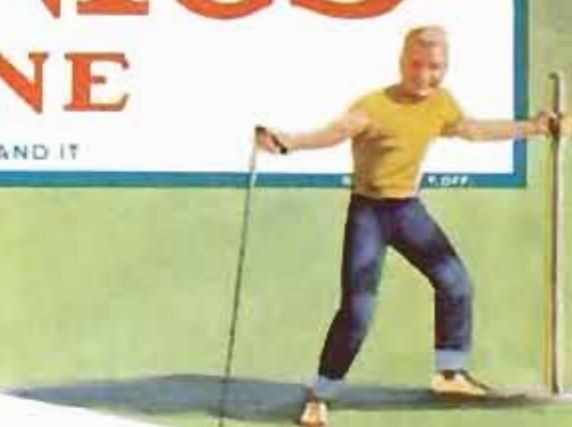


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# POPULAR MECHANICS MAGAZINE

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JULY 1959  
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“Just to make it a real magic carpet I added power steering\*, power brakes\* and that six-way

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**Volume 112**

**JULY 1959**

**Number 1**

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## *Next Month...*

**WHO'S WINNING** the race to the moon? An authority on space research takes a look at obscure but important Russian and American scientific papers and comes up with surprising predictions on the most significant race of the century. . . Also in August you'll find a fact-packed article that helps answer the question "Should You Buy a Foreign Car?" . . . and an on-the-spot description of a spanking new city, the wilderness capitol of Brazil



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leaders of long standing. They have always paid withdrawals instantly, and have a history of dependable performance as well as above-average earnings.

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# SHOULD A CAR'S ENGINE BE IN FRONT OR IN THE REAR?

It makes quite a difference. Driving a rear-engine car is not like driving a front-engine car at all. Automotive engineers have tested many cars lately to get all the facts. The results of those tests are important to every driver in America.

To begin with, all the rear-engine cars tested were decidedly back-heavy. Such unbalanced design produces a dangerous driving characteristic called "oversteering", which causes a car to exaggerate the effects of cross-winds and even road-crowns. On the wide-open straightaways of our modern highways, where cars are often buffeted by powerful cross-winds, the rear-heavy automobile is exceedingly difficult to control.

On the other hand, front-engine cars like the SIMCA react in the opposite way. They actually tend to *compensate* for the slope of a road-crown, and *fight back* against cross-winds. The difference in handling is due to the difference in weight distribution.

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PM 759

## ACROSS THE DESK



### To the Editor:

After eight months of hard work, I have just completed, with certain alterations, the Sea Knight [PM, May 1957]. The alterations comprised additional length (21.6 ft. l.o.a.) and bringing back the cabin bulkhead to the next frame. The space thus gained was used to install an enclosed marine head on the port side, the door of which being hinged in such a way that it serves the double purpose of cabin door and lavatory door. The

stern is built so as to accommodate two Mercury Mark 55 engines, which are completely enclosed, a hinged top being provided for accessibility and engine removal. The boat has been completely fiber-glassed and a racing finish obtained on the bottom. Two built-in gas tanks, of 10 imperial gallons each, are installed on port and starboard sides just forward of the engine compartment and side seats are built over these. A 10 imperial gallons water tank occupies the same place as indicated on the original plans. The steering gear is of the rack-and-pinion type with a push-pull inner and outer cable connected to the twin engine hookup. On the dashboard I have mounted twin tachometers, speedometer, gas-tank gauge of the hydrostatic kind and also a marine compass. The estimated gross weight of

SK II is about 2000 lbs. After the engines were dutifully run in, a maximum speed of 30 m.p.h. was recorded over the timed quarter mile. For normal cruising I maintain a comfortable 24-25 m.p.h.

Pedro M. Polzin,  
Brazilian Consul,  
Port of Spain,  
Trinidad, W. I.

(Continued to page 8)



## STOP AT THE SIGN OF THE SMILING TIRE...

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## John Philip Sousa, USA

A bit of an atmospheric disturbance has been stirred up by the letter in this column in the May issue from Hans F. Kutschbach. A long-time contributor to PM editorial pages, Mr. Kutschbach wrote from his Hannover-Westerfeld home in West Germany his recollections of the occasion on which the famed John Philip Sousa acquired his name. Sousa was German-born, he wrote, and adopted the name from the initials S. O., USA (for Siegfried Ochs, U.S.A.) which appeared on his luggage on a trip from America to Germany. This appears to be one of the myths that grow up around great personages. Here are some of the comments in our mail:

John Philip Sousa was born Nov. 6, 1854 in Washington, D.C. He was an American and very proud of it. His father was a Portuguese born in Spain and his mother was a German. Sousa was the correct family name.

Albert R. Hoffman,  
Phoenixville, Pa.

I have read of so many people who saw that trunk marked "S.O. U.S.A." that I wonder if they have all been moved from the pier even now. Mr. Sousa's autobiography, which states that he was born in Washington, D.C. . . . even includes a picture of the house in which he was born—a house that still stands. At the time of young John Philip's birth, his father was a trombone player in the United States Marine Band.

William F. Santelmann, Lt. Col.,  
Chairman,

John Philip Sousa Memorial, Inc.  
Washington 3, D.C.

### Rebuttal from Mr. Kutschbach:

I am astonished . . . Mr. Sousa emigrated from Germany and his name, S. Ochs, was changed into Sousa as a pseudonym. You can read in many German biographical dictionaries that first his name was S. Ochs. His father was not a Portuguese.

Hans F. Kutschbach,  
Hannover-Westerfeld, West Germany

And the clincher, a letter from Mrs. Helen Sousa Abert of New York City, the great band leader's daughter:

I hate to spike Mr. Kutschbach's guns for he has provided a new version of an old story. It has many more ruffles than the usual one that I hear. The addition of his uncle certainly lends it verisimilitude. The version usually given has his

(Continued to page 10)

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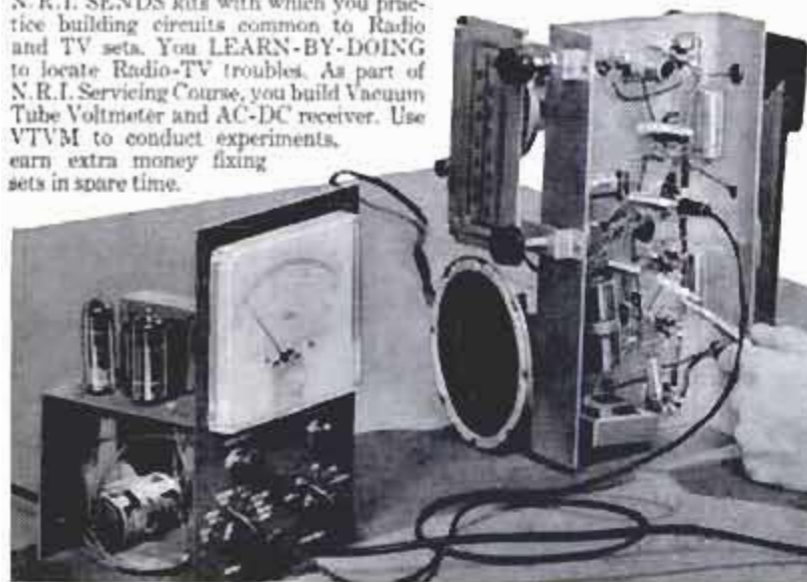
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Founder

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luggage marked USA as he emigrates to this country. Mr. Kutschbach's logical mind probably felt that was wrong and changed it to have him go in the other direction.

Like my father, I enjoy this story, for when legends grow about a person, I feel that is real fame. But Mr. Kutschbach is correct in one thing, for I have heard, though I have not seen it, that in the encyclopaedias published during Hitler's time, there was listed the name Sigismund Ochs as the real name of John Philip Sousa. This is easy to understand because it enabled the Hitler regime to steal my father's royalties in Germany. Not so easy to understand is the fact that Sigismund Spaeth used it in one of the reference books that he compiled . . . The story has gone around the world and the only place from which I never get a query is Washington, D.C.—they know better down there, for we still own the house in which Father grew up and to which his family moved when he was four months old. Also there is the fact that Sousa is a very common name in Portugal, ranging all the way from humble fishermen to royalty. In this country you will find it chiefly around San Diego and Cape Cod.

I hope this will clear the matter up for you. I know that editors don't like mistakes of this kind but you are in good company.

Helen Sousa Abert,  
New York City

☆ ☆ ☆

The other day your editor, feeling that he must keep informed about these new-fangled things on a firsthand basis, took a ride home to Chicago from New York on a Boeing 707 jet. In spite of his having read all about the jetliner in *PM* several times, he still was subjected to some surprises, such as pancakes and sausage, breakfast rolls and fruit and coffee at 28,000 feet. And music over the PA system. And setting a new record of one hour and 42 minutes from Idlewild airport to O'Hare. But the thing that was most surprising was climbing up to 28,000 feet and sliding down again without having to swallow or yawn or chew gum. No deafness or cracking of eardrums. We asked American Airlines why it didn't even occur to us to swallow. Reason: the 707 is pressurized at just about sea level all the way to 20,000 feet, and up to 30,000 the pressure is kept at around 3000 feet. Matter of fact, if we had been flying five

(Continued to page 12)

# INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

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miles above Denver, the cabin pressure would be the same as if we were about a half mile below the folks on the state-house steps!

☆☆☆

Dale Kelly's article, "How Good Are the Gadgets," in the annual automobile section last January evoked many comments, pro and con. The following letter to Mr. Kelly, independent consulting engineer whose analyses of cars appear in PM with each "Owners' Report," was of special interest:

Dear Mr. Kelly:

It is a great credit to you and to your publishers to find the straightforward treatment of the various automotive products in *Popular Mechanics*, January issue. It is particularly welcome to note a defense of the National Bureau of Standards position on a battery additive because of the unfortunate way in which the situation was resolved. We have well over 100 analyses of "mouse milk" which are sold as additives for fuel and lubricating oil, and a quick look at the contents will dispel any acceptance of the claims which are made for these products.

The tendency to stretch a point in advertising is by no means confined to the mail-order operation. One of our largest corporations described a product in reputable journals as exceeding "U. S. Bureau of Standard Specifications and SAE standards." What makes this interesting is the fact that neither of these organizations has such a standard.

J. C. Crawford, Supervisor,  
Automotive Chemicals,  
Commercial Solvents Corp.,  
260 Madison Ave.,  
New York City 16

☆☆☆

## To the Editor:

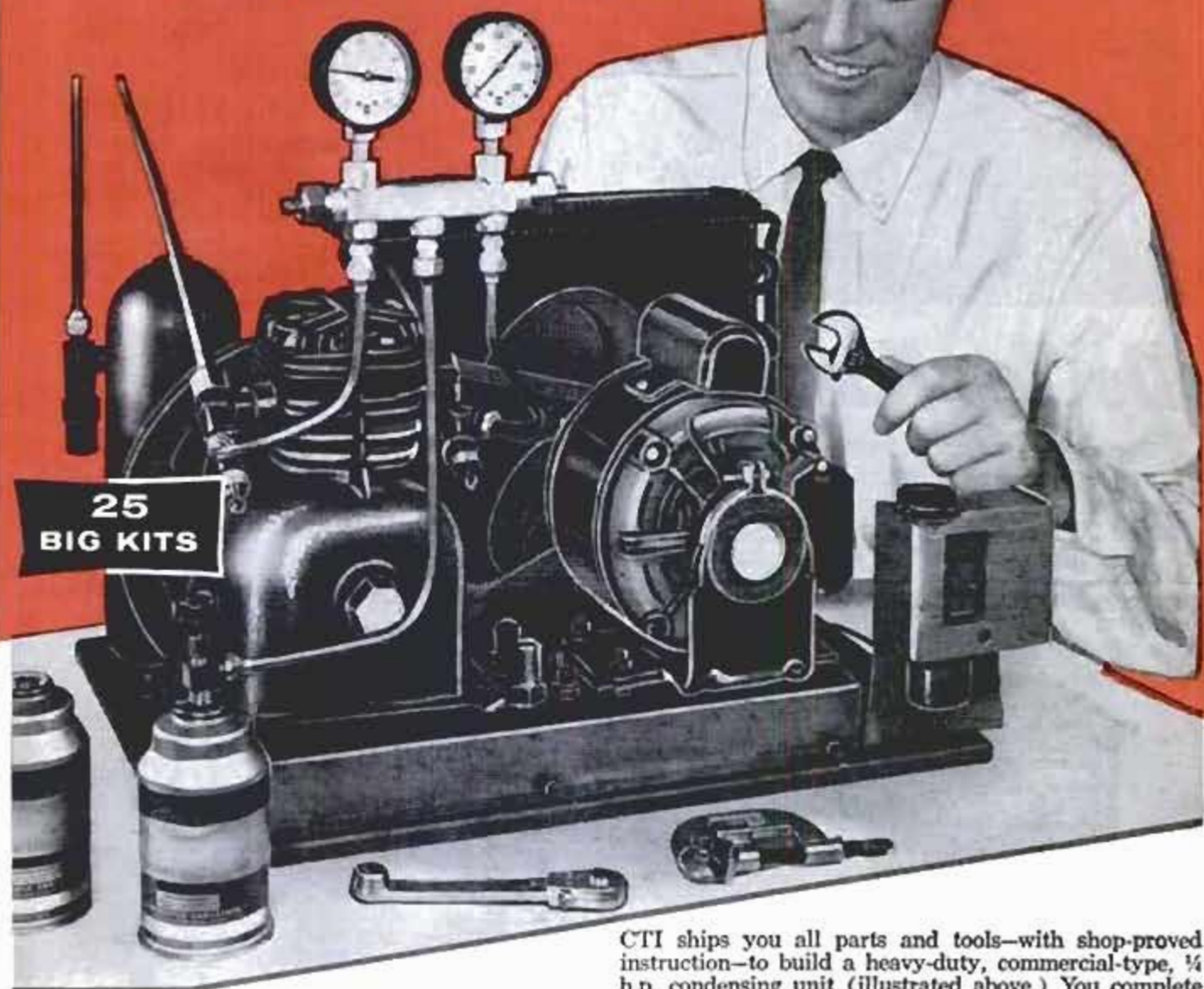
Enjoyed reading your article on "What You Should Know About Power Mowers" (*PM*, May 1959) immensely. Using a power mower on a steep incline is an invitation to danger, I wholeheartedly agree.

I would like to send you a suggestion that will prevent this danger of being cut up by a power mower.

When cutting your lawn either with a rotary or reel-type mower, wear golf shoes or baseball shoes. This will prevent slipping on the turf and the wearer will find that he will not be so fatigued after cutting his lawn. The spikes give a firm grip in the soil as you follow your mower.

L. J. Kapinos,  
Thompsonville, Conn.

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Almost any industry has jobs for men with special skills. In many cases, good pay and steady work are the rule. Yet—would you be happy in being a repairman all your life? Wouldn't you rather have a job that presents a challenge—still bigger money—an opportunity to grow?

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# INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are *your* laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

*Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.*

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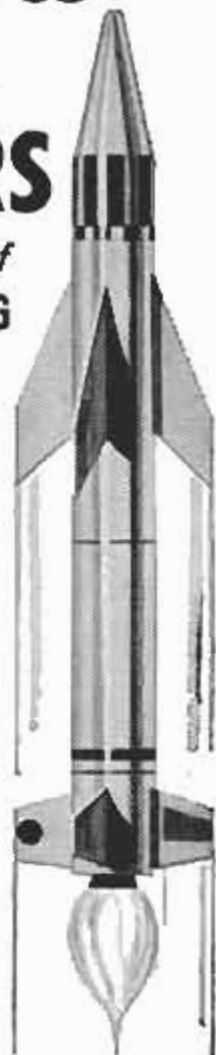
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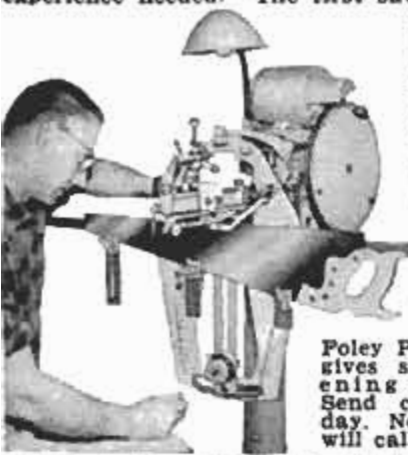
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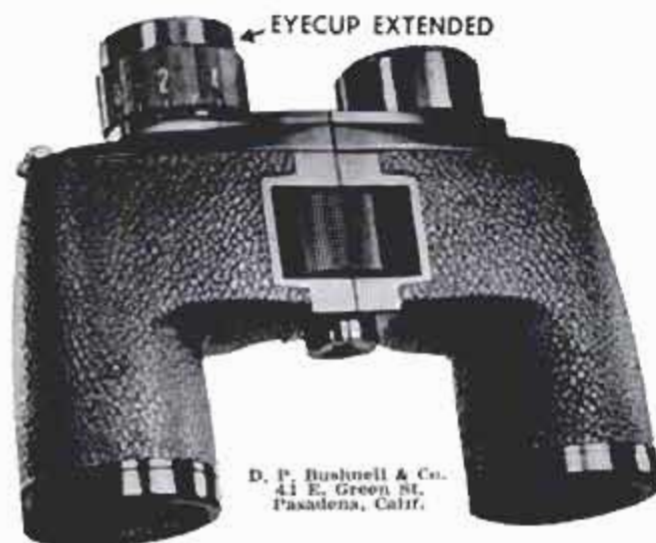
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**EVERYBODY Likes candy.** Make professionally home. Instruction, tools, supplies. Details free. (Our 49th year.) Ragsdale Candies, B107, East Orange, New Jersey.

**OPERATE Profitable mailorder business.** Write: Rocky Service, 6740-N Waterworks Rd., Norfolk 2, Virginia.

**NEWEST.** 3 Sport hat samples. \$1.10. Troy, 2160, Cleveland 8, Ohio.

**FREE Business-franchise protected.** Have own office. Self-employed. Nationwide travel service. Details free. Pippin and Company, Box 87, Benham, Kentucky.

**WANTED.** Men, women. Raise bait for us at home. Full, spare time. Doesn't take up space. We furnish everything. Sherwood, Dept. L-2, Monmouth, Maine.

**BECOME Finance specialist.** Handsome profits. Tucker Associates, 3633 Warder N. W., Washington 10, D. C.

**CASH** From sawdust, tin-cans, newspapers. Over 200 methods. Instructions \$1.00. Charles Company, 42-GPH, Norwood, Ohio.

**MANUFACTURE Beautiful concrete floor tile, spare time.** Free details. Century Sales, PM2, 704 North Douglas, Belleville, Illinois.

**MOTEL-Resort management.** Qualify for hundreds fascinating, leisurely, well-paid executive openings. Learn at home. Free booklet. Motel Managers Training School, PM-79C, 612 S. Serrano, Los Angeles 5.

**MAILORDER!** Succeed with your own guaranteed profit mail order business. No inventory. We dropship and show you how to make big profits. Write Giftime, 919 Walnut, Dept. GPM, Philadelphia, Penna.

**MONTHLY Fee** from members 80% profit for a service that will be franchised. Start at home part time. The idea is the thing. Appeared in national and local papers as a boon to small business. Information \$1.00 Marshall's Agency, 4154A Commerce Station, Phoenix, Arizona.

**WORK At home.** We supply everything. Send for free details. Suffolk Ceramics, 366p, Centerport, New York.

**FREE Literature!** Profitable mailorder plans. Hildreth, 1047-A Inner, Schenectady 3, New York.

**LARSTONE.** World famous, foolproof, formula. Stucco paint spackle, floor leveler, etc. Unlimited profits, free instructions. 3419-9 East, Salt Lake City 6, Utah.

**REFINE Old crank case oil.** Good business of your own. Part or full time. Small investment. P. O. Box 10161, New Orleans 21, La.

**SHEEP Return investment first year.** Instructive magazine. \$2.00 year. Shepherd, Sheffield 41, Massachusetts.

**LIFETIME Income yours!** Proved, repeat-sale, home mail order business. Spare or full time. Amazing success record. Free details, proof. Slater, 305 West Eighth, Los Angeles 14, California.

**FREE Literature.** Amazing profits in fishworms. Down-East, Box 149, Bangor 1, Maine.

**PLASTIC Signs.** You build and sell. Experience not necessary. McMaster Sign Company, Bellingham, Washington.

**DISTRIBUTE Clever, new, fast selling 25¢ novelties** to stores at wholesale. Samples \$1.00. Refunded first order. Creative Products, Box 423, Connersville, Indiana.

**LIQUID Marble.** Colorful, glossy! Molded, brushed, sprayed! Cast novelties, statuary. Composition floors, tile. Flexible molds. Particulars free. Marbleizing Service, Edwardsville, Illinois.

**DOLLARS From pennies!** It's easy to make and sell costume and sea shell jewelry. Friends, neighbors and shops will buy. Rush address for free catalog and details. Modern Craft, Box 11088-MB, St. Petersburg 33, Florida.

**HUGH Profits.** Manufacture concrete fence posts. Send \$2.00 for plans, instructions. Cretepost, Box #38, Windsor, New York.

**SELL "Winning Ways in Table Tennis."** Sample book \$1.49. Gross \$57.60. Goebel, Box 2803, Wichita, Kansas.

**40 FOREIGN Exporters** of good selling items. Many send catalogues on request. Complete list \$1.00. A. P. Howe, DeSoto 1, Kansas.

**BE Respected, earn money,** head your town's sales promotion business. Instructions, sales helps furnished. Easy franchise qualifications. No investment except time. Rush \$1.00 for "Profits from Sales Promotion" applications. Sales Promotion Enterprises, Suite 404 Ogilvie Building, San Antonio, Texas.

**SELECT List of 103 part or full time business opportunities,** home or farm operated. Information \$1.00. Business Reporting, Box 526, Arcadia 1, California.

**PROFIT With Popular Mechanics' subscription plan.** No investment, no experience needed. Earnings begin immediately when you obtain subscriptions for Popular Mechanics, Good Housekeeping and others. High commissions, bonus. No experience needed. Deal directly with the publisher. Write Popular Mechanics, Room 7B, 250 West 55th St., New York 19, N. Y.

**LEARN Sewing machine repairing.** To \$125 weekly. Sparetime. Supplies. Add to present business. Shipping from Chicago, New York, Los Angeles. Write today! Taylor Service, Box 2126, San Bernardino, Calif.

**IF You like motorcycles and money** then send for Harley-Davidson dealership book on how to become a franchised dealer of motorcycles and a new line of motor-scooters. Here's a chance to own your own business with a very modest investment. The youth market is beginning to explode and the next few years promise a chance to cash in on it. Write for free illustrated dealership book today. Harley-Davidson Motor Company, Dept. F, Milwaukee 1, Wisconsin.

**EARN Money at home raising fishworms** for us! Backyard, garage, basement. We buy your crop! Inquire: Oakhaven 38, Cedar Hill, Texas.

**FIND Money in your mailbox.** Start your own mail order business. Experience unnecessary. Experts show you how. Write Richton Company, 157A, Maplewood, New Jersey.

**BUY Direct from factories.** Appliances, cameras, watches! Free details! Cam Company, 6810PM—20th Ave., Brooklyn 4, N. Y.

**CANDIED Popcorn and potato chip equipment.** Eskins, Box 933-A9, Springfield, Ohio.

**BUSINESSES, Resorts, motels, investment property, ranches.** Our special service dept. at your disposal. No obligation. World's largest. 58 years' service. Strout Realty, 7-MB 8, Dearborn, Chicago 3, Ill.

**BIG Money raising fishworms and crickets.** Free literature. Carter Farms, Plains, Georgia.

**QUICK Profits, with no capital!** Take orders for magazines your neighbors like, want. Make cash on the spot! We show how with free kit. Get yours now. Write McGregor Magazine Agency, Dept. 311, Mount Morris, Ill.

**OPERATE Mailorder folio business.** Free details. Ballard's, 1834 Edgeland, Louisville 4, Ky.

**\$34.70 TWO Hours.** Manufacturing concrete products. No selling. Carlyne Castings, 1803 Fremont, Rapid City, South Dakota.

**TO \$100.00 Weekly.** Sparetime, home operated mailorder business. Successful beginner's plan. Everything supplied. Lynn, 10420-M National, Los Angeles 34.

**COLORGLAZED Concrete pottery** made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries Company, Grand Rapids, Minnesota.

**PIANO Tuning learned quickly at home.** Tremendous field! Musical knowledge unnecessary. Information free. Empire School of Piano Tuning, Champaign, Ill. (Founded 1935).

**WANT To make big money at home?** \$10.00 profit in an hour possible with invisible mending. Make tears, holes, disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 6234 Broadway, Chicago 40, Illinois.

**\$70 WEEKLY—Home, spare time.** Simplified mail bookkeeping. Immediate income—easy! Auditax, 34757A, Los Angeles 34.

**MAKE Flexible molds.** Cast plaques, figurines. Free sample. Tooker, 1045-R Fairview, Hamilton, Ohio.

**NATURAL Molding rubber, extra thick** Free sample. W. Wooley, 1016-A Donald Peoria, Illinois.

**I Want to send you proof of the wonder** ful pulling power of Popular Mechanic classified pages. What's your proposition? Write me today. Include literature if possible. F. W. Johnson, Manager Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.

**INCOME With garden golf.** Motivated archery ranges. Brockway, Box 3924, Portland 8, Oregon.

**OPERATE Profitable mailorder business** Write: Bond, 1637-H West Vernon, Phoenix, Arizona.

**RAISE Rabbits on \$500 month plan** Plenty markets. Free details. White Rabbitry, Delaware, Ohio.

**11,000 NEW Prospects daily.** Baby record books, shoes, albums. Sell mailorder. Use our literature. Write: No-Co-Ro, Capitola, California.

**BAKE New greaseless doughnuts** in kitchen. Sell stores. Free recipes. M. Ray, 3605 South 15th, Minneapolis 7, Minnesota.

**COPUBLISH Mail Sale Advertiser.** leading mail order paper. Details, latest copy, dime. Vanroy Shirk, Lebanon, Penna.

**FREE Catalog.** Contains hundreds of businesses, farms and income properties throughout U.S., Canada. Specify type and location desired. Deal direct with owners. U. I. Buyers Digest, 1608 Hillhurst, Dept. PM-3, Los Angeles 27, Calif.

**BRONZE Baby shoes!** Instructions, equipment and mountings for genuine electroplating process. Largest supplier of all plating equipment, supplies. Free catalog. Hollywood Bronze Supply, Dept. B-3, 1624 East First, Los Angeles 33, Calif.

**MAKE \$46 From square foot plywood;** jigaws necessary. Free details. Woodart, Bridgewater, Mass.

**PLASTERCRAFT Molds, liquid rubber,** plasters, flocks, candle supplies. Catalog and manual free. Blue Rapids Supply, Blue Rapids, Kansas.

**MARKETS Everywhere.** Make artistic concrete birdbaths, pottery. Best coloring. Home workshop. Hundred varieties. Hollywood Cementcraft, 8527-S Wonderland, Hollywood 46, California.

**LIQUID Molding rubber, free sample.** Shellcraft supplies. Chaney's, 1907-A East Road, Jacksonville 11, Fla.

**MAILORDER To motels, restaurants,** churches, institutions. Complete individual setup, not just instructions. Hermes Advertising, 152-C West 42, New York City 36.

**FIX Typewriters.** Free repair course. Home operated. Remit 25¢ for book explaining free course and agency appointment. Athey, Tarentum, Penna.

**MAKE Money by mail!** Free details! Hunholz, 902 Eighth, Wamego, Kansas.

**MANUFACTURER Fishing lures, plastic, none better.** 20 models pennies. Free circular. Quaker, 3514-24 N. Lawrence, Philadelphia 40, Penna.

**OPERATE Profitable mail order business.** Write Walter Service, 4159A East 112th, Cleveland 5, Ohio.

**EARN Good money sharpening chain** saws, scissors, cutters, knives. Free manual. Treyco, North Tonawanda, N. Y.

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**RE-Cast junk batteries into new.** Latest achievements. Battery Laboratories, Bayou LaBatre, Alabama.

**\$100 WEEKLY! Men, women! Work** home! Sparetime. Free "Confidential Plan." Scott Sales, Box 388, Great Neck, New York.

**IMPORT-Export business made easy.** Individual setup service. Not just instructions. Hermes, 152 West 42, New York City 36.

**HAVE A profitable business of your own** selling the "World's Most Usable Pictorial Bible." Let our 26 years experience help you. International Book Company, Dept. M., P. O. Box 118, Wichita 1, Kansas.

**VENDING Machines make money.** Free catalog. Rakes, 609P Spring Garden, Philadelphia 23, Penna.

**MAIL** Order business. Avoid losing money through errors of judgement. Read, "I was wrong about that", by Arthur Sizemore. Send for free copy. John Bishop, Box 153B, Ojai, California.

**BE** Appointed state notary public now. Details. Stationers, 515 East 33rd. Kansas City 9, Missouri.

**REPAIR** Hydraulic jacks—Learn high paying trade. Follow simple instructions in illustrated trouble shooters manual covering all models \$3.98. Hydraulic Parts Supply, Box 8695, Washington 11, D. C.

**START** Your own business. 10 money making chemical formulas for \$1.00. Custom Chemical, 17843 Van Dyke, Detroit 34, Michigan.

**\$3.00 HOURLY.** Typewriter required. Confidential homework literature 35¢. Interstate, 37 Besch, Albany 9, N. Y.

**START** Postage stamp route. Make 25¢. National, 100 Grand, Waterbury 5, Conn.

**BIG** Profits in your spare time. Exclusive mail order franchise now available. No experience required. Details free. McAllister, Burr Oak, Michigan.

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**START** Big-pay business at home in spare time. No experience needed to operate little table-top machine for bronzing baby shoes. Make \$5.46 profit on every pair. Full particulars free. Send postcard to Mason, 1512 Jarvis, Room CM-2-H, Chicago 26, Ill.

**AMAZING** Successes through franchises! Become exclusive franchise holder your territory. Information rushed. National Franchise Reports, MP-528, 333 North Michigan, Chicago 1.

**EASY** To start rubber stamp business at home in spare time. Make up to \$9.80 an hour without experience. Facts free. Write to Roberts, 1512 Jarvis, Room CR-2-H, Chicago 26.

**MEN—Women!** Start money-making plastic laminating business at home in spare time. Material that costs 11¢ brings back \$2.50. No canvassing or selling but mail orders bring in \$20 a day. Write for full particulars free. Rush name on postcard to Warner, Room CL-3-H, 1512 Jarvis, Chicago 26, Ill.

**\$1,500 PER** Month income for life possible. Operating needed service locally or by mail. Free details. Write: Smith, 7106 Millsboro, Houston 20, Texas.

**HOME** Mail order plan. Tutt, 1920 W. Camelback, Phoenix, Ariz.

**SNAKES** Are worth up to \$25.00, each. Lizards \$8.00. Turtles \$25.00. Toads and frogs \$1.75. We buy all kinds, sizes. Full details and collectors brochure 25¢. Biological Exchange, 1211L Wagner Lane, El Paso, Texas.

**"MAILORDER** And the Law" and "Starting a Mailorder Business." Know about required licenses, federal and state regulations, taxes, etc. Both for only \$1.00. Dorf, 186-M Covington Lane, Woodbury, N. J.

**I MAKE** Spare time cash every month taking and selling photos. Folio shows you how. \$1 postpaid. Bill Whitted, Fairmont, N. C.

**\$150.00-\$200.00 WEEK** Repairing typewriters. Send \$3.95 for course. Typewriter, Box 317, Walden, N. Y.

**MAKE** Money! Big "Home Business" magazine shows how. Sample 25¢ yearly (2). Save! Stone, 6 S.W. Second Ave., Miami, Fla.

**WE Pay** \$3.50 lb. dried. Grow mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We pay \$3.50 lb. Free book. Mushrooms, Dept. 173, 2954 Admiral Way, Seattle, Wash.

**FREE** Information about pleasure and profit ideas. Write Sanchez, Dept. mhi, 440 22nd Ave., San Francisco 21, Calif.

**CARTOONS.** Gags bought, sold. Dime. De-Signs, Box 2024, Davenport, Iowa.

**CRAZY** Cards. Profitable funmakers. Generous samples 25¢. Expect surprise. Particulars free Dalton, Box 615-M, Los Angeles 53, California.

**BECOME** An inventor. Send \$1.00 for article, "Secrets Behind Ideas." Daveco, Box 1095, Fort Wayne, Indiana.

**NEW** Magazine shows you how to operate profitable mailorder business. Free details. Mailorder Income, 2639-27 Howard, Chicago, Illinois.

**MAKE \$5,000-\$10,000** Or more yearly at home, in respectable field. Only 3 hours weekly attention needed. No experience, canvassing necessary! Exceptional but true! Few dollars starts you. Just \$1.00 brings complete detailed plan. Satisfaction guaranteed. Columbia Enterprises, Ltd., 9268-PM, Piney Branch Road, Silver Spring, Maryland.

**BIG** Profits raising nightcrawlers, red-worms. Easy soilless method. Three Oaks Ranch, Dresden, Tenn.

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**EARN** Money evenings copying and duplicating comic cartoons for advertisers. Advertiser, Argyle 1, Wisconsin.

**WORK** At home. Free details. Hayes, 1307 Sunset, West Palm Beach, Florida.

**WOOD** Fibre, flower making supplies, instructions. Catalog 10¢. Margaret's Fibre Arts, 1619 South Adams, Marion, Indiana.

**SELL** Table tennis books by mail. Goebel, Box 2803, Wichita, Kansas.

**120** WORLD'S New products. List \$1.00. Imports, 168 State, Brooklyn 1.

**NEED** Extra money? Picture an item that fits in your pocket, retails \$1.00, sells like hotcakes. You owe it to yourself to contact: Atlantic Import, 1302 Cadillac Tower, Detroit 26.

**SELL** Advertising specialties. Attractive sample kits. \$1 deposit refunded. P.O. Box 4098, Riverside, Calif.

**START** A profitable subscription business in spare time! We need men and women (young or old) as representatives for all leading national magazines. Liberal commissions on all subscriptions. Supplies free. No experience needed. Send this ad with your name and address to: Popular Mechanics, Room 7-0, 250 West 55th St., New York 19, N. Y.

**\$1,000-\$5,000 YEARLY** Possible, from choice of 72, home moneymaking opportunities! Free information! Mann, Z-427, Woodcliff Lake, N. J.

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**\$340.00 MONTHLY** With jigsaw. Details. Elkman, 346P North Summit, Sioux Falls, So. Dak.

**BIG** Money raising fishworms and crickets. Free literature. Carter Hatchery, Plains, Georgia.

**SELL** Titania gems. Far more brilliant than diamonds. Catalog 10¢. Diamonite, 2420-M 77th, Oakland 5, California.

**BOOKS;** Hundreds of subjects. Big 1958 book catalog—10¢. Popular Mechanics Press, 200-BC East Ontario St., Chicago 11.

**WIN** Contest money. General Contest Bulletin gives hundreds of tips. Lists current contests, rules. Sample magazine 25¢. General Contests, 1609½ East 5th, Duluth 12, Minnesota.

**MAKE** Money, operating mail order business, selling business cards. Vosacek Printing, 4444A Ute, San Diego 17, Calif.

**READ** Progressive Mailtrade, the magazine that tells how to make money by mail. Dime brings sample and special offer. Progressive Mailtrade, Box 357, Sheboygan, Wisconsin.

**MAKE** Money writing short paragraphs. Information free. Barrett, Dept. C-27-D, 7464 No. Clark, Chicago 26.

**NOW—Build** your own profitable collection agency! Informative document free! Box 1346-PPM, Denver 1.

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**10¢** CHEMICAL Doubles gallon paint. Formula and sample, \$1.00. Paulco, Box 245, Sun Valley, Calif.

**MAKE** Two different casting plastics at home with materials from local stores. Not the usual junk. Moneyback guarantee. Both for \$1.00. Vaughan, 304 Arbor Drive, Columbia, S. C.

**FORMULAS;** All kinds, latest, best. Literature free. Kemixal, Park Ridge, Ill.

**LATE.** Modern manufacturing formulas. List free. Moon Chemical, Martville, New York.

**FORMULAS** For latest money-making discoveries. New! Good! Valuable literature free! Miller, Chemist, 1517-D, Tampa, Fla.

### PLASTICS

**LEARN** Plastics fabrication for spare time income. Low cost home training now available. Write for free booklet. Interstate Training Service, Dept. D-3, Portland 12, Oregon.

**NOW.** Electric plastic laminating kit. Profit. Pleasure. Burr, 330 East Center, Kalamazoo, Mich.

**PLEXIGLAS.** Square foot costs. 1/16" \$1.20; 1/8" \$1.52; 3/16" \$1.86; 1/4" \$2.21; 3/8" \$3.23; 1/2" \$4.36. Colors add 10%. Send 15¢ for postage. Aristocrat Plastics, 23 Sussex Avenue, Newark, N. J.

**NEW** Do-it-yourself casting and molding plastics! No experience or machinery necessary. Send 25¢ for big 64 page catalog. Castacraft Corp., Dept. N-22, P.O. Box 555, Palo Alto, California.

**LAMINATING** Supplies. Free price list. Solomson, 46 Cornhill, Boston 8, Mass.

**BOXES.** Plastic. Free list. Althor, 170 Bay 23 Street, Brooklyn, N. Y.

**DENTAL** Plastic. Repair, molding, instructions. Send \$1.98. Hallmark Dental Co., Box 1924, Detroit 31, Mich.

**PLEXIGLAS** Small piece sales, square inch cost, postpaid. 1/16" 1¢; 3/8" 3½¢; 1/8" 1½¢; 1/2" 5¢; 3/16" 1¾¢; 3/4" 5¢; 1/4" 2¢; 1" 9¢. Davenport Scale & Staple Co., 2200 E. 11, Davenport, Iowa.

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**ROCKET** Chemicals, supplies for amateur research. Catalog 25¢. Central Rocket Company, Box 890, Waupaca, Wis.

**CHEMICALS** And apparatus for industrial, analytical, and private laboratories. Catalog 25¢. Dept. M-50. Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N. Y.

**ILLUSTRATED** Catalog: Chemistry, mineralogy, biology 25¢. Tracey Laboratories, Evanston, Illinois.

**PORTABLE** Physics laboratory complete with all apparatus and manual of 107 experiments, \$49.00. Model atom smasher, \$9.95 up. 3-in-1 electromagnet, \$14.95. Raymaster cloud chamber, \$16.00 up. spintharoscope, \$2.00. Send 25¢ for literature about these and many other fascinating new scientific products. Atomic, 3086 Claremont Ave., Berkeley, Calif.

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**MAKE** Extra money fast—show friends, others big value \$1.00-\$1.25 Christmas, year 'round greeting card assortments, gift wrappings, exciting gifts, household items, costume jewelry, stationery, toys. Profits to 100%. Bonus to 7%. Write for newest assortments on approval, free album name imprinted Christmas cards, free gift offer, details. Hedenkamp, 361 Broadway, Dept. PM-58, New York City.

**MAKE** \$10-\$100 A day! Sell new 2 year light bulbs. 450% longer burning life guaranteed. Customers save money, you make money. Free details. Solar Electric Products, 366 Fifth Ave., Dept. 973, New York City.

**EARN** \$12,000 Yearly—only two sales daily. World's best seller. The Holy Bible. (Illustrated), Protestant or Catholic. Margareta's, P.O. Box 92, Hazleton 7, Penna.

**CALENDARS.** Advertising novelties, matches. All styles, including religious, varnished, 12 sheet, girls. Hundreds of advertising novelties, book matches, etc. Fleming Calendar Co., Sales Division, 6539 Cottage Grove, Chicago 37, Ill.

**QUICKEST** Money with new Christmas cards. Show free sample exclusive 21-card \$1.25 assortment; make 75¢ on each, \$45.00 on only 60. Over 400 assortments, gifts, \$1 up. Leading \$1 box on approval. Personal album free. Cardinal, 1400 State, Dept. 51-G, Cincinnati 14.

**MAKE Extra money fast!** Show exclusive Sunshine business Christmas card album to businessmen. Make \$100 extra profit, and more, weekly showing beautiful album featuring variety of designs, themes, verses, colors. Exquisite quality at fast-selling economy prices. Complete portfolio on approval. Sunshine Art Studios, Inc., 151 Warwick, Springfield 1, Mass.

**60% PROFIT** On cosmetics — Famous nationally advertised Hollywood cosmetics pay 60%. Make \$25 day up. Hire others. For free samples, details, write Studio Girl, Glendale, Calif., Dept. 1297G.

**RUN A Spare-time** greeting card and gift shop at home. Show friends samples of our new 1959 Christmas and all occasion greeting cards and gifts. Take their orders and earn to 100% profit. No experience necessary. Costs nothing to try. Write today for samples on approval. Regal Greetings, Dept. 151, Ferndale, Michigan.

**OUT Of pawn, Bulova, Benrus watches.** \$4.95 up. Illustrated folder. Cosmos, New York City 35, Dept. 301.

**SELL Slide rules** to college students! Hoffman, 662M, Passaic, New Jersey.

**MEXICAN Art goods!** Free sample! Send 14¢ stamps mailing. Sylviak, Apartado 9036, Mexico City.

**SELL Portraits** painted in oils. Write: Portraits, 402-B Hazlett, Baltimore 29.

**NEW Bathroom deodorizer.** Hangs on wall. Banishes odors bathroom, kitchen. Lightning seller. Samples sent on trial. Kristee 63, Akron, Ohio.

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**MEN-Women agents:** Sensational new moneymakers — Beautifully hand-painted, plastic personalized photo enlargements, compacts, rings, bracelets, lockets, etc. Simply take orders, pocket 40% commission. We deliver and collect. Sales outfit free. Novelco, 3343 North Ave., Chicago 47.

**AMAZING Christmas card profits**—Make 75¢, not 50¢, on fast-selling \$1.25 assortment; \$75.00 on 100. Gift bonuses. 250 finest assortments, novelties, \$1.00 up. 59 Personalized samples free; assortments on approval. Free gift offer. Creative, 4401 Cermak, Dept. 507-L, Chicago 23.

**LORD'S Prayer sachets**—Lord's Prayer beautifully printed on gilt-edged envelope containing finest oil-base sachet in assorted popular fragrances. A self-seller. Send \$1. for sample dozen, refundable on your first order. Make up to 300% profit, and more! Canham Sachets, 257 South State Street, Elgin, Illinois.

**CHRISTMAS Cards** with customer's name imprinted. Broad-appeal personal designs and big-volume business designs all in one attractive presentation album that actually sells for you! These deluxe cards pay deluxe commissions. Earn \$300 to \$500, plus bonuses, easily between now and Christmas, even in spare time. Sales experience unnecessary. Old-established manufacturer. Free sales kit includes sample album and complete, easy-to-follow selling instructions. Send for kit now and pocket profits next week! Write Process Corp., Dept. 4, 1954 S. Troy, Chicago 23, Ill.

**SELL Plastic pocket stamps.** Reliable outlet. 50¢ brings details and your own name, address pocket printer postpaid. Little, P.O. Box 215-P, Melbourne, Florida.

**COSMETICS:** Sell our family products. 10¢ for profitable offer. P.O. Box 11, U. S. Soldiers Home, Washington, D. C.

**MIRACLE** Look-out exposes visitor though crouched under door-knob. Avoid tragedy; keep out strangers. Audium, 89-40 163rd St., Jamaica 32, N. Y.

**SELL Crystal stemware.** Write: Smith Crystal Supply, Box 353, Lancaster, Penna.

**REPRESENTATIVES** With telephone. Moneymaking novelty! Free information. Samples \$1.00 refundable. Imports, 168 State, Brooklyn 1, New York.

**ADVERTISING Salesmen:** clever new item. Sample free. Be first. Johnny Publishers, Box 423, Connerville, Indiana.

**AMAZING New fabric mender,** works like magic, whirlwind seller, profits galore. Write quick. Wallace Service, 834 Dudley, Philadelphia 48, Penna.

**BE The Popular Mechanics** representative in your neighborhood and earn big profits in your spare time. Write Popular Mechanics, Room 7A, 250 West 55th St., New York 19, N. Y.

**FEROX. Amazing liquid.** Removes rust like magic, startles housewives. Simple demonstration sells bottles galore. Great repeater. Free sample offer to livewires. Service Industries, 2103 East Somerset St., Philadelphia, Penna.

**"DEAR God Above"** (prayer for peace song). Fast seller at 60¢. Sample dozen \$1.00 returnable. Details free. George Gillespie, 2740 Stanhope, Norfolk 12, Va.

**BIG Profits.** Stamp social security plates, key protectors. Sample 50¢. Catalog free. General Products, 188-PM State, Albany 10, N. Y.

**SALON Reducing tables, rollers, belts, cushions, slant boards, Coin timers** factory. Mary-Mac, 1012 Powhattan St., Dallas 2, Tex.

**EASY Handwork** makes fast-selling useful articles. Sample free. Sunmade Company, Brockton 64, Massachusetts.

**PRINTING, Advertising salesmen**—Excellent moneymaking sideline selling decalcomania name plates, small quantities. Automobile initials, sign letters. Free samples. Ralco, XL, Boston 19, Mass.

**GOLD Or silver letters, numbers, Windows, doors, trucks, 1" to 6".** 500% profits. Free samples. Atlas-T, 544 West 79th, Chicago 20.

**AGENTS — 300% Profit** selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 1217-D West Newport, Chicago.

**YOUR Ad** in this space will get some good agents for you. Yes, I'll prove it. Write for Folder "A" right now. F. W. Johnson, Classified Advertising Manager, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.

**YOUR Own business — Used suits \$1.50, overcoats 65¢, mackinaws 35¢, shoes 12½¢, ladies coats 30¢, dresses 15¢.** Enormous profits. Catalog free. Nathan Portnoy Associates, 2109-AA Roosevelt Road, Chicago 8.

**SELL Champion, AC, Autolite spark plugs.** Reconditioned, electroplated, guaranteed 10,000 miles. 100% profit. Free sample. Lee Plugs, 1608-E Roberts, Houston 3, Texas.

**AGENTS—Make big profit** on combination tool sets. Write: Gamco, Box 1546, Lancaster, Penna.

**K-1 ADDED!** To paint kills insects for years! New product! Terrific potential! Kilpane-Ivers, Western Union Bldg., Houston 2, Texas.

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**WHOLESALE:** 850,000 Items. Supply source directory 25¢. Idealer, Park Ridge, Illinois.

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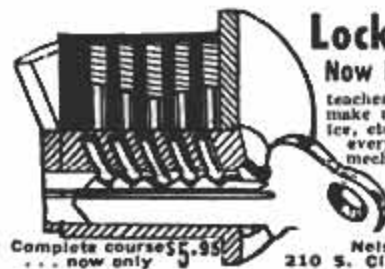


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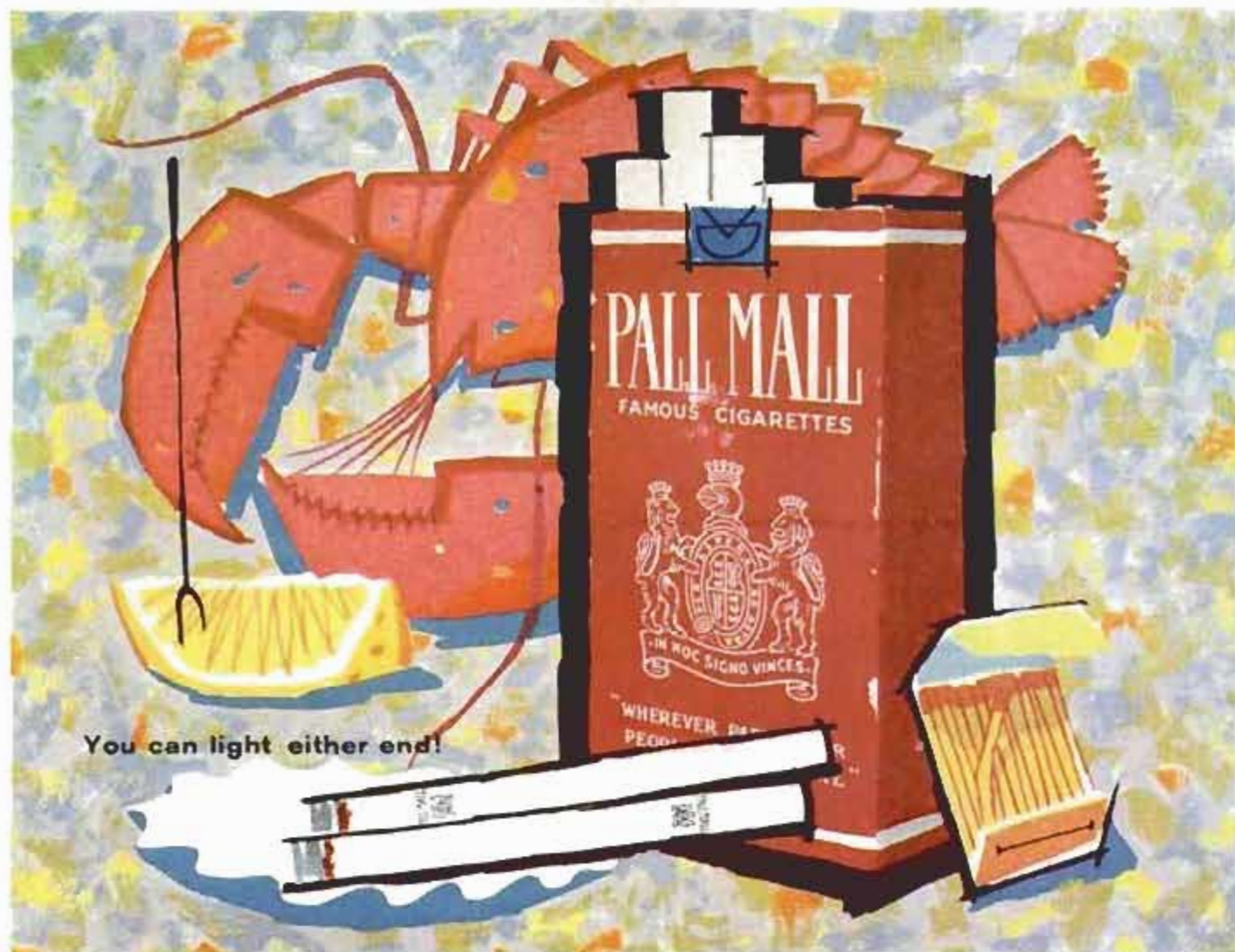
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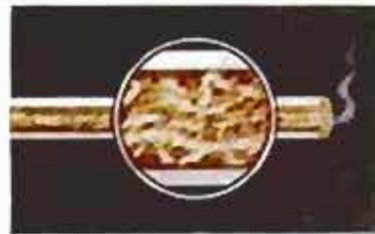
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**D**EEP IN the roadless wilderness and salmon coasts of southwestern Alaska, one finds a most unique air operation that's a tribute to old-fashioned American mechanical ingenuity. Alaska Coastal Airlines, the state's most independent airline, is located more than 1000 miles from the nearest repair shop and spare-parts stockroom. In spite of this handicap, the determined little 16-plane company maintains its comprehensive daily "flying bus service" for the grateful residents of this far-flung frontier, most of whom are trappers, timber operators and commercial fishermen.

It does so only because the airline's co-managers, Ben Benecke and Shell Simmons—like their 110 employees—have adopted this attitude: "If it fails to work we'll fix it ourselves, and if it can't be repaired we'll build a replacement part."

As an example of this, one day Benecke and Simmons held a conference with Gordon Graham, ACA's ingenious shop superintendent who has 30 years' experience as an airplane mechanic. It was becoming difficult to obtain replacement oil coolers for the planes. If some method could only be devised to clean out these coolers, so they might be used over and over again.

That afternoon, as Graham was listening to the rhythm of an electric washing-machine agitator, he got an idea. Result: Today, Alaska Coastal is probably the only commercial airline in the world that uses a simple home-type washing machine to reclaim airplane oil-radiators.

The homespun device does exactly what it is expected to do. This is entirely in

# POPULAR MECHANICS

JULY  
1959

WRITTEN SO YOU CAN UNDERSTAND IT  
VOL. 112 NO. 1

## Alaska's Flying Bus Line

Its mechanics and pilots keep the 16-plane fleet running on a do-it-yourself basis

By *George X. Sand*

keeping with the theme of this unusual airline: Solve each new problem as it arises, without fuss or strain.

When ACA decided to establish its headquarters at Juneau, a picturesque mountainside city on the shore of Gastineau

One of Alaska Coastal Airlines' original planes—a Bellanca Pacemaker—is lowered into the water on a hydraulic, lift-type elevator. The seaplane was built in 1929 and is in first-rate condition still

Photos by Joseph W. Alexander





Before taking off, an ACA pilot gets a briefing from the dispatcher. Most of the airline's fliers are former bush pilots



ACA's oil coolers are cleaned in, of all things, a washing machine. The machine runs cleaning fluid throughout the cooler



Sand for sand-blasting comes from a nearby glacier. Too moist, it is fed into a cement mixer and dried with a weed-burner

Channel, it found itself confronted with a 21-foot tidal variation. Ordinarily, this would have called for a costly elevator mechanism, to lift the Grumman Goose, Cessnas, Pipers and other planes high above the winter ice for storage in the maintenance hangars. The growing company could not afford such a big expense item.

Instead, they built the lift themselves, from scrap parts. The cylinder for the hydraulically operated elevator was found in the oil fields of Southern California. The hydraulic pump was reclaimed from a D-8 Caterpillar tractor. The 40-horsepower electric motor that drives this pump once operated the elevators in Juneau's Baranof Hotel.

To insure the lift's smooth operation during southwestern Alaska's near-zero winter weather, the hydraulic cylinder was enclosed in an insulated box. In addition, it was wrapped with resistance-type electric cable. Heat developed by the cable maintains the oil at a viscosity that will flow readily.

This makeshift plane elevator has given no trouble since its installation. Like the many other innovations at Alaska Coastal, it gets the job done.

#### Only 4 of 33 Points Have Airports

ACA serves 33 points in this vast, island-studded wilderness. Only four of these points have airports. All other landings must be made on salt water. Hence the need for seaplanes and amphibians. Last year ACA and Ellis Air Lines of Ketchikan (the only other scheduled airline serving this 30,000-square-mile frontier) carried more than 110,000 passengers. This is, as far as can be determined, the highest ratio of air passengers to population anywhere in the world. None of the cities or towns in this sprawling region between Juneau and Ketchikan are connected by roads. Travel must be done by air or boat. And there has been no commercial small-boat service to speak of since 1948.

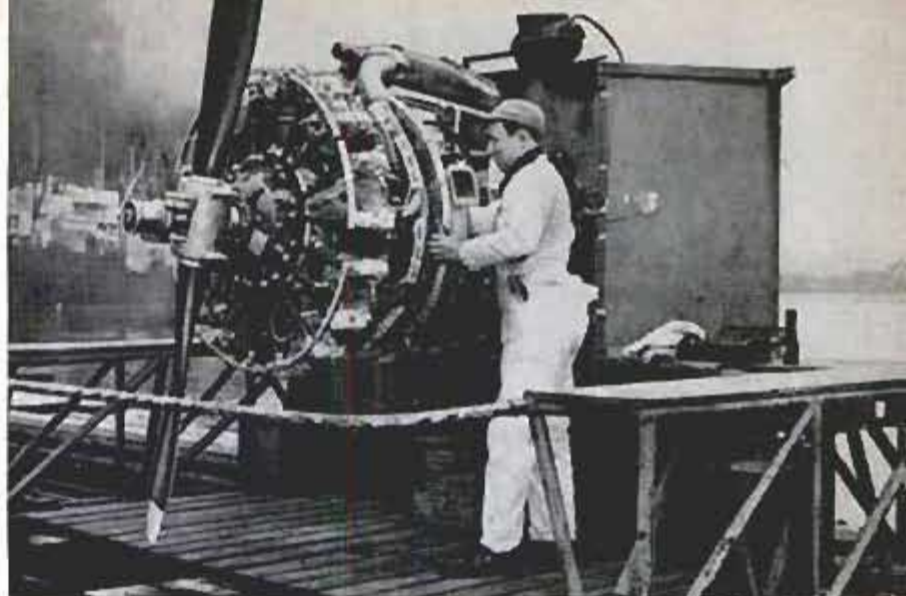
In fact, the remainder of the huge, 586,400-square-mile state of Alaska faces much the same problem. That's why there exist 17 times more airplanes in Alaska than the combined average of the other 49 states. Trapper, preacher and Congressman fly alongside Indian and Eskimo—or remain at home. The sourdoughs board planes with the same nonchalance that New Yorkers enter taxicabs.

The short-hopping ACA planes make landings and take-offs on an average of once every 26 minutes throughout each day to meet the commuting needs of the 30,000-odd lumberjacks, salmon-cannery employees and other residents of this region. Such constant strain is very hard on the plane motors. (Much more is demanded from an engine when the take-off is from water instead of from the conventional airfield.) However, thanks to an efficient maintenance program, the busy power plants are standing up under this grueling treatment. Their Wasp, Jr., engines (R-985s), for example, are providing 1500 hours between overhauls. ACA's aircraft-engine division is supervised by a man who has been at such work for more than 40 years. It has been acclaimed by Pratt &





In the engine-overhaul shop, parts often must be rebuilt practically from scratch



Engines, like the planes, are completely rebuilt whenever necessary. Here an ACA mechanic runs an engine on a test stand

Whitney as one of the best on the entire Pacific coast.

The engines, like the planes themselves, are completely rebuilt whenever necessary. "Some of our ships have been overhauled so often that scarcely anything but the original number remains," one mechanic told the writer proudly. Due to the amphibious nature of ACA's operation, and the fact that few new types of such aircraft are being manufactured to-

day, the airline must make its present planes last.

Since the airline cannot send a stock-room employee across town to a supplier when new parts are needed, it makes these in its own shops. In ACA's well-equipped machine and metal shops, one finds a vertical miller, roller, shrinker, expander and power-squaring shear. The various Grumman parts must often be rebuilt "practically from scratch," and for

At 29 of 33 points ACA serves, landings are made on water. Hence the need for seaplanes and amphibians





One of many ACA innovations is its method of weighing. A beam-type scale on the second floor weighs airplanes on the first

Another brainstorm led way to preventing corrosion, by spraying molten zinc-aluminum alloy on planes with a metalizing gun



this purpose fabricating jigs are maintained. Salt water is a powerful corrosive agent, and for years the maintenance crews struggled without success to overcome its disastrous effect on the metal planes. The lower longerons of a Bellanca Pacemaker, used to support the pontoons, had to be replaced every other year. During the intermediate years the rust would be painstakingly scraped from such tubing and the longerons repainted with zinc chromate and enamel. Even cellophane tape was tried in an effort to protect the metal tubing where it touched the fabric. Then, nine years ago, someone got an idea. A Bellanca fuselage was entirely stripped. It was sandblasted, then sprayed completely with molten zinc-aluminum alloy, using a metalizing gun. Since that time the lower longerons have remained as sound as the day they were coated.

### Sandblast With Glacier Sand

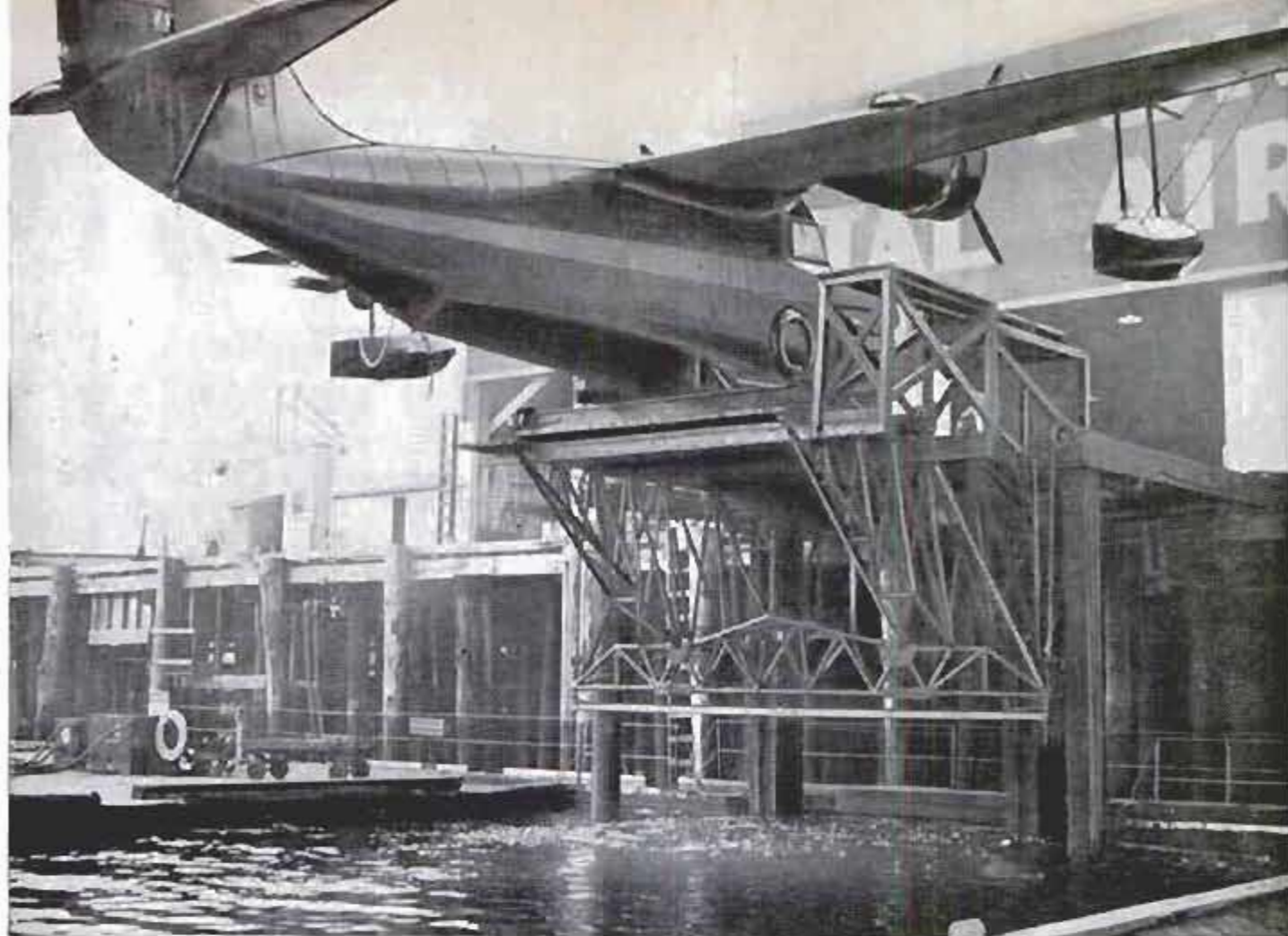
Incidentally, sand for such blasting purpose is obtained from nearby Mendenhall Glacier, a towering cliff of ice and snow said to be thousands of years in the making. It is nearly two miles wide, and the only glacier in Alaska directly accessible by highway. However, when reclaimed from the glacial moraine, the fine white sand is too moist for blasting use and must be dried first. Someone in the ACA shops figured out a simple and effective way to do this. The sand is fed into the mouth of a small, portable cement mixer, and the hot flame of a weed-burner goes in at the same time. After it emerges, the dried sand is stored in a shop bin for later use.

During landings and take-offs the metal wings of the ACA planes become drenched with flying salt spray. Should even a small scratch exist in the protective cover of the aluminum sheathing, corrosion will enter and spread out like a cancer underneath, where it cannot be readily detected. To forestall this type of deterioration, an alodine process is employed. The entire plane is alodized by dipping in a chemical vat that leaves an even coating of protective aluminum oxide.

"Were it not for such salt-water corrosion—and erosion—we could reduce our maintenance problems and over-all operation expenses by 50 percent," says manager Ben Benecke.

One problem that ACA's inventive personnel have not yet managed to lick—although they have taken big steps to minimize the losses resulting from it—is the erosive (as distinguished from corrosive) effect of salt water upon the metal propellers. At take-off time the whirling props strike water droplets at high speed. This produces countless small pittings in the soft metal.

Each evening the mechanics dress down the propeller blades with emery paper. If the condition is severe, a file is used. In time the blades get "out of profile" and lose their efficiency. At this point, some airlines discard the props. Not Alaska Coastal, however. Props used on single-engine planes can be cut down once and installed on Grummans. After that they can be cut once more. This is done with the approval of the Civil Aeronautics



Ingenious ACA personnel built this hydraulic elevator out of scrap. Being lifted is a Grumman Goose

Administration. Flight tests prior to service proved the shortened blades satisfactory. To date there has been practically no noticeable reduction in performance.

In explaining how the original experimentation came about, the shop foreman says, "Had we not learned to take such drastic steps . . . there have been many occasions in the past when crippling strikes on Stateside steamship lines and similar emergencies arose that . . . would have practically crippled this airline."

Another innovation is the plane-weighing method. On the second floor of their main shop they installed a 10,000-pound beam-type scale of the type that is used with large cranes. From the scale, a hydraulic cylinder with heavy chain and hook extends downward to the main overhaul station on the floor below. To weigh a ship bodily, the big hook is engaged into a lifting eyebolt at the top of the aircraft's fuselage, and hydraulic fluid is pumped into the piston, and balance weights adjusted until the plane is lifted free of the dolly on which it rests at the first-floor level.

Communications and transportation are inseparable in far-flung Alaska, and Alaska Coastal has spent much time and money in developing a reliable communi-

cations network. Radioteletypewriter circuits are operated on VHF with the stations so close together that fading, static and other undesirable Far North effects have been overcome.

Heavy rainfall and fog are common throughout this mountainous sea-island region. Hence, all of ACA's flying is done on a VFR (visual flight rules) basis. Were the pilots to follow the water lanes entirely, this would add about 15 percent to the distances involved. So they are instructed, instead, to make use of low-altitude mountain passes whenever possible. This entails but small added risk, however, for the amphibious ships are never very far from water.

"In fact, flying amphibians and seaplanes the way we do, we are operating over 'one big airport' practically all the time," is the way one pilot explained it.

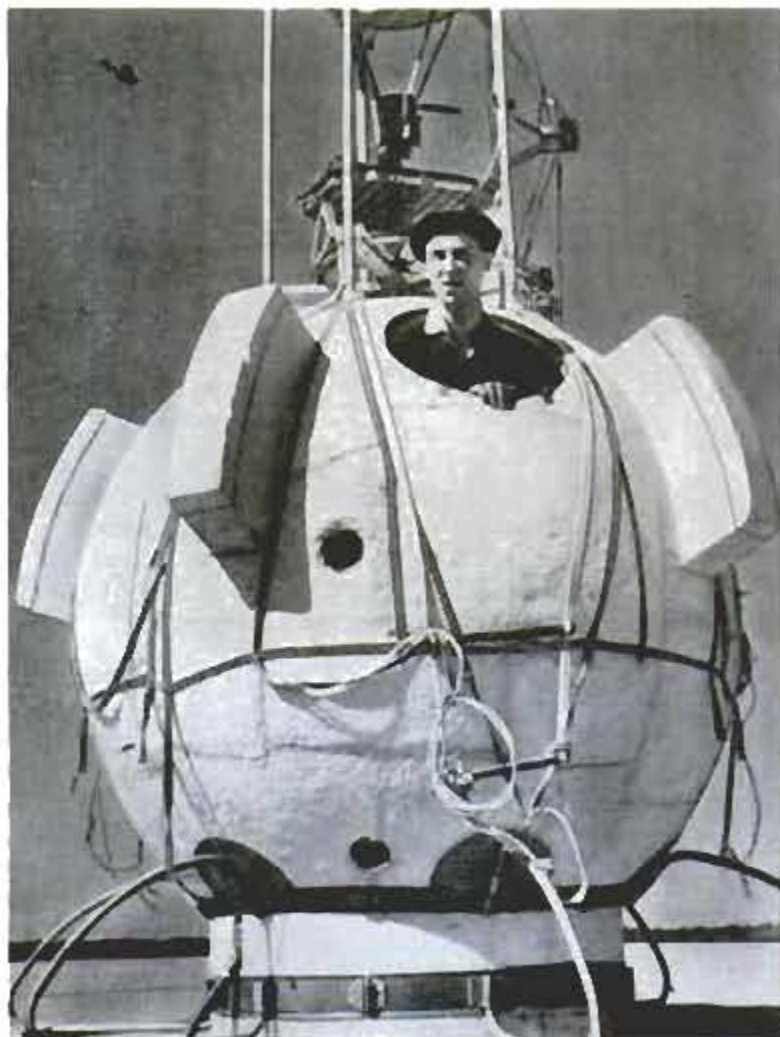
In making the 70-mile run from Juneau to Haines, for example, the pilot may have his ship on the water two or three times, should the weather turn sour. He will fly as far as he can and then, when the visibility drops below the safety minimum, he simply may land and keep his plane on the "step" at 60 or 65 miles per hour until such time as it clears sufficiently for him to take off again. ★ ★ ★



## Power Tool Tills and Trims Lawn

Equipped with interchangeable trimming attachments, a gasoline-powered garden tool now saves hours of hand labor in the yard. The lightweight machine, held like a hoe, has three detachable units, one

for tilling, another for trimming grass that overhangs flower beds, and a third for trimming along sidewalks. The tool can be used for cutting grass in places that can't be reached by a mower.



## Scientist in Balloon Soars 40,000 Feet

French scientist Audouin Dollfuss recently reached a height of about 40,000 feet in his aluminum gondola sphere, before several balloons that carried the vehicle burst. The scientist had expected to attain a height of 75,000 feet so that he could take photographs of the planet Venus. One hundred white balloons filled with hydrogen were tied, in groups of three, to 1500 feet of nylon rope. A closed parachute, extending between the gondola and the rope, held the balloons together at one point. When some of the balloons began to burst, Dollfuss helped his own descent by setting off small electrically fired explosive charges that severed portions of the rope. The parachute opened and the gondola eased itself to earth as the balloons were released into space.

The U. S. armed forces operate 34 television stations for servicemen at isolated bases throughout the world.

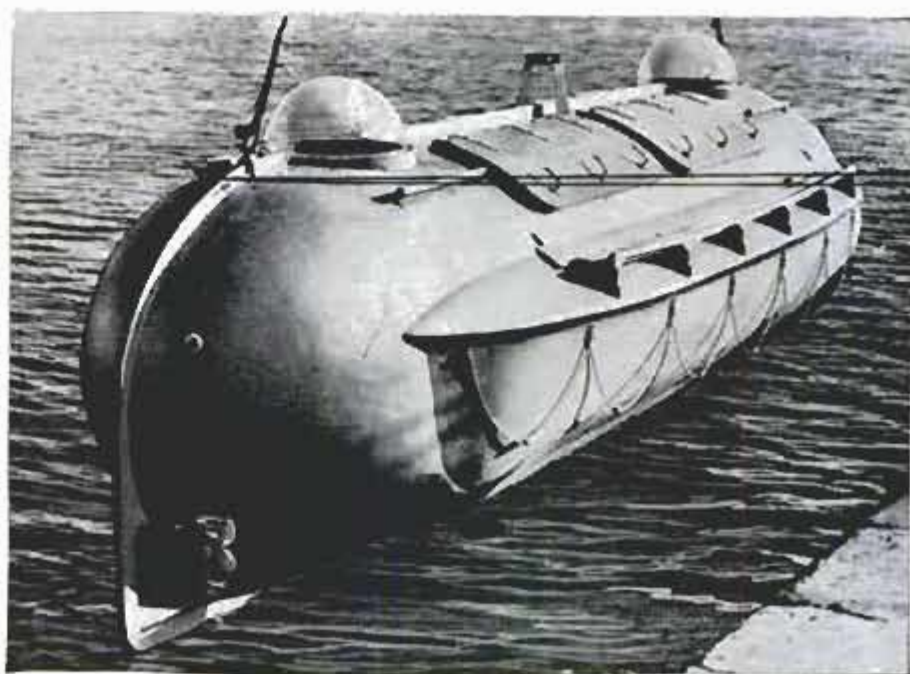
## Double-Bed Sleeper Rides Car Roof

For the traveler who likes to sleep outdoors at night, the British have designed a waterproof, ventilated sleeping compartment that fits even small European cars. Six feet long and four feet wide, the sleeper accommodates two and has steps for easy access. During travel, it folds down to the size of an auto-top carrier filled with suitcases. Heater, lights and a clothes rack are available, too.



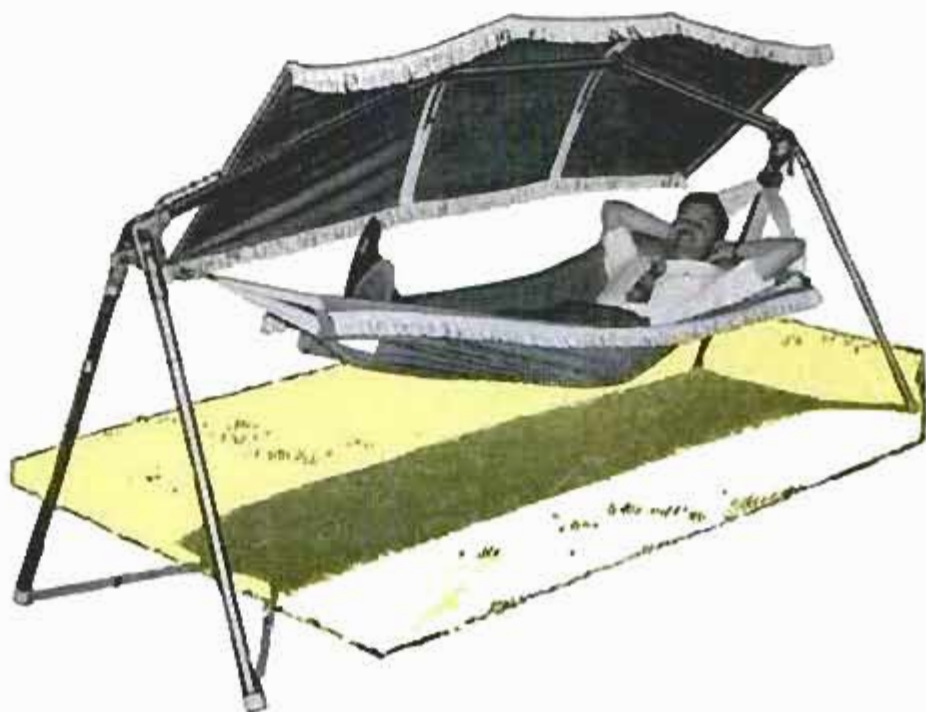
## Enclosed Lifeboat Seats 40 Passengers

With a shape similar to a submarine, a completely enclosed plastic lifeboat has transparent bubbles from which lookouts can maintain a watch. The boat, 26 feet long and 5 feet high, will turn upright from any position. It can be entered through four hatchways, and handles 40 passengers. It has a diesel motor and is equipped with radio.



## Portable Hammock Fits in Car Trunk

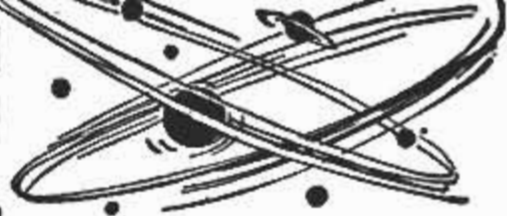
There's no need to nap on the damp ground anymore when you go on a picnic. A portable hammock that weighs only 25 pounds and can be assembled in five minutes can be taken along on any trip. It stows in a narrow box and fits in the back of the car. Equipped with a shade that is adjustable to either side, the hammock also can be tilted head down or feet down. And you don't need trees.



# AN EYE ON SPACE

By Dr. Dan Q. Posin

PROFESSOR OF PHYSICS, DE PAUL UNIVERSITY  
SCIENTIFIC CONSULTANT AND ADVISOR, COLUMBIA BROADCASTING SYSTEM



DR. ALBERT EINSTEIN'S Theory of Relativity has a good many important implications for us earthlings as we start out on that most majestic of all adventures, the exploration of space.

Einstein's theory says a lot of things which are difficult to believe but which have been verified. For example, it says we can convert substance into energy. This was confirmed the hard way over Hiroshima and Nagasaki. Also, it states that a beam of light which passes near a massive celestial body will be bent. This, too, has been confirmed—and has been reconfirmed with measurements made during several eclipses of the sun.

The most intriguing of Einstein's predictions, and the one which will be most important to space exploration, is this: If an object moves away from Earth, time on that object will run more slowly than on Earth. The greater the object's speed, the more time will slow down. It has been proposed that we fire off a satellite with a radio-transmitting clock inside, so we actually could measure the time difference. The lag might be only, say, .001 second in three months, but this could be measured accurately. Such an experiment will soon be performed.

Let's see how these ideas of Einstein bear on space travel. Is it "practical" to talk about a journey to another solar system? The distance to the nearest neighboring sun, Alpha Centauri, is about 25 trillion miles. Dare we even contemplate such a journey? After all, the distance to the farthest planet (Pluto) of our own solar family is 3.5 billion miles, and would take five years if we traveled at 100,000 miles per hour. Alpha Centauri is 7000 times farther. Would it, then, take us 7000 times five years, or 35,000 years to make the journey one way? Our space traveler would have to take along a good many bottles of medicine for "tired blood" to keep him alert and peppy.

Suppose we dare raise the question of traveling even farther—to the end of our galaxy. This distance is 25,000 times greater than the distance to Alpha Centauri; 25,000 times 25 trillion miles, or 625,000,000,000,000 miles. If we tried this trip at 100,000 miles per hour, it would take about 900,000,000 years. Clearly, even the most hardy among us would find it difficult to arrive in good shape no matter how we stuffed ourselves with vitamin B complex.

But, according to the Theory of Relativity, it may be possible to make such trips. In the first place, we don't have to travel only 100,000 miles per hour. Why not speeds of 100,000 miles per second? We should be able to achieve such speeds in empty space through applications of nuclear energy. But that is not the only encouraging feature. Let us recall that the Theory of Relativity states that if tremendous speeds are attainable—speeds which approach the speed of light (186,000 miles per second)—then time on the spaceliner will run appreciably more slowly than Earth time. While one million years elapses on Earth, for example, a spaceman traveling near the speed of light would grow only a few years older. Not only his wristwatch, but his body cells, circulation, everything will slow down so *he actually will be only a few years older when he returns!*

It is impossible for a material object to attain the speed of light. However, we may well reach speeds almost equal to the speed of light, and almost not age at all as we course through the majesty of celestial space.



TWINS !





Fichler photos from *Automobil Revue*

Left, like fabled Swiss cattle that have two short legs for grazing on mountainsides, the Metrac stays level under virtually any condition. Right, it bends at the middle axle to climb in and out of ditches like this

## Swiss Truck Is Double-Jointed

ANYWHERE you want to go, the experimental Metrac truck will take you without any strain at all. The sure-footed Swiss vehicle can even climb a concrete wall, thanks to its double-jointed design. It has six wheels, all of which can be driven by the front-mounted engine. Front and rear wheels are mounted on longitudinally swinging arms that pivot on the center axle. Chain drives inside the hollow arms power the wheels. Four hydraulic jacks, one at each of the front and rear wheels, permit the driver to lift any of the three axles completely off the ground. The jacks also make it possible to lower the front and rear wheels on one side so that the truck can be driven along a sharply sloping hillside while remaining in a level attitude. Ditches faze the machine not at all, as it can bend in the middle to roll in and out of them, or, if the ditch is a narrow, steep-banked crevasse, the truck can "step" over it by raising and lowering its axles in succession. Because all wheels can be locked or driven individually, the truck will turn around in its own length. The operator simply raises the front or rear wheels and locks one wheel of the center axle. The truck then pivots neatly on the locked wheel. When operating on a normal highway, the center axle is elevated so that the front and rear wheels touch the pavement. In this condition, the vehicle operates as a conventional four-wheel truck.



As the truck approaches the wall, the driver raises the front axle by means of the hydraulic jacks (visible behind fender)

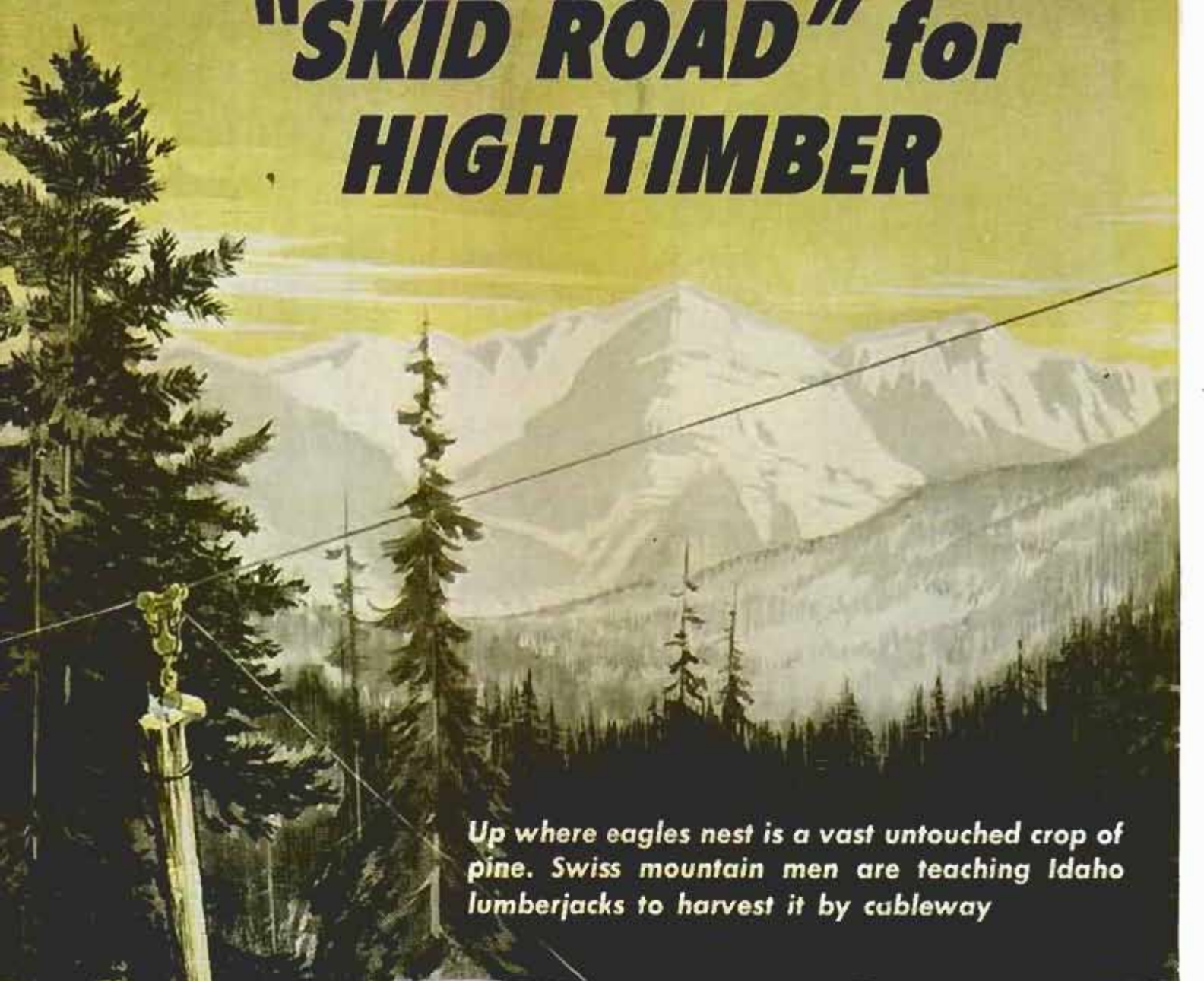


With front wheels up on top of the wall, the rear wheels push forward and the center axle is arched to support the weight

Center wheels drive the truck forward until front wheels touch down, then center wheels can be lowered and the truck is over



# "SKID ROAD" for HIGH TIMBER



*Up where eagles nest is a vast untouched crop of pine. Swiss mountain men are teaching Idaho lumberjacks to harvest it by cableway*

**By Rafe Gibbs**

**L**UMBERJACKS in the Idaho woods are telling the story of the three bears. In this case, of a mama bear and her two baby bears.

The story begins deep in the mountainous St. Joe National Forest, where 'jacks from Switzerland have been demonstrating a portable cable system that is opening up vast new timber areas throughout the world.

When the cable carriage first started its strange whirring in Idaho, the mama bear and cubs ran in circles. But the following day they came out on a point and observed the aerial logging operations.

It was a case of bears watching a circus, but they probably did not realize that they were watching today's biggest show in logging.

The Swiss system has now been put into operation in some 20 countries with hard-to-get trees. But it is new to the United States, which has billions of feet of timber in towering Western mountains that have beckoned vainly to lumbermen for many years.

The total commercial lumber in Idaho alone is estimated at 60,796,000,000 board feet. Even without reforestation the present stands are enough to keep the state's 250 sawmills





busy for the next 100 years. But the big problem is getting at the timber.

With the Swiss cable system, the steeper and higher the logging site the better, because the loads take advantage of gravity. Moving at a slower pace, logs are also hauled uphill out of deep ravines. Too, the cable outfit is inexpensive compared with standard logging outfits.

Winding our way for some 60 miles beside the shadowy St. Joe River, we visited one of the camps. We knew we were there when we heard yodeling over a telephone system equipped with loudspeaker.

Reclining under a big tree was a husky, bearded Swiss—Karl Wyssen, one of the clan which developed the cable system. Wyssen spoke in German over the telephone to some tree-cutting 'jacks across canyon, then addressed us in English:

"Excuse me for not getting up. I

**Lightweight portable yarder winches itself up a mountain-side, dragging behind it the cable of the aerial tramway**





Timbers move to mill or storage on this test installation in Switzerland that traverses level ground

am just recovering from a broken leg. Got it from a rolling log—but not one attached to the cable.”

It was a significant point, because insurance statistics reveal the Swiss system has an unusually low accident rate.

#### Swings From End of Cable

Vincent (Looie) Constantin, a French Swiss with muscles that rippled from bare waist to bare shoulders, swung like a trapeze artist up to the end of the cable, anchored to a giant pine. With a two-foot-long wrench, he tightened the bolts on the cable clamps.

“How long does it take to set up this outfit in the woods?” we asked.

Looie shrugged, then replied in French: “For short, straight hauls—maybe three, four days. Where the terrain is especially

bad and extra supports are needed, or for hauls of more than a mile—maybe two, three weeks.”

Light-metal alloys, used in the “yarder” which operates the cable, cut down on the machine’s weight and make it readily portable. How do the ‘jacks get it up to logging sites beside eagles’ nests? Well, that is the real secret.

The yarder is on runners and pulls itself up a mountainside on these. One end of a haulage cable is attached from the yarder’s winch to successively higher anchorage trees.

Like a mechanical mountain goat, the machine easily hauls itself up slopes that tax the men accompanying it. Because the equipment is easy to dismantle and move to another site, small isolated stands of timber can be logged economically.

#### Brakes for Logs

How are the logs kept from running away on a downhill ride? On the yarder are powerful air-cooled internal brakes, and an air-cooled engine (diesel or gasoline) with a six-speed gearbox.

When the Swiss lumberjacks, speaking German, French and Italian, brought their unique “skid road” to Idaho, they built a cabin high on top of a mountain. They thought they would feel more at home up there, and did—at first. They got along fine by bringing up on the cable cartons of milk by the dozen—the basic food of Switzerland—and equal quantities of canned pineapple—food that is hard to get in their native land.

But the Americans they met were friendly, so down from the mountain the Swiss came. One of them, studying English, learned it well enough to propose to an Idaho girl. Married, he now hopes to stay in the United States. Just how good is



Logging phone uses loudspeaker, can be heard at good distance above the roar of machinery. Left, main winch of the Swiss cableway system

Wyssen Skyline-Cranes





Lumberjack tightens the bolts of clamp that secures cable to anchor tree. Logs then ride the cable

the system the Swiss brought with them?

Comments George Weyerman, supervisor of the St. Joe National Forest: "The Swiss system is less damaging to land and residual growth than many of the old American systems. A whole tree, after being cut, is neatly pulled into the sky without skidding damage to standing trees and young growth."

Adds Ranger Art Johnson: "The idea of being able to pluck off a mountain trees that would otherwise go to waste means a lot. In this area, for instance, there are 200,000,000 feet of white pine with only 20 more years to live. Ten years ago, the pine was struck with the blister-rust 'kiss of death.' And a good share of that dying timber is in places we thought we could not reach—until the Swiss came."

Johnson pointed to the mountain top where the trees were being cut and cabled down to the valley.

"That's mostly rock up there," he said. "To build a road to the site would cost much more than the trees are worth."

#### Loudspeaker Telephone

A whirring noise sounded on the cable. A voice came over the loudspeaker saying that a tree was coming down. The Swiss powerphone, incidentally, is important to the operations. There is no pressing of the ear to the receiver, because the volume

can be stepped up so that the phone can be heard 50 yards away.

When the German words coming over the phone were interpreted for us, we looked across the St. Joe River at the mountain top. Reflected against the sun was a swinging, bough-trimmed tree. It looked small at first—about fence-post size—but as it came nearer... faster and faster... it grew and grew... 90 feet tall!

On the cable at the dumping and loading site near us was a special clamp or "stop" device. As the carriage with its tree load struck this, the choker hook at the end of the operating line was automatically released from the carriage. The tree dropped to the ground.

Grabbing a chain saw, Looie quickly sliced the tree into hauling lengths. Then a crew of loggers loaded logs onto a truck trailer that shortly rolled down the highway to a mill.

American loading equipment—and the speed and precision with which the Yankee loggers operate it—have fascinated the Swiss. The loading know-how will probably find its way back to Switzerland.

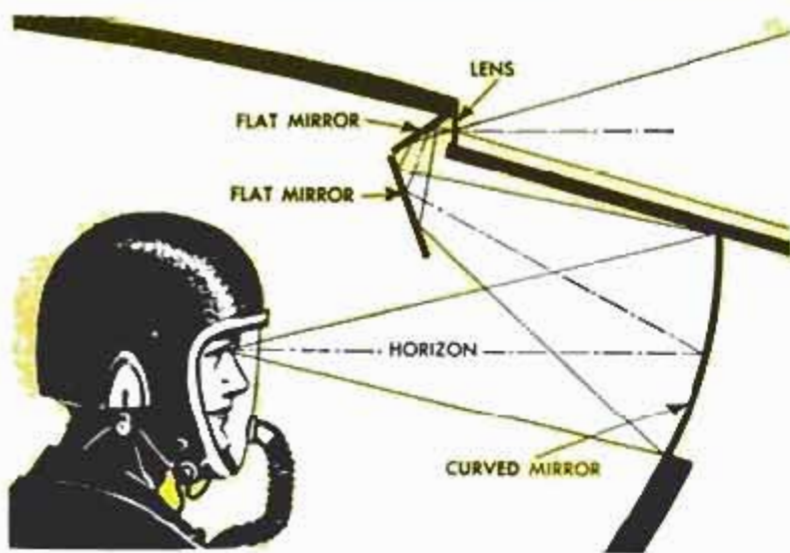
Two other pieces of American equipment have especially intrigued the Swiss—the double-bitted ax and calked boots.

Chuckled Looie in French: "I now have an ax that cuts two ways and boots that stick to a log many ways." ★ ★ ★



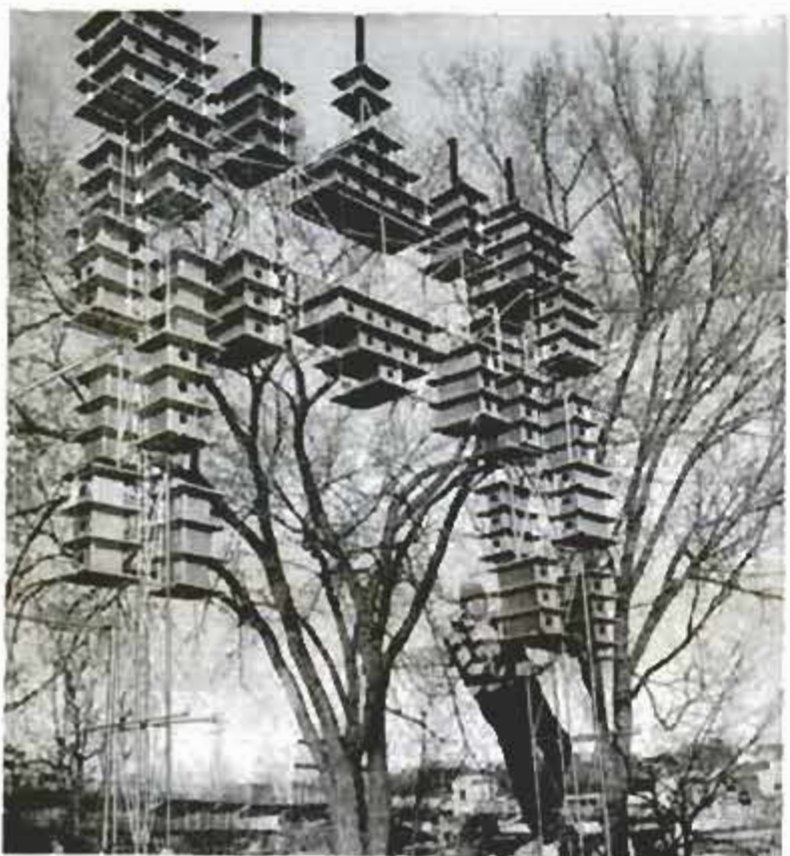
## Fan "Blows Up" Bed For Cool Sleeping

Your bed will have a gentle built-in breeze that lets you sleep relaxed on the hottest nights when equipped with a cloth sleeve that conducts the air from a household fan into the bed. The air inflates the top sheet and raises it from the body, then escapes around the sleeper's head and shoulders. A mesh partition in the sleeve slows down the air so there is no chilling draft. The sleeve may be used with single or double beds, and in daytime folds in with the sheets so that the fan may be used elsewhere in the house. Any ordinary 10 or 12-inch fan can be used.



## Periscope for Pilot Eliminates Big Windshield

Supersonic planes that use a new periscope need a windshield that is only one inch high. A cylindrical lens that fits into the inch slot, and a mirror system give the pilot a normal view of a large area ahead. The periscope overcomes the wind-resistance and heating objections to windshields in high-speed aircraft. The periscope also is to be tested in tanks, to allow the driver to see the road ahead without exposure to enemy fire.



## Hotel for Martins Has 214 Rooms

This aerial hotel, with 214 rooms, was built of aluminum sheeting, by Jerome Verhasselt, Wrightswood, Wis., for the purple martins in his area.

## FM "Broadcasts" May Warn Of Heart Trouble Ahead

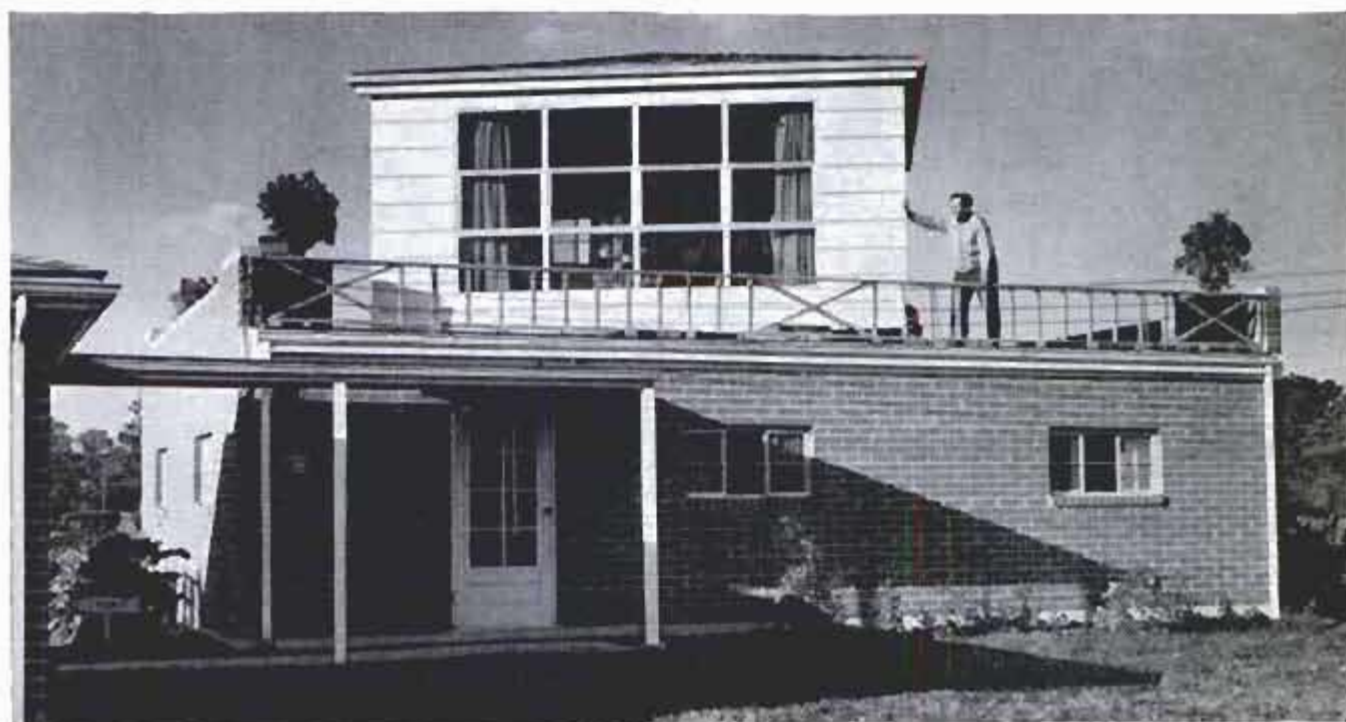
Someday it may be possible to foretell impending heart trouble through FM "broadcasts" of sounds inaudible to the human ear. In a new method of analyzing heart sounds, a microphone placed over the heart picks up vibrations. Electronic "ears," sensitive to particular frequencies, help sort the vibrations for recording on an FM tape system. Experiments have demonstrated subtle changes in heart-vibration waves which are not revealed by electrocardiograms.



Photos from Foto Find

## This Gives You a Turn

MOTORISTS driving near New Albany, Ohio, need not be alarmed if at 5880 State Route 161 they see a house with its upstairs revolving. That's what it was meant to do. Clark Ranney, the inventor, had it built that way so that the big picture window of the upstairs living room can be turned to face sun or shade, breeze or—whatever scene strikes the owner's fancy at the moment. The house is 36 by 36, its 18-foot-square living room mounted on a platform running on 24 flanged wheels. A switch at the top of the circular stairway controls a 1½-horsepower motor rotating the platform.

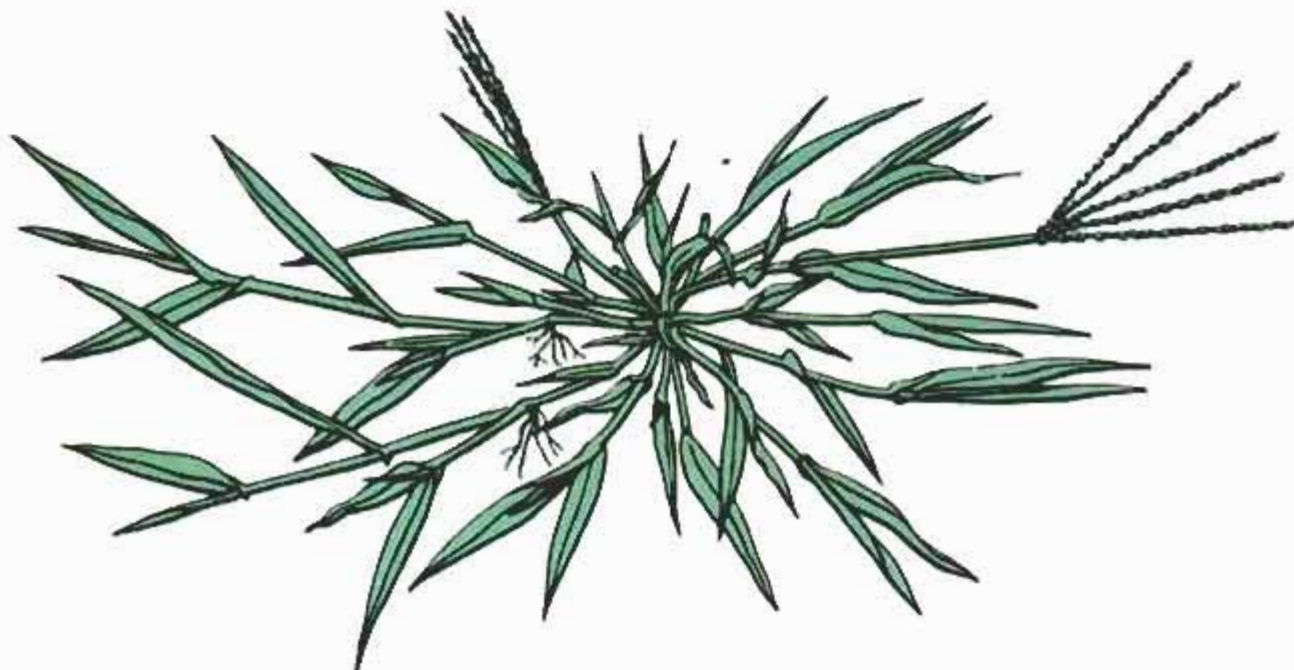


# BLAST THAT CRAB GRASS!

**T**HIS IS THE SEASON when tempers grow short, curses grow long and many a homeowner vows he'll plow up his lawn and start anew. It's the pivot point of summer, the moment when crab grass lifts its tousled head, looks around, then reaches out its hairy arms to embrace succulent lawns across at least two thirds of the country.

The harried homeowner is always on the prowl for new weapons to aid him in his desperate battle against this ancient enemy. Many a man has given his lawn a one-shot treatment of a new chemical in the hope that at last he has found the ultimate weapon. Alas, the Creeping Plague reaches out to smother his lawn again. Can crab grass be killed?

**SMOOTH CRAB GRASS** is reddish at base, has yellow-green seedlings that branch out and root at the joints



Yes. With the aid of a wide range of new chemical killers you can rid your lawn of this pest.

*But you can't achieve victory with one treatment, or even in one year. The secret of winning the battle is an attack that goes on around the calendar for at least two years, perhaps longer.*

The work isn't hard. It merely means spreading a dry chemical or spraying a wet chemical on your lawn at the right time and in the right amount.

*But you must be persistent.* Outlined below is a 'round-the-calendar program.

To learn why you must keep at the job, take a good look at your enemy. Crab grass is an annual; that is, new plants develop each year, not from the old ones, but from seeds dropped by the old ones. Thus it is a waste of time to kill a crab-grass plant *after it has formed seed heads.*

Large-area sprayer can cover a lawn completely with a liquid-type crab-grass killer in short order



Better Lawn & Turf Institute photo

**HAIRY CRAB GRASS** has larger, hairier leaves that are more gray-green in color; is more difficult to kill





Better Lawn & Turf Institute photo

One-wheel sprayer totes a two-gallon tank that can be filled with crab-grass chemical. Below, killers are also available in dry form for hopper spreaders

O.M. Scott and Sons photo



Once seed heads form, they ripen even though the plants are killed.

The U.S. Department of Agriculture says: "The key to success is to prevent plants from setting viable seed that will produce another infestation, the following season."

The seeds may spring to life any time from late spring until the first frost. Furthermore they may lie dormant for a year or two before they suddenly awaken.

There are two major species of crab grass, as illustrated on pages 72 and 73. As you might suspect, the larger, hairier variety is the more difficult to kill. The

two varieties go under several aliases in various parts of the country, but regardless of what these public enemies are called, they're still crab grass.

Killer chemicals can't do the job alone. The best deterrent to crab grass is a thick, vigorous turf. Reseed bare spots and feed your lawn at regular intervals. Crab grass thrives in the sun, so set your mower to cut high, thus providing shade at the soil level to discourage crab-grass seedlings. During dry spells it's much better to water your lawn deeply once in a while than to sprinkle it lightly every day.

In applying the new chemical killers, one factor is most important. *Follow the directions precisely!* Different formulations of the same chemicals are available, and must be applied in different strengths. You can be sure of doing the least damage to your lawn and the greatest damage to crab grass only if you follow directions. Measure off a small part of your lawn and test the coverage on this area first.

Several different types of chemical killers are available, but they all fall into two categories. *Post-emergent* chemicals kill crab-grass plants. *Pre-emergent* chemicals kill the seed. The pre-emergent types are relatively new, and make possible a year-round control campaign.

Trade names of these products usually give no indication of the chemical compound inside the package. Federal law, however, requires that the label state the formulation. By comparing that statement with the chemical names given below, you can be sure of the type of killer inside the package.

Obviously there's no need to use all the chemicals on the following list. Use of one good pre-emergent and one good post-emergent killer each year for two or more years should do the job.

Here's a roundup of several of the crab-grass killers. They are listed on a calendar basis so you can plan your own year-round campaign.

### Now (Midsummer)

This is the season of fast growth, when the plants begin to form seed heads. One killer for this time of year is KOCN (*potassium cyanate*). Research has shown, according to the U.S. Department of Agriculture, that a small amount of 2,4-D (ordinary broad-leaf weed killer) added to KOCN will increase its effectiveness.

Another midsummer weapon is AMA (amine methyl arsenate). It can be applied any time during the growing season. Usually two or more applications, five to seven days apart, are required.

(Continued to page 225)



## British Triumph Needs No Greasing

Bristling with new features, the Triumph Herald automobile has no grease points on the chassis, thus eliminating lubrication jobs. Rubber and nylon bushings are used. The car has four-wheel independent suspension. Its differential is bolted to the frame and the rear wheels are driven by swing axles suspended under a transverse leaf spring. There is no separate hood opening as the entire front body section pivots forward to uncover the whole front end. An adjustable steering column is collapsible so there is no danger of impaling the driver in a crash. A sporty coupe and two-door sedan are offered.



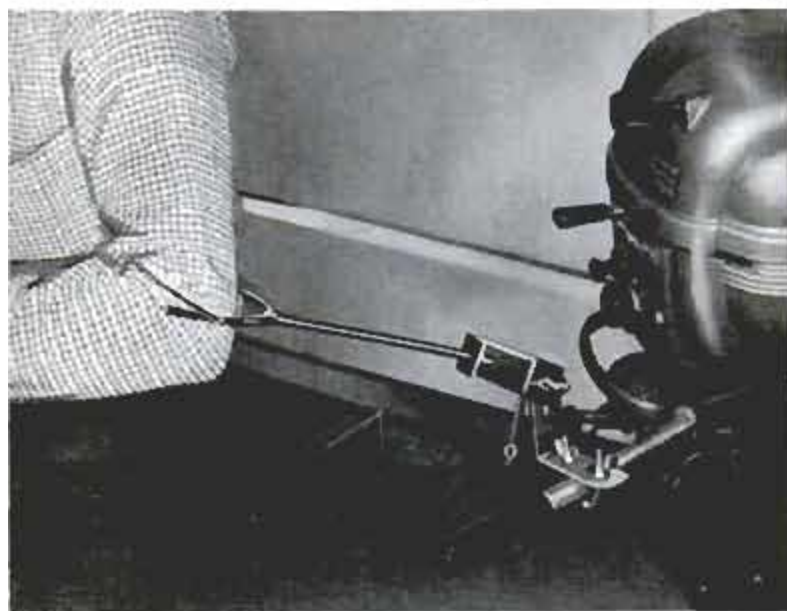
## Wax-Coated Bar Kills Lawn Weeds

Aimed at killing dandelions and other broad-leaf weeds, a wax-based bar is pulled across the lawn by a cord, applying a chemical deadly to the weeds. The bar, which can be pulled by hand or attached to a mower, treats the weeds with a chemical film that cannot be washed off or blown away. Susceptible weeds dry up in ten days to two weeks. The bar can be used close to flowers and shrubs without harm, if it does not touch them. Uneven lawns also are treatable since the bar follows the contours of the ground. The chemical should be applied in temperatures ranging from 60 to 90 degrees. One bar treats a lawn 100 by 200 feet. The chemical killer in the wax is 2,4-D.





## "Reactor Gun" May Help Weightless Spaceman Control His Motion



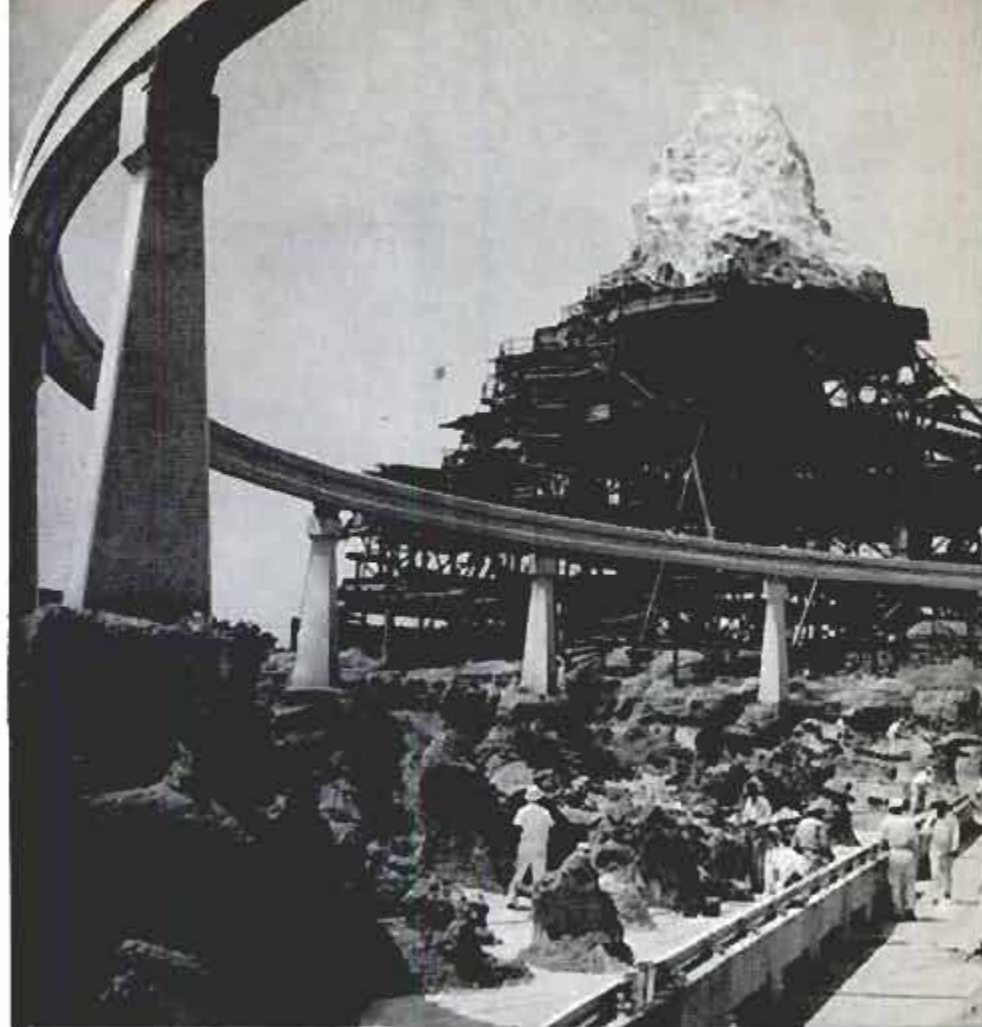
Air Force researchers are experimenting with a "reactor gun" that may help spacemen control their movements in weightless space travel. The gun is actually a nozzle attached by a hose to high-pressure air bottles on the spaceman's back. When the gun is fired, air rushes out the nozzle, and the reaction propels the spaceman in the opposite direction. The gun is being tested on "weightless" flights at Andrews Air Force Base.

## Steering Guide for Motor Frees Angler's Hands



Many an angler has wished he could steer the boat and still have both hands free for casting or trolling. A new accessory steering arm extends from the fisherman's arm or leg to the motor. Chrome-plated and adjustable, the arm is about a foot long and has a U-shaped end that fits around the leg like a cyclist's trouser clip. The leg can be slipped in or out easily. When the attachment is to be fitted on the arm, a supplementary U-shaped handle is folded forward to form a loop around the arm. This enables the fisherman to sit down, steer and still have both hands free. The steering arm can be attached to any motor.

Overhead monorail track frames the steel skeleton of "Matterhorn Mountain," shown here under construction. Workmen in foreground are painting the underwater coral gardens prior to flooding huge tank with water



## *Disneyland Adds Submarine and Monorail*

FORTY-PASSENGER submarines, a bobbed ride down a replica of the Matterhorn, and 82-passenger monorail trains are features of a new addition to Disneyland near Los Angeles, Calif.

Passengers on the submarines make a realistic underwater journey through coral gardens, then descend to greater depths to view the wrecks of old treasure galleons and pass under the polar icecap.

The conning towers on the submarines are above water at all times while the

passengers, sitting below the water level, view the scenes through portholes.

The descent to great depths is simulated by entering a tunnel in which the reduced light gives an illusion of a deep dive.

The 146-foot-high Matterhorn is a scale model of the actual mountain and is covered with imitation ice and snow. The new monorail system is the first of its kind in the United States, and its trains ride on rubber tires on the reinforced concrete beams that make up the overhead track.

Realistic plastic octopus guards galleon treasures that will be viewed by passengers on the new submarine ride

Walt Disney studies drawing of 82-passenger trains that zoom around the monorail system





This might look fine over your fireplace, but that isn't precisely the idea. This just goes to show that a chair stuck on a brick wall with Chrysler's Liquid Iron will hold a pretty girl, all 110 pounds of her, with ease

## THE MIRACLE GLUE

By Richard F. Dempewolff



It took several men to pull the chair from the wall, and when they succeeded the adhesive bond did not break. Instead, as the picture shows, chunks of brick pulled away and adhered to the chair. These epoxies are sticky!

**I**N THE CAVERNOUS plant of the Chrysler Corporation's Cycleweld Division, outside Detroit, Mich., technicians recently smeared a little puttylike substance on the side of an ordinary kitchen chair and stuck it high on a brick wall. A ladder, daubed with the same material, was "pasted" at a crazy angle against a steel I-beam. The chair and ladder were held in position without any noticeable pressure for only half a minute before the adhesive took over, and the men could let go.

A few hours later a fetchingly garbed young lady, weighing a well-distributed 110 pounds or so, was boosted up into the precarious-looking chair and sat there swinging her legs for photographers. Then the young lady climbed the ladder, swinging around it this way and that, supported only by two short, narrow, adhesive bands that gripped wood to steel with all the tenacity of heavy-duty rivets. Later, when the chair was wrenched from the wall by three men, it was the brick that broke away in chunks—not the adhesive. Long splinters of ladder still clung to the steel column when the rails of that item were torn free by a cluster of workmen.

The fact is, one tiny daub of the remarkable adhesive, gluing together two steel bars with only a one-inch lap, will support a 3000-pound automobile!

The new "glue," called Liquid Iron, is one more member of a family of startling

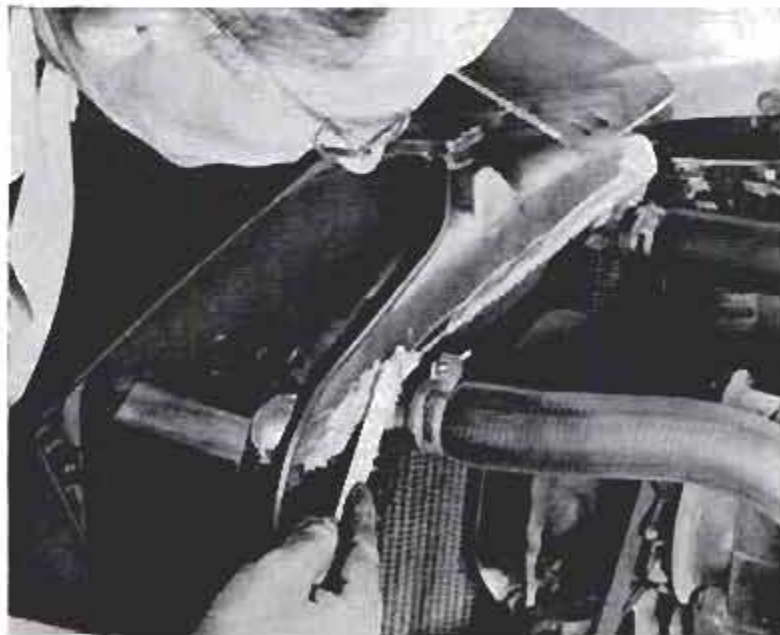
adhesives that have been sticking together all kinds of unlikely things in industry for some 10 years. Lately they have been showing up in small-quantity packages for the do-it-yourselfer.

Known as epoxy-resin adhesives, they come in two separate containers. Basic ingredient is the resin itself, an amber-colored condensation product of a carbohydrate such as petroleum or wheat, to which is usually added a "filler" of powdered metal, ceramic, pumice or diatomaceous earth that gives the resin plasticity or "body" for varying applications. In a separate container is liquid catalyst which, when added in proper measure, activates the resin and chemically causes the mixture to cure, or "set."

Some epoxy glues, such as the new Liquid Iron and one called Plastic Steel, are supplied in various-size jars, containing the proper amount of each component for small jobs or big ones. Others with names like Nylox, Neehi, Epotex and Alloy, formulated for boat and marine applications, come packaged in twin cans. A few, such as Eccobond, Mendt, Hysol, Metalset, A-4 and an upcoming Narmco epoxy called N2X are in tubes, so the do-it-yourselfer can squeeze out just enough of each component in proper measure to take care of any size job. Once the catalyst has been added to the resin of an epoxy glue, it begins to react immediately and in half an hour or so is solid. Whatever isn't used

## THAT WELDS ANYTHING

One application of Metalset A-4 repaired this leaky radiator, which since has stood a year's vibrations

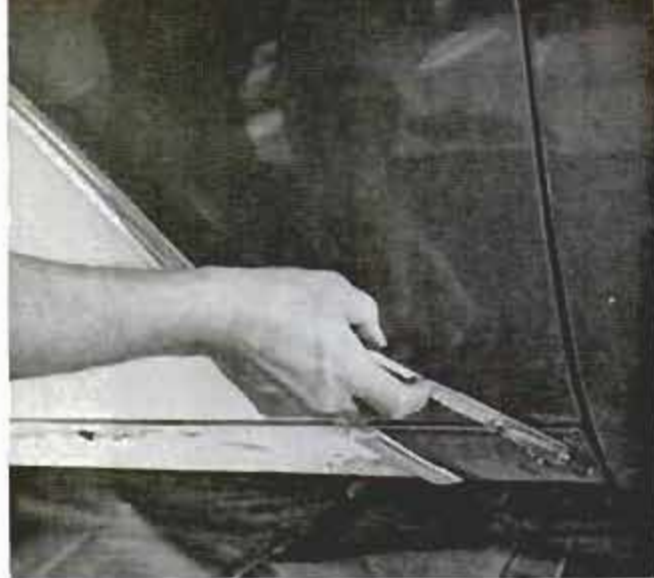


Another job for the new glues is patching concrete. Here a batch of Plastic Mastic is mixed





In employing a plastic metal like Liquid Iron for auto body repairs, area to be filled is first sanded



Then epoxy glue mixed with catalyst into putty-like substance is applied to rust hole with broad knife



One-to-one mixture of epoxy resin elements from two tubes was used in making repairs on leaky pipe

Hysol, another epoxy brand, was used by homeowner in calking edge of bathtub, common place for leaks



must be thrown away. In separate sealed containers, however, or otherwise kept apart, both components will last indefinitely. And one company puts its epoxy, Imcon 75, in a single jar. The curing agent, floated above the resin, forms a skin that won't break until you mix the two.

Epoxies actually have nothing in common with familiar "stickums." They aren't even glues. They are thermosetting plastics. When mixed with the curing agent they undergo a chemical reaction. Industrial types are subjected to heat and pressure as well. Consumer types react to the chemical catalyst at ordinary room temperatures. Some of them even smoke, with convincing evidence that something "magic" is happening, when the curing chemical is added. During the curing action, the chemical structure of the epoxy changes and its molecules actually link with the molecules of the materials being bonded.

The result, for all practical purposes, is a spectacular "weld" that, quite often, is considerably stronger than the materials it binds. And the things epoxy will bind, never to part, include almost anything you can imagine. One manufacturer made a list of applications on a 1000-foot roll of adding-machine tape and was still going strong when the tape ran out.

Chrysler claims its Cycleweld Liquid Iron will bond iron, bronze, wood, aluminum, brass, porcelain, marble, glass and "other materials." Like most epoxies, not only will it stick these things to themselves with the tenacity of a weld, but it will stick any one of them to any of the others with equal permanence.

The important thing is to get the type of epoxy best suited to the job you have to do. One outfit puts up several formulations—one with a thin white filler for gen-



Tough grip of these new glues makes them useful for repairing, or even installing, wrought-iron balustrade

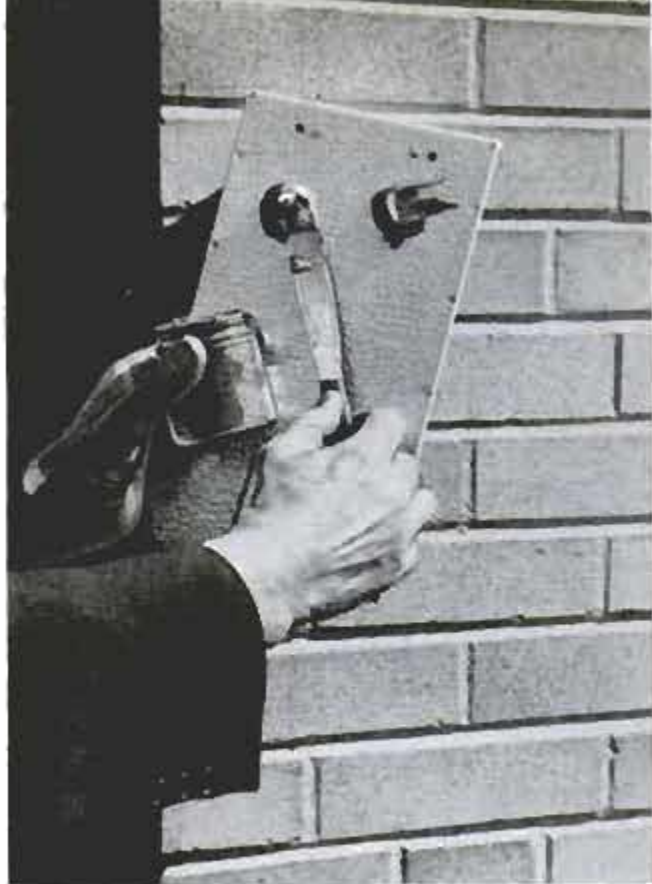
eral repairs; another with powdered metal for automobile repairs. A special epoxy has a filler of marble dust for repairing expensive marble slabs. The producers of this material have samples of repaired slabs which they hit with sledgehammers. The slabs break every place but along the bond.

With this wonder material you can bond wood to concrete, iron to bricks and stone, glass to steel, rubber to ceramic or metal. Broken golf clubs, fishing rods, basketball hoops, skis are all likely subjects. On boats, epoxy will put a bulldog clutch on everything from a broken mast to split strakes. Split and broken wooden furniture can be firmly stuck back together without benefit of clamps or wrappings; broken metal tools, cracked pipes and water tanks, leaky sinks, broken fixtures can all be repaired with startling ease and permanence. If they break again, chances are good it won't be in the same place. The adhesives can be obtained with different colored fillers in the resin. Black epoxy paste is used to fill gouges in bowling balls. White resin permanently and invisibly welds broken china and chipped sinks, and will produce a rugged permanent seal along the crucial line where

ceramic tiles and the bathtub adjoin.

That's another advantage of epoxies: They're waterproof. And because they cure by chemical action, the puttylike varieties can be used to fill cracks and chips in swimming pools—without draining the water! Spread on badly cracked concrete, the adhesive also provides a perfect key for new concrete that is poured on top of it before the adhesive has set.

Most do-it-yourself epoxy adhesives have a filler of powdered metal. Plastic Steel, for instance, is 80 percent powdered steel and 20 percent epoxy. Liquid Iron contains a similar proportion of powdered metals in a blend. Metalset is largely a powdered aluminum. Because of this, an epoxy can be chosen that has the same expansion coefficient of the material to which it is applied—an important factor in producing a tough, permanent bond. The type of filler is important for another reason: When the catalyst is added, the epoxy molecules, besides linking themselves to the surfaces being bonded, also link to the billions of microscopic metal particles in the paste itself. Hence, when cured, the finished mass, for all practical purposes, becomes a solid lump of steel, iron or aluminum that can be filed, tapped,



Epoxies can solve major problem of homeowner—how to fasten to masonry. Here epoxy is put on mailbox



Box then is "stuck" to a brick wall without aid of masonry anchors. It will stay there for a lifetime

drilled or machined just like any block of metal. Consequently these epoxies serve as metal fillers, and can be formed or molded to any desired shape. Motorists can use them to repair broken bumpers, car radiators, cracked castings, broken mirror brackets and hundreds of other things. Most of the metal-filled epoxy adhesives are thick enough in mixed form so that they can be applied with a putty knife.

Rusted-out rocker panels, car doors and trunk lids are perfect subjects for epoxy adhesives. If the holes are large the edges

are first cleaned with sandpaper. Glass cloth is used with the thinner epoxies, wire mesh with the metal-filled types, as a sort of lath, over which the adhesive is troweled. It is allowed to cure, then filed and sanded flush with the panel surface. Torn or dented fenders can be filled in the same manner.

What about cracked engine blocks? "It depends on where the crack is," a Cycle-weld engineer points out. "If it's too close to a hot cylinder wall, it may fail. But if the break is in a relatively cool part of

(Continued to page 232)



Epoxies are made in various formulations, for particular purposes. The color and some of the other characteristics depend upon the filler which is added to the resin. This Hysol epoxy, virtually colorless, is ideal for mending china





### Passenger Bus Turns "Convertible" to Add Hoopla to State Fair

Celebrities at Michigan's state fair will ride in "the world's largest convertible." The vehicle is a cut-down, remodeled Detroit bus (see inset). Machinists took the 31-passenger bus into their shop,

sawed off the top, removed the back door and added a simulated folded top made of 16-gauge steel. The cab is the eight-foot front section of the original roof, lowered 7½ inches.

### Drop-Leaf Picnic Table Can Be Wheeled About Like a Wheelbarrow

Here's a drop-leaf table for four that can be wheeled out to the patio or lawn like a wheelbarrow. And if there's a sudden rain, it can be pushed indoors in a hurry. There's a ledge to keep bowls,

dishes and cups from sliding off while the table is being moved. A lower rack accommodates folded chairs. The table's rubber tires are easy on the floors and carpet. Redwood is used in the construction.





## DETROIT LISTENING POST

By Art Railton

**D**ETROIT IS JUMPING. Not since Henry Ford announced he would replace the Model T has there been such anticipation. This time it's greater, being industrywide.

For the first time in generations, three started-from-scratch cars will come out in one year—cars with no visible ancestry. All three companies have had continuing small-car programs through the years. But these new cars are unrelated to previous activities. Earlier designs were scrapped and a clean sheet of paper was used in each case.

Nobody expects any sales problem. The real problem is to create desire without starting an epidemic. There will be "big" cars to sell also. Anyway small-car production is limited.

It is estimated that the Big Three can build fewer than 1,000,000 small cars in 1960 (350,000 each for Ford and GM, 250,000 for Chrysler). On a seven-day-week-overtime basis, the total could be pushed to 1,500,000—still short of the number that may be required.

The industry doesn't like overtime. Bonus pay cuts into profits—it is said to cost about \$50 more to build a car on overtime. That can't be added to the price so it must come out of profits. The profit picture is still cloudy, but at least one company expects to make the same number of dollars' profit per unit on the small car as on the larger models despite the lower price.

Passenger space in the smaller cars equals that of current bodies. In some cases, it's more. Trunk space is adequate (Chevy's rear engine may offer a minor problem). Over-all length is just over 180 inches, 30 to 40 inches under today's popular makes. Garage doors will close again all over America!

One fear is that the small cars with their unit bodies, all-new engines and suspensions, will be so tight, so responsive, so pleasant to handle, that the big cars may suffer by comparison. Millions of Americans will, for the first time, be exposed to

a disease that converted over 500,000 persons to small foreign cars. How do you keep these millions from falling victim to the small-car bug?

The Big Three may not offer hardtop small cars at first. There won't be a variety of series either. It's not that the industry is holding back, but simply that there hasn't been time for everything. Each make will have one series. Station wagons will be available, but scarce initially.

Many believe that the Big Three won't be able to produce enough small cars to meet the demand in Year One. Thus Rambler and Studebaker will have another prosperous year without even trying. Imports, too. The smaller the U.S. average car becomes, the bigger the imports will seem and that could make them more acceptable.

It's more apparent each day that the long-expected revolution has come. Industry top brass is aware of this and, like leaders in power during any revolution, they keep looking over their shoulders to see who's coming in to take over. It's all your fault. The final straw was the sales success of the Studebaker Lark. For the first time in recent years, a company boosted sales by shortening its cars.

**It must be added quickly, however, that there are industry diehards who still expect the small-car thing to blow away in a couple of years—and they could be right.**

But prototypes of the 1961 models of the small cars are already out on the highway for tests (in disguise, of course). Full-size clays of the 1962 models are now being approved. The public hasn't even seen the 1960 models (drawings that have been published are not even close to reality). Nobody is sure how they will sell (although never has there been so much confidence) and yet Detroit is forced by that old bugaboo, lead time, to spend money on 1961 and 1962. No wonder this business moves cautiously.

**Will these small cars get bigger, more luxurious, more expensive each year? Some experts think they will. But it does seem unlikely. The industry has learned its lesson. More likely is it that the "big" cars will get smaller.**

The second string of smaller cars will be out next year. These will fit neatly between the 108-inch-wheelbase new small cars and the 118-inch-wheelbase "old" small cars. At about 113-inch wheelbase, these cars will bear familiar names, probably names like Edsel, De Soto and Buick. Then the hierarchy of cars might read: Corvair-Falcon-Valiant; Buick-Edsel-De Soto; Pontiac-Olds-Dodge-Mercury; and, of course, Cadillac-Lincoln (or T-Bird)-Imperial. Time changes all!



Eight-sided house in Naples, Fla., has glass gables and a driveway that goes right under the concrete roof

# Octagon House

## *—Its roof is a concrete piecrust*

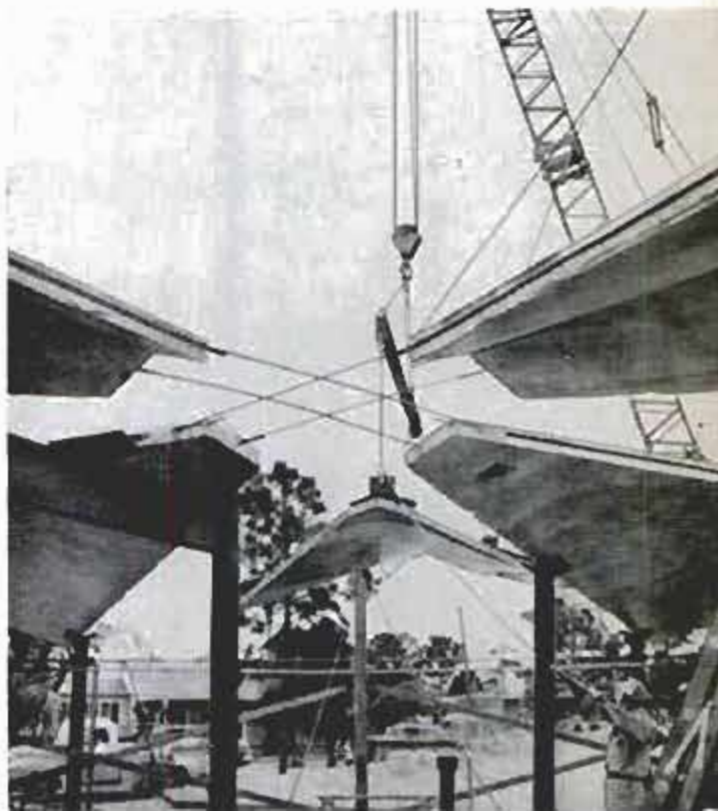
By Max Hunn

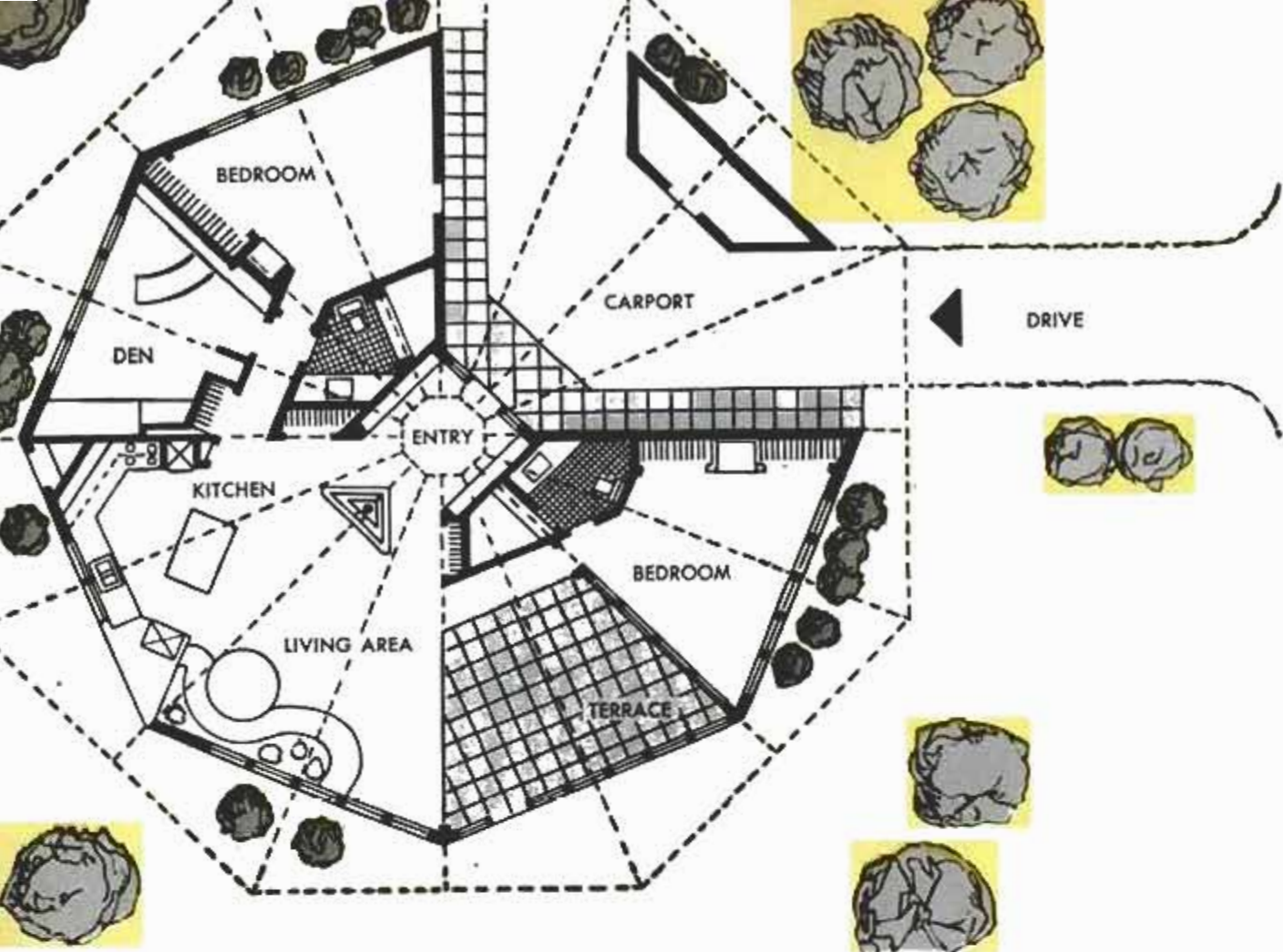
**A**N EIGHT-SIDED HOUSE with eight glass gables and a roof made like a concrete piecrust is stopping traffic in Naples, Fla.

This unusual home incorporates construction methods which may set a revolutionary pattern in future medium-cost home building, particularly in the use of concrete roofs. The octagonal house, which was built for Mr. and Mrs. John Cowles, represents a combination of three separate types of construction: the folded slab and thin-shell engineering principle, precasting of roof sections on the site (instead of pouring in place) and the lift-slab method.

The thin-shell type of construction—wherein the finished form relies upon its

The 11-ton roof sections were hoisted into place by special lifting apparatus; 16 columns support roof





shape rather than thickness for strength—has been in the experimental stage for several years. When used for residential construction it boosts the cost because of form work necessary when a concrete roof is poured in place.

The Cowles house, however, succeeded in combining the most economic elements of construction methods and secured a concrete roof at a cost of \$2.25 per square foot, despite many unexpected problems.

The first question visitors ask is: Why the eight-sided house? A brief glance at the plot plan and a knowledge of the pre-

vailing winds in southwest Florida supply the answer: It was a natural solution for the Cowles lot.

The house occupies a relatively narrow corner lot—75 by 150 feet—and was designed for maximum privacy and natural ventilation. The Cowleses had no desire for air conditioning. Nelson A. Faerber, the architect, designed the house to take advantage of the prevailing breezes which are from the east and south during the warm months. He placed the most-used areas—master bedroom, living, dining and kitchen sections—in the coolest sector.



Left, patio (foreground) looks into a section of the living-dining-kitchen area. Host John Cowles is sitting on built-in couch. Divider behind him holds freezer

Night scene (facing page) shows effect of lavish use of glass that extends into the gables. The house is situated on lot for maximum privacy with living areas at back



Last section of the "piecrust" roof is eased into place; open space in the center is for a big skylight

You enter the house through the main entrance behind the carport on the north-east section of the octagon. Proceeding clockwise from your left, you find the master bedroom and patio. Two walls of the patio are glass, one is screened and the fourth consists of wood jalousies opening from the master bedroom. Sliding glass doors on the patio open into the living-dining area which is separated from the

adjoining kitchen by a tiled breakfast bar and a half wall that contains the built-in refrigerator and freezer. A short hall leads from the kitchen area to a den and a guest bedroom. The latter room has a private entrance from the carport which Cowles calls the "escape hatch."

One of the main design problems was to enclose as many of the roof-supporting columns as possible. So successfully was

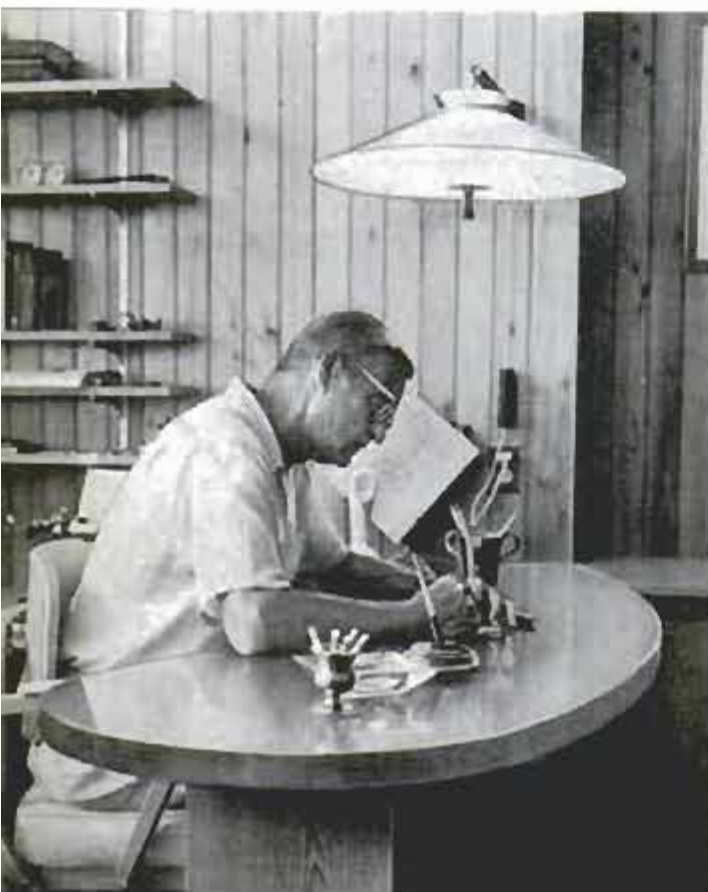




Breakfast bar with a top of in-laid Italian mosaic tile also is room divider. Raised oven is at right, and sink is beneath the window. Walls of kitchen, like all the rest of the house, are paneled with attractive red cypress

this done that only one of the 16 concrete-filled steel columns is exposed, and this one is incorporated in a built-in bar near the entry in the center of the building. Directly over the entry is an octagonal skylight which is six feet across; each of the roof sections stops three feet short of the center.

In an octagon house there are no square or rectangular rooms and the maximum space is on the outer perimeter. The bathrooms and hallways in the Cowles house are placed near the center of the octagon. Both bathrooms make good use of the angular space with many built-ins, custom-made medicine cabinets, step-down tub-showers finished in Italian mosaic tile—even heated towel racks and tilting shav-



ing lights. The doorway to the bathroom across the hall from the master bedroom is located in a position that made it impossible to use a full-size door. A folding door with piano hinges that is just one half the normal width when open solved the problem.

Living-room built-ins include a cabinet for hi-fi equipment, player and record shelves, also a serpentine couch along one wall. Built-ins keynote the kitchen, too, with special revolving shelves and pull-out innovations.

Despite the attractive interior, the roof has caused more comment than any other part of the house. When the concrete segments were hoisted into place, a major portion of the Naples population was on hand to witness a construction fiasco. They were wrong. When hoisted atop the supporting columns, the roof sections fit with a quarter-inch tolerance. The widest span of the sections is 22 feet 10 inches. The four-inch-thick slabs come to a peak, giving a fold for strength. Each section is 34 feet long, has an area of 400 square feet and weighs 11 tons. The sections are reinforced with steel bars.

The valley joints have been filled with nonshrinking expansive grout, and the roof was treated with three coats of waterproof cement. There are no expansion joints, Faerber explains, because the expansion and contraction will be absorbed by the pitch of the gables acting like "giant wings."

Why a concrete roof? The architect likes it because: "You simply pour it out of a bag, and there's no limit to originality in design. There are no dimensional limitations. It's a medium with unlimited horizons—even octagonal ones." ★ ★ ★

Curved desk is one of the many built-ins in octagon house. Owner John Cowles at the desk is a writer

# Why Not Take to the Wilderness?



How can you beat this life? In the calm bays of this huge lake you'll find the best fishing on the continent

*Each year this Illinois family roams the wilds of Canada by car and boat in search of fun, adventure and a new dimension in family life. Kids? No trouble. The wilderness has been their summer home since they wore diapers*

**By Dorothy Michelson**

**WE'RE A CAMPING FAMILY**, a wilderness-camping family. To us, the wilderness is not a "remote" campground, where you're forever tripping over rusty cans, but an area virtually void of human imprint. That's the sort of an area that puts our pioneering spirit to a real test.

If you've been blessed with a family that doesn't mind roughing it, we highly recommend a wilderness vacation. Fun, adventure, a new dimension to family life—these are the rewards.

Last summer, as we've done for the past eight years, we took to the wilds of Canada. There are four of us: my husband Harry, myself and our two children, Glen, nine, and Ann, six. In seven days we trailered our boat 3000 miles to the wilderness shores of Great Slave Lake in the Northwest Territories of Canada. There we

Harry helps six-year-old Ann with a bow and arrow made for her by a lonely wilderness fisherman, right





Here's a valuable tip for wilderness boaters: Cover the plastic windshield of the boat with cardboard to prevent damage from flying stones on the rough roads of the North



Menfolk change a flat on a lonely road in the Northwest Territories. There's no help here. In one stretch of 1000 miles, the wilderness explorers saw only one other car. ↓ Mom does laundry in heated water poured into rock basin



shifted our camping gear to our boat, and spent the next six weeks experiencing the most rugged, but also the most rewarding, vacation we've ever had.

We explored this "sea" (as the natives term Great Slave) and found her to be as unpredictable as her fishing is unbelievable. We ran aground, ran through waters of terrifying fury, even got lost—but our troubles were forgotten in the excitement of catching 25-pound lake trout almost any day we wanted to cast a lure.

We met wonderful people and saw awesome scenery. God must have left the lights on all night up there just so man could appreciate the beauty.

We learned that life can be unhurried. Eat when hungry, sleep when tired. This is the law of the land, and we soon found ourselves under its rule.

Two months later we returned to civilization, poorer by \$750, but our lives immeasurably richer from the experiences we had shared together as a family.

It's not the first time we headed north to the wilderness. Harry's job as a grade-school principal has allowed us at least three or four weeks each year for our wanderings. Ann and Glen, from the time they were literally babes in arms, were as accustomed to a tent and a boat as they are to a house and car. If you have doubts about taking tots into the wilderness, let me dispel them. Youngsters take to the wilds with a fresh enthusiasm that we adults all too often have lost.

We travel as a virtually self-sufficient unit. We sleep in our station wagon, cook our own meals, pull our 17-foot Thompson with its 50-horsepower Evinrude motor.

### Make Plans Early

We left home in June, but our trip really had begun in January. Such a trip takes a lot of planning, especially when children are involved.

Here are some suggestions for planning your own wilderness vacation.

- Write for maps of the area you intend to explore. In Canada, write the Map Distribution Office, Department of Mines and Technical Surveys, Ottawa, Canada.

- Also ask for current information affecting car travel in each of the provinces. A "pink" card (proof of adequate liability insurance) is





At Snowdrift the Michelsons saw a plane bring in four sport fishermen, the only other "outsiders" they met

required in some areas. It's easy to obtain from your own insurance man, but if you're caught without one your car can be lawfully impounded.

- Plan your trip around a tentative timetable, and leave it with a relative in case an emergency should arise.

- Get to know your outboard motor. You may have to make simple repairs. In our case, the Evinrude people gave us fine cooperation in suggesting what spare parts and tools to carry.

- Try to contact someone familiar with the area. In Canada, Hudson Bay Post managers, game wardens and most local residents are very accommodating. Such people not only will give you information, but will welcome you with open arms to their remote areas.

- Make a list of the basic items you'll need. *Need*, not *want*.

- In the weeks preceding your departure, solve the travel and camping problems that are unique to your family. One problem we had to solve was how to sleep everyone in the station wagon, en route. Glen could stretch out on the front seat, Harry and I on air mattresses on the rear floor, but that left no place for Ann. Harry built a small bed of  $\frac{3}{8}$ -inch plywood, which he elevated over our feet, using four aluminum legs standing in the door wells. The kids used it as a handy desk while we were traveling. When we removed the legs and

Man, this is real fishing. Lake trout probably weighed about 40 pounds, but this is an estimate since Harry's scale went to only 22 pounds. Within an hour in one spot he caught, on the same fly, huge specimens of four different kinds of northern fish: arctic grayling, lake trout, whitefish and northern pike





Photo was taken in bright light upon arrival at Snowdrift at 11 p.m. Indians were fascinated with big motor

inserted four longer ones, the bed became a camp table.

#### Leave Luxuries Behind

Be ruthless in crossing items off your list of equipment. With all-night daylight, we even left behind our camp lantern. Luxuries such as camp stools can be left at home. Lifejackets can double as pillows. Conserve on weight, but not on warmth. If you plan to go north, make sure your sleeping gear and clothing are adequate for weather extremes. In our summer travels north we have encountered temperatures from 10 to 110 degrees above zero.

Everyone pitches in with "household" chores. Here Harry and Ann do the dishes after lakeside lunch



Our basic list of troubleshooting extras includes outboard-motor spare parts, propellers, shear pins, spark plugs, gas hose, tires for car and trailer, and an extra trailer wheel.

And while you're packing, don't forget to tuck in your sense of humor and resourcefulness—absolute necessities in the wilderness.

On the road last year, our first few days were uneventful. Crossing the Canadian border takes one to three hours in some places, but we went through customs at Sweetgrass, Mont., in five minutes. You can help the customs procedure by having at hand the serial numbers of any guns, cameras, motors, car and trailer.

Before we had penetrated very many miles into Canada we hit a stretch of road repairs. The trailer sank so low into the ruts that the propeller on the outboard motor started to scrape the ground. Harry tied it up temporarily until we reached the next town where he made a permanent tilt-brace with a two by four. The incident taught us a lesson that we've passed on to our boating friends.

#### Measles in the Wilderness

Disaster struck the morning of the fifth day when Ann awoke with the German measles. This is typical of the minor crises the wilderness camper must be able to face with aplomb. Because Ann didn't feel really sick, we felt we could push on from



Michelsons always make last-minute check on lawn before departure. Below, map shows route

town to town, always ready to stop should she begin feeling worse. Fortunately she was back to normal within a few days.

Everyone we met had some advice—most of it excellent—for our long trek down the gravel road. Here are a few of the suggestions that we found worthwhile:

- On gravel, increase the air pressure in your tires. This helps prevent rock bruises.

- Overload springs are a wise investment.

- On a wilderness trip such as ours, carry at least three spare tires at all times.

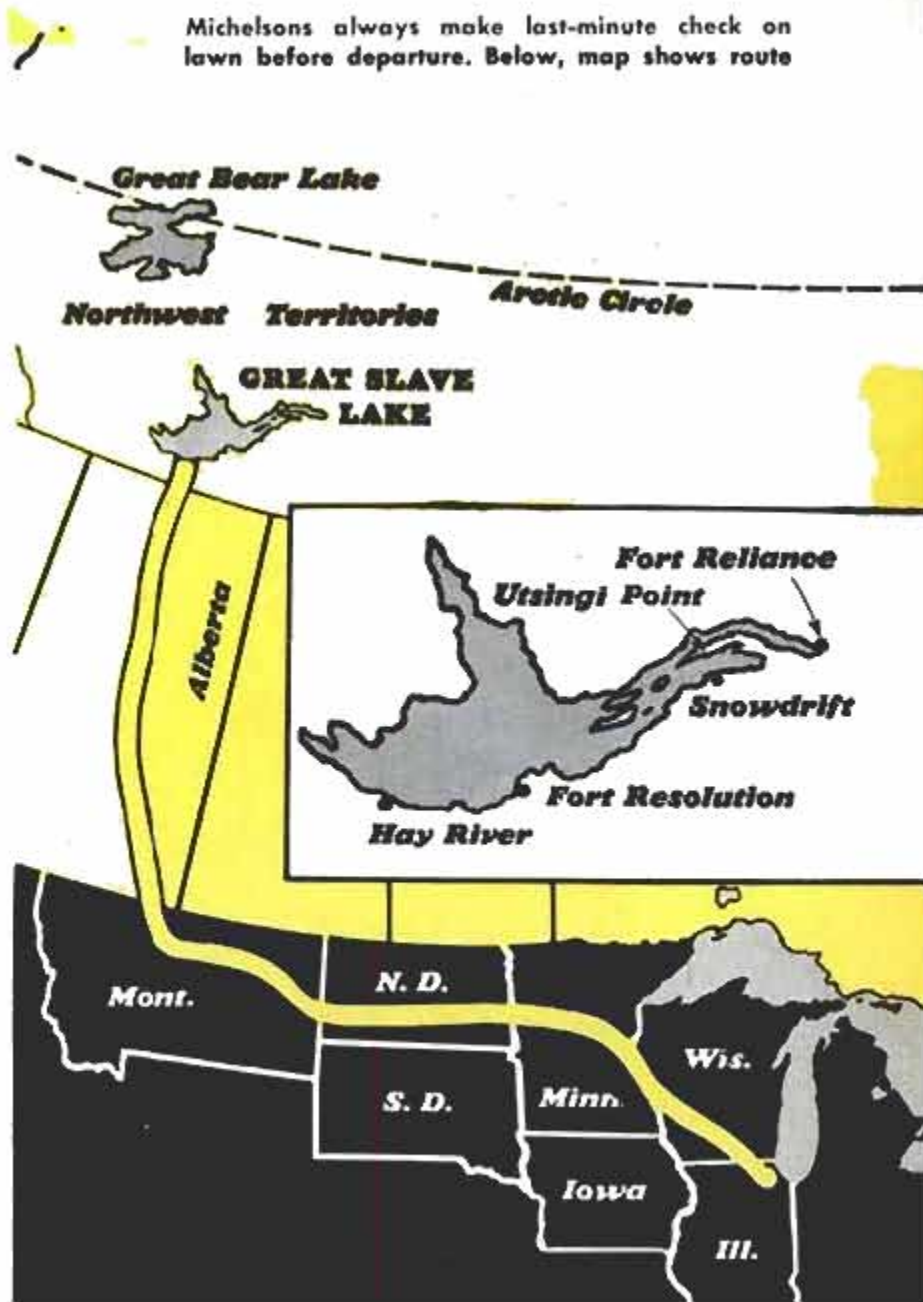
- Check the bolts on the boat trailer frequently. They may tend to shake loose.

- Cover the boat windshield with heavy cardboard to protect it from flying stones.

- Before leaving each stop, check on the availability of gas and food farther down the wilderness trail.

- Carry extra gas. (We lost a quarter of a tank before we discovered that the gas tank had been punctured. It was just one of many incidents that proved that the wilderness camper must be able to improvise. We plugged the hole temporarily with plastic patching.)

- Stop and offer help to anyone





When the propeller started to scrape on ruts in road-repair area, Harry stopped at next wilderness village and built a tilt brace from a two by four



Prize finds of the kids were moose and caribou horns discovered on explorations in wilds

Be sure you carry extra gas in wilderness, as it's a long way between stops



parked along the road . . . an unwritten law.

- Wrap clothing and bedding securely in a tarp to protect it from the clouds of dust.

- Refill the water jug at every gas stop, and carry along some hard candy to suck on, to relieve the dryness in your mouth.

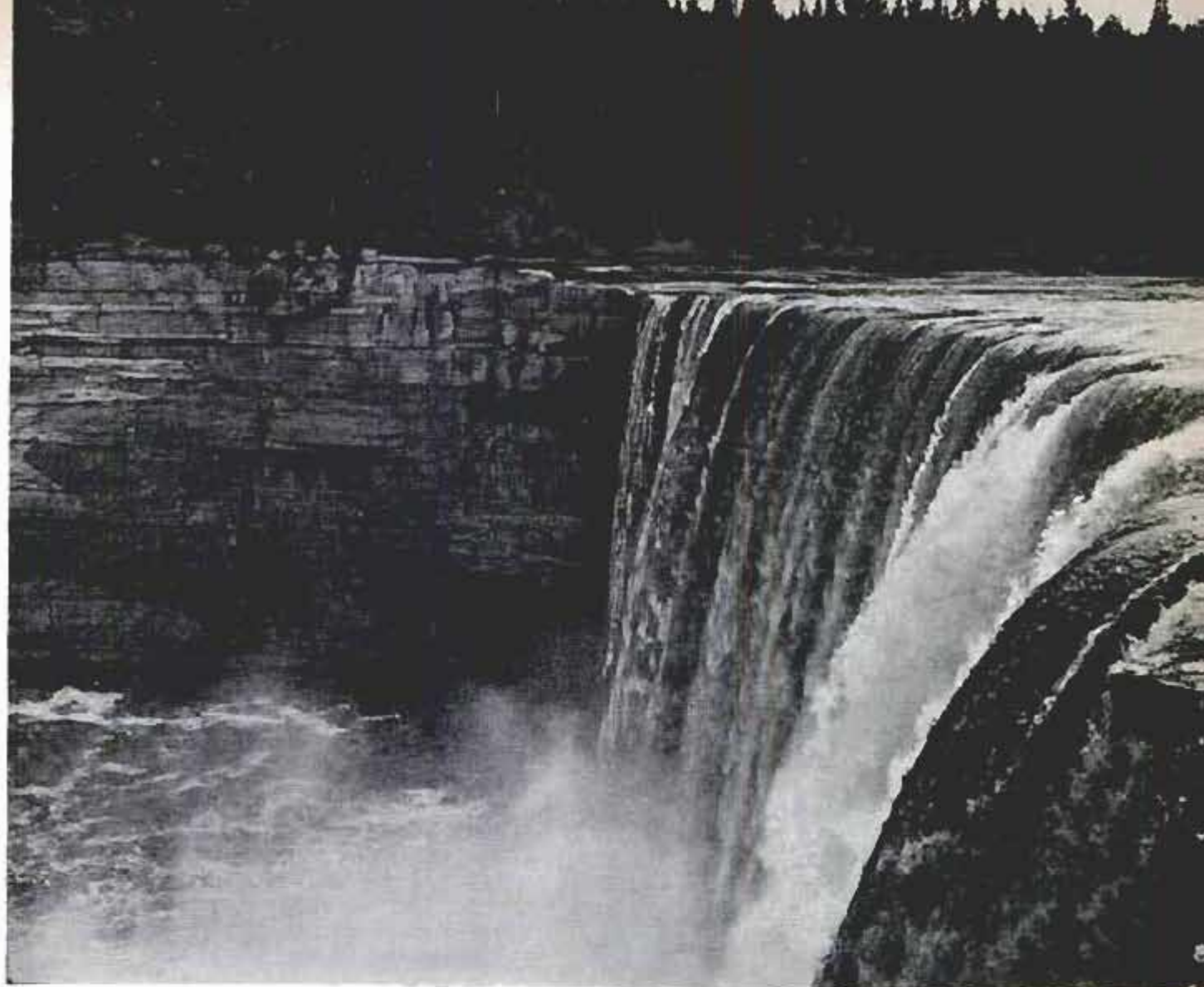
I somehow had the feeling that all of our small misfortunes were a mere toughening-up process for the adventure that lay ahead. This feeling was confirmed by a bewhiskered sourdough at Whitecourt, Alberta—our first personal contact with Great Slave Lake. He had prospected that area for years, learned to love its wilderness, and had left, he said, only because he “just couldn’t take that rugged life anymore.” He advised us to get the water routes and schedules of all of the transport and fishing companies, and mark them in red on our maps.

“Great Slave’s a beautiful lady, but she can be wicked,” he warned. We didn’t dream that soon we might owe our lives to his advice.

On our sixth day we reached Grimshaw, Alberta, where Route 2 continues west to Dawson Creek, start of the Alaska Highway. At this point we turned north onto the MacKenzie Highway.

Just 28 miles short of our destination, we

(Continued to page 220)



Michelsons were among a handful of "outsiders" who saw the lonely grandeur of Alexandra Falls last year. Dad checks the motor while son fishes, at beautiful spot on Hay River, waiting for wind to abate on lake.





Coal fire burns brightly inside experimental mine. The fire was one of nine started deliberately to test the new "foam plug" technique. Six of the fires were controlled by the foam, three of them were not



Far from the fire, a researcher sprays bubble-making solution across a net. Large "plug" of bubbles forms, which is carried to the fire by ventilating current

Huge mass of foam fills the mine's passageway as it is pushed along by air currents toward the fire



## "Plugs" of Soapsuds Snuff Coal-Mine Fires

BIG GOBS of soapsuds may soon be used to smother coal-mine fires. Carried by ventilating currents, they drift down mine tunnels to the fire zone. The Bureau of Mines has been experimenting with the foaming agents. Fires have been started in the Bureau's experimental coal mine near Bruceton, Pa., to determine the effectiveness of the "foam plug" technique. The method was developed in England and now is being tested under mining conditions in this country.

The same chemicals found in your laundry and in industrial detergents were used as bubble-making solutions to fight the coal-mine fires. Some distance from the fire, a cotton screen or net was stretched across the mine passage. The researchers then used a hose and nozzle to spray the detergent solution on the screen. In passing through the netting, the solution formed large bubbles that soon built into a huge mass or "plug" of foam.

This mass of bubbles, carried by the air currents of the mine's ventilating system, moved slowly toward the fire. When it reached the fire zone, the water in the foam vaporized, lowering the temperature and subduing the flames.

In one test, the men created a foam plug 1600 feet long but it contained little moisture to fight the fire. In another test, an effective plug traveled more than 1000 feet.

The Bureau of Mines indicates that the foam-plug method has promise in fighting coal-mine fires, especially as a means of subduing a fire long enough for men to reach it with water and other conventional fire-fighting agents.

Subdued by "bubble bath," the fire is brought under control by water and other fire-fighting agents





## Mammoth French Truck Carries 100 Tons Across Desert Sand

Billed as the world's largest truck, the Berliet T-100, a French product, is 45 feet long and 16 feet wide. The vehicle, powered by a 600-horsepower Turbodiesel engine, can carry up to 100 tons and weighs 129,800 pounds. Its tires are eight feet high. Designed for off-highway transport of heavy equipment in desert areas, it has three separate driving axles and has a top speed

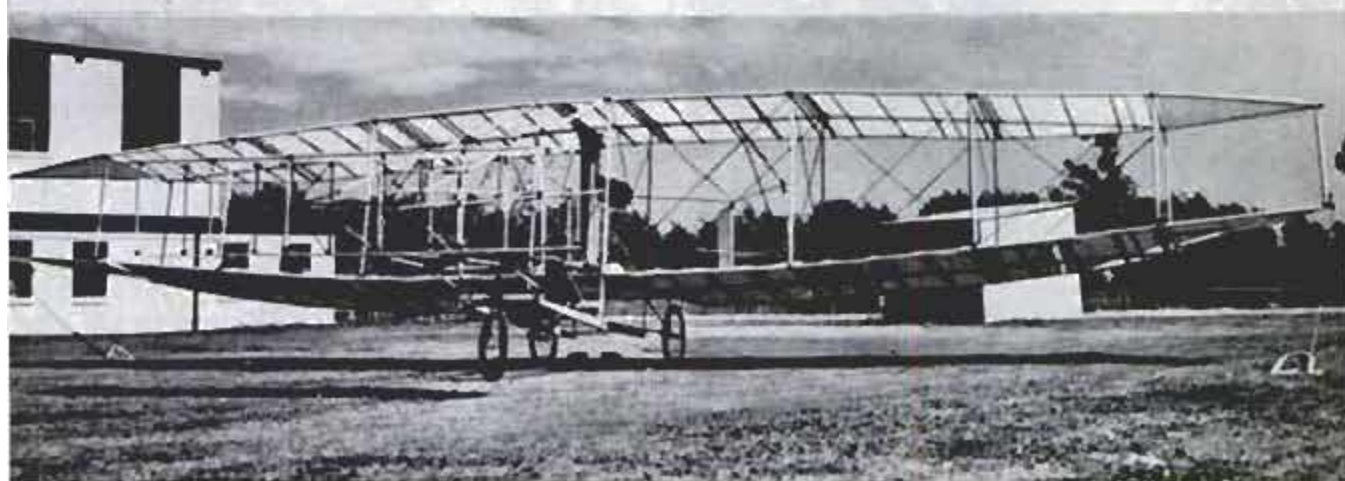
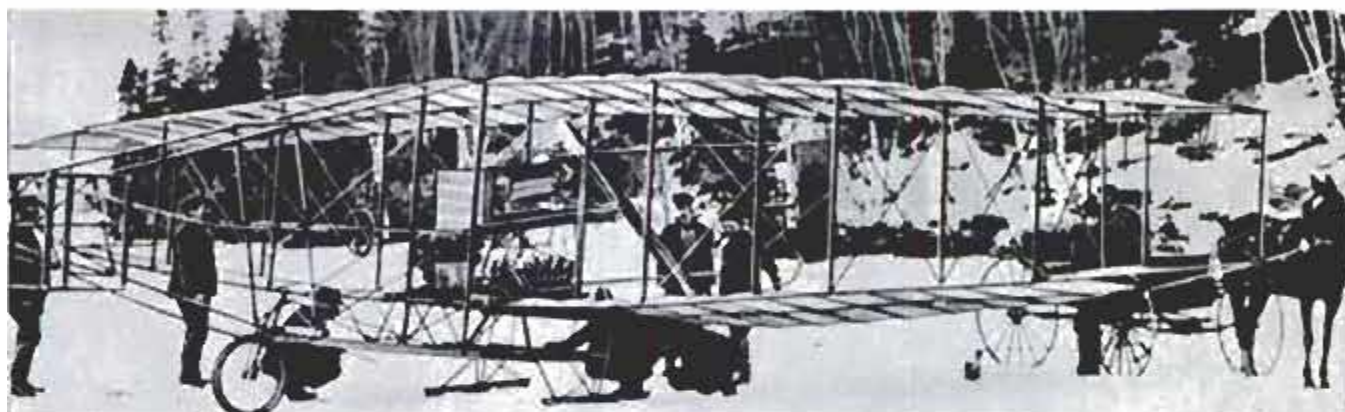
of under 25 miles per hour. Its fuel tank holds 251 gallons. Equipped with conveniences for the driver, the cab has air conditioning, a cooking range, refrigerator, and a drinking-water tank. Despite its size, the truck exerts low tire-to-ground pressure—14 pounds per square inch—and requires no more effort to drive than a passenger car.

## "Silver Dart" Replica Re-Enacts Historic Flight

Replica of the "Silver Dart," the plane that made the first powered flight in the British Empire, recently re-enacted the original flight. On hand in Nova Scotia to witness the 50th anniversary of the flight

was John McCurdy, 74, who piloted the first flight, in 1909. Originally, the plane was built by the Aerial Experiment Association, headed by famed inventor Alexander Graham Bell.

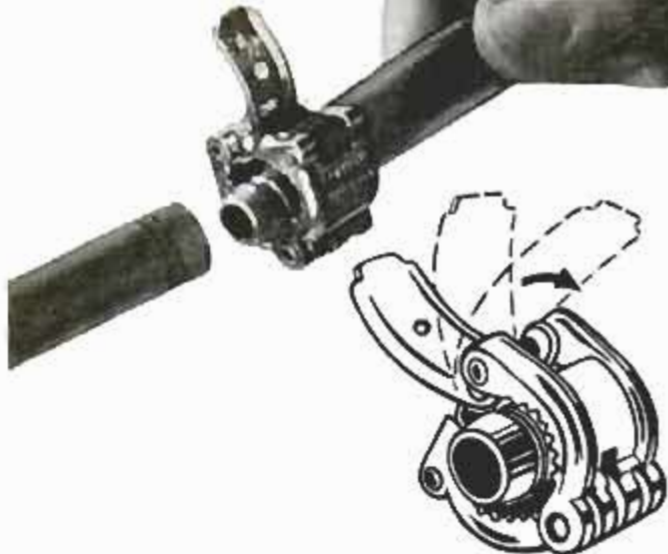
Original "Silver Dart" (top) as it was prepared in 1909 for its historic flight. Replica is at bottom ....



# WHAT'S NEW FOR Your Home

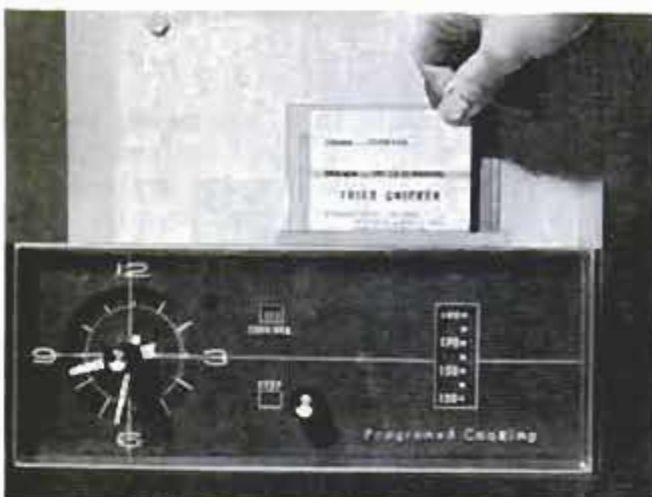
**GARDEN-HOSE MENDER**, right, requires only your thumb to attach it to the hose. You simply press the lever down when the ends are in place. To reuse the clamp, you lift the lever. Equally efficient on plastic and rubber hose, the rustproof device can mend a thick-wall plastic hose or a thin-wall one

Franklin Metal and Rubber Co., Jacksonville Rd., Hatboro, Pa.



**PORTABLE AIR-PURIFIER** uses activated charcoal to remove irritants and odors from the house. Resembling a smart-looking radio, the electric purifier has a silent-running motor. A six-inch fan draws in foul air, then passes it through the charcoal filter

Pafcon Products Corp., 30240 Lakeland Blvd., Wickliffe, Ohio



**PROGRAMMED-COOKING CARD**, inserted in master control for oven, sets cooking cycles in motion. It activates both surface units and ovens, including timers and cooking temperatures for all foods in preparation. This device is not yet in production

Hotpoint Co., 3000 W. Taylor St., Chicago

**OUTLET ON YARD LIGHT** provides electricity for lawn mowers, edgers, hedge cutters, cooking equipment, radio and television sets, etc. The outlet is placed high on the post so young children cannot get at it easily. A weatherproof cover protects the outlet from rain and other elements

Progress Mfg. Co., Inc., Castor and Tulip, Philadelphia 34, Pa.



**POP-UP LID** on ice crusher is opened by pulling back on handle. It stays open until the cubes are loaded and closes as soon as cranking starts. Crusher has stainless-steel blades and produces fine, medium or coarse ice

The Dazey Corp., St. Louis 7, Mo.





# WHAT'S NEW IN Barbecues



**PLASTIC BUCKET** for charcoal has a 12-quart capacity and holds a 10-pound load. The attractive bucket has a snap-on handle and a cover to protect the charcoal from moisture and control dust. The bucket comes with tongs, cookbook and bags of insulating material  
Flambeau Plastics Corp., Baraboo, Wis.

**CHARCOAL BLAZER** helps ignite coals quickly, safely and easily. Crumpled newspaper is placed at bottom before coals are inserted. Paper is ignited and coals are red-hot in minutes. Blazer is lifted off  
Williams Cutlery, Inc., Seaman, Ohio



JULY 1959



**PORTABLE GRILL** can be set up in seconds. It has four parts: fire basket, grill and two-piece post. No tools are necessary to put post in ground and attach basket and grill. Upper part of post serves as hammer for driving lower part into the ground  
Chesley Industries, Inc., 24777 Telegraph Rd., Detroit 41, Mich.

**HEATER-BROILER** employs new principle of producing flameless, infrared radiant heat. A heater in any position, it can char-broil a one-pound steak in six minutes. Tilted, it can be used for pot-pan cooking  
Devonair Products, Oxy-Catalyst, Inc., Wayne, Pa.



99



## Electric-Starter Kit For Power Mowers

Owners of rotary lawnmowers with four-cycle engines now can start them electrically. Operated by fingertip from the mower handle, the electric starter is mounted on the engine crankshaft under the mower deck. Developed by General Electric, the new starter has only one moving part in its induction motor. Insertion of a 110-volt extension cord into a socket on the mower handle starts the engine. A switch automatically shuts off the starter. The lawnmower is ready for action as soon as the plug is removed from its socket in the handle. The starter comes in kit form and can be installed quickly. Once the blade has been removed, a rotor is assembled on the crankshaft. The stator and its housings are then placed over the rotor and fastened by the engine-mounting bolts. The photo at left shows the starter's components: from left to right, extension cord, handle socket and cord clamps, stator gap-spacers, rotor, stator and housing, and handle socket and cord.

## Assembly Beacon Beckons Paratroops

To mark assembly points for airborne troops, the Army has developed a beacon light that can be dropped from the air. It has a visible light range of five miles when viewed from a 1000-foot altitude, and an infrared light for ground use. Mounted on a telescoping mast that can be extended to 23 feet, the marker can be erected and operated by one man. It is equipped with six signal lenses: white, red, amber, green, blue and infrared. The operator controls the marker from a box that contains the coding-sequence mechanism and a 12-volt rechargeable nickel-and-cadmium battery.

☛ Ferrosul, a waste material of steel manufacture, shows promise as a source for calcium, sulphur, magnesium, iron and manganese.



## Overdrive Unit Increases Generator Speed as Engine Idles

Batteries are kept at peak charge by a generator overdrive that speeds the rotation of the generator when the engine is idling. When engine speed increases, the

unit automatically returns the generator to the normal charging rate. It is designed to prevent battery failure in police cars and other emergency vehicles.

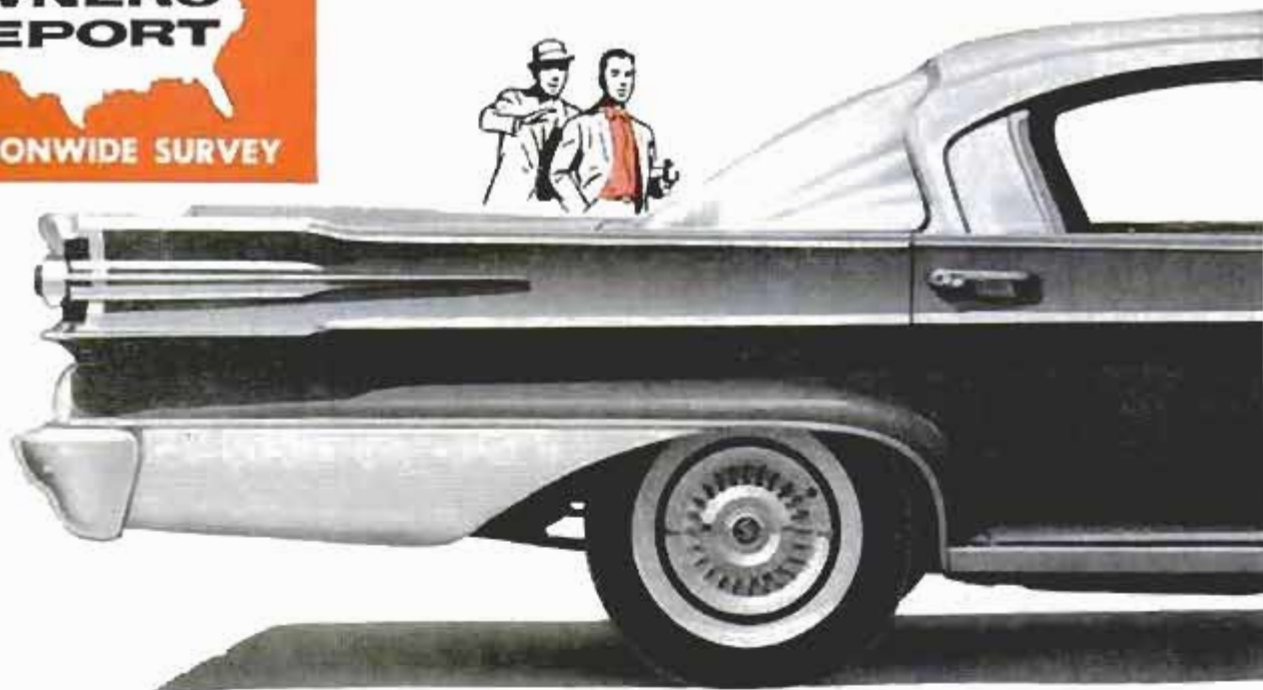
## Unique Fighter Designed for Allies

Designed specifically to meet defense needs of Allied nations during the 1960-70 decade, the Northrop N-159F fighter, now under development, would have a variety of missions in wartime, including the delivery of ultrasonic guided missiles and bombs against an enemy's air strength. The N-159F will be able to operate from short and unfinished airfields. Its weapons system will be unique in that it will represent the first time U. S. technology has been tailored into a weapon specifically designed for operation under conditions found in friendly nations outside the U. S.



# OWNERS REPORT

A NATIONWIDE SURVEY



## Mercury Owners Like Roominess,

MARGINAL COMMENTS  
BY ART RAILTON  
PM's AUTO EDITOR

Average "Poor" rating →  
for all 1959 cars in PM  
surveys is 3.9 percent.  
Highest poor rating was  
6.7 percent, lowest  
0.9 percent.

MERCURY OWNERS have trouble agreeing on what's wrong. No single complaint is mentioned by as many as 10 per cent of the owners. This is certainly a strong indication of owner satisfaction.

Usually, 15 to 20 per cent (or more) agree on one or two faults, but among Mercury owners the most frequently mentioned complaint comes from only 9.7 percent.

Also, only 2.9 percent of the owners rate the car poor over-all. While this is not the best record (some have been under 1.0 percent) achieved in these surveys, it is certainly among the four or five best.

PM Owners Reports are prepared by asking 1000 owners what they like and don't like about their new cars. The owners questioned are picked for us by an independent organization and are selected at random from all over the country.

Tops on Mercury owners' best-liked list are handling ease, riding comfort and interior roominess. The last-mentioned item, roominess, is rarely praised by today's new-car owners. Mercury does have an open, roomy sensation,

### What Should Industry Do?

"Cut down the top of the windshield. I do not combine airplane spotting with driving."—Minnesota physician.

"Go back to the 15-inch wheel."—Washington, D.C., government analyst.

"Pay more attention to producing a sound, sturdy body. They seem to 'slap' the cars together."—Nebraska dentist.

"Get bodies back to a sensible width and length."—Georgia engineer.



## Dislike Big Windshield

especially in the front seat. In a year of knee-high-to-a-grasshopper seats and cramped interiors, this characteristic is a pleasant one.

What don't the owners like? As you might expect in this era of economy, the most frequently mentioned complaint is poor gasoline mileage (9.7 percent), followed by dissatisfaction with the rear-view-mirror location (8.7 percent) and the much-too-big windshield (also 8.7 percent).

But let the owners themselves tell you what they think about the car:

"It handles as well *without* power assists as any car *with* them I have driven. It is an in-between car. It is not clumsy, but still is heavy enough to hold the road."—Kansas farmer.

"Handles like a light car. You get around in traffic so smoothly and feel so safe in it."—California owner.

"Drives easily. Can be driven several hundred miles over indifferent roads, without fatigue."—Oklahoma orthopedic surgeon.

"I like the comfort. We rode from Rhode Island to Cali-

*There's no reason for ridiculously big windshields. They not only let in too much sun, they boost insurance rates. They are said to sell cars. Do you buy a car for its double-wrap windshield?*

*You do feel secure inside it. There's a definite cocoonish atmosphere—detached, isolated, away from it all. It could make you forget how fast you are going, how long it would take to stop.*

### Why Not Buy a Foreign Car?

"Lack of available service."—Oklahoma laundry owner.

"Not big enough for the family."—North Dakota owner.

"I wouldn't feel safe."—Illinois salesman.

"Because of business reasons."—New Hampshire undertaker.

"I believe in keeping business at home."—Arkansas metalworker.





## AN ENGINEER'S ANALYSIS

By **DALE KELLY, SAE**  
Registered Professional Engineer

## 1959 Mercury Montclair V8

**MODEL TESTED:** Four-door sedan with four-barrel carburetor, single exhaust, multidrive Merc-O-Matic (three-speed) transmission, power steering, power brakes and air-conditioning.

Rear-axle ratio: 2.71 to 1. Wheelbase: 126 inches.  
Tires: 8.50 by 14. Weight: 4498 pounds with gas tank half full (57.5 percent on the front wheels, 42.5 percent on the rear).

Mileage on car at time of test: 1200 miles.  
Barometer: 29.2 inches. Temperature: 70 degrees F.  
Payload: 200 pounds.

### ACCELERATION TIME FROM STANDING START (in seconds)



| Ignition timed for:         | 0 to 20        | 0 to 40 | 0 to 60 | 0 to 80 | 1/4 mile |
|-----------------------------|----------------|---------|---------|---------|----------|
| Regular gasoline.....       | 3.1            | 6.8     | 12.5    | 25.3    | 19.5     |
| Premium gasoline.....       | 2.8            | 6.4     | 12.0    | 24.3    | 19.1     |
| Super-premium gasoline..... | No improvement |         |         |         |          |

(Gasoline used had following octane ratings by research method: Regular 90; Premium 99; Super-Premium 105).

### FUEL ECONOMY (miles per gallon)



| Ignition timed for:         | Steady 30 m.p.h. | Steady 50 m.p.h. | Steady 70 m.p.h. | Traffic Route |
|-----------------------------|------------------|------------------|------------------|---------------|
| Regular gasoline.....       | 17.5             | 14.7             | 12.2             | 8.6           |
| Premium gasoline.....       | 17.8             | 13.8             | 12.2             | 8.8           |
| Super-premium gasoline..... | Not tested       |                  |                  |               |

(In traffic test, car makes 10 full stops per mile and is driven fast enough to average 15 miles per hour).

### ESTIMATED AVERAGE ANNUAL GASOLINE BILL: \$247 for 10,000 miles

(Assuming that 25 percent of owners will use regular gasoline at 30.5 cents a gallon, and the rest premium at 33 cents a gallon).

### SPEEDOMETER ERROR (miles per hour)



|                           |    |    |    |    |    |    |    |
|---------------------------|----|----|----|----|----|----|----|
| Speedometer reading ..... | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| True speed .....          | 19 | 27 | 36 | 44 | 53 | 62 | 70 |

### ODOMETER ERROR (miles traveled)

Odometer registered 106 miles for the actual distance of 100 miles.



### DRIVER'S VISION

Driver could see part of road 19 feet in front of car, full width of road 21 feet in front of car.



### GROUND CLEARANCE (unloaded car)

Worst dip that could be crossed..... 29-ft. radius  
Worst hump that could be crossed..... 20.5-ft. radius  
Deepest rut that could be negotiated..... 7.5 in.  
Curb clearance for door opening..... 13 in.

### STEERING:

Steering-wheel turns for 50 ft. circle... 1.6 turns  
Curb-to-curb turn-circle diameter..... 43 ft.  
Wall-to-wall turn-circle diameter..... 46 feet  
Steering-wheel turns, lock-to-lock..... 3.8 turns

**CENTER OF GRAVITY:** 22.3 inches high.

### TRUNK CAPACITY

14 cartons (one cubic foot each)

### WATER RESISTANCE: Fair

Splash-pan test: No trouble or leaks  
High-pressure test: Leaks around doors, windows.

### OBSERVATIONS

All the instruments were easy to read; odometer and speedometer, however, were grossly optimistic. Wiper coverage at the center of the windshield was outstanding.

The passenger in the center of the front seat will find plenty of cushioning and only a moderately high hump under his feet. Head room is restricted, front and rear. The glove compartment is unusually wide but unusually shallow.

In D1 range and with light accelerator pressure, the transmission shifted from first to second at 12 miles per hour and from second to third at 23. The full-throttle shifts came at 47 and 73 miles per hour. When the transmission control is set at D2, the car starts in second; this reduces the chance of spinning the wheels on ice, snow or sand.

Dale Kelly, SAE



High on the complaint list is the hard-to-reach location of the radio, caused by the forward position of the dash



Mercury's lower front-seat floor hump provides the center passenger with sufficient legroom

fornia and had the most enjoyable ride anyone could imagine."—California aircraft worker.

"Roominess of the interior. I bought this car because it offers the most in size for the money."—Maryland sales executive.

"Low tunnel permits six people to be very comfortable."—New York salesman.

"Plenty of room between front seat and dashboard."—Oklahoma farmer.

Here are the top-ranking complaints, in the words of the owners themselves:

"Gas mileage has been as low as 10 miles per gallon. It is 14 now."—Wisconsin attorney.

"Poor fuel economy. There is nothing economical about this 'economy' engine. Mercury advertises that regular gas is suitable. The owner manual and shop manual specifically call for premium fuel. If you retard the ignition enough to use regular gas, performance drops from average to poor."—Ohio engineer.

"I have the 'economy' engine. Gas mileage does not reflect this economy. It gets 11 miles per gallon in city, 15 on trips. They advertise that oil filter is good for 4000 miles as an economy feature. It costs almost twice as much as a 2000-mile filter."—Montana office manager.

"Rear-view mirror is in a bad place. It obstructs your vision to the right and the person riding in the middle of the front seat always bumps his head on it."—Iowa farmer.

"With three passengers in front, the mirror creates a safety hazard to the center rider."—New Mexico civil servant.

"Windshield goes back too far at the top. The sun comes in and roasts you."—Maryland salesman.

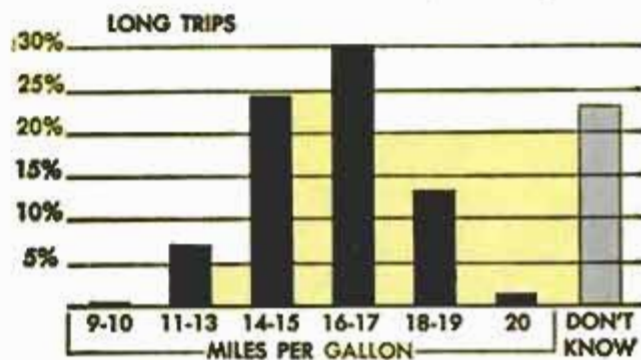
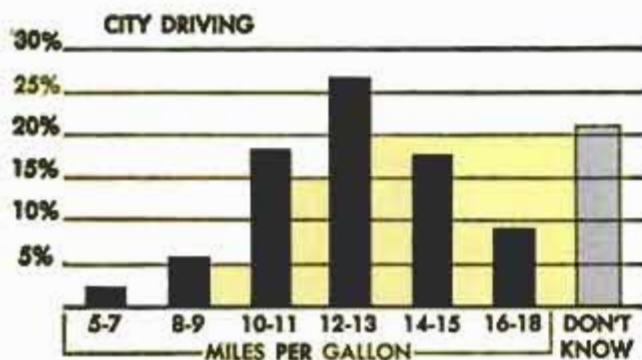
"When the sun is hot, it will burn you up. When driving against the sun, it hits you in the eyes three to four hours

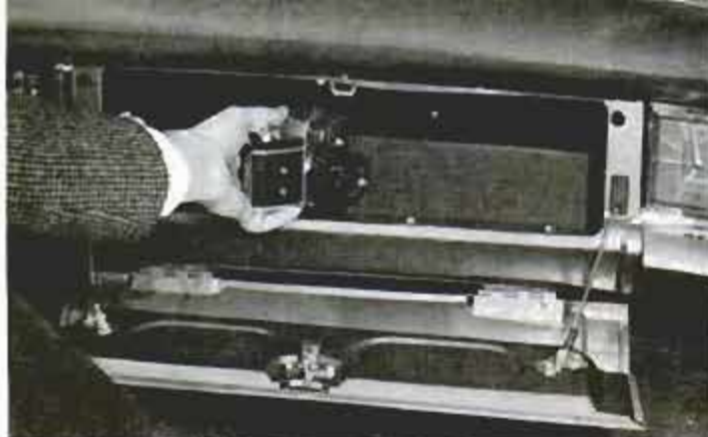
← Mercury solves the problem of space by "seeming" to be big inside. It appears to be roomy. By measurement has less room inside than many cars. The dashboard design contributes to the spacious feeling.

← PM's tests show that you can expect to get between 12 and 14 miles per gallon over-all on all but the economy Monterey which may get 15 or 16.

← The industry is working on this. I've seen a mirror mounted atop the roof and viewed through a plastic skylight over the driver's head. Another car had a periscope built into the roof. But production cars still use the same system we've had for 25 years.

Below, bars show percentages of owners and gas-mileage claims





Although the glovebox is very wide, it is shallow. It is fine for gloves, but won't hold more bulky objects



Mercury makes its trunk space more accessible by mounting the rarely used spare tire forward

We are now looking through glass mounted at a 45-degree angle. The flatter, the more vertical, the better you see. We've "progressed" a long way backwards here.

The dentist must have obstreperous kids! Wagons give them more room to fight in. Actually, wagons are less safe for small children than sedans—there's more room for the kids to be tossed around in, like a couple of eggs in a pail.

instead of one hour. The man that thought that up was just plain nuts."—Missouri sales manager.

"Tough job to keep sun out, even with visors down."—Rhode Island commercial fisherman.

"Replaced windshield twice due to cracks. No blow to windshield; it just cracks."—New Jersey physician.

### Advice to the Industry

In each survey, *PM* asks the owners to make one suggestion to the whole automobile industry, about something that is not applicable to their cars only. Here are some of the things Mercury owners suggest for the industry to consider:

"I need more economy, as the price of gas is increasing each year. When it costs about three cents a mile for gasoline then it is time for the manufacturer to get more mileage out of his engine."—Rhode Island owner.

"Why don't they make station wagons with glass between the front seat and the rest of the wagon, and with an additional heater in back?"—Michigan dentist.

"Cars and their motors have been my hobby for the past

(Continued to page 226)

## SUMMARY OF MERCURY OWNERS' OPINIONS:

Poor 2.9%

Excellent 71.8%

Average 25.3%

### Best-liked features

|                    |       |
|--------------------|-------|
| Handling ease      | 50.9% |
| Riding comfort     | 42.4% |
| Roominess          | 30.1% |
| Exterior styling   | 24.9% |
| Power, performance | 17.8% |
| Visibility         | 14.9% |
| Roadability        | 11.3% |

### Most-frequent complaints

|                          |       |
|--------------------------|-------|
| None at all              | 29.2% |
| Poor gas mileage         | 9.7%  |
| Rear-view mirror         | 8.7%  |
| Windshield size, shape   | 8.7%  |
| Inadequate leg, headroom | 5.5%  |
| Body squeaks, rattles    | 5.2%  |
| Radio location           | 5.2%  |

### Had trouble with engine?

|                      |       |
|----------------------|-------|
| No trouble at all    | 82.7% |
| Some trouble         | 16.0% |
| Considerable trouble | 1.3%  |

### What was engine trouble?

|                 |      |
|-----------------|------|
| Carburetor      | 3.5% |
| Automatic choke | 2.0% |
| Valves          | 2.0% |

### Best-liked styling feature

|                      |       |
|----------------------|-------|
| Long, low look       | 11.6% |
| Smooth, simple lines | 10.4% |
| Windshield           | 8.0%  |

### Least-liked styling feature

|            |      |
|------------|------|
| Windshield | 6.4% |
| Side trim  | 2.9% |
| Grille     | 2.6% |

### Have economy V8 engine?

|              |       |
|--------------|-------|
| Yes, have it | 48.2% |
| No, do not   | 43.7% |
| No answer    | 8.1%  |

### Of those with economy V8:

|                            |       |
|----------------------------|-------|
| Satisfied with economy     | 65.1% |
| Not satisfied with economy | 26.8% |
| No answer                  | 8.1%  |

### How is dealer service?

|           |       |
|-----------|-------|
| Excellent | 51.8% |
| Average   | 38.3% |
| Poor      | 9.9%  |

### Would buy from him again?

|                       |       |
|-----------------------|-------|
| Yes, would            | 81.2% |
| No, would not         | 12.6% |
| No answer, don't know | 6.2%  |

### What make was traded?

|                     |       |
|---------------------|-------|
| Mercury             | 51.1% |
| Other Ford make     | 16.2% |
| General Motors make | 16.8% |
| Chrysler Corp. make | 6.8%  |
| Other makes         | 2.3%  |
| No trade, no answer | 6.8%  |

### What make will buy next time?

|                       |       |
|-----------------------|-------|
| Another Mercury       | 58.2% |
| General Motors make   | 9.4%  |
| Other Ford make       | 4.9%  |
| Chrysler Corp. make   | 1.3%  |
| All others            | 3.2%  |
| No answer, don't know | 23.0% |

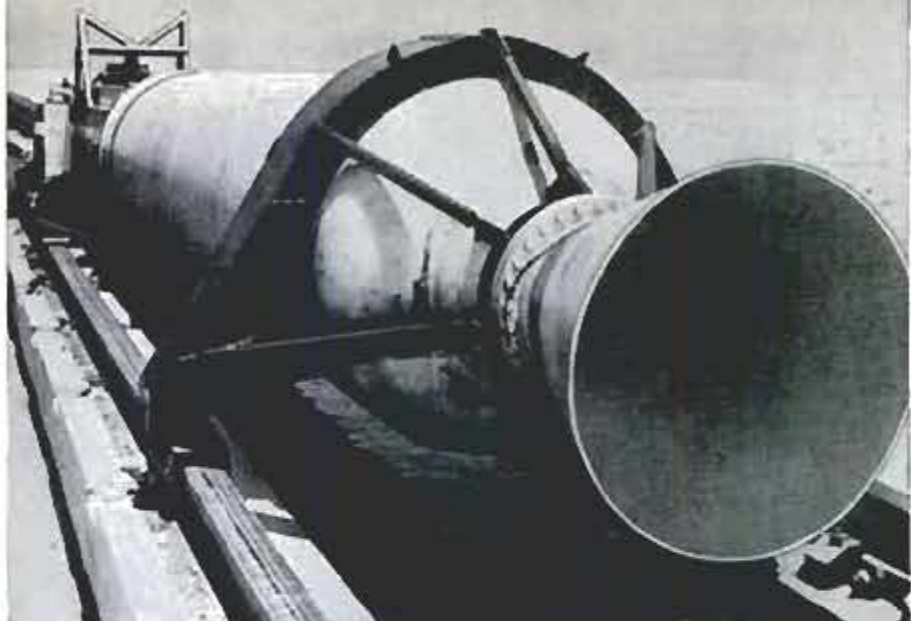
### One suggestion for industry?

|                            |       |
|----------------------------|-------|
| Better gas mileage         | 17.5% |
| Reduce horsepower          | 7.7%  |
| Make cars smaller          | 7.4%  |
| Simpler styling, less trim | 6.8%  |
| Make prices lower          | 6.4%  |
| Better workmanship         | 6.1%  |
| Make cars higher           | 5.5%  |



## Giant Rocket Propels Sled

Delivering a whopping 100,000 pounds of thrust for 10 seconds, a huge rocket motor hurls sleds down the new 35,000-foot test track at Holloman Air Force Base. The motor is 22 feet long, 38 inches in diameter and uses a solid propellant. It can propel a 2000-pound pay load down the track at speeds in excess of 1200 miles per hour.



## Wall Panel Controls Climate

One instrument panel for the home shows details of the weather outside and automatically controls the climate inside. The panel gives constant readings of the outdoor and the indoor temperature, barometric pressure and relative humidity; controls heating and air conditioning; operates fans automatically, and adjusts the temperature at preset times. The control center also flashes warning lights if filters are clogged or the oil burner fails to ignite.



## Who Does Dishes At His Home?

How long do soapsuds last? That's the scientific problem facing Daniel J. McHugh. In his scientific research, he washes mountains of dishes. McHugh works for Esso Research Center in Linden, N. J., where new soaps are developed from petroleum. In the laboratory are a good many expensive and precise measuring devices but no one has come up with a better method of testing soaps and detergents than the old-fashioned way of washing dishes by hand.





## Merchant Ship Is too Deep for Suez, too Wide for Panama

Largest merchant ship ever built in the United States, the 71,282-ton *Princess Sophie* has a full-load average speed of better than 17½ knots. The 859-foot tanker, queen of the Greek merchant marine, requires about half a mile for turning and a little less than two miles to crash stop from full speed. With a loaded draft of 44¼

feet, *Princess Sophie* is too deep for the Suez Canal and her 115-foot beam is too great for the Panama Canal. Scheduled to make six trips a year between the Persian Gulf and the U. S. West Coast with Middle East crude oil, the ship has private, air-conditioned staterooms for all crew members. She was built by Bethlehem Steel.



## Triggered Rod Holder Sets Hook Automatically

For anglers there's a new spring-action rod holder that sets the hook when the fish bites. The three-position trigger can be set for small, medium or large fish. The line is run through an eyelet on the holder. Any bite releases the trigger, and the rod snaps to a vertical position.

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It helps you and it helps the postman.*



Dolly wheels, which increase maneuverability ashore, serve as an efficient stern bumper when boat is afloat

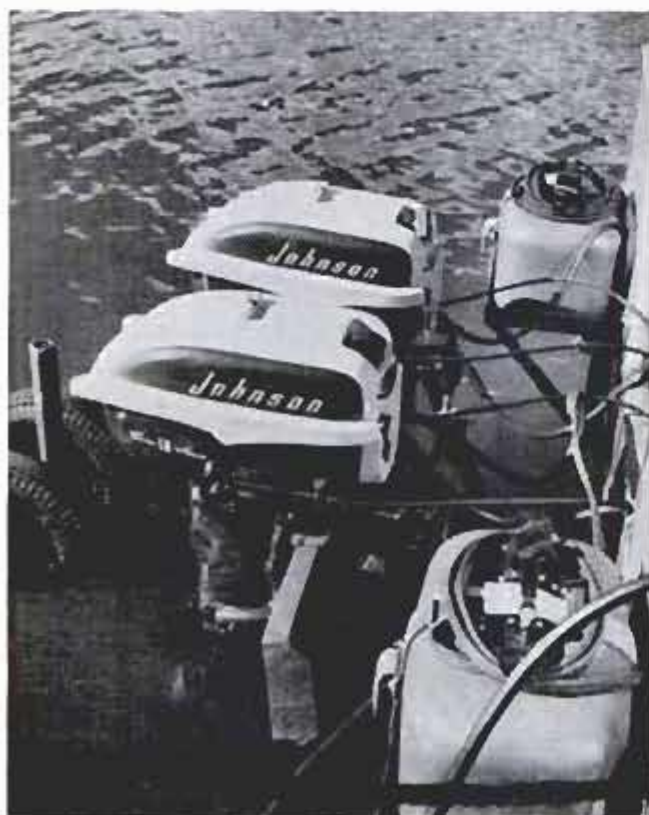
## Dolly Wheels Are Bumpers for Houseboat Motors

IT TOOK A lot of work, but Clark Harrison, of Mentor, Ohio, finally has his houseboat the way he wants it. Originally, the motors were hung directly on the transom and the fuel tanks stored inside the cockpit. But Harrison likes to conserve space inboard, so he now carries the motors and tanks outboard on stern racks.

Stern racks hold motors and tanks. Rods join motors and are linked to steering gear and wheel by cable

Other changes include a weld that keeps the tongue in a permanent trailing position, and a pair of wheels that can be raised or lowered with a pneumatic jack. On the highway, the boat seems to be going when it's really coming, because it trails backward. This protects the craft's twin outboard motors from bumps in traffic.

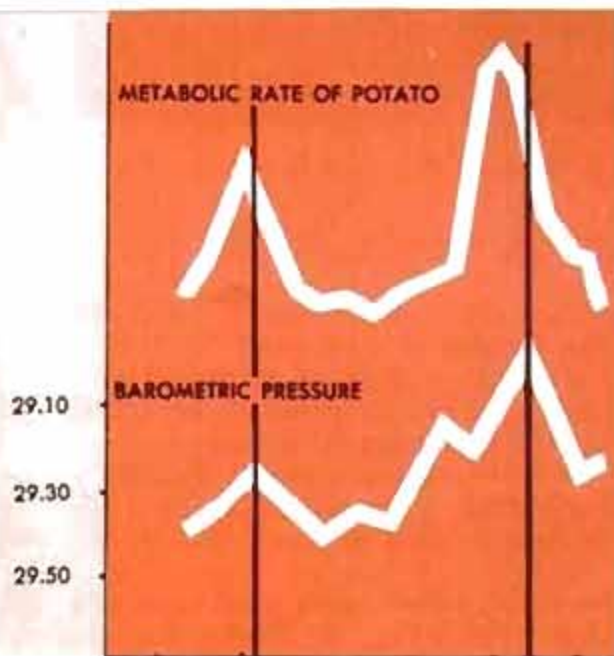
Gear train behind wheel transfers steering motions to knuckles taken from front end of junked car





## Potato in Flask Forecasts Weather

Pieces of potato sealed in glass flasks can predict barometric pressure changes two days in advance. They do it by exhibiting changes in their metabolism, studies at Northwestern University have found. The potatoes also "know" the outside temperature, even though sealed and under constant conditions of temperature, pressure and light. The flasks, with oxygen attached, are connected to a recording device, as shown above. This device gathers data on the potato's daily, monthly and annual cycles of metabolism. As shown on the graph, the potato's metabolic rates varied inversely with barometric changes and tended to anticipate the pressure changes—nobody knows why.



## Cushions for Garage Door Protect Paint on Fenders

Have you ever scraped your automobile while driving into the garage? Cushions of rubber composition attached to sideposts on the outside of the garage will protect the car's fenders from such damage. They are 30 inches long and can be affixed in a few minutes with a hammer and rustproof nails. The fender savers can be painted to match the garage color scheme.

## Fly-It-Yourself Tours Hedgehop Across Europe

Adventureseekers now can join a caravan of five Piper Tri-Pacer planes and hop across Europe on a novel three-week tour. Leaving New York via Air France (the tour's sponsor), junketeers pick up Tri-Pacers in Paris and head for off-the-beaten-track spots. Requirements for the trip include a pilot's license—and \$3000.

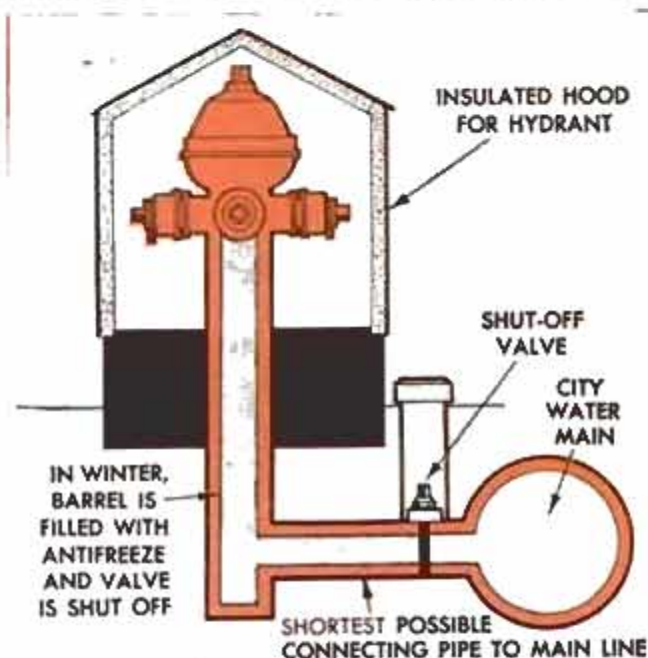
POPULAR MECHANICS





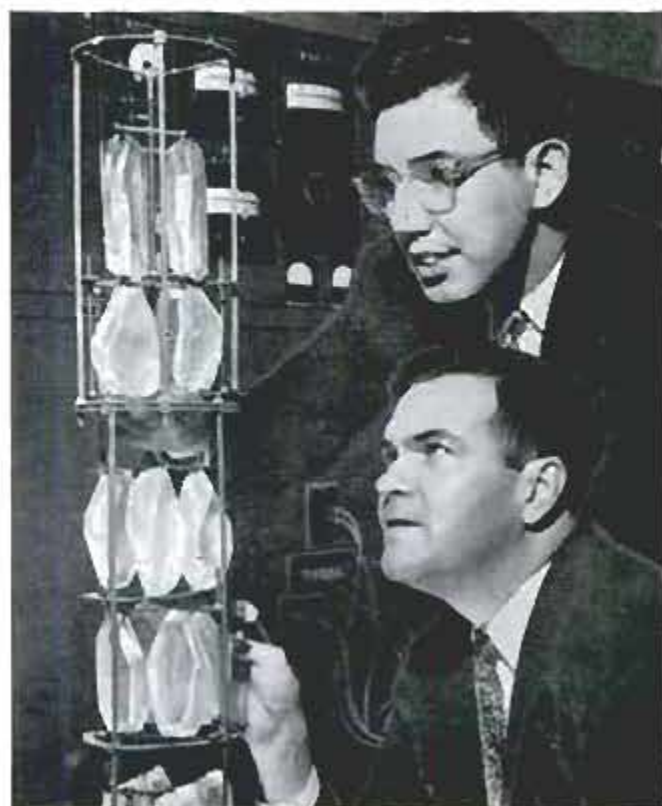
## Fire Hydrants in Fairbanks Wear "Overcoats" in Winter

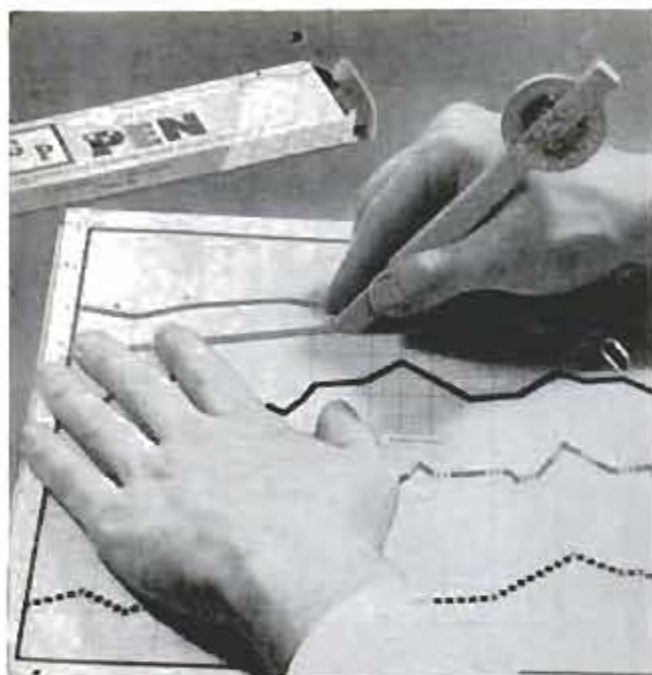
In Fairbanks, Alaska, where winter temperatures dip to 45 and 55 degrees below zero, fireplugs are equipped with insulating covers to protect them from icy winds and penetrating cold. In the above picture, the top of one of these covers has been removed and is shown at the right of the hydrant. The plug is isolated from the main line by a shutoff valve, and in winter the plug's barrel is pumped dry and filled with 12 to 15 gallons of alcohol. When the fire department attaches a hose, the valve is opened and water from the main line rushes in and carries the alcohol out with it. Plugs are installed near main lines.



## Big Quartz Crystals Grown From Seed

Large quartz crystals are being grown synthetically for use in electronic equipment. The system was developed by Bell Telephone Laboratories and now is in the pilot-plant stage. Natural quartz crystals come mainly from Brazil, and are becoming increasingly difficult to obtain. The new process has produced crystals up to six inches long. In the process, a vessel is filled with an alkaline solution, and small pieces of readily available natural quartz are placed in the bottom. Seed plates cut from natural crystal are suspended near the top of the vessel. The container then is heated, with a temperature differential from bottom to top. The nutrient dissolves in the hot lower region and is carried by convection to the top. There, the cooler temperature causes the solution to become supersaturated, and the dissolved quartz is deposited on the seed plates. Thus the crystal grows from the seed.





## Colored Tape Replaces Ink For Making Charts

When you have occasion to make a chart, do you find that—no matter how careful you are—your fingers often smear the ink lines you've drawn so painstakingly? If this is the case, you will welcome a new lightweight pen that makes lines with self-adhesive tape instead of ink. Handy for artists, draftsmen and office workers who have to make monthly charts, the pen can "tape down" its straight, curved or jagged lines faster than you could draw the same lines with pen and ink. It uses solid-color or patterned tapes. Colors available include black, red, green, blue, silver, gold, white, yellow, orange and orange-yellow. The pen has a built-in cutter and comes in two sizes to handle different tape widths.



## Chair Gives Massage While Executive Keeps Working

Executives now can be massaged without leaving their office chairs. All they have to do is drop an arm to one side of the chair's seat, open a small panel door and turn a dial. A cyclo-massage motor and a thermo element do the rest, relaxing the high-tensioned, high-powered executive with a three-way massage action (vertical, horizontal and circular). If it's fatigue that is bothering the executive, he turns the control to "high" and adds heat for a perk-up "rubdown." If he's taut and over-stimulated, the dial is moved to "low." This starts a calming, soothing action. The massaging unit makes it possible for a busy executive to continue his work, such as dictation, while the chair's cycloid action is relaxing his body. The unit is built into both a swivel chair and a regular desk chair. Both models are available in leather or Naugahyde covering. Colors include pine green, cedar, red, tan, sand, blue, gold, beige and brown.



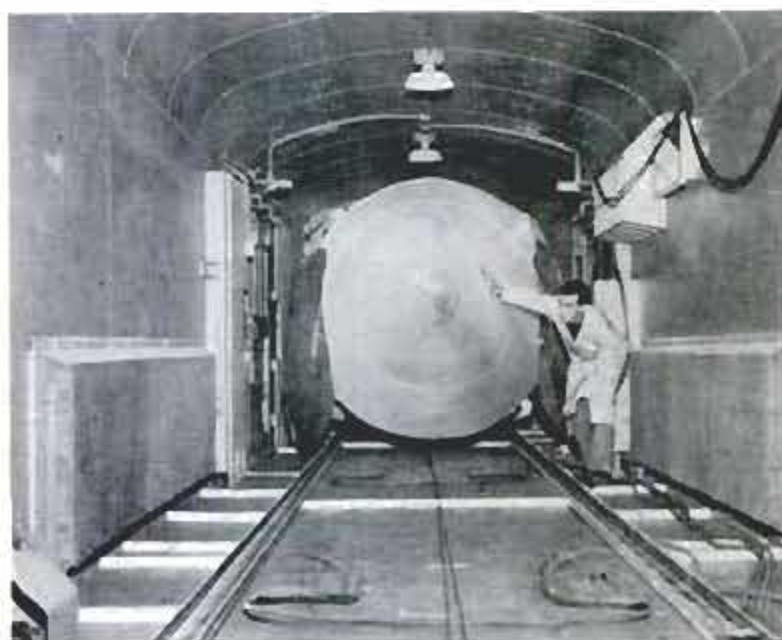
## Coin Counter Speeds Job - see letter And Makes Wrapping Easy

Sorting, counting and wrapping coins no longer need be a tedious job. You can buy a plastic counter that will do most of the work for you. The counter has channels that are calibrated for counting pennies, nickels, dimes and quarters. Each channel holds the number of coins that fit into bank-approved wrappers and tubes. When the required number of coins is reached, the wrappers are slid under, or tubes are slid over, the coins. This can be done without a snag. The counter is colored onyx, and the numbers are printed in black for easy reading.



## Missile Rides Rails On Pillows of Air

Supersonic missiles transported by the New York Central Railroad will ride on air. The NYC has developed a technique in which the missile is "floated" by rubber air-pillows that surround it. If the car should be jarred, the air absorbs the shock. The missile rides on temporary, removable tracks. When the missile is to be removed, the air pillows are deflated, allowing dolly wheels on the missile support-frame to come to rest on the tracks. A truck then hooks onto the missile and pulls it out of the car.



## Chair on Golf Cart Helps Player Relax

While waiting at the tee or green, a golfer can ease his tension by relaxing on a chair attached to his golf cart. The chair is folded flat against the bag when not in use. Strong but light, the chair is made of aluminum tubing, with a seat of birch plywood. The seat is padded and covered with water-resistant, stippled plastic. The chair can be adjusted to fit any golf cart on the market and can be attached in seconds with a screwdriver.

## Electric Shaver Is Adjustable

The latest model of one electric shaver has an adjustable feature by which the "roller combs" can be raised or lowered to suit the individual shaver's skin.



The Greene brothers don't have a monopoly on prizes as model-automobile builders but they came pretty close when . . .

# THEY MADE IT THREE STRAIGHT

By Howard E. Jackson

**J**OSEPH, THOMAS and Daniel Greene of Medina, Wash., are the top-ranking, award-winning, model-car building brothers in the United States. They have won more than \$12,250 in the Fisher Body Craftsman's Guild contest for model cars, sponsored by the Fisher Body Division of General Motors each year. (This year's contest, incidentally, closed June 5, and the winners will be announced July 28.)

The Greene brothers built these cars to get money for their college careers. Since all three brothers are winners of national-award scholarships they are no longer eligible for Guild competition. Here, for the first time, they tell how they developed and built their prize-winning models.

Joe, now 22, started competing in the Fisher Body contest in 1951, at the age of 14. Tom, now 20, began in 1953, and Dan, now 16, in 1956. Here is a summary of what they learned about building award-winning models and how they eliminated one major step in the construction of wood models. The brothers used many ingenious tricks to win their outstanding national awards: Joe's 4th-place \$2000 scholarship; Tom's 1st-place \$4000 scholarship; and Dan's 1st-place \$5000 scholarship.

Designing—drawing on paper—is the first major step in model-car making. The Greene brothers agree that there is no short cut here. They made at least 100 drawings apiece for each of those top-winning model cars. Their first designs were simple, their drawings crude, compared with later attempts, but they developed the feeling for drawing cars. First they made small drawings in pencil. Later they switched to full-size drawings not only in pencil but also in pastel chalk and Prisma color. They studied experimental-car pictures, showing futuristic designs by professional stylists, then strove to add original ideas of their own.

They made dozens upon dozens of drawings of fenders, taillights, hoods, grilles and bumpers, in addition to scores of front ends, sides, rear ends and entire car views.

"You've got to do serious drawings," they conclude. "Sketchy sketches are out, if you're after an award winner."

Working out the design in clay, just as professionals do, is the second major step.

The brothers feel that clay is wonderful to use along with design. By having a clay model you can change your drawings readily as you get new ideas. They often

Tom Greene, who won over \$4300 in prizes, chisels a fender line on one of his cars

Joe Greene demonstrates how he formed his \$2000 winner in clay for the 1956 contest. Finished model is shown on page 116

Photos by author







Left to right, Joe, Dan and Tom Greene have won over \$12,250 by their skill in designing, building models

went back and forth, from drawing to clay, clay to drawing, using one to improve the other, working with one when they tired of the other.

To save clay, they used a wooden form or "buck" made of wood blocks. This "buck" was mounted above a baseboard that had four bolts through it, with a nut locking each bolt. A second nut  $\frac{5}{8}$  inch above the baseboard is used to adjust the height of the clay model (ground clearance), and a third nut on the very top secures the buck.

They shaped the preheated modeling

clay with knife and fingers (no fancy tools), following the drawings or just working out new ideas as they went along.

They made both full clay models and half-models which they pressed against a mirror to get the effect of a full model. They took templates from the clay models when making the wood models.

The wood model was the next step. The Greenes' first wood models were made conventionally, using simple construction. These brothers used many types of material before they selected birch as the

Big winner was Dan's roadster which earned him a \$5000 scholarship plus \$900 in other prizes



**DAN: \$5000**



## JOE: \$2000

Joe, oldest of the trio, tried six years in a row before winning a \$2000 scholarship with this car in 1956

best wood for model-car making. They made models of balsa, alder, aluminum, plaster of paris and phenolic resin, but each had its drawbacks.

The first wood models they made from laminated blocks by drawing and cutting out accurate side-view cardboard patterns from the clay models, tracing the patterns on the sides of the wood blocks and sawing out the blocks.

After getting the rough shape along the sides and middle section of the wood models they did finer carving, working down the rough-cut block by means of chisel, wood file, knife and sandpaper.

They were guided during the carving by templates from the clay models. At first they used cardboard templates rubbed with colored crayon on the inside edges. When the crayoned templates were rubbed against the wood model, the crayon marked the high spots, which then were trimmed

down. But the brothers found that cardboard is too soft and frays when rubbed. Furthermore, it was hard to cut sharp corners in it. They solved the problem by making their templates out of acetate, which cuts, scores out and sandpapers readily. It can be cut into fine corners, crayon-marked, and does not fray.

However, in more recent years, the brothers used a simpler wood-construction method they developed themselves.

They cut off the long sides of the laminated blocks of birch wood on a table saw. Then they clamped the two sides together and cut them to shape by hand or on the bandsaw, thus forming identical top and side contours, fenders and wheel cutouts.

### "Must Use Good Wood"

Since the sides had been removed from the center section, it was easy to shape the hood and rear deck. There was no side interference. The bottom of the cockpit was left in. Since it was only  $\frac{1}{8}$  inch thick it had to be cut carefully. "You must use good wood to cut the cockpit bottom on a bandsaw," the boys say.

The sides were remounted on the center section by holding them in place, boring two small holes through front and rear fenders and center section, and inserting small dowels and gluing in place.

After that, woodworking tools were used to put the finishing touches on the models. The boys used Duratite surfacing putty to fill in any body flaws. Hood, trunk and door lines were cut into the wood models before painting, using a rat-tail file and French curve.

Now a graduate of the University of Washington, Joe polishes the car that helped make his college possible





**TOM: \$4000**

Tom won his scholarship with this car in 1955. It took him only three tries to win top honors in the national contest

The Greene brothers consider this three-section model construction method the best, especially for open-car models.

The Greenes' top three national award-winning cars were all open sports convertibles. Their next best was a hardtop sports car. Let's see how they made hardtops, which will also tell how they formed windshields, for both are made of Plexiglas, using similar methods.

#### Dust Is Problem

They first used acetate, but found it too stiff. So they switched to the thinnest Plexiglas they could buy. They had two problems: How to mold a heated sheet of Plexiglas into a transparent windshield or hardtop, and how to lick dust.

They first used carved and painted wooden molds. They cut the plastic sheet to dimensions larger than the windshield or hardtop, put it in the kitchen oven, heated it at 225 degrees until it was flexible. Wear-

ing gloves and holding the edges of the heated plastic sheet, they quickly placed it over the carved wooden form. They held it firmly until it cooled to its new shape, but they had trouble with pits and warping. They tried covering the wood forms with felt, but they still had the same trouble. The brothers next tried pouring mineral oil over the wooden mold and then shaping the heated plastic over it. This helped. Later they made an aluminum mold from their own pattern. With the aluminum form it was possible to shape compound curvatures of Plexiglas, pressing the heated sheets over the aluminum form as over the wooden form, and using crankcase oil in place of mineral oil simply because it was more reasonable. With the aluminum molds they did not need to worry about pits or warping. They sanded the large surfaces of the Plexiglas with 6/0 waterproof sandpaper, and polished with fine buffing

(Continued to page 234)

Here's what the front end of Dan's \$5000 winner looks like. The plastic windshield slides on and off over two pins that fit into the shiny metal trim. It took Dan, youngest of the brothers, only two tries to win top honors in the 1957 event





## Hydraulic Mower Attachment Cuts 45-Degree Slopes

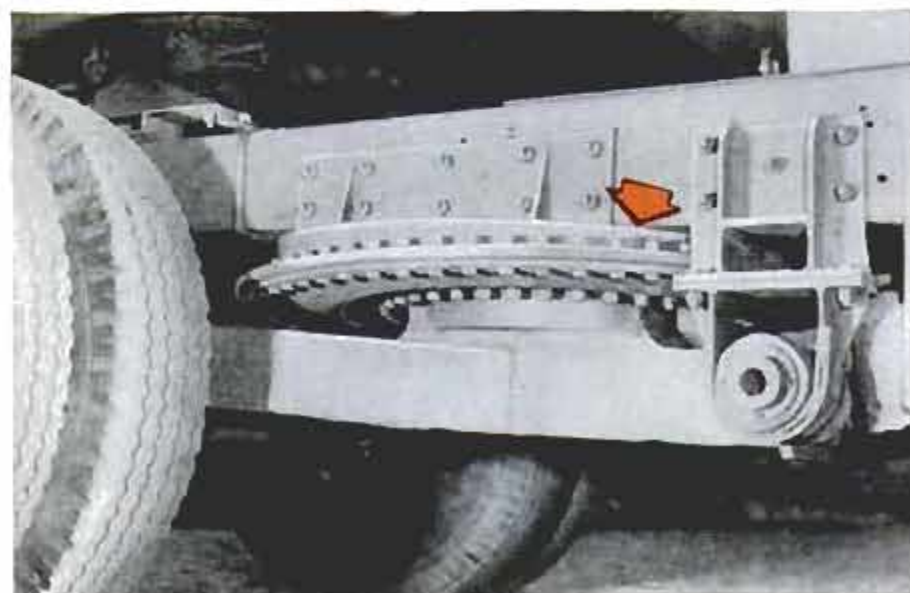
Highway banks with slopes 45 degrees below the horizontal, or up to 90 degrees above, can be trimmed by a new hydraulic mower. The cutter bar also can be raised from ground level to a cutting height of

15 inches without slowing down the knife action. The attachment has been used to trim the sides and tops of bushes and hedges. The cutter bar swings back and clear if it strikes any obstruction.



## Ingenious Seabees Create Sleek Boat

Ingenuity, the trademark of the Navy's Seabees, recently solved an off-duty problem for them. A Seabee detachment in Bermuda wanted a boat for after-hour recreation. They built seats into two aircraft-wing pontoons and welded a Morris Minor engine between the two "hulls." Now the sleek "boat" plies the blue waters off Bermuda each week end.



## Truck Air Ride Needs No Grease

Supporting loads of more than 48,000 pounds, a new type of truck air-suspension "springs" the weight on a central horizontal diaphragm. This diaphragm is made of a multi-ply material similar to that used in tires and is about 42 inches in diameter. It is inflated with 35 pounds of air per square inch. No torque arms are needed, thus no need for lubrication.



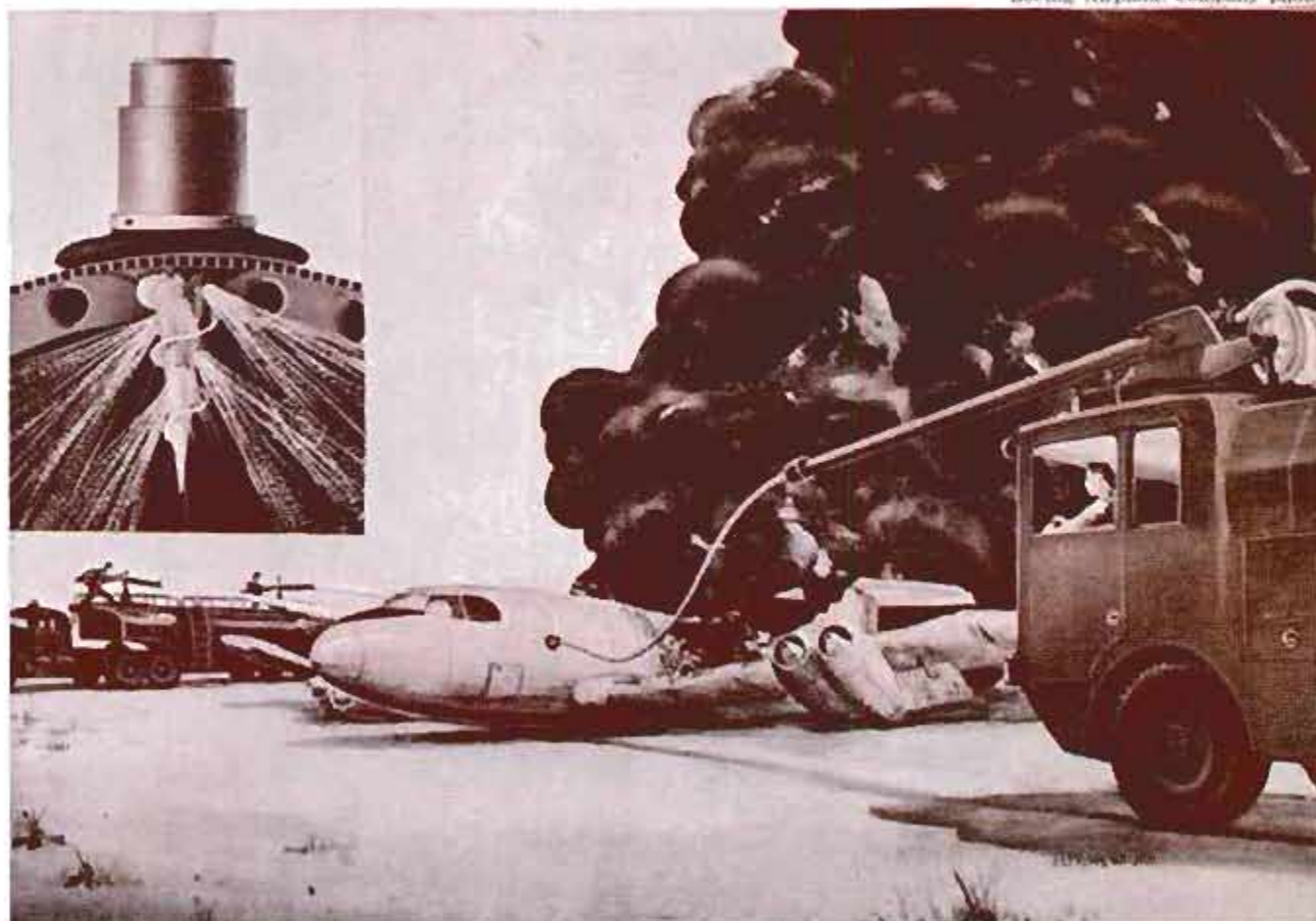
## Toboggan Takes to Snow or Water

They call it a "Combo-Boggan"—and with good reason: For winter sliding, this plywood-veneer toboggan has triple metal runners. In summer there's an interchangeable hardwood rudder for water fun. It has an aluminum railing and tapered edges with rustproof fittings.

## Truck "Harpoons" Fuselage of Burning Plane

When a grounded plane catches fire, an experimental fire truck can pierce its side with a giant "hypodermic needle" from a boom. This locks an auger (inset) on the plane, and the truck backs away to a safe distance, unreeling hose attached to the auger through the boom.

Boeing Airplane Company photo



# Camera and X Ray Team Up for

## PHANTOM PHOTOS

By Douglas C. Eaglesham, M.D.

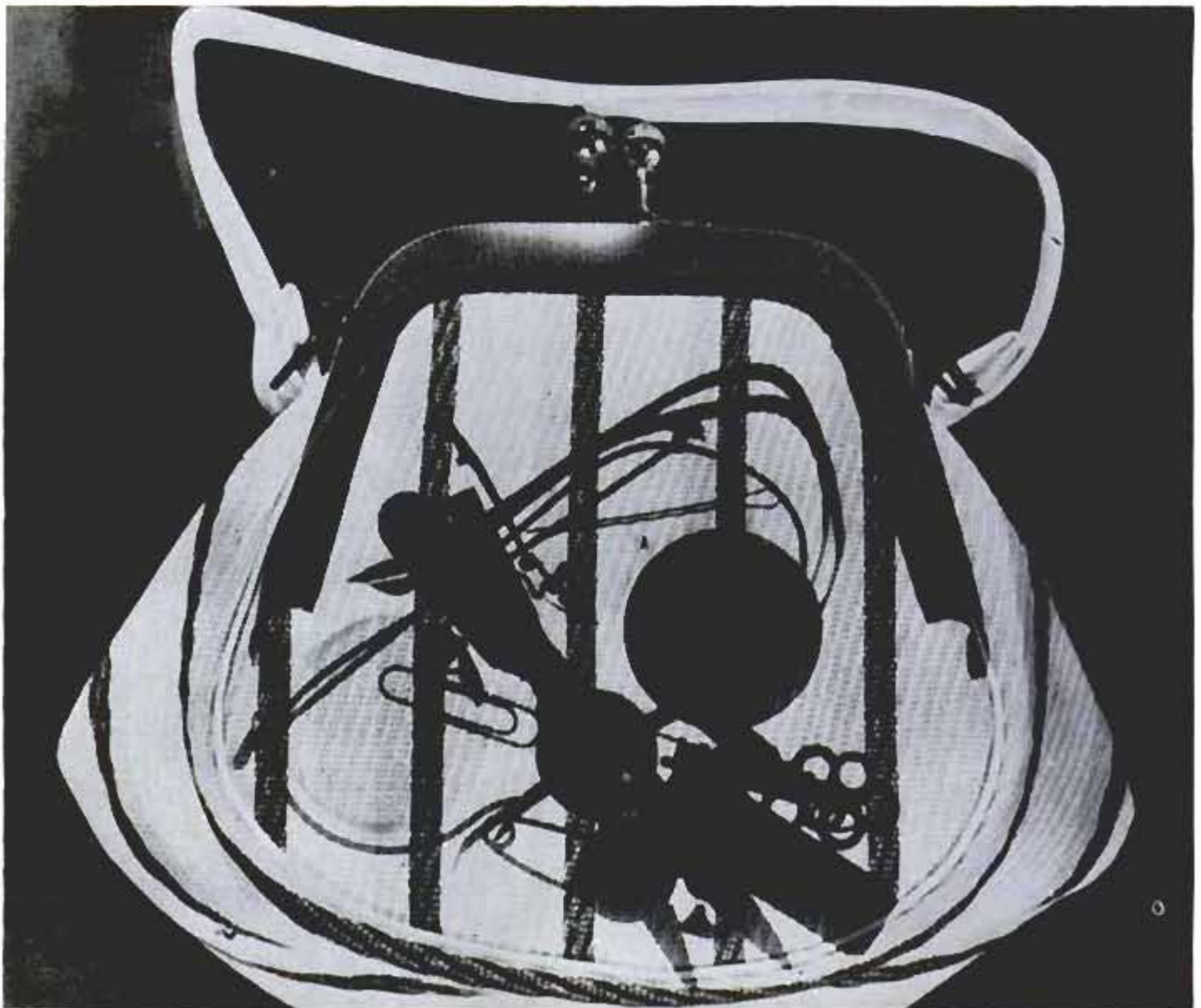
RADIOLOGIST, GUELPH GENERAL HOSPITAL, GUELPH, ONTARIO, CAN.

A PHOTOGRAPH shows surface details of opaque objects. A radiograph reveals structures hidden from the eye.

To combine the two—that was what I wanted to do when I was a student taking postgraduate work in radiology. My first

attempts at solving this interesting problem were made in 1938. They showed possibilities. It wasn't until 1954 that I was fully successful. That was when I designed the apparatus pictured on these pages, and coined the term "Composite Photoradiog-

Composite photoradiograph of woman's handbag includes paper clip, safety pin, keys, eyeglasses, nail file



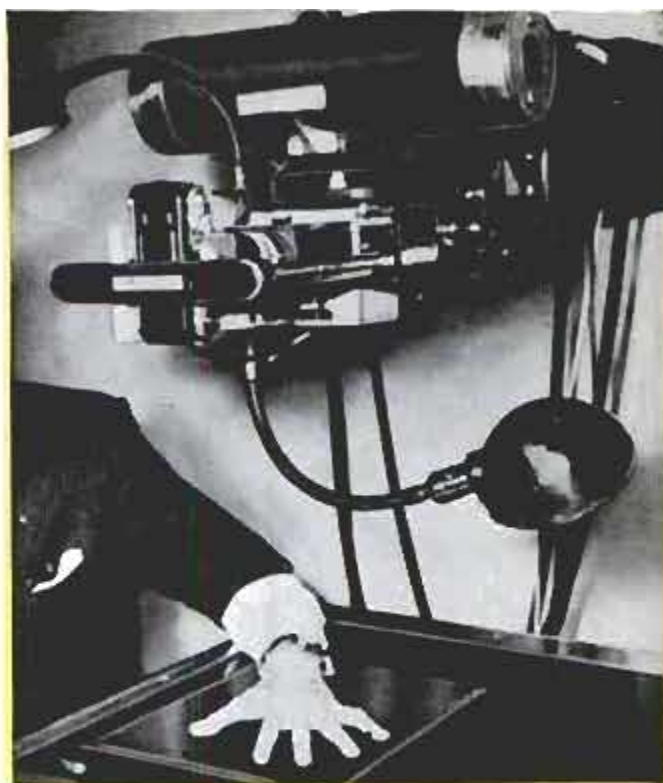
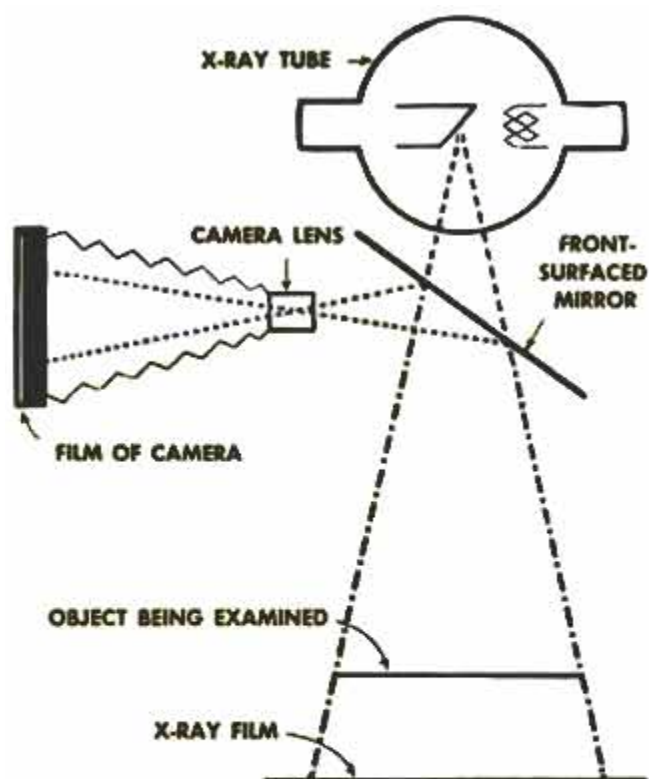


Diagram shows author's apparatus for composite photoradiography. Above right, camera and X-ray machine

raphy" to describe my new process.

My early attempts were unsatisfactory because simultaneous X rays and photographs could not be made to satisfy one prerequisite to accuracy: identical perspective in the two forms of the subject's image. Then I studied optical principles, and these studies led me to devise an attachment to a conventional X-ray diagnostic machine that has enabled me to take X-ray and photographic views simultaneously, in black and white or color.

Basically, the apparatus consists of a thick metal plate designed to hold a camera and a tunnel-like housing for a mirror—all of which is attached to the X-ray machine. The apparatus can be removed, but its presence does not interfere with the equipment's use in X-ray diagnosis.

The mirror is placed at a 45-degree angle to the X-ray beam and directs the light from the subject or object into the lens of a camera. This mirror offers little resistance to the passage of X rays, which pass through it and then through the object being examined, recording an X-ray image on X-ray film in a suitable holder. The camera and X-ray negatives are developed separately and later combined in the darkroom. The mirror is a front-surface one. An ordinary mirror gives rise to confusing double images by reflection from its front and back surfaces.

Two main conditions have to be satisfied

Here's a man's hand when photoradiographed. Black and white, color and stereoscopic views can be made

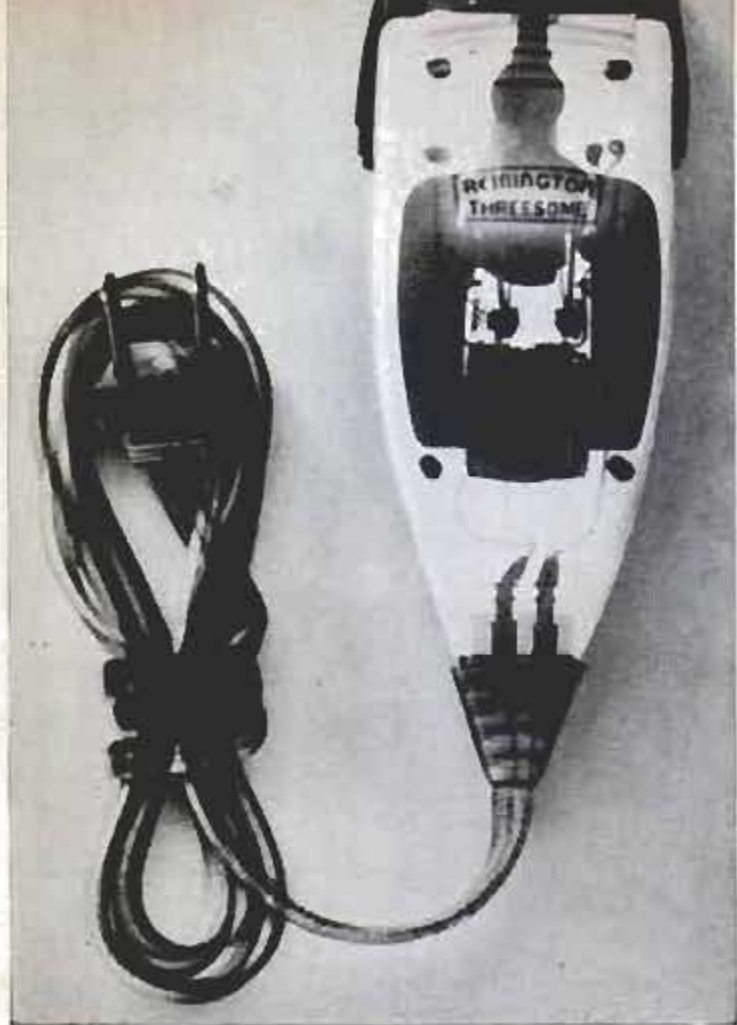




Photoradiograph profile of a woman's face shows bony structures, teeth, nasal sinuses and soft tissues

to make a correct composite photoradiograph: The photographic image must match the radiographic image in size and in perspective. The first condition is met by enlarging the photographic negative image to a size matching the X-ray image. This can be done by having two or more registration marks recorded on each image. Small, lead-foil disks cut out with a paper punch

This composite photoradiograph shows man's arm when bent. Author's first experiment was in 1938



Inner structure of electric shaver is shown in composite print made from radiographic transparency

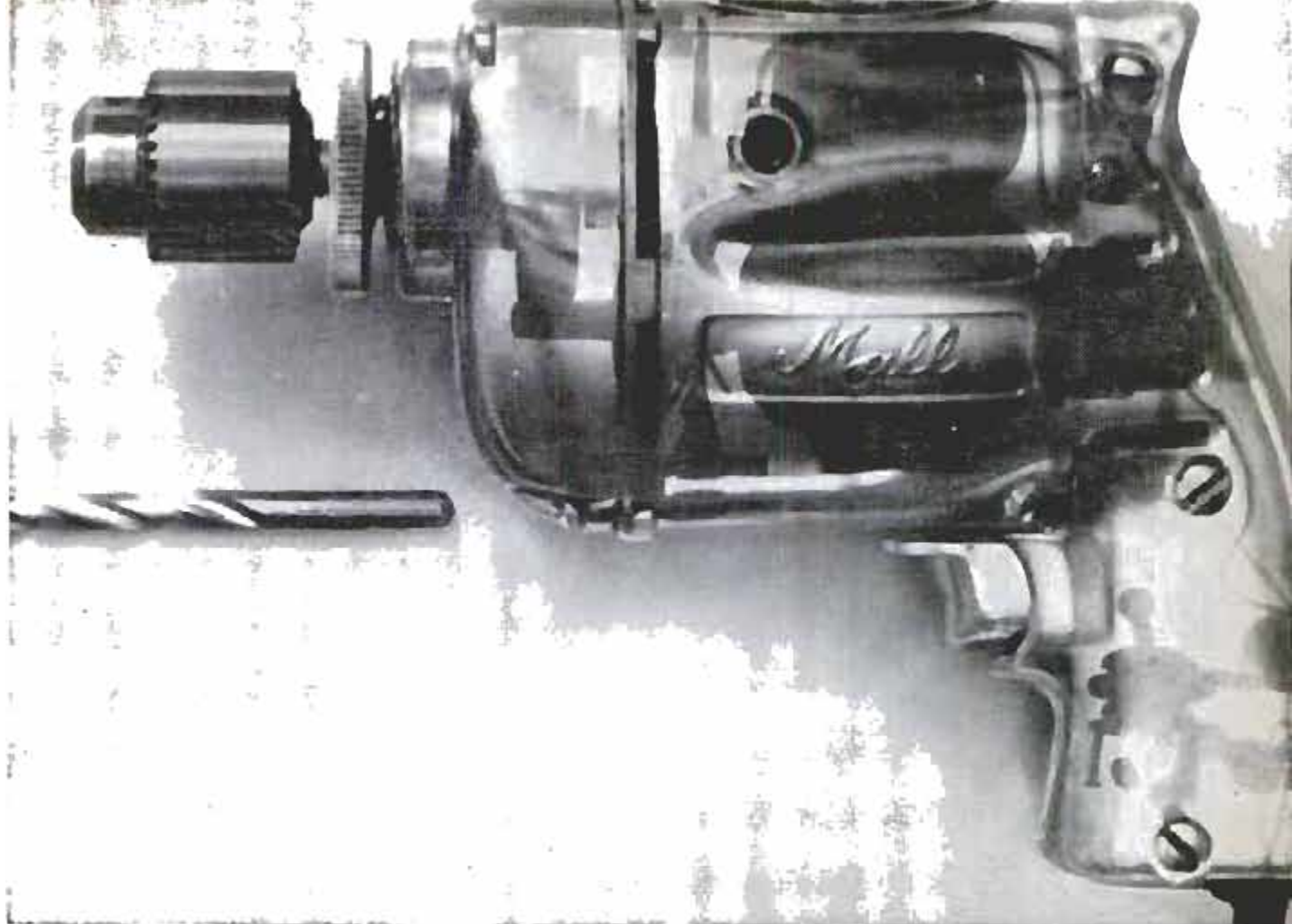
serve this purpose very well, for they are recorded clearly in the photograph, and by their opacity, in the radiograph also. The second condition is met by the construction of the apparatus.

The camera lens is so placed, in relationship to the mirror, that it "sees" the object optically in the same way that the X-ray tube does. This is assured when one makes

Inner parts of alarm clock black out the hands in this photoradiograph, but all the numbers are visible







Study of electric drill shows accuracy in getting identical perspective in X-ray and photographic images

the distance from the front nodal point of the lens the same distance from the mirror as is the target of X rays in the X-ray tube. Information on the position of this nodal point for a particular lens may be obtained from the lensmaker or computed by methods described in books on photography.

A separate device to collimate the X ray and light beams may be used in making the apparatus, but is not necessary if care is taken in constructing it.

The camera may be any size, provided the aforementioned requirements are met. When working at the usual distances of 36 to 40 inches for medical radiography, lenses with a focal length of 2 to 6 inches will be satisfactory. A preferred camera would be one with ground-glass focusing such as in a studio copying camera or a single-lens reflex camera. Twin-lens reflex cameras introduce a parallax error at short distances that makes them unsuited to this purpose.

If the camera has fixed-lens components, focusing is best accomplished by removing the camera back while the lens is fixed in its proper position. Many of the studio-type cameras have arrangements for back-focusing.

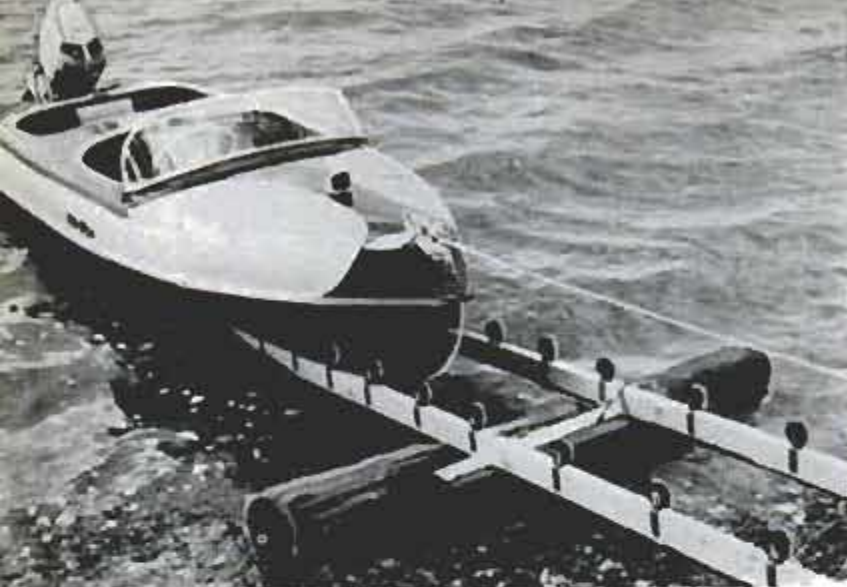
If improvising is necessary, the lens can be fixed in position with a retaining clamp, and the body of the camera can be slid backward or forward in a slot in the

frame of the apparatus. Some cameras are focused by separating the lens elements and, in these, the camera base can be fixed permanently in one position.

(Continued to page 230)

Telephone's make-up is brought out. Process has many applications in medical and commercial fields





## Ramp for Small Boats Built From Kit

Servicing and dry-docking a boat is made easier by a new boat ramp that comes in a kit. A series of wheels on the ramp allows the boat to be rolled up onto shore, either to be serviced or dry-docked. The kit contains wheels and all necessary hardware to make the ramp. Lumber must be supplied. A 14-pound electric winch is available for use with the ramp.



## Level on Putter "Reads" Slope of Green

Golfers who find it hard to tell if the green is level or if it rises or dips can now put an end to their guesswork. A new instrument can be attached and adjusted to the shaft of the putting iron. The golfer then can read the level in the attachment to tell if the green is downhill, uphill or level. The instrument is placed at a right angle to the path the ball must take to reach the cup.

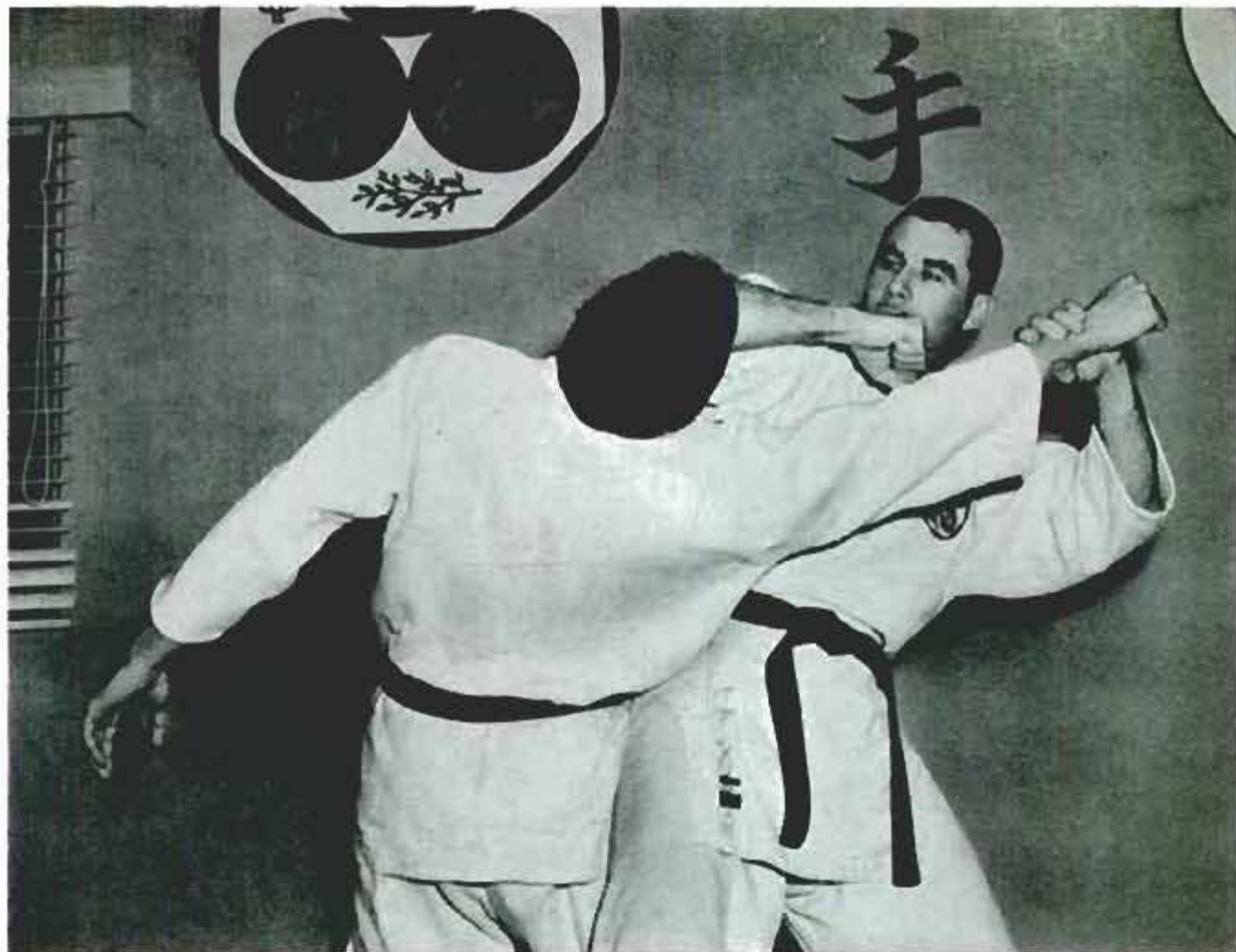
## Experiments Prove Animals Can Live on Mars

Russia's experiments high in the Himalaya Mountains may hold a key to Soviet plans for putting a man on Mars. The experiments prove that animals can live on Mars, says Lloyd Motz, associate professor of astronomy at Columbia University. Reports are that the Himalayan laboratory reproduces conditions believed to exist on that planet.



## Machine Quizzes Student, Then Shows Answer

Hamilton College in New York is testing a method that lets students learn from a machine. The pupil puts in a film strip that presents a question on a screen. He writes his answer on a tape in a second window. After turning a crank, the correct answer appears on the screen. If he is wrong, he can correct his error before proceeding. The machine helps teach students logic, mathematics as well as psychology.



Beneath the karate symbol, Trias demonstrates a lightning-fast elbow blow to stop an assailant in his tracks

# Karate--"Gentle" Art of Self-Defense

By Henry F. Unger

**I**NSIDE A SMALL building in Phoenix, Ariz., students are taught to use one of the most potent of all weapons—the human hand.

Passers-by invariably are startled to hear loud shouts and pounding on walls. If they walked inside they would see enthusiastic students practicing the *kiai*, or yell, which is part of the science of karate (perhaps the most deadly of all forms of self-defense). This is the Arizona Institute of Karate Judo, operated by Bob Trias. It is the only karate school in the nation which is officially connected with the famed Japan Karate Association in Tokyo.

Trias, a lieutenant in the Arizona State Highway Patrol, has taught this unique art of self-defense to such diverse citizens as

a Supreme Court Justice, narcotics agents, a Treasury man, police officers, highway patrolmen, bankers, draftsmen and teachers.

In his *dojo*, or exercise hall, Trias and his instructors put their students through an intensive two-month course (15 instruction periods) that prepares them for hand-to-hand combat with any aggressor.

Before Trias imparts any knowledge to a new batch of students, he emphasizes the lethal nature of karate.

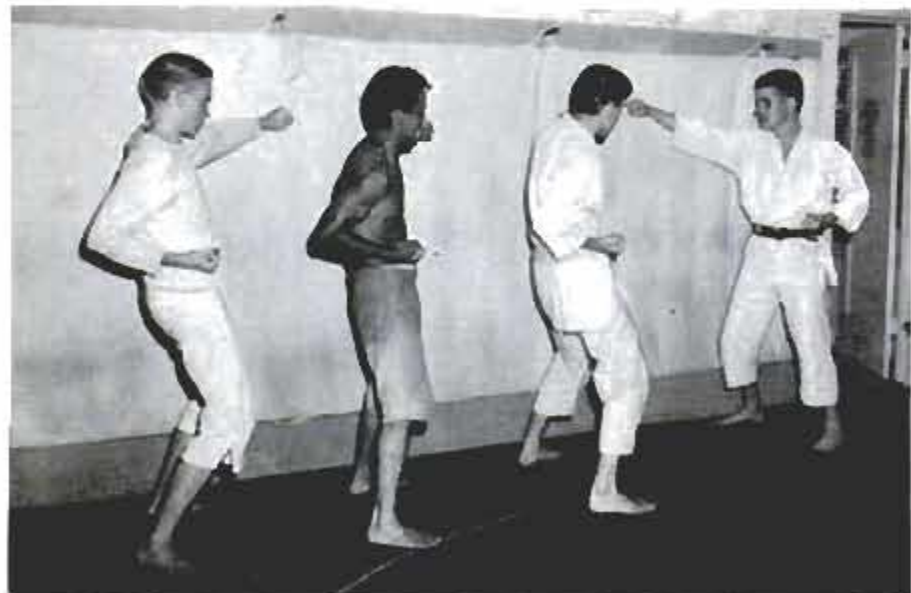
"I insist," he says, "that all karate students avoid fights. They should walk away, using any means available to sidestep a fight. Karate must be used only as a final self-defense measure. As such, it is a potent weapon indeed."



Two karate experts tangle. One tries a fast leg thrust which the other parries with a hand chop. Note position of hands, always ready for a blow



Feet are strengthened and hardened by practice blows against a 400-pound bag. Below, recruits spend long periods smashing hands against canvas, yelling at each blow. Yell is considered essential to karate blows



The science of karate, according to Trias, is about 5000 years old. It was originated by the great Prince Daruma, who, aware of the physical weakness of his tribesmen, sought a new means of developing their bodies. He introduced karate with its distinctive use of hands and feet to conquer an opponent. The system later was perfected in Okinawa. During the invasion of that island by the Japanese, in 1652, the Okinawans used their karate with such lethal efficiency that the Japanese adopted it, referring to it as the "hand sword." Today, karate has grown to mean "empty hand," referring to the use of only hands and feet as weapons.

To an outsider, karate combines some strange elements. No student can become proficient, says Trias, unless he masters the art of breathing from deep in his lower stomach. The combination of the *kiai*, or releasing of air from the lungs, with the lashing out of an arm or leg makes a perfect rhythm with the heartbeat and produces maximum efficiency. The loud shout is considered very important to karate.

Before the student can acquire top karate skill, Trias feels, he must have three assets: speed, know-how and endurance. These elements, together with surprise, can slow down, disable or fell an aggressor every time.

#### Deep Breathing

Beginners at the school are first taught the art of deep breathing. This is followed by basic instruction in blocking, chopping and kicking. The remaining instruction consists of variations on this quartet of basic skills.



Wooden blocking arm is used to teach a student how to ward off assailant's blows with speed and accuracy

For 15 minutes at each practice session, students toughen their hands by thrusting them into boxes of rice. After four sessions they switch to boxes of beans. As their hands become tougher, students advance to boxes of sand, then gravel.

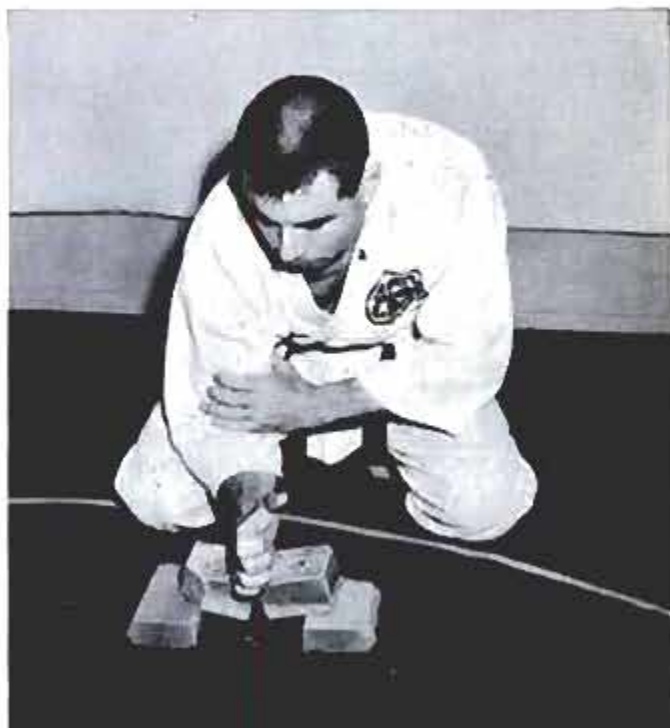
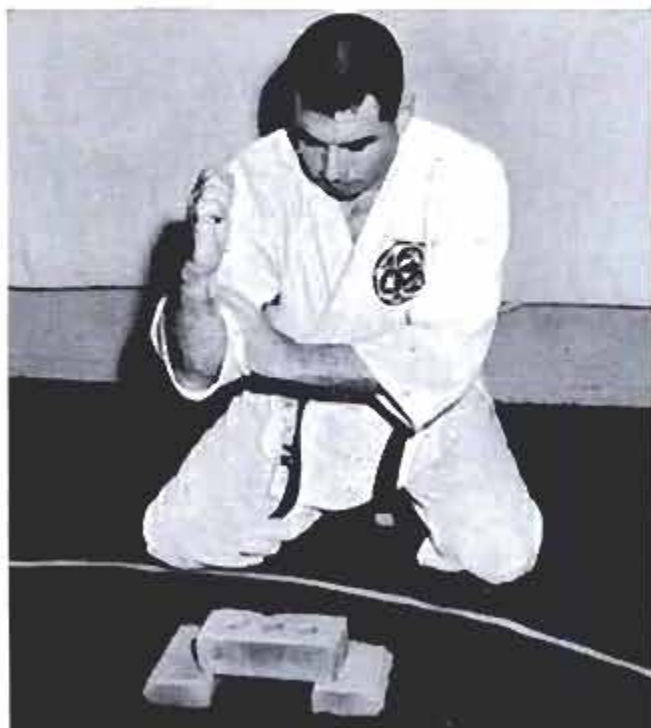
During this period the students also practice the chop by striking at canvas-covered pockets of rice, beans, sand and

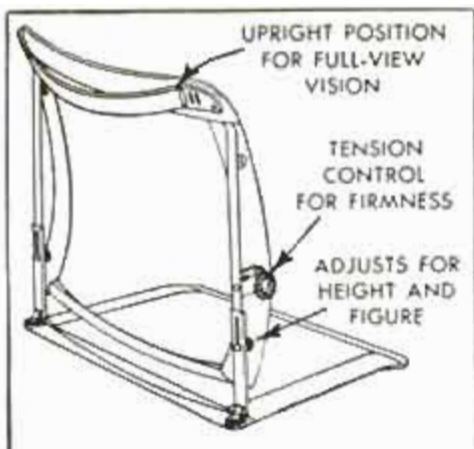
gravel. Then, in the comparatively small exercise hall with its oriental karate symbols on the wall, students further toughen their hands and feet by chopping at a 400-pound bag, shouting loudly at each blow.

Students learn the vulnerable parts of the body—the top and front of the skull, the larynx, solar plexus, groin, spinal

(Continued to page 216)

Trias is one of few Americans who can break a full-size building brick with one stroke of his hardened hand





## Adjustable Backrest

If the driver's seat of your car doesn't give your body the proper support, you can adjust a new backrest to fit your individual height and figure. Two knobs modify the "sitting height," a third knob controls the firmness and curve of the support, and a collar at the top adjusts to the axis of the driver's spine. Constructed of glass-fiber mesh on an alloy-steel frame, the device also gives the driver a better view of the road because the lifting effect raises the eye level as much as two inches.

☐ Silicone compound wiped onto electrical-line insulators may protect them up to three years, preventing fires.

## Supersonic Whip Tip

First man to break the sound barrier, according to *The Journal of the Acoustical Society of America*, was the first man to crack a whip. Physicists using bullwhips and high-speed cameras proved that the crack of a whip occurs, not because leather slaps leather, but when the tip of the whip moves at a speed of 1400 feet per second.

## "Chemical Hoe" Aids Corn Growth

Simazin, a new chemical weed killer for corn fields, has been tested successfully by the Department of Agriculture and the University of California. When sprayed on the soil, the "chemical hoe" reportedly kills all seeds of annual grasses and broad-leaved weeds without affecting the yield or quality of the corn.

## You Dial Your Order For Postage Stamps

Dial-equipped vending machines are dispensing stamps in some post offices. The customer inserts nickels, dimes or quarters in the machine and turns a dial for the number of three-cent, four-cent or airmail stamps he wants. The vending machine returns any change due the buyer and some models say "thank you" from a recording.



"thank you" from a

## Gauge on Furnace Warns of Clogged Filter

You can tell when to change the filter on your furnace or air conditioner by watching a gauge fastened to the unit. It accurately measures the vacuum in the blower compartment. As the filter becomes clogged, a ball on the gauge indicates that a new filter should be installed. The filter gauge is made of plastic.



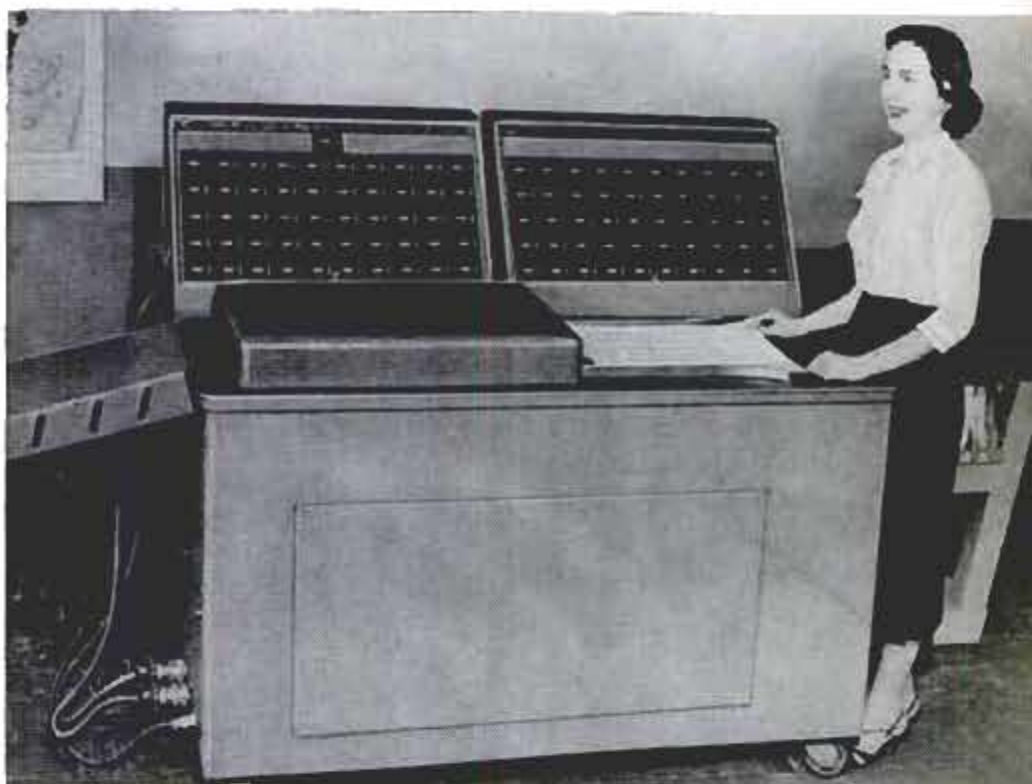
## Hotel Atop Airport To Be Soundproof

Though jet planes may zoom all around it, a hotel being built atop Miami International Airport's terminal building will be an oasis of peace and quiet. The 256-room hotel will have triple windows, a double-hung roof and sound-filtering air conditioning. Each window will consist of a sloping double-glazed Thermo-pane outer window and a vertical inner pane. An airspace between deadens sound.



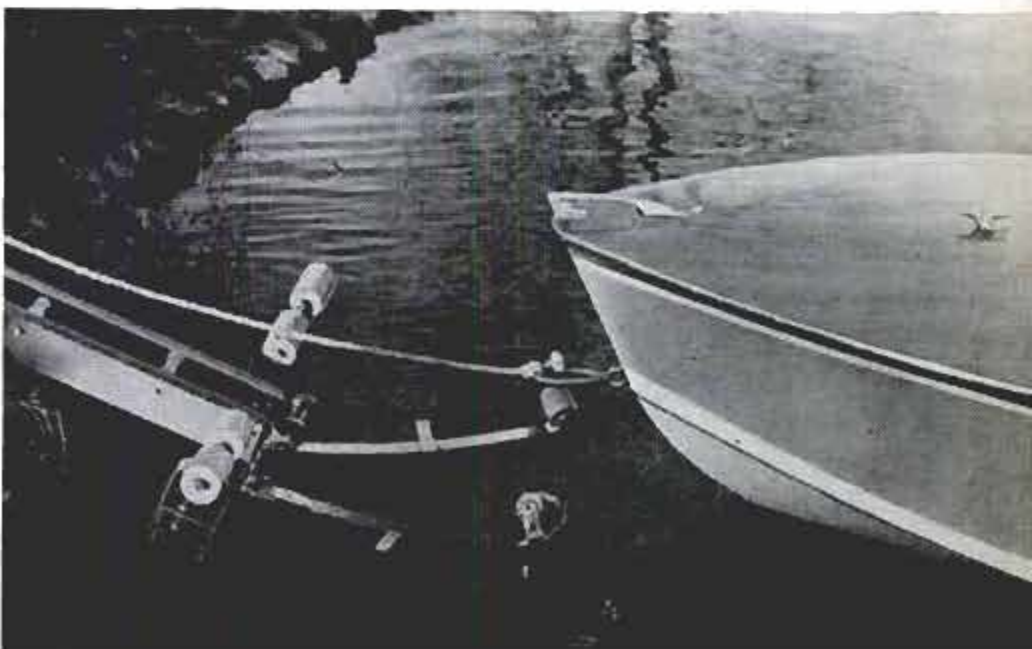
## Machine Counts Votes per Second

Several thousand ballots an hour can be tabulated by a machine that replaces 125 clerks. As ballots come in from the precincts they are fed into the machine at the rate of one per second. The machine records the votes instantly and registers them on two panels at the back of the machine. Each panel can accommodate up to 150 different candidates or political issues. The ballots are marked by the voter with an ink stamp provided in the booths. The system is said to reduce voting costs 67 percent and eliminate inaccuracies in counting.



## Arms Guide Boat Onto Trailer

Boat-loading problems caused by choppy water and wind are eased by flexible arms attached to the end of a trailer. The arms swing out into the water and guide the bow of the boat. At the end of each arm is a rubber roller. As the bow touches the rollers, winching swings the boat into alignment.





Suspect (posed by model) is interrogated at scene of a robbery. Later his reactions will be studied on screen

# Seattle Police Take a Tip From Hollywood

By Rafe Gibbs

Officer Segar and Sergeant Corr team up to provide Seattle Police Department with top-notch "crime" and safety movies



THE TELEPHOTO LENS of a motion-picture camera poked over the window sill of a hotel in Renton, Wash., an industrial town fringing Seattle. Manning the camera, Officer Howard Segar of the Seattle Police Department focused on a broad-shouldered man walking out of another hotel.

The man strode briskly to the street corner. The whirring camera followed every step. A bus slowed, stopped. The man hopped aboard.

Segar turned to a fellow officer in the hotel room.

"This should prove our case," he said.

The man who had walked so easily—and unknowingly—before the police camera limped into civil court



several days later. About a month earlier, he had started suit against the Seattle Police Department for damages, claiming he had been beaten by the police and his leg had been injured, causing the limp.

He had a record as a brawler, and the police said he had not been beaten, but merely stopped from fighting. However, the man did limp.

Office Segar showed in court the movie of the bus-catching scene. The defense attorney objected. But Segar had a witness to the filming. The court ruled in favor of the Seattle police.

The department had found another use for motion pictures—this time in its own defense.

The motion-picture camera, which became a great tool for entertainment two generations ago, is now becoming a great tool in police work. Seattle's police department can turn out 15-minute sound movies in color for \$50. And Seattle's lawmen are not the only ones grinding out low-cost films of police value.

At the 1958 New Year's Day Mummer's parade in Philadelphia, for instance, that city's police had three motion-picture cameras trained on the 12,000 marchers—and the hundreds of thousands of spectators. The cameras were checking on police efficiency, traffic and pedestrian conditions, and trying to find out whether juvenile

gangs, pickpockets and other undesirables were present.

Traffic violations were becoming a serious problem in Las Vegas, Nev., so Municipal Judge Walter J. Richards had a camera-equipped car take motion pictures of violations without the offenders knowing they were being photographed. There was no arguing with this camera. Inventor Frank Abell of Inglewood, Calif., had rigged the camera to photograph a calendar, chronograph and speedometer synchronized with the car speedometer, as well as the scene in front of the car.

### Movie "Party" in Court

The traffic violators were invited by Judge Richards to a motion-picture "party" in court. The startled citizens had little to say, but the judge had plenty. He dismissed the minor offenders, and accepted pleas of guilty from speeders, reckless drivers and light jumpers.

In a hotel room at Miami, Fla., two police officers "shook down" a graying bookie named Ben Moscovitz \$50 a week for protection. They were arrested with the case against them neatly wrapped up in motion-picture film. Moscovitz was really a special crime investigator. In his hotel room was a one-way mirror. A police camera set up in the next room could "shoot" right through it. To make the film complete with

Police shoot scene for an educational movie on the perils of jaywalking. The jaywalker? He's a policeman, too





Officer taps power supply in rear of station wagon. Narrator sits inside wagon to eliminate street noises

sound, the dead telephone in Moscovitz's room held a live microphone. Even the calendar on the wall had special significance, for three dates were marked for the camera—the dates when visits were made in the shakedown. The bills used in the pay-off were marked, too. Oddly enough, the men who got the money didn't wonder why the hotel was so generous with electricity. The room was lighted with a 300-watt bulb.

Seattle's police department, headed by Chief H. J. Lawrence, utilizes its crew of movie experts for tracking criminals on film, but it is also attracting national attention in police circles for turning out its own movies on security and safety. The department has produced such films as:

"Walking Yourself to Death." This drama shows what happens when a pedestrian glances at the near traffic lane, sees out of the corner of his eye that it is clear, starts

Segar has devised his own hum minimizer and sound-level control system for the special police films



across the street, and is hit by a car in the center lane, a lane he had ignored. It shows how the big gamble—jaywalking—doubles the chances of being run over.

"Halloween Make-up for Safety." This one is for children—and parents. It shows how youngsters can have fun putting on theatrical make-up instead of masks that slip and impair vision, creating a safety hazard.

Commented Sergeant Gene Corr, who heads the moviemaking unit:

"We can buy ready-made films along these lines for showing at schools or meetings of various groups, and over local TV station, but the response is not nearly as great as when we make our own. When we show what happens to a careless pedestrian on Pine Street all the Seattle people in the audience know that street. They also know the same thing can happen to them if they're careless.

#### Hometown Actors

"Or take that movie about make-up versus masks. The kids watching it don't miss a beat because all the actors are Seattle youngsters. Outside Seattle, the movie might be a flop. But here it's a big hit. And that's what we're interested in—our own people."

Added Jack Porter, assistant chief of police who keeps a special eye on the moviemaking:

"Motion pictures don't need to be expensive—just good. We don't have a heavy moviemaking budget—just a heavy responsibility."

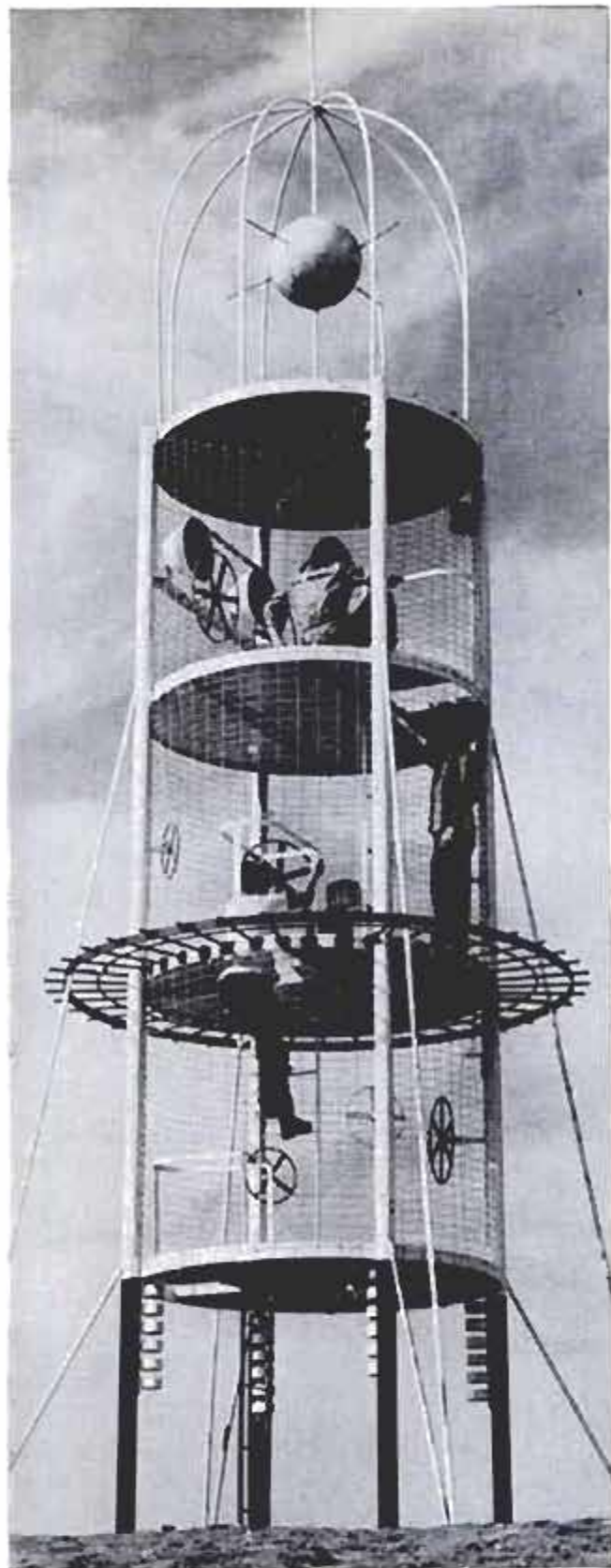
The policeman who has the biggest load in carrying out that responsibility, and who does it with ingenious makeshift touches, is Officer Segar. He has been on the Seattle force for nine years, and has done his share of walking a beat, but he greatly prefers filming one.

He started making his own movies when he was 10 years old with a secondhand camera he bought for \$2.50. Using neighborhood kids as actors, he turned out horseless Westerns. Later, with his father, he shot about 30,000 feet of Northwest wildlife scenes. For 10 years, before turning to police work, he managed Seattle's Roxy Theater.

Now Officer Segar does everything. He writes the script, does the filming, directing, developing and projecting.

Segar has rigged up a station wagon for making sound movies. A six-volt line is connected to the car's battery, and the line's plug is installed in the rear floor deck near the tailgate. This makes it easy to operate the sound equipment from the rear of the wagon.

(Continued to page 210)



### **Playground Rocket Ship Has Three-Story Cages**

When the Kiwanis Club of Ontario, Calif., wanted to add a piece of playground equipment to a local park, they proved they were in tune with the times by installing a 40-foot "rocket." Designed by John Svenson, a sculptor, the rocket has three "stages" or platforms. Each stage is actually a cage to prevent the youngsters from falling out on their make-believe trip to the moon.

JULY 1959



### **TV Tower in Tokyo Tops Eiffel by 118 Feet**

Tokyo now has a tower that's higher than the famous Eiffel Tower of Paris. It's the 1092-foot Tokyo Tower, owned by the Nippon Television City Company. Shown above, fully illuminated against the night sky, the Tokyo Tower stands 118.25 feet higher than the French structure. Open to the public, the tower has become one of the most popular sight-seeing spots in the Japanese capital.

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# Armor for Your Legs



Wearing aluminum leggings as safeguard against snakes, Florida hunters unleash dogs on night bobcat hunt

By Max Hunn

**S**UITS OF ARMOR have been obsolete in warfare for centuries, but aluminum leg-armor is the sportsman's latest protection against deadly snakes, stinging sea

denizens and the brush and brambles of the outdoors.

Because Alvie Twiss, who loves to hunt, had just one too many brushes with rattlers, he's now in the unique leg-armor manufacturing business after years at a cobbler's bench in Arcadia, Fla.

After a close call with a rattler one evening, Alvie decided to design a snake-proof legging. Thirty-seven models later, he succeeded in creating aluminum leggings that are lightweight, won't become water-soaked and are almost indestructible.

## Variety of Users

Today he's turning out thousands for a wide variety of users. Hunters, naturally, were the first to adopt the new leggings. Then came fresh-water fishermen, fearful of water moccasins when fishing from banks of streams and lakes, and salt-water anglers, who wanted protection against



At left, inventor Alvie Twiss shows freshly cut and stitched legging. Finished product is in other hand

sting rays and other annoyances when surf-fishing.

The men who fight the brambles, bushes and fallen underbrush in the citrus-grove and timber country soon placed orders for the leggings, as did grove workers, surveyors, timber cruisers and oil explorers.

A pair of Alvie Twiss' antisnake leggings weighs just two pounds. Tubular, they cover the leg from the instep to just above the knee cap and are equipped with leather tuck-loops that quickly lock the legging along the side, or in back.

#### "Makes" Own Machines

Making the leggings was a continual struggle to solve unexpected problems. There was no machinery for his special needs. He needed a binder for his sewing machine, but he was told no binder could be made to do the job he wanted. So he modified his machine to do the task—to the manufacturer's engineers' mystification.

When he needed an electric saw to cut from underneath, he licked this problem by inverting a small, portable electric handsaw. The rough edge of standard rivets irritated him, because he wanted a smooth head both inside and outside of his legging. He met this problem by modifying his riveting machine to handle a double-headed rivet—something else he couldn't persuade a manufacturer to do.

When he needed something to provide a permanent bend for the upper part of his legging, he invented a curving device that looked like a pair of handles from a post-hole digger. On completing this he realized that a post-hole digger's blades would do the job, so he sawed off the handles of his digger.

Alvie has an assembly line that enables him to turn out several hundred pairs of leggings a day. He needs the mass-production technique. One timber company alone



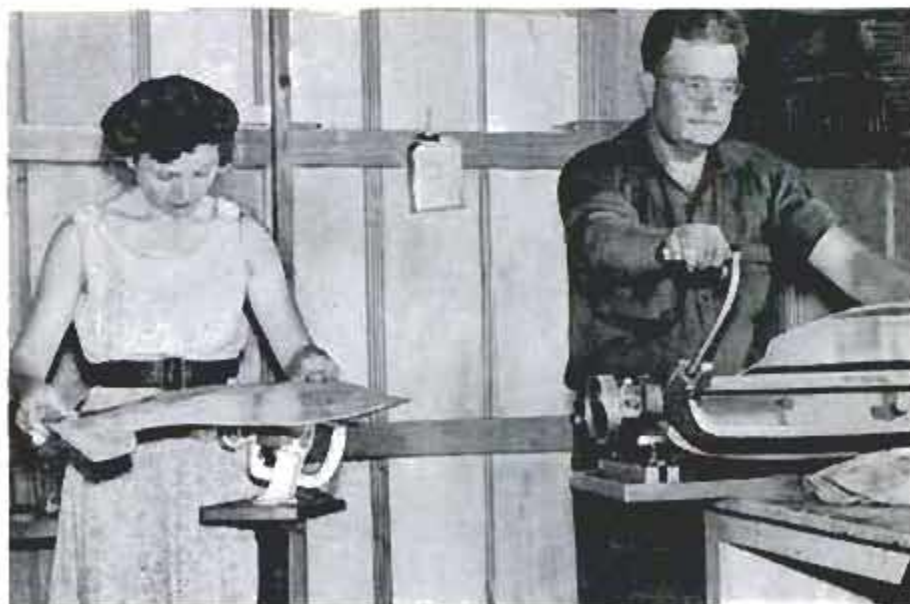
Leggings do not impede walking movements. Twiss can turn out several hundred pairs of leggings daily

gave him a whopping order for 500 pairs.

Twiss never has been struck by a snake while wearing his leggings, but he knows of persons who have. A doctor out hunting was hit by a rattler after he and his dogs stepped on the snake, but the leggings saved him.

Another man was struck by a rattler while wearing a borrowed pair of Twiss-made leggings. He never returned the leggings. Instead he bought a new pair for the owner and kept the borrowed lifesavers for himself. ★ ★ ★

When pressed for help, Twiss can call on his wife, who is able to do any of the operations connected with making the aluminum leggings. Here they team up for two production-line jobs



## Diver Takes Lunch To Porpoise Pals

In the Miami Seaquarium, a diver descends at regular times each day with a basket of food for the hungry porpoises. The porpoises are fed four times every day, as are the moray eels, loggerhead turtles, sharks, sea bass and other specimens living in the three-story main tank. The mammoth tank holds 550,000 gallons of water.

## Prefabs Set Record

Factory-packaged prefab houses mushroomed to the tune of 110,080 units throughout the country last year—nearly one fifth more than sprouted in 1957.

## Hey, Detroit! Look at Poland

In Poland, a brand-new automobile may cost the equivalent of seven years' wages, so one frustrated owner of a junk car solved his transportation woes by attaching it to a one-horsepower open shay. Other hurdles that face motorists in Poland are the high expense of gas and the scarcity of new engines and spare parts.

## Pipemobile Lifts 68-Ton Section

Meet the Pipemobile. It was invented by the American Pipe and Construction Co., South Gate, Calif., to lift, haul and set 68-ton concrete-pipe sections in one operation. Riding on earthmover tires, the machine places about 15 joints a day. It has four wheels at the rear, two in front. The machine crawls part way into a section, picks it up and waddles it to position.



## In Tune With TV . . .

DESPITE the inroads made by high fidelity and stereo, television remains by far the number-one medium for home entertainment. To make sure it stays that way, engineers in TV and related fields are constantly developing new ideas well-calculated to keep you in front of your TV set for an ever-increasing number of hours.

One approach toward this goal is RCA's "hear see" tape player shown in Fig. A. The device, still in advanced stages of laboratory development, would supplement the motion-picture camera and film in many broadcast and home applications. With it, you would be able to reproduce high-quality tape-recorded pictures and sound through your standard TV receiver.

"Greater realism" is Motorola's approach to television of the future. In a recent demonstration, company officials unveiled a laboratory receiver, Fig. B, complete with two speakers and capable of—you guessed it—stereophonic sound reproduction. Though technical aspects of stereo TV have been resolved, home equipment of this type is still several years away—pending FCC approval, public demand and station compliance.

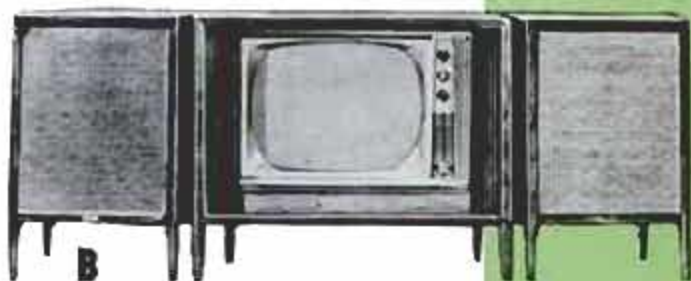
On the broadcast end, both commercial and military television will be aided by G-E's newly announced TV camera capable of literally seeing in the dark. Photos in Fig. C show pretty Louise Estes being televised with the new tube. Upper monitor photo shows picture taken under normal lighting—lower one taken in total darkness.

An entirely new look in TV receivers, plus vastly improved picture quality, may soon become evident as a result of a new picture-tube development announced independently by two major glass companies. The new tubes will have a contoured safety glass bonded directly to the tube face, Fig. D, eliminating the separate safety glass now standard on all receivers. Photos in Fig. E show the difference.

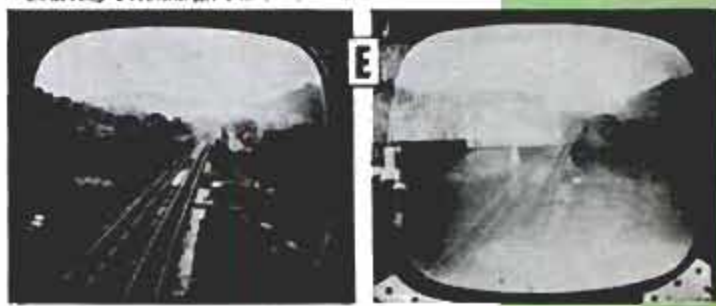
Courtesy Corning Glass Works



## Radio Television Electronics



Courtesy Pittsburgh Plate Glass Co



# TV Extension Speaker

By Dan Tomasek



Concealed in pole-lamp "bullet," speaker permits personal TV listening without headphone discomforts



Adapter plug, speaker and grille-cloth assembly replace light bulb. Friction holds parts in place

LOOKING FOR a convenient place to conceal a speaker for "private" TV listening? If you're among the thousands of pole-lamp owners, there's a ready-made enclosure in any of the bullet-type lamp shades.

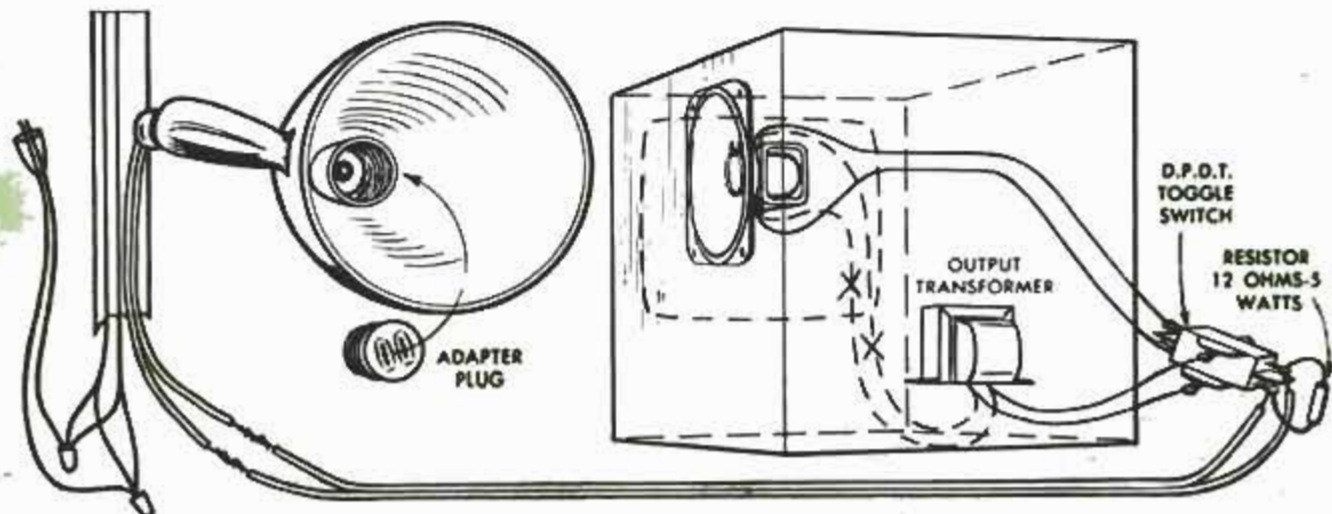
The simple installation eliminates headphone fatigue while still permitting individual, low-level listening which does not disturb others in the room. And, if your lamp has individually switched "bullets," you can cut out undesirable commercials without getting up from your easy chair.

**Here's how:** (See schematic) Pole lamps are made with a length of lamp cord leading from each bullet to a master switch, or to a junction with the line cord in the base of the lamp. The first step is to locate the wires leading to the bullet in which the speaker is to be installed, and to disconnect these from the switch or junction. By disconnecting one pair of wires at a time and then plugging the line cord into a wall socket, you can quickly determine which is the correct pair. Splice an additional length of lamp cord, long enough to reach the TV set, to these wires. Cover each splice with insulating tape.

Inside the receiver, you'll have to make a minor modification. Locate the speaker and note that there is a wire from the output transformer to each of the two speaker lugs. Unsolder these wires from the speaker and solder them instead to the two center lugs of a *d.p.d.t. toggle switch* which you

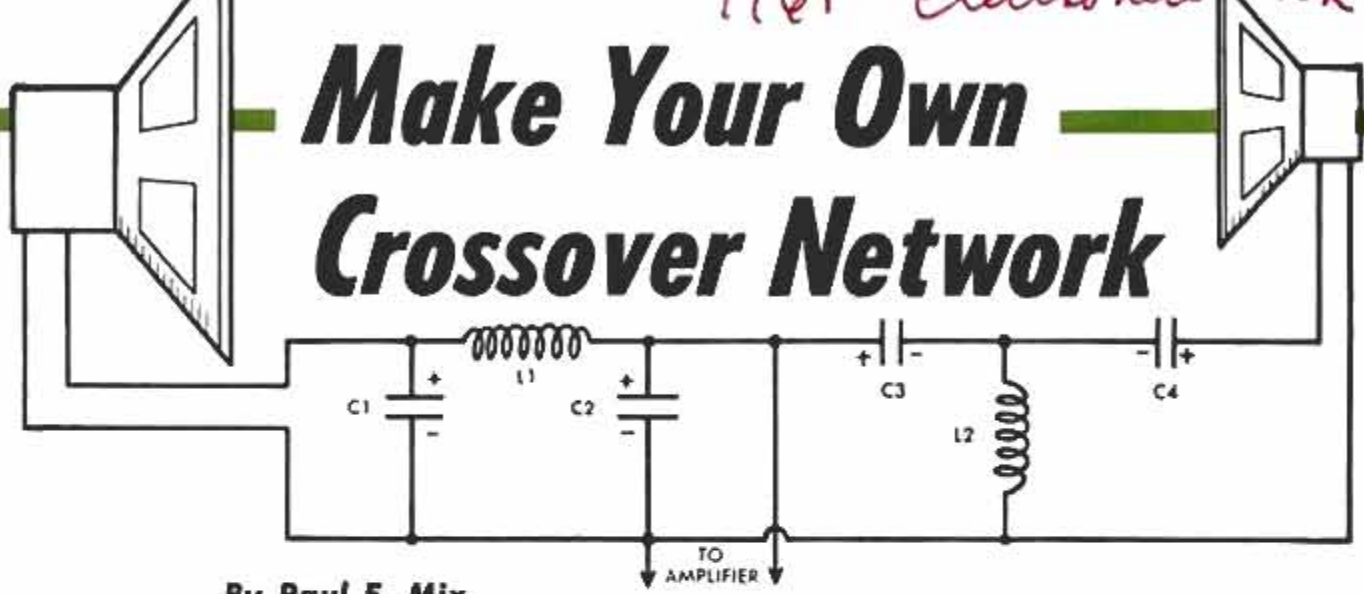
(Continued to page 218)

Schematic diagram of wiring changes. Switch at right switches sound from set speaker to extension unit





# Make Your Own Crossover Network



By Paul E. Mix

**I**F YOU'RE LOOKING for ways to improve the sound of your music system, take a critical look at your loudspeaker. Even if the other components are not of high-fidelity quality, chances are that the greatest improvement in sound can be obtained by concentrating on this portion of your radio, TV set or phonograph.

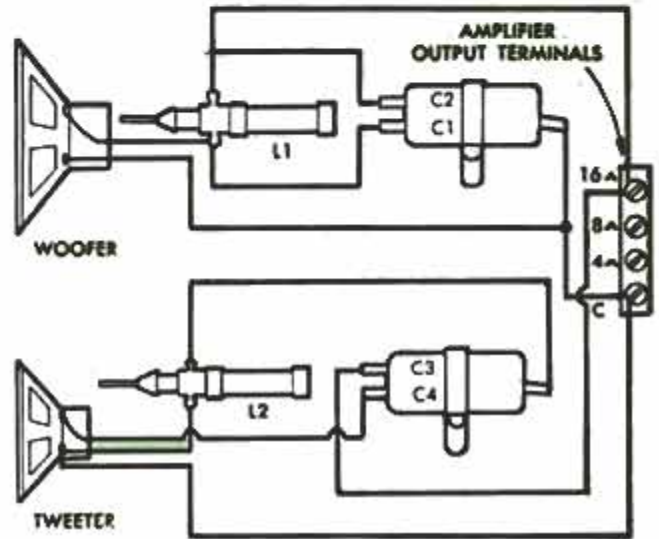
Single speakers, except for a few expensive hi-fi units, just aren't capable of reproducing the range of frequencies inherent in speech and music. The larger ones may adequately reproduce bass tones, but they can't handle the high frequencies which give brilliance and sparkle to music and a high degree of intelligibility to speech. Small speakers produce little or no sound at the low frequencies which provide the basic timbre of music.

Obviously, the solution rests in using two speakers, a large one (8 to 15-in. dia.) and a small one (3 to 5-in. dia.), each intended to reproduce a specific frequency range. And that's where the crossover network comes in.

The network is essentially a filter which divides the audio-frequency spectrum into two (or more) bands, sending each band to the particular speaker best equipped to reproduce it. In doing this, it must keep the low frequencies out of the high-frequency speaker (called tweeter) and the high frequencies out of the low-frequency reproducer (called woofer). Otherwise, the frequencies at opposite ends of the spectrum would interact, giving rise to a serious form of distortion.

The network shown here consists of two constant-impedance (Z) bandpass filters which do an excellent job of frequency separation. What's more, it is made of inexpensive parts which are available from most radio-parts dealers. Its characteristics, as compared with those of a particular commercial L/C filter, show a steeper

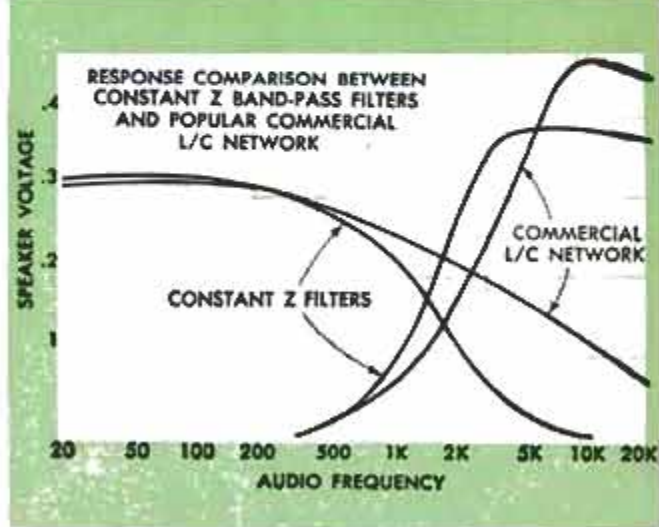
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**TABLE OF COMPONENT PARTS**

|       | SPEAKER VOICE-COIL IMPEDANCE |                            |                           |
|-------|------------------------------|----------------------------|---------------------------|
|       | 3-4 OHMS                     | 8 OHMS                     | 16 OHMS                   |
| L1*   | 0.64 mh.<br>Coil No. 6195    | 1.28 mh.<br>Coil No. 6199B | 2.56 mh.<br>Coil No. 6318 |
| L2*   | 0.16 mh.<br>Coil No. 6196    | 0.32 mh.<br>Coil No. 6195  | 0.64 mh.<br>Coil No. 6195 |
| C1-C2 | 20-20 mfd.,<br>25wv.         | 10-10 mfd.,<br>50 wv.      | 5-5 mfd.,<br>25wv.        |
| C3-C4 | 20-20 mfd.,<br>25wv.         | 10-10 mfd.,<br>50 wv.      | 5-5 mfd.,<br>25wv.        |

\* All coils are TV linearity or width controls made by J. W. Miller and available through leading radio-parts distributors.



# new products

## For Kit Builders & Experimenters . . .

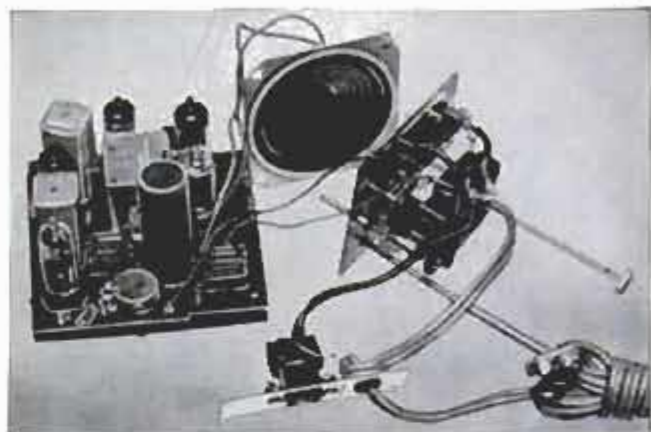
MANUFACTURERS of electronic kits have long prided themselves on their ability to produce products and instructions which permit anyone, even a rank beginner, to successfully build complicated electronic projects. The professionally styled clock-radio in Fig. A fully substantiates these assertions.

Circuitwise, the receiver is a time-tested, 5-tube superheterodyne, with a deluxe G.E. Telechron clock-timer which provides just about every function desirable in such a device. But the big feature of the kit is its construction ease—due primarily to the factory-preassembled *modules* used here, for the first time, in a popular-type kit.

The modules, which contain all of the small resistors and capacitors, merely plug into a printed-circuit board, along with other relatively large parts, ready for soldering to the printed foil. The only actual wiring you need to do is to the speaker and clock mechanism, as shown in Fig. B. The whole job shouldn't take more than a couple of hours and, if you follow the instructions, you literally can't make a mistake. If you can handle a soldering iron, here's a radio you can build even if you've never before seen the insides of one.

Another newcomer to the kit field is the transistorized radio-phonograph shown in Fig. C. Ideal for beach parties, picnics and other outdoor spots, the unit operates more than 100 hours from four ordinary flashlight cells. Deluxe model features AM radio and 3-speed turntable with dual sapphire stylus, but smaller, phonograph-only models are also available.

Not all commercially available kits are of the popular entertainment type. The Electronic Analog Computer Kit, Fig. D, is



a typical example of a laboratory-type instrument which fills a definite void in the educational and industrial fields.

Designed for trade schools and colleges—for teaching analog-computer design and applications—and for industrial laboratories where preliminary running of problems often saves costly time, its relatively low cost also places it within reach of many students and experimenters.

Kit is completely self-contained, including all circuit parts and components for setting up scores of complex problems. Step-by-step assembly instructions also illustrate operating procedures, provide basic computer information and show how to set up and solve typical problems.



## For Music Lovers . . .

Hi-fi headphones, Fig. E, prevent detrimental effects of room acoustics and extraneous noise from marring true high fidelity and stereo sound reproduction. Patented construction virtually eliminates intermodulation distortion and extends frequency response to cover entire audio band.

If adjusting the individual channels of a stereo system has you going in circles, you'll welcome the stereo-balance indicator shown in Fig. F. The sensitive (120 ua.) meter movement permits precise balancing for either reproduction or recording purposes. Can be used as a VU meter.

There's nothing quite so injurious to your records as a worn stylus. And, with a diamond stylus being good for 1000 hours or more, it's easy to overlook suggested inspections until excessive distortion tells you it's too late. But not if you install the Stylochron, Fig. G, which counts the hours your record player has been in use and lets you know that the time has come.

What looks like a fine Kikuchi print, Fig. H, is really a multiple-speaker, full-fidelity speaker system. The ideal solution for space-saving hi-fi (or two, for stereo), system is less than 3 in. deep. Available with a choice of prints and in two sizes.



E



F



G



H

## And Hobbyists

New vision for pleasure cruisers. Unique low-cost, miniaturized radar system is especially designed and developed for small-boat use. System is packaged in only two units, an antenna-transceiver and the radar-screen indicator illustrated in Fig. I, thereby eliminating expensive waveguide "plumbing" and reducing power loss. Operates from 12 or 32-volt power source and has one-mile and five-mile range scales.

Something new for the Ham Shack. A translucent Great Circle map, Fig. J, with a rear-projected wedge of light which shows the amateur radio operator the direction and beam-width of his rotating antenna assembly. The map indicator is especially designed for use with Hy-Gain Roto-Brake, a new antenna-rotating assembly. The wedge of light, 10 degrees wide at the edge of the indicator, is geared to move on the vividly colored map in coordination with the antenna rotation.



I



J



Courtesy The Maanite Corp.

## YOUNGSTER'S 4-IN-1

**H**ERE'S A DESK youngsters won't out-grow. Preschoolers will have fun with it as a play center, and then continue to find it useful as a homework desk all through the grades and even high school. It makes good use of the small space it takes, for it not only provides storage galore for books and toys, but incorporates a king-size blackboard on the underside of the desk. Best of all, the desk part swings up out of the way so the unit takes even less space when closed.

### Most of It Is Hardboard

The complete unit consists of two separate cabinets (a base and a top) both of which are assembled from simple wooden frames faced with tempered and perforated hardboard. The latter is used for facing of ends on the inside and, in turn, to hold the hangers that are used to support the

shelves. With the exception of the frame for the writing desk, which is made of 1 x 4s, all frames are cut from 1 x 2s. Glue and corrugated fasteners are used to join the frame members.

Both upper and lower units are simple boxlike assemblies. The end frames can be faced with perforated hardboard at this time, but the outside, as well as the entire assembly, is not covered with hardboard until after the frames are glued and nailed together. You'll notice in the case of the base unit, Fig. 4, that the top frame differs from the bottom one in that wider end members are used, and that the bottom frame fits inside the ends, whereas the top frame laps the latter. In the case of the top unit, Fig. 3, identical pairs of frames are made and, in turn, lapped and nailed to the ends of the end frames. Only the bottom and ends are covered both sides.

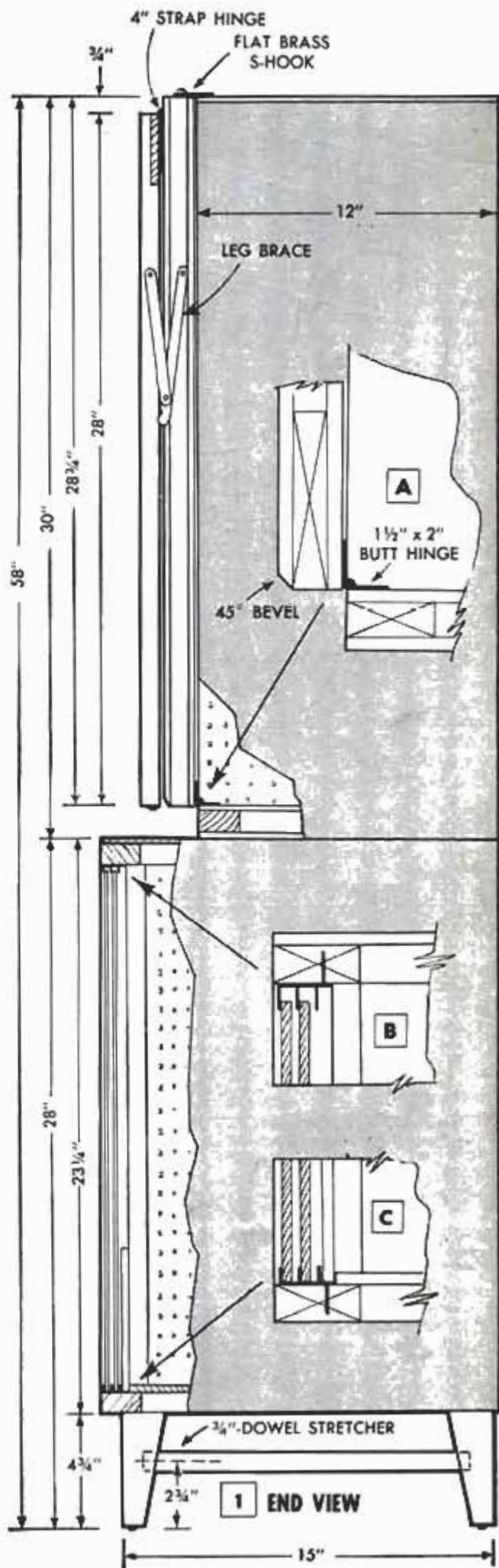


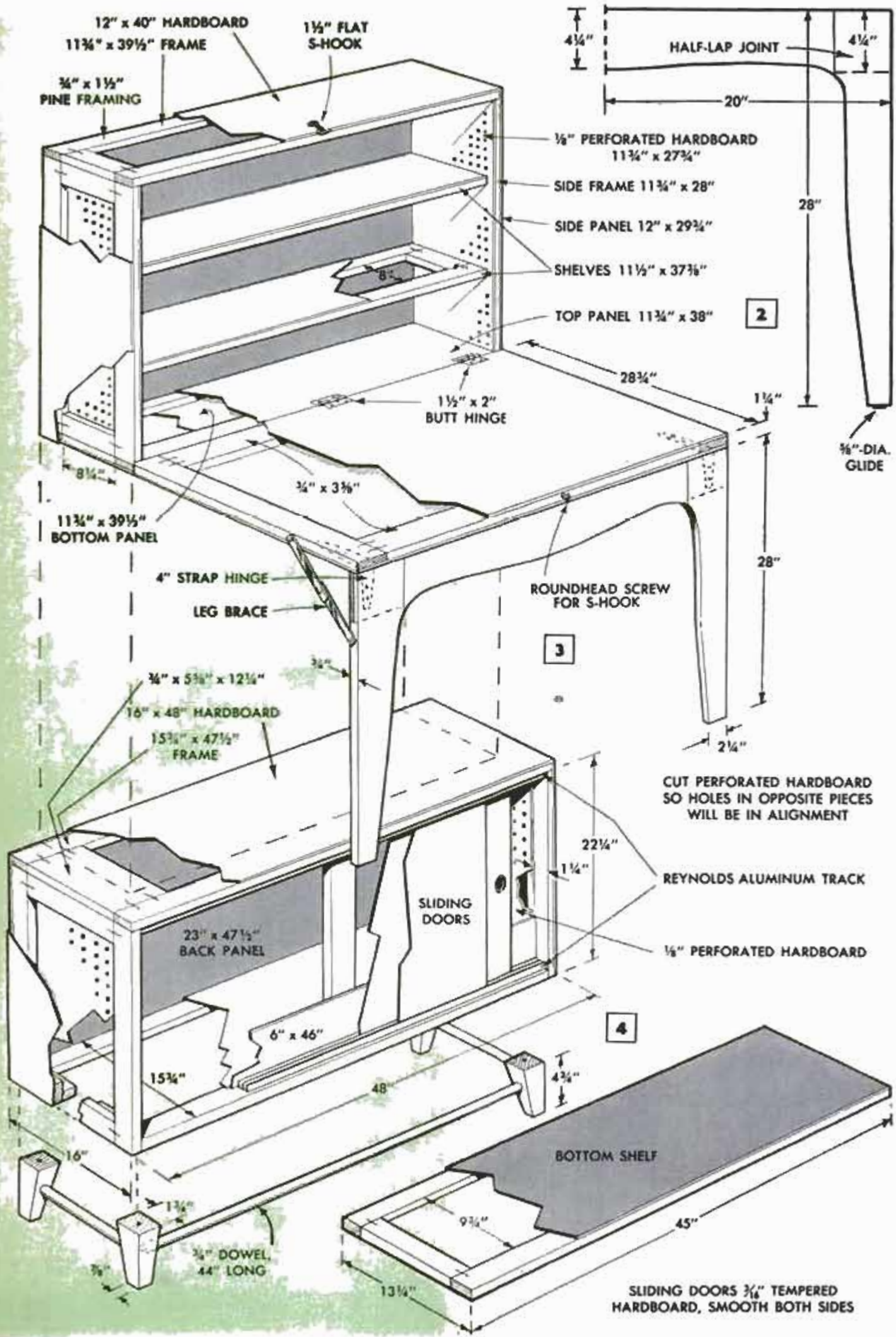
*It's a blackboard, desk, bookcase and toy box all in one. Makes compact play center for preschool tot and future home-study desk for teen*

# PLAY DESK

## "Veneering" the Outside

In gluing the hardboard panels to the framework, a better job will result if you have a few C-clamps on hand to clamp the work. Start by adding the back panels first. These are kept flush all around and will add rigidity to the units. Both units are covered in much the same manner, the main difference being that both sides of the bottom frame of the upper unit are covered with hardboard, whereas just one side of the bottom frame of the base unit is covered. The panels covering the tops of both units lap the panels covering the ends, and all panels lap the edges of the back panels. When facing the sides of the writing-desk frame, apply both panels at one time to avoid unequal stress and possible warping. The three shelf frames, one for the toy chest and two for the bookcase, can be faced on just one side, although if





faced on both sides they will hold a lot of books without bowing.

### Adding Legs and Doors

Holes for the dowel stretchers that join the legs are bored before the legs are tapered. If you should find it difficult to buy a dowel 44 in. long, thin-wall conduit can be used for the stretchers. In tapering the legs from 1 $\frac{3}{4}$  in. square at the top to  $\frac{7}{8}$  in. square at the bottom, note that only the inside adjacent faces are tapered, the outside faces are left straight. The legs are fastened to the corners of the base with 2-in. No. 10 flathead screws driven down through the hardboard and frame members. Use glue in addition to screws and set the legs  $\frac{7}{8}$  in. in from the corners. Both the legs for the base and those that support the writing desk should be made of hardwood to withstand years of use.

The bypassing hardboard doors for the toy chest slide in aluminum tracks which can be purchased at hardware stores. Details B and C, Fig. 1, show where the tracks are located, top and bottom. They are set about  $\frac{1}{8}$  in. in from the front edges and fastened with small nails. A 1 x 2 center post gives support to the base unit, and this is installed next, gluing and nailing it top and bottom, and positioning it at the very edge of the bottom hardboard panel. Finally, a 6 x 46-in. hardboard strip is fitted across the front, gluing it to the post and to the edges of the hardboard bottom and perforated side panels. The sliding doors measure 20 $\frac{7}{8}$  in. high and 23 $\frac{3}{4}$  in. wide and are fitted with regular brass finger grips pressed into  $\frac{3}{4}$ -in. holes bored 1 $\frac{1}{4}$  in. from the outer edges. It should be mentioned that when installing the tracks, the track with the wide flange is placed at the top, otherwise the doors will not engage the upper track and will appear to be too short.

### Cutting Desk Legs

Fig. 2 gives a half pattern for the scroll-cut desk legs. This is a one piece unit which is assembled from three members that are half-lapped at the corners and later bandsawed, after gluing. Strap hinges are used to attach the legs to the writing desk and three butt hinges are used to pivot the writing desk to the upper cabinet. In both cases, the hinges are surface mounted. Card-table leg braces hold the legs in the open position, and a round-headed screw and a flat brass S-hook are used to hold the desk when swung up. Green blackboard paint is applied to the hardboard; the rest is painted to suit.

Any nails exposed in the hardboard surfaces should be set below the surface and puttied over before painting. ★ ★ ★



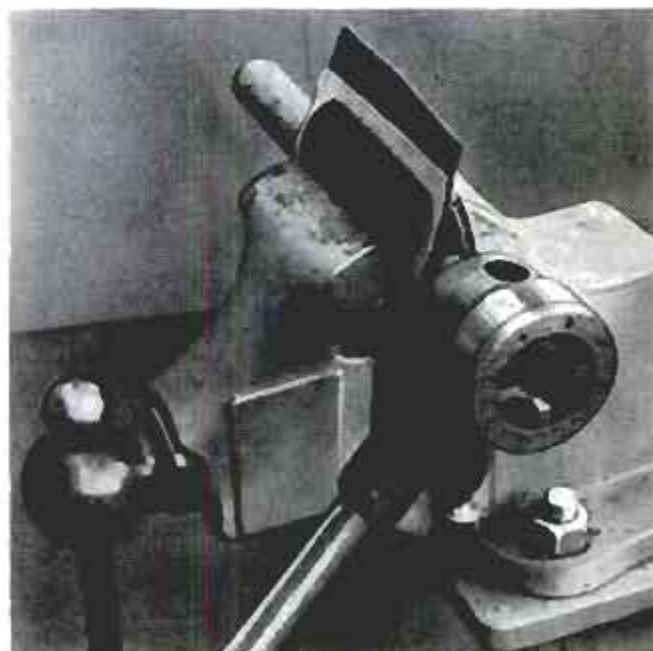
### Preloading Sander Saves Time By Carrying Its Own Supply

If several pieces of sandpaper are fitted on a pad sander when loading it, a new sanding surface is available when needed by merely tearing off or unclipping the outer sheet. This not only saves time, but eliminates the need for carrying a separate supply of sandpaper to the job.

R. Hanscom, Elmhurst, Ill.

### Clamping Pipe in Vise

To clamp pipe securely in a machinist's vise, wrap a piece of abrasive cloth around the pipe and slip a length of slit rubber hose over the cloth and pipe as shown in the photo. The abrasive side of the cloth must be next to the pipe. Not only will this arrangement permit holding the pipe securely for threading or removing a fitting when a pipe vise is not available, but it will do the job without marring the pipe surface.—H. J. Gerber, Stillwater, Okla.





## CONVERTIBLE TOP FOR YOUR BOAT

By Fred W. Goette III

**B**OATING AND FISHING are great fun, but a few hours in the broiling sun, or a sudden downpour, can make an outing anything but pleasant. The best way to avoid this, and at the same time improve the appearance of your boat, is to equip it with a convertible top.

Easy to make, the top consists of three U-shaped frames over which canvas is stretched. While the dimensions given in Figs. 1 and 3 are intended for a top that will fit boats from 14 to 16 ft. in length, it is an easy matter to scale them to suit larger or smaller boats. The distance between the legs of the frames has been omitted because most boats of the same length seldom have the same or even a similar beam. To find this dimension, simply place the deck fittings on the gunwales and measure the distance between them.

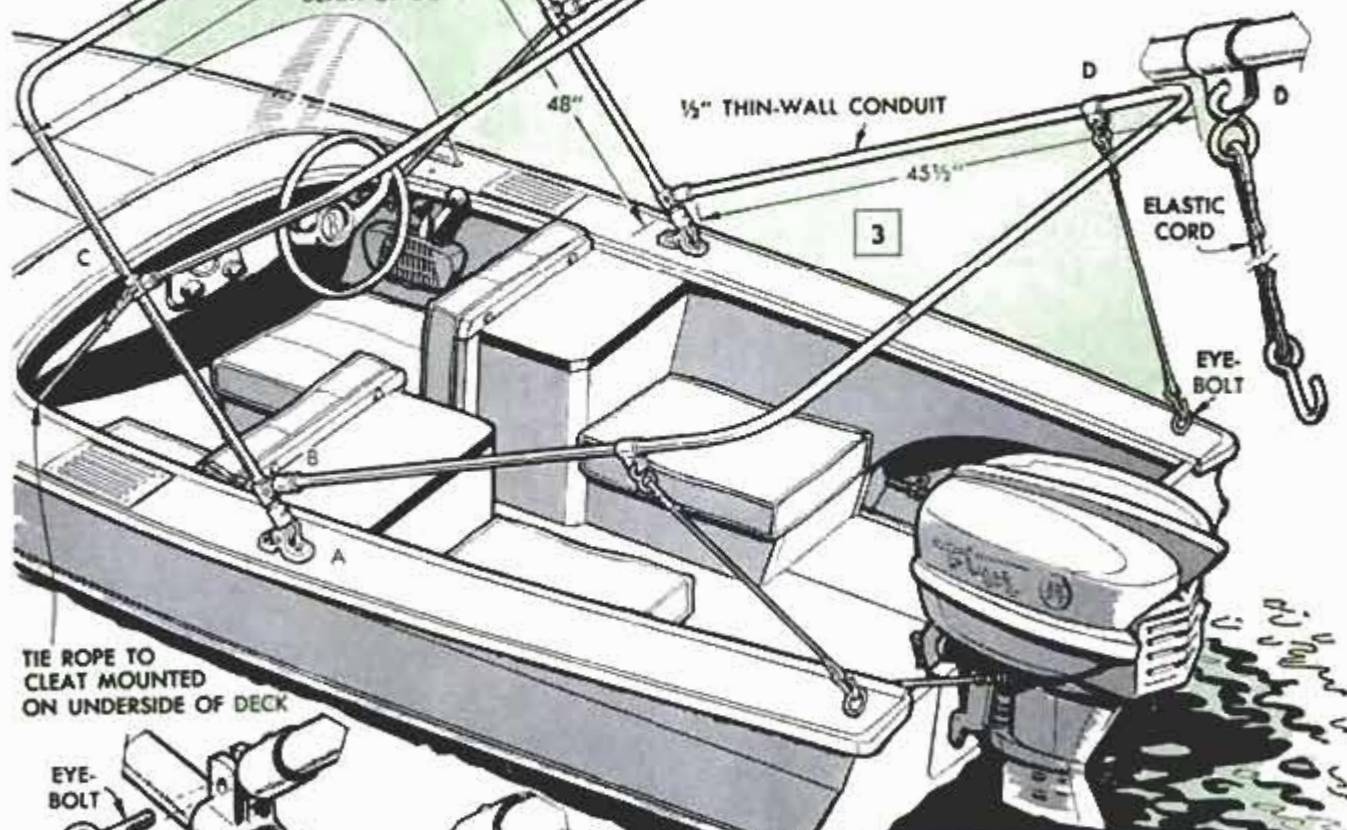
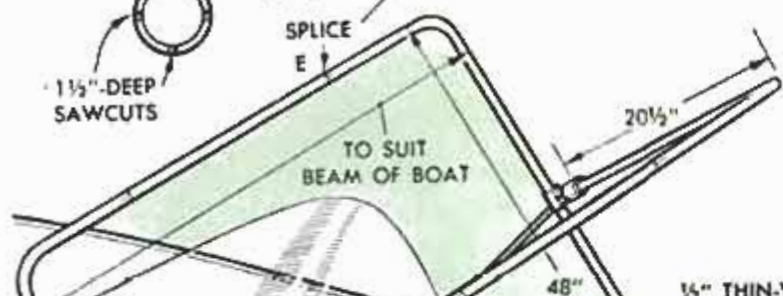
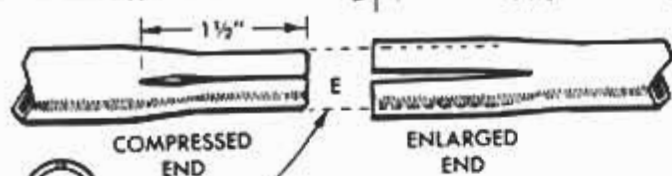
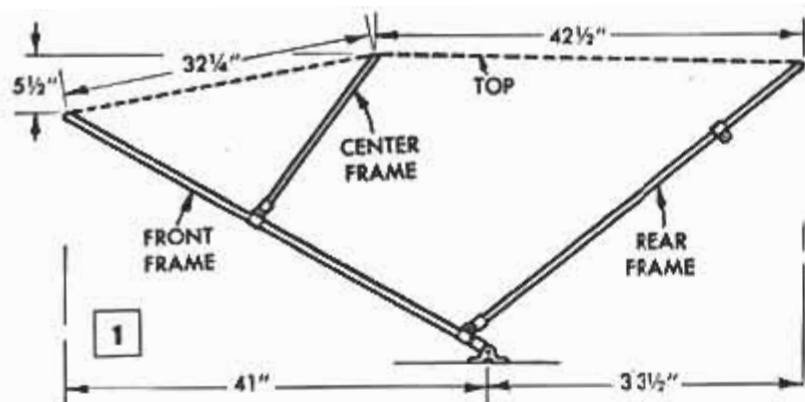
Materials needed for making the convertible top include about 35 ft. of  $\frac{1}{2}$ -in. thin-wall conduit and several yards of 10-oz. canvas treated to resist water and mildew. The following slip fittings also are needed: 6 end sockets, 4 slide fittings and 2 deck hinges, Fig. 3, details A, B and C. Such fittings may be obtained from most large marine-supply stores. Do not buy similar-type fittings that are used for canvas residential awnings, and which are threaded for installation on pipe lengths.

The frame members for the top are shaped with a conduit bender. For ac-

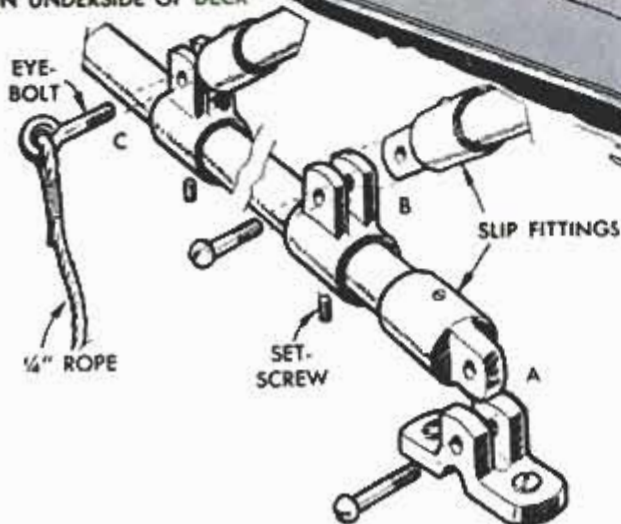
curacy, each U-member should be made of 3 lengths of conduit—2 equal lengths for the legs and another piece for the straight center section. The length of the latter is determined after bending the legs and laying them on a flat surface, spaced to give the required width between legs. The straight section is then spliced into the ends of the leg sections in the manner shown in detail E, after which the joints are brazed. Note that an eyebolt is substituted for the stock bolt on each of the center-frame slide fittings to permit attaching a rope tie-down to them as in detail C. An elastic cord secured to each leg of the rear frame and hooked to eyebolts fastened to the stern keeps the top taut, as shown in the illustration above and detail D.

The canvas top is custom-fitted to the frames as in Fig. 4. When doing this, the front and rear frames are secured in position as in Fig. 3, and a rope is knotted to each of the frames at the center, linking them together at the required spacing, Figs. 1 and 4. At this time, check the vertical clearance under the front and rear frames, Fig. 2. Sitting headroom should be at least 3 ft. so as not to obstruct vision. Next, stretch the canvas over the frames and pin it to them temporarily, using a canvas strip to form a long loop enclosing the center frame. Then disassemble the unit, slip the canvas off and replace the pins with proper hem stitching. ★ ★ ★





TIE ROPE TO CLEAT MOUNTED ON UNDERSIDE OF DECK



4. Rope knotted to each frame at center holds them in position while canvas is fitted on frames and pinned in place temporarily



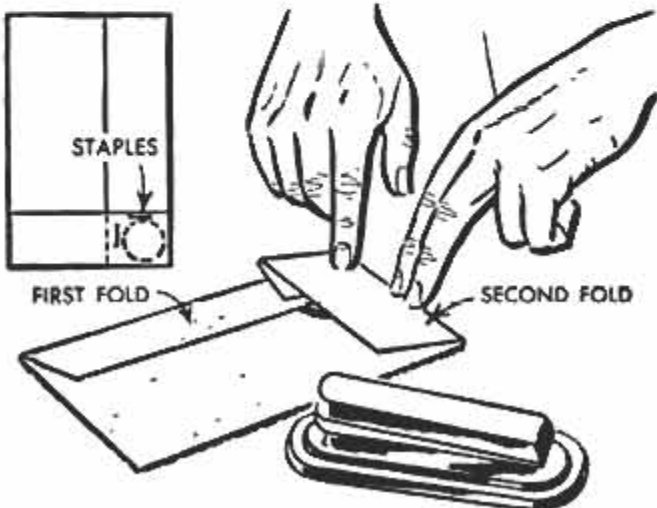
## Wax for Lubricating Screws Stored in Screwdriver Handle

Wax that is used for lubricating screws to make driving them easier can be kept in a hole drilled in the screwdriver handle so that it is readily available when needed. A  $\frac{3}{8}$  x 1-in. hole will hold enough wax to lubricate a large quantity of screws. Drill the hole carefully, being sure not to go deeper than 1 in., to avoid splitting the handle. If the handle to be drilled is plastic, use a twist drill rather than an auger bit.

H. Hanscom, Elmhurst, Ill.

## Quick Method of Securing Coins For Mailing With Letter

Here is a quick way of preparing coins for mailing with a letter. Using a sheet of medium-weight stationery, make a fold at one side so that the width of the fold exceeds by  $\frac{1}{2}$  in. the diameter of the largest coin to be mailed. Make a second fold of the same width as the first at one end of the sheet, slip a coin in the corner under both folds and staple it in position as in the detail. The other two margins are folded in the same manner to take additional coins. Thin coins may be stapled in the folds between corners as well.



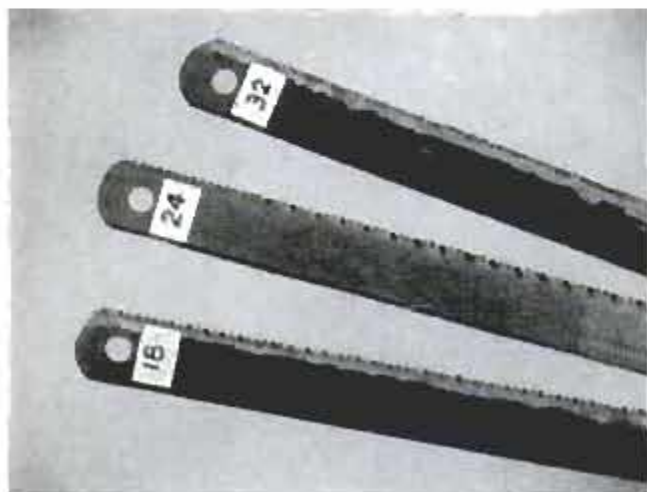
## Valve Spring Broke the Rules

This broken valve spring proved to be the culprit when the engineers of Champion Spark Plug Co. were called in to correct a spark-plug miss. The plug fouled constantly, despite the fact that compression, valve action and tappet settings apparently were normal. The pieces of the spring had interlocked and someone had adjusted the tappet to eliminate what seemed to be excessive valve lash. As a result the valve was held slightly open, reducing compression pressure and causing imperfect combustion.



## Numbers on Hacksaw Blades Indicate Teeth per Inch

To avoid the problem of comparing the teeth on hacksaw blades each time one must be selected for cutting a piece of metal of a certain thickness, one home craftsman applied the tooth-count number of each on the end of the blade as shown. The tooth-count number refers to the number of teeth per inch on a blade. For steel, brass and copper bar stock from  $\frac{1}{4}$  to 1 in. thick use a No. 18 blade, a No. 24 blade for  $\frac{1}{8}$  to  $\frac{1}{4}$ -in. stock, and a No. 32 blade for metal that is less than  $\frac{1}{8}$  in. thick.





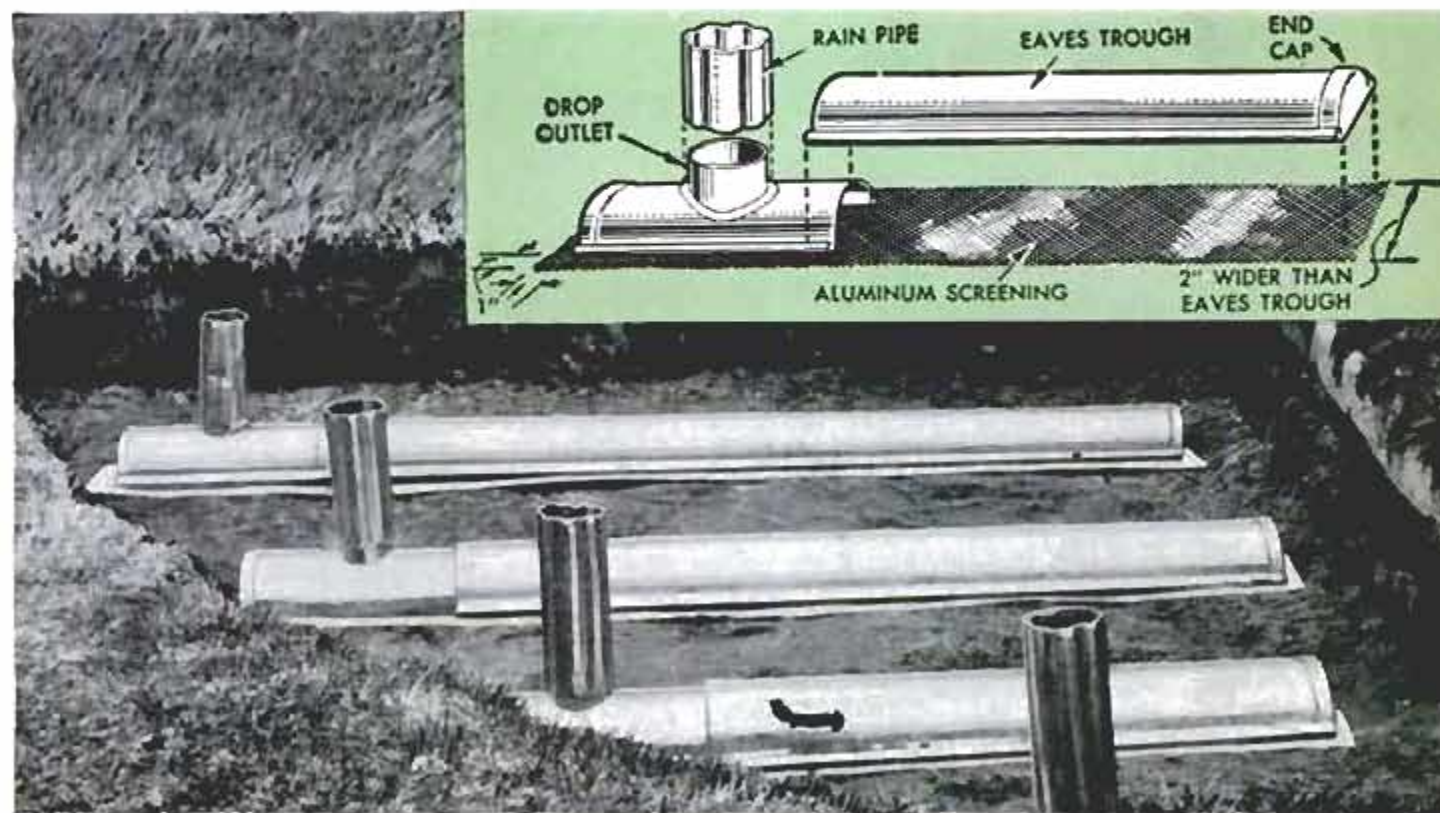
## SUB-SURFACE IRRIGATION FOR FLOWER BED

By Lee G. Braunstein

FOR A TIMESAVING method of watering a flower bed without puddling the surface soil, excavate the bed to the required depth and bury lengths of eaves trough and fittings in the inverted position in it as illustrated. A depth of 1 ft. is about right for perennials; 6 to 8 in. for annuals. The irrigator units also serve to aerate the soil, and make an easy job of applying plant food. The latter is simply poured into the open rain pipe extending aboveground at the head of each row and carried directly to the plant roots by flushing the pipe with a garden hose.

When preparing a flower bed for this type of irrigation, excavate it 1 in. deeper

than required if the soil is heavy. Then spread a 1-in. layer of sand on the bottom before assembling the eaves trough and fittings in the bed, as indicated in the drawing below. The strip of screening on which each irrigator unit is placed prevents the earth from filling the trough. Do not omit it. The rain-pipe length on each unit should extend from the drop-outlet section to 1 in. above grade level of a completed bed. Irrigator units may be assembled from galvanized or aluminum parts, but do not mix metals in the same installation, resulting in rapid destruction of one of the metals.





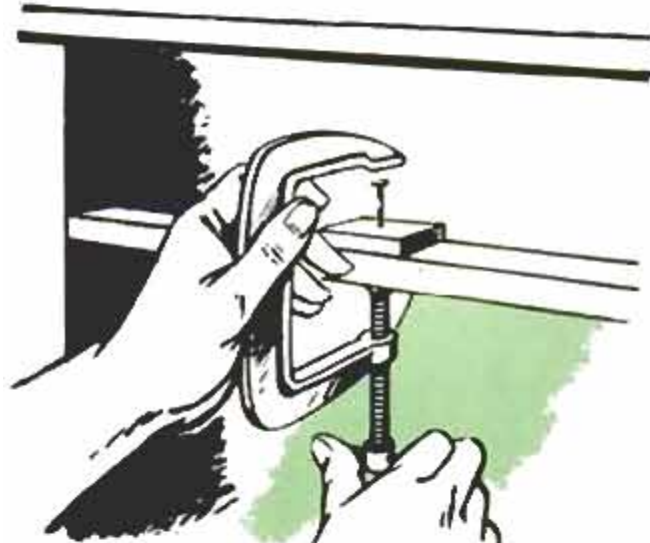
## Tap Threads

Cutting edges of taps become dulled or broken quickly when the taps are carried in a box with other tools. To minimize this problem, turn a couple of steel nuts on each tap so the cutting edges are kept away from the other tools. The nuts can be removed in a moment when the tap is to be used on a job. The nuts also will clean the taps after they are used in soft metal.



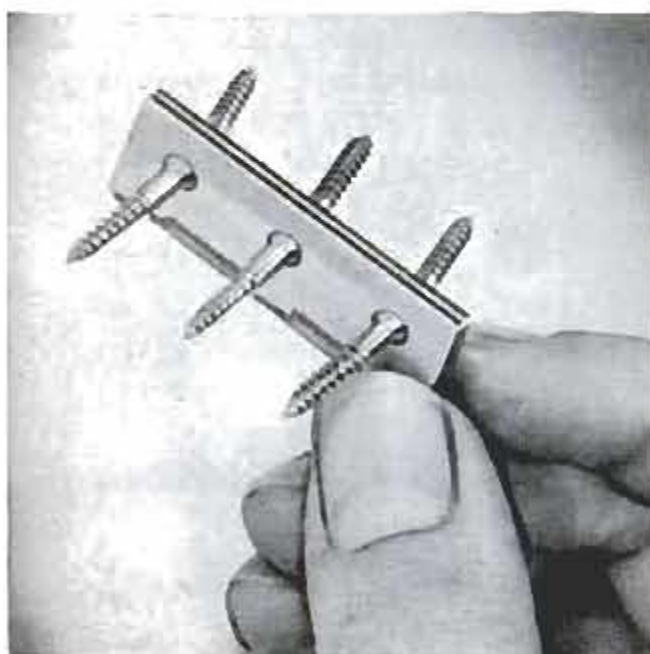
## Chuck Extension

If you have the job of drilling a number of holes in a location that cannot be reached by a drill bit of ordinary length, try this extension-bit stunt. A length of  $\frac{1}{2}$ -in. steel round is shouldered at one end to fit the drill chuck and threaded at the other to receive a second chuck as indicated. A chuck can be borrowed temporarily from another drill for this particular job.



## Hammerless Nailing

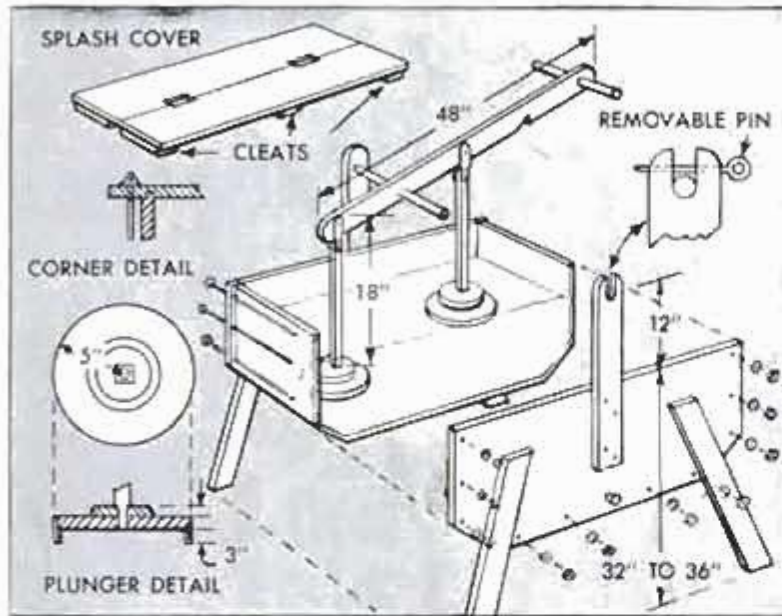
It is possible to drive nails without a hammer when space limitations make using a hammer difficult or impossible. Such a situation might occur when nailing stops for a desk drawer as illustrated. Each nail is positioned, then the fixed pad of a C-clamp is fitted on the nailhead and the clamp is tightened to force the nail into the wood. Use nails of a length that will not penetrate the second piece of wood and bear against the movable pad of the clamp. If the blocks also are glued, the clamps can be left in place after driving the nails until the glue has set.



## Hinge Screws

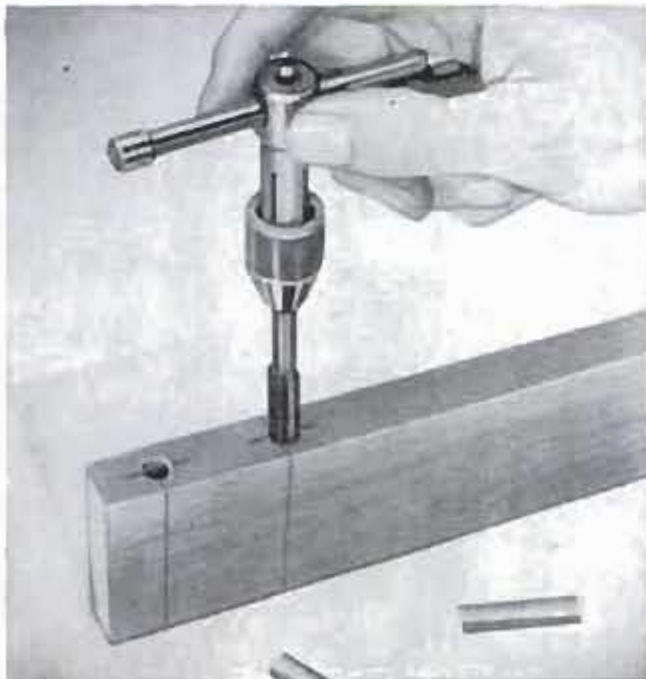
Make sure when you store those spare hinges that there are screws of the right size and type with them so there will be no delay when the time comes to install the hinges. Simply fit the screws through the holes in the hinges so the screws are held in place. Should the hinge pins be loose, wrap the leaves with a length of tape to keep them together. This idea also works well with other pieces of hardware, such as barrel bolts, cabinet latches and the like. In the case of the latter items, the screws are held in the hardware with strips of cellulose tape. Screws for some hardware are contained in a plastic envelope included in the package. Tape this envelope to the hardware when it is stored.

**IT WILL NEVER REPLACE** the automatic washing machine in this country, but this hand-powered washer is a boon to people in countries where clothes are washed on rocks in a river. Costing about three dollars to build, the washer was designed by the International Cooperation Administration in Washington, D.C., for use in underdeveloped areas of the world. When the lever is pumped up and down, the plungers alternate in forcing soap and water through the clothes. This washer could be the answer to the problem of the lack of clean clothes at a fishing cabin that is located in an area so remote that there is neither electricity nor civilization



### Threads Improve Dowel Joints

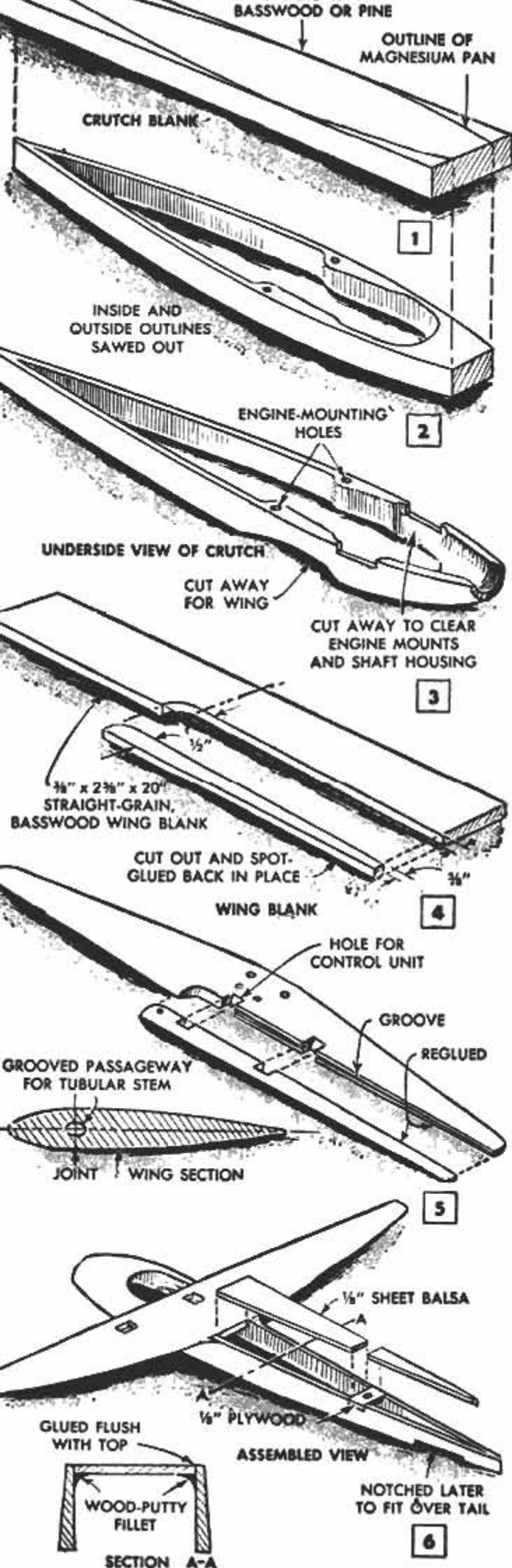
Assure a stronger glued-dowel joint by running a machine tap into the hole to cut threads in the wood. The glue then will be forced into the threads instead of being expelled from the hole when the dowel is tapped into place. The extra glue "locked" in the threads makes a stronger bond, especially in close-grained hardwoods.



### Opener Carried on Paint Pail

No need to look for some device to pry off the lid of a paint pail if a hook-type opener, such as shown, is drilled and slotted to fit over the bail so it is kept with the pail. Some openers already have a hole in one end, but in either case a slot is sawed to the hole so the opener can be slipped on or off the bail.





# Win With the

By Bob Lauderdale

YOU'LL HAVE a good chance of breaking the world's speed record with a copy of the "All American." For even though this lightninglike model plane holds the present world's record of 172 m.p.h. for propeller-driven models in F.A.I. (Federation Aeronautique Internationale) competition, it has been timed unofficially at speeds as high as 180 m.p.h. Entered in the 1957 National Model Airplane Championships in Philadelphia, the All American broke the world's record of 158.26 m.p.h. held by Laszlo Berke of Hungary, and later, during the 1958 Nationals at the Glenview Naval Air Station, set a sizzling speed record of 172 m.p.h., for which the author was awarded a certificate from the F.A.I.

Those who build and fly this speed model will find it very stable and easy to fly, and since the only differences between the F.A.I. design and the conventional speed model are the weight and the greater supporting area, the All American can be flown in regular A.M.A. (Academy of Model Aeronautics) Class C competition.

The original All American used a Magna magnesium pan, a Stanzel Class B control unit and a McCoy 60 Redhead racing engine. These, or similar parts, plus basswood, balsa, cement, wood putty, etc., will have to be purchased beforehand from hobby shops.

Start by smoothing the outside of the magnesium pan with a file and then sand and polish it with fine rubbing compound, such as DuPont No. 7. After the pan has been completely finished on the outside, locate the holes for the engine-mounting screws. Be sure in locating these holes that you allow for a small amount of left thrust adjustment, about 2 deg. Make the holes  $\frac{1}{4}$  or  $\frac{7}{16}$  in. deep with a No. 33 drill and then tap them with a No. 6-32 tap.

The crutch is made next. Select a piece of straight-grained basswood or pine,  $\frac{7}{8}$  x




# "ALL AMERICAN"



2½ x 16 in. and, using the magnesium pan as a pattern, trace the outline of the pan onto the crutch blank as in Fig. 1, and saw it out. Next, trace the inside contour of the crutch, following the dotted lines given in the full-size crutch pattern, and saw out. Your blank should look like Fig. 2. It is generally a good idea to sand the outside of the crutch block before removing the inside portion. With the engine mounted in place, fit the crutch to the pan. In order to do this, you must carve out the underside of the crutch to clear the shaft housing and the engine mounts, Fig. 3, and let it fit flush with the pan.

The next step is to make the wing. This is an important part of the model since it houses the control unit, which controls the plane in flight. The wing is made from a basswood blank, ¾ x 2⅝ x 20 in., and as shown in Fig. 4, a portion of the wing blank is cut away and later glued back in place. It is marked by measuring ½ in. in at the center line and ⅜ in. in at the wing tip, and drawing a line between the two points. Draw this line about ¾ in. past the center line and continue it in a half circle out to the leading edge of the wing blank. The full-size wing pattern shows this clearly. Now saw away the leading portion and glue it back in place with two or three



drops of glue. Let the glue dry overnight. Next, trace the shape of the wing on the blank, following the full-size wing pattern. Saw it out and sand the edges lightly. Taper the underside of the wing from the root section at the fuselage joint to the wing tips, leaving the latter ⅛ in. thick. While the original All American used a lifting airfoil at the root section, which progresses to a symmetrical section at the wing tips, you may prefer to use a completely symmetrical airfoil section. Carve and sand this section carefully to maintain the full wing area for F.A.I. requirements.

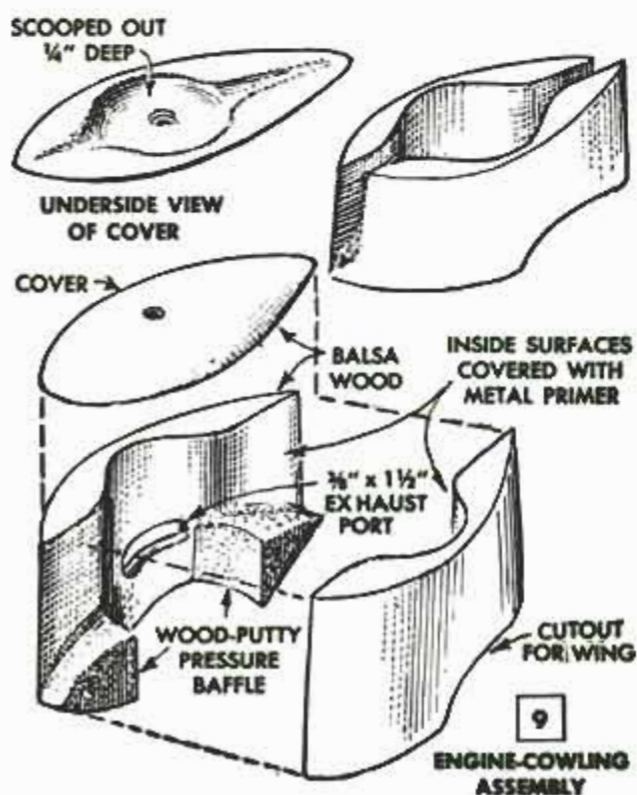
To install the control unit, separate the leading portion of the wing that is partially glued, by parting it with a knife blade. You will notice in the sectional detail in Fig. 5 that a groove is made in each part, to form a passageway for a tubular stem. Carefully cut and sand the grooves, allowing for several applications of clear dope. Notch out for the control unit, slip it into place and adjust it so the tubular stem extends, centered, in the grooved passageway. Drill holes through the wing and fasten the control-unit mounting bracket with two small



Bob Lauderdale, the author, is shown working on his record-breaking model plane. He finds that cleaning and reworking stock engine gives record performance



Along with a control unit, here are the two additional parts you must buy—a racing-type engine and a magnesium pan to which engine is bolted. Mounting holes drilled, then tapped in



machine screws. When tightening the screws, make sure the control unit remains in alignment with the tubular stem in the grooved passageway. Before replacing the leading-edge section of the wing, cut matching notches in both parts, to form an opening at the end of the tubular stem. When cementing the section to the wing, avoid getting any cement in the passageway and around the tubular stem, as this may cause binding when dry. Use only enough cement and rotate the cam a few times to make sure the tubular stem has not become cemented in the groove.

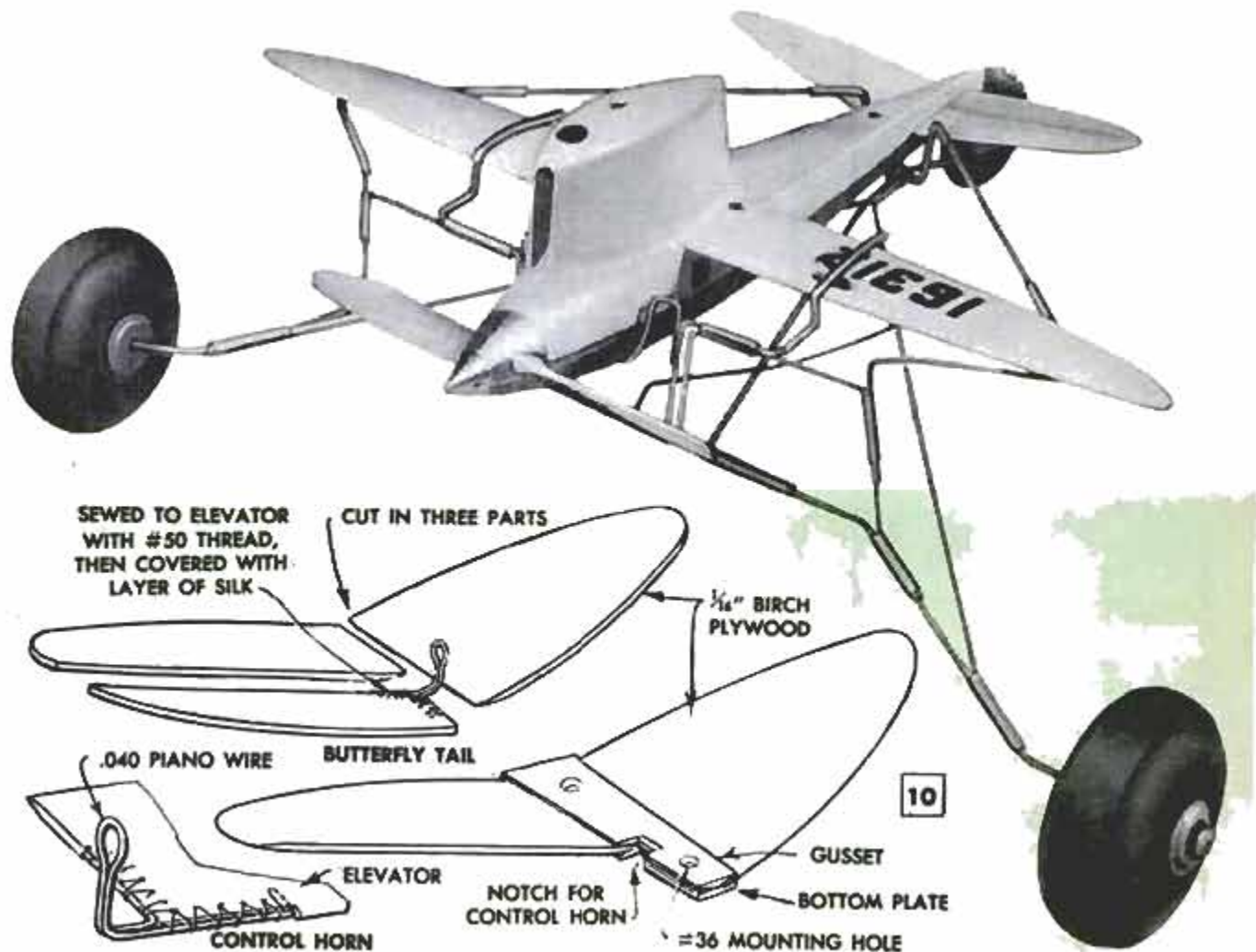
Now drill a  $\frac{1}{16}$ -in. hole through the wing to receive the bell-crank pivot pin. Adjust the pin in the hole so the bell crank will move freely, and then anchor the pin with a spot of solder. The cam follower pin should have a slight clearance at the bottom of the groove. If necessary, the bell crank may be bent upward slightly to make it move freely.

The wing-tip control-line bearing is formed from a piece of  $\frac{1}{8}$ -in. brass tubing about 1 in. long. Flatten it to an oval shape,  $\frac{3}{32} \times \frac{5}{32}$  in., and securely fix and embed it in the wing tip. To further anchor the bearing, sew several loops of No. 50 thread around it and give it a coat or two of cement. The entire wing should be finish-sanded before cementing it to the fuselage. In locating it on the fuselage, rotate the inside, or left, wing tip about  $\frac{1}{8}$  in. This will bring the wing-tip control-line guide about  $\frac{1}{4}$  in. ahead of the center of gravity, or point of balance, when the model is completed.

After locating and cementing the wing to the fuselage crutch, drill and tap the pan for the two fuselage tie-down screws. Then transfer the hole locations to the fuselage crutch and drill through with a No. 28 drill. Attach the wing and the crutch to the pan with flathead No. 6-32 screws and then taper the crutch down to match the full-size profile pattern. Be sure to leave the aft end of the crutch high enough to clear the elevator control horn. Use  $\frac{1}{8}$ -in. sheet balsa to cover the open portion of the crutch, cementing this inside and flush with the crutch walls, as shown in the section view in Fig. 6. Notice that the crutch cover is in two parts and that a  $\frac{1}{8}$ -in.-plywood block, resting in notches, divides the two and provides a bearing for the aft hold-down screw.

The engine cowling comes next. This is made in three sections, from medium-grade balsa wood. The inside and outside contours, as well as its length, are taken from the full-size cowling pattern. After the two left and right-hand side sections are carved, sand them on the inside and apply two or three coats of primer, such as Ditzler's metal primer, to the inside. If this is





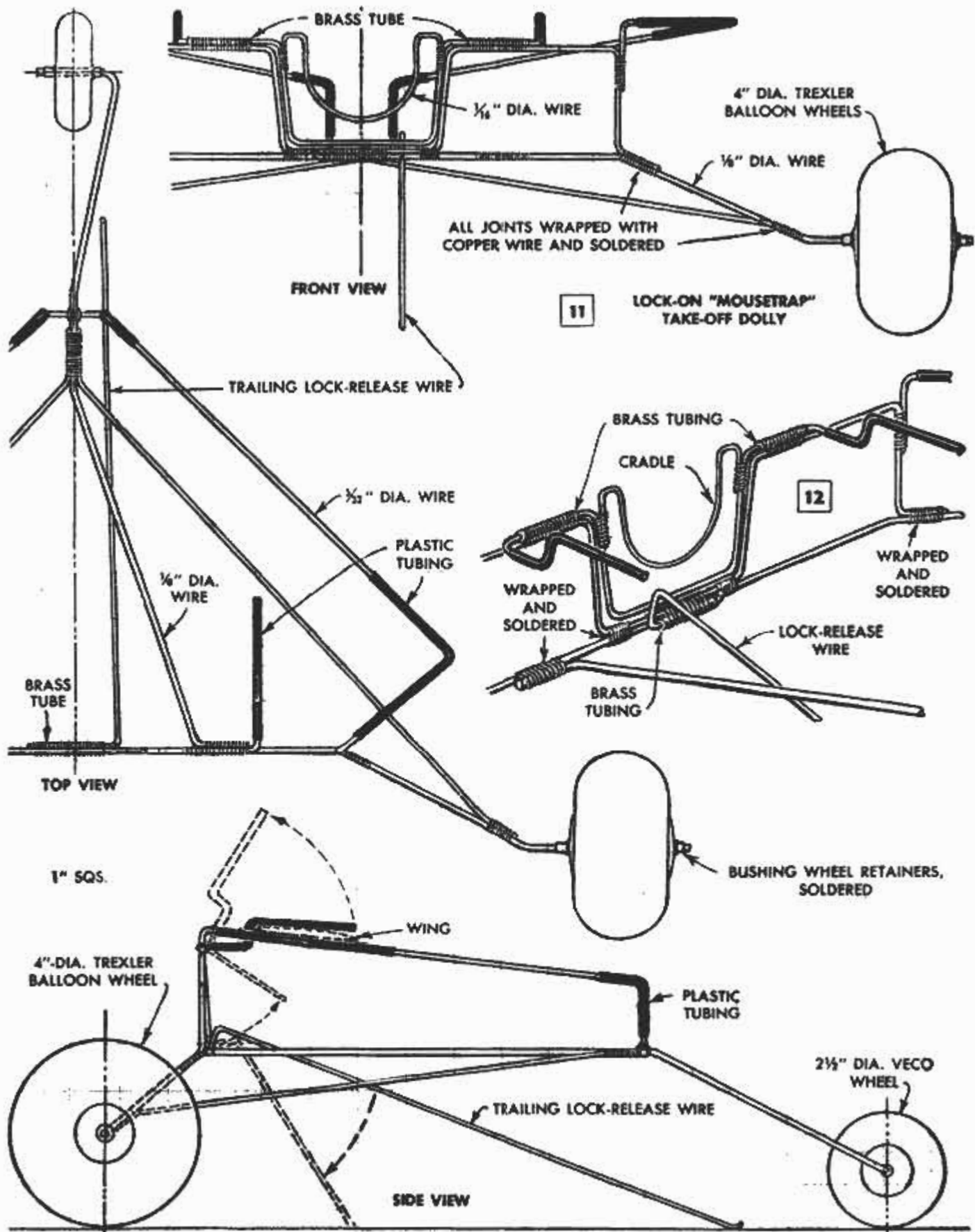
not available, use a balsa filler from a hobby shop. Fit the sections so they clear the wing, glue in position and add the pressure baffles at front and rear on the inside. Notice in Fig. 9 that an exhaust port is made in one side of the cowling. Finally, carve the cover, prime the underside and cement it to the cowling. Wood putty is used to form a fillet around the base of the cowling where it joins the wings and fuselage. This produces a blending contour, which when smoothly sanded and carefully painted, will give the cowling a molded, one-piece appearance. Wood putty is used on the inside of the cowling, too, to produce a molded contour and to strengthen it.

The final part of the All American is the "V," or butterfly, tail. This is an important part of the model and should be made with care. First, draw the full-size outline of the tail on a piece of  $\frac{1}{16}$ -in. birch plywood and cut it out. The leading edge should be sanded to a round section and the trailing edge filed or sanded to a sharp edge, for a distance of  $\frac{1}{4}$  to  $\frac{1}{2}$  in. from the edge. Next, draw a center line, cut the plywood in half and then remove the elevator portion from the inside half of the stabilizer. The two stabilizer halves are cemented together at an angle, duplicating the same angle as given in the full-size end-view pattern of

the tail, and are reinforced top and bottom with a plywood gusset and platform.

The elevator-control horn is made from .040 piano wire. Bend it to the shape indicated in Fig. 10 and sew it to the elevator with No. 50 thread. A layer of silk cemented over the thread will secure it. The elevator is attached to the stabilizer with cloth hinges of the type sold in hobby shops. The reinforcing plywood gusset and bottom plate will have to be notched to admit the control horn. The entire tail assembly is held to the pan with two No. 4-40 flathead screws. Use a No. 43 drill-tap for the tapped holes in the pan and a No. 36 drill for clearance holes in the tail.

With the tail assembly attached to the pan, the notch should be cut at the aft end of the fuselage to allow the crutch to set against the pan. Remove enough wood from the inside of the crutch to allow the elevator-control push rod to connect to the control horn. The  $\frac{1}{8}$ -in.-plywood hold-down pad should be located now, cementing it in place and drilling and tapping the pan for a No. 6-32 flathead screw. Use a light fuel-proof primer and auto enamel to finish your model. Give it two or three thin coats of primer, allow to dry for three days, then finish-sand and spray with enamel that has been thinned about 60 percent. This

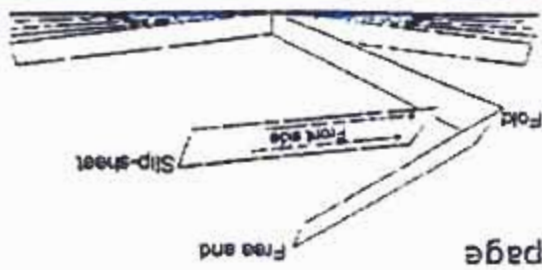


will give you a lasting fuelproof finish.

Figs. 11 and 12 detail the takeoff dolly. This is designed to lock onto the model and release when the plane begins to lift high enough for a trailing wire to swing downward. The best way to construct the dolly for size is to make full-size patterns from the squared drawings and then place the wire parts on top of the patterns, to de-

termine their lengths. Short pieces of brass tubing, seized with fine wire and solder, provide bearings for the pivoting parts. Fig. 12 shows clearly how the release wire locks the wing hold-downs at takeoff. Wire of three different gauges is used in the dolly, the lightest gauge being used to form the cradle for the fuselage. The balloon-

(Text continued to page 163)



1. Open the foldout page
2. Insert this sheet with
  1. Front side touching the free page
  2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Inverted Foldout slip-sheet



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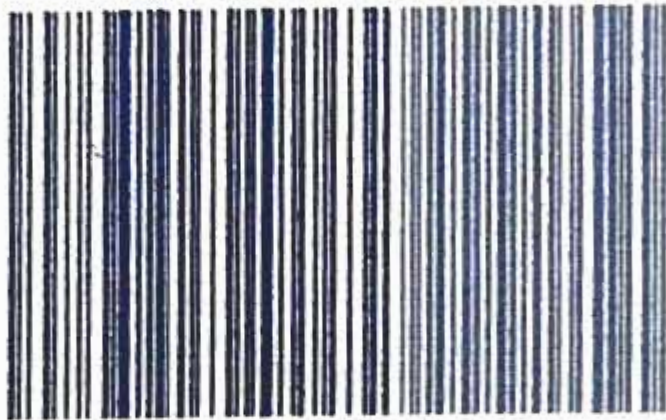
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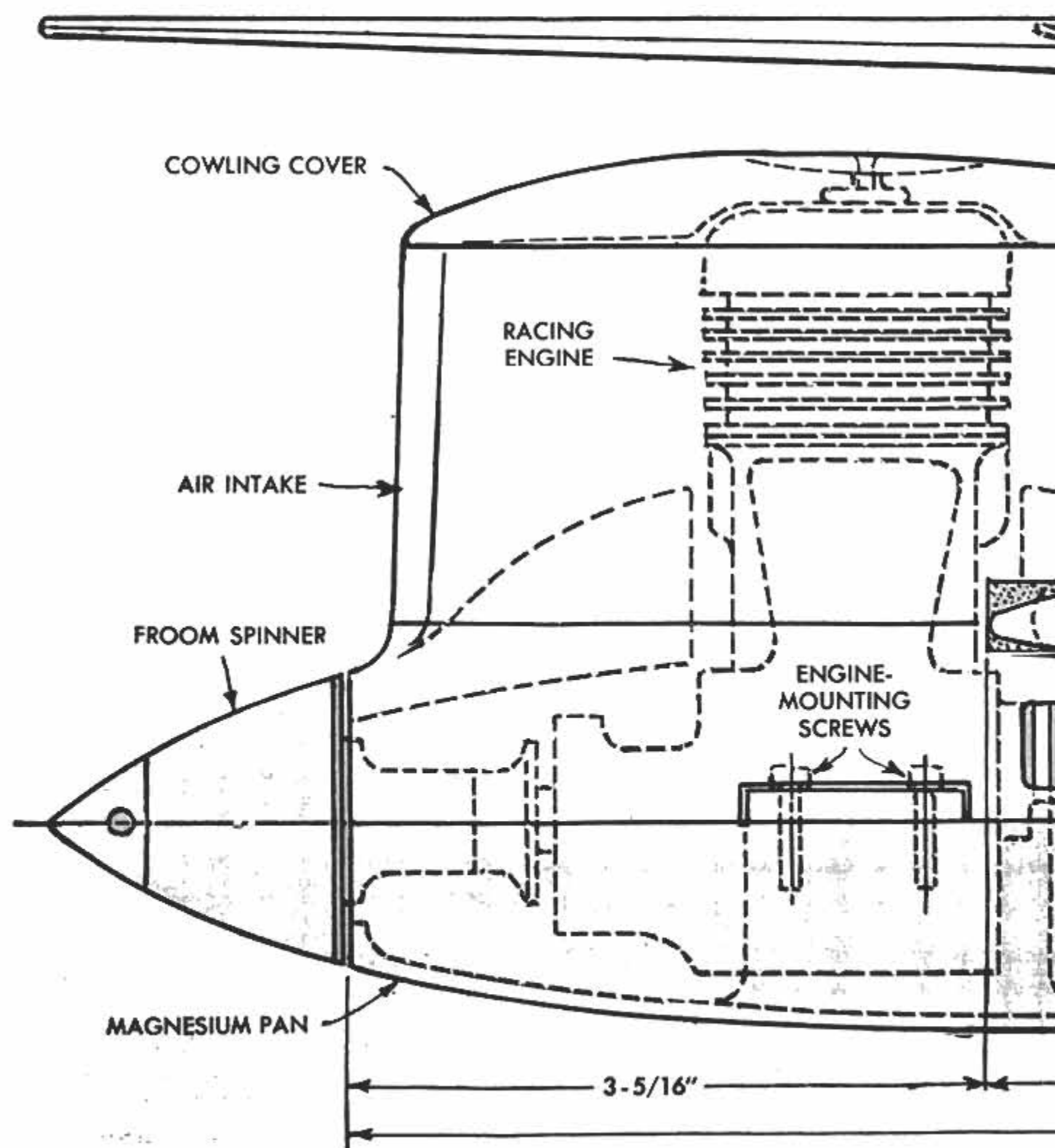
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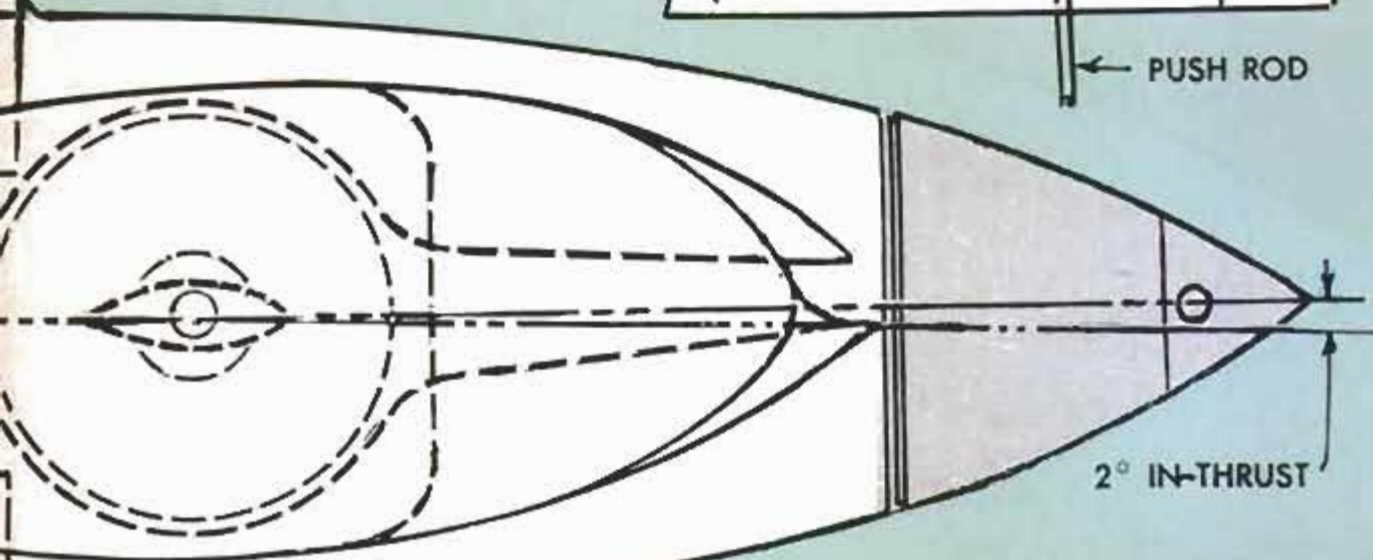
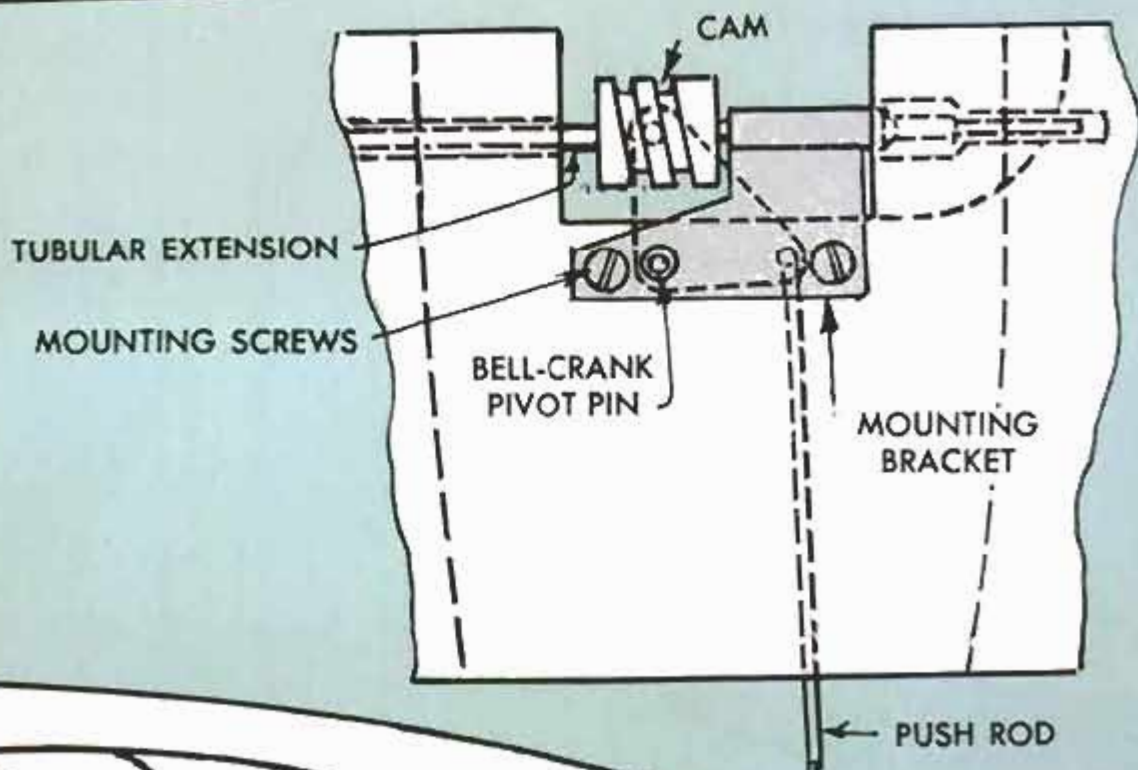
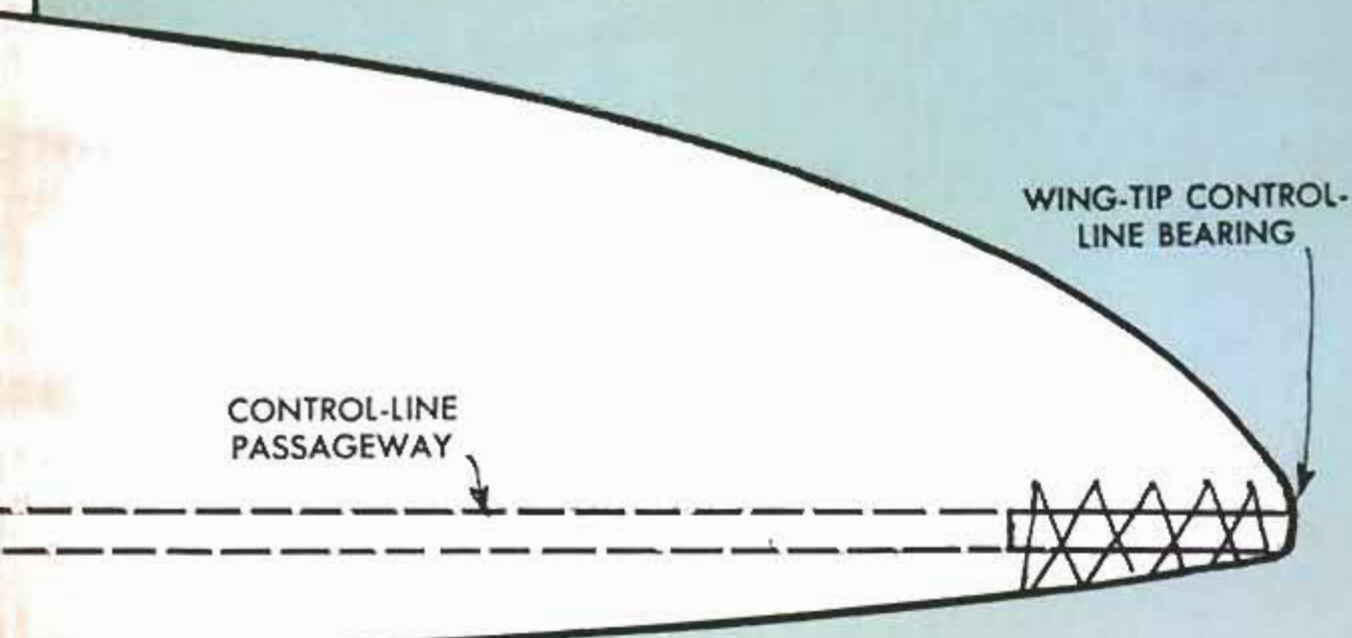
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# END VIEW OF TAIL

GUSSET, 1/16" PLYWOOD

PLATFORM, 1/16" PLYWOOD





**COWLING PLAN**

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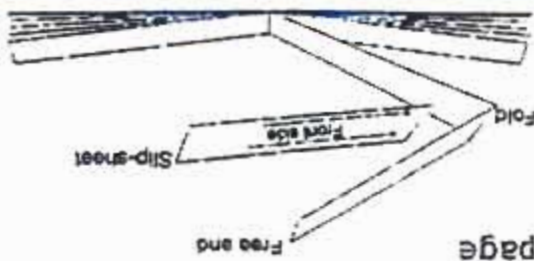
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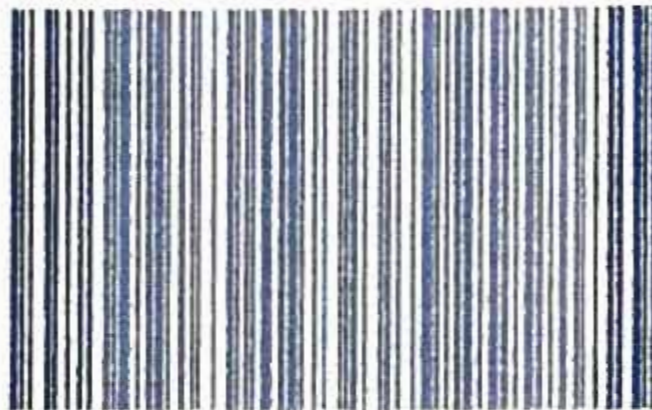
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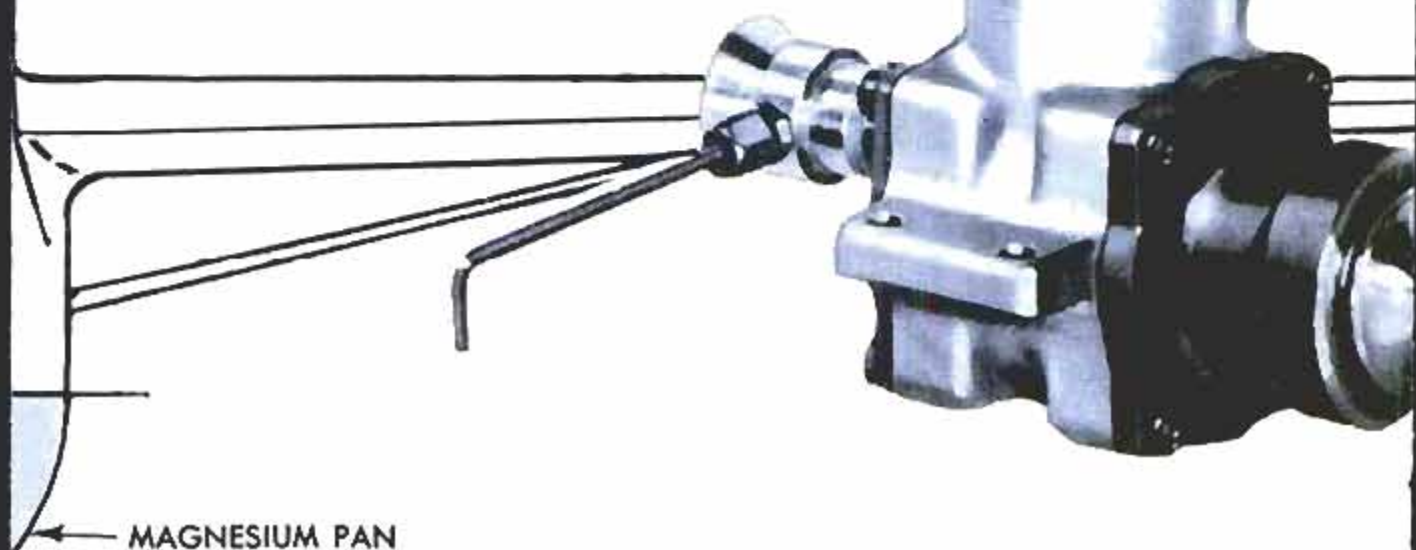
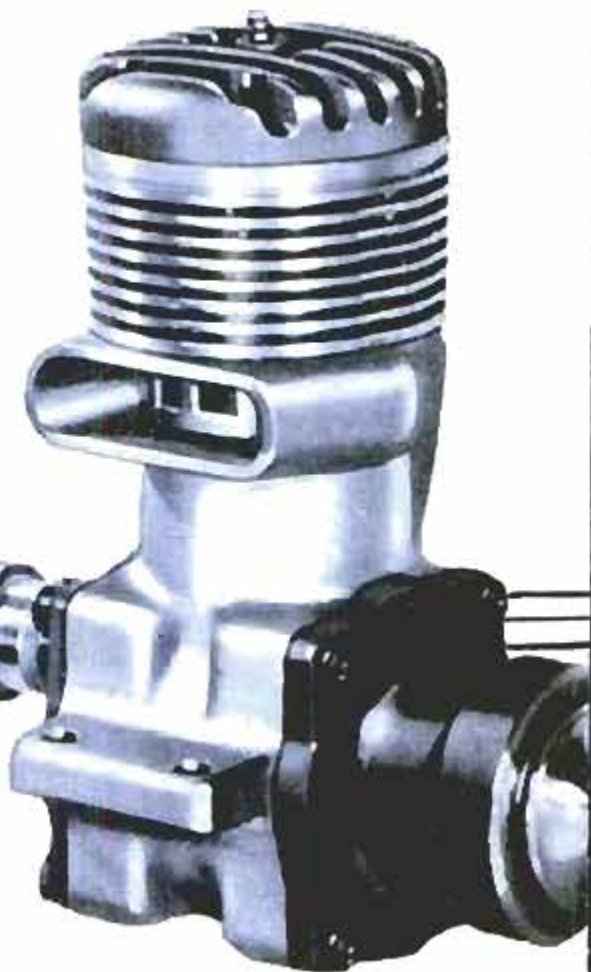
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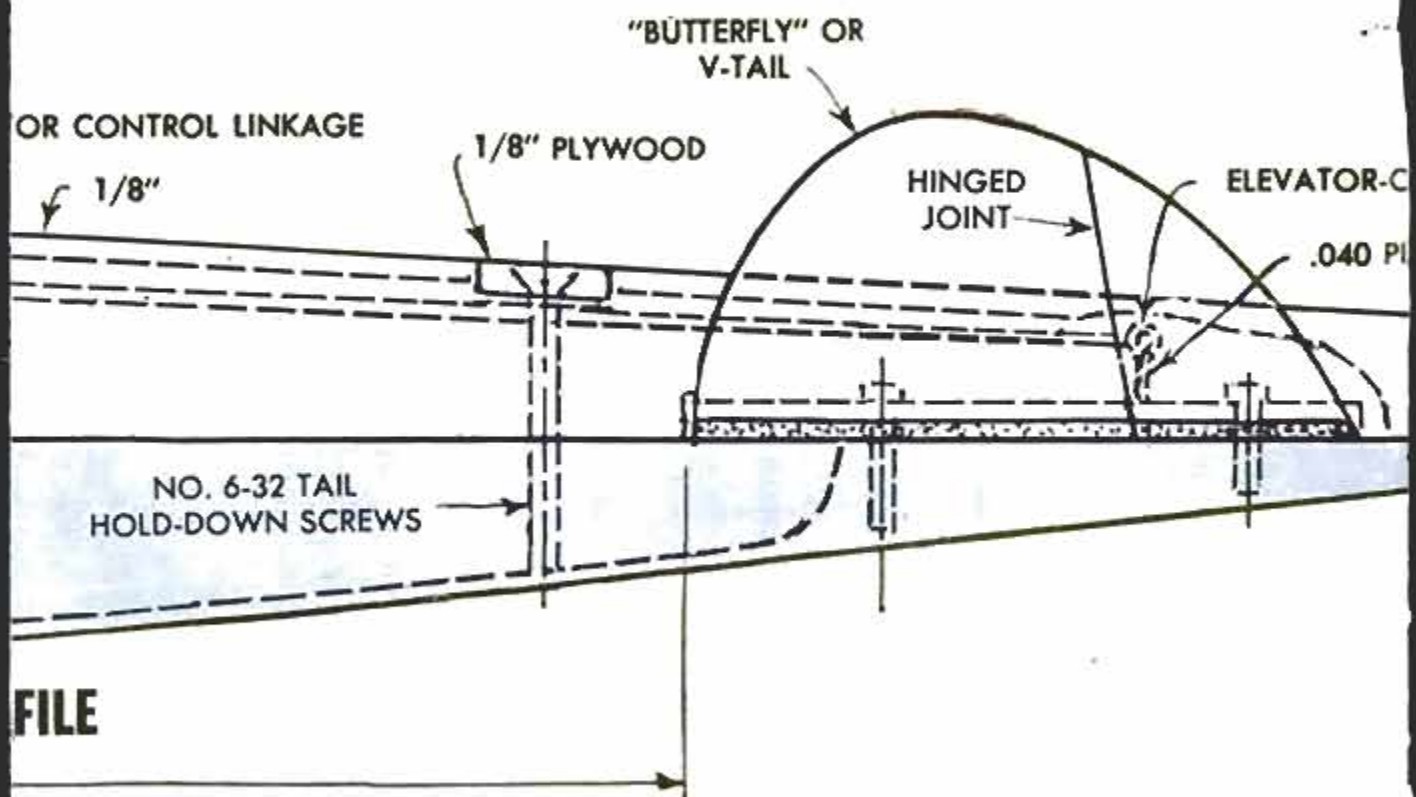


This is the power plant used in the "All American"—a McCoy 60 Redhead racing engine. Other engines, having similar over-all dimensions, can be used with these plans. Engine is given 2-deg. left thrust adjustment when bolting to supporting magnesium pan

Photo courtesy The Testor Corp.



MAGNESIUM PAN



"BUTTERFLY" OR V-TAIL

OR CONTROL LINKAGE

1/8" PLYWOOD

HINGED JOINT

ELEVATOR-C

1/8"

.040 PI

NO. 6-32 TAIL HOLD-DOWN SCREWS

FILE

WING TIE-  
DOWN SCREW

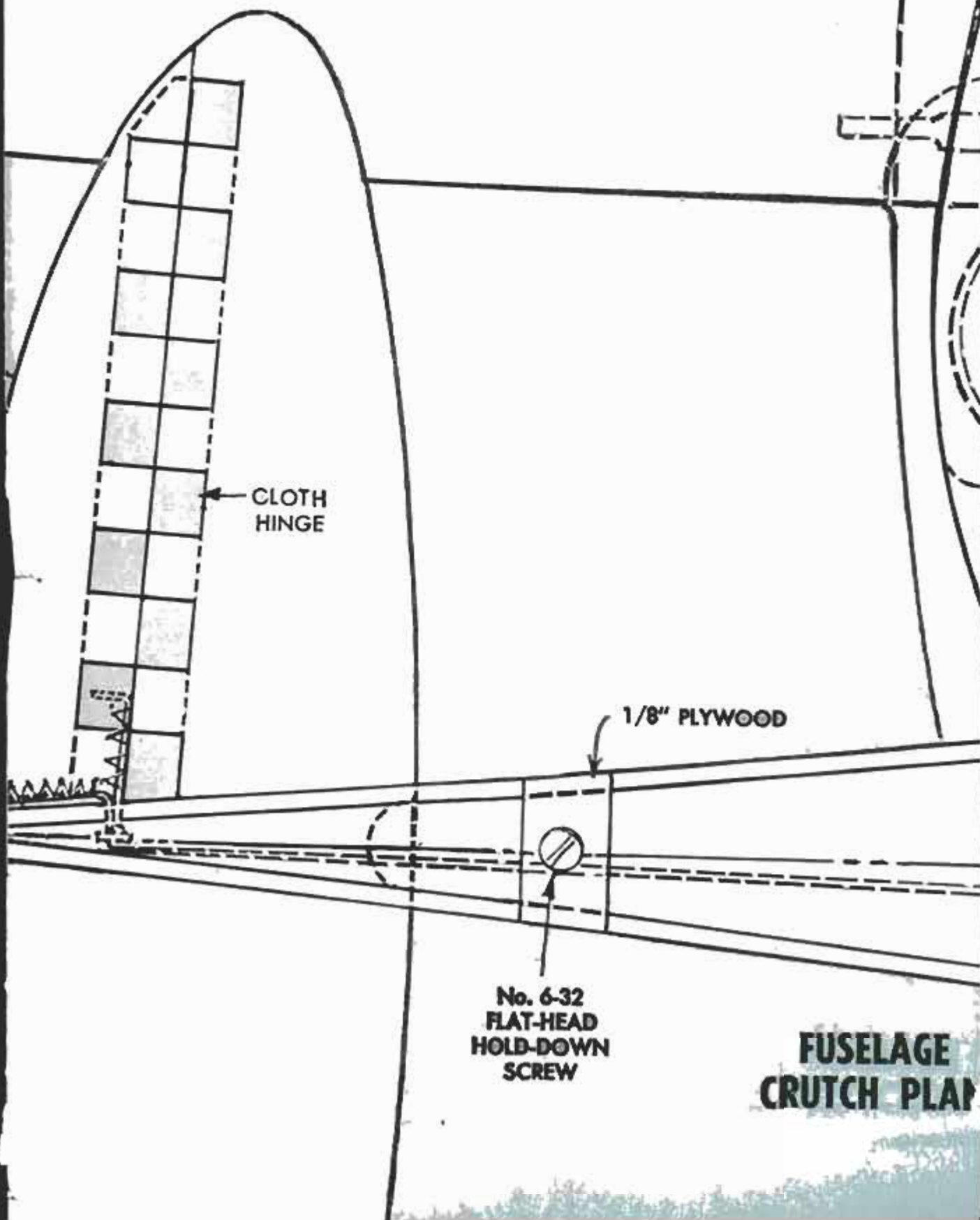
CENTER LINE

CLOTH  
HINGE

1/8" PLYWOOD

No. 6-32  
FLAT-HEAD  
HOLD-DOWN  
SCREW

FUSELAGE  
CRUTCH PLAT



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Back

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Inverted Back

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GbsSlipSheet-001



Inverted Foldout slip-sheet

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4. Close the page and slip-sheet



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type wheels specified can be purchased at most hobby and model shops.

For record performance, your engine should have some cleanup or reworking. You may want to fly your engine stock, but in order for it to perform at maximum operation there are a few things that should be done. First, completely disassemble the engine on a clean working surface. Then remove the sleeve, or cylinder liner, from the cylinder block. This can be done by heating the block. The sleeve should have the intake and exhaust webs filed thinner but only enough to brighten them. Remove any burrs from the inside, clean the sleeve and then replace it in the cylinder block. The front crankcase cover should be disassembled and the rear bearing removed. The crankshaft should then be polished to allow the rear bearing to slide on and off freely. The rear portion of the front cover, which houses the rear bearing, should be polished enough to allow the outer race of the rear bearing to rotate. The housing for the front bearing also should be polished on the inside to allow the front bearing to move fore and aft when the front cover is assembled. This will allow the bearings to self-align and will eliminate the possibility of any binding.

With all the parts of the engine completely clean, reassemble the engine, placing a few drops of gun oil on all the moving parts. Allow at least 10 to 15 warmup runs for the engine to reach peak operation. Make sure that all the needle-valve settings are on the "wet," or rich, side of peak. Then there will be no danger of burning up the engine.

Before test-flying the All American, check the operation of the control system to see that you have at least 10 deg. upward movement and 10 deg. downward movement of the elevator. Be sure there is no binding or rubbing of the elevator push rod or of the torque tube inside the wing. Since the All American incorporates a Class B monoline control unit, there will be considerable control action when flying on a .024 control wire for A.M.A. Class C competition. Therefore, use care not to over-control. When flying F.A.I.-record attempts, use a .020 wire, 65 ft. 4 in. long, which is the official length required. It is recommended that you not use a flying wire of less than .020, and that only for F.A.I.-record attempts. When flying on a 65-ft. line, you will note there is considerable pull on the control handle and it is suggested that you use a safety thong around your wrist. You will be very busy applying control and it is recommended, too, that you first build a monoline trainer and fly it a few times before attempting to fly the All American speed model. ★ ★ ★



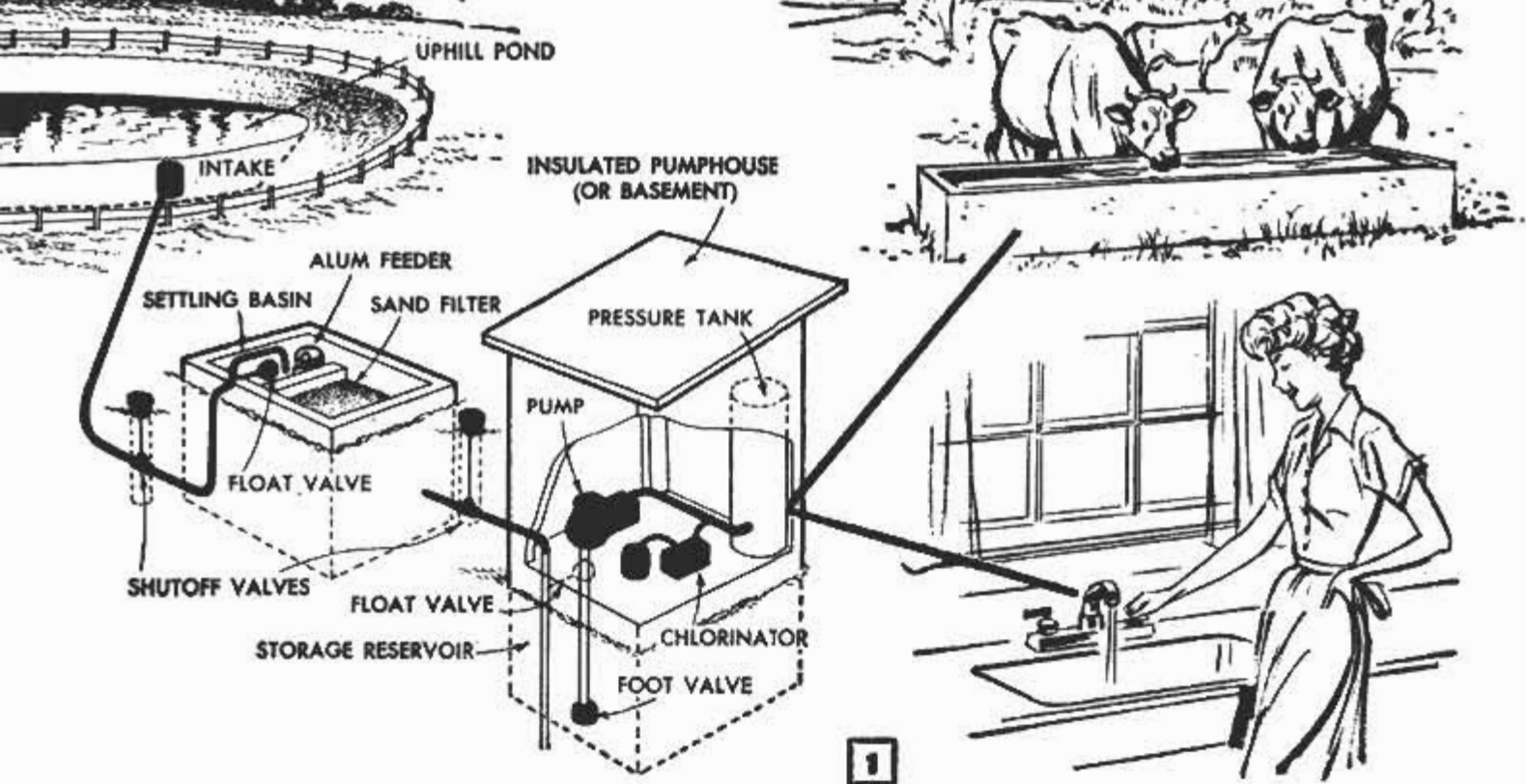
### Broom "Herds" Baby Chicks

Getting baby chicks into a brooder ahead of a storm can be frustrating. Darting here and there, they are difficult to round up. However, you'll find that a broom makes quick work of corralling them, and there is little chance of injuring the chicks. After several times, mere sight of the broom will cause the chicks to head for home.

### Rubber Band Prevents Loss of Cap

When using a can of polish, wax or other liquid that must be carried about and used, for the most part, with the cap removed, it is easy to misplace the cap. This won't happen if you snap a wide rubber band, cut from an innertube, around the can and place the cap under it as soon as it is removed from the can.





Water from this uphill pond is purified by flowing down through a settling basin where alum is added, then through a sand filter. From here it flows into a storage basin from which it is pumped and chlorinated

## Safe Water Supply From Ponds

By E. R. Haan

PART I

**F**IRE PROTECTION and plenty of running water the year 'round, at the turn of a faucet, are musts for homes beyond the water mains. A water reservoir, or pond, which impounds drainage from a natural watershed; a simple filtration plant, and pressure system give you every convenience of urban living at modest first cost.

Prolonged droughts and receding water tables in many localities frequently dry up existing wells, making it necessary to drill old wells to new depths, or drill new wells to greater depths. This is costly, especially if the process of deepening existing wells must be repeated as the water table recedes. Because of mounting costs and the unreliability of wells, farmers and suburban homeowners in many localities are impounding water in artificial ponds in order to assure themselves an adequate water supply. In some farm and suburban communities it may be possible for several families to share a single pond and thus reduce the initial cost, as well as the operating cost, per family.

### Water From Ponds

Costing up to \$3000, depending on size, a pond and water-treatment plant will pay

for itself on most farms by making production of better products possible through proper sanitation, and by providing better drinking water for both humans and animals.

Information on building ponds and purifying water, as contained in this two-part article, is based on extensive research conducted by various institutions such as the Kansas State College of Agriculture and Applied Science, the Agricultural Engineering Departments of the Universities of Missouri and Oklahoma, and the U.S. Department of Agriculture.

### Defraying Initial Costs

Where several farmers are planning the same improvement, a savings can be made by sharing the cost of forms for concrete work. Also, the forms can be made and rented out by REA cooperative power associations, extension councils, chambers of commerce, banks or material dealers. Good forms can be used for 10 or more jobs, which greatly reduces the cost of each one. Sometimes a single water-treatment plant can be owned jointly by farm neighbors living in close proximity, another way to save costs.

Fig. 1 shows the equipment and arrange-



Photo courtesy U. S. Department of Agriculture

Typical dam and pond, fenced in to keep out livestock that could damage dam or banks of pond and cause muddiness. Note that sodded emergency spillway also is fenced in to prevent its being damaged

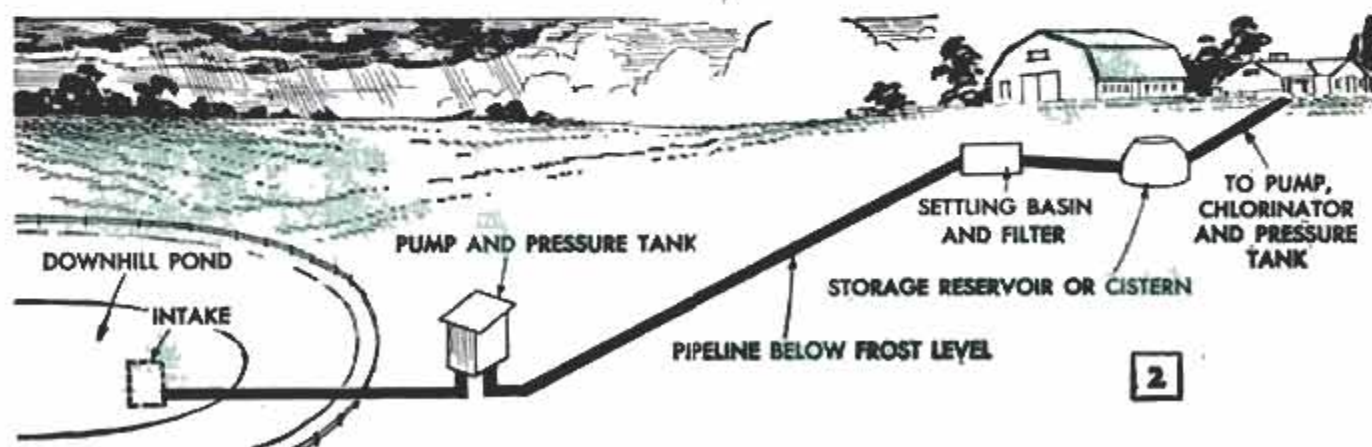
ment of a pond-water purification plant where the pond is above farmstead level. Where a pond is below this level the arrangement in Fig. 2 is applicable. In both types of installations the water is brought to a settling basin first. This has a float valve to control water level, and an alum feeder. Alum brings together tiny suspended particles in the water and causes them to settle, thus reducing the amount of dirt and foreign matter in suspension. The water then passes through a sand filter where particles still in suspension are trapped. Filtered water then enters a storage reservoir or cistern. The size of the units necessarily varies for efficient treatment of the volume of water for which a plant is designed. The settling basin and filter may be combined in a single tank as

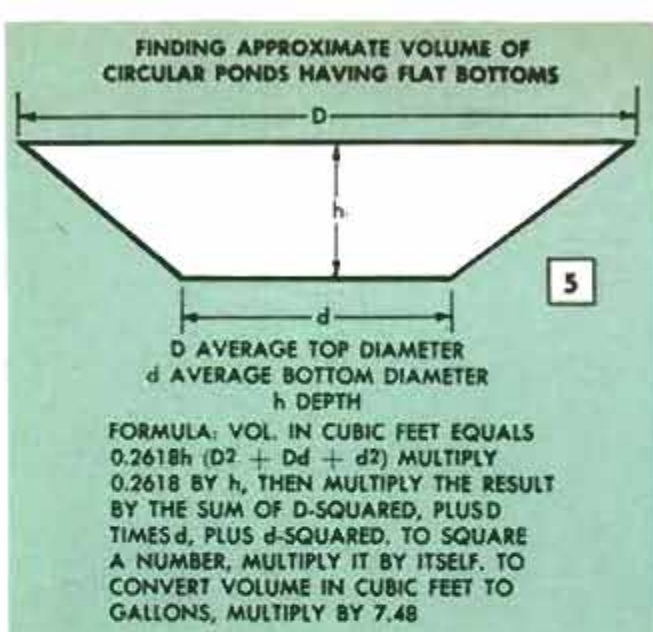
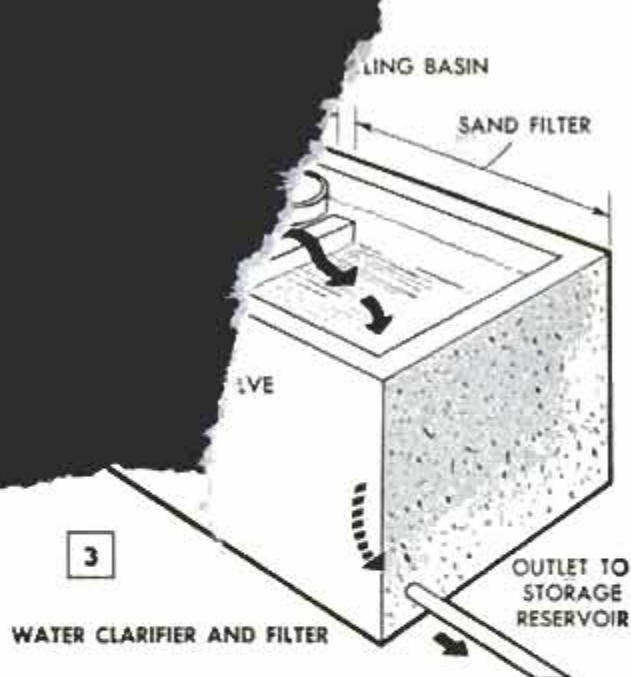
in Fig. 3, which will be detailed later.

A pump and pressure tank installed in the usual way are used to distribute water to the various supply outlets. In the uphill system, Fig. 1, only one pressure system is required. A downhill installation requires two pressure systems, Fig. 2. A chlorinator between pump and tank injects chlorine solution automatically when the pump is operating. Underground pipes should be below frost level and long pipelines should have expansion joints, Fig. 8.

### Plant Capacity

A water-treatment plant having a capacity of 1800 to 2000 gal., which will be detailed in Part II, is sufficient for an average farm home and dairy. Only large dairy farms have greater water requirements.





Where needs are considerably less, as for instance, a daily need of 250 to 300 gal., a single day's operation of such a plant will provide water for almost a week. Or, a plant of this size can supply several neighbors if the total water demand is not more than the plant's capacity. Individual smaller plants cost almost as much to build as a single larger unit that several families can use, and the smaller plants do not have the advantage of a reserve supply. Table A on page 167 gives information of help in determining daily water needs.

### Planning the Pond

If you live in a soil-conservation district, the extension agent will help you plan your pond, its location, size of the watershed, and other details. The success of a pond depends not only on the kind of soil but also on the size, slope and characteristics of the watershed as well as the average amount of annual rainfall. Soil tests at a proposed site will disclose if a pond built there can be expected to hold water satisfactorily. Many ponds fail because they are built on the wrong kind of soil. Avoid

sites having a deep subsoil of sand, gravel, peat or marl, as these will not hold water. A pond built on these materials will require a watertight bottom of some material such as clay. Many states have laws governing the building of dams necessary for most farm water supplies. A permit may be required.

A typical arrangement of a pond, dam and spillway is shown in Fig. 4. A relatively deep pond, from 10 to 20 ft., is preferred, as it has less surface area than a shallow pond of equal volume, and therefore the evaporation losses are less. A location close to the farmstead, yet outside the range of barnyard seepage involves less cost for pipe and power lines. If the pond is some distance from the farmstead, the water-treatment plant still may be located close to the house as in Fig. 2, to avoid long trips for servicing, regular servicing being important for efficient operation.

A pond formed by damming a gully, or a pond placed too far down in a drainage area, may be subject to silting and flooding and may involve extra costs to control excess water. Lack of a good vegetative cover on the watershed and dam also causes silting and muddy water. For this reason cultivated land should not be included. Too steep a watershed slope is susceptible to rapid erosion. On gentle slopes a pond may be located quite close to the ridge and terraces used to control the flow of water to the pond. Such a location may also provide a gravity feed to the treatment plant and so avoid the cost of an extra pump and pressure tank.

### Storage Capacity of Pond

Size of the pond should be sufficient to meet estimated daily needs for a 2-year period without replenishment. The amount of water likely to be lost by seepage and





Photo courtesy Kansas Farmer

Newly built pond with strainer inlet standing above water. The pond banks here have not as yet been seeded with protective grasses that would prevent erosion and washing of mud and silt into the pond

evaporation should always be included in this calculation. This is often equal to half the water contained in the pond. For the water-treatment plant to be described in Part II, which has a daily capacity of 1920 gal., a 2-year water supply including losses, is 2,758,214 gal. This is the approximate capacity of a circular pond having an average water-surface diameter at spillway level of 220 ft., a flat-bottom diameter of 130 ft., and a depth averaging 15 ft. to 2-to-1 sloping banks. Fig. 5 gives the formula for finding the volume of a circular pond. Minimum size of a pond for household water supply should not be less than 100,000 gal., and its depth should not be less than 8 ft.

### Dam and Spillway

An earth dam can be placed straight across two merging slopes, or across a shallow natural waterway; a curved dam can be built on a slope. A necessary part of a dam is a spillway to drain away excess water. It is best to have a small pipe spillway to take care of small overflow caused by springs and moderate rainfall, plus a sodded emergency spillway for sudden, heavy overflows.

After staking off the approximate area of the pond at water level, for which you use a surveyor's transit, stake off the space

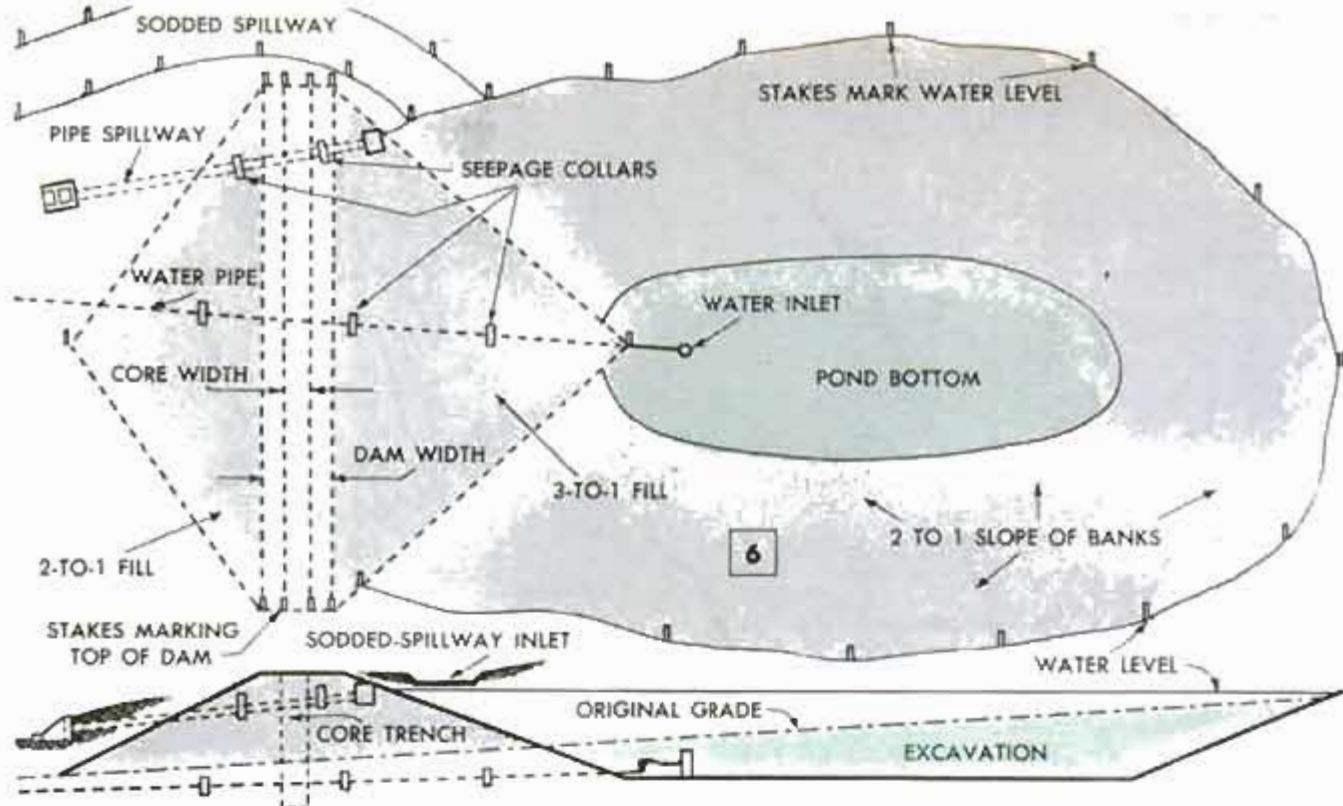
**TABLE A**  
**APPROXIMATE REQUIREMENTS**  
**FOR WATER ON FARMS**

| Use                            | Gal. Per Day         |
|--------------------------------|----------------------|
| Each person <sup>1</sup>       | 50                   |
| Each workhorse <sup>2</sup>    | 12                   |
| Each milk cow <sup>2</sup>     | 20                   |
| Each beef cow <sup>2</sup>     | 12                   |
| Each hog                       | 4                    |
| Each sheep                     | 2                    |
| 100 chickens, cooped           | 9                    |
| 100 chickens, not cooped       | 4                    |
| 100 turkeys                    | 7                    |
|                                | <b>Gal. Per Hour</b> |
| $\frac{3}{8}$ -in. garden hose | 200                  |
| $\frac{3}{4}$ -in. garden hose | 300                  |

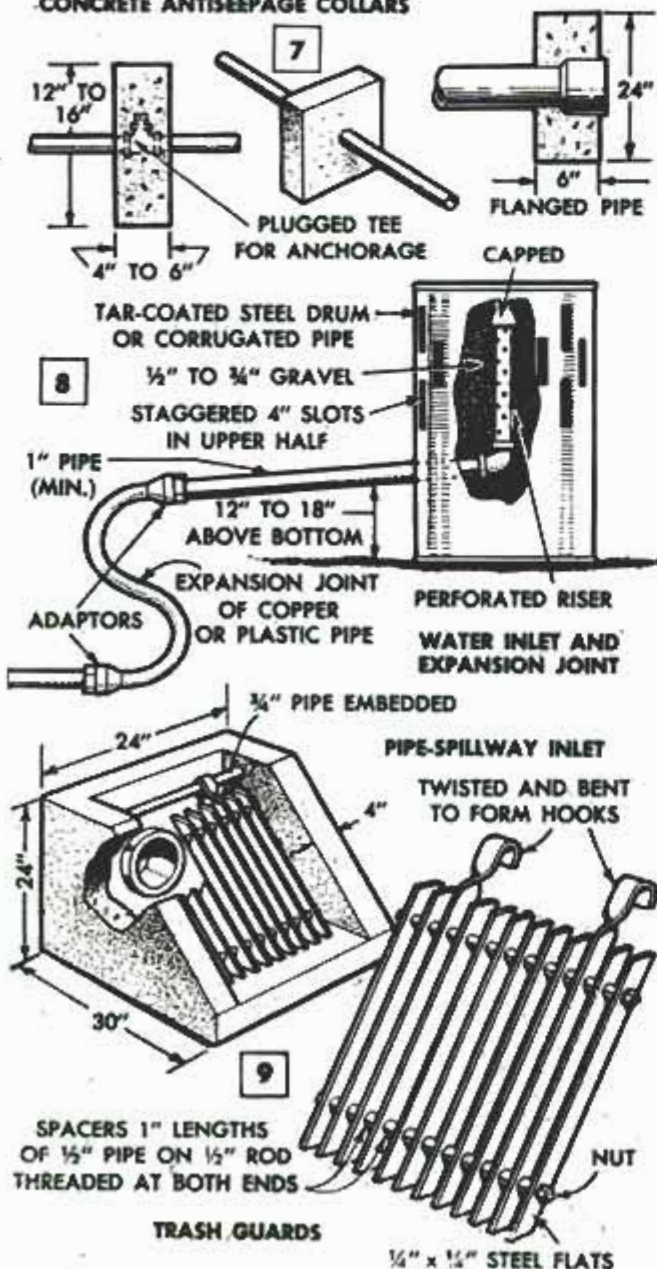
<sup>1</sup>Includes water for drinking, cooking, washing, bathing, laundering, etc.  
<sup>2</sup>Allow 15 gal. additional per horse or cow for flushing stables and washing dairy utensils.

**TABLE B**  
**DIAMETER AND WIDTH OF SPILLWAYS**

| Watershed Area | Diameter of Pipe Spillway | Bottom Width of Emergency Spillway |
|----------------|---------------------------|------------------------------------|
| 10 acres       | 6 in.                     | 8 to 10 ft.                        |
| 10 to 20 acres | 8 in.                     | 10 to 15 ft.                       |
| 20 to 30 acres | 10 in.                    | 15 to 20 ft.                       |



### CONCRETE ANTISEEPAGE COLLARS



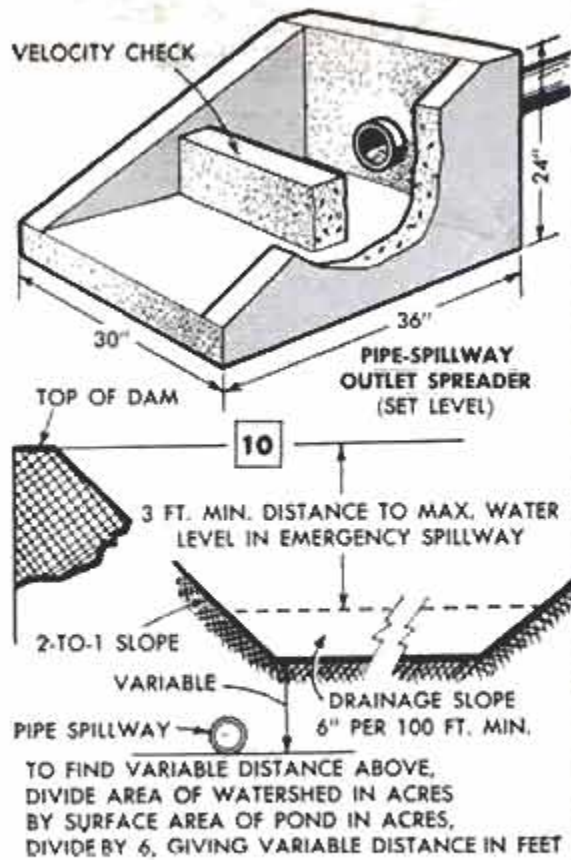
for the dam as in Fig. 6. Start by laying out the top width, which should not be less than 8 ft., and more if heavy earth-moving equipment is to be used. Top of the dam should come 3 ft. above the maximum estimated runoff in the emergency spillway, adding about 15 percent of fill for settling, which will give the top a slight arch. Next, stake off the bottom width of the dam, allowing for a 3-to-1 slope (horizontal base line to vertical rise) on the pond side, and a 2-to-1 slope on the downstream side. Clear away all stumps, roots, brush and debris, then strip the sod and topsoil to a depth of about 6 in. from the base area of the dam.

### Water-Supply Pipe and Intake

Before placing any fill for the dam, dig a trench for a water-supply pipe (not less than 1-in. size) which leads to the treatment plant. Lay the pipe below frost level where it projects beyond the dam downstream. Where it runs under the dam install concrete antiseepage collars, Figs. 6 and 7, and also puddle clay around the pipe to seal it. The pipe runs to the deepest part of the excavation where it connects to a gravel-screened inlet, Fig. 8. The pipe, like other long pipelines, should have an expansion joint.

### Clay Core in Dam

Where surface soils are somewhat porous, a dam will require a clay core to prevent horizontal seepage through it. As shown in the elevation view of Fig. 6, this is started in a core trench about 4 ft. wide and runs lengthwise under the center of the dam. The trench must be deep enough



At right is shown dam being constructed with aid of earthmoving machine. Wide top on dam is required to accommodate such machinery. Above is detailed outlet of pipe spillway and emergency spillway



Photo courtesy of U. S. Department of Agriculture

to reach clayey subsoil to prevent horizontal seepage. It should be dug before laying the water-supply pipe as already described. The core is laid in 6-in. layers, compacted tightly, while placing fill on either side. Sometimes the core level is kept slightly lower than adjacent earth to form a depression to hold water for puddling the clay. Adjacent earth should not contain sod or debris, and rocks should be separated.

### Spillway Details

A pipe spillway is laid in place as construction proceeds, installing antiseepage collars spaced 10 to 20 ft. as detailed in Fig. 7. The pipe should be of durable, waterproof material for underground use. The size will vary as indicated in Table B on page 167. The inlet, Figs. 6 and 9, has a trash guard. The lower edge of the pipe at the inlet comes flush with the pond water level. The discharge end terminates at a spreader, Fig. 10, located to stand level.

The intake of the sodded emergency spillway should be located from 1 to 3 ft. above the level of the pond when full. This variable distance is calculated from data given in Fig. 10, which is based on the runoff rate from a gently sloping, grass-covered watershed. If the distance comes

to more than 3 ft., another kind of emergency spillway of larger capacity and greater strength will be required such as one of concrete.

The emergency spillway is scraped out of previously undisturbed earth to bypass the dam at a safe distance, making dam washout improbable. Minimum drainage slope is 6 in. per 100 ft., and the sides should have a 2-to-1 slope. Depth should be calculated to confine maximum expected runoff. Width varies with watershed area and pond area as in Table B.

### Protecting Dam, Pond and Watershed

Exposed surfaces of dam and spillway should have protective grass coverage. Pond banks have a 2-to-1 slope to retard underwater weed growth. Watershed should be fenced off to keep cattle from contaminating the water and possibly damaging the shoreline, dam or spillway. A diversion ditch just outside the fence and parallel with it will lead off contaminated surface water coming from uphill.

Excessive muddiness in a pond can be reduced by scattering agricultural gypsum on the water in the proportion of 12 lb. per 1000 cu. ft. of water. This reduces the load on the filter plant.

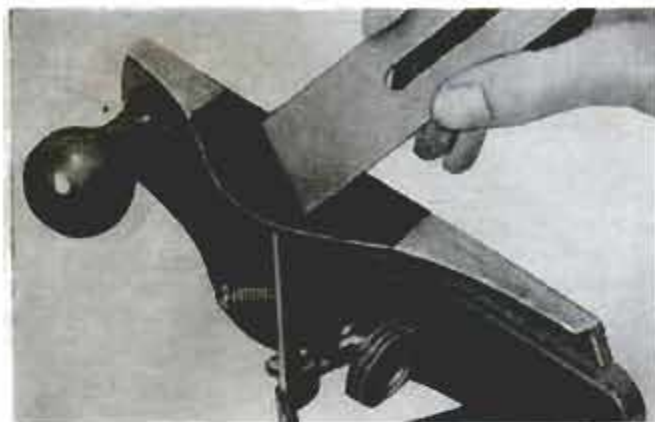
(Continued next month)



### Lunch Bag Hung on Car Door Is Disposable Waste Basket

Youngsters will be less likely to throw food wrappers on the car floor or highway when on a trip, if a lunch bag having a hook formed from copper wire is hung on one of the doors as shown. Take several such bags along to replace ones that become filled.—Muir Adair, Markham, Ont., Canada.

### Touchup Surface for Plane Iron



Emery cloth cemented to one side of a plane as shown provides a handy means of touching up the blade, or plane iron, when an oilstone is unavailable. The cloth can be replaced easily.

R. Hanscom, Elmhurst, Ill.

### Automatic Choke Malfunctioning

Car-engine troubles, such as stalling, backfiring and hard starting, frequently are caused by failure of the heat tube in the automatic-choke mechanism, according to the service department of Champion Spark Plug Co. A bad heat tube usually permits carbon deposits to build up on the choke components and restrict choke action, causing it to stick somewhere between the "on" and "off" positions. To correct this trouble, replace the tube according to the manufacturer's instructions.

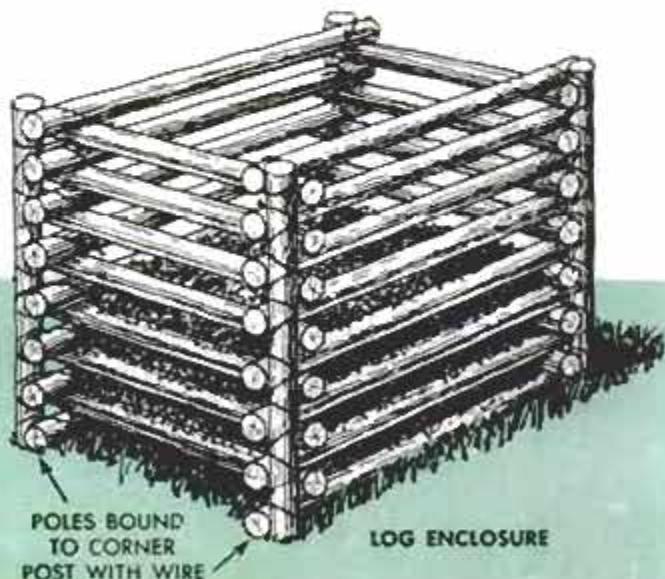
# 5 Designs in COMPOSTERS

By Charles H. Coleman

**I**F THE HIGH COST of garden fertilizers has discouraged you from developing a "green thumb," here is a way of producing all the natural fertilizer needed at no cost. Simply build one of the five types of compost enclosures illustrated in this article, and keep it filled with lawn clippings and other waste vegetable matter.

The type of enclosure you build or the materials used for its construction are unimportant. However, compost matter should be piled as high as possible to minimize evaporation and retain heat generated by the microorganisms that reduce the material to fertilizer. For these reasons, do not build a composter that is too large for your needs.

An efficient composter is one that rapidly converts vegetable matter into dark-colored, granular fertilizer having an odor of good, rich earth. Five essential elements are necessary to accomplish this: Vegetable matter, moisture, air, warmth and microorganisms. Bulky plants, such as tomato vines and weeds, should be chopped into small pieces to permit the compost to be packed more densely, which induces faster decomposition. If the material is dry, saturate it with water. To keep the compost sweet-smelling there must be adequate exposure to the atmosphere. Each of the five types of enclosures shown provides for ample ventilation. Heat is developed by the microorganisms working on the compost materials, developing temperatures as high as 165 deg. F. in a densely compacted, bacteria-rich mixture. In addition to speed-

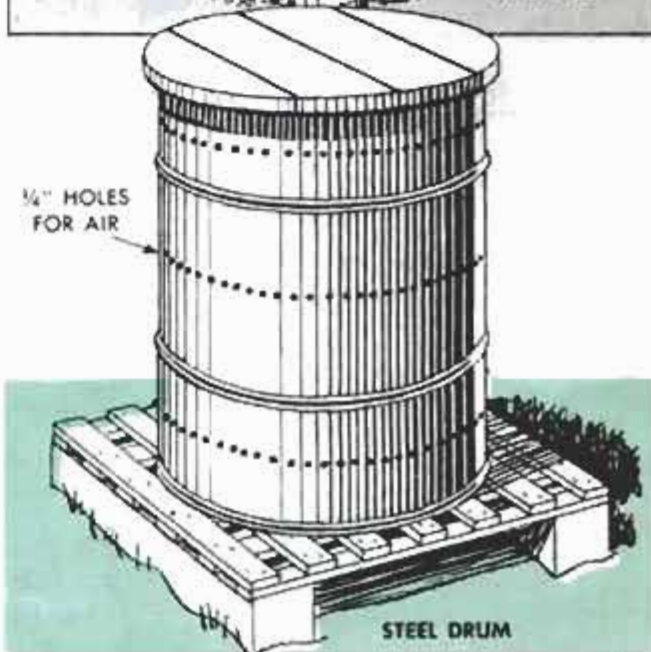
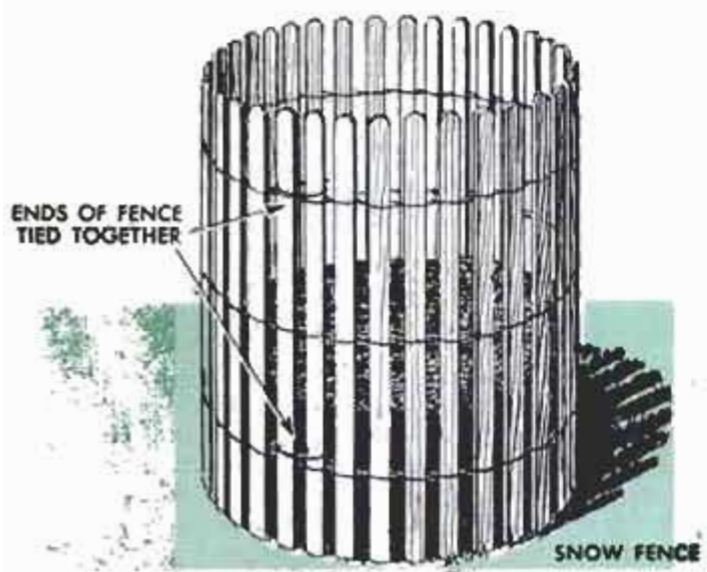
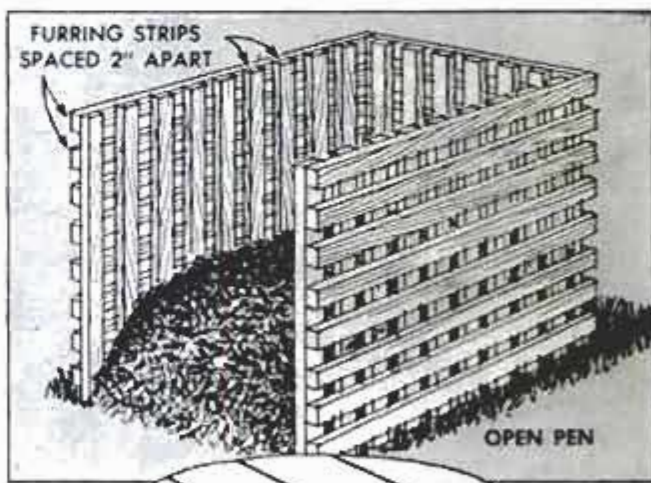




CONCRETE BLOCK

ing decomposition, high temperatures kill germs and weed seeds.

The best procedure for filling a composter is to first throw a 2-in. layer of moist grass on the bottom of it. Then sprinkle a thin layer of black soil on top. The soil provides the microorganisms (bacteria and fungi) necessary for decomposition. Continue filling the composter, alternating a layer of vegetable waste with a layer of soil. Cap the last layer with several shovels of soil. For an extra-rich compost, sprinkle the soil layers with bone meal, ground rock phosphate, or lime. In 2 to 4 weeks most of the vegetable matter should be converted to rich fertilizer. ★ ★ ★



# SOLVING Home Problems

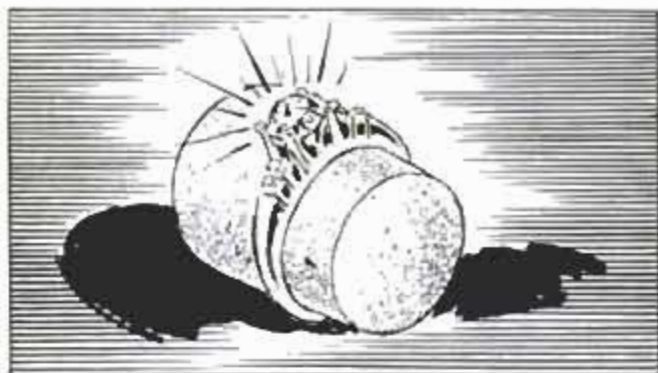


**IF YOU WANT TO "MILK"** a coconut quickly and completely, drill out the two soft eyes in the end and insert a soda straw in one to vent the interior

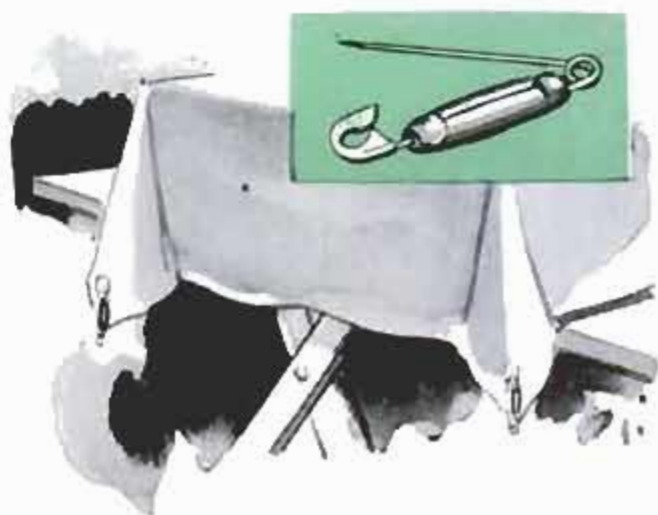
A "CORKING GOOD" IDEA is to store a finger ring on a cork. It not only will protect the stone when the ring is kept with other jewelry but will make it easier to find. Provides grip when cleaning



**FISHLINE SINKERS** attached to safety pins serve as neat little weights for keeping a picnic cloth from blowing off the table. Best of all there is no laundering problem since the weights are easily unpinned. The lead clamp-on-type sinkers are simply pinched shut around the backs of the safety pins

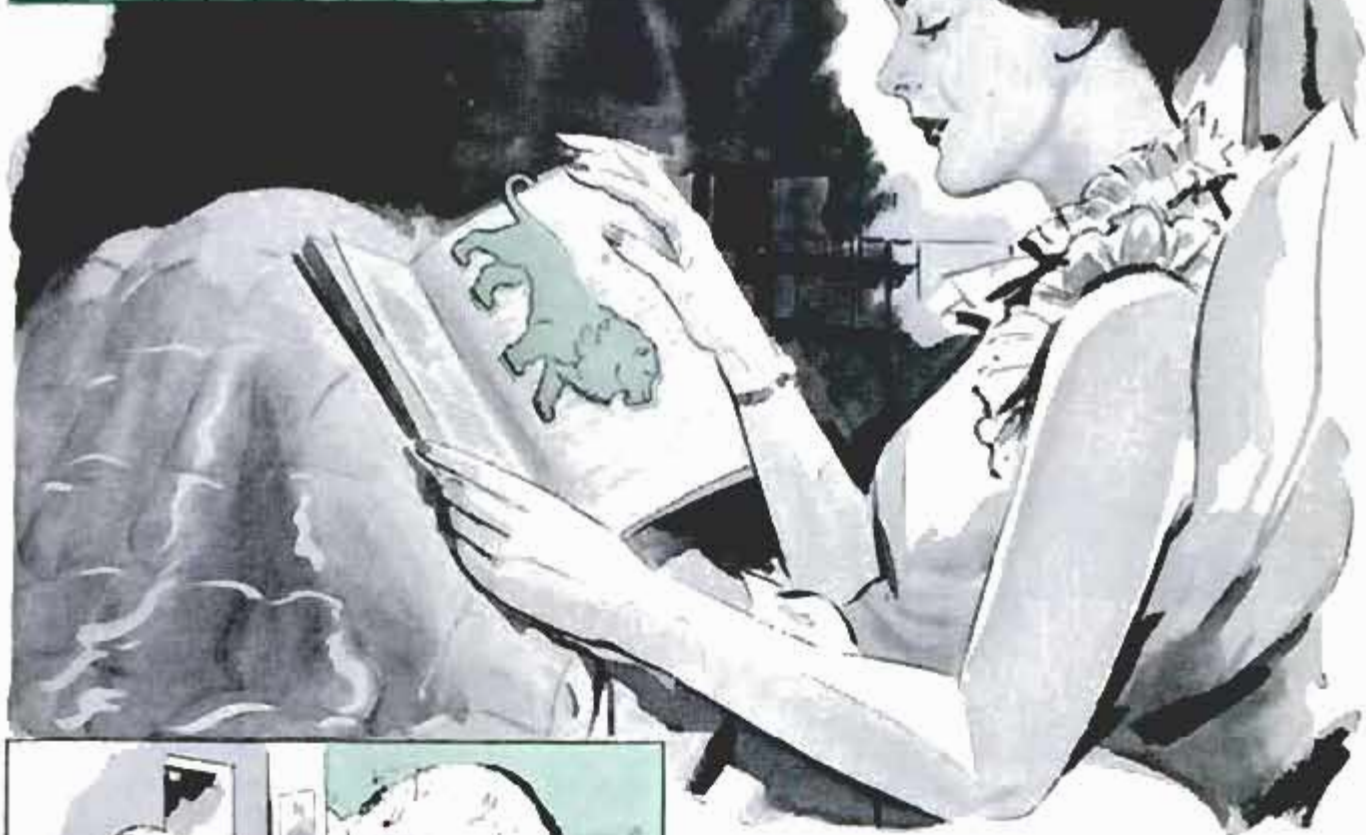
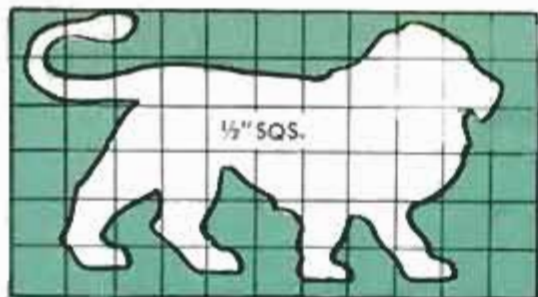


**THE HOOD** from a baby carriage will be found ideal for keeping the weight of bedclothes from touching a patient. Placed over the feet, for example, the hood will lift the bedding and yet keep the feet covered. Bedding, of course, must be extra slack



**KITCHEN STEP-ON CAN** won't skid about on a slick floor when the pedal is depressed if the bottom is made skidproof with a length of  $\frac{1}{4}$ -in. rubber tubing. The wall of the tubing is slit with a sharp knife so it will clamp itself over the crimped edge of the can. Tubing applied in the same way to the top of the can will quiet the closing of the lid





**SAFEGUARDING TYKES** against head injury on the projecting bolt of an interior door lock is accomplished by keeping the bolt depressed with a piece of adhesive tape. Bring tape around so it will hold

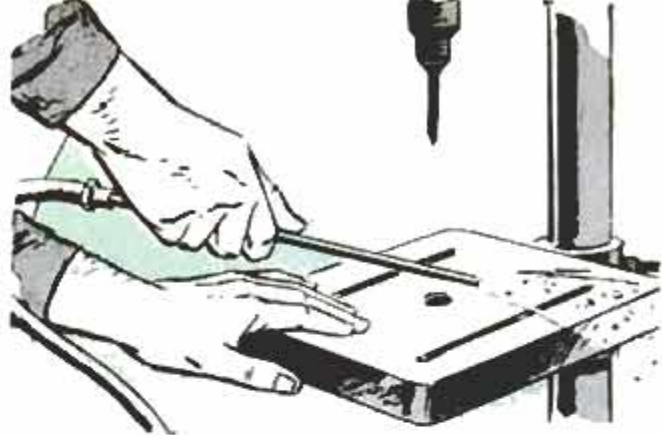


**WHAT TO DO** to keep pans from blackening on the bottoms has troubled many a housewife. One method that has been found effective is to rub the bottoms with a cake of soap. The soap film prevents the formation of sooty coatings so difficult to remove. It is best to heat the pan before applying soap,

**IF YOU LIKE TO READ** in bed and are apt to drop off to sleep while doing so, you won't lose your place using a bookmark that hooks over the edge of the page. Such a bookmark can be cut from cardboard in the form of an animal, letting the tail serve as a hook to hold it and keep it from falling out

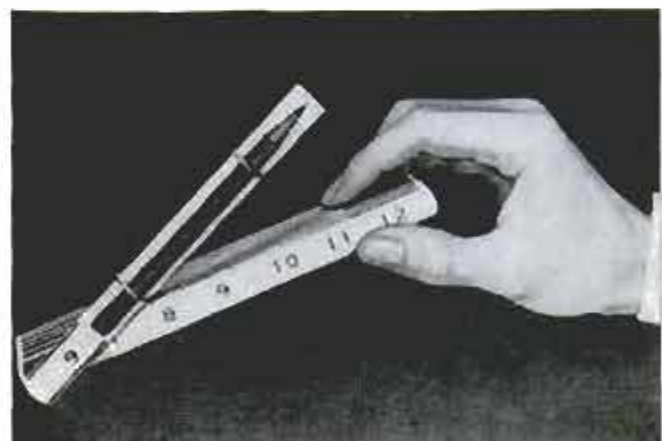
**WHEN DRY WEATHER** outlaws open picnic fires, you can lick the cooking problem with wide-mouthed vacuum jugs. Hot dogs and buns, for example, are packed piping hot in separate jugs, the hot dogs being drained and the buns steamed. Both buns and hot dogs will arrive piping hot, ready to serve at the picnic





### Extension Tube Directs Air

Cleaning machinery with compressed air is done more easily with an extension tube on the blowgun. A spare blowgun nozzle is drilled to accept a length of hard-brass tubing that is soldered or brazed in place. The tube permits directing air into locations difficult to reach with a regular blowgun, and also keeps the operator farther from the blast of air and the debris that is blown about. It takes only a moment to change back to the regular nozzle.



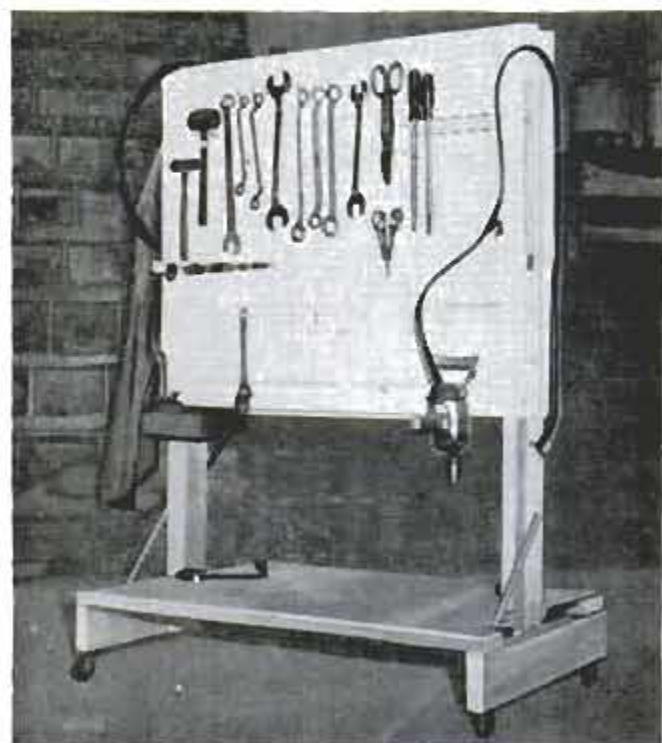
### Pencil Held on Folding Rule

You can be sure of always having a pencil to use with a folding rule by fastening one to the rule with a couple of small rubber bands. The bands and pencil are fitted on one of the outside blades, where the pencil is readily removed. If the rubber bands are small ones they will not interfere with the folding of the rule blades. A flat carpenter's pencil can be used, as well as a round one such as shown in the photo.

R. Hanscom, Elmhurst, Ill.

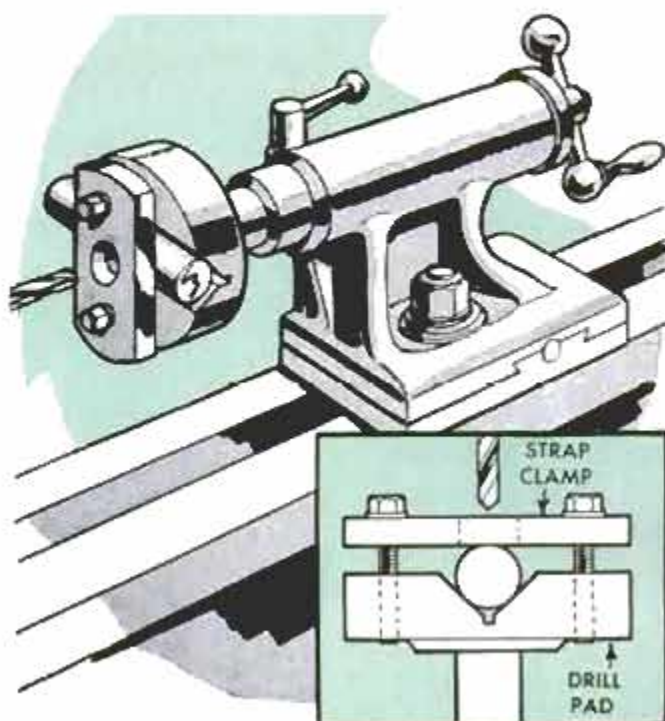
### "Roll Anywhere" Tool Board

Easily rolled anywhere in the shop, and with a shelf at the bottom for carrying materials, this tool board eliminates much walking and tool hunting. The board is a sheet of perforated hardboard fitted with hooks of various types to accommodate different tools. When one side of the panel becomes filled with tools, the opposite side can be used also.



### Clamp for Drilling Round Stock

Cross-drilling round stock in a lathe is easier and more accurate when this improvised clamp is used. The clamp is a drill pad drilled and tapped for two capscrews that hold a flat steel clamp as indicated. A hole in the center of the flat permits seeing the centerpunch mark that indicates where the hole is to be drilled in the stock so it can be aligned with the drill.



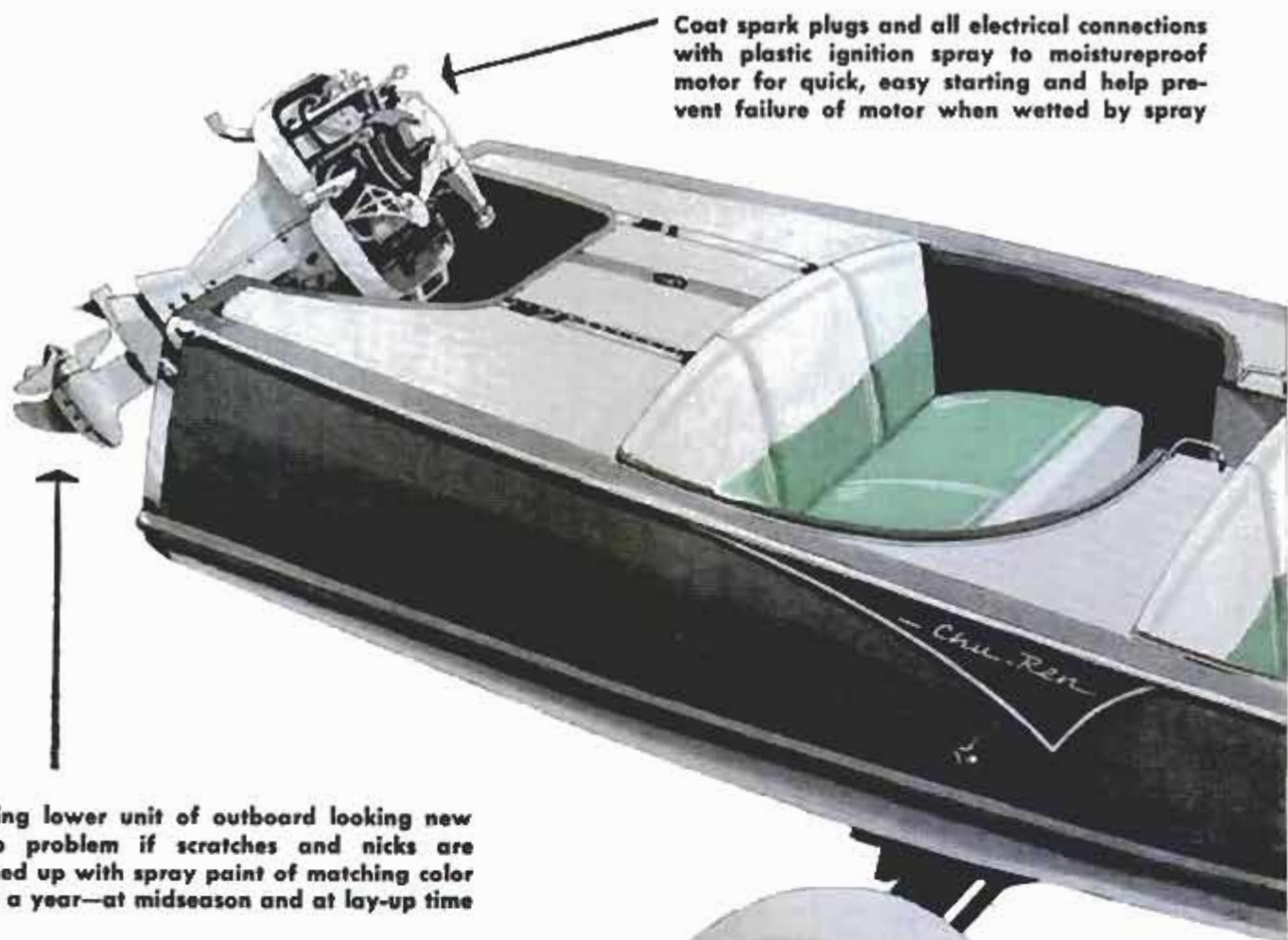




### **"Woven" Plywood Sun Screens Supported on Pipe Columns**

DESIGNED BY Smith and Williams, architects, Pasadena, Calif., this garden sun screen consists of sheets of slit  $\frac{1}{4}$ -in. plywood fitted over 2 x 12s. Each sheet of exterior-grade plywood is cut lengthwise on a saw, the first cuts being made 3 in. from each of the edges, and the remaining cuts being spaced 2 in. apart. All of the cuts stop 6 in. from the ends of the sheets. The resulting alternate strips then are pried apart and a length of 2 x 12 is slipped between them. The ends of the 2 x 12s can be cut at an angle, or given a "design look" as in the photograph, before being slipped through the plywood. To support the 2 x 12 timbers, lengths of 2-in. pipe are set in concrete. These pipe columns are located in pairs. Holes are drilled through the

pairs of pipes and the timbers to permit bolting the latter in position. Although the pipe columns shown are quite tall, personal preference or landscaping might dictate that shorter columns would be preferable. The plywood sheets and timbers should be given a heavy coat of wood preservative or paint to protect them against rain and snow. Wood screws driven through the plywood strips into the timbers should be brass or aluminum to avoid the problem of rust. Pipe used for the columns should be galvanized, and a cap is turned onto the upper end of each to prevent rainwater entering them and causing the lower ends to rust inside the concrete. As shown, adjacent plywood sheets are joined by slotted lengths of 1-in. wood strips.



Coat spark plugs and all electrical connections with plastic ignition spray to moistureproof motor for quick, easy starting and help prevent failure of motor when wetted by spray

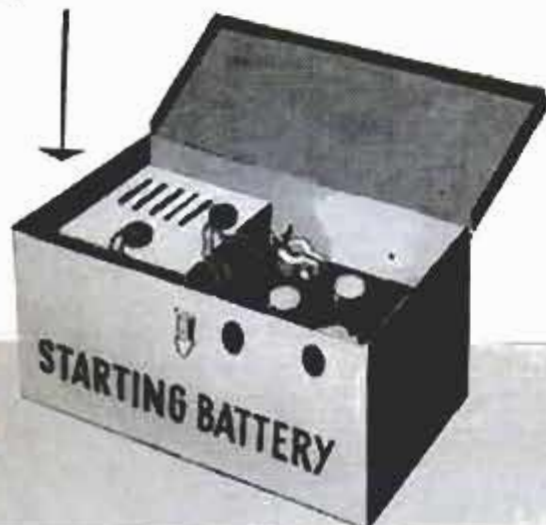
Keeping lower unit of outboard looking new is no problem if scratches and nicks are touched up with spray paint of matching color twice a year—at midseason and at lay-up time

Paint scratches and nicks on trailer fenders should be touched up before rust attacks bare metal. To refinish, featheredge scratches and spray-paint with enamel of matching color



Battery terminals corrode rapidly when exposed to salt spray, reducing battery efficiency. To avoid this, clean and coat terminals with plastic spray and keep battery under cover

Don't neglect remote fuel tanks. Areas that need paint should be cleaned with lacquer thinner and sprayed with "fire red" lacquer



# BOAT CARE

By V. Lee Oertle

Use pressurized, foam-type upholstery cleaner to keep fabric-covered parts of boat and convertible top clean and bright, removing soil before it discolors the fabric permanently



Coat marine hardware, steering wheel and motor hood with clear plastic spray immediately after cleaning to minimize weathering and reduce seasonal maintenance work



Spray trailer-hitch parts and winch gears with rust solvent to keep them in good working order. This should be done frequently, especially if the equipment is used on salt water

**DON'T LET MIDSEASON**-maintenance "blues" keep you from enjoying full use of your boat and motor. If the preventive-maintenance suggestions given in this article are followed, you will spend more hours boating and less making repairs.

Most materials needed for small touchup and servicing jobs come in pressurized cans that are easy to use, yet permit doing a professional job without expensive professional tools. Enamel and lacquer in colors to match original finishes on most popular models of equipment can be pur-

chased from dealers and most marine-supply stores. Spray-on rust solvent is ideal for freeing rust-frozen parts and for keeping boat roller bearings on trailers, winch gears and trailer hitches working properly.

Upholstered seats and fabric-covered boat cushions can be kept looking new simply by giving them a periodic cleaning with upholstery cleaner. Be sure to remove soil before it works into the fabric to leave a permanent stain. Polished hardware stays bright when coated with easily applied clear-plastic spray. ★ ★ ★

## Grass Cutter for Sprinkler Head

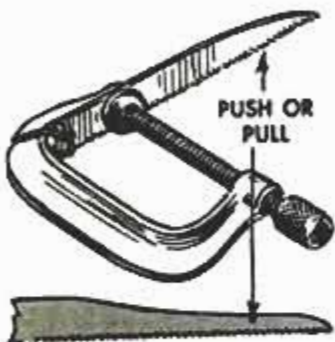
Trimming grass around a sprinkler head of an underground watering system is easy when a can of slightly larger diameter than



the head is cut in half and pressed into the ground surrounding it. A short length of dowel tied to the cutter with wire as shown in the detail serves as a handle.—A. N. Melin, Hialeah, Fla.

## Compass Saw From Hacksaw Blade

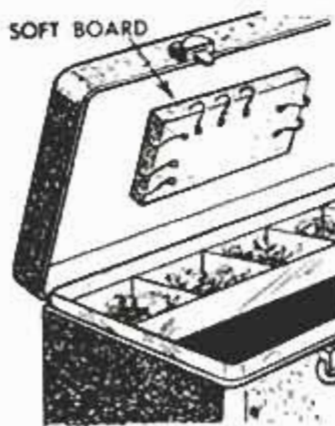
When a compass saw is needed and none is available, you can make this emergency tool from a discarded hacksaw blade.



First fasten the blade in a C-clamp, positioning it so the teeth face in the desired direction. Then cut the blade to the required length and grind the end to a point as shown.—R. L. Sargisson, Berwyn, Ill.

## Balsa Secures Fishhooks

There will be no tangling of loose fishhooks inside a tackle box if you use a block of balsa wood as a "cushion" to hold them.



Cement the block to inside surface of lid. If available, contact cement will hold the block firmly in place. The same idea can be used for snelled hooks by driving small brads into one end to take the looped ends of the leaders.—G. E. Hendrickson, Argyle, Wis.

For temporary repair of a cracked rib or gunwale on a wooden boat, drill one or more holes in the area of the break and force waterproof glue into each hole. Then clamp the member to close the break. Remove the clamp when the glue has set, sand the repaired area and refinish it to match.

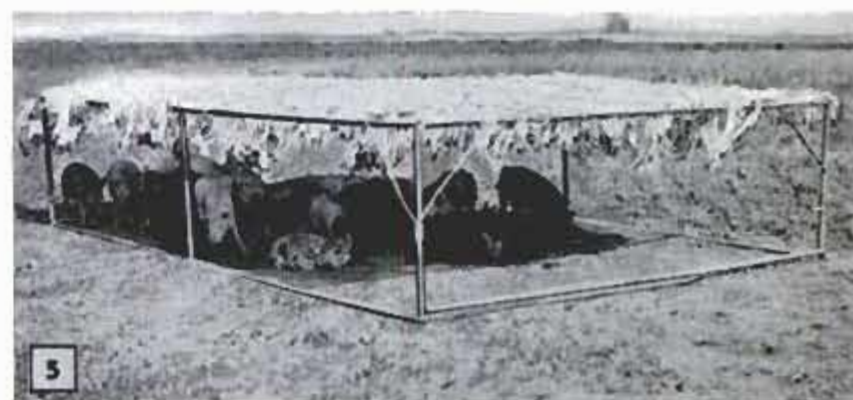
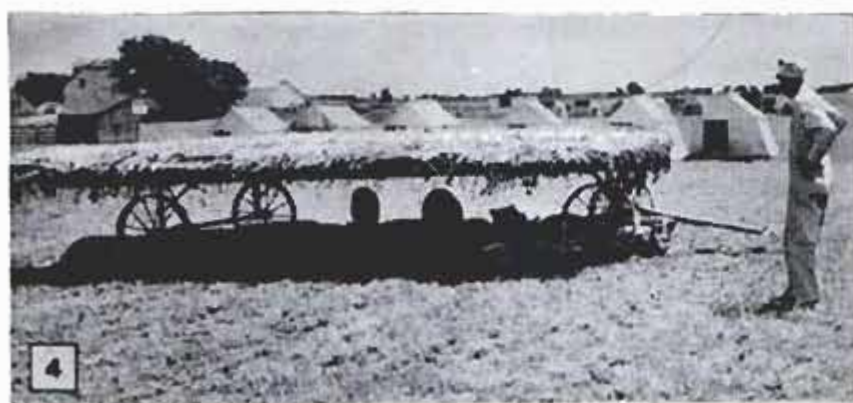
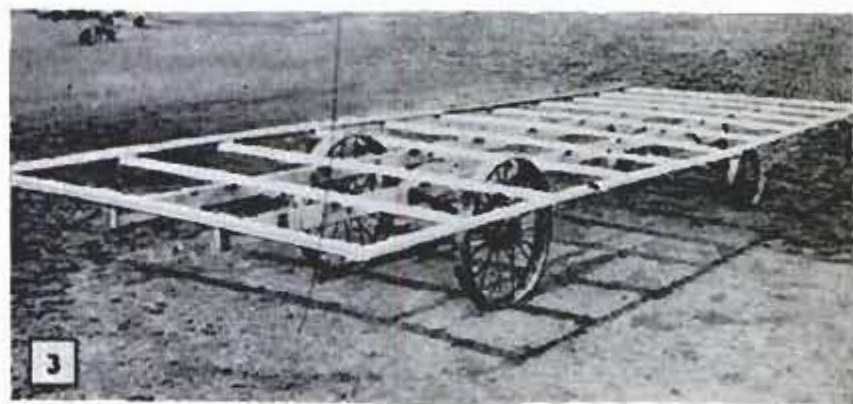
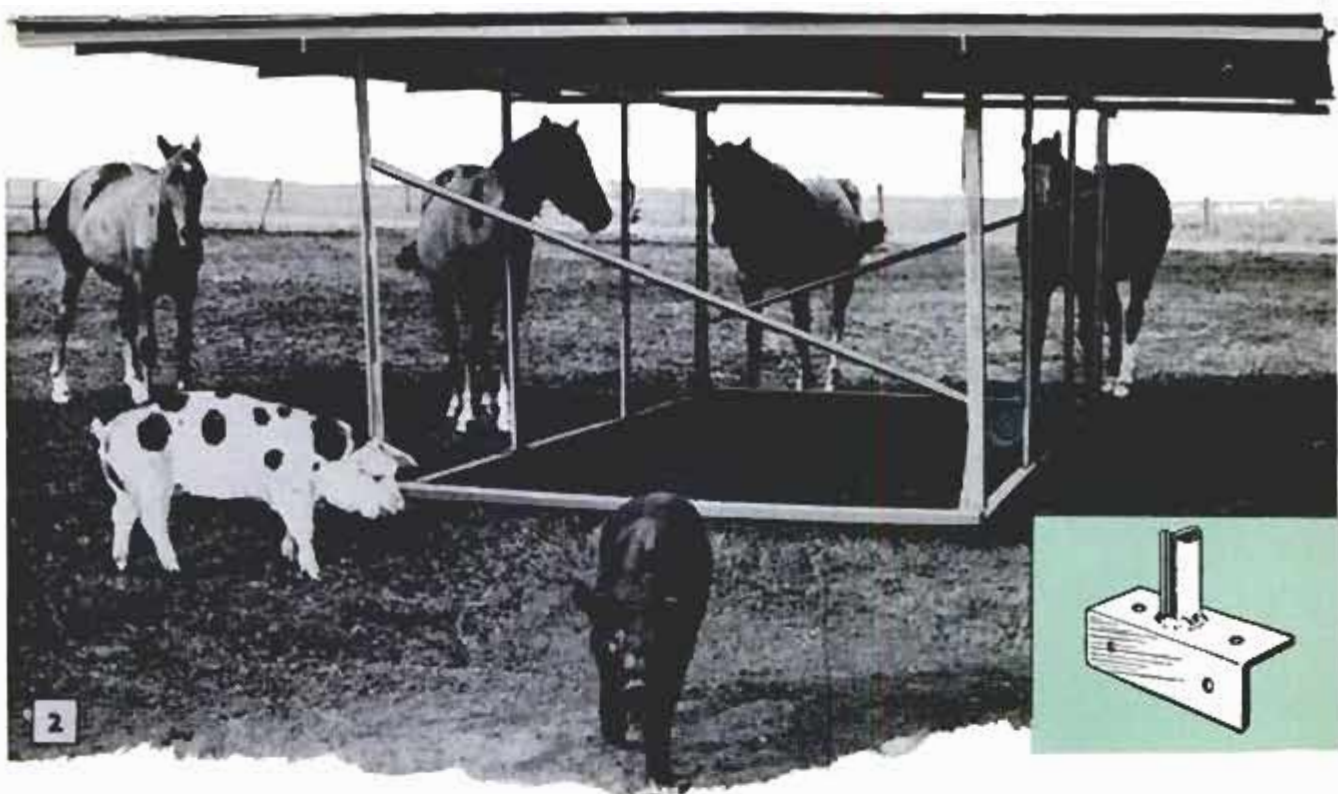
Ken Murray, Colon, Mich.

# LIVESTOCK SUNSHADES

By A. M. Wettach

- 1 Low sides and an arched roof help to prevent this shelter from being overturned by wind. The roof arch is formed by edgemooring a 2 x 4 midway on the rafters on each side of the roof, then attaching corrugated roofing to span the roof arch.
- 2 Livestock of all sizes can be accommodated by this sunshade, the frame of which is made of angles and pipe lengths welded together and fastened to wooden runners as indicated. Shiplap boards nailed to roof stringers provide the shade.
- 3 Here is a low sunshade for hogs that is mounted on farm-machinery wheels for easy moving. The "roof" of this unit consists of a frame of 2 x 4s to which lengths of woven-wire fencing are nailed and then covered with a 6-in. layer of hay.
- 4 This sunshade for hogs is similar to the one shown in Fig. 3, except that the frame that takes the thatch of hay is raised above the wheels to provide clearance for large hogs. Hay is ideal because it acts as a heat barrier as well.
- 5 Lengths of steel pipe welded together as shown form the frame of this portable sunshade for hogs. Woven-wire fencing stretched across the top and tied in place with wire prevents the loose thatch of hay from falling through the mesh.







## Portable Tester Uses AC or DC

By Frank Fritz

**L**IGHT AND COMPACT, this tester can be a real aid to the homeowner who does his own electrical-repair work and to anyone who utilizes electricity or electronics in a hobby. Photographers, especially, will find the tester useful for checking extension cords, flash guns and even flash bulbs. Testing unit can be operated with 110-volt house current, or by its own self-contained dry-cell power. This latter feature makes it possible to use the unit on equipment in the field, where other sources of electricity might not be available. Because of the circuitry, either the house current or dry-cell power can be used to test flash bulbs without firing them, and both circuits can be used on other devices that are powered by higher voltages.

As indicated in the wiring diagram, a recessed male plug is located in the 110-volt circuit of the tester. This permits the female end of an extension cord to be used to supply current. From this plug the current flows in series and parallel through a neon lamp and three resistors that reduce the voltage, so that when exposed test prods are used, upper left-hand photo on this page, touching the prods with bare hands does not present a hazard. However, even

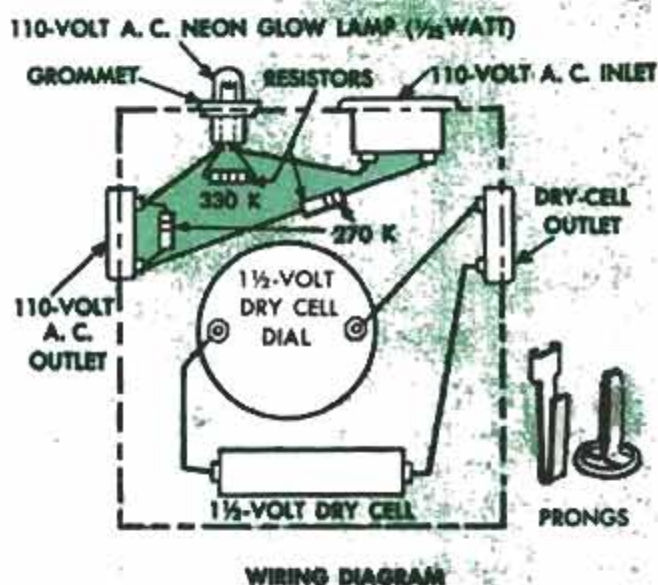
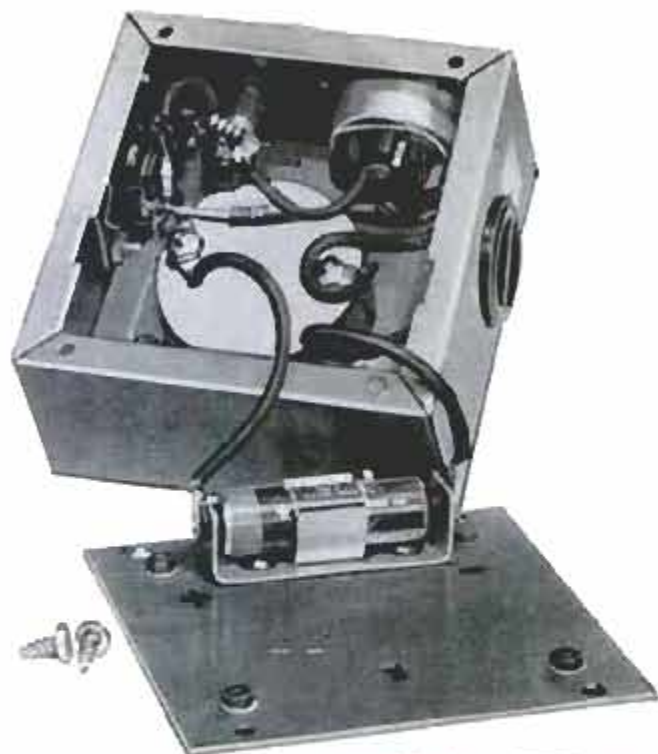
moderate voltages present a potential danger, so treat the tester with respect. When it is not being used, disconnect the 110-volt supply to eliminate the chance of anyone touching bare contacts. Prods inserted in either of the flush-mounted receptacles for testing flash bulbs and house lamps consist of a paper clasp and one prong taken from a light plug. The latter also is available as a replacement prong for some types of plugs and can be purchased in hardware stores. The head of the paper clasp contacts the center of a lamp base, the prong touches the side. If a flash-bulb filament is good, the meter will register or the neon lamp will glow, depending on which circuit is used.

In the dry-cell circuit of the tester, a meter or miniature socket that will accept a No. 40 miniature lamp is used. The meter in the original tester was salvaged from an old radio. If you have such a meter, test it in the following manner: Plug into the socket of the circuit a test cord fitted with prods. Touch the prods together and the meter needle should swing across the dial. Next, touch the prods to the tip and side of the base of an ordinary lamp bulb. The needle should move about halfway across the dial. Finally, touch the prods to a photo-flash bulb, holding the bulb in a gloved

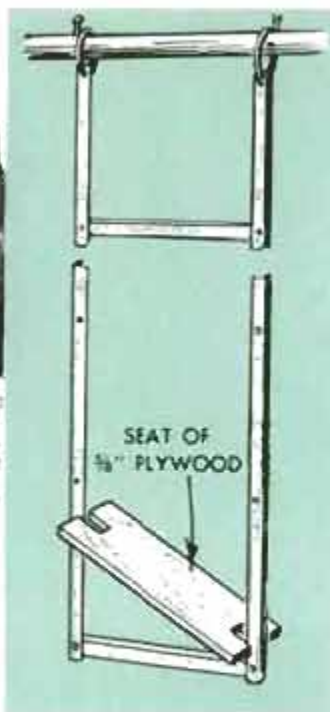


hand in case it fires. If the bulb does fire, discard the meter, as it does not contain enough resistance. The miniature bulb will work as well, but the meter does not project from the tester as will the bulb.

The tester is housed in a metal box of standard 2 x 4 x 4-in. size, available from radio-supply houses. The dry cell, a pen-light size used for power units utilizing transistors, also is obtainable at this source, as are the dry-cell holder, the recessed male plug, the two receptacles and the lamp sockets. Various types of test leads and prods can be made up to suit a particular use. For example, test leads with alligator clips would be handy when checking the continuity in the circuits of an electric motor. Or one lead could have a clip that could be snapped on a convenient ground, while the other lead could be a prod that is moved quickly from one spot to another to check for short circuits or to check continuity of a circuit that is supposed to be grounded. ★ ★ ★



## Nontipping Swings for Gym Set



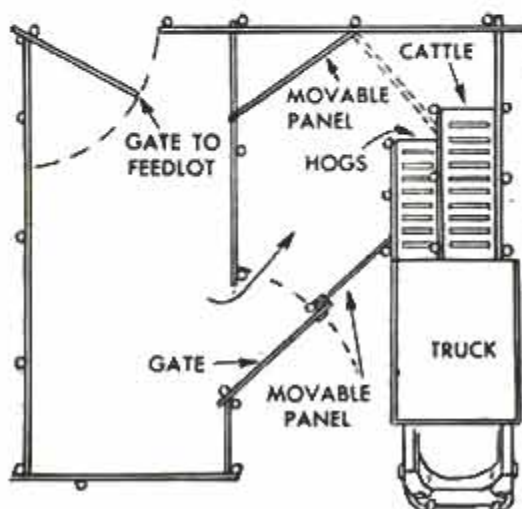
A ladder salvaged from a dismantled windmill will make several nontipping swings for a home-built gym set. Several rungs are removed from each ladder section and a notched board is added for a seat. The swings are hung to the cross-pipe framework with rings formed of  $\frac{1}{4}$ -in. steel rod and later welded. Bolts in the pipe next to each ring provide stops to keep the swings from wandering sideways on the pipe. A dab of grease applied to the rings will make the swings noiseless, and a coat of paint will keep the swings from rusting.



## Tag Keeps Service Record

Outdated key-chain identification tags in the form of miniature car-license plates can be put to good use as lubrication-data tags. Attached to motors and other shop equipment, the tags can be used to record service dates, types of lubricants and other pertinent information. To convert these metal tags, remove the license insert and write the data on a new cardboard insert of the same size before replacing. Protected by a plastic window in the metal frame, the insert will stay clean and serve as a ready reminder. The plastic-type tags can be converted and used in a similar manner.—Richard Hanscom, Elmhurst, Ill.

## Twin Loading Chute Accommodates Large and Small-Size Stock



To permit easier loading of hogs and cattle from the same chute, one farmer partitioned it to provide a narrow passageway for the hogs and a wider one for the cattle as shown. This way, the animals are forced to move through the chute single file. Movable panels that can be attached to the pen and gates permit closing the side of the chute not to be used.—A. M. Wet-tach, Mt. Pleasant, Iowa.



# DO IT BETTER with a STAPLER

ONCE FOUND ONLY ON DESKS, where they were used for fastening sheets of paper together, staplers now are available in a variety of shapes, types and sizes that are used in the home workshop, in factories and in the construction industry, to replace hammer and nails and other fastening devices. Even the desk stapler has become a multipurpose tool, no longer restricted to fastening just paper. The heads of most desk staplers can be pivoted back, or removed completely from the anvil, permitting the stapler to be used as a tacker. Attaching cloth or light sheet plastic to card tables is an example of one job that these staplers do quickly and neatly, Fig. 7. The young lady could do a better job on the table if she had a gun-type stapler, such as the one in Fig. 3. This inexpensive stapler drives fairly heavy  $\frac{1}{4}$  or  $\frac{5}{16}$ -in. staples and will do many jobs around the average home and workshop, including most of those shown in Fig. 5. In this, as in all gun-type staplers, the staple driver is powered by a spring which is tightened to maximum pressure, then suddenly released by the single action of squeezing the trigger arm toward the base. Concentrating the total force of the spring on the narrow

2. Right, top stapler is gun, center is hammer stapler, bottom is mallet-drive stapler. 3. Below is inexpensive, smaller-size staple gun having many uses around a home; it should be in every home workshop



Swingline, Inc.

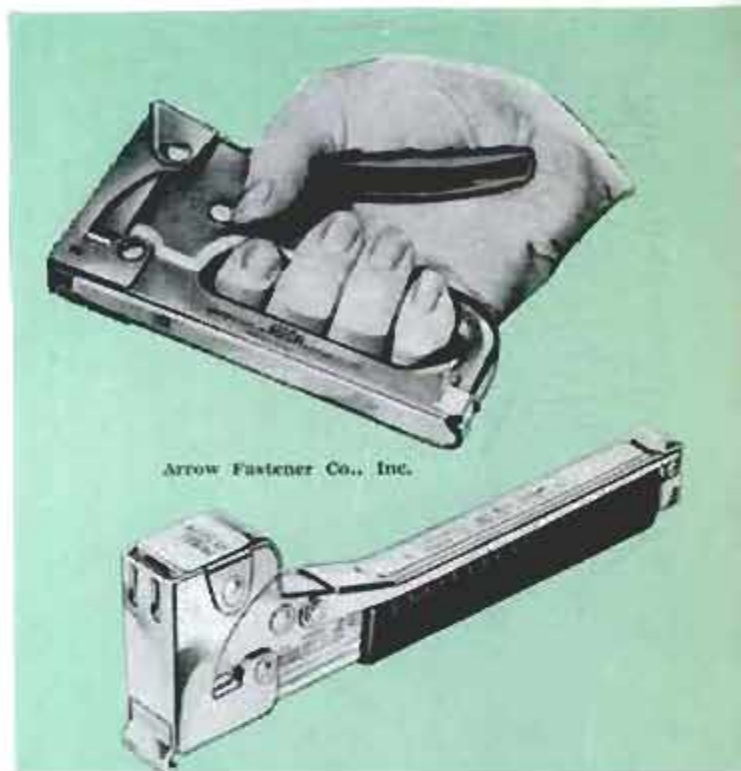
JULY 1959

183



Johns-Manville

1. Quick fastening of ceiling tile through blind flanges is just one job for which a staple gun is ideal



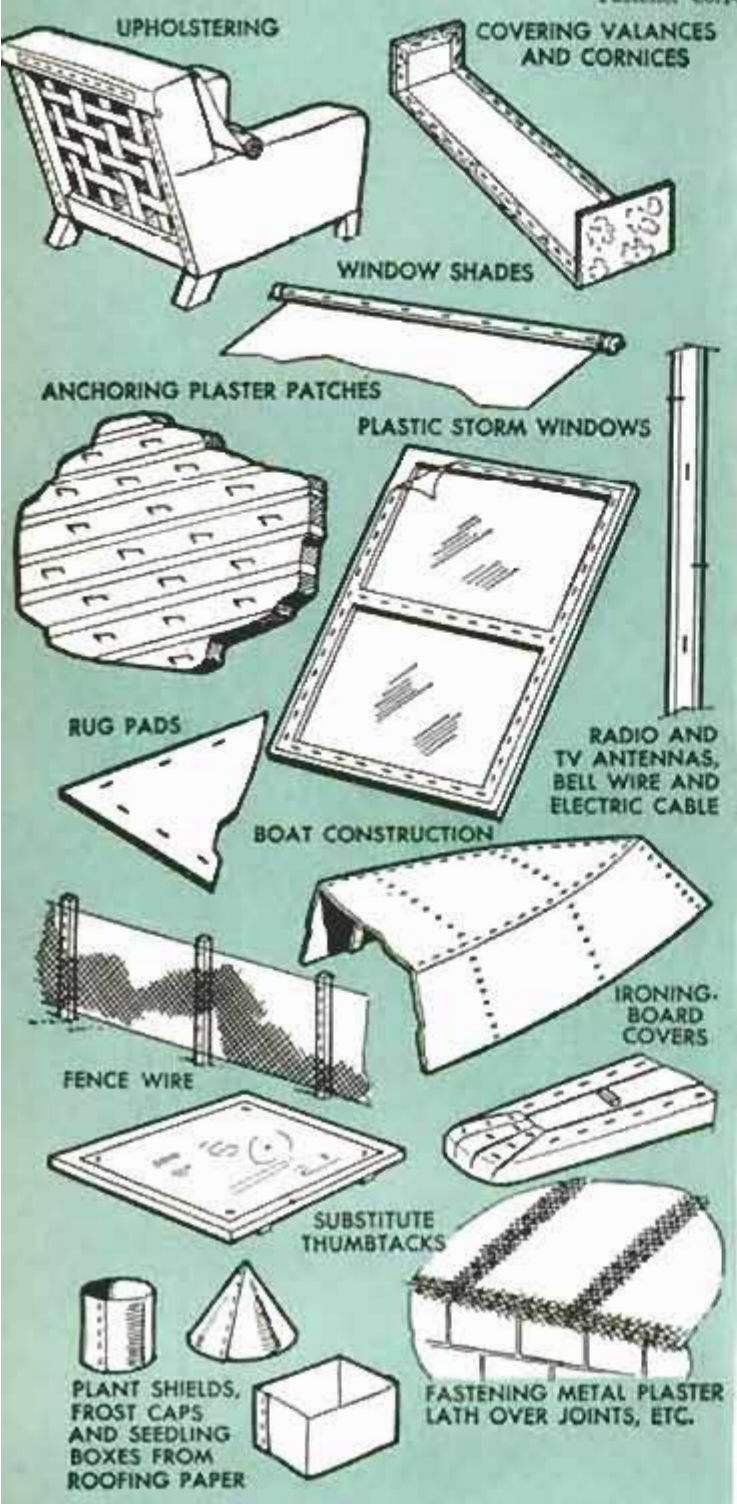
Arrow Fastener Co., Inc.



Spotnalla, Inc.



Fastener Corp.



A FEW OF MANY USES FOR STAPLES

4. Attaching new screening to frames, whether it be metal or plastic, is a quick job with sure-holding staples. Screen trim also can be stapled in place

area of the head of a staple causes it to be driven with tremendous force.

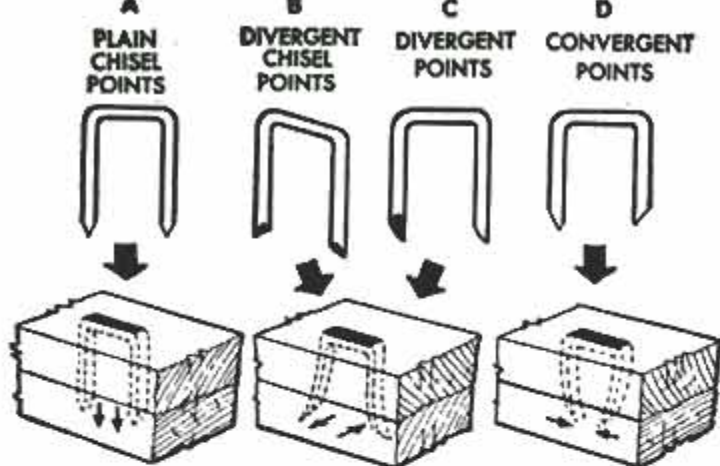
When a job is beyond the capacity of the small gun-type stapler, a larger gun must be used. An example of this is shown in Fig. 1, where the flanges of the ceiling tiles are  $\frac{1}{4}$  in. thick. The staples of the smaller gun would not penetrate deeply enough into the wood, after passing through the flanges, to provide adequate holding power. Larger guns use staples of lengths from  $\frac{7}{16}$  to  $\frac{5}{8}$  in. Heavier drive springs also are used in the larger guns. Compound leverage is used in the triggering mechanism, reducing the work effort required to operate the guns. These larger guns are more expensive and the staples used also cost more than those for smaller guns, but there are obvious advantages to the larger guns. Not only can they do the heavy jobs, but the lighter ones as well. Attaching screening, Fig. 4, upholstery, Fig. 8, and putting up insulation, Fig. 9, can be done with either the large or small guns.

Most staplers can use more than one size of staple. Thus, if one size does not drive flush in a fairly dense substance, a staple with shorter legs should be used to assure firm seating of the staples against the material being stapled. Deep penetration of staples is due to their strength and sharp points. Staples for work heavier than fastening paper usually are made of high-carbon-steel wire for maximum resistance to bending. Plain chisel points, Fig. 6, detail A, drive straight with the least tendency to spread. Divergent chisel points, detail B, have inclined straight edges in opposite directions that cause the staple to spread while cutting through the stock. Divergent points, detail C, also spread the legs, while convergent points, detail D, tend to bring the legs together for anchorage in the material.

Staples are made in a variety of shapes to suit special purposes. The heads may be square, round or oval. Thickness of the wire varies with staple size. In view of these variations, staples of a size other than those specifically made for a machine should not be used. Other staples will not fit or will jam in the plunger passage.

Staples are available plain, without any coating, or they may be rosin-coated or etched to provide greater holding power. Corrosion-resistant staples are galvanized or copper-clad. Stainless-steel staples also

5. Shown are a few of the many jobs that staplers can do. If you are a home handyman, a gardener or a housewife, staplers can do a job better for you



6. Various types of points are used on staples to provide holding power compatible with job requirements. Average gun staples have plain chisel points

are available for some types of guns.

As with most tools, a stapler must be used properly for best results, and with care to avoid mishaps. Keep your fingers clear of the channel through which the staples are driven. In use, hold a gun stapler flat and firmly against the work so the gun will not jump, which prevents it from delivering full power. As an aid in obtaining complete penetration, especially with the smaller guns, press the thumb of the hand not holding the gun on the head, to prevent the gun from jumping.

Larger staple guns often accommodate staples of several lengths. In some guns the depth of penetration can be controlled by an adjustment so that the material being fastened, such as electrical cable, copper or aluminum tubing, will not be damaged. Guns that are especially made for such purposes have lips that fit the work.

Big brother to the staple gun is the hammer stapler, center photo Fig. 2. This tool is swung like a hammer, and drives a staple with each blow. Some of the heavy-gauge staples used are  $\frac{3}{4}$  in. long. Staplers of this type are useful for tacking down carpet pads, shingles, metal plaster lath, roofing paper and similar materials. Another type stapler is the mallet-drive stapler, lower photo Fig. 2. Some of these staplers are built to drive 16-ga. staples as much as  $1\frac{1}{2}$  in. long, for fastening stock  $\frac{3}{4}$  in. thick. Fastening  $\frac{3}{4}$ -in. plywood would be one job for which they are suited.

Not shown are pneumatic staplers, which can drive staples 2 in. long. They are used in assembly and construction in the building industry, as well as in factories. Even sheet metal is fastened with staplers.

But for the homeowner, staplers provide a quick, sure method of attachment, with no skill required, as in nailing. No chance either of making hammer marks where not wanted on a finished surface, with a stapler. ★ ★ ★



Bostitch

7. Above, desk stapler can be opened and used as light-duty tacker. Small gun would do better job



Huller Roberts Mfg. Corp.

8. Above reupholstering chair seats with either cloth or sheet plastic is another easy stapling job. 9. Below, installing insulation is job probably most commonly considered to be done best with a stapler



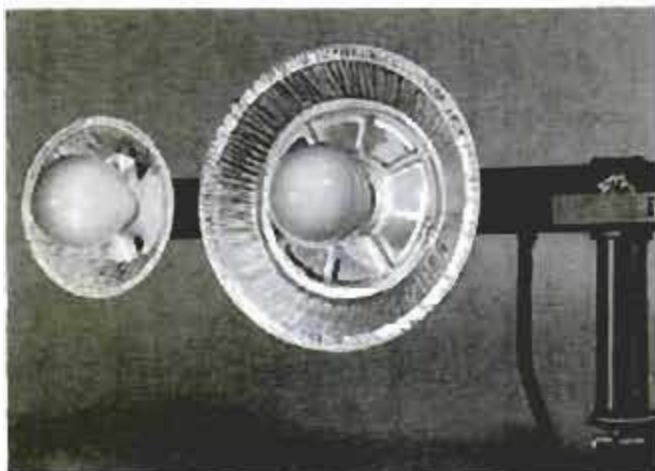
Bostitch



## Lime Marker on Spreader Prevents Overlapping

Overlapping won't happen when applying fertilizer or weed killer if a marker is attached to one wheel of the spreader to show where you have been. The marker is a baking-powder can having a small hole in the side through which a spot of lime is deposited on the lawn with each turn of the wheel. The resulting row of white dots serves as a guide in lining up the hopper with the previous pass. The can is attached to the wheel with a bolt inserted in a hole drilled near the rim and is wedged to position it at right angles to the wheel disk. The spreader is pushed and pulled in making alternate passes and, of course, the hole in the marker must remain in an "up" position when you come to a stop.

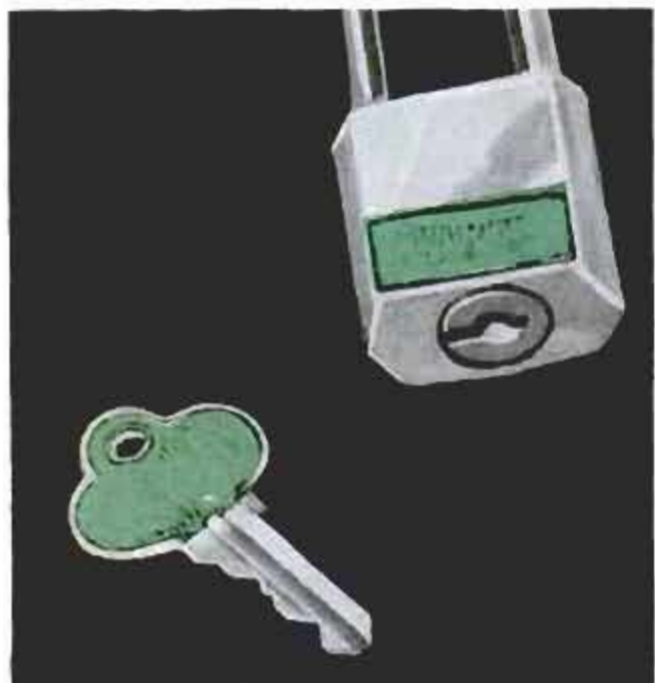
☞ Save those old felt hats and the next time you get an ash tray, ceramic figurine or knickknack that might scratch the surface of furniture, cut a felt pad and cement it to the bottom.



## Improvised Photoflood Reflectors

If you have an occasional need for a makeshift reflector on a bar light or to rig up an extra fill-in light, the reflective qualities of an aluminum-foil pie plate will make a good substitute. The plate is forced over the base of the photoflood lamp by cutting an undersize hole in the center so it will grip the bulb and stay put. Different size plates permit varied lighting effects, and if you should want more depth to the reflector, the plate can be creased to give it more of a cone shape.

Lyn Brueback, Pueblo, Colo.



## Colors Match Locks and Keys

Where a number of padlocks are used, selecting the correct key for a particular lock will be much less of a problem if a spot of matching color is painted on both sides of related keys and locks. Each lock and key, of course, requires a different color. Nail polish could be used where only two or three padlocks are involved as you might have a few different shades on hand.

When stick shellac is not available for filling small holes or nicks in finished surfaces, try using one of the youngsters' wax crayons. Select a crayon of a color that most nearly matches the finish and use a heated knife blade to soften and "iron" it into the nick or hole. When the wax hardens, polish the surface by rubbing briskly with a soft cloth.

*On the*  
**MARKET**  
*for Do-It-Yourselfers*

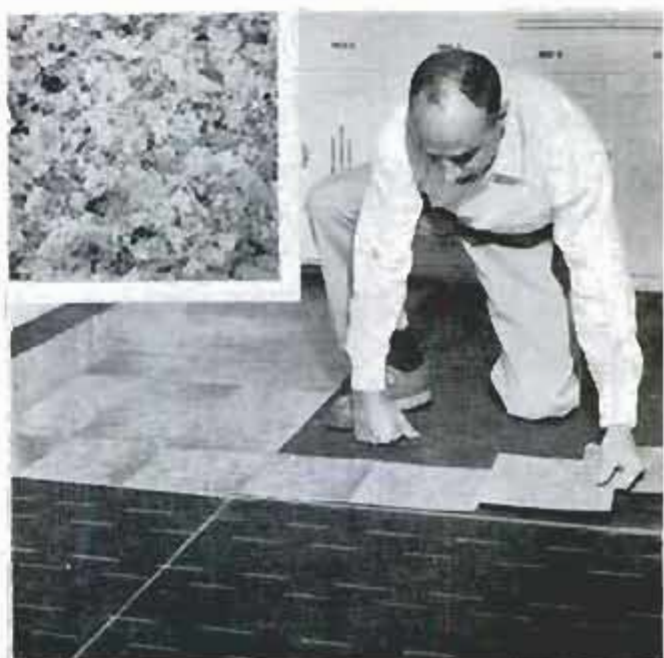
**PLASTIC WALL TILE**, right, can be used in one color or in modern mosaic patterns consisting of several harmonizing colors. Tiles are 4¼ in. square but are molded in a pattern of four 2½-in. tiles butted tightly  
Arcraft Plastics Co., Inc., 255 W. 79th St., Chicago 20

**PEEL AND MOLD-RESISTANT PAINT**, center, left, contains a preservative pigment that resists peeling and tends to inhibit molds that give paint that dingy appearance. Produces resilient film that won't chalk  
Frost Paint & Oil Corp., 1209 N.E. Tyler, Minneapolis 13, Minn.

**FAST-DRYING CEMENT**, center, right, does nearly all household jobs that require use of a strong, flexible cement. Tube is provided with a thin-edged applicator that gets cement into hard-to-reach places  
Ambroid Co., East Weymouth, Mass.

**PLASTIC GUTTERS AND DOWNSPOUTS**, below, left, are reinforced with glass fiber. Do not rust. White color is permanent. No painting is required to protect from weathering. Units are strong, lightweight  
Owens-Corning Fiberglas Corp.,  
598 Madison Ave., New York City 22

**PLASTIC TILE**, below, right, combines appearance and resilience of ordinary cork tile with wearability of plastic. Clear plastic, which forms wear surface, is fused to base of genuine cork, giving a cork texture  
Armstrong Cork Co., 1010 Concord St., Lancaster, Pa.





### Lanterns Help Protect Turkeys

Lanterns hung on steel fence posts driven into the ground help keep predatory animals away from a turkey flock on one farm when the gobblers are penned on the range. Driving the posts at an angle permits the lanterns to hang freely, and thus level, so the wicks burn more evenly and the chimneys are not smoke-stained quickly.

### "Wrought Iron" Picnic Table

Two pairs of legs from old-fashioned sewing machines plus the grill from a floor furnace are combined to make this unusual back-yard picnic table on the Fritz Mayer farm in Henry County, Iowa. Because of its openness, both rain and sun pass through it readily, minimizing the chance of grass beneath it being killed by lack of either. When disassembled, the table becomes a flat "package" that requires a minimum of storage space when put away for the winter months.

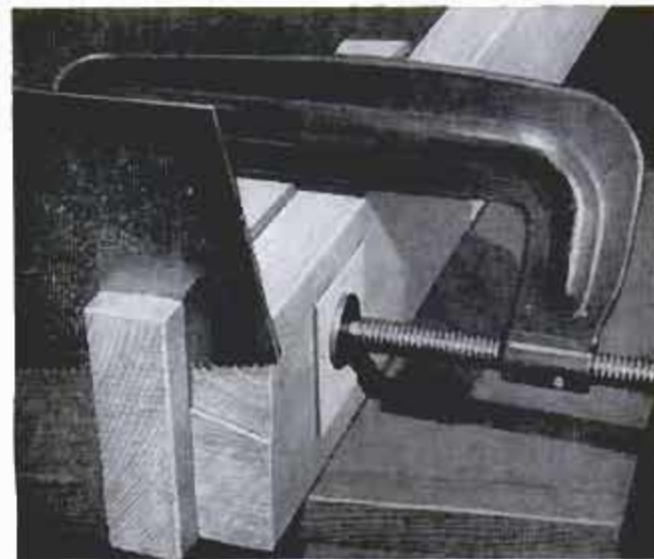


### Bicycle Grip Improves Bow Saw

Slipped over the handle of a bow saw, a bicycle handle-bar grip permits a firmer grasp of the handle when the tool is used. The grip provides not only a larger diameter for easier holding, but also a slipproof surface. Chance of injury also is minimized, because the sharp end of the saw handle is covered by the grip.

### Sawing Thin Slice From Wood

Sawing a thin slice from the end of a piece of wood usually results in a rough, inaccurate cut because the saw cannot be guided. To overcome this problem, clamp the stock to be cut to a piece of scrap wood and saw through both the scrap and the good stock as indicated. The cut in the scrap will keep the saw aligned and permit making a straight cut in the good lumber. A backsaw is best for this type of cut as it will flex less when sawing close to the end of a board.





## POWERED SILAGE UNLOADER

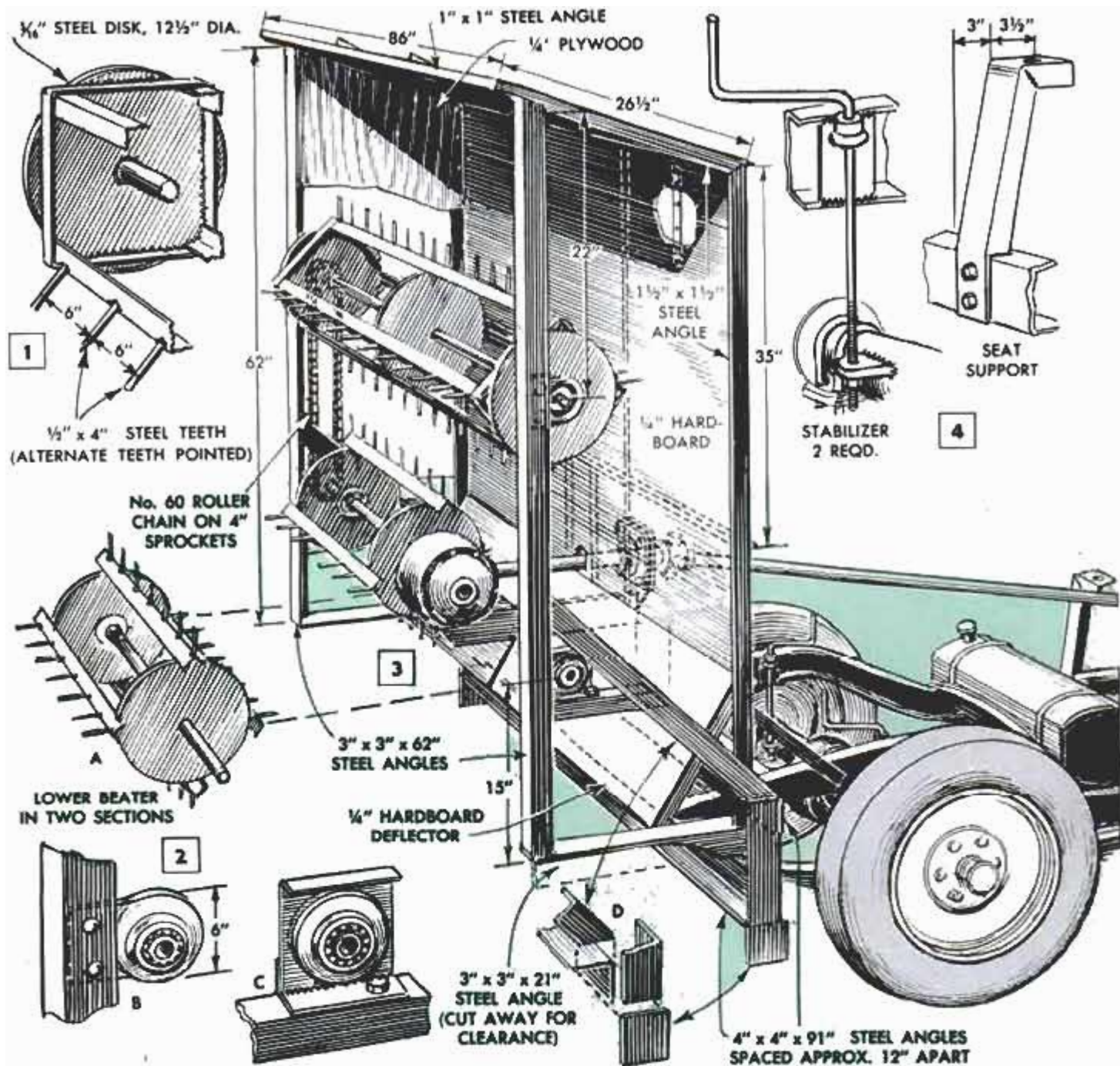
By A. M. Wettach

**A**N UNLOADER which is self-propelled and individually powered has advantages over other types driven by tractor power takeoff or from some other separate source of power. In some instances its use will eliminate one tractor from the operation of green-feed storage. Also, in custom work or in a change-work plan among neighboring farmers, the speed and maneuverability of the self-powered unloader can effect a material saving in time and labor.

The speed of the beaters can be varied to suit conditions and the type of material being handled. Both beaters are driven at the same speed, which has the effect of controlling the amount of green chopped material fed to the drag. This prevents slugging and possible damage to the blower which conveys the material to the silo or other storage unit. The original beater assembly was mounted on a light-truck chassis and, with the exception of steel angles, rods and some other stock items, is built almost entirely of parts salvaged from

old cars and farm machines. Nearly all older-type light trucks and some older cars can be used as power units. The car or truck is stripped down to the frame, leaving only the hood, steering column and dash, all of which are utilized. The beater unit is mounted on the rear end of the chassis frame and is housed on the top, back and one side, Fig. 3. The lower beater is driven through a locked auto differential and, in turn, the lower beater drives the upper one through a roller-chain drive which is shielded by the plywood end panel.

Note in Figs. 1, 2 and 3 that the upper beater is constructed as a single unit while the lower beater consists of two identical units which operate as one. In most instances the two-section lower beater can be mounted on the original differential shafts, or axles. Outboard bearings for the lower beater and those carrying the upper beater are ball bearings salvaged from farm machines. Ball bearings of the type mounted in flanged cartridges or in brackets are the most suitable for the purpose as the



bearing assembly can be bolted to the steel-angle frame of the beater housing. In some types of car and truck rear axles the outboard bearing mountings can be utilized by cutting away the axle housing and welding a bracket to the bearing mounting. Or, if necessary, you can make up special bracket bearing mountings as in Fig. 2, details B and C.

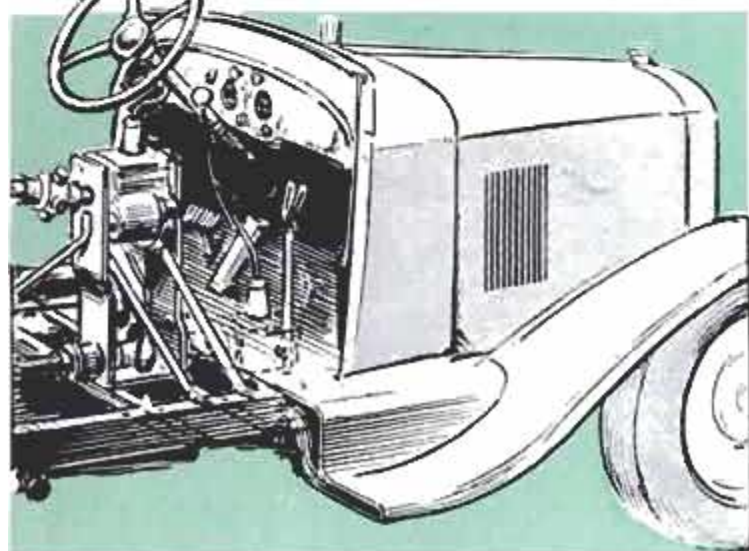
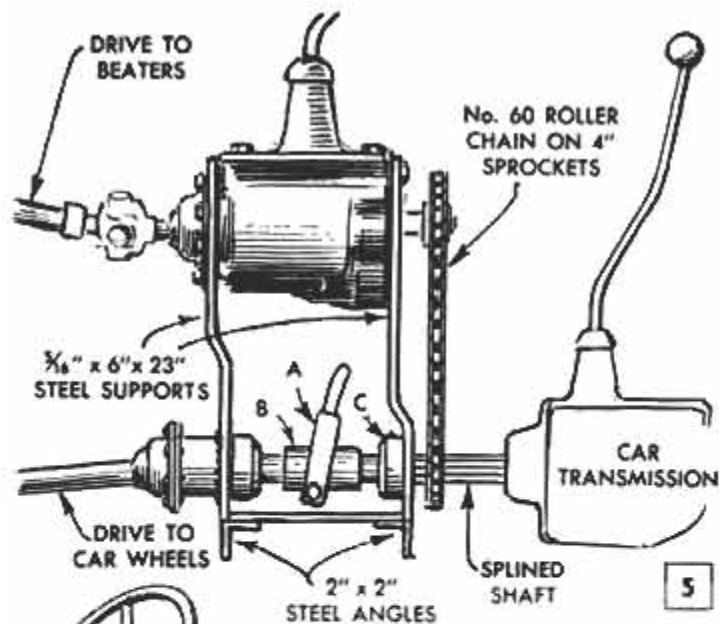
Only the general over-all dimensions of the original unit have been given. The reason is that if a different truck or car chassis is used, dimensions of the parts, and also the over-all dimensions of the unit, may have to be changed. Do not cut any material until the chassis to be used has been carefully checked to determine the changes that may be required.

As will be noted in Fig. 3, the over-all size of the beater housing is given as 26 1/2

x 86 x 62 in., the upper beater being centered 22 in. below the top of the housing at its highest point. On the original unit the beaters were located 25 in. apart, center-to-center. This gives about the minimum spacing between the tips of the beater teeth on the two units. As detailed in Fig. 1, the beater teeth are 4 in. long and are spaced 6 in. apart, the alternate teeth being pointed. The teeth should be so arranged that those on the upper and lower beaters do not track.

Note from Figs. 1 and 2, detail A, that the upper beater is of somewhat heavier construction. This is necessary as the upper beater may handle a varying amount of material due to unevenness at the top of the load on the trailer or truck. Both beaters are of all-steel, all-welded construction for maximum rigidity. Although the teeth





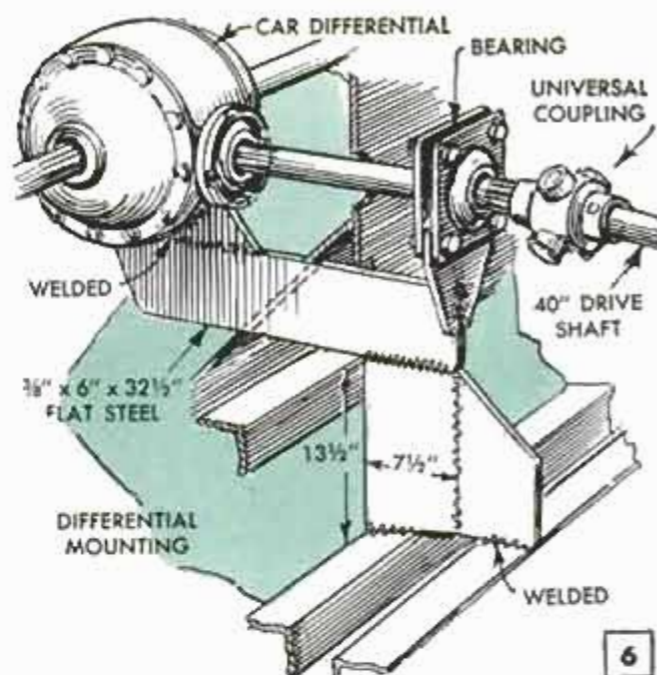
NOTE—IN ORIGINAL UNLOADER CORRECT BEATER SPEED WAS OBTAINED WITH CAR TRANSMISSION IN 2nd. GEAR; BEATER TRANSMISSION IN HIGH GEAR



on the beater bars can be welded to the corners of the steel angles which form the bars, it is better to drill undersize holes through the angles, drive the teeth into the holes and then weld in place. It is important that the alternate teeth be pointed as indicated in Fig. 1.

The horizontal subframe of steel angles which supports the beater frame carries two braces at each end. Only one of the two braces is shown in detail D, the lower right-hand detail in Fig. 2. The two horizontals of this frame are 4 x 4-in. steel angles spaced approximately 12 in. apart. Detail D shows the assembly at the lower corners of the frame. Before this frame is assembled it is necessary to make a careful estimate of the required height for clearance over the hopper of the blower drag with which the unit is to be used. These measurements should allow additional clearance to permit lowering the car or truck frame by means of the improvised stabilizers, Fig. 4. The stabilizers, one being attached to each member of the car or truck frame, are shown in position in Fig. 3. These units serve the dual purpose of providing a means of leveling the beater unit and also preventing it from rocking sidewise when it is in operation.

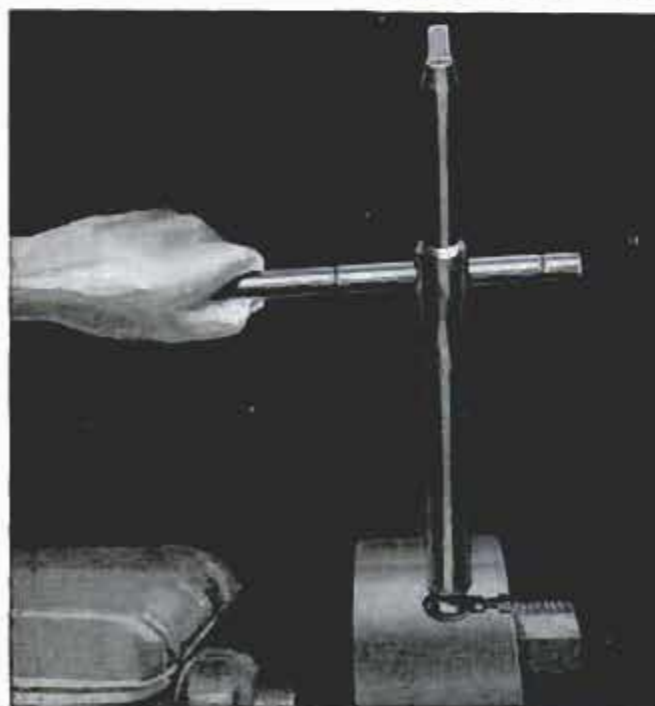
Figs. 5 and 6 detail the drive used on the original unloader. It utilizes a second transmission mounted above and behind the car transmission as in Fig. 5. To shift this drive from the rear wheels of the truck



or car to the beaters, a sliding splined sleeve, or collar, is used. In fitting this sleeve it may be necessary to weld a splined extension onto the end of the output shaft of the car transmission and carry this in a bearing, detail C, Fig. 5. Also, it may be necessary to cut a section from the drive shaft of the car, rejoin by welding and then weld in an extension at the universal joint. This arrangement permits the drive to be shifted from the rear wheels of the car to the beater transmission simply by shifting the position of the splined sleeve by means of the pivoted yoke A, Fig. 5. Travel of the splined sleeve must be sufficient to permit the end to clear one or the other of the

shaft ends when the sleeve is moved forward or back. With the sleeve in the position shown the drive is through the altered drive shaft to the rear wheels of the car or truck, the beater transmission being in neutral. When the sleeve is shifted to the forward position the drive is to the beaters through the second transmission and the differential, Fig. 6. Care must be taken in the assembly to make sure that the shafts are in line so that the sleeve will slide easily from one to the other. In all illustrations the beater drive shaft is shown with the guard removed. When in use the shaft should be guarded to prevent possible injury to the operator. ★ ★ ★

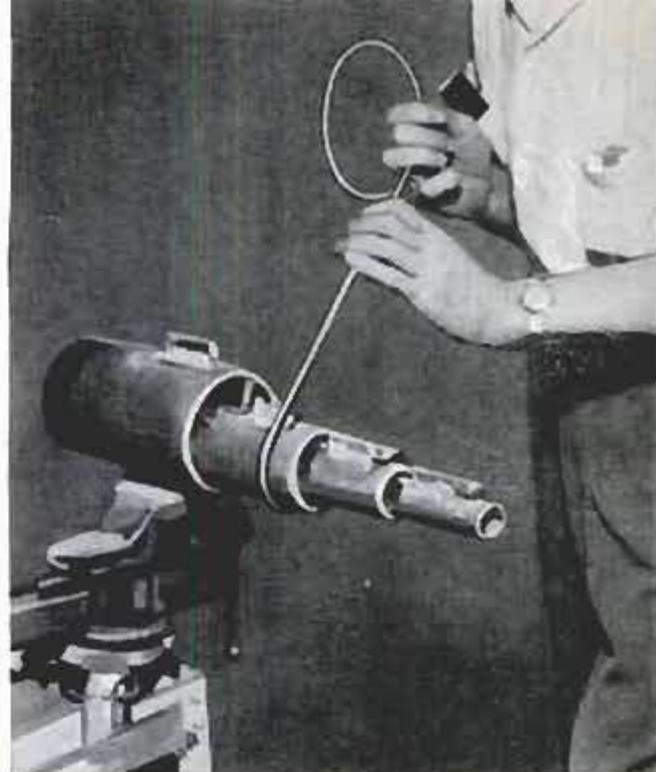
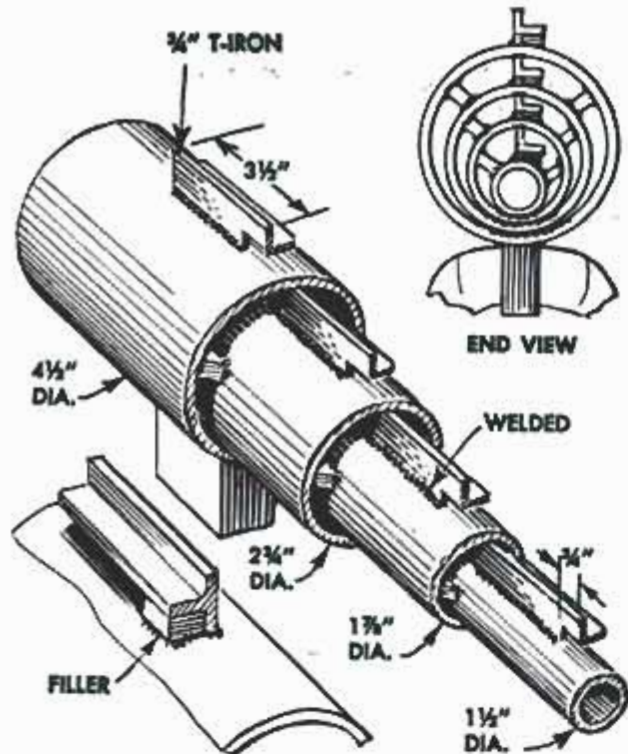
## Two Different Lathe-Chuck Wrenches Combined in One Tool



When both a 4-jaw and a universal chuck are used on a lathe it sometimes is necessary to have a wrench with a different-size end for each. Minimize the possibility of misplacing one of the wrenches by combining them. To do this, pull the T-handle from one and weld the wrenches end-to-end as indicated. Use the heavier of the two T-handles for the combination wrench.  
H. J. Gerber, Stillwater, Okla.

## Check for Smooth Timing Advance

Accelerate an engine slowly when using a timing light to set ignition timing, to determine if timing advances smoothly. Sometimes excessive wear in the bushings or distributor drive train will cause fluttering or "fanning" at certain speeds. If the flutter exceeds 3 deg. the condition should be corrected, as the engine obviously is not firing at the proper time.



## Bending Jig for Wrought-Iron Work Has Four Radii

Ordinarily it takes a lot of careful work with a hammer to form neat scrolls on round or square steel rods. According to The Linde Company you can handle the job in a fraction of the time with this simple bending jig, and no hammering is required. One turn of the stock forms the scroll to precisely the radius you want. The jig is made from four sizes of pipe telescoped loosely as pictured and detailed.

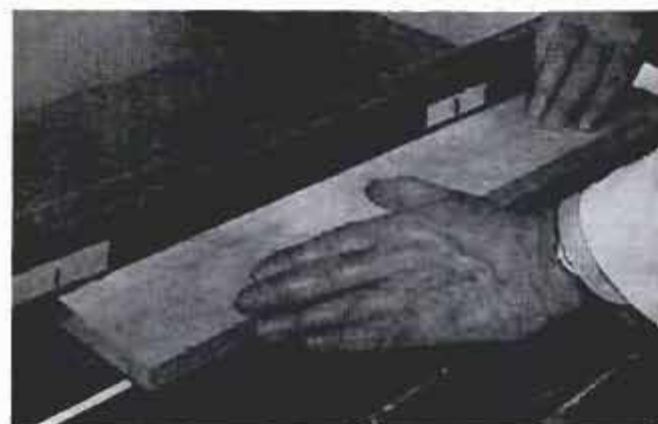
The bending lugs are made of short lengths cut from steel tees, each having the web notched on one side of the stem as indicated. Note that the tees are welded in place with the web standing vertically and the stem projecting horizontally. The notch in each tee forms the lug, or lip, under which the end of the stock is placed. The outside radius of each section of pipe determines the inside radius of the scroll.

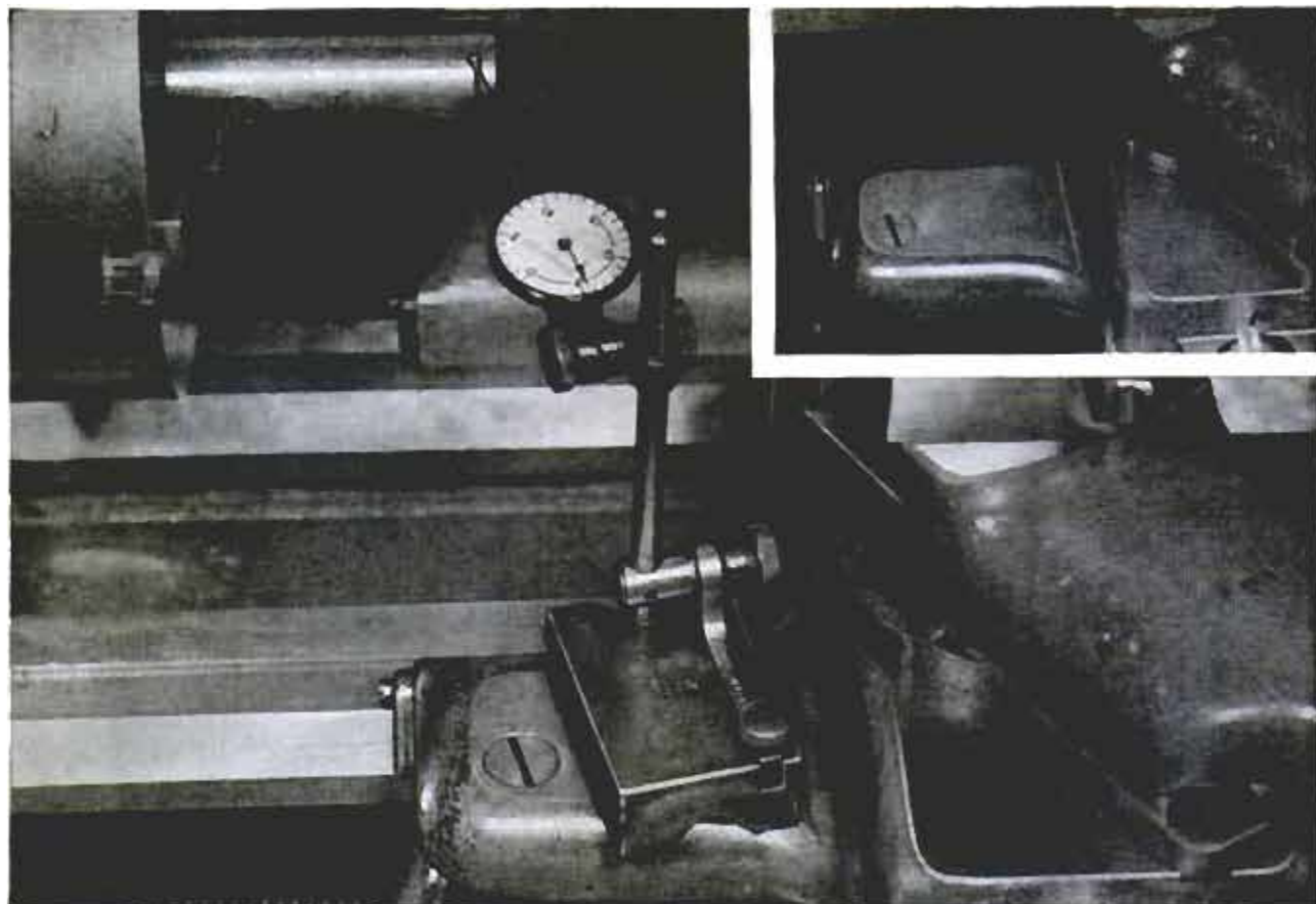
## Stop Marks Gauge Blind Dadoes

Blind dadoes can be gauged accurately for length with two marked strips of adhesive tape, which are located on the ripping fence just above the stock so that the marks are easily seen. One mark, farthest from the operator, indicates the position of the end of the stock at the start of the cut. The second mark indicates the point at which the cut must be stopped.

## Extending Tractor Front Axle

Under certain difficult field conditions, and also in wide crop rows, front tractor wheels that track with the rear wheels on the wide setting are an advantage. The design of nearly all tractors will permit welding or bolting in extensions of the axle and steering arms to give the same tread front and rear. Care should be taken to see that the steering mechanism operates freely.





## Flat Milled on Carriage Seats Indicator

Machining a flat on the lathe carriage effects a material saving in setup time by providing a dependable seat, or surface plate, for a dial indicator of the type used in centering lathe work. In use, the indi-

cator is mounted on a surface-gauge base or a magnetic base and placed on the flat. This saves the time usually spent in mounting the indicator in the toolpost.

J. C. Magee, Schenectady, N. Y.

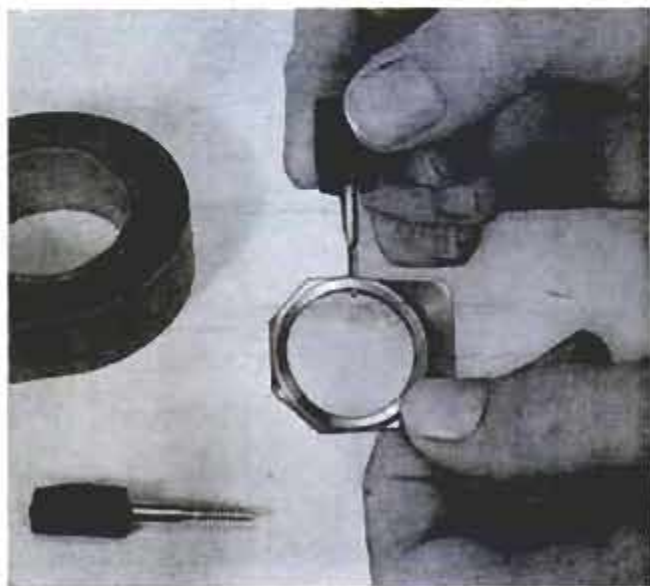
## Gutter Anchored to Rafters

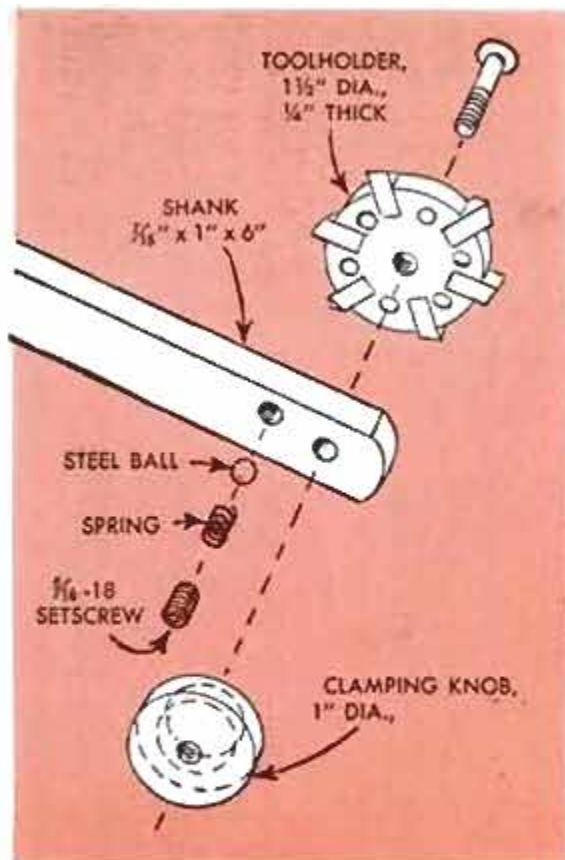
Long runs of gutter won't sag when anchored to exposed rafter ends with heavy steel corner brackets. The spaced brackets are first riveted to the gutter, then attached to the rafters with screws.



## Torque "Wrench" for Taps

Running a thread with a tiny hand tap is a ticklish job even in the softer metals. Try wrapping the tap shank with friction tape. It serves as a sensitive torque wrench to guard against breakage.





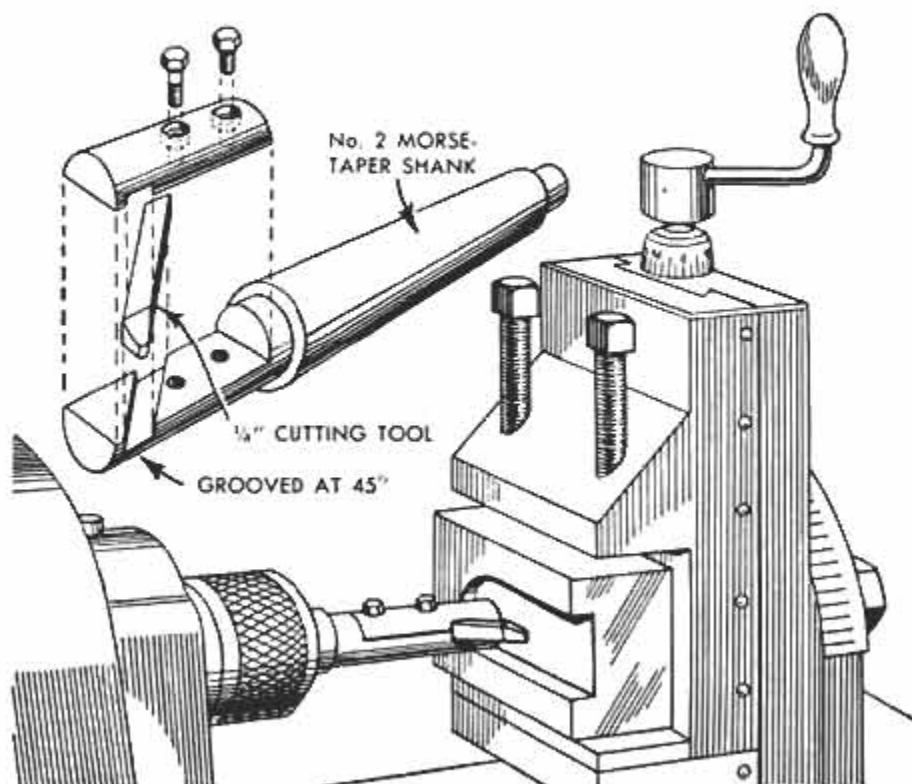
## Six-Station "Turret" Fits in Lathe Tool Post

Some types of lathe work require several tool changes as the job progresses from the first roughing cut to the finished or semifinished stage. Time lost in making the changes can become a cost factor, especially in smaller shops having limited equipment. That's where this six-station toolholder fills in as a timesaver. As dimensioned in the detail it's about the smallest size practical, as the holder, or

head, takes  $\frac{1}{4}$ -in. cutting tools, making it suitable for use in the tool posts of 9 and 10-in. lathes. For larger machines the head and shank should be made proportionally larger. A spring-loaded ball catch stops the head accurately at any one of the six different working positions. Tightening the clamping knob, or palm wheel, locks the head securely in position. Cutting tools are press-fitted in the slots.

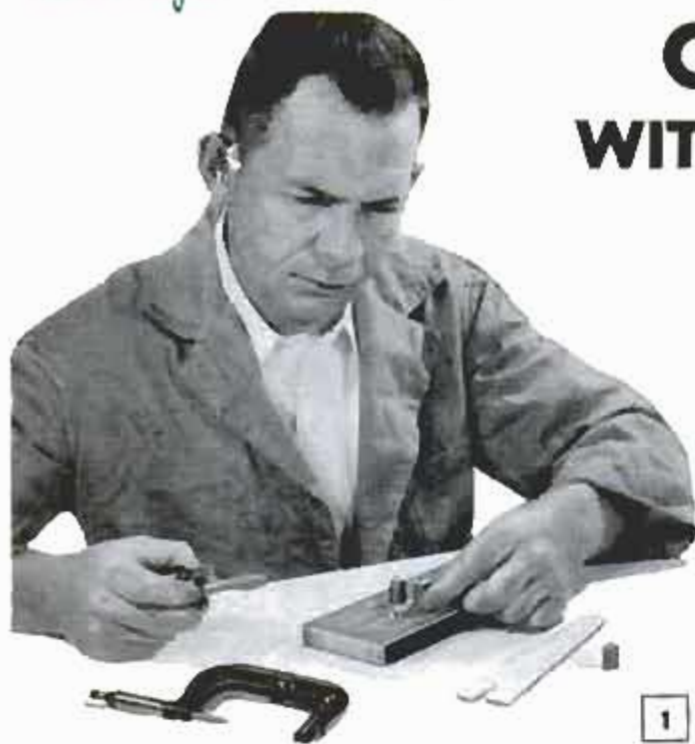
## Tapered Drill Shank Makes Fly Cutter

Certain shallow boring operations in blind holes, also slotting and facing on small parts, can be done advantageously by means of a fly cutter carried on a short shank which fits in the lathe-spindle. The shank can be made from a discarded twist drill having a Morse Taper shank. This should be cut away, milled and slotted as in the detail. Then the clamping piece and the body are drilled and tapped for capscrews. Use  $\frac{1}{4}$ -in. lathe bits for average work.—C. W. Woodson, Chicago, Ill.

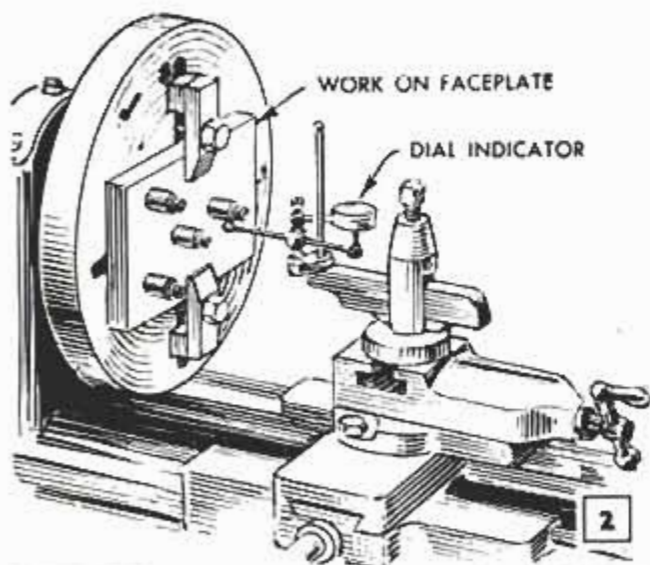
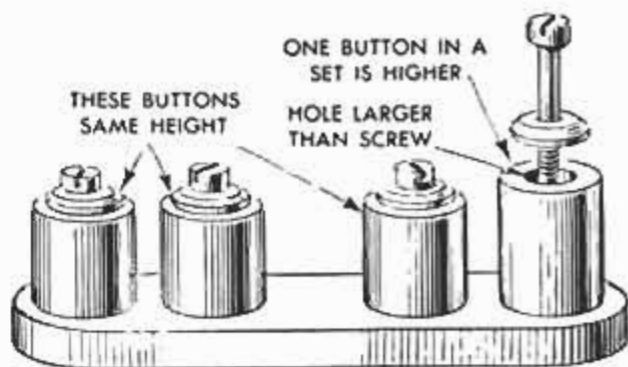


# ON CENTER WITH TOOLMAKER'S BUTTONS

By C. W. Woodson



1



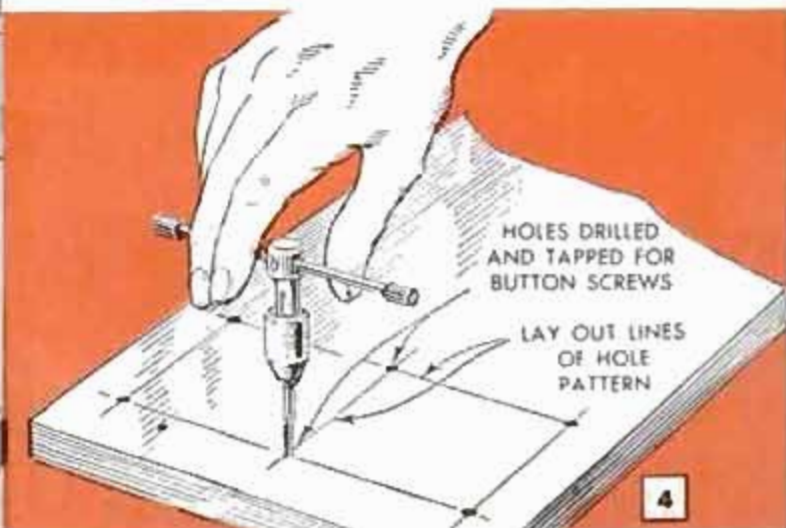
2

**H** OLES TO BE DRILLED in small precision parts can be located with extreme accuracy by using toolmaker's buttons. The buttons are machined, ground and hardened steel bushings, or sleeves, and usually they come in sets of four, Fig. 1, one button being about  $\frac{1}{8}$  in. longer than the other three. To make calculations easier the buttons are ground to a uniform diameter, the common diameters being .300, .400 and .500 in. The four buttons in a set usually are of a single size. The ends are ground and lapped square to insure that the buttons will stand perpendicular to the machined surface on which they are placed.

In common practice, holes to be centered and drilled are first laid out on the work and the centers are lightly punched. Then the tap holes for the screws holding the buttons are drilled on the punch marks. While it is permissible to tap these holes by hand as in Fig. 4, it is considered better practice to use the drill press as a guide



3



4

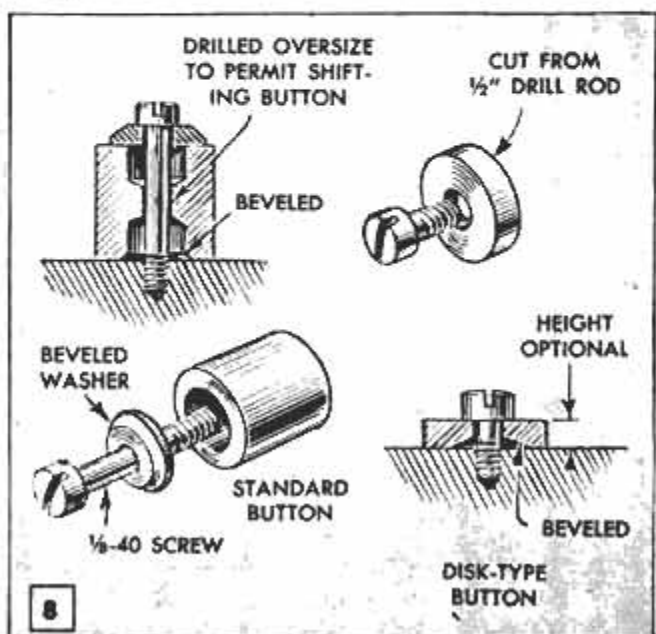
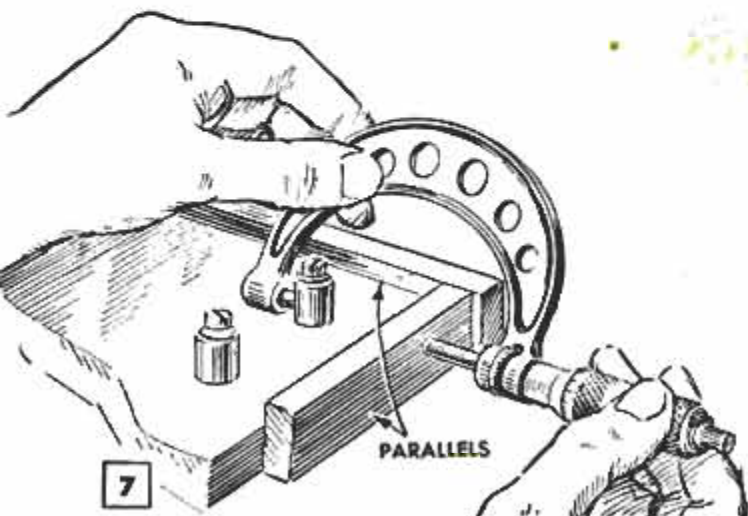
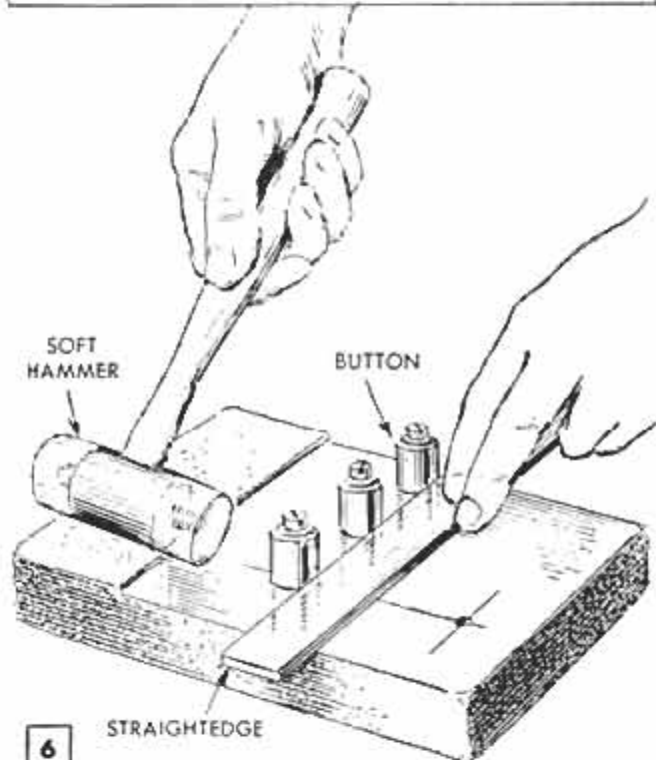
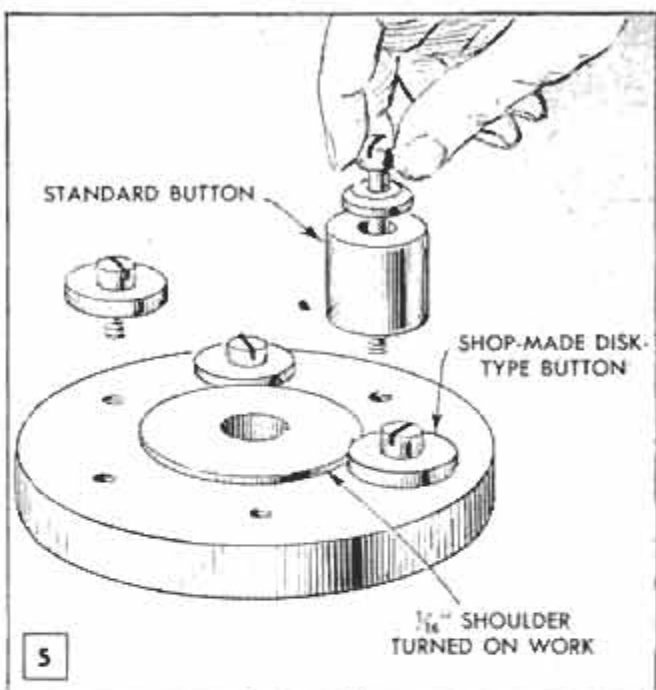
when starting the tap. This precaution will insure a true thread. Any holes for bolts, screws or other fastenings which need not be located with great accuracy ordinarily are drilled in the work before placing the buttons, Fig. 3.

The buttons come with special screws and machined washers, Figs. 1 and 8. As a first step in placement the buttons are screwed to the work firmly but not so tightly that they cannot be moved by tapping with a soft hammer, Fig. 6. Before locating a button, make sure that both the button and the surface on which it is to be placed are perfectly clean. Dust or fine metal chips, even a film of light oil, can result in inaccuracies.

Where the nature of the hole pattern permits, the buttons are often located from a machined edge by the use of machinist's parallels and a micrometer as in Fig. 7. Sometimes it is possible to locate a reference button in this manner and then locate others from the reference button. Once the button has been located according to the specifications, it is tightened securely in place. Care must be taken not to dislocate it when tapping other buttons in place.

A common operation with toolmaker's buttons is locating holes to be drilled in work mounted on the lathe faceplate, Fig. 2. Here it's the usual practice to strap-clamp the work to the faceplate (only two clamps are shown for clarity reasons) and center the button with the aid of a dial indicator. Then the button is removed, the work clamped securely and the hole drilled and reamed to the size required. Other buttons on the same piece of work are indicated true in the same manner.

Machinists, diemakers and others often make and use disk-type buttons either separately or in conjunction with standard buttons, Figs. 5 and 8. As an aid in locating buttons radially the work is often shouldered as in Fig. 5. The diameter of the shoulder must be carefully calculated to assure correct location of the buttons.





## Chain Hoist Made Portable

Boulders, buried tanks and short logs can be lifted and transported with this shop-built rig. The open-end trailer frame consists of an A-shaped drawbar made from parts of old car frames, and an arch made by bending a length of 3-in. pipe. Height of the arch is about 7 ft., from the ground level. A ring is welded to the center of the arch to support the chain hoist. The arch is braced to the drawbar and all parts of the frame are joined by welding. Wheels are carried on stub axles welded to the frame.

**Light-Gauge Wire** which has become kinked can be straightened quite easily. Drive a straight row of small nails into a wooden block, using 6 to 10 nails spaced about  $\frac{3}{4}$  in. apart. Clamp the block in the vise and thread the wire alternately between the nails until the end is in the clear. Then grasp the end and pull through. Usually one pass of the wire is enough.

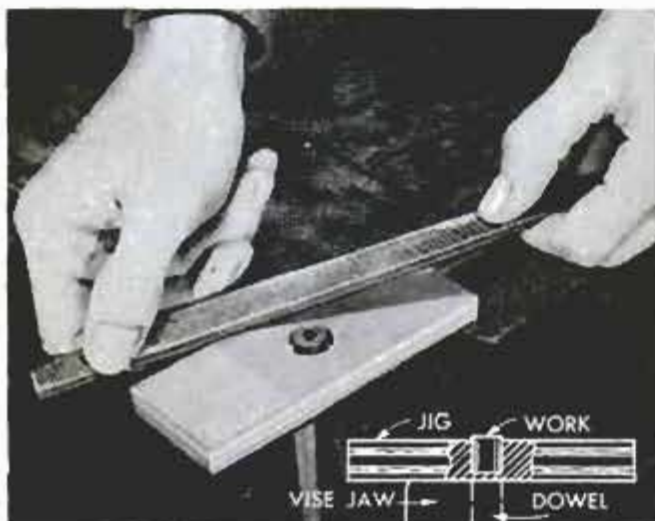


## Tape Quiets Noisy Lathe Dog

When running an interrupted cut on work between centers the sharp rap of the lathe dog at each revolution of the work may be objectionable, and even highly distracting, to others working nearby. The noise is caused, of course, by the tail of the dog striking the side of the driver-plate slot each time the tool picks up the cut. Four to six layers of friction tape wrapped around the tail of the lathe dog will stop the clatter quite effectively. Often the same stunt will stop tool chatter when all other means fail.

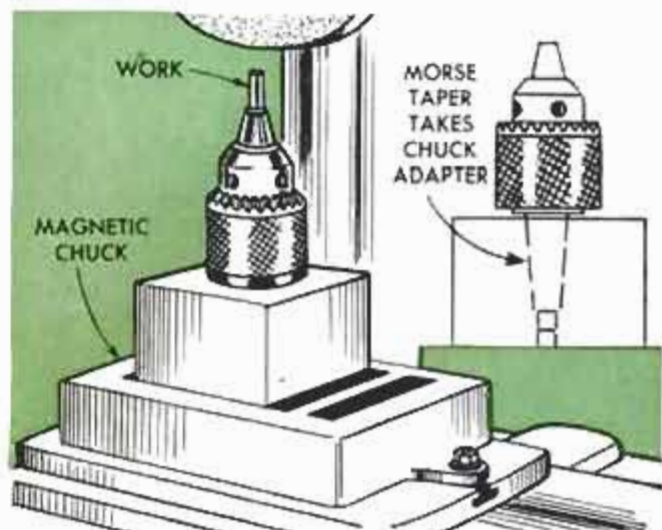
## Jig Holds Round Work for Filing

To make it easy to file round work held in an ordinary vise, drill a hole in a small piece of plywood to take the work. Force a short length of dowel part way into the hole. Insert the work from the opposite side and place in the vise.

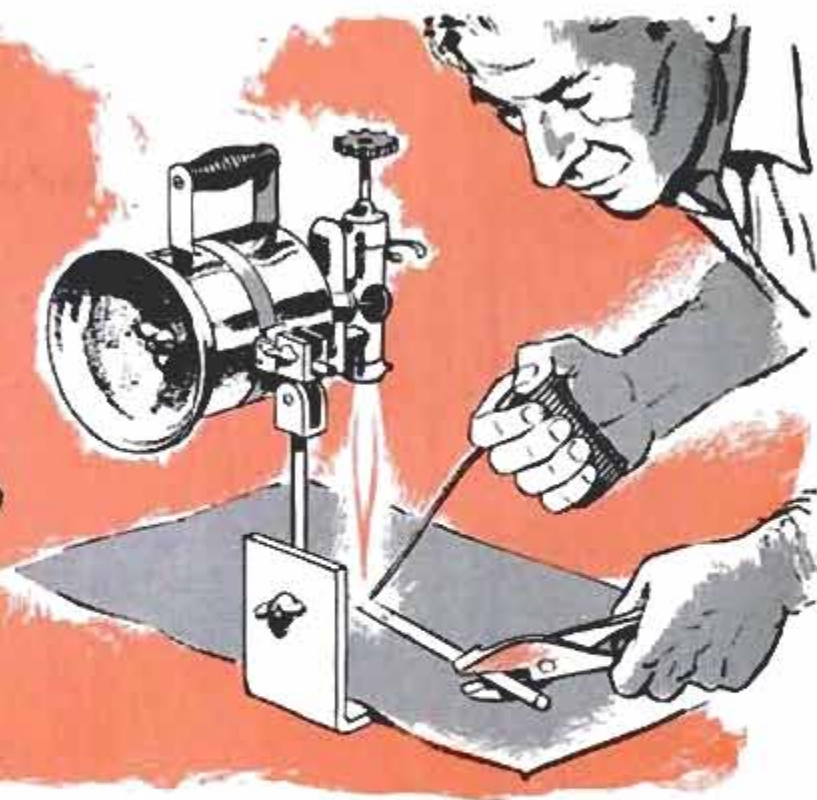
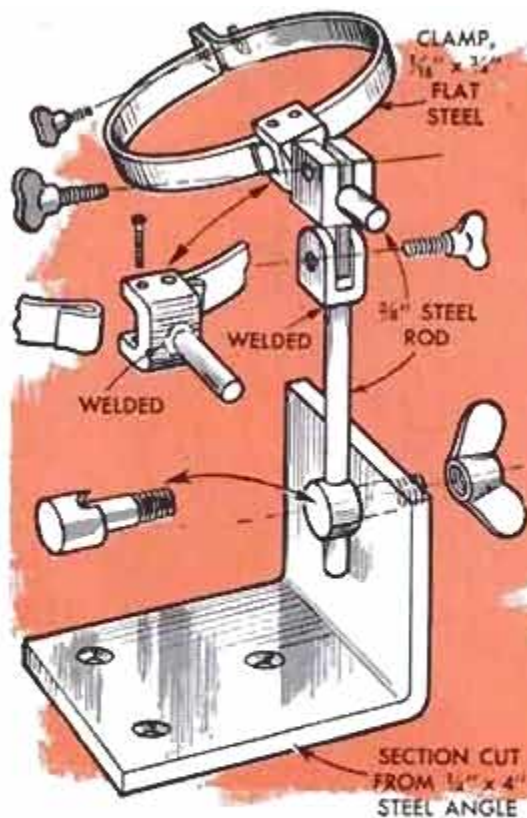


## Work Holder for Surface Grinder

Not many improvised shop accessories serve a twofold purpose. This one does. It can be set up as a precision-work holder on a surface grinder, or can serve as a holder, or chuck, for the diamond dresser when it is necessary to true up the wheel.







## Universal Holder Widens Work Range of Blowtorch

With this universal holder you can direct the flame of a blowtorch anywhere you need it: up, down, sidewise in either direction, and at any angle needed to reach the work. A 4-in. length cut from a heavy steel angle forms the base. Two simple pinch clamps cut and filed from mild steel form the universal joint. A length of  $\frac{3}{8}$ -in. steel

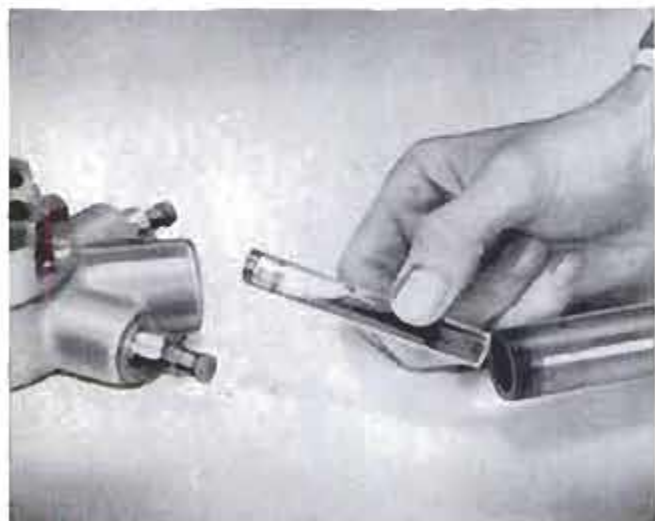
rod forms the column. This is held by a binding screw made from a short length of shouldered stock transverse-drilled at the shoulder and threaded to take a wing-nut. A clamping band of flat steel holds the torch. The length of the two members of the band must be determined by measuring the diameter of the torch to be used.

## Cutting Oil Always at Hand

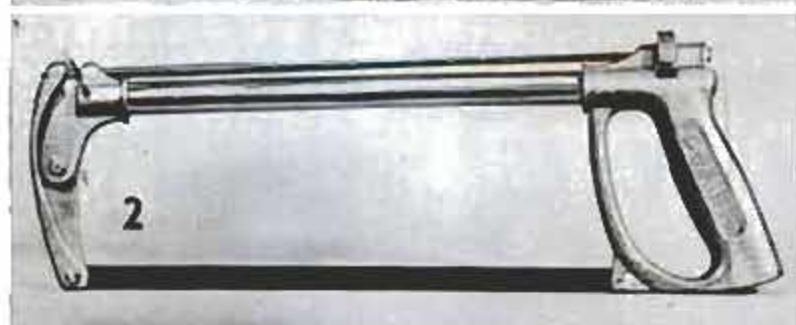
Plumbers and steamfitters who may have run out of thread-cutting oil while on the job can appreciate the simple precaution of carrying an emergency supply in the handle of the diestock. Unscrew the handle, plug the open end and fill with tissue or other packing material. Then fill a vial with cutting oil. Cork tightly and place in the handle.

## Accurate Radius Gauges

Thin disks cut from brass or steel rod make accurate radius gauges for checking work for uniformity. Drill rod is best for the purpose, but brass disks will serve where fine accuracy is not a factor. Small-diameter disks should be cut about  $\frac{1}{16}$  in. in thickness, larger disks  $\frac{1}{8}$  in. in thickness. Center-drill the disks and fit a short handle for convenience in handling.



# SHOPPING



# FOR TOOLS

**1. CONDUIT BENDER** is portable, rolls on wheels like a wheelbarrow, with the weight evenly distributed. Electrically operated, it bends heavy, rigid conduit at the rate of three bends a minute. Will make any bend, 90 degrees, offsets, doglegs close to elbow  
Chamor Mfg. Co., 43-63 11th St., Long Island City, N. Y.

**2. HACKSAW FRAME** has no projecting wing nuts or handle extensions. Blade is held at each end by flush pins, no projections at ends of blade to catch in work. Blade can be turned sidewise 90 degrees to permit cutting where clearance exceeds that of frame  
Dreier Bros., Inc., 7301 Woodlawn Ave., Chicago 10

**3. NAIL DRIVER** can double as holder for starting wood screws and capscrews in those hard-to-reach places. Just seat the nail, screw or capscrew in the jaws. Nails can be driven home without bending. Screws and capscrews are started by turning holder  
KJ Co., 1423 S. Second St., Milwaukee 4, Wis.

**4. SUCTION CLEANER** has a detachable power unit that can be used for blowing and spraying. Unit handles wet or dry pickup. For dry pickup cleaner is supplied with enameled metal tank of 15-gallon capacity. For wet pickup it has stainless steel tank  
Ace-Sycamore, Inc., 448 DeKalb Ave., Sycamore, Ill.

**5. ADJUSTABLE SPANNER WRENCH** is especially designed to facilitate repair of hydraulic jacks and other equipment utilizing either gland or packing nuts requiring this type of wrench. Set includes two wrenches with spanner extensions, offset extensions  
Hydraulic Jack Packing & Tool Co., P.O. Box 50, Bloomfield, N.J.

**6. NEW FILES** have diamond-shaped grooves that break up chips, give maximum stock removal, exceptionally smooth finish and greatly extended file life. They are available in conventional flat, half-round and square shapes and in 8, 10, 12 and 14-in.  
Simonds Saw & Steel Co., Fitchburg, Mass.

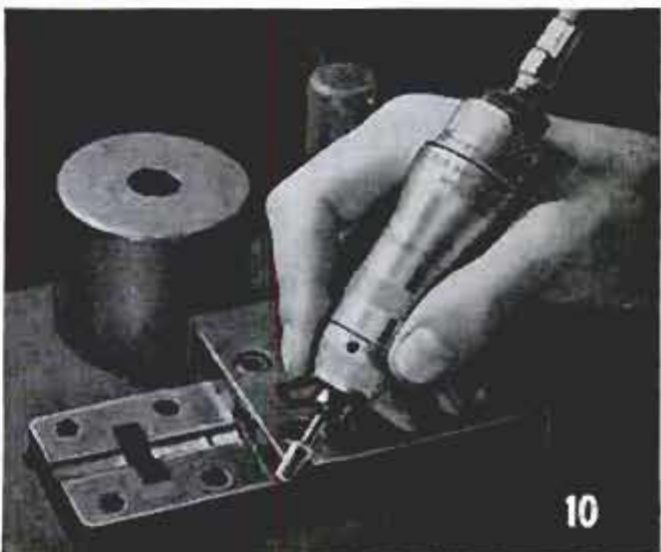
**7. UTILITY ELECTRIC DRILL** of full  $\frac{1}{2}$ -in. capacity weighs only  $7\frac{1}{2}$  lb. Drills holes up to  $\frac{1}{2}$  in. in steel,  $\frac{3}{4}$  in. in masonry and 1 in. in hardwood. Comes equipped with spade, pipe and pistol-grip handles for two-handed operation in all drilling positions  
Black & Decker Mfg. Co., Towson 4, Md.

**8. METRIC OPEN-END WRENCHES** are designed to meet the need for special wrenches for repair and maintenance of foreign-built autos and other equipment. Wrenches are available as a set like that shown or are available singly in any size from 8 to 17 mm.  
Lectrolite Corp., 1902 Jefferson Ave., Toledo, Ohio

**9. GUN** for installing hollow-wall anchors, or fasteners, does the job three to six times faster than can be done by hand. Complete set contains the gun, four arbors and a suitable wrench. Arbors supplied permit gun to handle three sizes of hollow-wall anchors  
Diamond Expansion Bolt Co., Inc., Garwood, N. J.

**10. PNEUMATIC GRINDER** for high-speed tool and die finishing delivers 75,000 r.p.m. at normal 90-lb. air line pressure. Does any type of grinding or cutting where mounted-type wheels or cutters having  $\frac{1}{8}$ -in. shanks can be used. Weighs 7 oz. Length  $4\frac{1}{2}$  in.  
The Aro Equipment Corp., Bryan, Ohio

(Continued on next page)



# SHOPPING FOR TOOLS

(Continued from page 201)



11

**11. MOTOR-DRIVEN CONCRETE MIXER** for one-man concrete jobs thoroughly mixes a 50-lb. batch in just two minutes. It's lightweight and easily portable; weighs only 22 lb. without motor. A 5-gallon pail is utilized as a mixing drum. Unit can operate anywhere electric current is available. Takes only 2 sq. ft. of floor space. Enables one man to mix and pour 8 cu. ft. of concrete per hour. No wheelbarrow or tilting device needed; just remove pail and pour mixed concrete where required. Comes with or without motor

KOL, Inc., 2323 Ellis Ave., St. Paul 14, Minn.



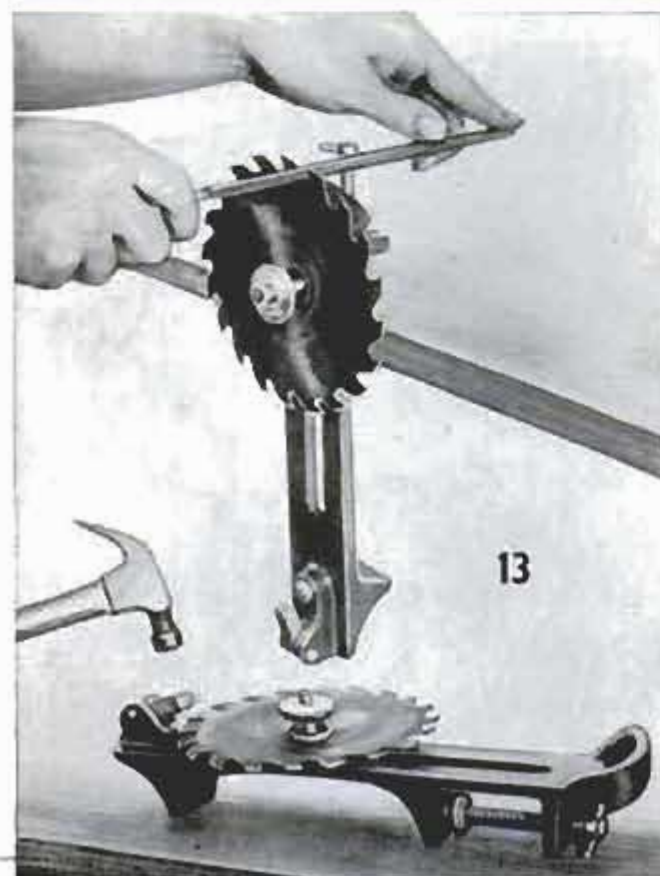
12

**12. DETENT PINS** are self-retaining, have spring-loaded ball retainers on both the small and large sizes. Pins have been developed to meet special requirements where design of mechanical units and research apparatus calls for fast assembly and disassembly of either a part or parts, or the entire structure. Pins are available in standard diameters ranging from 1/4 to 1 in. and in lengths up to 8 in.

Aerofast, P.O. Box 324, Wheaton, Ill.

**13. CIRCULAR-SAW BLADES** can be kept in top-notch operating condition with this combination setting stake and blade holder. It takes circular blades from 6 to 18 in. in diameter and all standard arbor holes are accommodated on the cone-shaped spindle. The stake consists of an anvil and striker with hardened faces ground at an angle of 15 degrees. For filing, blade unit clamps to edge of bench top

Calgo Mfg. Co., 89 N. Santa Anita Ave., Pasadena, Calif.



13

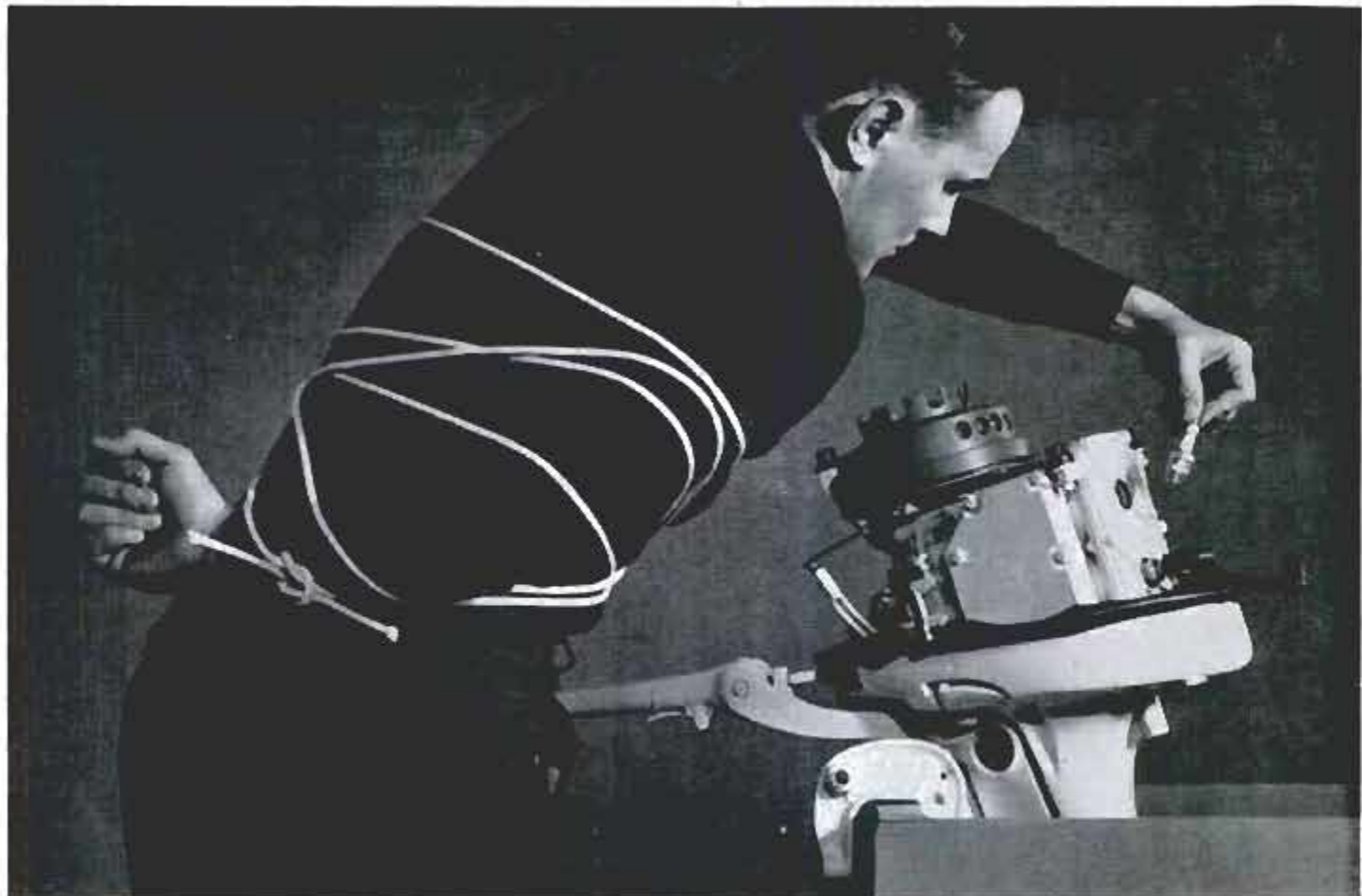
**14. MAGNETIZE** or demagnetize any small tool very quickly with this simple portable unit that operates from any 115-V. outlet. Magnetize a screwdriver, nut runner or small wrench and it will hold the nut or screw for starting in hard-to-get-at places. Demagnetize the tool in the same length of time (a few seconds) and it can be replaced in the kit. Useful in any operation that requires placement of small parts

Perma-Power Co., 3100 N. Elston Ave., Chicago 31



14

POPULAR MECHANICS



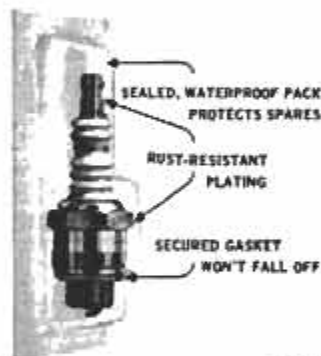
*Even with one hand tied behind you...*

## **You can install this Champion marine spark plug without danger of dropping the gasket!**

**Champion's attached gasket is perfect for changing spark plugs over the water. It's another reason for making plated marine Champions your choice for spares . . .**

Champion's new *plated* marine spark plug has an attached gasket that cannot fall off—from the time you open the waterproof packs that keep these Champions clean, dry and

ready for instant use, until they are firmly secured in your engine. (Without gaskets to make gas-tight seals around spark plugs, your engine would lose compression and power.)



Only Champion has a *waterproof pack*. After 24 hours under water, these Champions went right in an outboard, sparked it to life on the first try.



Champion  
Spark Plug Co.  
Toledo 1, Ohio

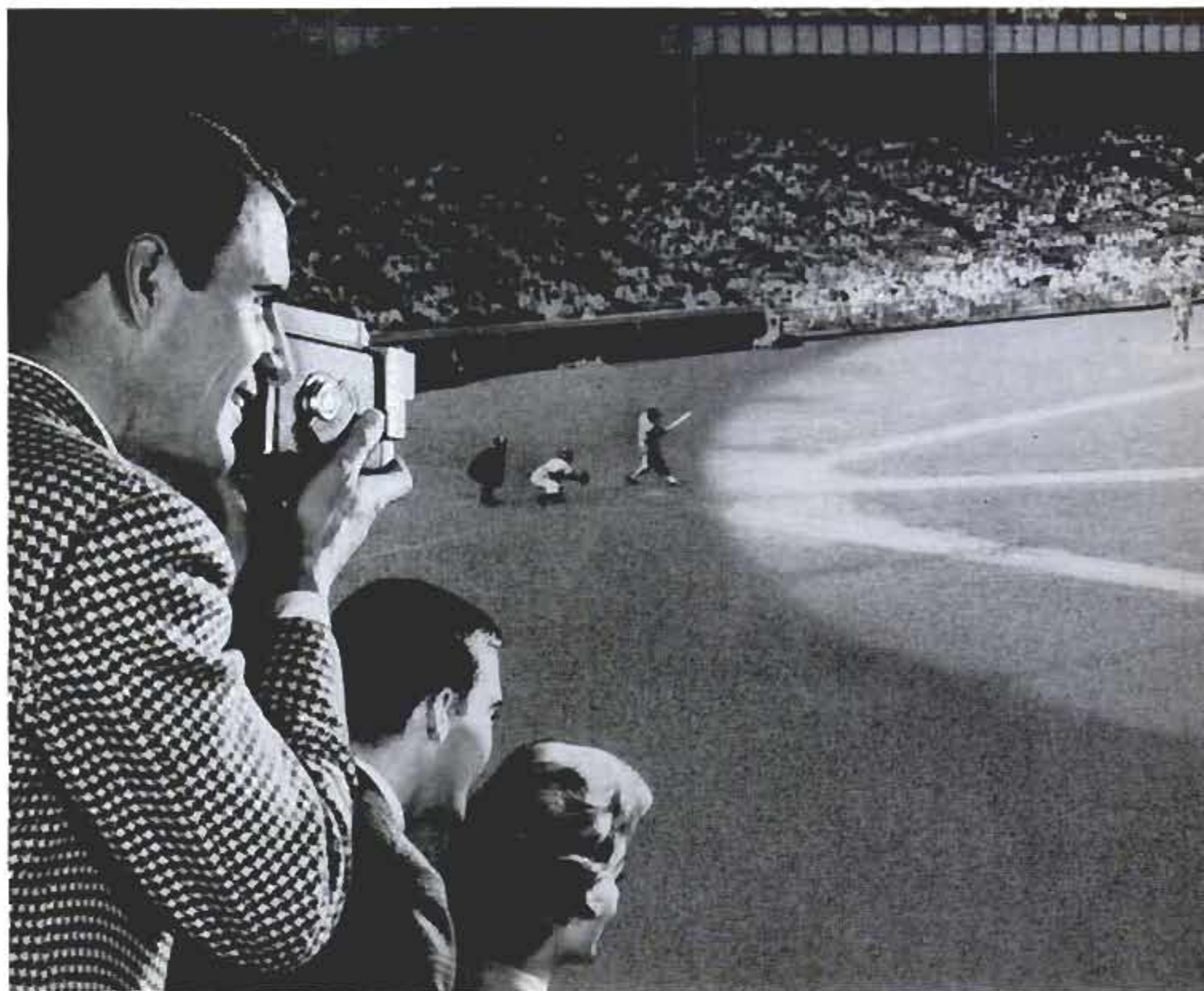
Be sure your marine engine will always have the full-firing spark it needs for smooth, dependable power. For fun and safety, always carry a spare set of the world's finest marine spark plugs—*plated* Champions in the *waterproof* pack.

**CHAMPION**

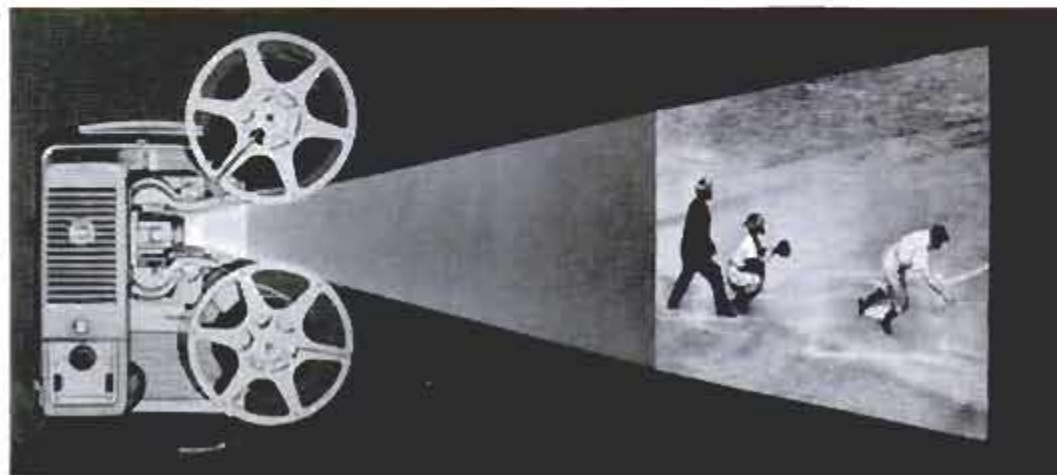
SPARK PLUGS

**YOU'RE A SAFER SKIPPER WITH A SPARE SET OF CHAMPION SPARK PLUGS**

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**New automatic Kodak Cine Showtime Projector, Model A20**, threads itself right onto the take-up reel—and starts show automatically! Has fast  $f/1.6$  lens and new high-lumen lamp for brightest 8mm projection in Kodak history. 400-foot reel capacity. Only \$137.50. Model A30 has variable-speed control, operates on AC or DC. Comes with Kodak Presstape Movie Splicer. \$167.50.



See "The Ed Sullivan Show" and "The Adventures of Ozzie and Harriet"

# -from start to finish!

**New Kodak Cine electric-eye-controlled cameras give you correctly exposed movies every time. New Kodak Cine projectors actually thread themselves . . . right onto the reel!**

Now you're free to follow the action wherever it leads . . . without stopping to reset the camera lens! Imagine being able to film a subject moving from sunlight to shadow without taking your eye from the viewfinder—confident that every frame of color film will turn out beautifully exposed.

These new Kodak Cine cameras let you do just that. In bright light . . . in shade . . . indoors, their sensitive electric-eye meters constantly

measure the light and *automatically* make the proper lens adjustments for you.

Perfect companions to the new Kodak Cine Automatic Cameras are the superb new automatic Kodak Cine Showtime Projectors. They thread themselves completely, then start the show . . . *automatically!* You see your movies brighter than ever before. This is movie equipment your photo dealer is *proud* to demonstrate! Visit him today.



**New 8mm Kodak Cine Automatic Turret Camera,  $f/1.9$ ,** has electric eye that automatically adjusts lens to any light. Yet, you can lock the lens opening at *any desired setting*. Comes lens-equipped for regular, wide-angle, telephoto shots. True telescopic viewfinder, built-in "Type A" filter, low-light-level signal. \$124.50. (Single-lens model, \$92.50.)



**New 8mm Brownie Automatic Movie Camera,  $f/2.3$ ,** with electric eye that automatically sets the lens for you—indoors or out. Adjusts for ASA film indexes 5 to 40. Has multi-frame finder, accepts auxiliary Kodak wide-angle and telephoto lens converters. Never before an automatic movie camera priced so low. Only \$74.50.

*Most dealers offer terms as low as 10% down. Prices are list, include Federal Tax, are subject to change without notice.*

**EASTMAN KODAK COMPANY**  
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TRADEMARK

# Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.

## Moss Grows on Terrace



**Q**—My lot slopes and is terraced at the lower edge just above the sidewalk. Most of the terrace is covered with moss which is choking out the grass. I've been told that moss growing anywhere indicates that the soil is poor. Is this true? And how do I get rid of the moss?—E.T., Ohio.

**A**—It is true that moss often takes over when the available plant food in the soil is depleted to the point where it no longer will support a vigorous sod. But as a rule you will find moss growing only on rather poorly drained soils and more particularly on north slopes and terraces. If the area is partially shaded during the day, the spread of the moss seems to be greatly encouraged. There are several ways of eliminating the intruder, but perhaps the simplest and most effective is to rework the soil, either by hand or with a powered rotary tiller. Once the soil has been loosened to a depth of 4 to 6 in. and thoroughly aerated, work in humus in the form of a compost or peat moss, add a complete fertilizer and rake this into the top 2 in. or so of loose soil. Next soak the area with the hose, allow the top to dry, then rake lightly and reseed with a suitable mixture of lawn grasses. Rake the seed into the top inch or so of soil. Sprinkle lightly and then cover with a mat to prevent the soil from washing during a heavy rain. Prepared mats for this purpose are available, or you can use straw. Also, if possible, it's a good idea to trim, or thin, any trees that may be partially shading the area.

## Plastering Masonry Wall



**Q**—I'm planning a new home, of light concrete blocks stuccoed on the outside and plastered on the inside. This seems to be the cheapest construction. But a friend tells me that plastering over the blocks can cause sweating of the inside walls. Is he right?—A.R., Miss.

**A**—He is right. This is not a generally approved type of wall construction, although it is, as you say, the cheapest in most localities. There are several types of approved concrete-block wall construction, but perhaps the simplest and least expensive of these is to fur the blocks on the room

(Continued to page 208)

## PAINTING YOUR HOUSE THIS YEAR?

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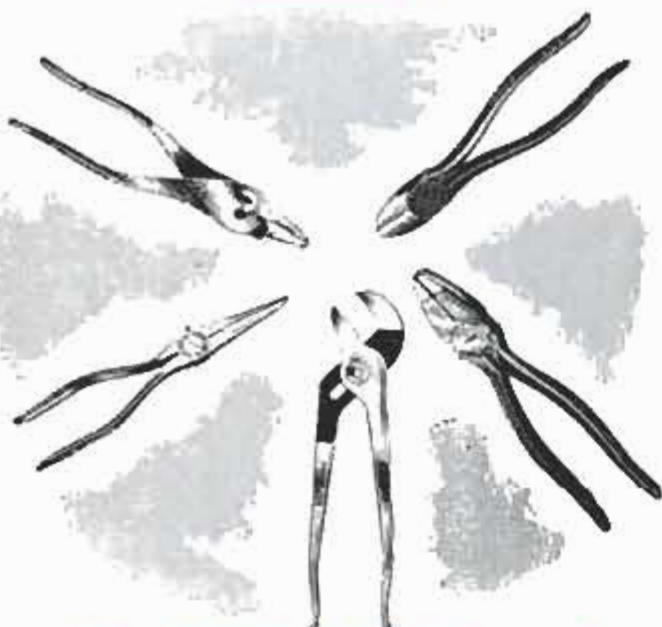
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MEADVILLE, PENNSYLVANIA

side, apply a blanket-type insulating material having a vapor barrier and then finish with plaster board, or a plaster base and the conventional plaster. The attic floor should be insulated, the insulating material being placed between the joists, and the attic area should be ventilated by louvers installed in the gable ends or in the roof near the ridge. Also, if the roof construction permits, air inlets should be provided in the soffits, or cornices, to permit adequate air circulation in the attic area.



#### Painting Stained Shingles

**Q**—The outside walls of my home are finished with shingles which appear to have been stained some years ago. The shingles show some weathering and I would like to paint them, but is there any possibility of the stain bleeding through the paint?—S.B., Mass.

**A**—If the original stain used contained creosote there is a possibility of the stain bleeding and discoloring the paint. However, there are shingle and shake paints which are said to resist bleeding effectively. It is quite likely that if you used one of these paints you would have no trouble. However, we would recommend that you consider staining the shingles rather than painting. We think you would find the job more satisfactory in the long run. Before you stain or paint, go over the walls with a wire brush and remove all loose material and brush off all the dust and other debris that tends to collect on the rough surfaces. Then follow the instructions on the container when applying the new material.

#### Cold Floor

**Q**—My home is built over a vented crawl space, the space between the ground and bottom edges of the joists averaging about 20 in. The floors are cold in winter and I'm wondering if it is not possible to insulate between the joists. Will it be effective and can I do the job myself?—C.D., N.Y.

**A**—Yes, but it will not be as effective as it would if it had been built into the structure. You should use a foil-faced insulating material lapped and tacked on the edges of the joists. To prevent the insulation from sagging it should be supported with wooden lath nailed to the joists or by coarse hardware cloth. Capillary moisture should be blocked with a plastic membrane which covers the entire area of earth inside the foundation walls. Smooth roll roofing will serve the same purpose if the edges are lapped about 4 in. and cemented. Installing insulation in such limited space is going to mean a lot of time and labor expended but we think you will find it worthwhile in the end, as the reduction in heat loss alone will amount to a considerable saving in heating costs.

#### Feed Lawn During Summer

**Q**—My lawn does not stand hot weather very well. It turns a grayish brown color in July and does not show many signs of life until late September. I've thought of digging it all up and starting over again. Or is there a better way?—N.E., Ia.

**A**—From your description we would gather that the soil has become so depleted that it no longer will support even a moderate growth. We think you need to add seed and plant food in generous quantities. You can start with a fertilizer application immediately and follow with a second application in two to four weeks. A third application in, say, September, plus a fairly heavy seeding should put your lawn in rather good condition for wintering. Use a nonburning fertilizer and apply with a spreader made for the purpose. This gets it on evenly and avoids waste and skips. Water regularly only during the dry spells, set the lawn mower to cut at least 1½ in. high and do not remove the clippings, as they serve as a mulch to retain moisture. If you use a rotary mower and the clippings tend to bunch, as they sometimes do when the grass is damp, scatter the bunched material evenly, but do not remove from the lawn.



photographed at Florida's Silver Springs

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**TWINS—6 hp, 10 hp, 15 hp, 22 hp. FOURS—35 hp, 40 hp, 45 hp. SIXES—60 hp, 70 hp. "Full Jeweled"® Power throughout**



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Fond du Lac, Wisconsin**

## Seattle Police Take a Tip From Hollywood

(Continued from page 132)

In the actual filming of a scene, everything happens at once.

"The secret is the same as that for the success of a gambling raid—timing," says Segar.

Particular attention is given to the dialogue or the sound-track portion of the script. All narration is timed and noted, and is adjusted to fit each scene. The overall length of a scene cannot run longer than 2½ minutes without a break.

Musical background, if used, is prerecorded on tape and is timed and fitted to each scene. If the same music is to continue over more than one scene, careful attention is given to matching the continuity of the music to avoid any noticeable interruption. The use of tape makes it easier for the sound recordist to mix music and narration, and requires a minimum of personnel. The narrator sits inside the station wagon with doors and windows closed.

"By keeping the car tightly closed, even on a hot day," says Segar, "we eliminate most of the street noise or at least keep it at a low level, where it adds to rather than detracts from the quality of the sound track."

Pedestrians are cooperative and rarely foul up a scene, but every now and then there is a small boy who pipes up the question: "Are you really policemen?"

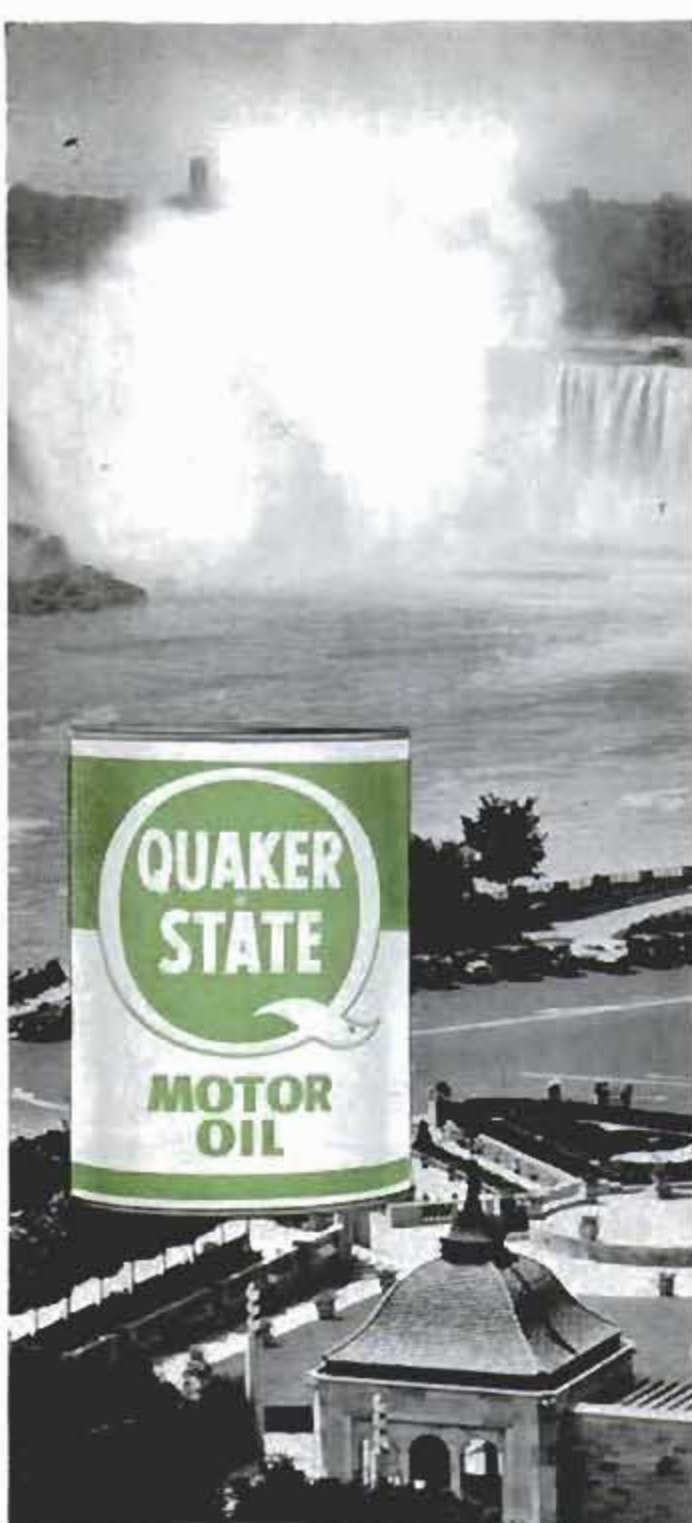
Where ideal recording conditions do not exist — such as at police headquarters where the public is coming and going, typewriters are clattering and telephones are ringing—both music and narration are first put on tape.

Segar says that any of the popular brands of movie film with single perforation for sound recording produce good results. For most police work, reversal film is used. That is, the same film used in the camera is reversed from a negative to a positive print in processing, and then utilized for projection. When only one print is desired, this saves the cost of having a positive print made.

### Department Processes Film

The Seattle Police Department processes all its black-and-white film, but color film is sent to the manufacturer. Fast developers are used. A negative image is brought out to full development in two minutes or slightly less. A hundred feet of film can be processed, dried and ready for projection in about 25 minutes. If detectives wish to study in detail the reactions of a suspect

(Continued to page 212)



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**On tour or around town, drive with Quaker State, the oil that cuts engine wear, prevents engine breakdown. Fortified with anti-wear detergent additives, this pure Pennsylvania oil stops rusting and corrosion, eliminates sludge, carbon deposits and damaging acid action. Result: moving parts work smoothly and friction-free under all driving conditions! Next oil change, insist on Quaker State.**

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6-piece set in metal rack  
**ONLY \$3.90**

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60c to 70c each in sizes from 1/4" to 1"



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2110 Columbia Avenue  
Rockford, Illinois

photographed at a crime scene, they can do so a few minutes after the filming.

"You can learn a lot by studying expressions in a movie," says Segar.

In fact, one movie made by the Seattle police told much because an expression revealed nothing.

In one of the city's most tragic crime cases, a 12-year-old boy admitted killing a four-year-old girl. The boy was taken to the scene to re-enact the killing. He did, as Segar's movie camera whirred.

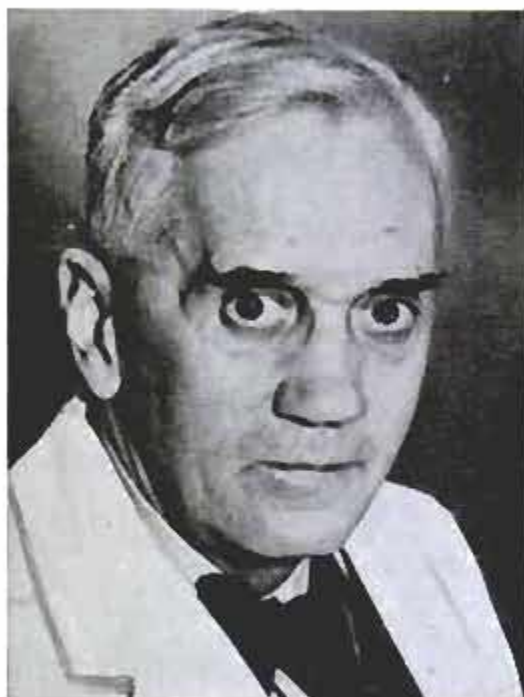
When the film was projected on the screen at police headquarters, there was no doubt the boy was guilty. He showed no hesitancy about details. But the camera had caught something that a human observer might have missed. It was the fact that there was no emotional reaction on the boy's face whatsoever as he re-enacted the crime. Not a nervous blink, not a dropped tear. Just a blank.

Police chief, prosecuting attorney and judge studied that film. As a result the boy, instead of being confined to a meaningless life behind bars, today is being given psychiatric treatment. ★ ★ ★

*This Month's*

**"Great Pioneer in Science"**

(Page 18)



**Sir Alexander Fleming — 1881-1955**



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If you can hammer a nail, you can build with Corrulux. Easy to apply with ordinary carpenter's tools.

Send 5 cents (in coin) for detailed construction and materials plan of patio illustrated. Specify Plan No. 1. Send 30 cents for set of 12 plans of practical uses for Corrulux around the home.

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## Make Your Own Crossover Network

(Continued from page 139)

slope near the crossover point and a smoother over-all response.

The filters consist of adjustable TV coils and aluminum electrolytic capacitors whose values, for various speaker impedances, are given in the table. Ordinary radios and TV sets are designed for speakers with 3 or 4-ohm voice coils, while hi-fi systems with separate amplifiers usually have provisions for matching any speaker impedance. The choice of filter parts, therefore, depends on your speaker selection.

For the specified parts values, the crossover point (the frequency at which separation becomes effective) is approximately 2000 cycles. This choice of frequency makes the network suitable for a number of high-fidelity woofer-tweeter combinations as well as for inexpensive replacement-type speakers.

The diagrams on page 139 give details for connecting the parts and speakers, but you'll have to make a couple of adjustments to obtain optimum results. While precise adjustments require test instruments, such as an audio-signal generator and output meter, you'll find that your own ears do a pretty good job. Start by turning the screws of the TV coils about halfway into their forms and then listen critically to the resulting sound. If the midfrequency range (the soloist, for example) sounds a bit weak, either loosen the screw of L1 or tighten that of L2. If the midfrequencies seem accentuated, reverse this procedure. The idea is to make the over-all response as smooth as possible and a little experimentation can produce excellent results.

With the woofer properly housed in a suitable enclosure, a two-way speaker system can provide a worthwhile improvement in sound quality. This one-evening project, therefore, should prove to be interesting and informative as well as highly rewarding. ★ ★ ★

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## Karate—"Gentle" Art of Self-Defense

(Continued from page 127)

column, kidneys, nasal bone, tail bone. A well-directed karate blow to any of these points will stop an opponent in his tracks.

A good karate student, says Trias, must be prepared to lash out in any direction with hands or feet. He must strike swiftly and then back away.

In the karate chop, there's a minimum of motion. When the arm or leg lashes out, the motion is direct and definite. The fingers, which are kept folded, might be compared to brass knuckles. When the feet are used, the kick is made with the ball of the foot.

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Only the karate expert can split a building brick with his hand. Trias is one of the few men able to do this to a brick two inches thick. Concentration and proper breathing are part of the technique. According to Trias, a Japanese expert holds the world's record by breaking two bricks with one stroke.

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Trias tells the story of what happened to one karate man after he joined the Army. Another soldier, on several occasions, insisted on a fight, but the karate expert simply turned his back. A showdown was inevitable, however. When the time came, the karate expert, to the amazement of his opponent, removed his shoes. A moment later he let go a wild *kiai* yell, leaped at his opponent and unleashed a minimum blow to the pit of the stomach.

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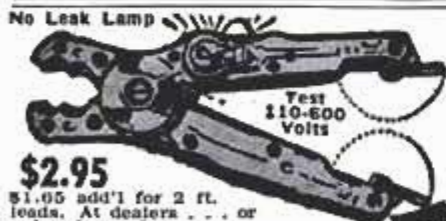
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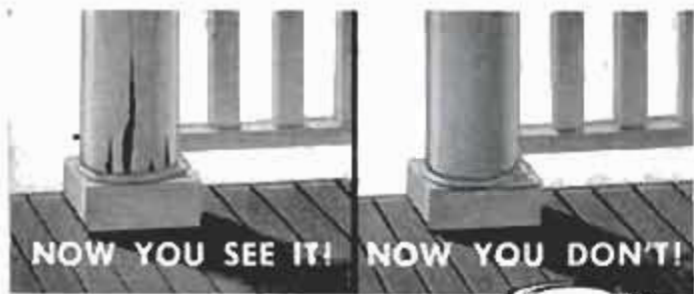


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## TV Extension Speaker

(Continued from page 138)

can mount somewhere on the back of the cabinet. Solder a wire from each of the speaker lugs to terminals at one end of switch. Solder the wires of the extension-speaker cord to the remaining pair of switch terminals.

If your lamp is equipped with a separate switch for each bullet, wire a 12-ohm, 5-watt resistor across this pair of terminals to load the amplifier in the event that the extension speaker is switched off to silence commercials.

Installation of the extension speaker is shown in the illustrations. Replace the light bulb of the bullet with a screw-type adapter plug and solder a 7-in. length of lamp cord to the voice-coil lugs of a 4-in.-square speaker. Terminate the other end of this lamp cord with an a.c. plug to fit the adapter.

Bend back the corners of the speaker faceplate in a 1/4-in. flange and cover the flanges with tape to protect the interior of the shade when the speaker is inserted. Friction will hold the speaker in place.

A decorative grille is made from a 1/4-in.-wide cardboard ring with an outside diameter slightly less than that of the mouth of the shade. The ring can be covered with grille cloth and friction-fitted into the shade to complete the project.

**Warning:** Do not work on the lamp wiring unless the line cord is disconnected from the wall outlet.



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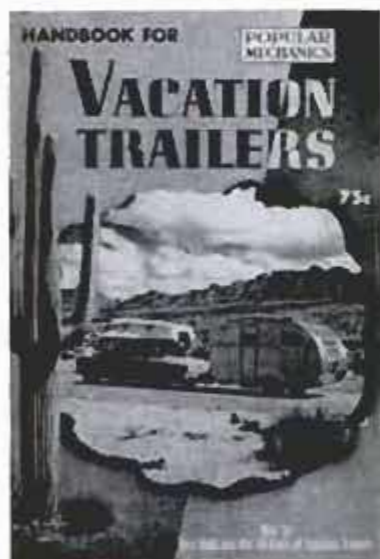
Depth gauges with accurate readings up to 200 feet are now available for skin divers. The new gauge is protected from shock in a plastic case, and has a pressure-resistant lens made of the same material. An "O" ring mounted in the lens keeps the luminous dial watertight, but the gauge has a filter with a removable cap so it can be cleaned easily. It has a plastic wrist strap and can be read at a glance.



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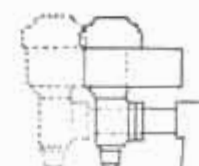
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## Why Not Take to the Wilderness?

(Continued from page 94)

paused to view the lonely magnificence of Alexandra Falls. Lonely is the right word, for we were told that no more than 50 "outsiders" see the spectacular sight each year. Here water cascades over a 106-foot drop and surges north through Hay River to empty into Great Slave Lake. Tourist-wise, this area is virgin!

We found our pretrip correspondence worthwhile when we reached the village of Hay River. We were met by Barney Maher, schoolteacher, with whom we had corresponded. He knew how eager we were to set out on the lake, but advised us to wait a few days because the prevailing winds and ice floes were dangerous.

We took Barney's advice and camped on a meadow halfway between Hay River and the Indian village. Our only danger here was from bear. We were careful to burn garbage immediately, bury empty cans, keep food out of the tent and even to throw dirty dishwater downwind. Thanks to our precautions we had no trouble. In general, we have found that the "wild" bear we have encountered in our wilderness travels have a lot more respect for man than do their "tame" brothers who reside in some national parks. Though four-footed creatures gave us no trouble, the bug population seemed to be at its peak. Through the years we have devised a three-step, sure-fire method of outsmarting these blood-thirsty little critters:

1. Cover yourself with bug repellent.
2. Put rubber bands over clothing at wrists and ankles. (Keeps bugs out, blood in!)
3. Spray the inside of the tent an hour before bedtime, and wear head nets even to bed if necessary.

In addition to mosquitoes and black flies, there's an insect up there called the bulldog. Its name is derived from its bite. 'Nuff said.

### Trout by the Dozens

While we waited for a break in the weather, Harry spent some time fishing the headwaters of the MacKenzie River, 30 miles west of Hay River. Using small wet and dry flies, he caught arctic grayling trout by the dozens, trout that are tremendous fighters (and absolutely melt in your mouth).

Meanwhile the kids and I visited the Indian settlement. Most of the Indians of that area are Chippewa, though some are of the Dog Rib and Slavi tribes. They make a meager living, fishing through the summer

and trapping during the winter. Gambling starts young, and the use of tobacco even younger. When an 11-year-old playmate offered Glen a "chew," I put my foot down. Indian life offers some startling contrasts between the primitive and modern. One Indian tent had a bed of spruce boughs, with a picture of Elvis Presley pinned to the canvas overhead!

The local storekeepers advised us to take dried foods and canned items, rather than bottled. Our emergency food box (a two-week supply of dried food) was the first item aboard when we started loading the boat. We were eager to be on our way, as everyone warned us to be off the lake by August 15, the date when, with almost weird precision, the fall storms unleash in full fury.

We couldn't help feeling somewhat like pioneers as we "set sail" on the vast body of water. Great Slave is truly great. Its 325-mile length makes it the twelfth-largest lake in the world, and the fifth-largest in North America. Fisheries research has found that in places it is more than 2000 feet deep.

### 12-Foot Waves

That first night out we had a rough initiation. Although it had been calm when we started, a stiff wind came up, and we soon found we had all we could do keeping the boat nosed into the 12-foot waves. By timing each five-gallon tank, I could switch the fuel hose from one tank to another, eliminating a motor stop that could be fatal in rough water. After several hours the storm subsided, but now, thanks to the storm, we no longer knew where we were. We traveled slowly for several miles, but just when we thought we had our bearings, the motor stopped!

Harry moaned something about the clutch (the motor wouldn't shift), and we had visions of our dream trip ending the first night out. For some reason (which he can't explain to this day) he suggested that I grab a paddle and take a sounding. The paddle hit the bottom of the lake—only 18 inches down. There we were, perched on a sand bar. No wonder the motor wouldn't shift! So began our adventure.

As we traveled along the lake, I made a note of every landmark—odd rock formations, exceptionally tall pines, even an eagle's nest. These would serve as welcome guideposts on the return trip.

We arrived at Fort Resolution in time for the Dominion Day celebration, which corresponds to our Fourth of July. The entire native population, from wee babes on boards to pipe-smoking great grandpas,

(Continued to page 222)

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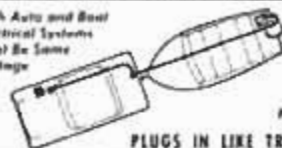
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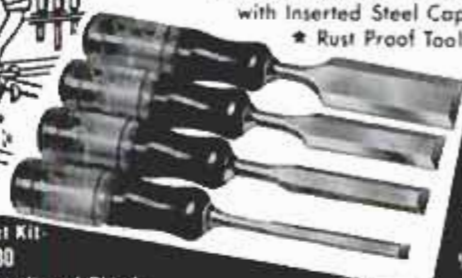
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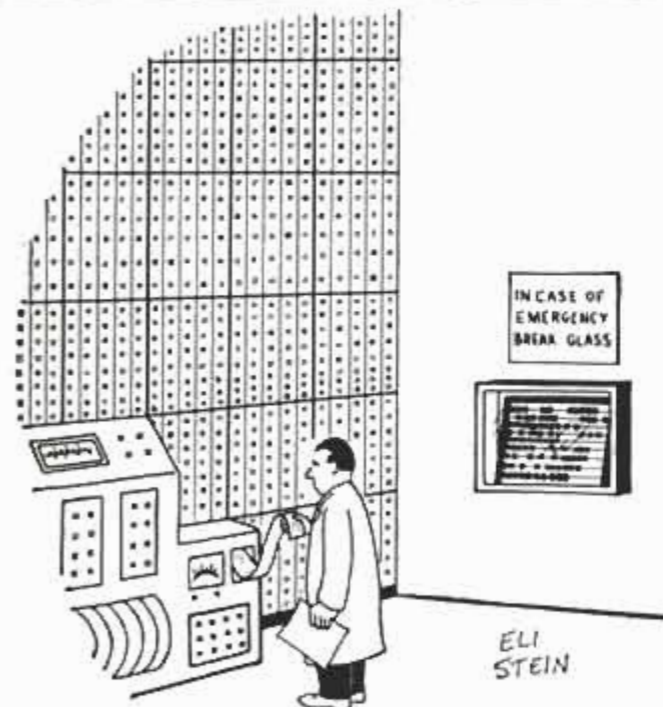
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turned out for the races, contests—and liberal consumption of “home brew.”

While traveling these waters we had to be sure of an ample gas supply. Before leaving Fort Resolution, we had the Hudson Bay man wire ahead for confirmation of the gas supply at Snowdrift. The price per gallon of gas increased along with our mileage away from civilization. In Hay River it was 31 cents per imperial gallon; at Fort Resolution, 60 cents per gallon; and at Snowdrift, 90 cents per gallon. When we refueled, we filled our five 6-gallon Evinrude tanks, four 5-gallon tanks and a 12-gallon drum.

After leaving Fort Resolution we traveled 200 miles without seeing any sign of life. The commercial-fisheries outpost at Utsingi Point was indeed a welcome sight. Fishing was good, so we set up camp. In selecting the location for our tent at any camp spot, we are governed by these things: level of land, wind protection, drainage and availability of water supply.

You don't need to worry about boiling the pure waters of the northern wilderness.

Camping near a fisheries outpost proved to be an educational experience for Glen. He watched wide-eyed as the fresh-caught fish were processed for truck shipment from Hay River.

Hardly a day passed without some unforeseen excitement in camp, whether it was a nosy porcupine or a raging forest fire. Glen and Ann had learned to stay close to camp. They didn't have to wander far at Great Slave to find mink scampering in the underbrush or a mother duck teaching her new brood to navigate. There was always a Husky pup ready for a playful bout. But the children's best “finds” were inanimate; on our combination exploration and fishing trips they came across huge moose and caribou horns.

### Phenomenal Fishing

Fishing trips proved successful beyond a fisherman's wildest dreams. The fish were there, in unbelievable quantity and phenomenal size. We caught lake trout on the surface, and nearly cried when we couldn't ascertain the weight of some of our prizes (our scale went to only 22 pounds). Average weight for these beauties was about nine pounds and, at Snowdrift, where Stark Lake empties into Great Slave via the Snowdrift River, it was not uncommon to have two or three this size gulping our spoons at the same moment.

We found, in general, that two topics dominated the conversation of the local people: fishing and the weather. About the middle of July we enjoyed two weeks of

beautiful sunshine, with daily temperatures reaching 60 to 70 degrees. At best, this country has one month of what we in the Midwest would term summer. On our trek, we encountered every form of precipitation—rain, sleet, hail and snow. One exceptionally cold morning (15 above), Ann insisted that we would have to fish through the ice that day. On cool nights we heated a large rock and placed it in the tent an hour before bedtime.

Time means nothing in that land. If I hadn't been keeping a diary, I'm sure we would have lost all track of the date. At the fish camp one morning, Harry, from force of habit, asked the time of day. A visiting missionary answered 9:45, a fisheries man said 10:30, and a prospector's reply was 11:00. Furthermore, none of the three bothered to change the setting on his watch. It simply didn't matter what time it was.

For four weeks (after that first night) our voyage had been smooth sailing—almost too smooth. During our last four-day side trip before returning to Hay River, Fate dealt us a real blow. Harry injured his back, so I had to take over. On a rough lake, this could have meant real trouble. How thankful we were for that old-timer's advice about getting the routes and schedules of all the fish packers. With this information, we managed to make connection with the M.V. Landa packer just in time to be towed (free) the 250 miles back to Hay River.

We found that these people, self-sufficient as they may seem, really look out for one another. Beneath an independent skin there exists a brotherhood of man that is humbling to an outsider.

### Trip Wasn't Easy

Looking back now at our summer's adventure, we can say it wasn't easy. There were times, I admit, when I thought we were out of our minds to take two children into an area we knew relatively little about. But at Great Slave, as in our other wilderness wanderings, we have learned that “precaution” is the keyword to the success of the trip.

We found Great Slave Lake, in summer, to be beautiful. The east arm of the lake, in particular, provides a panorama so spectacular and brilliant that one is deeply humbled by her greatness.

The greatness of Slave is not only her untouched beauty and tremendous size; her vast mineral resources, which haven't even been tapped; the great fish that swim her depths. Somehow we feel that in spite of all her material assets Great Slave has

(Continued to page 224)





**EXTRA BLOWOUT PROTECTION:** Nylon has lasting strength to guard against blowout. Nylon protects against the four kinds of unseen tire damage that can lead to sudden tire failure: (1) heat, (2) bruising from bumps, (3) moisture, (4) flexing. All tire makers use nylon cord in their better tires. Why risk a dangerous blowout? Have your tires checked regularly. And whenever you need new tires, be sure they're made with nylon cord!

**THE SAFEST, STRONGEST TIRES ARE MADE WITH**

**NYLON**

LOOK FOR THE NYLON IDENTIFICATION ON TIRE SIDEWALL.



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← FULL  
ADD OIL →

Your  
dipstick  
**PROVES**  
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difference  
in filters

**HASTINGS**  
keeps oil clean

Hastings Oil Filter Cartridges keep oil clean from filter change to filter change, when replaced as normally recommended.\*

That's because only Hastings has Densite filtering material, which traps and holds even the most microscopic dirt particles. The dipstick test proves it!

Just ask for Hastings—next filter change. Be sure of clean oil *all* the time.

\*Proved by tests conducted in accordance with U.S. Bureau of Standards. U. S. Patent Numbers 2,797,811 2,584,771

**HASTINGS**  
OIL FILTER  
CARTRIDGES



HASTINGS MANUFACTURING COMPANY  
HASTINGS, MICHIGAN

Casite, Piston Rings, Oil Filters, Spark Plugs

one "greatness" which overshadows all others. This is her hospitable people. We believe that Great Slave, or any other true wilderness, infuses a type of greatness into the people that can't be matched in any concrete jungle.

Wonderful people, awesome beauty, fabulous fishing, unexpected adventure—all in an untouched setting. We found our "promised land" in Great Slave Lake.

If all this has stirred that old pioneering spirit in you, but you've always held back because of family, lack of time or funds, forget these "minor" matters.

We have found no greater satisfaction than the closeness, the wholesome relationships that an adventure in the wilderness fosters within a family.

Our jaunt took two months. It could be done in one.

As for finances, once you're in the wilderness, there simply isn't any place to spend money.

Convinced?

If your family is willing, don't hesitate. Start planning your wilderness vacation right now.

Perhaps your "promised land" will not lie north, as ours does. But there is one waiting for you, somewhere, in some wilderness. ★ ★ ★



### Portable Humidifier

If you want to get rid of dust or dryness in any enclosed area, humidity will help. A West German manufacturer is marketing a small portable humidifier that will vaporize one quart to two gallons of water wherever you want it. The unit, based on the aerosol principle, brings air through a filter to protect the atomizing assembly from dust and dirt. A continuous stream of water from its tank is converted into a mist of five to ten-micron particles by centrifugal force. The humidifier comes with support brackets for quick set-up anyplace, or it can be permanently attached to a wall or post with screws.

## Blast That Crab Grass

(Continued from page 74)

### Late Winter

This is the time for effective pre-emergent controls. Here are a few:

**Calcium arsenate.** Get this stuff on early, before the first crab-grass seed cracks its coat. One authority recommends applying it at the rate of 12 pounds per 1000 square feet, immediately after the last snow thaws (but how do you know which is the last snow?). In any event, there's no need to wait until the ground thaws completely. According to another expert, you can apply calcium arsenate up until the day the first daffodil blooms. If you apply it earlier, during a February thaw, it can also provide excellent control for knotweed. The second year, authorities recommend a booster application of about one fourth the dose of the first year. This, they say, should give up to 95 percent control. Calcium arsenate is poisonous, so keep it away from children and pets. Once it is on the soil, however, it is safe.

**Chlordane.** This chemical provides a one-two punch, but must be handled more carefully than some of the others. It should be applied in early spring, well before the first seedlings emerge, at the rate of four ounces of 45 percent chlordane emulsion per 1000 square feet. In addition to crab grass, it also destroys many soil insects including grubs. Warning: Do not apply to a relatively new lawn.

**Triazine complex.** This is designed for use in the South for pre-emergent control of many weeds, including crab grass. It should never be applied to a newly seeded lawn. Use it only on Bermuda and St. Augustine grasses.

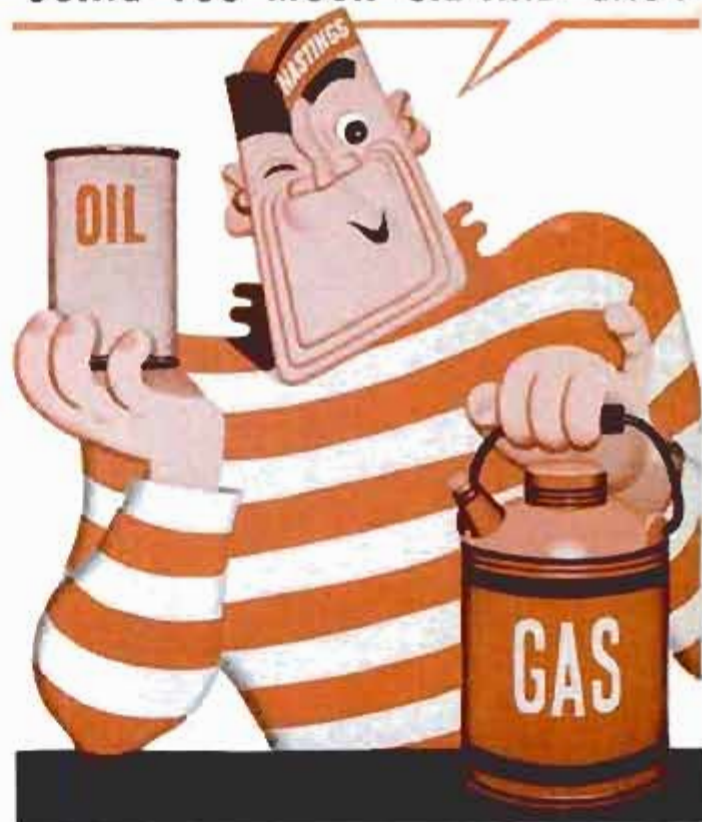
### Early Summer

**PMA (phenyl mercuric acetate).** This chemical kills crab-grass seedlings as soon as they emerge but before they advance to the seed-head stage. Three to five treatments at intervals of seven to ten days usually are necessary. PMA may be applied any time between the emergence of the crab grass and the two-leaf stage.

**Disodium monomethyl arsenate.** This is another early summer control. It should be repeated once or twice at 10-day intervals. It browns lawn grasses severely, but causes no permanent damage.

Once you start your year-round campaign, don't forget that persistence is the secret of success. You can't apply any chemical only once and expect to rid the lawn of your ancient enemy. But careful use of pre-emergent and post-emergent killers can bring ultimate victory. ★ ★ ★

## USING TOO MUCH OIL AND GAS?



## IT'S TIME FOR HASTINGS

When your oil and gas bills start growing bigger—look out! Using too much oil is your first sign of worn-out piston rings. And worn-out rings mean power drop-off—costly waste of oil and gas—and expensive repairs later on!

The sooner you act, the less it will cost. When your motor specialist recommends new piston rings ask him for Hastings. They're engineered exclusively for replacement service . . . to provide the additional lubrication worn engines need . . . to stop oil-pumping, save gasoline, restore lost performance.

Get new car power and performance from your present car—with Hastings. Truly your best investment for many thousands of extra miles of trouble-free driving pleasure.

# HASTINGS

## PISTON RINGS

**TOUGH** on oil pumping **GENTLE** on cylinder walls

HASTINGS MANUFACTURING COMPANY  
HASTINGS, MICHIGAN

Piston Rings, Casite, Oil Filters, Spark Plugs

## Mercury Owners Like Roominess, Dislike Big Windshield

(Continued from page 106)

30 years, but if they make them any more difficult to work on, I may take up some other pastime."—Pennsylvania salesman.

"The one thing which is sadly lacking today in American cars is craftsmanship and no one seems to care very much. Labor has apparently lost all sense of pride in a job well done so long as the job pays well. I am sure your survey can do nothing about this, but if enough people mentioned it perhaps the labor organizations not run by goons would try to improve something which is a blot on their records."—Nebraska physician.

"I think the industry seems to have too much 'cut the corners, boys, the suckers will buy them anyhow.' Styling is a race to see who can produce the biggest fins, the longest and flashiest designs. Entirely too much planned obsolescence. Prices are too high for such low quality. If this keeps on I think a lot of us are going to buy the cheapest thing that will run and forget about impressing the neighbors."—Minnesota advertising vice-president.

"I am a little shamefaced in making this report. I am one who has continually complained that the manufacturers are building cars too long. I have also been complaining about the increase in horsepower. Then I buy the biggest Mercury they make! If I had it to do over again I would not buy such a long car."—Nebraska attorney.

"Mostly what's wrong with cars is that most people don't know what they want. So how do they expect the companies to know?"—New Hampshire plumber.

### More Best-Liked Features

Fourth on the list of best-liked features is Mercury's exterior styling, followed by its power and performance. Visibility and roadability come next in owners' favor, and then, comfortable seats.

Here are quotations by the owners themselves, describing these and other best-liked features (in order of frequency of mention):

"I like the styling, the clean, uncluttered lines. It has enough chrome to look good, but not too much. It doesn't look like a designer's nightmare or a rocket ship ready to take off for the moon."—California dispatcher.

"It does 100 so easily I don't know what the top speed is, but 120 miles per hour (on the speedometer) is relatively easy. It has as safe a feeling at 100 as my old car had at 70."—Iowa farmer.

"Visibility is so good my six-year-old boy can sit in any seat and see out 360 degrees. He doesn't have to sit on my wife's lap."—California landlord.

"Holds the road without swerving on curves. Seems to be well balanced."—Alabama retired owner.

"I am able to sit in a normal position while driving in complete comfort. I am not in a semiprone position."—Iowa attorney.

"In a check of 80 miles of city driving and 160 miles of country driving, I averaged 15.5 miles per gallon. I am well pleased with the mileage."—Minnesota high-school teacher.

### More Complaints

Fourth on the complaint list, with 5.5 percent of the Mercury owners mentioning it, is the restricted headroom.

(Continued to page 228)

*I'm sure people have been complaining about this ever since the Industrial Revolution.* →

*At least the lawyer is honest. How many of us complain about big cars, then buy them? No wonder the industry moves slowly. The plumber from New Hampshire describes the problem nicely.* →

*And yet some people keep insisting that higher horsepower doesn't mean faster speeds. Anybody who drives 100 on Iowa's narrow roads is asking for trouble. He may feel safe—all the way to the end!* →

*You do sit erect and the belt line seems lower than usual, providing an observation-tower attitude for the driver.* →

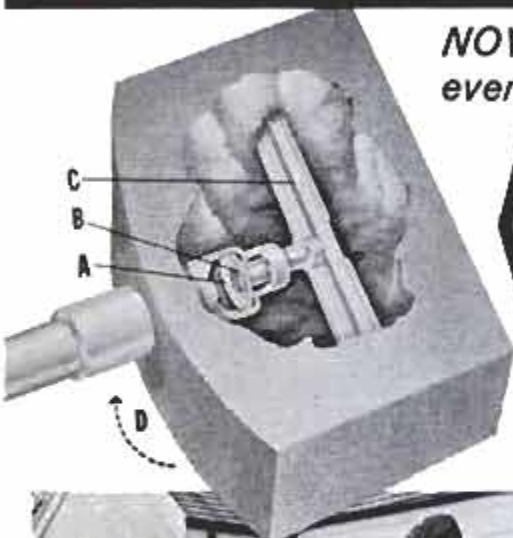
Here's the Swivel-T Valve that makes the NEW

HOPPY

# DEW BOY a Car Washer that thinks for itself!

NOW IT'S EASY to wash your car, boat, plane... even your house, with this unique helper.

**HERE'S HOW IT WORKS:** One end of the rigid, vinyl-covered aluminum handle connects directly to the hose. When water is turned on to maximum force desired, the water pressure forces the valve (A) to a closed position, stopping the water at point (B). Light pressure, as exerted for washing, pushes against the Swivel-T (C), which partially opens the valve and allows a gentle stream of water for washing. For rinsing, a firmer pressure with the sponge pushes the Swivel-T completely back against the cylinder, fully opens the valve and allows a heavy stream of water for rinsing. Entire head swivels (D) for easy wheel washing.



## DEW BOY PATENTED Swivel-T HEAD

- Eliminates running back and forth to the faucet
- Eliminates wasted water and muddy mess!
- Let's you WORK FAST, WORK EASY, WORK CLEAN!

## DEW BOY Bonus FEATURES

- sponge head is made of durable polyester in attractive pastel colors
- the entire, big sponge head is useable working area
- no protruding parts to scratch or break surfaces
- sponge head is self-cleaning — no souring or mildewing
- entire sponge head assembly is replaceable at small cost

**2.98**

Replacement Head only

**1.49**



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## Tens of Thousands in Use: New Precision Instrument for Leveling and Incline Measurement

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Easy as a camera to operate! One man—ALONE—can do leveling and incline measuring. Accurate to a fraction of an inch. Many uses on the job and around the house. Guaranteed Product Satisfaction.

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Only  
**\$6.95**

Handy carrying case optional only \$3.25  
Satisfaction guaranteed

**Headroom is less than in any car in its price class. In fact, less than in most cars that sell for less also.** →

**It's impossible to tune the radio and drive properly, so far is the reach. The reason: the dashboard has been moved forward to give more kneeroom. The same fact makes the glove compartment only four inches deep—not deep enough to hold many items you might want to stuff into it.** →

**Miscellaneous: Front and rear seats well padded over small tunnel. Really a six-passenger car. Roomy stepdown in back seat. Sharp edges on dash knobs. Sun visor hardware could be dangerous in a crash. Instruments easy to read, night or day. Power steering heavy, unexciting. No polo-pony feel to this animal. More like a boat. Power steering should help, but its help shouldn't be obvious. Like a good secretary—you want her to do all the work without seeming to do any of it! This power steering let's you know it's working. Wipers leave no blind spot in center, but leave big unwiped area on sides. Also tend to lift off glass in strong winds. Most outstanding characteristic is the way you're separated from the outside environment—no noise, no bumps (except big ones), no feeling of speed, just a relaxed, Pullmanish ride.**

These owners often praise the front-seat spaciousness, but at the same time bemoan the fact that they can't wear a hat inside the car.

"Car top is so low that occupants of average height must remove hats. Heads of tall persons touch the top."—Kentucky crane leader.

"My particular gripe is that when the seat is far enough forward to reach the gas and brake pedals your breastbone is rubbing the steering wheel."—Arizona beautician.

"The top is too close to the floor! The four-way power seat is at the low point, but my hat still rubs on the ceiling. Also, when leaning forward I am smacked by the sun visor and windshield top."—Rhode Island salesman.

Fifth and sixth on the complaint list are body noises and the location of the radio dial. In order to give more front-seat kneeroom Mercury moved its dashboard forward. This puts the radio farther forward than is convenient to reach.

"Rattles beneath the cowl next to the steering column. Bumping noise in right rear, sounds like shock absorber. Mechanics cannot find source."—District of Columbia government worker.

"Radio is hard for driver to reach."—Iowa salesman.

"It took the local dealer almost a week to reassemble the car after delivery from the factory. Nothing except the motor worked. The electrical system, heater and all mechanisms were haywire. Even a flat bearing in the front wheel."—Wyoming insurance broker.

"The roughest motor when first started of any car I have ever owned."—Nebraska professor.

"This Park Lane (\$4495) leaked around the front and rear windows. About three inches of water accumulated in the trunk. Door panels would fill with water. They corrected the trouble by drilling holes so the water would escape."—Kentucky electrician.

"Too low for use on gravel roads. I am having trouble on such roads."—Louisiana schoolteacher.

The following quotations describe additional best-liked features of the 1959 Mercury:

"Easy to get in and out compared to some 1959 cars."—Minnesota banker.

"Large trunk area, and no high lifting is required to remove pieces from trunk."—Pennsylvania manager.

"Body seems tighter than before."—Mississippi owner.

"The change from the pushbutton gearshift to the regular lever was the best idea anyone ever had."—Indiana owner.

"I like the front-hinged hood and the easy access to the spark plugs, distributor and fuel pump. I especially like the location of the oil filter."—Kansas postmaster.

"I had a little trouble with my 1957 Mercury and my dealer did not correct it. I wrote to Ford Motor Company and I received a letter from Henry Ford II, and my car was taken care of. When a big man like Mr. Ford takes care of a little buyer like me, how can one go wrong?"—Illinois railroadman.

"My wagon seats nine persons and all are facing forward."—Ohio salesman.

"I haul a travel trailer about 10,000 miles per year. The Merc-O-Matic transmission is the most troublefree and can work hard without getting hot. I just returned from a 6000-mile trip with the trailer, and averaged 11 miles per gallon. For my use, the Mercury is the best car I know of."—Maine salesman.

There they are, the opinions of the persons who know the Mercury best—the owners themselves. For an engineer's viewpoint, turn back to page 104.

**HUNTER TOOLS**

**DON'T DROP SCREWS!**

USE AN AUTOMATIC...

**Magic-Tip**

SCREW HOLDING SCREWDRIVER


HOLDS... DRIVES... REMOVES SCREWS

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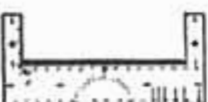
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# CUTS GAS BILLS



**EVERY MILE YOU DRIVE** adds dirt and gum to your carburetor. This build-up can reduce gas mileage as much as 10%. And at today's prices that costs you about 3c a gallon.

You can easily beat this problem by cleaning your carburetor with Gumout. Simply add a can of Gumout to your gas tank. It cleans the carburetor as you drive.

You'll get smoother engine performance and, best of all, you'll get more miles for your gasoline dollar. Gumout is sold by most service stations and auto supply stores.

**GUMOUT • CLEVELAND 4, OHIO**

## Camera and X Ray Team Up For Phantom Photos

(Continued from page 123)

The apparatus permits simultaneous X-ray and photographic views, but they may be taken consecutively if desired when movement is not to be contended with. For lighting, there are two attached gooseneck lamps to supplement room illumination. Electronic flash or flash bulbs can be used and may be necessary if the subject shows motion. Black and white, color and stereoscopic views all are possible. For stereoscopic views, the X-ray tube with the apparatus is shifted for the second picture.

### Negatives Developed Separately

The X-ray negative and the photographic negative are developed separately in the darkroom. When dry, they are combined by enlarging the photographic negative with a conventional enlarger or slide projector to form an image on an enlarging easel, matching the radiograph. Proper perspective having been attained automatically in the making of the photographic negative, it is only necessary to enlarge the negative until its registration marks coincide with those of the X-ray negative that is placed on the easel. When the proper size and orientation are determined, the X-ray negative is fastened down along one border with masking tape, which serves as a hinge to permit enlarging paper to be placed under it. Then the enlarger light is switched on for an exposure which, in passing through the X ray, records a composite of the two on the enlarging paper.

Several alternative methods may be used as variations. The X ray may be first recorded on the paper as a contact print by using a light source other than that of the enlarger, to be followed by the photographic projection after turning the X ray back on its hinge. Another variation is to reverse the tones of the X-ray image beforehand by making a contact positive transparency. The choice here lies in the visual, tonal qualities of the subject being examined; if predominantly dark, a further darkening to show the X-ray image would be less satisfactory than if it were lighter in tone.

### Automatic Enlarger Recommended

An enlarger with automatic focusing is recommended for ease in matching the images, but it is not necessary if one has the patience to make several trial exposures at various magnifications.

You may find it helpful to use variable-contrast paper for the composite print, for

by this means the X-ray image may be recorded in one contrast and the photographic image in another. In place of photographic enlarging paper you may use negative-type material to produce an enlarged transparency suitable for viewing with an X-ray view-box just as X-ray films are conventionally examined. Finally, one may copy the finished composite on slide material for showing with a slide projector.

For the production of color composite photoradiographs, a different process is used. The photographic color picture in negative or positive transparency form is projected on the back surface of an upright translucent screen. The X-ray negative is placed in front of the screen and the combined picture is copied on color film with a camera directed toward the front surface.

### Patience Is a Necessity

The usual aids in controlling density of particular areas may be needed. One may find it helpful to dodge or mask these areas during part of the darkroom exposure.

Some patience is required to bring about the desired result. With care, a pleasing, accurate and useful composite can be made. At the present time a composite of this type is less of a novelty to the general public than to those familiar with radiographs, for the former is generally unaware that radiographs reveal little surface detail visible to the eye.

Applications of composite photoradiography at present are in three fields: First, in the field of medical radiography for the teaching of anatomy; second, as an aid in cosmetic surgery and dental corrective surgery and, finally, in the industrial and advertising fields, to show the relation of internal structures of objects to their external surfaces.

As familiarity with the process grows, new uses may be found. While it will not take the place of the illustrator's art in making "exploded" views of mechanical devices, it does provide accurate information about the relation of internal to external structures.

When Roentgen's epoch-making discovery of X rays was announced in 1895, there was a shock wave of hysterical reaction from overly modest females who imagined that their well-clothed figures would become revealed to anyone carrying about an X-ray machine. Their fears were unfounded, for radiology became solely a laboratory procedure. The present device for making composites should not revive those fears for it only adds the visual impression of an object's photograph to its X-ray appearance. ★ ★ ★



# tri-star



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DIVISION OF WOLVERINE AVIATION CO.  
P. O. BOX 3841, DETROIT 5, MICHIGAN

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Newest, safest, most practical, most versatile small boat ever designed . . . All models easily convert to other uses . . . the fast moving Speedster . . . smooth, maneuverable Sailor . . . Ideal Fisherman . . . The fiberglass Tri-Star is lightweight and compact . . . practically nonsinkable and almost impossible to overturn . . . models also available in "Quick-Kits" . . . Write for free catalog and nearest dealer.



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**"BUILD YOUR OWN"  
ENGINE DRIVE ARC  
WELDER**  
Save \$300 to \$500



Get your own highly efficient welding machine by simply connecting a Hobart generator to a good used auto engine. Write for free booklet.

**NEW, LOW COST A.C. WELDER**  
for shops, garages,  
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easy to use.



Saves time, money and replacement parts. The same unit repairs, construction and metal fabrication. Ideal for those quick money-making jobs around farms, shops and garages.

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HOME TYPE WELDER**  
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FREE . . . "Welder's Vest Pocket Guide" Write HOBART Brothers Co., Box M-79, Troy, Ohio, Phone Federal 2-1223



**TOM  
HENDERSON**

"For dessert, Bill's going to open these peaches I canned last year."



Here's what happens with worn shocks. Wheel hits bump, then returns to road . . . but violent spring recoil pulls it off road a second time. Meanwhile car body (indicated by plane lines) rocks severely. This causes serious loss of control, shakes up passengers, takes miles off tires.



With new Gabriel Adjustomatic shock absorbers, wheel hits bump, returns to road . . . and stays there! Spring recoil is absorbed, entire car recovers from impact almost instantly. Besides increasing safety, comfort and tire mileage, this helps prevent spring breakage, actually lengthens car life!

## Gabriel Adjustomatic shock absorbers give greater comfort and car control

If you've gone over 20,000 miles on your present shock absorbers, chances are you need new ones. Ask your service station attendant or garage mechanic to give your shocks the Gabriel safety check now . . . especially if you are planning a family trip soon. And if you *do* need new ones, tell the man you want Gabriel Adjustomatics, the modern shock absorbers that can be adjusted to give you the kind of ride you need, for the kind of driving you do!



Lee Petty won the recent 500-mile stock car race at Daytona riding on Gabriels! Lee says: "It sure was a wonderful feeling riding on those Gabriel shocks. They gave me perfect control throughout the race, even on the curves. I wouldn't have any other shocks on my race car . . . or my family car, either!"

**Gabriel**  
ADJUSTABLE SHOCK ABSORBERS

THE GABRIEL COMPANY • Cleveland 15, Ohio

## The Miracle Glue That Welds Anything

(Continued from page 82)

the block, epoxy metal is as good or better than a weld."

When cured at high temperatures (350 degrees F. and higher), as it is in industrial applications, epoxy will stay put, right up to the actual curing temperature. When allowed to cure at room temperatures in a home or job shop, epoxy will generally hold up to the boiling point of water. Al Creighton, Devcon's president, has more than 500 letters from people who have successfully repaired cracked engine blocks with his epoxy product.

Except for its temperature limitation, there is little done by real metals that the new plastic metals won't do as well, or nearly so. Job shops use it for repairing steel machinery, plugging holes in radiators and filling air or sand holes in castings. "Some shops," says C. H. Smith, general manager of Cycleweld, "actually make tooling dies of metal-filled epoxy. A heavy concentration of filler is used in the center, then the die is given a hard metal surface."

Out on the range, cowpokes, for several years, have used Plastic Steel to patch holes in water-storage tanks; and hundreds of pounds of the amazing material repaired Saudi-Arabian oil pipelines and tanks punctured by bullets.

The talonlike secret locked in epoxies first became known to plastics engineers in the 1940s. At Chrysler, it was about 1943. Researchers were looking for a paint bonderizer that would give them stronger adhesion of paint to metal. In the course of experiments with various plastics, a laboratory technician discovered that one particularly promising bonderizer stuck to the surface of almost any material.

At about the same time two other men—Dan Bradley and W. R. McConnel—at the Shell Chemical labs in Detroit, found the same properties in some resins they had developed. Shell and Chrysler put their heads together. Out of their efforts came a startling new resin adhesive. Though not an epoxy base, it was so powerful that it could be used to "glue" together many parts of military fighter planes, eliminating expensive rivets. The Army used it to fasten an aluminum nose cone over an antitank shell so solidly that the metal cone broke apart before the bond did.

This early resin adhesive was dubbed "Cycleweld" because, in order to "set," it had to go through a cycle of time, pressure and heat. After World War II the need for an even stronger bond, that

(Continued on page 238)

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## They Made It Three Straight

(Continued from page 117)

rouges. They used a rotary tool to cut the windshield or top to size, finishing off the edges with sandpaper.

The Plexiglas dust problem was solved by means of finishing off with 6/0 waterproof sandpaper and emery buffing using a black compound (red rouge will tint plastic).

For molding or trim on windows, hard-tops and windshields, the brothers used TT-gauge model-railroad tracks. They filed off the running rail to get a T-rail. After bending to shape, they inverted it and inserted it in body grooves. The tee hides any sloppy paint at the wood edges.

The railroad track is not the best for windshields, they found. A piece of chrome-plated brass, bent and grooved (with a rotary grinder) to take the windshield is more rigid. But it is the most work. The brothers finally settled on aluminum strip, bent to form a channel around the edge of windshield and glued to it.

The windshield can be held in place by various means. The Greenes have used three methods. The first is to slide the upright, outside legs of the molding over vertical pins sticking out of the wood. The pins cannot be seen.

A second anchor for the windshield is

Hours of planning come first. Each brother made over 100 sketches before going ahead with the winning car



to tie it down by means of fine thread from the bottom molding through small holes in the dashboard.

Another way to hold the windshield in place is to have a removable dashboard, the dash fitting against the windshield molding from the back. This makes the firmest anchor.

Windshield wipers, inside and outside door handles are all aluminum. A fine hole is drilled into the underside, a pin (without the head) is pressed into the hole. The protruding pinpoint is pushed into the wood, holding the part in place.

The car interiors consist principally of seats, floorboards, dash, steering wheel and steering post. The brothers have made seats from carved wood, covered with corduroy, and from kid leather over sponge rubber. They learned one trick about the kid-leather forming by accident. They had placed the leather on a wood seat-shaped mold, sewed back and bottom. Accidentally the whole thing dropped into boiling water. The water shrank the leather tight. When they removed the wooden mold and put sponge rubber in its place, they had a plush leather seat.

### Floorboards of Aluminum

Floorboards varied. Joe made his from beaded aluminum, pounded out U-shaped to simulate the housing. Tom sprayed the car's flooring with clear lacquer, then sifted flock (hairlike wool) onto the sticky lacquer and dumped out the excess. Dan made his transmission housing out of wood and covered the entire flooring with baby-bib cloth cut to size.

Dashes were generally cut in the blocks that formed the center section of the car. Only one removable dash was among the top-winning three models.

The best steering wheels were of aluminum, turned on a lathe. The inside of the turned ring was filed smooth. Steering posts were of wood or metal dowels, with two spokes holding the aluminum wheel.

Four hardened-rubber wheels are supplied to contestants by the Guild, but the modelmakers must make their own hub caps and sidewalls. The brothers turned their hub caps on the lathe. And by far the easiest way to make white-sidewall tires was to use an ink compass and scribe two or three circles with white ink rather than have one thick white layer. Wheels were attached to axles or mounted to the bottom plate of the car (wheels must not rotate).

Bumpers and grilles were made from aluminum bar stock or chrome-plated brass, shaped by rotary grinder, and wired or

(Continued to page 236)

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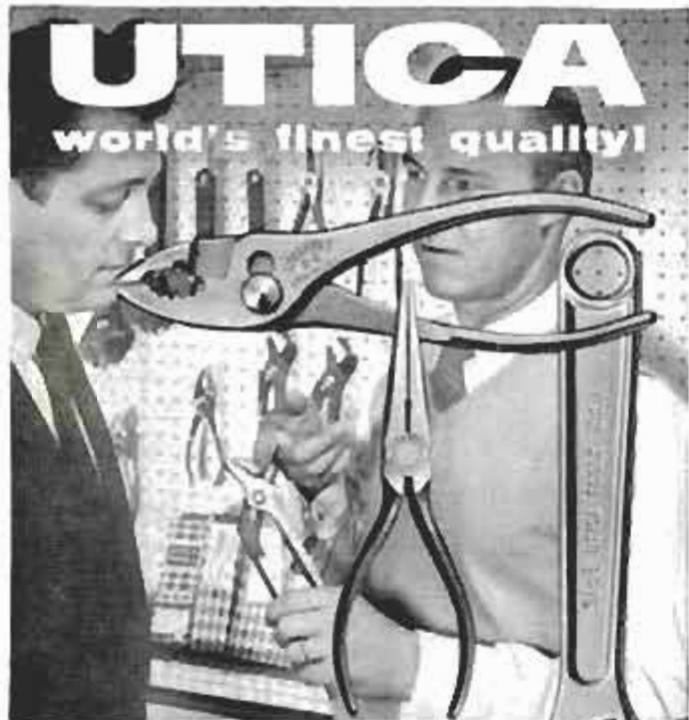


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Headlights of clear Plexiglas and taillights of colored Plexiglas were turned on a lathe, or formed by hand and put into aluminum-tube mountings. The backs of the headlights were convex, painted silver, to give the effect of sealed-beam headlights from the front. While the plastic lights were in the lathe, fine lines were scored on the front with a knife. This is a very fine detail, but one that might help win.

All trim, moldings, grilles, bumpers and hub caps were highly polished by using a series of wet and dry sandpapers from 180 grit for the roughest to 240, 320, 400 and up to 600 grit, followed by buffing slightly.

### The Final Stage

Putting a gleaming finish on their model cars was the final step. All low spots were filled with Duratite, then the surface worked over with coarse and fine grades of sandpaper until it was as smooth as glass.

The first step was to put on three or four coats of sealer, then a black undercoat of lacquer (commercial auto body), then colored dope or lacquer. Coats of clear dope or lacquer were sprayed on top of the colored dope or lacquer.

As many as 20 coats (sealer, primer, final, clear) were sprayed on these top cars. Each coat was sanded carefully. If the boys "went through," they sprayed on another coat.

Joe and Tom did not sand the last coat, but Dan did, using 600-grit paper after the final coat. The boys then used three different types of polish—red-rouge paste, Blue Coral and, finally, Simoniz. Their cars look, feel and gleam like metal.

The question is: "Can other model-makers learn from these brothers and save themselves a lot of trial-and-error years?"

Dan's experience answers the question. He certainly learned from his brothers. His first model took top state and regional awards, and his second model took top state, regional and national awards. In only two tries, he reached the top.

Norman Greene, 17, who lives next door to his cousins, the three Greene brothers, is another answer to that question. His cousins offered suggestions and taught him the tricks of model-making. They also shared tools with him. In 1956 he was awarded honorable mention for his first car, a station wagon. The next year his red-and-cream sports convertible won second state, plus a \$1000 styling award. Norman is now shooting for a top national award and, with the luck and skill of the Greenses he'll probably win one before he's through. ★ ★ ★

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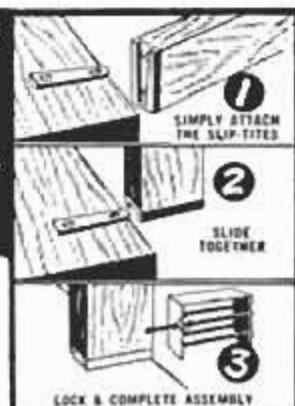
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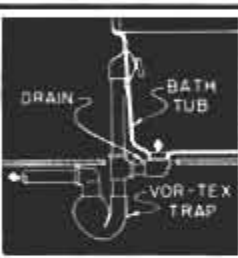
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And it is best to use the proper formulation for the job at hand. Even though most consumer epoxies will stick anything to anything, the right kind of preparation—putty types for filling liquid types for gluing—get the best results. Too, in many types, the curing agent is toxic and must be handled with care to prevent skin burns and irritation.

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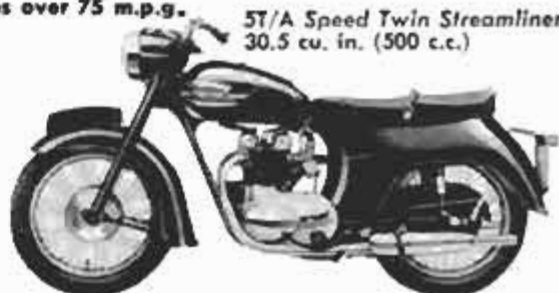
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(answer to quiz, page 14)



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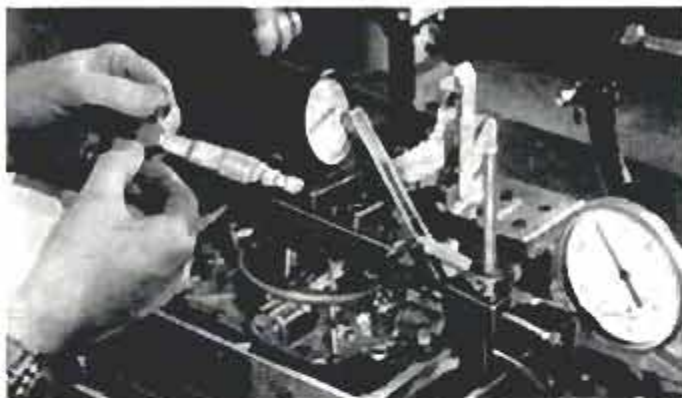
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