to water, 2¼ pints, zinc, ½ oz., nitric acid, 3 oz., and a small piece of dextrin, which can be obtained at any drug store. A similar dip for brass and copper consists of sulphuric acid, 8 oz., slowly added to water, 2¼ pts., nitric acid, 12 oz., lampblack, ⅛ oz., salt, ⅛ oz., and a small piece of glucose or gelatin.

# The Next Issue

## THERE'S MONEY IN HANDMADE FLOWERS

Seeing and feeling these unusually realistic flowers, made of wood fiber of delicate texture and color, will give you little clue that they are hand-tailored at home in someone's spare time. The materials used are inexpensive and you can ask three or four times the cost for the finished product.

## DO YOUR SHADE TREES NEED A DENTIST?

Stop decay, the breeding spot of disease, and you will prolong the life of a prized tree. How to fill cavities, bridge weak crotches, brace limbs, etc.

## ALUMINUM PAINT HAS MANY USES

A protective film of aluminum paint, with its ability to reflect heat and light and to seal pores gives it unlimited uses as a primer or finish coat.

## PICTURES IN RARE WOODS

Woods of different kinds and colors jig-sawed to shape and assembled on a backing make lasting reproductions of pictures that look well in any room.

## MODEL GAS ENGINE

Just the thing for model-racing hulls. Four-cycle, air-cooled type. You can make the patterns, cast the parts and turn them in your own home workshop.





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 31 years and up,  under 16 years.  
Check your age group.



# Shooting 'Em from the Sky

(Continued from page 351)

cameras with long focal lengths are needed, whereas at lower levels a short focal length may be used. A commercial aerial photographer may use a short focal length lens for low-altitude mapping, but if he wishes to make large scale obliques of buildings or small areas, he would need to fly higher and use a long-focus lens. Interchangeable lens cones, which may be quickly and easily removed and attached, give these different focal lengths.

Aerial cameras are used chiefly for military purposes, exploration, aerial mapping, and commercial and news work. Two types of pictures may be taken—oblique and vertical. In the oblique, the shots are taken over the edge of the airplane, and in vertical work through a well under the floor of the gondola or plane. For vertical pictures, a vertical view finder is used. This is a separate viewing camera equipped with a wide aperture lens, a strong aluminum alloy body and a ground-glass focal plane upon which the image of the ground is sharply focused. A circular level bubble is provided so the view finder may be maintained in the proper vertical position, and a scale, reading up to forty-five degrees each way from center, is used to measure the "crab" of the airplane. This view finder and an intervalometer which provides exposures timed automatically at regular intervals enable an aerial photographer to take a strip of overlapping vertical photographs such as are necessary in mapping.

Using both vertical and oblique photography, the task of mapping the Dominion of Canada from the air has been undertaken. A five-lens camera taking at one exposure one vertical and four oblique negatives was used for a complete aerial photographic record, for mapping purposes, of the state of Massachusetts. This was operated from an airplane flying at an altitude of 15,000 feet. To plot the course, an ordinary commercial map of the state was used, the flight lines being charted twelve miles apart from north to south. With photographs taken at intervals of about one minute each, the state was photographed in an actual flying time of twenty-four hours and forty minutes. In surveying from the air, sections have

sometimes been discovered that have never before appeared on the tax rolls.

An important piece of air survey work was recently done in the southwest. For this survey a compound camera with ten lenses, which includes two five-lens camera units, was installed. One unit is set at an angle of forty-five degrees to the other so that the ten prints secured from each tripping of the master shutter control overlap to make an octagonal composite print covering 760 square miles of ground area at 30,000 feet. Aerial photography also has been employed to check charts used by airmen to make certain the charts are accurate. Much simpler photographic work is done for news purposes. During the floods last spring, newspapers and news photo syndicate photographers did considerable news reporting with the aid of aerial photography.

Persons making a hobby of aerial photography often find the hobby is also a source of remuneration. The president of a flying service in New England took some flood pictures throughout the New England area, some of which were front-page pictures in the Boston newspapers.

For certain kinds of work, special cameras have been devised, such as the "skyscraper" camera for photographing skyscrapers. This is three or four times as tall as the average aerial camera, with a focal length of twenty-four inches and an over-all height of three feet. Because of the long focal length the "leaning" effect so often present in photographs of tall buildings is eliminated. With this camera a photographer can fly twice as high as with any other camera and get more detail, or he can fly at a lower altitude and get a more intimate view.

The latest development is a nine-lens aerial camera, which incorporates the use of eight highly efficient steel mirrors to reflect the images to the side lenses. This camera was designed for mapping from a higher altitude than has ever been practiced hitherto with multi-lens equipment.

☞ Whenever you find that you wish to know more about any article in this magazine, write our Bureau of Information, inclosing return postage.



**FAST ACTION**

**INDOORS AT NIGHT**

**EVEN IN THE RAIN**



Much less than actual size

# For the Pictures You Want —when you want them

**T**HE big fun of picture making is in having a camera that doesn't need time off. Kodak Six-16 (f.4.5) lets you master every snapshot opportunity.

Every hour of the day or night is picture-making time with this modern Kodak. No matter when or where snapshot opportunities arise, you're set with Kodak Six-16.

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**FEATURES:** 1/400-second Compur-Rapid shutter with delayed-action timer, Kodak Anastigmat f.4.5 lens, eye-level finder. Makes 2½ x 4¼-inch pictures, costs \$40.

**Kodak Six-16 (f.4.5)**



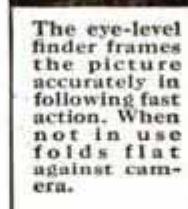
**KODAK AUTO-FOCUS ENLARGER, MODEL B.** The ideal enlarger for home darkrooms—takes negatives up to 4x6 inches, is adaptable to film or plate negatives, enlarges from 1½ to 3½ diameters. Complete with lens, Photoflood lamp, paper holder, table clamp and set of seven flexible metal masks. Price, \$40.



The 4-section lens is a photographic jewel . . . a high-quality, high-speed anastigmat that "makes good" under difficult conditions.



The Compur-Rapid shutter has nine speeds, from 1 to 1/400 second. Delayed-action timer lets you get in the picture yourself.



The eye-level finder frames the picture accurately in following fast action. When not in use folds flat against camera.



Metal spools make Kodak Six-16 the smallest roll-film camera for its picture size. No bulky wooden spools take valuable room.



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# Adventures of the Fire Detectives

(Continued from page 406)

living room and the dog had been trained to jump over a low barricade to leave the box. On the night of the fire a heavy cord had been stretched across this spot. One end of the cord was tied to the wire that was fastened to the pine knot in the fireplace. Then, when the dog jumped over his barricade he tripped the string. That



*Instrument kit carried by fire detectives when searching for the cause of a blaze*

jerked the burning knot out of the fireplace and into a heap of combustible material near the center of the room.

Sometimes the arson squad proves a suspected person is actually innocent. Some farmers asked Wolfe to investigate a fire that had consumed the contents of a barn. Wheat, oats and beans had been destroyed. They suspected the manager of the storage barn had stolen most of the contents and then set the fire to cover his theft. Their suspicions were based on the fact that hardly any debris remained in the barn after the fire. Wolfe burned samples of the produce that had been stored and his tests vindicated the manager. Very little debris was left, he found, because beans, for instance, lose seventy-six per cent of their bulk in burning and oats lose forty-five per cent of their bulk.

A residence fire that looked like the work of firebugs started with an explo-

sion that ripped the basement apart. The property was well insured but instead of arresting the owner after his investigation Wolfe advised the gas company to plug some leaks in their mains. The house was situated on a stratum of rock and after the fire Wolfe found traces of gas issuing from the stratified rock. Gas from a main some distance away was leaking into the stratum and the fire occurred after enough gas had gathered in the basement to be ignited by a pilot light.

The arson squad also investigates "mystery" fires that seem to start spontaneously. Every fire has a cause, of course, but firemen were once puzzled to find a fire apparently had kindled itself inside a sealed double partition wall. Wolfe found a concave shaving mirror hanging on a near-by wall and decided it might be the answer. He bought a similar glass and focused the sun's rays with it on a plaster surface. The plaster didn't burn but the heat generated by the gathered light was so great that wood behind the plaster burst into flames. That solved the mystery.

Another time, when some lace curtains burst into flames without any apparent reason, the fire detective found the blaze actually had been started by a fire extinguisher. It was of the glass-bulb type, filled with extinguishing fluid, and hung on a wall bracket. The glass sides of the extinguisher had acted as a light-gathering lens under the rays of the sun and had ignited the curtains in the same way a burning glass will char wood. Glass bottles in store windows sometimes start fires in the same way.

## F810 Brake Lining That Outlasts Car Likely with Improved Design

Brakes that outlive the automobile and need never be re-lined are foreseen by manufacturers as the outcome of improved brake design. Drum scoring and lining wear are the result of high temperatures, and if localized over-heating can be eliminated, brake lining wear can be reduced. This may be achieved by distributing pressure over a larger area within the drum, and increasing drum width.

Linderman  
Lenses, Inc. 149





**AW, QUIT IT, CAN'T YOU—just tell the fellows I'm staying home**

**- NED'S PIMPLY SKIN MADE HIM SHUN THE CROWD ..... UNTIL**



**Don't let adolescent pimples spoil YOUR chances for fun**

**P**IMPLES can be joy-killers after the start of adolescence—from 13 to 25, or longer. At this time, important glands develop. Disturbances occur in the body. The skin gets oversensitive. Waste poisons in the blood irritate this sensitive skin. Pimples result.

Fleischmann's fresh Yeast clears these skin irritants out of the blood. Then, the pimples go. Eat 3 cakes daily—plain, or in a little water—until your skin clears.

*—clears the skin by clearing skin irritants out of the blood*

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# The World's Biggest "Eye"

(Continued from page 375)

shop on the campus of the institute. Here a saucer-shaped depression is to be ground into its surface with fine abrasives. The grinding and polishing are being done with motor-driven tools faced with glass and pitch-covered blocks. The grinding machine can exert a scraping pressure that amounts to tons, or deliver a polishing rub as gentle as that of a powder puff.

During the first month of grinding, four tons of material are to be ground away. Then, during the next three or four years, only two more pounds of glass will be removed. The reason is that the rough spherical concavity can be gouged out rapidly with carborundum dust and emery. After that the curve of the surface must be carefully formed to that of a paraboloid. The difference is only a few wave lengths of light, or a few hundred-thousandths of an inch, and the final curve must be accurate to within one-millionth of an inch. The glass will be polished away with jewelers' rouge and in the final stages of the work a mixture consisting of a few teaspoonfuls of rouge per pint of water will be used. Working inside a tolerance of one-millionth of an inch, the opticians must keep the glass at a constant temperature. They must stay as far away from the glass as possible. If one should sit on the edge of the disk for a few minutes, for instance, the heat of his body would raise an invisible hump that would change the "figure" of the glass.

When the grinding and polishing are completed, the slab will be only four inches thick, as compared to the thirteen-inch thickness of the 100-inch telescope mirror on Mount Wilson. This thinness, it is expected, will minimize expansion and contraction from changes in temperature when the telescope is in use. Nevertheless, the disk will be strong and rigid because of the sturdy honeycomb backing that supports the slab.

The final treatment will be the mirroring process. For this it will be placed in a huge vacuum chamber, and after the air has been exhausted, aluminum will be evaporated by electrical heat inside the chamber. The result will be a thin coating of aluminum only a few molecules thick on the disk. Aluminum reflects more

light and will last much longer than silver.

Even in its present state the great slab of glass represents an "impossible" achievement. Until the Corning Glass Works succeeded in pouring the Pyrex disk, some scientists wondered whether such a huge piece of glass ever could be cast and be free of cracks and bubbles. Last spring, after cooling for months, the most valuable piece of glass in the world made the journey across the continent in a padded case in a special train. The train moved at twenty-five miles per hour and only during daytime to avoid any jars.

Grinding the mirror is only one of the problems in building the telescope. The astronomers have had to invent a new way to suspend the glass in the telescope so that no matter at what angle it is turned, there will be no bending or straining. Without support, its own weight might bend the glass an infinitesimal amount, but enough to change the curved surface and give a distorted picture of the stars. The disk is to be held in its cell by a number of metal fingers that will fit into the interstices of its honeycombed back. These fingers will each support a fraction of the weight to hold the mirror rigid.

Another problem that confronted astronomers was the driving mechanism that will slowly and smoothly move the massive mounting to follow the stars. The entire telescope must creep around at a pace so slow the movement is invisible, in order that the mirror may remain trained exactly on the same stars for hour after hour. How to get this motion in the 450-ton instrument with absolutely no vibration was one of the big puzzles. Now the astronomers think they have the problem whipped. They are going to float the entire telescope on a moving film of oil that is only three-thousandths of an inch thick. In order to find possible "bugs" in the mounting before it is built, a scale model of the telescope, one-tenth actual size, is being tested. Already some modifications have been made as a result.

Until a few months ago no one knew where the super-telescope was to be placed. Picking the best location was a five-year job in itself and involved expe-

(Continued to page 120A)

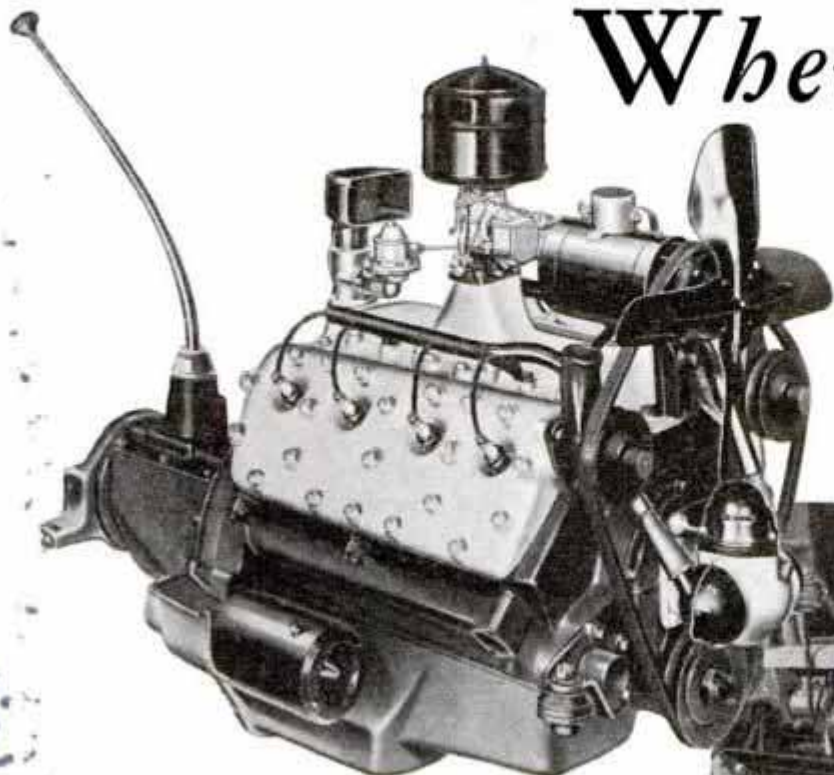


# FORD V-8 ENGINES DO A JOB

*Wherever*

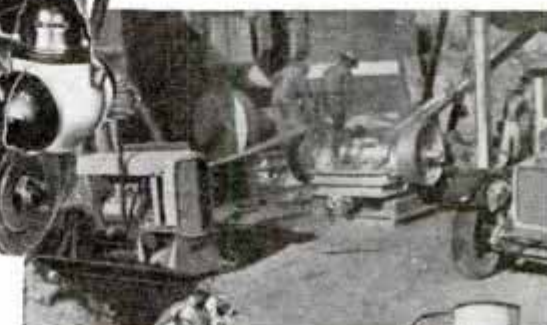
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*is needed*



On half a hundred different types of jobs you'll find Ford V-8 Engines at work. They drive industrial locomotives. They run mine cars. They power motor boats. They operate farm machinery, sawmills, concrete mixers and rock crushers. And wherever they work you'll find them supplying economical, dependable power—often in service that requires unfailing operation day after day over long periods of time.

Ford V-8 Engines are built to a high degree of perfection. Power-machinery manufacturers appreciate the fact that in the entire engine-building industry they can find no closer precision limits, no better manufacturing methods.



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Portable feed-grinding unit powered by a Ford V-8 Engine.

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(Continued from page 118A)

# WANTED: Owners Of PENS THAT CLOG

## To Try The Amazing New Ink That Cleans a Pen As It Writes

There's no longer any need for shaking and fussing with a pen to get it to write. Just get a bottle of Parker Quink and your pen will start instantly—every time. Parker spent \$68,000 in creating Quink to guard the famous Parker Pens from ordinary pen-clogging inks. Now this revolutionary new discovery in writing ink makes any pen—a Parker Pen or any other—a self-cleaner! Here's why—

Quink is an ink that contains a special, harmless ingredient that actually dissolves the caked-up dirt and sediment left in a pen by ordinary inks. This ends pen-clogging, and makes any pen work like a charm.

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PERMANENT Quink is for office and commercial use—for permanent records, ledgers, etc., and is as PERMANENT as the paper.

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Get either kind of Quink at any store selling ink. It will give your writing new distinction—new beauty. For Quink is not a watery ink, but rich, full-bodied and brilliant. Try Quink today, 15c or 25c.



Made by The Parker Pen Co., Janesville, Wis.

ditions with small telescopes to compare the "seeing" at a dozen different prospective sites. The spot selected is on top of Palomar mountain, a 6,100-foot peak fifty miles north of San Diego and ninety miles from the headquarters of the observatory in Pasadena. The site is above the dust belt in the lower atmosphere and above the fog line. Aside from the balmy climate and good "seeing" on the mountain, the peak is in the middle of a mountainous region where no large city with its glaring lights can grow up near by. Astronomers like a dark sky with no reflections from neon signs and street lights. A landing field may be constructed on the grounds of the observatory so astronomers can fly direct to the Pasadena laboratories. Preliminary construction of water tanks, fuel tanks, and temporary structures has started on the mountain, the work being supervised by radiotelephone from Pasadena. The whole observatory and the telescope, it is expected, will be completed long before the mirror is polished.

Astronomers hesitate to predict exactly what their monster instrument will reveal. They know they will discover an untold number of new stars and they will be able to study stars that so far have only been glimpsed in other instruments. Research in the distant sky may explain further how the universe was created and whether it is self-perpetuating. Some astronomers think the universe is exploding and this theory may be proved when the giant eye searches the heavens. The most exciting possibility is that through study with the telescope, more data on sources of energy may be found and the way pointed out to put atomic energy to work.

23  
Spider Webs Are Used as Bait  
by South Seas Fishermen

Webs spun by huge spiders on the To-briand islands off the New Guinea coast have been used as bait by the native fishermen for centuries. These spiders weave extraordinary tough webs in which small birds are trapped. When they go fishing, the natives collect the webs, wind them into a ball on a small wooden frame and cast off their long twine lines. Any fish that bites into that bait becomes entangled in the strands of the web.

*Handwritten notes:*  
Palomar  
Queens  
Cyn. Queen  
Hand gate

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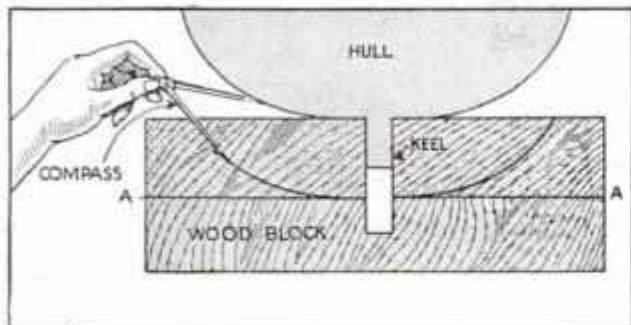
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## Carving Model-Boat Cradle to Fit Hull Perfectly



Model boat fits cradle snugly when hull outline is traced on cradle blocks with compass

The often difficult job of carving a cradle block to fit the hull of a model boat is done easily as shown. After selecting the cradle block, draw the line AA on one side. Then make a slot to extend below the line the width of the keel. Now set the boat on the block and, with a compass, scribe the curved line, holding the compass so that a line passing both points will be at right angles to the hull. If this is done carefully, the line scribed on the block will duplicate the contour of the hull. Remove the waste wood from the block with a scroll saw and true it up with a wood rasp.

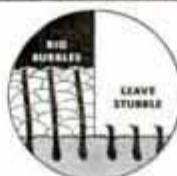
—Charles J. Domke, Chicago.

## Marring of Woodwork by Lock Prevented with Celluloid



When the end of a chain lock mars a door casing, just take a piece of clear celluloid and cement it to the casing at the point where the chain touches the woodwork. Use a clear celluloid cement, which can be obtained at almost any store handling notions. The woodwork will show through the celluloid, which will not be noticeable.

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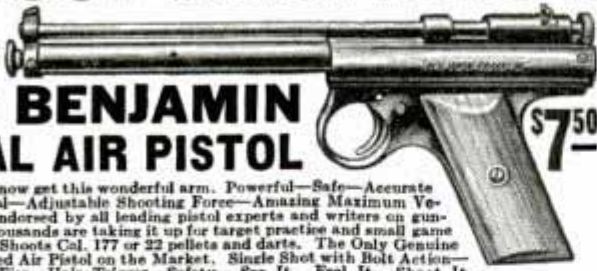
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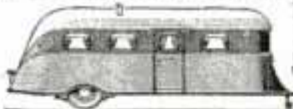


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# PULVEX FLEA POWDER

## Wings over the West

(Continued from page 399)

Commuting to the city is also made easy by plane. Harry Minor flew back and forth between the University of Nebraska campus and his home in Hyannis, and Eddie Arnold used to do the same between Creighton University in Omaha, and South Dakota. Many of the biggest ranches are owned by men who do not live on them, and they, too, are often aviation devotees.

Hunting antelope often was more tedious than pleasant before men learned to fly. The Indians used to hide behind a clump of sagebrush, stick out a piece of buckskin tied to a pole and wave it to and fro, hoping the antelope might let their curiosity overcome their caution. It is the same inquisitiveness which prompts the antelope to look right at an airplane, even while running away from it. Nor are the creatures easily convinced that they cannot outrun one. Automobiles sometimes have overtaken them, but frequently the antelope can run circles around a car traveling over rough prairie roads.

Airplanes, of course, will never take the place of cow ponies for ranch work, but recently two were used to assist in rounding-up a herd of wild horses which had ranged for years in a rough bad-lands region and had defied all efforts of cowboys and riders to bring them into corrals. Finally the local stockmen arranged with Bill Monday, cowboy pilot, to fly over this rough country and chase the horses down to the flats where large corrals were built. The deafening roar of airplane motors swooping down through rough canyons started the horses down over dry washes and arroyos toward the open country where riders waited to pick them up and haze them into the corrals. The horses, however, soon discovered the airplanes were not giant birds and in order to keep them moving toward the open corrals the "flying cowboys" had to bank their planes low over the backs of the running animals. A corralful of snorting horses at the end of the round-up attested to the practical success of this modern method for capturing outlaw mustangs.

When conservative veterans of the cattle and sheep ranges take to the air, it's a safe bet the next generation will include not dozens but hundreds of flying cowboys.



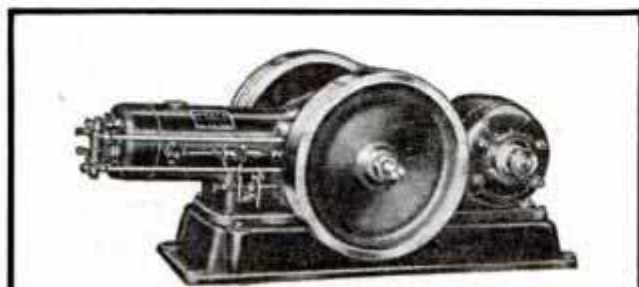
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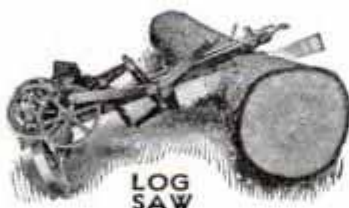
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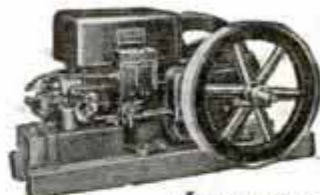
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(Continued from page 383)

radio continued to function, directing squad cars to explore devastated areas where existed conditions certain to spread disease. Their reports enabled the police to warn citizens against returning to those areas until precautions could be taken.

From Fitchburg, Mass., Police Chief Thomas J. Godley reported: "The flood came with suddenness. Electric lights, city water, transportation were quickly out of commission. Realizing that our electric power would not be available, we secured a portable gasoline power plant and generator which furnished power for our radio, keeping it in commission so that we did not miss a call. The value of radio at this time was beyond my powers of description."

Police Chief Albert C. Megale of Wheeling, W. Va., said: "When we first learned that the Ohio river was rising rapidly and that the crest would probably surpass that of the great flood of 1884, we immediately began preparations for relief work. Calls were repeatedly sent out on the police radio system for radio patrolmen to find boats to be used in rescue work. Radio patrolmen in seven cars received broadcasts from headquarters of persons stranded in flooded homes. The messages were rushed to the water's edge to officers in police boats and rescues were effected promptly. Telephone communication was paralyzed in all flood areas.

"On March 19, the river rose to a crest of fifty-five and one-half feet, the biggest flood in history. It was a night of terror. Wheeling island, lower part of the business section, South Wheeling and the Out-the-Pike sections were inundated. Two radio cars were assigned to each district while one of the talk-back cars was sent to the island end of the steel bridge. This car remained at the end of the bridge day and night, directing rescue work through instructions from police headquarters over the radio system. Women and children forced to climb to the roofs of homes were rescued by radio-directed boats. Food was taken from relief stations to starving people by police radio cars.

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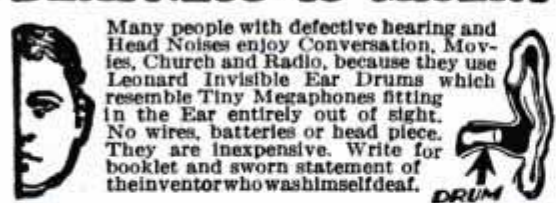
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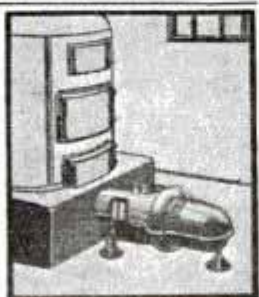
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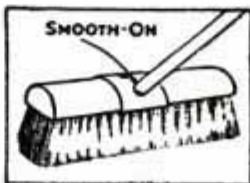
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## Horses—Their Limit of Speed

(Continued from page 343)

trotting or pacing, thereby eliminating the necessity of heavy shoes.

Balancing a trotter or pacer is accomplished by putting extra weights on certain of the horse's toes, or by weighting one or more of that horse's shoes. If, for example, a horse has a tendency to throw out his right rear leg, extra weight is put on that leg. Sometimes, this weight is kept on throughout his racing career, or a horse may outgrow his fault and thus permit the trainer to remove the weights.

The sulky also has undergone radical changes. The introduction of bicycle wheels increased the speed of the light-harness horses from five to seven seconds. The modern carts with their twenty-eight-inch wheels and wire spokes, weigh only twenty-eight or thirty pounds. Some sulkies have longer leg room for tall drivers, but most of them are standard.

It's no easy matter to sit in a sulky and keep a horse on his gait. A driver must manipulate a stop watch to clock each quarter, and also a rein in either hand and his whip. The shafts bear the brunt of the whip. In a tight finish, the sound of the whip on these shafts is usually enough to make the horse do his best.

Other equipment sometimes used include a roll across the horse's nose to prevent him from seeing his own shadow and shying, a head pole, to keep his head straight and boots to prevent him from chafing knees or ankles, should he be knock-kneed or pigeon-toed. To bring a horse to the peak of its capabilities, the trainer must be experimenting constantly, largely by the trial and error method.

Endurance is as important to the trotter or pacer as speed. Because of the "heat" system, a horse must have sufficient endurance to go three or four miles at racing speed in one afternoon. A trotter or pacer on a racing day will go about ten miles, including the training and warm-up periods, whereas the flat runner may not gallop that distance in a week. Light-harness racing is in the midst of a strong revival. Probably 8,000 horses are racing, at least another 8,000 are in training, and more than \$50,000,000 are invested in this booming sport, according to the Trotting Horse Club of America, general governing body.





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# The Secrets of Movie Weather

(Continued from page 359)

non on demand. Creating a moon seems a simple job, but the moon has nearly 200 different shapes and expressions. In the last ten years Witte has made 162 moons and nearly all have been different. The kind depends upon when and where the scene is supposed to occur. Painted on canvas backdrops behind the sets, his half moons and crescents have been photographed through the rigging of ships, above street scenes, and through the windows of houses. His most elaborate moon cost \$3,000. It consisted of a glowing glass disk that slowly moved through a heaven made up of 2,500 twinkling flashlight bulbs suspended above the stage.

Nature has only one kind of snow but the movie weathermen use a dozen brands. To create snow-clad hills and fields they cover the ground with a layer of marble dust. Marble dust can be washed with a hose when it gets dirty and saved for the next snow picture. Snow banks usually consist of wooden frames covered with burlap dipped in white plaster. Snow that has drifted on sills and doorsteps is imitated with marble dust or table salt. When footprints must show, a spongy substance called pyrocell is used.

None of these materials will stick to trees and bushes realistically, so the weathermen use white asbestos flakes. They spread the feathery material over the branches by hand. The sound of snow crunching under foot is produced by a man who steps on leather bags filled with sand. Corn flakes were once the favorite substance for falling snow but the latest is potatoes. The potatoes are ground up and put through a process that brings them out as small white flakes. With a hundred pounds of potatoes each, half a dozen stage hands at the top of a set produce realistic snowstorms by slowly spilling the flakes out of hand rockers. A few small fans turned on and off to swirl the snow heighten the effect. Ground mica makes a dry glittering snow easily blown along the ground by wind machines. When a close-up scene is needed that shows snow melting on an actor's face and clothing, shaved ice is a good substitute. To show the work of Jack Frost on the windowpane the weatherman touches up the edges of the

glass with a prismatic lacquer that looks like frost but doesn't melt away when the heat from the powerful lights strikes it.

A picture often requires vast amounts of snow materials. In making the effects for "The Country Doctor," Witte used 250 tons of marble dust to cover an airport and a few streets. He also used 1,000 pounds of asbestos on trees and bushes, and six tons of pyrocell to cover sidewalks for close-ups. The closest the weatherman can get to an icicle is to create the rough shape by molding plaster around a string and then covering it with transparent silicate of soda. From a distance it looks authentic.

Another thing that has them stumped is a way to photograph the condensed vapor of breath you would expect on a cold day. There are ways to get the effect, usually with chemicals held in the mouth, but this is dangerous and they are looking for some substance that can be used safely. Hail is another substance hard to reproduce. Ice is not always imitated since sometimes, as when a company is on location in the mountains, plenty of ice is available. But even then precautions are taken. If an actor is to be shown breaking the film of ice in a pail, the director sets half a dozen pails outside to freeze the night before. Then there will be no delay in making retakes if something goes wrong.

The latest thing for making ice and snow scenes in Hollywood is a refrigerated stage building. It was formerly an ice-storage plant and is now leased out to the studios. There are 25,000 feet of refrigerated pipes in its walls and ceiling and a steady temperature as low as six degrees below freezing can be maintained. In this stage real ice ponds can be created in a few hours, icicles are made easily, and real snow is manufactured by putting crushed ice through a special process.

The studios manufacture ice floes and cakes of ice that float in the water from wooden boxes covered with paraffin and paint. The paraffin keeps the water out and the paint provides the shades and depth of real ice. The hollow cakes are ballasted so they float like real ice instead of bouncing around like corks.

(Continued to page 130A)

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(Continued from page 128A)

For one picture Witte was asked to build a jagged ice floe forty by thirty-five feet that would split in half and finally into smaller pieces in the water. He did it by building the small blocks separately. Then he assembled the pieces and locked them together with wire hooks. The hooks were tripped at the right time by underwater jerk wires, causing the floe to split up. When a studio needs an ice rink and can't use the refrigerated stage the technicians mix up a special chemical formula. After it has been poured into place and allowed to set for a day it has a glossy finish and is practical for real skating.

For a sand or dust storm the weathermen use ordinary sand blown through the air with one of the big wind machines. For close-ups of an actor who has been through a sandstorm, fuller's earth or bran is sprinkled over his clothes and features. Steam rising from a kettle is usually the vapor of dry ice. Perspiration on an actor's face is achieved with water or glycerin blown on with an atomizer. Soapsuds or whipped cream gives the effect of lather on a horse. Drops of rain on a face are obtained by first coating the face with a film of mineral oil and then spraying on the water. The oil causes the water to collect into drops.

Many "special effects" also are handled by the weather departments. One job is smoke making. In the morning a "smoke man" may create a grey wisp of smoke trailing from a camp fire and in the afternoon he may be providing the black clouds that pour from a steamer's funnels. For that task he uses as much as 100 pounds of chemicals per hour and builds his fires at the bases of the funnels.

The weathermen are also experts on fires and the big explosions required in battle scenes. For a big blast of fire one of them blows a powdered chemical past a pilot light similar to the method used in creating artificial lightning. Sheets of flame that shoot forty feet in the air thus can be produced. Small fires that flicker up and down at will are produced with a mixture of gasoline and kerosene that issues from jets. Camp fires are ordinarily built of asbestos logs and the flames are created with chemicals poured on the artificial wood because a regular wood fire might die down before a scene is finished.



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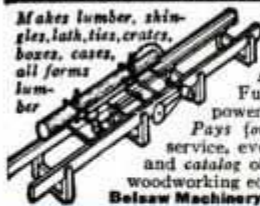


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f 543

**New Tasks for Glass**

(Continued from Coloroto Section)

on a steel plate or lithographic stone. A print is then made on a fine tissue paper with the aid of a composition known as a "resist" which is impervious to acid. The print is applied to the glass, and the paper is removed, leaving the design. Then the glass is coated with wax, leaving only the design to be etched of clear glass. When placed in an acid bath, the acid etches into the glass wherever it has not been covered with wax.

In pantograph etching, motion is communicated to a large number of cutting tools with the aid of a pattern on a steel plate, removing the design on wax-covered glass. Thus a pattern can be marked on several articles at one time. Frosting or matte etching of the surface is done with acid, the part not to be frosted being covered with a resist. In sandblasting, very fine sand is forced against the glass by air pressure, zinc foil or rubber being applied where sanding is not desired.

For encrusted gold decorations, the design is transferred from a steel plate to a tissue paper with the resist, and the glass is coated with wax and etched as in plate etching. It is then banded or painted with a precipitate of pure gold, heated in a kiln and then the gold is polished. Flat gold decorations usually are done by hand and for raised gold decorating a relief paste is used to receive the gold. Sterling silver can be used also to decorate glass by a somewhat similar process. Colored enamels are applied to glass as are certain types of paints for decorative purposes.

Glass, like most other widely used materials, appears today in almost as many forms as there are applications for it. While sand is about the only constant in the different kinds of glass, more than 100 substances enter into its manufacture in its various forms. The uses for glass and the kinds of glass are constantly increasing and some recently tested glass products have as many amazing new characteristics as others now in general use.

Tests are being made to determine the advisability of using shatterproof glass to protect precious objects, such as museum pieces. In this connection a tempered glass that can be hurled across a room

(Continued to page 134A)



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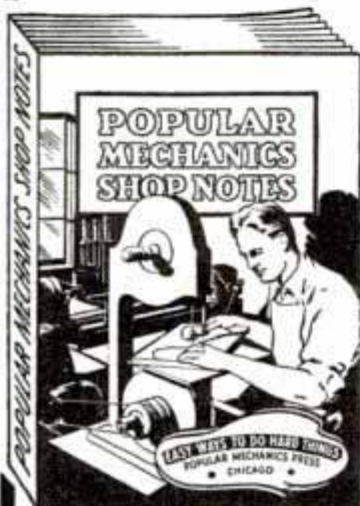
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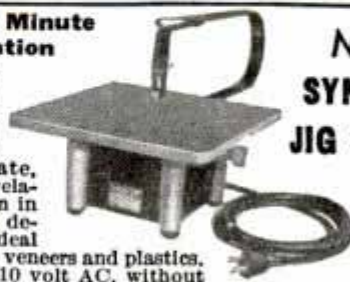
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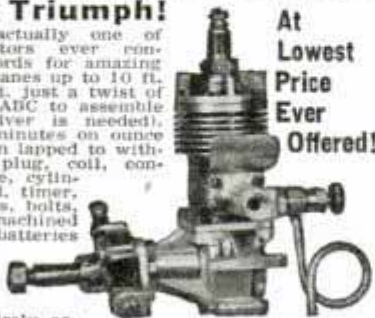
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(Continued from page 132A)

onto a concrete floor or struck with a hammer without breaking has been produced. Black opaque glass and glass reinforced with straight steel wires are newcomers in the field as is also a fireproof fabric of spun glass.

Probably more kinds of glass have been produced and more uses have been found for glass since the turn of the century than in all the thousands of years since man has made and used this product. And still other kinds of glass and other uses for glass are being sought, so that we may expect this "frozen liquid" to play an increasingly important part in our lives.

## F 57 S Cheating Death on a Motorcycle

(Continued from page 367)

slide and he is straightened out for the next stretch. He pulls out of a slide partly by the drag of his left foot and partly by turning the power wide open.

Motorcycle riders get into racing by entering Class C events held for inexperienced racers. Their machines may be assembled from the castoff parts of other motorcycles. If a rider is good enough he may graduate to Class B ranks after a few weeks and compete for larger prizes. Finally he may prove good enough to obtain a Class A rating. An average rider may take in about \$4,000 during a season in appearance money and prizes. A lot of the income, however, goes for repairs.

A racing motorcycle costs \$600. Upkeep may cost several times that during a season. Parts must usually be replaced after every wreck. One evening of racing wears out one and one-half rear tires. The reason for the fraction is that most wear is on the left side of the tire and after one race the tire can be taken off and turned around so the unworn rubber on the right side is used. After each night of racing a good rider takes his motor apart, grinds the valves and installs new rings. Valve springs must be replaced after every third night, and a new piston must be installed after every week. Every two or three weeks the lower end is overhauled. Bearings and the connecting rod are usually replaced even if the wear is slight.

Each kind of motorcycle contest requires a special type of machine. For the short flat tracks the riders use a one-cylinder



J. A. P. racer. It has the highest compression ratio of any internal combustion engine, being rated at fourteen and one-half to one. Some riders have tried compression ratios as high as fifteen and one-half to one, well inside the Diesel range. The three-quart fuel tank holds re-refined wood alcohol to which ether and special dopes and compounds are added. Castor oil is used in the crankcase. The small engine makes 6,500 revolutions per minute and develops close to forty horsepower. It is capable of nearly 120 miles per hour in a straightaway speed dash. The machine has no brakes and no clutch. An assistant starts it by pushing it down the track. The knobbed tires carry air at ninety-five pounds pressure.

On the long tracks an even smaller engine, of twenty-one cubic inches displacement instead of thirty and one-half, is used. Faster speeds are made with the smaller motors because the straight stretches of the track are longer. This sort of racing requires a different kind of frame, with no springs, and the tires carry 110 pounds pressure. The lack of springs and the high tire pressures give good control but are punishing to the riders. For hill climbs another special frame holds a big two-cylinder engine. This motor has overhead valves, and is equipped with a three-speed transmission. Skid chains are used on the rear wheel. Stock motorcycles are used in road races that may be 200 miles long. The machines may be "hopped up" to some extent but with the exception of special cams all contestants are required to use stock factory parts.

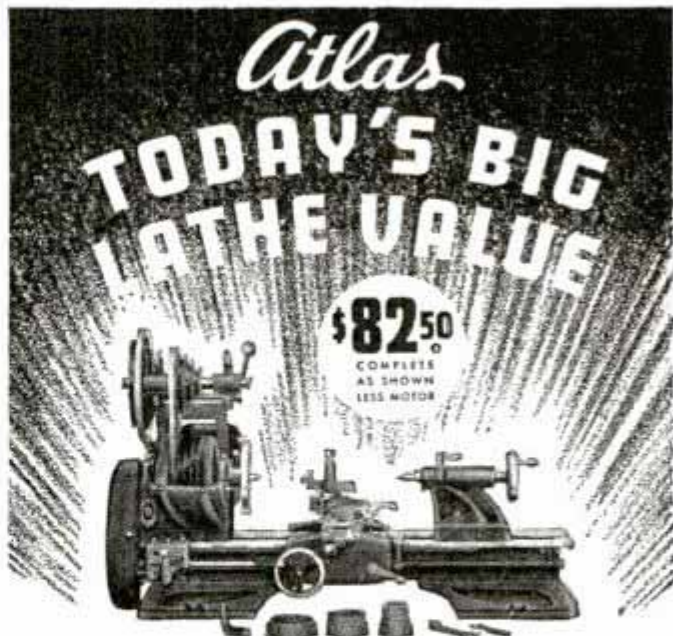
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See Mar 1934-421

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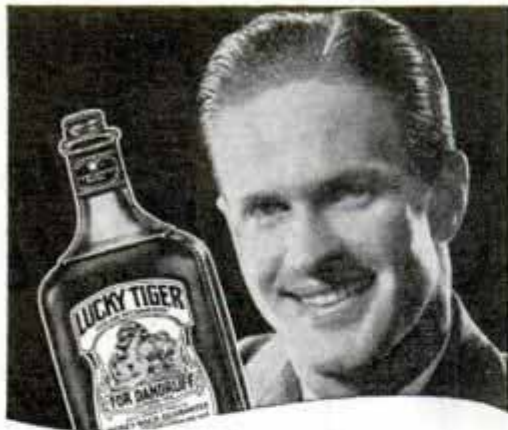
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## Tricks of the Speedboat Aces

(Continued from page 389)

open hole in some parts of the hull near the propeller admits no water as long as the boat moves at high speed. Once a speedboat knocked a hole in its bottom and started to scoop up water but the driver won the race because the water was scooped up so fast that it was thrown clear out of the boat through the open cockpit.

Outboard hulls and motors are still in an evolutionary stage and many ideas that were accepted as common sense two years ago are being reversed. Instead of longer, narrower hulls the trend is now toward short wide hulls almost triangular in shape. The increased width at the stern is needed to support the heavy engine as well as to prevent capsizing on the turns. Short hulls are lighter and offer less wind resistance. Owners are "shingling" the bottoms of their boats like roofs to stir up a sort of lubricating layer of bubbles on which the wetted portion of the hull rides.

Outboard owners are packing more power than ever into their little power plants. They have taken a tip from automobile racers and are stepping up compression ratios. In some cases engines develop 7,000 revolutions per minute, a speed that would have seemed disastrous a few seasons ago. Stepping up the compression ratio may add as much as five or six miles to the top speed.

Cylinder walls are being chromeplated for highest efficiency and steel tops for aluminum pistons are being considered in the hope of eliminating burned piston heads. Getting rid of the tremendous heat created in the small engines is one of the big problems and copper may replace aluminum as the metal used for making combustion chamber heads. Copper disperses heat faster and does not crack as easily as aluminum.

Tractor type propellers that pull on the water instead of pushing it away behind have been found to deliver fifteen per cent more speed. The improvement requires rebuilding the lower element of the outboard engine and has not been adopted as a stock device. The long, narrow, fanlike propeller blades of a few years ago are being abandoned for shorter, wider blades

(Continued to page 138A)



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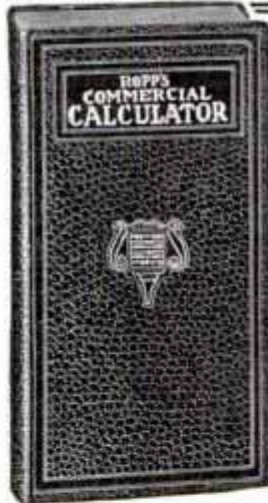
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(Continued from page 136A)

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that approach more closely the deep spiral of a real screw. Instead of churning a lot of water, the new ones disturb less water but give it a more thorough shove.

R. V. Collins, Los Angeles speedboat builder and driver, thinks he will smash all existing records with a "front drive" boat he is laying out on paper. Instead of mounting the outboard engine on the stern he plans to hang it right on the bow. This would give the tractor type of propeller the advantage of moving in undisturbed water.

His plan calls for an entirely new type of hull, blunt at the bow and trailing to a cigar-shaped stern, just the reverse of present designs. The combination of a blunt bow and the front engine would give the boat the appearance of backing up at full speed ahead. Experiments show a blunt bow moves through the water with the least amount of disturbance. Collins' boat will be streamlined above and below the waterline and he expects it can be made so narrow that the mechanic will be able to sit forward of the driver where he can reach the engine easily. Such a design ought to be able to turn a sharp corner safely, he thinks, merely by twisting the outboard's propeller in the new direction.

European speedboat drivers are trying two propellers, one mounted one-half inch in front of the other, and turning in an opposite direction. Indirectly this allows them to use faster, round-bottom boats that can be banked around turns since the need for wide sterns to offset propeller torque is eliminated. Most European hulls are constructed of duralumin or some other light metal, while wood is almost universally used in this country.

One of the reasons speedboat racing is becoming more popular is that you can carry your boat almost anywhere on a trailer. Thus many speedboat clubs have their headquarters in towns miles from the nearest water, and owners in Los Angeles, for instance, think nothing of towing their boats as far away as Boulder Dam for a day's racing.

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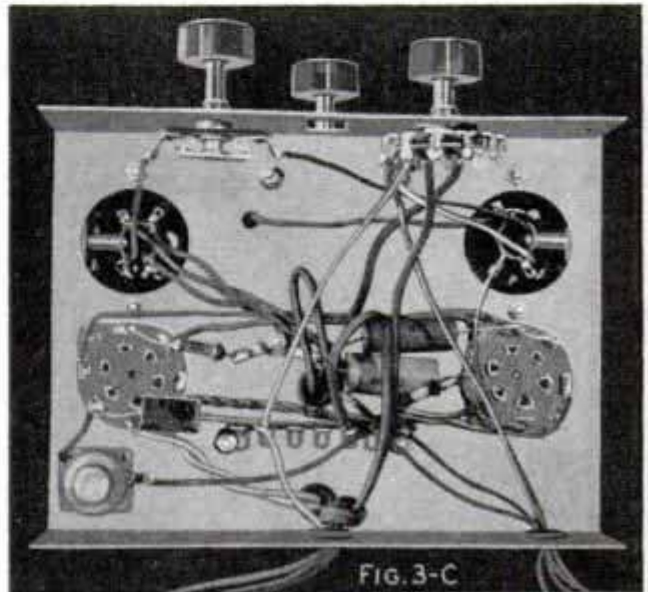


## Pre-Amplifier for All-Wave Set

(Continued from page 419)

geared down 8 to 1 to provide vernier tuning. A complete list of the original parts used can be obtained from Popular Mechanics radio department without charge. The blueprint number is R-228.

Switch  $S_1$  is shown in the 50 to 200-meter, or 1,600 to 5,700-kilocycle, position in Fig. 2; with this switch in the opposite position, the range is from 16 to 55 meters,



or 5.7 to 18.6 megacycles.  $S_2$  is the "on," and "off," switch. When the pre-amplifier is turned off the antenna is automatically connected to the receiver, so that when once installed with your set it need not be disturbed. To balance the pre-amplifier, connect it to your receiver as previously described, and tune the receiver to about 20 meters. Now set switch  $S_1$  on the 16 to 55-meter position and adjust the trimmer condensers,  $C_1$  and  $C_3$  indicated in Fig. 3-B, with a small screwdriver for maximum noise. These are the bottom condensers on the coil assemblies, and are easily reached through holes in the sides of the shield cans. Now tune the receiver to about 60 meters and set switch  $S_1$  to the other position. The final step is to adjust condensers  $C_2$  and  $C_4$  to maximum noise, or loudest speaker hiss, and the pre-amplifier is perfectly balanced.

## Short-Wave Hints Helpful

"I am interested in short-wave radio. The most helpful suggestions that I have read on the subject were all in Popular Mechanics."—F. E. Trager, Berwyn, Ill.





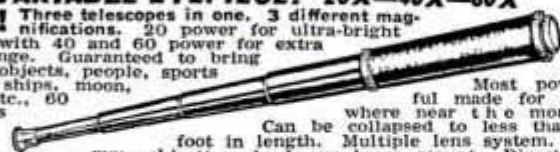
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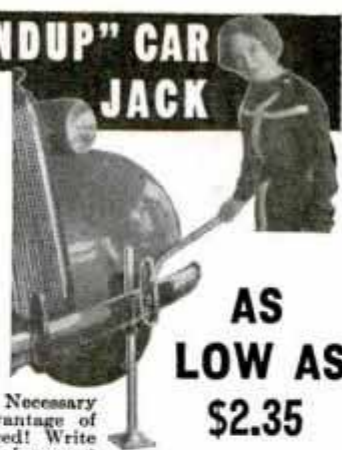


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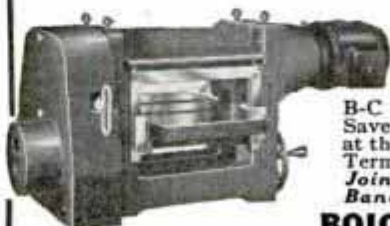
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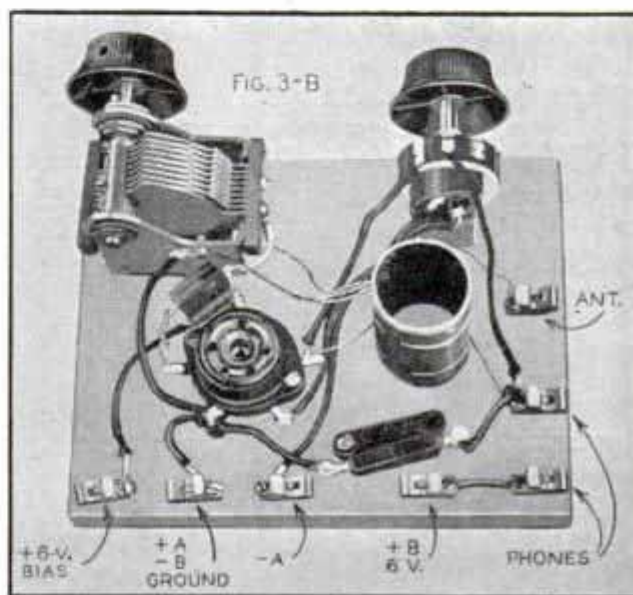
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## Set Works on Flashlight Cells

(Continued from page 420)

board in an upright position directly back of the regeneration control.

All parts are mounted on a wood base-board,  $\frac{3}{4}$  by  $5\frac{1}{2}$  by 7 in.; the arrangement is clearly shown in Figs. 3, 3A and 3B. It will be noted that a separate Fahnestock clip is used for supplying the inner grid voltage. This is done so that a higher voltage may be used on the plate than the grid if desired. The plate voltage, which goes through the headphones to the plate of the tube, may be increased to 12 volts

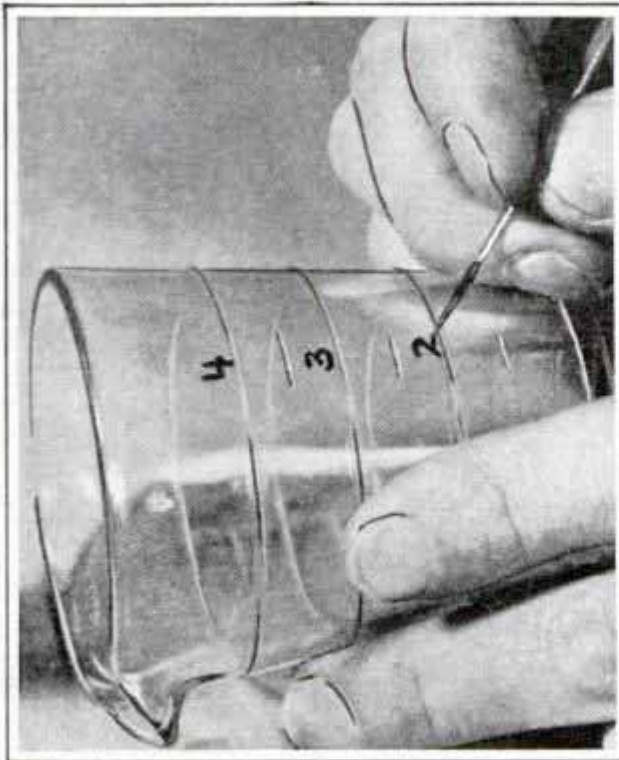


with a slight increase in volume; however, the grid bias should remain at six volts. A complete list of the original materials used in this set can be obtained from Popular Mechanics radio department without charge. The blueprint number is R-227.

When the wiring has been completed and carefully checked, connect the batteries and headphones; use a good antenna and ground and be sure that your headphones do not have a total resistance of more than 2,000 ohms. Higher resistance phones will reduce the plate voltage so that the set will not operate properly. In tuning, the regeneration control is advanced until a soft thud, which indicates oscillation, is heard; now back off the control slowly until oscillation ceases. Stations are then tuned in by rotating the knob on the variable condenser. Slight readjustment of the regeneration control may be necessary in order to obtain maximum volume. The set is most sensitive at the point just before oscillation begins.



## Etching Glass Without Acid



Lettering put on glassware and allowed to remain for a couple of weeks leaves a matte surface

For etching lines and numbers on glassware, ordinary water glass, or sodium silicate can be used. This should be mixed with a little dye or lampblack to make its application more clearly visible. When applied with a pen or pointed brush and allowed to remain on the glass for two or three weeks, the water glass leaves the same matte appearance on the glass as that obtained with acid.

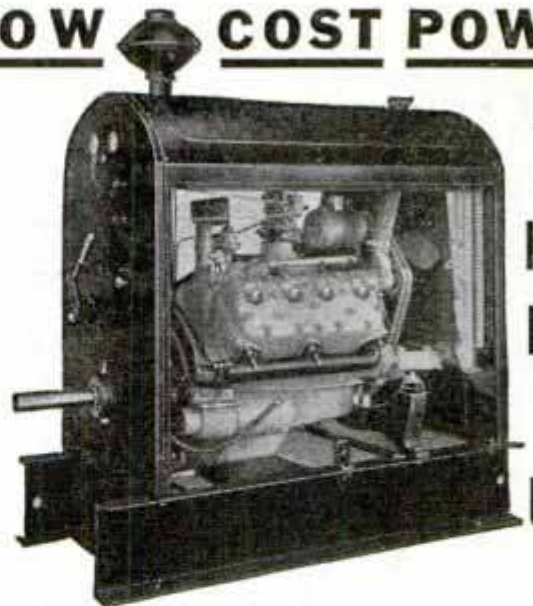
—Kenneth Murray, Sturgis, Mich.

## Moistureproof Match Holders from Soda Straws

If a moistureproof box for carrying an emergency supply of matches on a camping trip is not available, try using paraffin-coated soda straws. Cut the straws in two, slip one match in each piece, turn over the ends and bind them together with a rubber band. Even though exposed to considerable outside moisture, the matches will stay in good condition and ignite quickly when removed from the straws.

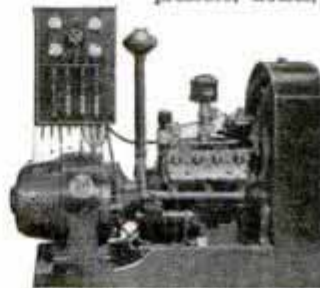


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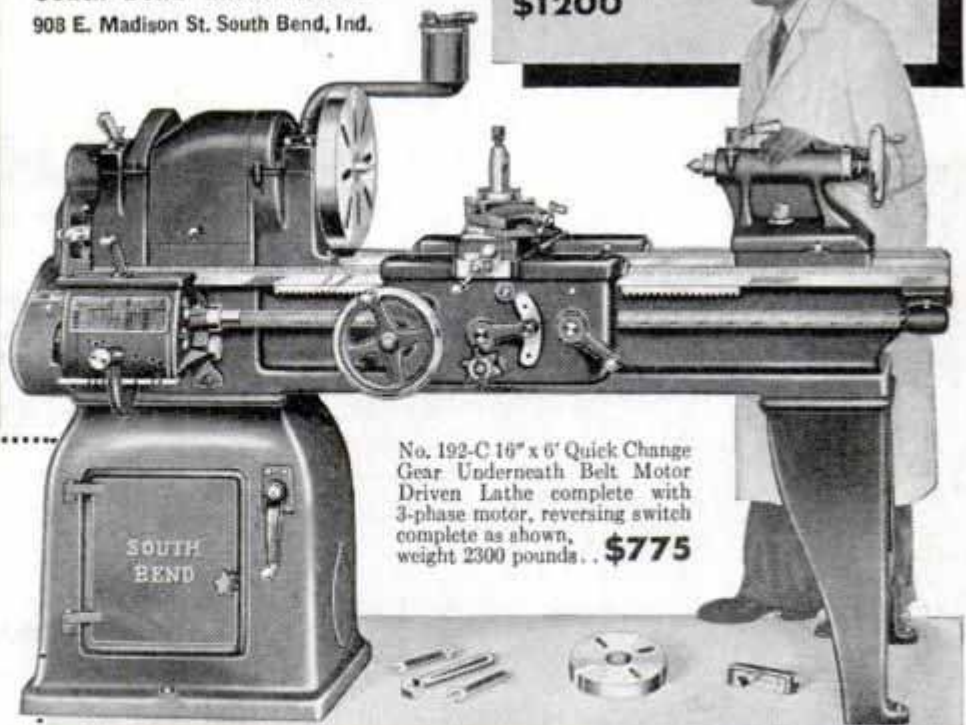
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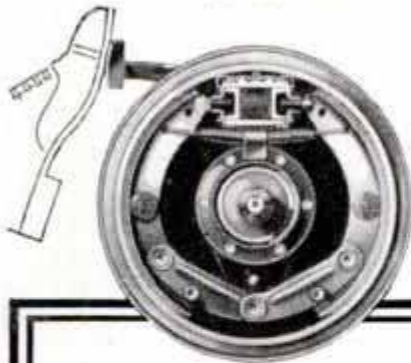
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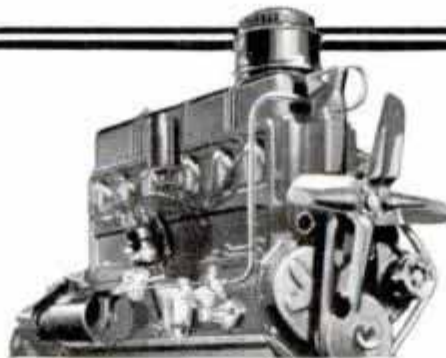
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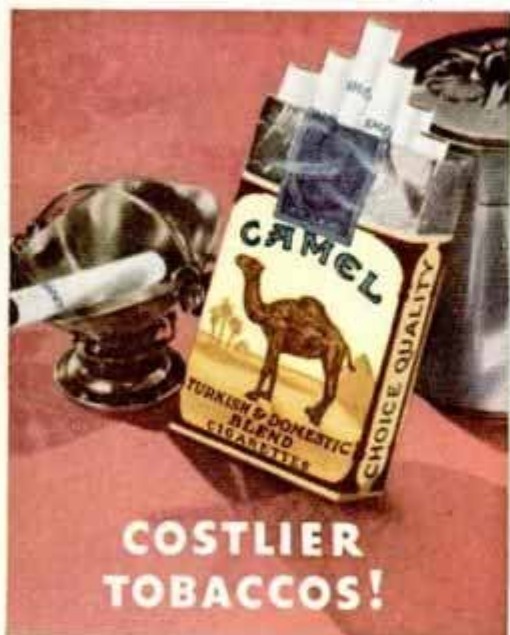
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