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# POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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**MARCH**  
**25 CENTS**  
30c IN CANADA



SEE PAGE 383

**"YOU MAY BE BIG  
BUT YOU DON'T LOOK VERY BRIGHT!"**

You're telling me! They've been sticking new bulbs in me, trying to brighten me up, but it doesn't do any good. My trouble is that I don't get enough "juice" through these worn-out wires and dirty connections that hook me up to the electrical system.

You said a lens-ful there, big boy! A voltage loss of only 10% in the wiring and connections will cause a 30% drop in candlepower. What you need is a Packard Certified Re-Wiring check-up for electrical "bottlenecks"—and some new Packard lighting wire.

## **For Better Lighting—Better Electrical Service go to a PACKARD CERTIFIED RE-WIRING STATION**



Now that winter is here, it's all the more important that your electrical system should be in A-1 shape. It gets dark earlier, so you want your headlights to give you full visibility; cold-weather starting is harder, so you want your battery and battery cables to deliver full power to the starting motor; heater, lights and winter starting require more electrical energy, so you don't want your battery to be robbed of charging current from the generator by defective wiring.

Any Packard Certified Re-Wiring station is especially qualified to provide these services for you. A Certified Re-Wiring mechanic will check your electrical system for "bottlenecks" in the wiring, connections, and electrical units themselves; all necessary cable replacements will be made with high-quality Packard cable. Get a Packard Certified Re-Wiring check-up today. Packard Electric Division, General Motors Corporation, Warren, Ohio.

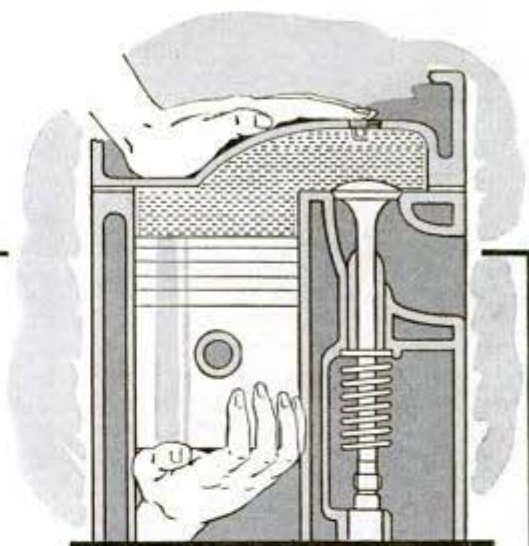
**Packard**  
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**THE STANDARD WIRING EQUIPMENT OF THE AUTOMOTIVE INDUSTRY**

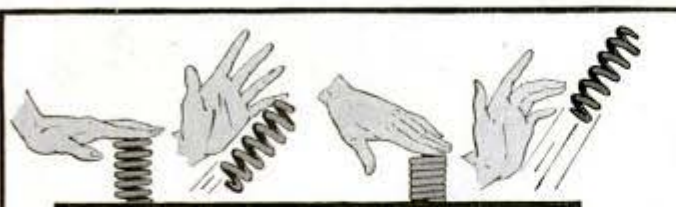
# Inside Story on How THIS POWERFUL ENGINE PUTS THE SQUEEZE ON GAS

## Super-High Compression Gives New Plymouth Engine Unusually High Efficiency

A HIGHLY IMPORTANT factor by which engineers gauge an engine's efficiency is its "compression ratio"... good tip for the buyer with an eye out for economy!



is *super-high*—6.70 to 1—highest of "All Three" low-priced cars! Gas is squeezed down to less than *one-sixth* of its original volume... to make it carry you farther!



Compressing Gas is Like Compressing a Spring

THE MORE YOU COMPRESS a coil spring before releasing it, the harder it will rebound. Similarly, the more the gasoline mixture drawn into an engine is compressed before being ignited, the more *power* its combustion will produce for you! Compression ratio of the 1941 Plymouth engine

THE 1941 Plymouth can offer the big gasoline savings of a 6.70 to 1 compression ratio because it is *completely engineered* for high compression with:

1. Calibrated Ignition to prevent "ping";
2. Four Rings Per Piston (in-

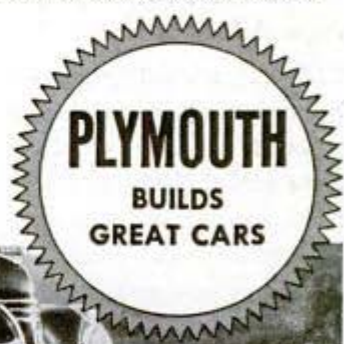
stead of the usual three) to safeguard against compression loss;

3. Directional Cooling and Full-Length Water Jackets which quickly remove the heat of high compression, and

4. Patented Floating Power Engine Mountings which make

such high compression possible without roughness. Plymouth Division of Chrysler Corporation.

TUNE IN MAJOR BOWEN, C. B. S., THURSDAYS





# Here's where it all starts

Every day the power that starts *millions* of cars on their rounds is supplied by powerful, dependable Delco batteries.

This responsibility rests on Delco batteries because they are original equipment on more than 43 per cent of all new cars sold. They have satisfied the requirements of the automotive engineers who are responsible for the dependability of America's leading cars; and now they are satisfying the owners of these cars by providing *extra* starting capacity and long battery life under all conditions of service.

This same dependability and satisfaction are

available to owners of older model cars who replace with a Delco battery. Delco batteries *for all makes and models* offer the advantages of sturdy, genuine hard rubber cases—specially constructed plates of highest quality—ample electrolyte capacity—and the new Delco Electro-Level that safeguards *automatically* against overfilling.

*Always Replace with a*  
**DELCO** *Battery*

## Delco-Remy

**World's Largest Manufacturer of Automotive Electrical Equipment**

# Popular Mechanics Magazine

H. H. WINDSOR, Founder

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

March, 1941

Vol. 75, No. 3

## IN THIS ISSUE

How Fast Can We Fly? . . . .	321
Little Giants of Industry . . . .	328
"Grand Central" of the Airways Coloroto	
Uncle Sam Gets Up Steam . . . .	348
Transportation of Tomorrow . . . .	354
Keeping Ahead of the Joneses . . . .	360
Stopping Bugs at Our Borders . . . .	366
Horses on Wheels . . . . .	371
Daylight Made to Order . . . . .	376
School for Deep Sea Divers . . . .	386
Preparing Our Home Defenses . . . .	392
Radio Hams Practice for War . . . .	402
Invisible Death on the Road . . . .	408
Combatting the Rat Menace . . . .	412

(Continued on next page)

## Throwing Light on Security

AMERICA'S factories need not turn out the lights if the blackout comes. Engineers plan to light them with yellow sodium lamps whose rays are invisible behind windows painted with a blue dye; yet these windows admit daylight. That is but one item on the defense program rapidly evolving in U. S. research laboratories—great organizations that are carrying on anonymously where Edison and Marconi left off. "Throwing Light on U. S. Security," an April feature, takes you behind the scenes in these laboratories that are preparing to guard America.

## Wilbur Shaw Tells How to Win

THREE times the checkered flag has signaled victory to Wilbur Shaw at the finish line of the Indianapolis Speedway. This year he means to make it four. Next month, in an article headed "Winning Races Before They Start," Shaw tells how he "blueprints" the race in advance. He figures the winner will have to beat 125 miles an hour this year.

## Next Month

ENEMY forces are spotted from the air, concentrating at a bridgehead. Uncle Sam's big troop carriers roar into the sky, ferry 1,000 air infantrymen to the scene, 200 miles away, in less than an hour. Twelve men pour out of a plane in ten seconds, float to earth in forty or fifty more, and in two minutes after landing have opened fire with machine guns. "Soldiers with Wings," an April feature, tells of this new striking force of the U. S. Army being trained in southern skies.

## Television in Color

ONLY five years old in black and white, television is coming out soon in fancy dress. Based on a new scanning system developed by the chief engineer of the Columbia Broadcasting System's television department, it brings to your home television screen a full-color motion picture. This revolutionary development in a field that is still in its infancy is described in next month's Coloroto section, illustrated by eight pages of color photographs.

## Dogs Join 'The Force'

TWELVE Doberman pinschers have joined the police force of Berkeley, Calif. They ride in the squad cars, help capture criminals, solve many a mystery beyond human power, and do a bit of "detecting" on their own. If you can't afford another policeman in the patrol car, says the Berkeley chief, get a well-trained dog. Read about these real police dogs in April.

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AUTOMOTIVE

"Phantom" scout car can do sixty on road.....324  
 Quick-acting hand tool for removing tires.....333  
 Tiny trailmaker breaks path to forest fire.....353  
 Air raid signs on highway warn motorists.....358  
 Cabinet in trunk carries salesman's samples.....382  
 Direction markers on signs for motorists.....382  
 Heavy army-tank aerial survives enemy fire.....383  
 Slanting curbstones guard white-sidewall tires.....384  
 Flexible hose bends to fit most cars.....389  
 Noise sleuth traces unwanted sound in car.....400  
 Fitness test for bearings notes millionth-inch error.....406  
 Clip board has built-in light for night writing.....410  
 Jack to remove auto muffler quickly.....410

AVIATION

Target plane catches fire when hit is scored.....325  
 Chemists disperse fog at airport with spray.....382  
 Self-heating suits use rubber heating element.....389  
 Stub wing on plane carries bombs or food.....391  
 Dummy cockpit trains air corps cadets.....395  
 Rocket type super-engine may revolutionize planes.....396  
 Huge wing of bomber dwarfs small plane.....401  
 Dummy tests parachute for slow-motion film.....401  
 Robot observer records test flight on film.....411  
 Bombers line up outdoors for final touches.....415

FARMS

Bees visit 2,500,000 blossoms in one day.....380  
 Hay rake loader and stacker mounted on tractor.....385  
 Corn used as locomotive fuel in Argentine.....415

HOUSEHOLD

Ice package cools food in picnic basket.....358  
 Vegetable cutter slices up French fries.....358  
 Three-way switch controls intensity of light.....364  
 Safety razor handle forms carrying case.....374  
 Wall table hangs from molding.....374  
 Spring grip for lifting fruit jar.....384  
 Budget box separates cash for spending.....396  
 Chair folds into sixteen-inch package.....405  
 "Skyscraper" steam cooker adds units as needed.....410  
 Wire card table has outlets for electric lights.....416

MODELS

Problems of camouflage studied with models.....369  
 Wind machine sails model ships to sea battle.....407  
 Tiny pipe organ has hand bellows.....416

PHOTOGRAPHY

Viewer and projector replaces the sample kit.....389  
 Three pictures on two films by new method.....390  
 Stereoscope holds disk of seven views.....406

RADIO AND ELECTRICITY

Thirty-five ton transformer is 15 feet high.....332  
 "Electric eyes" aid in policing tunnel traffic.....336  
 Turbine generator can light 1,000,000 lamps.....391  
 Two-way amateur television at low cost.....455  
 1941 Little Giant a.c.-d.c. super five.....456  
 Changing push-button sets for new frequencies.....458  
 Helpful radio hints.....459  
 Decade resistance boxes for experimenters.....460  
 Motor with electromagnetic clutch.....460  
 Pocket size set in streamline aluminum case.....460  
 Radio equipment for small planes.....460

SCIENCE AND INDUSTRY

Dial opens frozen-food locker.....326  
 Million-volt tube X-rays huge castings.....327  
 Light ray of mercury is accurate yardstick.....353  
 Ultraviolet intensity measured by "sun-tan" meter.....364  
 Odd togs seen at odd jobs.....365  
 "Wrist watch" warns workers of exposure to X-rays.....369  
 Liquid helium produced at low cost.....370  
 Window in welder's helmet replaced quickly.....374  
 Germicidal ice kills bacteria in fishing boat.....375  
 Atom smasher whirls electrons at light's speed.....383  
 Smoke screen kills germs in air-raid shelters.....405  
 Water reacts with compounds it dissolves.....406  
 "Prolon" is new name for synthetic wool.....410  
 Small-size miller relieves large machines.....415  
 "Sulfa" drug may cut mortality of surgical patients.....416

SPORTS

Chairway hauls skiers a mile up mountain.....333  
 One-hand gaff grips large or small fish.....370

(Continued to page 6A)



"If Only I Had Known the Risk!"



Only yesterday, Edith and I recalled the vacation trip we and the youngsters enjoyed last summer in our new car. My how that car performed!

Guess I thought the new car thrill would last forever. I overlooked the fact that even ordinary operation brings contaminations into an engine. That emergency use—like when Edith punishes a cold engine getting the youngsters to school through snow-banks—calls for important measures of protection.



But I know now! When my garage man handed me a bill for \$48.67 for replaced bearings and repairs he told me how cold starts, alone, can harm an engine. How common oxidation of oil forms corrosive substances that damage the metal parts.



This gave Bill, the service man, an opportunity to shoot one of his "darts." Bill said, "With Pyroil in their cars men tell me they never run into trouble like that. Pyroil protects them against these damage dangers. I tell you, Mr. Baker, it pays to use Pyroil right from the start. It saves you far more than it costs!"



For ten years Pyroil has been giving car owners greater motoring pleasure and longer useful car life. Pyroil prevents acid-corrosion attack and wear on vital metal parts. It protects engines against the formation of hard carbon, gum and sludge. It cleans out these contaminations where they have already formed.

B-r-r Cold Weather!

PYROIL MAKES CARS START MORE EASILY AND SAVES ON BATTERY DRAIN IN COLD WEATHER! USE IT! Mail coupon for the interesting "Story of Pyroil." Manufactured and guaranteed by Pyroil Company, W. V. Kidder, Founder, 53 Pyroil Bldg., LaCrosse, Wis.



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## **HARLEY-DAVIDSON** WORLD'S CHAMPION MOTORCYCLE

HARLEY-DAVIDSON MOTOR CO., Dept. P, Milwaukee, Wis.  
Send pictures and descriptions of smart 1941 models.  
Also FREE copy of big 24-page ENTHUSIAST magazine  
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*Bell & Howell*

## (Contents—Continued)

"Metallized" team poses as statues.....	375
Oil-soaked rope preserves gun barrel.....	395
Rubber grip for bowling ball lessens fatigue.....	396

### TOOLS

Adjustable tipper lifts barrel with easy leverage.....	332
Sander also drills and mixes paint.....	358
Pocket screwdriver equipped with flashlight.....	382
Small saw carries drill in tip to make start.....	383
Circular plane for convex or concave surface.....	385
C-clamp like pliers is opened by handles.....	396
Padlock opens and closes like jaws of vise.....	400

### WAR

Fats may help win or lose war.....	364
How bombardier works aboard British plane.....	381
Metal goggles guard eyes from shrapnel splinters.....	390
War calls out muscles and outdated engines.....	397
War tank ferried across river on pontoons.....	405
Glycerin made from petroleum to avert shortage.....	130A

### MISCELLANEOUS

"Core feed" electric eraser.....	325
Type stick fed from alphabet case.....	325
Printing plant in truck runs off programs.....	326
Wool-like rayon fiber takes light dyes.....	332
Monocle outlined in lady's veil.....	353
Inventors exhibit beauty aids and mousetraps.....	359
Coil spring of plastic shows strength.....	364
Flaming oil lines in desert saved by sand.....	368
Holder lights and serves cigarettes.....	370
Snowplow runs hours on gallon of gas.....	370
Buzzers replace bugles to awaken soldiers.....	374
"Covered bicycle" protects rider in winter.....	380
Movers roll 350-ton tank a mile.....	380
Cement that expands forms leakproof bond.....	384
Plaster cutter makes slots for electrical conduit.....	384
G-man's "draw" clocked by timer.....	390
Mechanizing the delivery boy.....	398
"Venetian blinds" in goggles.....	400
Twelve-track sound film gives six hours music.....	416

## Craftsman and Shop Notes

### AUTOMOTIVE

Auto shortcuts.....	477
Air pressure speeds removal of oil from drum.....	478
Easy method of polishing ball bearings.....	478
Lag screw expands battery post for connection.....	478
Sure-grip pin puller.....	478
Punctured inner tube deflated with pipe stem.....	479
Striped windshield on motorcycle easily seen.....	479
Washers protect battery hydrometer.....	479
Sack protects shift knob from greasy hands.....	480
Trouble lamp snaps in place.....	480

### FARM

Handy carrier for oil drums on farm.....	422
Notched disk-harrow blades cut cornstalks.....	463
Tank pipe with flexible joint easily detached.....	466
Dump bottom feed box easily cleaned.....	469
Tumbling barrel is inexpensive seed treater.....	473
Grain scoop conveyance for stringing barbed wire.....	474
Improvised egg candler.....	474
"Wiggle rod" inside grain spout prevents clogging.....	474

### FURNITURE

Chairside magazine rack.....	423
Modern finishes for your furniture projects.....	425
Book shelves in pairs.....	434

### HAND TOOLS

Threads cleaned with bent bobby pin.....	419
Nut "die" to clean bolt threads.....	422
Rubber disk holds drills in case.....	429
Wood reamer from old saw blade.....	444
Renewing worn teeth of pipe-wrench jaws.....	445
Trammels improvised from dowel and clothespins.....	445
Reamers and how to use them.....	461
Servicing your grindstone.....	464
Pipe used as file handle.....	466
Preventing toolbox slipping on roof.....	466
Twist handle loosens star drill.....	472
Chisel reground to cut steel barrels.....	476
Grease gun handle on drill carries bits.....	476

(Continued to page 8A)



# Are You STILL in the DEPRESSION??

**T**IMES are better. Business is out of the rut—well ahead of a year ago. Millions of men have gone back to work. There's more money in lots of pay envelopes. But what good is that to you, if *your* pay check is still written in depression figures?

You weren't so discontented a year or two ago. In fact, you considered yourself lucky to have a job. But now—you have begun to wonder and worry why the oncoming tide of prosperity hasn't reached you yet. The situation is getting desperate. Bills continue to pile up. You can't get along forever on a "shoe string" budget. You *must* win back those pay cuts. Other men are doing it—how can you?



Certainly, you can't work any harder than you have been. And it isn't a question of your intelligence, honesty or ambition. Those virtues do not solve today's problem—they are often insufficient to hold down a job, as millions unemployed sadly testify.

But there *is* a way to get back to the prosperity pay check. A way that's probably far easier than you have dreamed. A *plan* that has been "depression-tested."

During the worst period of the depression, this plan was helping thousands of men and women forge ahead. Today, during recovery, these same men and women—their ranks swelled by thousands more—are being picked for top positions. They are escaping years of monotonous, routine service—achieving their dreams while they are young enough to enjoy success in its fullest measure.

Since this plan brings results in bad times as well as

good, it obviously works independently of business conditions. As unbelievable as that may sound, remember that success is largely up to the individual. Most men struggle through a depression all their lives. The few who forge ahead ride to success the same business tides that sweep the majority to failure.

The LaSalle Success-Building Plan is made for men like you—men with courage, ambition, persistence, who need expert guidance to make the most of their efforts. But LaSalle supplies even *more* than that. Not only individualized training and coaching to help you meet today's crying needs . . . but also the very steps you may need to take to fill the job ahead, and force that pay raise *quickly*. Any

synopsis of this plan, which we might include here, could give you only a vague idea of this service. We suggest you mail the coupon for complete details on your own line of work.

## Today's Danger

There's a real danger to accepting "depression pay" these days. A danger that lower wages will continue to dog you—for no employer will pay more until he is convinced you are worth more. Some day, some way, you've got to convince him. There's no time to lose. The sooner you begin, the better.

If the LaSalle Plan has fulfilled this aim for thousands, isn't it logical to expect it can do as much for you? At least, it's worth investigating. This coupon can easily become your passport to better times. Mail it today.

**LASALLE EXTENSION UNIVERSITY, Dept. 364-R, Chicago**

**A CORRESPONDENCE INSTITUTION**

I would like to know about your Success-Building Plan and service in the business field I have checked.

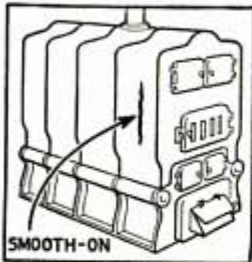
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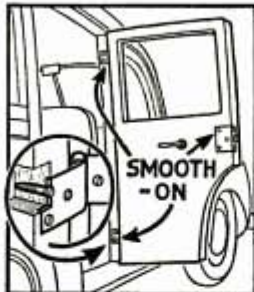
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# How 35c can save you many dollars



Sealing Leaks

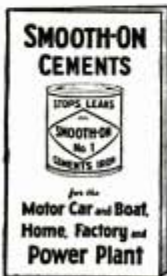


Tightening Loose Parts

A 1-lb. can of Smooth-On No. 1 costs no more than 35 cents, but is an investment that will bring you a tremendous return in actual cash. With Smooth-On, you can stop leaks in boilers, heaters, radiators, piping, etc., that otherwise would involve expensive repairs, and you can make fully serviceable leaky tanks, utensils, etc., loose handles, wall fixtures, furniture casters, door hinges, bolts, screws, etc., that otherwise would have to be replaced.

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Buy Smooth-On No. 1 in 1-3/4-oz., 7-oz., 1-lb. or 5-lb. can from your hardware store or, if necessary, from us. For your protection, insist on Smooth-On, used by mechanics and repair men since 1895.



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3-41

## (Contents—Continued)

### HOME IMPROVEMENTS

Breakfast nook folds flat against wall.....	417
Dual-tone door chimes in compact unit.....	419
Repairing holes or cracks in plaster.....	433
Basement sump pump starts and stops automatically.....	475

### HOUSEHOLD

Cleaning a kitchen without cleanser.....	418
Solving home problems.....	420
Liquid wax makes windows slide easy.....	422
Ramp to wheel baby carriage up porch steps.....	422
Hot water shrinks cork to fit small bottle.....	424
Marbles prevent tangled stockings on clothesline.....	424
Tees in furnace coils permit easy cleaning.....	424
Model of plasterer's hod is toast tray.....	429
Waste basket for hard use.....	443
Non-poisonous powder exterminates cockroaches.....	473

### PHOTOGRAPHY

Winding your own 35-mm. film spools.....	449
Developing tanks mounted under bench.....	450
Jar holds film in solution while developing.....	450
Lens holder slips on belt.....	450
Portable reflector screen on a photo-lamp stand.....	451
Coffee table used as copying easel.....	452
Filters carried in spectacle case.....	452
Jar cover keeps lens dustfree.....	452
Slide file made from box.....	452
Wax in photo tray aids in removing prints.....	452
Checking focus of ground-glass cameras.....	453
Mounting filters made from sun glasses.....	454
Negative opaque can be rubbed off with finger.....	454

### POWER TOOLS

Hold-down lathe disk sander protects fingers.....	419
Servicing your grindstone.....	465
Octagon arbor for square holes.....	466
Step blocks adjust height of lathe stand.....	470
Two-ton screw press from scrap parts.....	471
Grinding ends of chuck jaws.....	474
Emergency drill-press sanding drum.....	476

### STORE AND SHOP

Soldering outfit has simplified heat control.....	429
Oilcan holder made from necktie rack.....	444
Measuring shaft clearance without a micrometer.....	463
Thumbtacks carried safely in round cork.....	464
Shop calculations simplified.....	467
Plate scraper applies ink to printing rollers.....	470
Auto-hood clamp anchors sign to curb.....	478
Illusion of tire through window attracts attention.....	479

### TOYS AND NOVELTIES

Jigsawed plant and flower displays.....	430
Boxers give fun and action.....	437
Emergency connectors for toy-train track.....	444
Miniature gardens in trays, bowls, and niches.....	446

### MISCELLANEOUS

Anchoring portable typewriter.....	424
Lathe bed covered provides more work surface.....	424
Rivet is collet for small shanks.....	428
Mirror polish in small-bore shotgun barrels.....	433
Support prevents cello from slipping.....	436
Gravel on concrete wall improves its appearance.....	436
Glass etched with lead shot and emery powder.....	437
Wire brush gives wood a weather-beaten finish.....	443
Increasing life of flashlight batteries.....	444
Soap aids in lettering glossy showcards.....	444
Care of paintbrushes.....	445
Plumber's force cup holds bulbs on stepladder.....	464
Magnet holds artists' lettering brushes.....	466
Panels on chest opened by springs.....	470
Using light sacks to ship heavy materials.....	470
Compass helps locate switch box.....	472
Marking boundaries on ice for hockey game.....	473
Boulders removed single-handed with dump truck.....	476
Rubber strip keeps T-square from sliding.....	476

### IMPORTANT NOTICE

It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. We take no responsibility as to whether the disclosures contained in our articles are covered by patents and advise readers to investigate this subject before making, using, or selling any of the products, machines, or processes described, in order to avoid possible liability for patent infringement.

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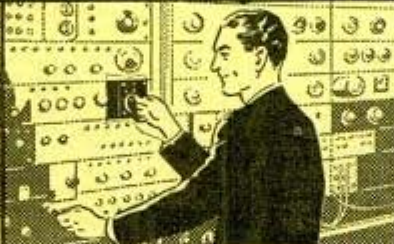
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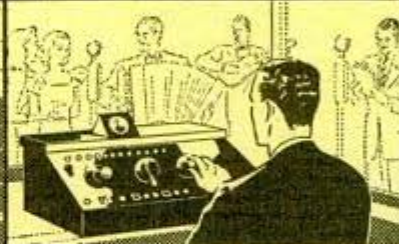
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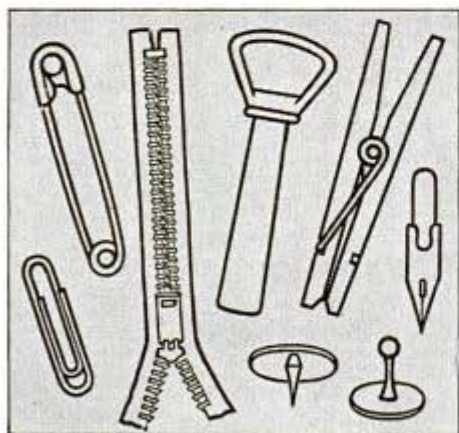
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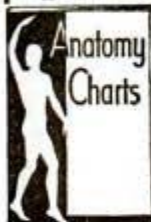
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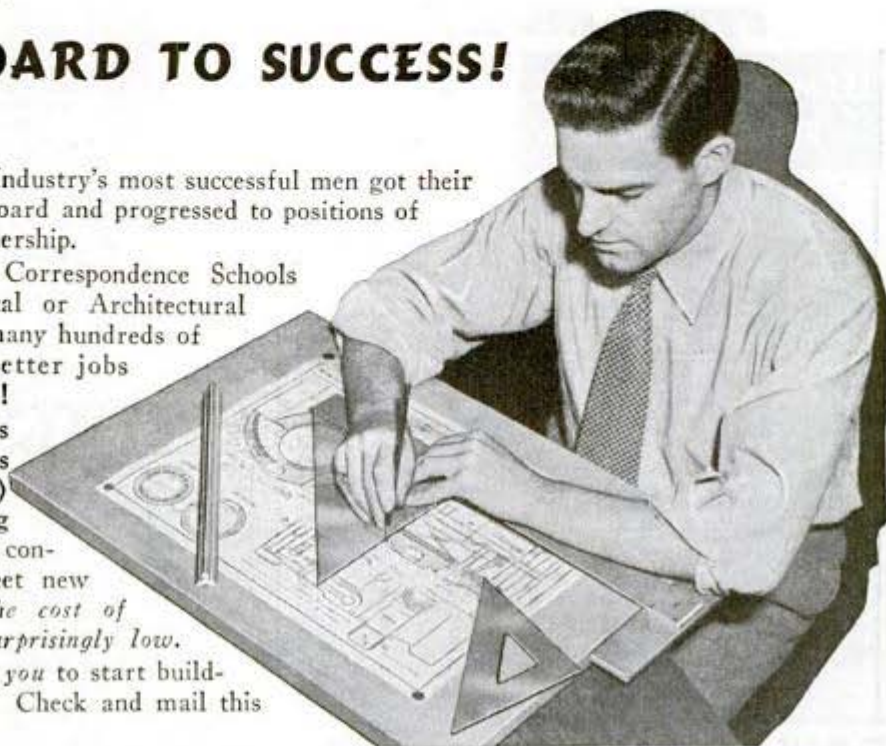
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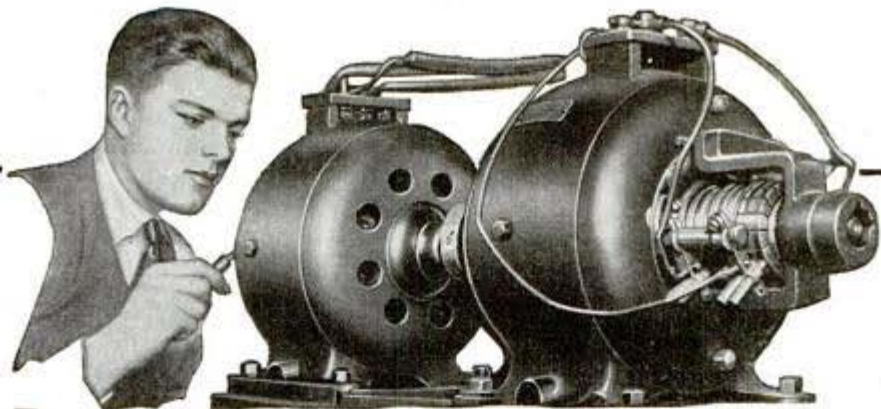
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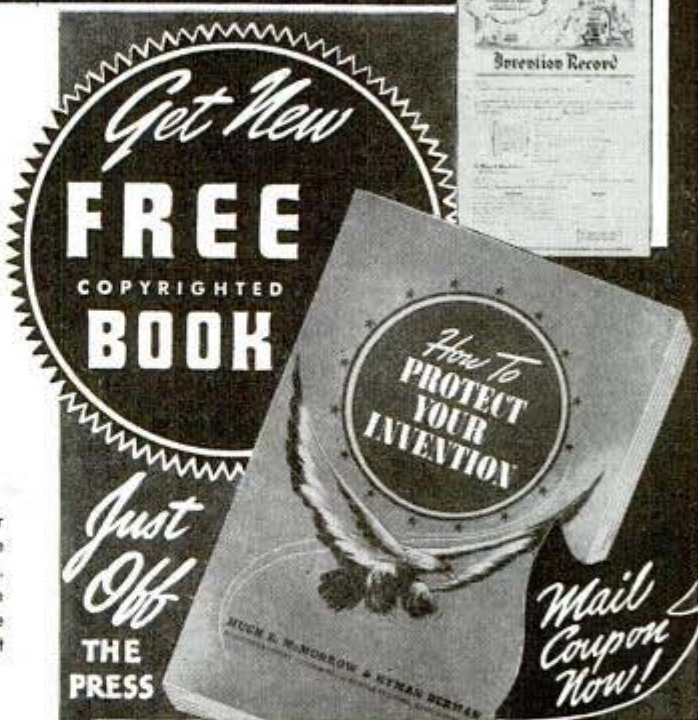
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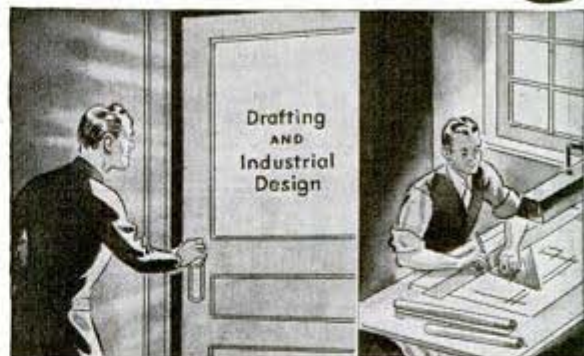


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(Original letter on file in our office)

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10 KVA 110V. AC. generators \$185.00; other sizes. Motors, converters. State your needs. Queen City Electric, 519 South California, Chicago.

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**HOLLYTINTS** Better prints. Choice of the stars. Two prints each 8 exposure roll developed—25c. Fascinating premiums. Hollytints, P-1350, Hollywood, California.

**TECHNIFINISH—35MM.** 36 exposure rolls (except "Mercury") fine grain developed and beautifully enlarged to 3"x4" glossy prints, 85c. Cartridge reloaded with Eastman Plus X, 30c. One day service. Satisfaction guaranteed. Write for free mailing bases, information and sample print. Technifinish Laboratory, 641-645 Brown St., Rochester, N. Y.

**FOTOSTAMPS.** (Your picture), gummed, perforated, hundred \$1. Empire Fotostamps, 272 West 34th, New York.

**FREE—Beautiful 5x7 silk** enlargement from negative. Dime for handling appreciated. Stewart Photos, T-6852 Indiana Avenue, Chicago.

**CANDID** Special. 35mm. rolls enlarged to 3 1/2x4 1/2, \$1.00. 18mm. rolls 60c. 3 1/2x4 1/2 reprints 3c. Brown Photo Company, 1910-61 Emerson, Minneapolis, Minn.

**SUPER Service.** Box 481, Lawrence, Mass. Roll developed, 8 super snaps, wide plate sunk deckled edged border, and one enlargement free.

**8 ENLARGEMENTS** And films developed, 116 size or smaller, 25c coin. Special introductory offer: enclose this ad and negative with your order for double weight hand colored enlargement free. Enlarge Photo, Box 791, Dept. PM, Boston, Mass.

**8 ENLARGED Prints** (nearly postcard size) or 16 regular size prints from your roll or negatives 25c. Willard Studios, Dept. 47, Cleveland, Ohio.

**19c ROLL** Finishing, 8 prints guaranteed. Nu-Tone Fotos, Schwenksville, Penna.

**ROLL** Developed, three enlargements, 16 prints, 25c, 24 reprints, 25c. Trial, Dick's Photo, Louisville, Ky.

**YOUR** Negatives enlarged black and white, 5x7, 25c; 8x10, 40c; 11x14, 65c cash. Heelia Photographic Laboratories, Cannon Avenue, Albemarle, N. C.

**100 GENUINE** Kodaks given away free! Roll developed, two prints each exposure plus free cellophane album, 25c. Send rolls! Write for free offer, Pho-T-Pho, P3, Highland Park, Mich.

**ROLL** Developed and 8 beautiful enlargements 2 to 6 times larger—high gloss—deckled edge. Any 8 exposure roll 25c coin. Reprint enlargements 3c each. Alden Photos, 94-B Astor Sta., Boston, Mass.

**BEAUTIFUL** Enlargement from each picture on roll 25c. Cut Rate Photos, Dept. B-4, Janesville, Wis.

**FOR** The discriminating amateur—8 exposure rolls, 2 prints each 25c. Miniature rolls enlarged 3 to 6 times, 8 exposures 25c, 16 exposures 50c. 35mm. 36 exposures 3x4 enlargements \$1.00. Unexcelled quality, prompt service. Paramount Photo, 327 E. 92nd Street, New York.

**35MM.** Rolls developed 36 big 3 1/2x5 enlargements \$1.00. Cartridge reloaded 35c. 16 enlargements from 127, 120, 50c. Camerashop, Linton, Ind.

**OIL** Coloring photographs a fascinating hobby or profitable business. Learn at home. Easy simplified method. Previous experience unnecessary. Send for free information and requirements. National Art School, 1315 Michigan, Dept. 3432, Chicago.

**PHOTOGRAPHY** For pleasure and profit. Prepare at home. Common school education sufficient. Write for information and requirements. American School of Photography, 3601 Michigan, Dept. 3452, Chicago.

**IMMEDIATE Service!** Pictures returned same day order is received. Sixteen guaranteed deckled-edge prints from roll, 25c. One colored or two plain enlargements plus 8 deckled-edge Velox prints only 25c. Special! Coupon for 8x10 enlargement given with each 25c order. Any 36 exposure 35mm. film fine-grain developed Vaporate treated and each good negative enlarged to 3x4 on deckled-edge Velox paper, only \$1.00! Reloads: 36 exposure, 50c; 18 exposure, 35c. 3x4 deckled-edge reprints, 4c each. 24 hour service. Details, sample and mailers free on request. American Studios, Box 51, LaCrosse, Wis.

**IDEAL** Photos beautifully finished with wide border, deckled edged, 25c per roll of 8 and free enlargement. Ideal Photos, Box 2255, Paterson, N. J.

**EXTRA Special!** Five 5x7 enlargements, 25c. Cardinal Photos, Summit, New Jersey.

**ROLL** Developed and 8 lustrous distinct finish permanent Velox glossy prints 25c—reprints 3c each. Fotoprint Service, Box 1, Roanoke, Virginia.

**18 LIFETIME** Prints, 3 sparkling Hollywood enlargement coupon, each roll 25c, 21 reprints 25c, 100—\$1.00. Finished 3 hours. 25 other bargains. Overnight Studio, Albany, Wis.

**20 REPRINTS** 25c. Hundred reprints \$1.00. Rolls developed and 16 prints or 8 prints and 2 enlargements—25c. Mercury Studios, Dept. L, 109 N. Dearborn, Chicago.

**FREE Trial—16 sparkling** Lifetime prints, three lovely Hollywood enlargements, and free Leathertone frame with roll—25c. 20 reprints 25c; 100—\$1.00. Overnight service. Lifetone Studios, L-39, Des Moines, Iowa.

**ROLL** Developed—16 guaranteed prints, two coupons on enlargements, 25c. Smart Photo, Winona, Minnesota.

**PROMPT Service!** Rolls developed, two Velox prints each negative 25c. Hench Studios, Harrisburg, Penna.

**ROLLS** Developed, two prints each and two free enlargement coupons, 25c; reprints, 2c each; 100 or more, 1c. Summers' Studio, Unionville, Mo.

**THREE** Prints each good negative in roll 25c. Reprints 3c. Fred D. Eastman, Bode, Iowa.

**100 REPRINTS** \$1.00, 116 or smaller, Rex Photo, Ogden, Utah.

**FREE 3 Professional 5x7 enlargements** of your own choice, 2 guaranteed sets of prints with your roll film developed—all for 25c, original order only. Aro Studios, Dept. 12, Des Moines, Iowa.

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**RELIGIOUS** Films, 16mm, sound, silent. Screenart, 729 7th Ave., New York.

**8MM-16MM.** Art films. Free catalogue sample 10c. Parkway Exchange, 961 East-earn Parkway, Brooklyn, New York.

**ANNUAL** Clearance of 16mm. sound and silent films. Large selection. Send for your "Amateur Movie Special" today. Specify sound or silent. Institutional Cinema Service, Inc., 1560 Broadway, New York City.

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**FREE** Sample and lists, all kinds movies. Goodwill Company, Jackson, Tennessee.

**GLAMOUR** Pictures, lists. Sample film dime. Erwine's Laboratories, Allentown, Penna.

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**LOOK!** Nationally advertised movie cameras, projectors, films, accessories. Payments low as \$2.50 monthly. Send 10c for large two color catalog. Don Elder's, Dept. 24, 739 Boylston Street, Boston, Mass.

**PASSION** Play, sound 8mm, \$30.00, 16mm, \$60.00. Travelogues \$5.95. Artcraft, 1221 E. 8th, Gary, Ind.

**CAMERAS, Projectors, films.** Lists free. (Art sample, 10c.) Box 108, Lefterts, Brooklyn, N. Y.

**BARGAINS** Galore, 16mm-8mm. No-Wat-Ka, 255 Main Ave., Passaic, N. J.

**FREE** 16mm, 8mm, bargain lists. Home Movies, Box 216, Easton, Penna.

**LEARN** Motion picture theatre projection, management. Free catalog. Give age. Theatre Institute, Elmira, N. Y.

**35MM.** Sound programs \$7.50. Silent features \$5.00. Bargain equipment list. Simpson, 1275 So. Broadway, Dayton, Ohio.

**BASS** Says: Shrewd buyers send for the new Bass Cine Bargaining No. 245, an 84-page catalog exclusively cine. The new Revere Double 8 with Bausch & Lomb F:3 lens at \$37.50 is the buy. The RCA 16mm. SDF news reel camera at \$275.00. Write Cine Headquarters for your copy of this great free book. Bass Camera Company, Dept. A, 175 W. Madison St., Chicago, Ill.

**16MM.** Laboratory. Color, black and white. Sound recording. Titles. Send for list. Film Associates, Dayton, Ohio.

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**LEARN** High speed code with Hi-Speed Codemaster. Quick, simple. Listen to "hams" commercials. Send 25c coin for complete method, instructions, postpaid. Codemaster, Box 895, Cincinnati, Ohio.

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**FOR** An extremely profitable lifetime business, operate a collection agency-credit bureau. Free folder. Write Cole & Associates, Syracuse, New York.

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**MAIL** Order business course shows you how to make money, spare or fulltime. Teaches professional mail order technique—not penny-catching schemes. Free details. Nelson Company, 500 Sherman, Dept. 404-C, Chicago.

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

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100 PROFITABLE Mail order and local plans. Gilbert Supply, 5-P West 24th, New York.

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#### MONEYMAKING OPPORTUNITIES

RELIABLE Men to operate movie circuits in theatreless communities. Earn \$50.00 to \$100.00 weekly. Everything furnished. Southern Visual, Dept. PM-15, Box 2404, Memphis, Tennessee.

JOHNSON Sea Horse outboard motor dealers make most money per motor sold. Liberal margins and high volume per sale. Start a boat and motor sales and service shop. Not necessary to be on boating water. Most sales to fishermen. Good territories still open. Write for details. Johnson Motors, Dept. 40, Waukegan, Ill.

BOOKKEEPERS Make money operating new idea bookkeeping service. Ralph Lee, Vicksburg, Michigan.

UNEXCELLED Opportunities. Free literature. Fitzallen Associates, Box 16, Station J, New York.

FREE Folio. Moneymaking opportunities now ready. Hub Specialty Co., Box 1005, M. Yakima, Washington.

SELL By mail! 100 moneymaking opportunities free! American, 491-P William, East Orange, N. J.

MAKE Money growing Christmas trees. Instructions 25c. J. Clifford Hoskins, Route 5, Pontiac, Michigan.

BIG Mails. Many money making opportunities. Dime. Reo, 3512 North Luna, Chicago.

YOU'LL Like resilvering mirrors, tableware, making chipped glass nameplates, signs. Write Sprinkle, Plater, 287, Marion, Indiana.

MAIL Order spare-time or full-time business enterprise. Gather, "edit" and sell names for advertisers. Details free. C. N. Schroeder, 56 West Washington, Chicago, Illinois.

LUCKY 13 Collection of new tips 10c. Brewster, Eastport, Maine.

WIN Money! Prizes! New contest bulletin (10c). 473PM Sebring, Florida.

GOLD Mine of money making secrets. 64 pages, 25 cents. Charles Sierer, Railroad Street, Ironton, Ohio.

MILLION Articles. Buy wholesale. Valuable directory 10c. Ideal Service, D-3, Park Ridge, Ill.

MAILORDER Opportunities! Send name postal. Schroeder, 803 Wisconsin, Peoria, Illinois.

LEARN Battery trade. Re-build auto and farm batteries. Write Home Occupations, St. Paul, Minnesota.

PUN And profit for amateur cartoonists. Easy copy work. Copy-Ads, Arkyle, Wis.

MONEY Maker mailorder business. Sales, plans. Copy Keystone Money Maker 10c. Morris Co., PM2534 So. 3rd, Philadelphia.

MAKE Caramel corn, candy apples, barbecue sauce, salted peanuts. All recipes for \$1.00. Zehnder Sales, Phillipsburg, N. J.

CASH In on your spare time. Read "Mail Trade" magazine. You get everything; "moneymaking" ideas, plans, business schemes, trade secrets, tips and articles—opportunities for everybody. Keep posted. Sample copy 10c. Langley, Pub., 631 Roscoe St., Chicago.

TWENTY-SEVEN Moneymaking publications. Comprehensively catalogued. Opportunity Book Company, Flushing, N. Y.

SPARE Time money. 25c auto expense book, 6c. Your auto services buy for customers. Mayer, 235-M Collins Ave., Pittsburgh, Penna.

YOUR Name on 5,000 mailing lists—25c. Get free samples, opportunities galore from all over world. Eastern, P-961 46th, Brooklyn, N. Y.

1100 USES For waste. 25c. Satisfaction guaranteed. Box 487, Hollywood, Calif.

CONVERT Old lawn mowers into electric mowers. Low costs make it profitable work. Complete plans \$1.00. Wheeler Merchandise, St. Petersburg, Fla.

CASH for butterflies, insects. See Sinclair display advertisement page 12A.

EARN Extra money with typewriter. 25c coin brings copyrighted instructions. Joseph Weber, 2543 West 63rd Street, Chicago.

BE Funny for money. Write cartoon ideas. Complete instructions 25c. Ullsh Studios, 5518 Wrightwood, Chicago.

MAKE Money easily, pleasantly with roadside stand. Write Fame-&-System, Lathrop, Calif.

GET Squab checks weekly. Eye-opening poultry guide free. Rice, Box 639, Melrose, Mass.

SELF Employment. Valuable instructions 25c (silver). Homecraft Arts, Lakeside, Calif.

MOULDS. Guaranteed, for casting toy soldiers, Indians, trappers, warships, sinker moulds, 244 kinds. Send 5c for illustrated catalogue. Send \$1.00 for large sample mould. Henry C. Schiercke, 645 Spencer, Ghent, N. Y.

BE A professional scrapbooker. Big fees. Unlimited opportunities. Can be done at home. No competition. No capital needed. Write to Scrapbookers Guild, 59 Park Place, New York, N. Y.

WILL You give us 5% first \$600 you make? Afternoons free! Work home. \$1,000 month reported (exceptional—full-time). Expect surprise. National, Box 1240-A, San Bernardino, Calif.

WHOLESALE Sources, 500,000 articles. Free directory. Maywood, 1107 Broadway, New York.

MONEYMAKING Ideas—Latest books—Barnain catalog free. Popular Mechanics, 633 St. Clair, Chicago.

#### FORMULAS, PLANS, ETC.

10,000 MONEY-MAKING Formulas, recipes, secrets. Make most anything. 924 page illustrated book. \$1.50 postpaid or C.O.D. (foreign \$1.85). Catalog 3c. Adams Brown Company, Chestnut Hill, Mass.

MAKE Fast selling products. "Chemist Approved Formulas." Catalog free. Kemico, 12-N, Park Ridge, Illinois.

THAXLY Formulas, processes, for successful products. Accurate analyses. Catalog free. B. Thaxly Co., Washington, D. C.

ELITE Formulas and plans; make and sell your own products. Descriptive booklet free. Elite Co., 214 Grand St., New York.

FORMULAS—All kinds. Real money-makers. Lowest prices. Catalog free. Clover Formulary, 108-PM, Niles Center, Ill.

SINGLE-INGREDIENT Formulas. No manufacturing! Information free. A. Kinford, Wayne, Penna.

FORMULAS—Latest best. Analysis. Literature free. Belfort, Engineering Building, Chicago.

NEW. Money making formulas book tells how to go into business for yourself. Send for free details. Popular Mechanics, 200 E. Ontario, Chicago.

SOLVENT Oil for cleaning guns, pistols, (fishing tackle) \$1.00. Stephens, 4741 Aldrich South, Minneapolis, Minn.

#### CHEMISTRY

FREE! Catalog chemicals, laboratory supplies for students, new idea chemical-kits, apparatus-outfits. Scientific books at discounts, telescopes, microscopes, biological needs, photographic chemicals, scales. Write Winn Mfg., Dept. JE3, 124 W. 23 St., New York.

FREE Catalogue, Chemistry, mineralogy, biology, microscopes, telescopes. Tracey Laboratories, Evanston, Illinois.

MERCURY—C.P., A.D.A. specifications, 43 lb. postpaid. Pure-Lab Company, Norwood, Massachusetts.

HANDBOOK For Chemical Experimenters, hundreds of experiments, illustrated, 50c. Experiment booklet 15c. Free catalog. Reading Scientific Company, Reading, Penna.

FREE Chemistry catalog. Supplies at 5c! Equip complete laboratory. Kemkit Scientific Corp., 397P Bridge St., Brooklyn, N. Y.

CHEMICALS, Laboratory, glassware, apparatus. Send 3c for catalog CP1. Biological Supply Company, 1176 Mt. Hope Avenue, Rochester, N. Y.

SPECTROSCOPE For quick chemical analysis \$2.50. Kutting Sons, Campbell, California.

CHEMICALS In 5c quantities. Catalog 5c. Fleischer's Laboratories, Medford, Mass.

FREE—Big list of helpful books. Popular Mechanics Press, 200 E. Ontario St., Chicago.

#### HELP WANTED

CALL On service stations, factories, restaurants, businesses, professions; with lettered advertising uniforms, shirts, work suits, etc. 100 styles. Exclusive features. Big advance commissions. Free outfit. Toons, Dept. U-7, Rochester, Ind.

PERMANENT Representative wanted for Hoover uniforms to call on restaurants, hotels, beauty parlors, doctors, nurses, others. Excellent income. Leads furnished. Equipment free. Hoover, Dept. PK-10C, 251 W. 19th, New York.

I WILL Give you \$6.00 worth full sized packages of food products, soaps, etc. free if you agree to show friends and others. Amazing spare time money making opportunity. Write Zanol, 2244 Monmouth, Cincinnati, Ohio.

BIG Money taking orders: shirts, ties, hosiery, underwear, pants, jackets, sweaters, uniforms, etc. Sales equipment free. Experience unnecessary. Nimrod, 4922-BG Lincoln, Chicago.

STEADY Work—Good pay. Reliable man wanted to call on farmers. No experience or capital required. Pleasant work. Home every night. Big money every day. Wonderful new proposition. Particulars free. Write McNess Co., Dept. 484, Freeport, Illinois.

HOW To get the job you want! Complete plan 25c. Edmar Publishing Company, Box M-245, Baltimore, Md.

EARN Spare time cash. Make simple deliveries and collections for me. Hansen, Box 61, Albert Lea, Minn.

#### AGENTS WANTED

AMBITIOUS School seniors—Sell classmates the "tops" in graduation name cards. Lowest prices featured today. 35% commission. Free cards. Agencies going like wildfire. Hurry! Craftcards, Box 235, Pittsburgh, Penna.

START Your own business selling famous Johnson Sea Horse outboard motors. Small capital required to start. Many good territories open. Liberal protection franchise. Write for full information. Johnson Motors, Dept. 40, Waukegan, Ill.

BIG Money taking orders: shirts, ties, hosiery, underwear, pants, jackets, sweaters, uniforms, etc. Sales equipment free. Experience unnecessary. Nimrod, 4922-AN Lincoln, Chicago.

MEN, Women to sell leather gloves direct to wearers. Women's capskin and doeskin. Men's and women's pliskin. Liberal commission. Excellent quality, attractive prices. Write for particulars. Gerald Rigden, 309 East Main Street, Johnstown, N. Y.

HUGE Profits in 1941. Perfected self starting clear lighter. No flint or friction. Lights in wind. Sample lighter with can of fluid and sales plan 25c. New Method Co., Box PM-99, Bradford, Penna.

NEW Adjustable socket wrench—Grip-tule. Holds and drives bolts, nuts, screws, gadgets. Representatives write Grip-tule Mfg Co., Annapolis, Maryland.

SELL Automatic burglar alarm. No wiring. Prospects unlimited. Generous commissions. Firex Corporation, 520 South Broadway, St. Louis, Mo.

AGENTS: Good opportunity selling leather and plastic advertising specialties. Kriewaldt Specialty Mfg. Co., 502 Park Ave., Oconto, Wis.

44% PROFIT. Year round sellers. Not sold in stores. Agents, distributors, set details. Hub Specialty Co., Box 1005, M. Yakima, Washington.

SELL! Sell! Sell! Six paper pocket savings banks, postpaid 25c, thirty for \$1.00. Sell for dime each. Send coin or stamps. Builder Uppers, 443 Ashland Ave., Saint Paul, Minn.

AGENTS Wanted. Sell vanilla flavoring powder. Nonalcoholic. Package 10c, make 4 oz. bottle. Box 83, Bath Beach, Brooklyn, N. Y.

STRANGE Chemical sponge cleans wallpaper like magic. Banishes housecleaning drudgery. Sensational seller. Samples sent on trial, Rush name. Kristee, 125, Akron, Ohio.

HERE Are extra dollars for you. Make money in your spare time. Turn odd moments into cash. Earn extra weekly income quickly, easily. Hundreds of different offers to choose from—all legitimate, well established companies. Regardless of where you live or what your interests are, there is something here for you. Big news monthly magazine tells how. Next 6 issues free as introductory offer to win new friends. No obligation now or later. Write today for this fascinating publication. A postcard will do. Address "What To Sell," Box 31, 169 N. Michigan Ave., Chicago, Ill.

SELL Sta-Brite, 15c glass cleaner. Big profits. Johnson Specialty Co., Brookport, Ill.

REVOLVING Advertising colorful motorless window display. Adapted for every business. Sample \$1.00 postpaid. Geller, 1532-P University Avenue, New York City.

AGENTS. Fast seller, everybody a prospect. Big opportunity, permanent, dignified. Write today. Smith Co, 1905 So. 3rd, Louisville, Ky.

SENSATIONAL! Amazing! Low priced shampoo. Big profits. Fast seller. Sample 10c. Eldore, 299-G Madison Ave., New York.

YOU'LL Like resilvering mirrors, tableware, making chipped glass nameplates, signs. Write Sprinkle, Plater, 128, Marion, Indiana.

AGENTS—Sell \$1.79 Nylon hose for only 79c in combination. Amazing hose guarantee against holes, snags, and runs or replaced free. Hose for personal use given with large outfit. Rush name and hose size today. Wilknit, Desk BC-37, Greenfield, Ohio.

FREE Water and our concentrates make 72 products. We supply labels, bottles. Enormous profits. Qualco, E-20030 Russell, Detroit.

MEN—Women (Catholic) sure seller—big profits. Dime brings sample. Minke-mer, 414 Empire Building, St. Petersburg, Florida.

SELL New, used clothing from home, auto, store. Men's suits 77c, leather jackets 29c, top-coats 38c, dresses 20c, ladies' coats 35c. Other bargains. Catalog free. National, 436-M East 31st, Chicago.

"GALLOPING Ivories"—Nicknamed by salesmen. It's really hot! Plenty immediate - repeat commissions. Every retailer - service station wants it. Hurry! Universal, 2222 Diversey, Dept. C502, Chicago.

MAKE Easy money visiting friends with display of gorgeous dresses. Amazing values. No investment, experience. Samples free. Harford, Dept. T-242, Cincinnati, O.

AGENTS! Men's suits 86c, pants 23c, topcoats 49c, ladies' coats 36c, dresses 10c. Other bargains. Catalog free. Portnoy, 566-P Roosevelt, Chicago.

NEW 1941 Opportunities. Phospholene cleaning crystals 1c package; bleach 2c gallon; glass spray 3c gallon; hand soap 2c pound; luminous paint and other fast sellers. Western, 401 Cilmmax Bldg., Cleveland, Ohio.

DON'T Be a job hunter. Start your own business on our capital. No hard times; no lay-offs; always your own boss. Hundreds average \$3,000 to \$5,000 annual sales year after year. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant, dignified, profitable business backed by world-wide industry. Write Rawleigh's, Dept. C-U-PPM, Freeport, Ill.

SCHOOL Seniors—Sell graduation cards. America's largest, fastest selling display. 30% commission. Free cards. Universal Engraving & Printing, Box 745-M, Pittsburgh, Penna.

SELLS Like hot cakes, new laundry soap-flakes, perfumes clothes, lastingly when washing. Territory given. Sunset Laboratories, Lynbrook, New York.

AGENTS Wanted: Sell business cards—\$1 per 1000. 2000—\$1.60. Commission, free cuts. Dollar Card, Stapleton, New York.

MONOGRAMMING Automobiles real money maker. Write for samples. International Co., Box 9360, Philadelphia, Pa.

SILVERWARE Cleaned instantly. Simply dip and dry. Amazing demonstrations. Everyone wants it. 300% profits. NuProcess Cleaner, Dept. 98, Aurora, Ill.

**AGENTS:** Paint, dollar gallon. Formula 50c. Oscar Shults, Sullivan, Missouri.

**MORE Money** with salesboards. Johnson's, Box 114 Waverly Station, Baltimore.

**AGENTS Opportunity** that have inventions. National Employment Foundation, Marietta, Ohio.

**\$1 STARTS** You in business selling men's ties, ready tied Slyde-On ties and boxed novelties. Write today for descriptive wholesale catalog, free sample materials. Philip's Neckwear, 20 West 22nd St., Dept. P-6, New York.

**NEW!** Just out! Positive necessity for every public toilet. Taverns, restaurants, hotels, etc. buy on sight. Past \$1.00 seller. Sample 50c. Information free. Hudson, 808 East Monroe, Springfield, Illinois.

**AMAZING**—Electric indicating ironing switch. Iron-So-Ezee, Mt. Washington, Ohio.

**BEAUTIFUL** Hand-made patriotic emblems! Sample dime. Marquez, Apartado 1176, Mexico, City.

**START** Life-time, repeat business. New product. Exclusive franchise. \$1.00 profit every \$1.20 sale. Literature free. Therm-alab, Peoria, Ill.

**AGENTS**—Men, women, youngsters. Send for price list and sample. Agents Supply Co., 1017 - 7 Street, Washington, D. C.

**AGENTS**—Merchants, sell genuine in-laid frames—new on market. Literature free. Fotofram, Riverhead, N. Y.

**EARN \$10-\$15** Daily applying beautiful, goldlike sign letters. Cost 1c. Sell for 25c. Free samples. Hurry! Modernistic, B-3000 Lincoln Ave., Chicago.

**SELL** Sound repeat item, always in demand. Neckties—Fifth Ave., New York labels. Large profits. Write for free swatches, details. Danforth, 499-P Fifth Ave., New York.

**SEAL** And save cracked motor blocks—radiators—boilers. Copper, bronze, lead compound. Guaranteed. Free sample. "Grafix," Peoria, Ill.

**\$50 EXTRA** Per month, moneymaking home operated business. Formula and complete instructions \$1.50. Robt. Smith, 2502A West Hebert, St. Louis, Mo.

**THOUSANDS** Money making opportunities. Samples, particulars 25c. Levine's, Box 15-X, Boulevard Station, New York, N. Y.

**WHY** Pay more? 100 blades 24c. Side-line merchandise. Free catalog. No substitutions. Jay Arr Specialty Co., 150 Christopher St., Box 7, New York.

**EARN** Extra money selling personal stationery, everyday and Easter cards. Descriptive circular free. Heather Greetings, Dept. 41, Springfield, Mass.

**FANCY** Greeting cards. Sample free. Henderson, 716 S. 4th, Maywood, Ill.

**GOOD** Sideline for printing and advertising salesmen. Decalcomania name plates in small quantities. Great demand. Also make money applying initials on automobiles. Free samples. "Ralco," 727 Atlantic Ave., Boston, Mass.

**LOWEST** Prices in America. Free samples. New styles. Absolutely beautiful. Window sign letters. Atlas, 7941 Halsted, Chicago.

**WE** Pack products under your label. Cleaners, food products, etc. Big profits, low prices. Samples free. Bestco, 5007 Irving Park, Chicago.

**SELL** 1941 Tax records—Every type business. Huge profits. Records Co., 2626 N. Irving, Minneapolis, Minn.

**AGENTS:** Smash go prices! Santos coffee 12c lb., 4-oz. vanilla 8½c. Razor blades 10 for 8½c. 100 sticks chewing gum 12c. 150 other bargains. Premiums. Experience unnecessary. Carnation Company, P.O. St. Louis, Mo.

**AGENTS** Make big profits on food products bargain deals. Low wholesale prices. Rush name for trial outfit offer. Ho-Ro-Co, 2810-U Dodier, St. Louis, Mo.

**CALL** On service stations. New item, necessity, big profits. Knipp, Long Beach, California.

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

**SUCCESS** With your products. Make-sell them. Formulas. Processes. Accurate analyses. Catalog free. B. Thaxly Co., Washington, D. C.

**MANUFACTURE** Specialties, hire agents yourself. Big money. Free literature. Gilbert Supply, 5-P West 24th, New York.

**AGENTS**—30% Profit selling gold leaf letters; stores and offices. Free samples. Metallic Letter Co., 438-B North Clark, Chicago.

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

**GOOD** Paying business silvering mirrors, plating autoparts, reflectors, bicycles, bathroom fixtures by late method. Free particulars and proofs. Gunmetal Co., Ave. N. Decatur, Ill.

**AGENTS**—Opportunity make money; book containing 127 successful business plans; home-office; send for free introductory booklet. Elite Co., 214 Grand St., New York.

**AGENTS**—To mail our literature. Good profits. Home business. Maywood, 1105-1107 Broadway, New York.

#### HIGH-GRADE SALESMEN

**COOKWARE** Men. Leading manufacturer of cold-rolled heavy aluminum ware for health cooking has openings for men who can sell and handle men. Exclusive line featuring temperature control and mineral and vitamin savines. Permanent, exclusive territories. Direct sales experience helpful. Managerships available to qualified men experienced in home demonstration selling. Write The Kitchen Craft Company, West Bend, Wisconsin.

**REVOLUTIONARY** New invention. Thousands prospects everywhere. Men earning high as \$100.00-\$150.00 week. Placed on free trial. Sells itself. Orders financed by factory. Protected territory available. Free demonstration offer. Sales manager, 2440 Lincoln Ave., Dept. R-818, Chicago.

**SALESMEN**—Wagon jobbers. Sell dealers. Profitable counter card displays and fast selling 10c cosmetic line. Exclusive territory. Write quick. Peerless, 2802 Dodier, St. Louis, Mo.

**ADVERTISING** Book matches, America's largest manufacturer of union label book matches. Past selling line. Large sales producing kit. Sample matches. Complete cut catalog, 13 color combinations makes selling easy. Commission in advance. Superior Match Company, 7530 Greenwood, Dept. M-3, Chicago.

**SELL** Complete line everyday business necessities—over 2,000 items. Lowest prices. Beats competition. Commissions advanced. Experience unnecessary. Samples free. Federal, 301-J So. Desplaines, Chicago.

**EVERY** Business must buy. Printing, adv. specialties, book matches, tags, pricing sets, etc. Take orders for the pioneer line—1000 necessity items at 50% price saving. Free deals. 40% advanced commission, bonus. Experience unnecessary. Outfit free. Willems, 2130 Gladys, Dept. 43, Chicago.

**SELL** Printing at cut prices. 2,000 business cards \$1.50; 1,000 envelopes or statements, etc. \$1.75; 25 printed sales books \$1.50; 1,000 process embossed cards \$1.50; 2,000 two-color labels, free holder \$1.50. One-third comm. Free outfit. Bargain Prtg Co., 189-F W. Madison, Chicago.

**MAKE** More money selling Red Comet Fire Control Products. Write today for free facts. Red Comet, 704 Comet Building, Littleton, Colorado.

**CALENDARS**, Novelties, matches. Complete line. Full commission on well rated accounts. Bonus. Friede Advertising Service, Eau Claire, Wisconsin.

**MAN** With car to cover retail store route. Openings in almost every locality. Handle orders for nationally known manufacturer-jobber. Average 50% commission. Good income at once. Permanent proposition backed by national advertising and full cooperation of home and branch offices. Sales experience desirable but not necessary. Right man can get quick advancement and chance to operate own big pay wholesale business. Write fully: President, World's Products Co., Dept. 10-J, Spencer, Ind.

**JUST** 3 Sales a day pays you \$12.00 to \$20.00 selling new low priced stool covers. Slips over any old or new stools. Restaurants, taverns, draftsmen, drug stores buy. Free details. Durable Cover Mfg. Co., 3963 Olive, St. Louis, Mo.

**STEADY** Work. Commissions weekly. Sell trees and plants. Willems Sons' Nursery, Brighton, N. Y.

**MAN Wanted**—Good pay for steady work. Manufacturer established over 50 years needs a few steady and trustworthy men with cars in certain good localities. There may be a locality open right where you live or near you. Will finance responsible man with complete stock of guaranteed foods, farm and home necessities—you pay when sold. Mighty attractive proposition. Products well advertised on radio—big help to success. Selling experience unnecessary. Farm experience helpful. No slack seasons or lay offs. Write for no-investment offer. McCannon and Co., Room WC-66, Winona, Minn.

**ADVERTISING** Book matches—World's largest "direct selling" book match factory offers advance cash earnings calling on every type of business. Experience unnecessary; full, part time. Low prices for high quality; quick deliveries, help you get orders. Good repeat profits. Free kit, instructions. Match Corp. of America, 3343 West 48th Pl., Dept. E-3, Chicago.

**SELL** Wedding invitations. Samples. Drach Printing Company, 1619 Hogan, St. Louis, Mo.

**PATRIOTIC** Plaques sell fast during defense program. Sample 25c. Bryan, 312 W. 42nd, Minneapolis, Minn.

**ATTENTION**. Amazing new discovery Merchants waiting. Big profits. Whizz, Hopkins, Minn.

**LAYMON'S** Merchandise. Kittrell blades, hostery, etc. Exclusive territories. Kittrell Company, Factory Distributors, Ackley, Iowa.

**AT** Home, your own manufacturing business, making popular 81 novelties. Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. T-842, Cincinnati, Ohio.

**GET** In the "big money." Offer personalized publicity—in own mediums and other ad-propositions. Start right away, spare, full time. Grow enormously. Fine income, real independence. Free circular "My Game Is Advertising" describing 34 different modern ideas—each your private enterprise. Langley, 631 Roscoe St., Chicago, Ill.

**BIG** Commissions—selling to stores celluloid pricing tickets, metal shelf moulding. To restaurants menu covers, signs. P. Pricing Press, 124 White St., New York.

**SEASIDE**—Mountain top air for offices, stores, homes. Portable equipment. Cost \$12.50 to \$17.50—Profit \$7-\$12. Salesmen's year around gold mine! National Devices, 75 East Wacker, Dept. L-1, Chicago.

**MAKE** Real money selling Chestnut chicks. Profitable side line for roustemen or salesmen, with car, calling on farm trade. Illinois oldest U.S.-approved hatchery, operating entire year. Liberal commissions paid promptly. Free portfolio. Chestnut Hatchery, Box 117, Chestnut, Illinois.

**CHANCE** To build regular income obtaining customers for high grade smoking tobacco. Once used, repeat business assured. Sample kit provided. Pleasant work. Male, female. M. J. Conway, Inc., Gap, Penna.

**NEW** Specialty—Sells every business and professional man. Four \$15 sales daily pay \$280 weekly. Farrell cleared over \$1,000.00 monthly. Write F. E. Armstrong, President, Dept. FM, Mobile, Ala.

**BLADES**—Big profits. Best quality. Factory prices. Postpaid. Ace Blades, Buffalo, N. Y.

**EXCELLENT** Opportunity selling our complete line of brushes, largest commissions. Write for sales plan. Wire Grip Sanitary Brush Company, 2300 5th Ave., New York.

#### EDUCATIONAL AND INSTRUCTION

**LEARN** A good trade now. Big demand for welders and mechanics. Complete practical courses in arc and acetylene welding, auto and aviation mechanics, body and fender bumping, spray painting, metal finishing, etc. Low rates. Pay after graduation plan. Write today for big illustrated catalog. Michigan Trade School, 3756 Woodward, Detroit, Mich.

**MAKE** Up to \$25-\$35 week as a trained practical nurse! Learn quickly at home. Booklet free. Chicago School of Nursing, Dept. K-2, Chicago.

**CREDIT** Managers, adjusters, commercial investigators and special representatives for finance companies, etc., are always in demand. Our course trains you quickly. Particulars free. Nebraska Finance Co., Lincoln, Nebraska.

BOOKS Of all publishers on advertising, art, color, photography, engraving, printing, offset, silk screen, journalism, sales management, correspondence, etc. Trade magazines, Discounts. Lists free. Commercial Engraving Publishing Company, 34C North Ritter Avenue, Indianapolis, Indiana.

NEW Opportunities in air conditioning, electric refrigeration and auto body-fender including metal work, welding, painting. Many trained men earn up to \$35-\$50 weekly. Start preparing now. Get free facts. Utilities Engineering Institute, 1314 Belden, Dept. 113, Chicago.

WELDING—Electric arc. Learn profitable trade quickly through actual practice. Individual welder instruction at bare cost of materials. Full particulars free. Valuable welding lessons book 50c. Hobart Welding School, Box M-315, Troy, Ohio.

WATCH Repairing is steady profitable work. Experts usually in demand. You can learn watchmaking trade at home, spare time. New original instruction system. Script engraving course included. Write for free details today! Nelson Co., 500 Sherman, Dept. C-2001, Chicago.

U. S. government jobs. Commence \$105-\$175 month. Men-women. Prepare now at home for 1941 examinations. Full particulars and list of positions, free. Write today. Franklin Institute, Dept. P3, Rochester, N. Y.

ASTOUND. Amaze, succeed with Super-Memory! Write "DU" Info Company, Box 1122, Chicago.

MASSAGE. Hydrotherapy, dietetics, drugless therapeutics, chiropody, taught by mail. Evans Correspondence School, Montgomery, Ala.

DRAFTING. Layout, blueprint reading. Davison Tech. 7 Grand Avenue, Detroit.

BE Somebody. Head the parade. Go places, do things free. Twirl a baton like trick champions. They're popular everywhere. Know how. \$1.00 complete. Tedbos, 2265 Warren, Toledo, Ohio.

CLINICAL Laboratory technic taught in your own home. Practice outfit supplied. Bulletin free. Imperial Technical Institute, Box 494-E, Elkhart, Indiana.

LEARN Figuring the new fast way. Frederick Smith, Consulting Engineer, 2410 Bernard St., Chicago.

LEARN Big pay trades in a few weeks. Decorating, paperhanging, graining, marbling, sign and pictorial painting. Catalog free. Chicago Painting School, 102 West Lake Street, Chicago.

LEARN Auto mechanics, body, repairing, welding electricity, refrigeration. Diesel. Stevenson's, 2008A Main, Kansas City, Mo.

LEARN Telegraphy! Opportunities now available to beginners due to new railroad retirement act. Expenses low. Catalog free. Dodge's Institute, Hiatt Ave., Valparaiso, Ind.

U. S. Gov't jobs pay up to \$40 a week to start. Get ready for next examinations; railway postal, rural carrier, mail carrier, office help and others. Free book tells how you may qualify. Write quick. Patterson School, Dept. P. M., Rochester, N. Y.

SECRET Investigation. Experience unnecessary. Detective particulars free. George Wagner, M-2640 Broadway, N. Y.

#### PLAYS, STORIES, MANUSCRIPTS

PUBLISHERS Want booklength manuscripts. Renseb-PM, 30 Church, New York City.

#### CARTOONING, COMMERCIAL ART, SHOWCARD WRITING, SIGN PAINTING

ILLUSTRATING. Lettering, reasonable. Samples free. Trankus, 349 Tenth, Moline, Illinois.

HAVE Your own money making business. Learn show card writing, sign painting. Write for details. Begley Specialty, 1472PM Broadway, New York.

PUN And profit for amateur cartoonists. Easy copy work. Copy-Ads, Arkyle, Wisconsin.

PEN And ink drawings. 5c square inch. Wesley Weeks, Keatchie, La.

AMATEUR Cartoonists wanted. Good copyists. Describe training. Box 1970, Cleveland, Ohio.

PEN And ink drawings. Let us draw your advertising and catalogue illustrations, from photos, copies or objects. Best work and fair prices. Heraldic Studios, 1914P Oakdale Avenue, Chicago, Ill.

"HOW To Draw" shows by text and photographs how art is studied in "life classes" contains numerous photographs of artists models in various poses with corresponding line drawings. Send \$1. Foundation Books, 105M West 40th St., New York City.

MONEY In portrait sketching. Progressive steps teach you. 20 complete lessons \$1.00. Harold Parks, R. 3, Ypsilanti, Mich.

#### ADVERTISING AGENCIES, LETTER WRITERS, FOR ADVERTISERS

ADVERTISING Placed all magazines, newspapers U.S.A., Canada, Mexico, Central-South-America, West-Indies. Lowest rates. Free service. 54 page catalog free. Baker Advertising Agency, A-189 West Madison, Chicago. Established 29 years.

ADVERTISE Profitably: \$15 reaches 5,000,000 Sunday newspaper readers with 24-word ad. Newspaper, magazine, mailing-list ratebook, free. Chicago Advertising Agency, 20-PA West Jackson, Chicago.

YOUR 20 Word ad 25c—three issues 50c in result—getting mailorder and hobby monthly! Display 75c inch! (Sample 10c.) Collector-Dealer-Trader Magazine, 1102 Clay, LaPorte, Ind.

ADVERTISE "Progressive Mailtrade" informative, interesting 68 page magazine. Classified 3c word. Inch \$1.50. Copy 10c. Tipton's, Moulton, Iowa.

24 WORDS, 165 Magazines \$15.00. Circulation 6,000,000. Kellis, 1231 Spofford, New York.

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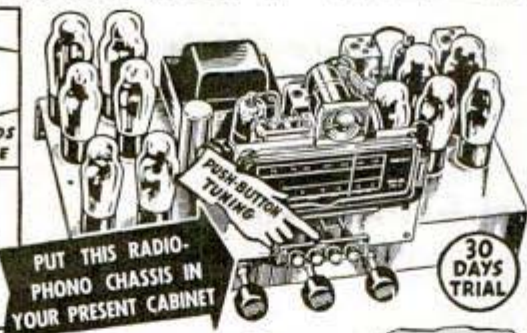
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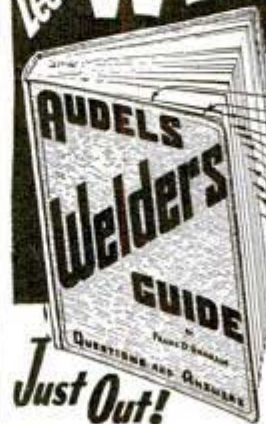


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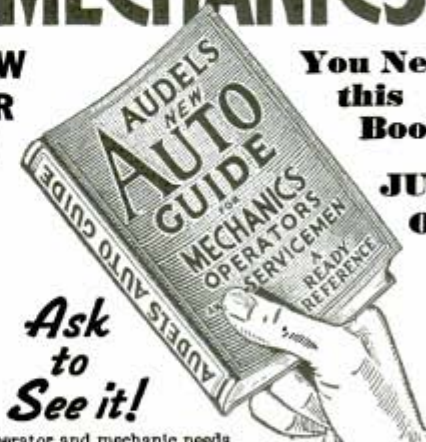
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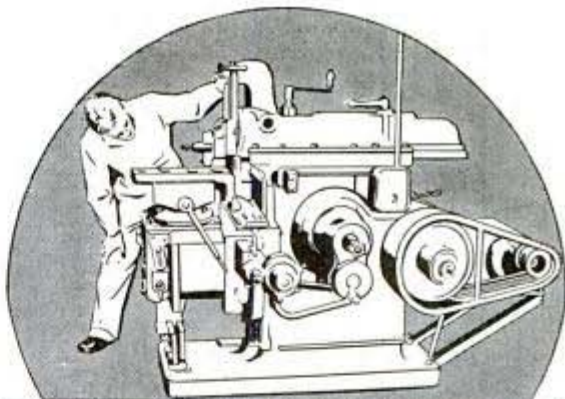
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I AM PLEASED TO ANNOUNCE that the activity of the Ford Good Drivers League will be broadened in 1941. This year, girls as well as boys will be admitted to membership. The enthusiastic support given the League in its first year by educational, safety, and civic organizations is gratefully acknowledged. I believe that the work of the League in 1941 will be equally interesting to these groups.

To all boys and girls between the ages of 14 and 18 inclusive, I extend a cordial invitation to join the Ford Good Drivers League and participate in its activities.

*Edsel Ford*

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Membership in the Ford Good Drivers League is open to any boy or girl who lives in the United States, who is between 14 and 18 years of age inclusive, and who is legally authorized to drive an automobile. An enrollment card may be secured from any Ford or Lincoln and Mercury

dealer, or by writing to the Ford Good Drivers League, Dearborn, Michigan.

Those who join the League will receive, without charge, a membership card, a membership button, an illustrated book, "How To Become A Skilled Driver," and full details of the nation-wide driving contest. 98 scholarships (49 for boys and 49 for girls) will be awarded to the 98 State Winners competing in the National Finals in Detroit in August.

Every boy or girl who enters the safe driving contest has an opportunity to become the driving champion of his or her city, state, or even the entire country.

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Vol. 75

MARCH, 1941

No. 3

## HOW FAST CAN WE FLY ?

**M**ARSHALL HEADLE, Lockheed's chief test pilot, was getting himself supercharged. For half an hour he had exercised on the bicycle apparatus while breathing in pure oxygen through his face mask. Now the nitrogen content of his bloodstream had been lowered to a safe level and he was ready to test one of the world's fastest airplanes.

Lockheed's new P-38 interceptor pursuit can climb to thin air so fast that an unprepared pilot would get the bends, the same malady that affects deep-sea divers who rise from the depths too rapidly. To prevent bubbles of nitrogen from forming in his blood the pilot has to supercharge himself with oxygen before he leaves the ground.

Testing airplanes at speeds that are faster than anyone ever flew before introduces some strange problems. Several of the newest American fighting planes are so fast that it would be too dangerous to test them at their all-out top speeds. Engineers know that the terminal velocities of some of these planes are around 700

*Above, the P-38 retracting its wheels as it makes fast-climbing takeoff. Right, model of flying wing type of military design, with one puller and one pusher engine*



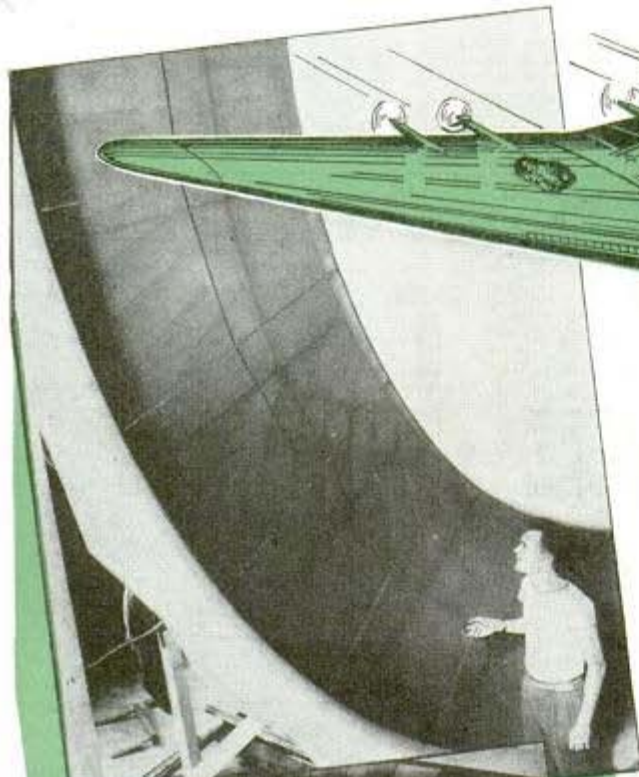
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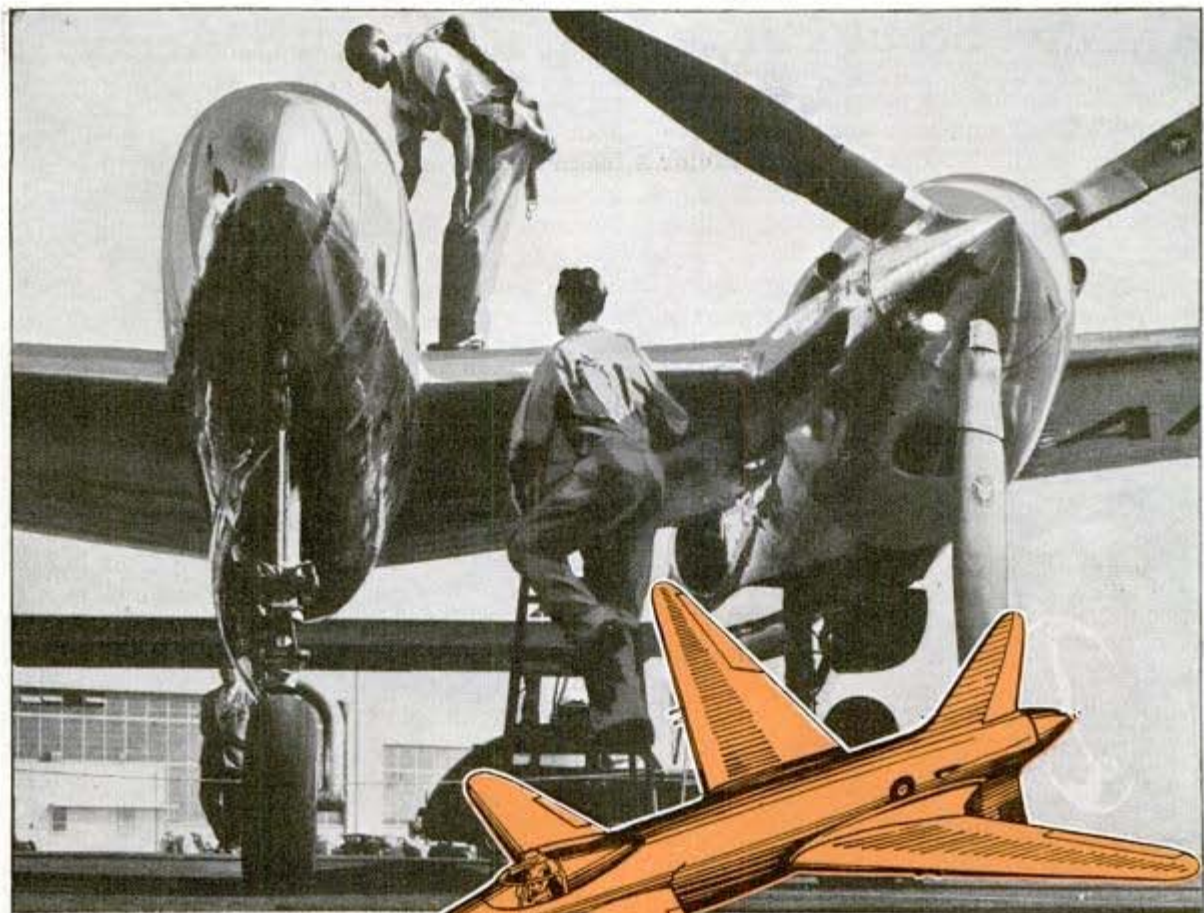
*Top, left, part of air intake of Stanford wind tunnel. Inset, another flying wing model. Right, note "cuffs" at propeller blade roots that provide extra thrust. Bottom, exterior of wind-tunnel chamber*

miles per hour. From a 30,000-foot altitude such a plane would hurtle in a dive to sea level in twenty or thirty seconds. The pilot wouldn't have time to pull out of his dive after reaching terminal velocity.

Even coming downhill at 500 miles per hour puts a strain on the pilot. Passengers on transports that descend 500 feet a minute are fairly comfortable but a test pilot may come down a hundred times faster. The descent into dense air is so rapid that he would suffer from sinus pains and might even cave in his ear drums if he didn't remember to shout all the way down to help equalize the pressure.

You could count almost on the fingers of one hand the number of pilots who have flown faster than 450 miles per hour in level flight. Flying an airplane at 500 miles per hour is very much the same and at the same time is very different from flying a slower airplane. To Headle, 500 miles per hour feels the same as





*Above, checking over 500-mile-per-hour plane before test flight. Inset, "tail-first" model of fast military ship. Below, machine gunner of military aircraft with his equipment. Bottom, pilot in cockpit of fast-climbing plane breathes oxygen to offset ill effects of air too thin for man to breathe*

150 miles per hour as long as he holds the plane in straight and level flight. But it's different when he lets the plane deviate from its straight path. Pilots have passed out when pulling out of a terminal velocity dive too rapidly, and in a 500-mile-per-hour plane the same thing can happen merely by banking the plane into a turn. Headle has to take his turns gradually or else slow down for them.

If that's the case, what good is excessive speed in a military airplane? The advantage is that a high-speed interceptor can save precious minutes getting off the ground and up to the scene of a fight, after which the pilot can throttle down to a safe maneuvering speed. Pilots are least affected by changes of acceleration when they are lying down, and in the

(Continued to page 154A)



# 'Pygmy' Scout Car to Be Used by U. S. Army

Remarkable for its versatile service, a "pygmy" truck and scout car being produced for the U. S. army by Ford Motor company is a wholly new type of military vehicle. Known as a "command reconnaissance four-four," the small, lightweight car is powered with a forty-two horsepower, four-cylinder engine adapted from the Ford tractor, and has a four-wheel drive, a unique feature being that the front-wheel axle can be used either as a driving axle or as an idling axle. There is an auxiliary transmission in addition to the regular gear box, resulting in six speeds forward

and two reverse. The car will travel about sixty miles an hour on level surfaces. When on reconnaissance duty the car carries three men and an all-angle machine gun. Storage space for a sub-machine gun is provided. It is expected to prove useful for hauling light freight and in towing anti-tank guns and other small field pieces. Since it is capable of carrying several men, it can transport troops quickly. The truck has shown an ability to take sharp inclines and to travel over very soft ground. Hand grips are provided around the outside so the crew may help lift it out

if the car falls into a deep hole. The windshield folds down flat over the broad hood for wartime service, and there is also a folding top. In addition to ordinary lights, the car is equipped with blackout lamps at front and rear. A brush guard extends across the front of the car. Built extremely low to the ground, the midget truck is only thirty-eight inches high at the cowl, and it has a wheelbase of eighty-one inches.



*Diminutive proportions of the army's new reconnaissance car are strikingly noticeable when it chances to park alongside one of its big-brother military trucks, below. On scouting missions it would ordinarily carry a crew of three men*

*Its ruggedness belied by the toylike appearance, scout car and truck can travel at sixty miles per hour on level ground, above, or bounce safely over roughest terrain, center. Handles at sides are convenient for soldiers to grip when the going is hard, or to lift car out of holes*



K1383

# Tiny Target Plane Burns When Hit Is Scored

Riflemen of the British home guard practice methods of defense against dive bombers with the aid of a moving target that bursts into flame to indicate that a bull's-eye has been made. The target consists of a tiny bomber modeled in metal, which is fixed by an arm to a shaft in a way to simulate the motion of a dive bomber. When the marksman registers a hit on one of the vulnerable parts of the plane, the bullet ignites inflammable material.



Model plane mounted on moving arm presents realistic target. It bursts into flame if rifleman, right, scores hit

*British Combine Photos*

*The Photo by Lee Co. 629 W. Washington Blvd. Chicago*

K1437

# Type Stick for Lettering Signs Is Fed from Alphabet Case



Printed type faces available in block form make easy the lettering of signs and labels of all kinds at home or office. The blocks, containing many prints of all the letters in the alphabet, as well as numerals, are arranged in a convenient case. An adjustable holder is furnished, and letters are placed in it as type in a "stick." When the words are spelled out, the back of the holder is mounted with scotch tape so the entire sign can be slid out and mounted wherever the letters are to be used.

At left, laying out a sign in the adjustable holder with type faces taken from blocks of letters

K1407

# Seven-Inch Eraser Saves Frequent Changing of Rubber in Machine

Feeding out the eraser as its tip wears down, like a mechanical pencil extends its lead, an electric eraser now available overcomes the frequent changing required where short "stubby" erasers are used. The seven-inch rubber core fits into a tubular shaft, being tightened at the lower end of the machine by a chuck.



Cutaway view of machine, at right, illustrates hollow shaft through center that houses seven-inch eraser. As rubber wears down, the core may be extended until it is all used up

*Hollow Shaft*

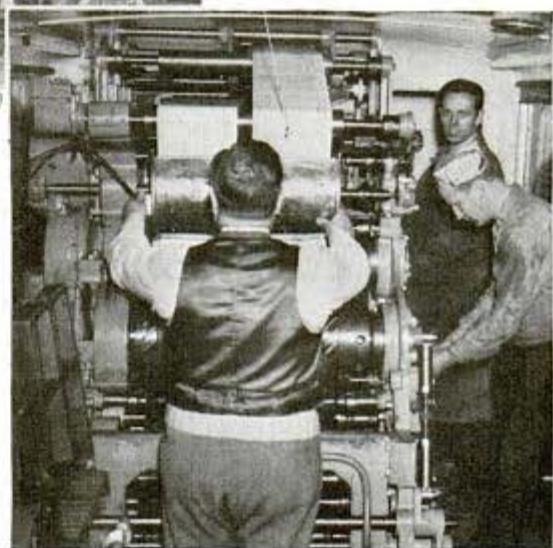
MARCH, 1941

*Charles B. Running Co. Inc. 825  
100 Beade St. New York City*

K 1423 Barnwell Ellyatt Official  
 Program Corp. 11 & 44 St  
**Printing Plant in a Truck Runs Off Programs**  
 New York



At left, copy for the day's race program is handed to the crew of the trackside printing plant. Below, the two-color rotary press inside the truck runs off programs at the rate of 10,000 an hour. Six men and a chauffeur operate the plant



Experiments with a printing plant on wheels have proved so successful in turning out race programs right at the trackside that the plan may be put into operation soon at tracks and sports arenas around the country. Printing the programs at the track enabled the officials to run off the exact number required by the day's attendance, with the latest information in the sheet. A printing shop complete with color press, Linotype machine and binder capable of turning out 10,000 programs an hour was installed in a truck with a floor space thirty-one by nine feet.

K 1410  
**Dial Opens Frozen-Food Locker as Patron Serves Self**

As simple as push-button tuning on a radio, the dial system has been extended to frozen-food lockers. The lockers are arranged on a large wheel, and for access to his own compartment the patron merely presses his particular button and the individual locker moves automatically to the door opening where it can be unlocked with his own key. No attendant is required and the patron need not enter the zero room to obtain access to his locker.

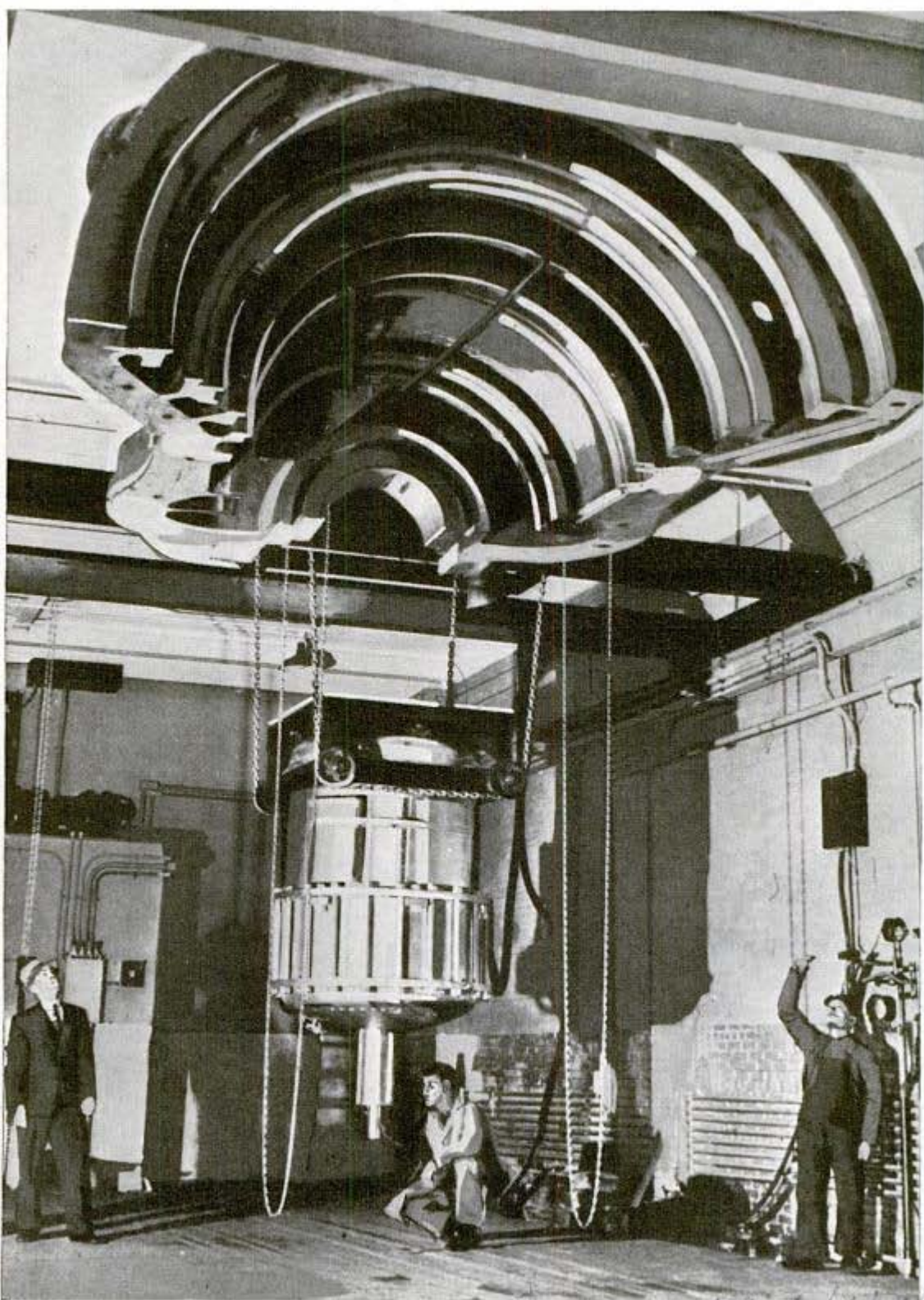


Left, a patron dials her locker number and presses button; right, swung into position, the locker is opened and frozen food is withdrawn

Press built by C. B. Cottrell Co. Western N.Y.  
 Globe Photos  
 Armstrong Cork Co. Lancaster Pa.

X420

# Million-Volt Tube X-Rays Huge Steel Castings



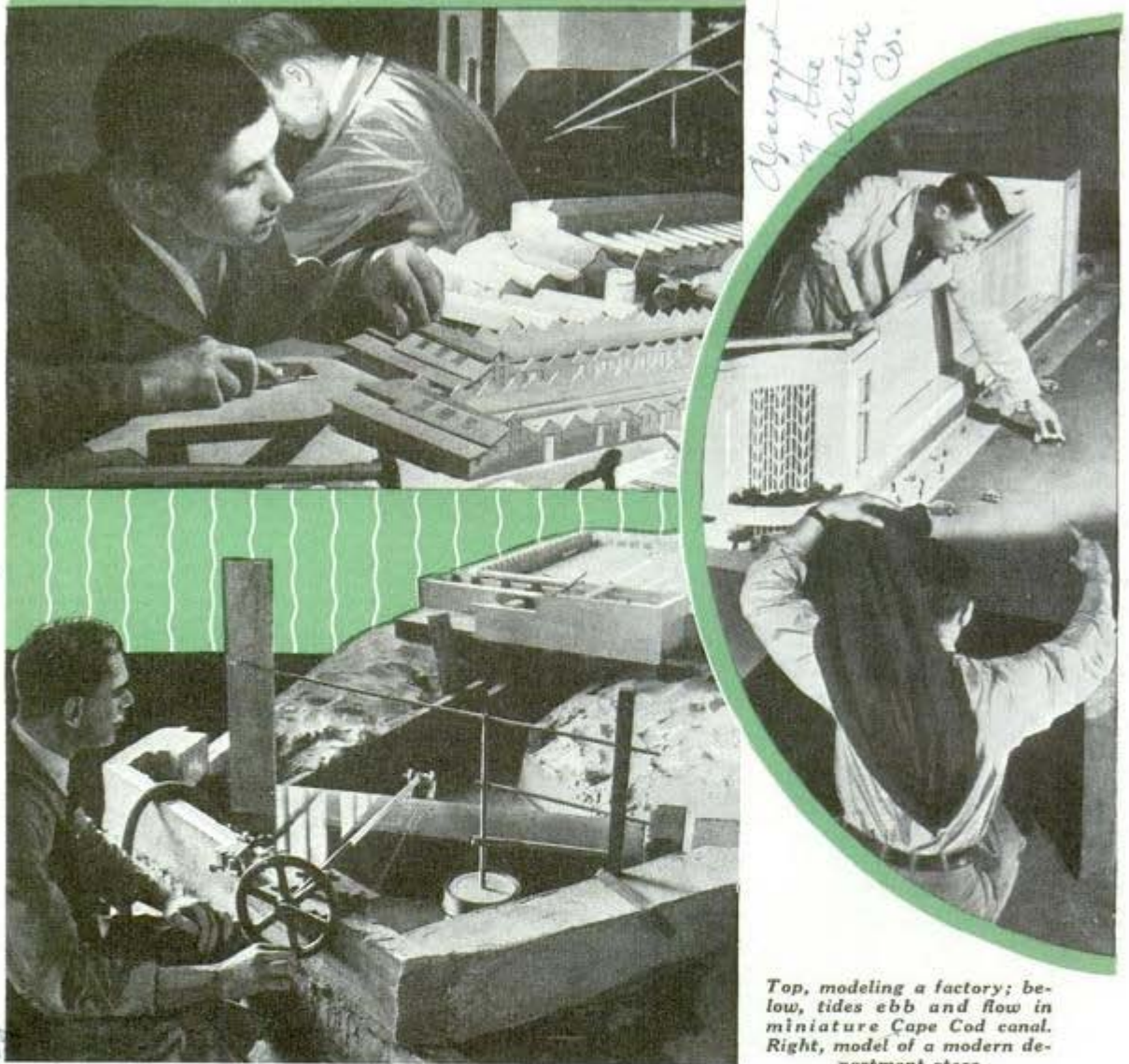
*Wide World*  
 Emitting energy equal to \$90,000,000 worth of radium, a million-volt X-ray tube, developed by General Electric, saves time making X-rays to find flaws in large castings for electrical equipment. Despite its small size, it photographs through four-inch steel in less than two minutes, which formerly required an hour. Above, turbine casting above X-ray machine is being lowered into position to be photographed

MARCH, 1941 *Schenectady, NY*

Monsanto Chemical Co  
St. Louis plant.

Charles E. Bullock  
Cleveland model maker

# LITTLE GIANTS



Designed  
by the  
Purdue  
Co.

Top, modeling a factory; below, tides ebb and flow in miniature Cape Cod canal. Right, model of a modern department store

at Currama Cor. 3432 33rd Street  
Prof. F. A. Reynolds  
Mr. Allen Warren Ellyott

**I**F YOU were to select the most remarkable characteristic of modern industry, probably the first thing that would come to your mind is size—huge buildings, gigantic machines, massive ships, great airplanes, bulky trucks, mammoth dams, tall derricks, towering excavators, long trains. Man himself seems puny and weak beside his creations.

The second characteristic you might note would be the complexity of the ingenious devices, which often taxes the average human capacity for understanding. Indeed, achievements of recent years have pretty nearly shown that whatever man can im-

agine he can build. And they have brought a new problem, the difficulty of visualizing and pre-testing these entirely novel and untried scientific and mechanical wonders.

A roll of blueprints is a poor aid to the imagination. And, since the best test of a theory is to prove that it can be made to work, modern industry has turned more and more to the use of miniature models, precise in form, scale and operation.

These little giants of industry have been throwing a tremendous weight behind the forward-moving wheels of progress. Vitrally necessary during the early stages of thousands of projects, they are forgotten

at  
Bullock

# of INDUSTRY

*Herbert Ziskin  
Brooklyn, NY*

*A1217*

*1/10 Bernay  
my  
23 W  
my*



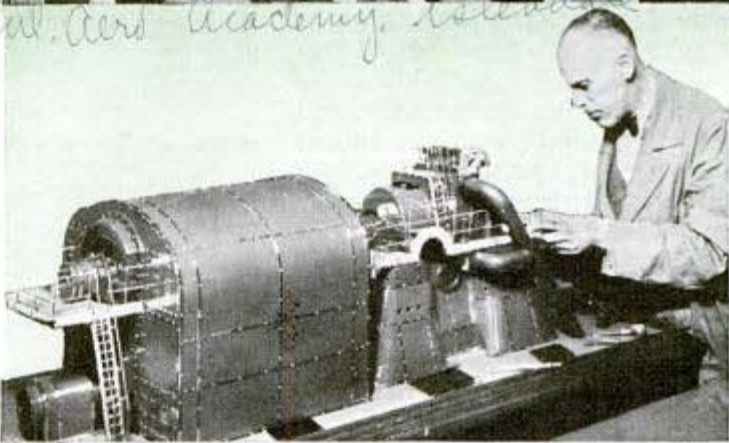
*Capt. H. J.  
McNaughton*



*U.S. Army Engineers*



*Capt. Harry  
Clawson*



*Deputy Commandant  
L. F. Hadley, Westinghouse*

and tossed aside when the project takes final form, perhaps as an intricate packaging machine, a new automobile, a whirling turbine, or a cavernous wind tunnel for testing airplanes.

So we seldom hear of them, as though they were part of another world, a lost Lilliputian universe right in our midst.

Now, under the impulse of war, these little fellows have suddenly increased a hundredfold in number and thousandfold in importance.

Hidden away in safes and locked behind metal doors of

*Four-foot Boulder Dam (left) built by eighteen-year-old youth is a working model. Top, right, army engineers solved problems with scale model of Santee River dam spillway. Center, flying cadets study a maneuver with tiny planes. Bottom, model of turbine generator*

*South Carolina*

*Westinghouse 329  
Central Power Station  
New York City*

K 121\*



bases on both coasts officers are splashing around in shallow beach waters directing the landing of model soldiers-of-the-sea from model boats in the face of theoretical fire of model cannon.

On a dozen flying fields army and navy pilots are studying battle maneuvers and formation flying with model planes held in the air, moved across the ground or suspended on wires. On army reservations tacticians are operating tumblebug tanks over miniature obstacles and stringing miniature wire entanglements in

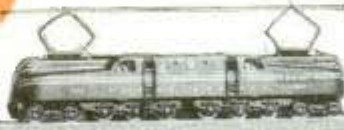
front of miniature trenches. In airplane plants tiny ships bob and sway to tiny air blasts in tiny wind tunnels.

But war is not all guns and tanks and ships. Generators, turbines, textiles, and hundreds of other products, including the very buildings in which they will be manufactured, require miniature models.

And preparation for defense is not all of life today, either. In the laboratories of the great electrical, oil, metal and rubber companies scientists are using small-scale

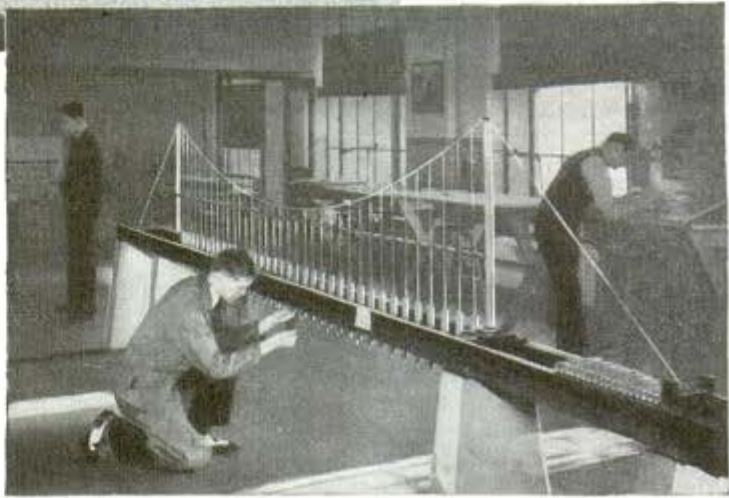
models in their peaceful experiments to improve civilization. In the

Westinghouse  
V. P. Morgan  
A. S. Smith



war department buildings in Washington are hundreds of tiny working models, guarded from the eyes of foreign spies as though they were vital blueprints. In fact they are blueprints, raised into three dimensions. In the models are hidden the secrets of swift raiding planes, ingenious bomb sights, revolving gun turrets and other surprises Uncle Sam is cooking up for future enemies.

In the near-by Naval Experimental Basin, engineers of the navy tow around models of battleships, airplane carriers, cruisers, destroyers, and submarines of types never yet built. In marine



Top, model of a 65,000-kilowatt New York power station. Center, tiny Pennsylvania electric locomotive is controlled by voice. Bottom, testing behavior of suspension bridge in advance with weights hung under deck of model to simulate traffic load

at Mass Inst.  
POPULAR MECHANICS



K1217

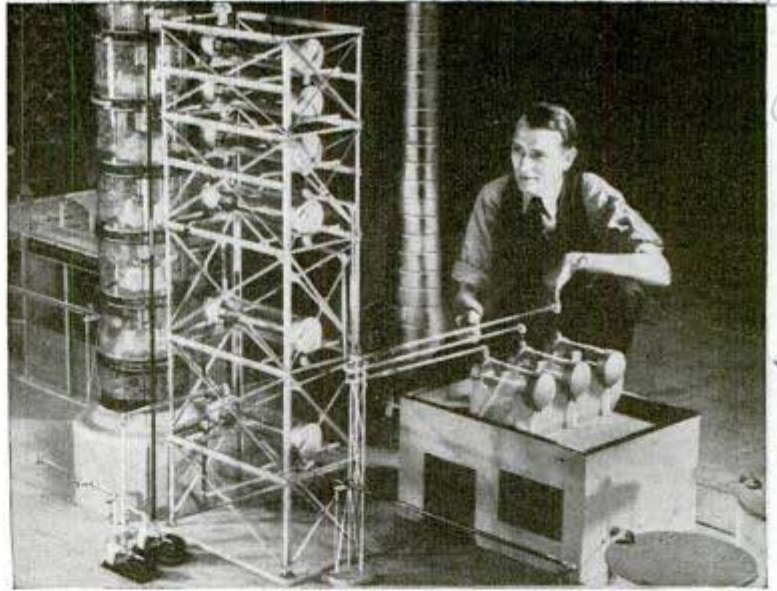
Standard Oil Company of N.J.  
Built by Scientific Engineering Co.

General Electric and Westinghouse and similar laboratories are guarded models of secret machines that have never been constructed, machines made to move by the impulse of sunlight, radio waves or ordinary electric bulb light. Standard Oil of New Jersey has a complete model oil refinery fashioned mostly of steel and glass. Goodrich Tire and Rubber Company uses little model tires for laboratory experiments; real tires would require huge scientific apparatus.

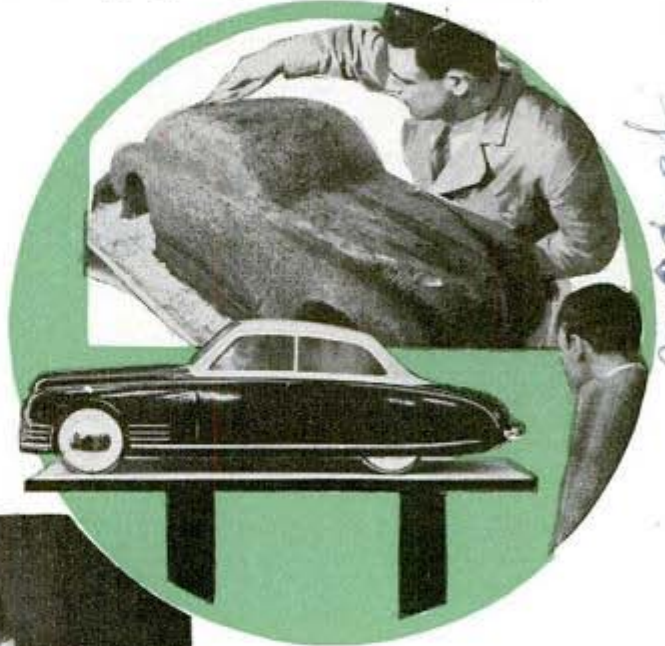
In shipyards, little hull models are built and then marked off so as to lay out huge steel plates for real ships.

The scientists employed by railroads and railroad equipment manufacturers are often busily engaged testing miniature trains, switches and safety and signal devices that would gladden the hearts of many a youth as a birthday present. But these research men are working, not playing; they are fashioning the train and railroad equipment of tomorrow.

Some of the most elaborate models ever put together are helping U.S. Army engineers control mighty rivers and coastal wa-



Complete miniature oil refinery, above, shows crude-oil storage tanks, still, bubble tower, pump house, condensers and heat exchangers



Model of  
that structure of Technology

Scale model automobile in circle is complete to headlights and upholstery; above, its beginnings in clay. Bottom, working out maneuvers with tiny planes on wires

ters. Reduced to a scale often as low as 1/2,000 of their real size, but built in accurate reproduction of the genuine river bend, tide-water shoal, harbor or inlet, these models make little problems of big ones. Experimental currents are created from water flowing from a faucet, paper confetti is cast on the miniature water surfaces and,

(Continued to page 146A)

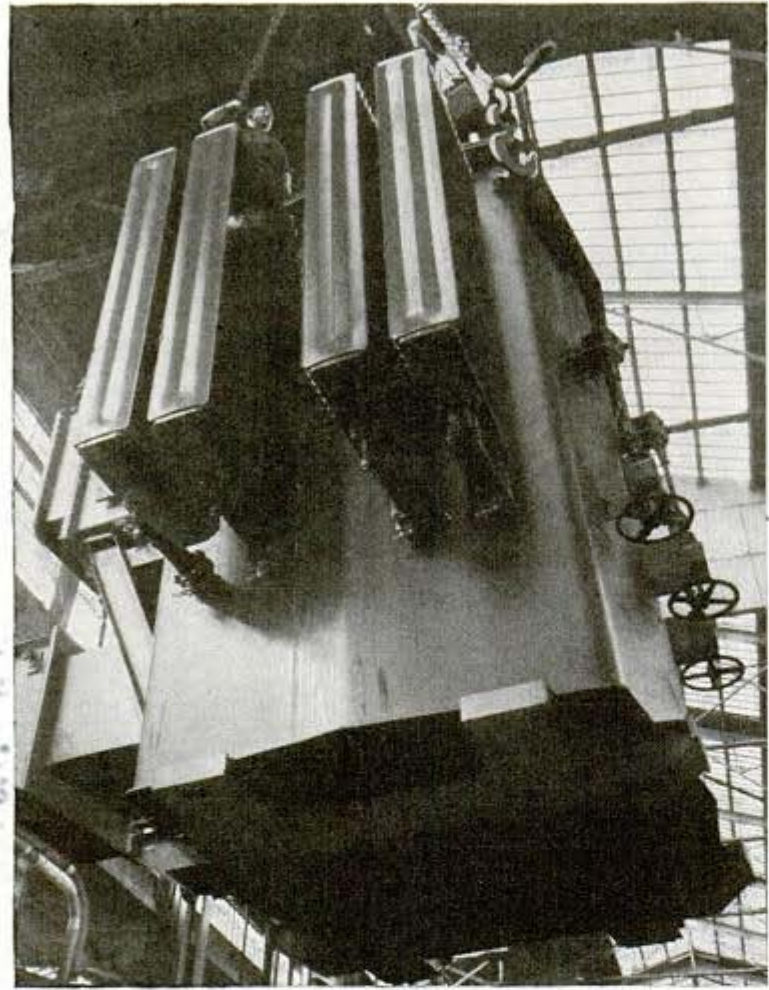


MARCH, 1941

Randolph Field

R2408

# Fifteen-Foot Transformer Dwarfs Men Riding on Top



Workmen atop transformer appear as midgets compared with thirty-five-ton mammoth. "Wings" at sides are radiators that cool 4,000 gallons of oil

Ready to take its place distributing electric power in the national defense program, a thirty-five-ton transformer recently was transported from a Westinghouse plant. Its gigantic size dwarfed men riding on top as they directed its movement to a freight car which was to haul it. More than 4,000 gallons of oil, to be used in the fifteen-foot transformer, will be cooled by circulating through radiators at the sides.

Sharon O'a

## Wool-like Fiber Made of Rayon Can Be Dyed in Light Shade

Capable of retaining a crimp with a high degree of permanence, a new rayon fiber developed by the du Pont company possesses certain characteristics now available

only in wool. Known at present as "fiber D," the new yarn has been used satisfactorily in rugs, carpets, upholstery materials and wall coverings, and is usable also in decorative fabrics such as draperies and plushes. As with other rayons, fiber D may be dyed to brilliant, clear colors even in the lightest shades, which is of particular interest to rug designers, who require expensive white wools for the lighter colors. Luster can be controlled as with rayons. The fiber is mothproof and takes readily to treatment with anti-mildewing and flameproofing preparations.

K1422

## Adjustable Tipper Lifts Barrel with Easy Leverage

Lifting drums or barrels to an upright position is easy with a long-handled "tipper" just brought out. It has a pronged collar that adjusts to fit all types of drums and barrels, holding them firmly during the lifting. The long handle increases the leverage.



Pronged collar takes a firm hold on edge of barrel and the long handle makes the lift easy

Wilmington Del.

Waterbury Mass  
275 Walnut St  
Leves... the para... sales

R1367 Cont. Grant

# Chairway Hauls Skiers a Mile up Mountain

Up an avenue cut through the trees on the slopes of Mount Mansfield, Vt., runs a cableway more than a mile long, carrying skiers past the treetops to the summit. The eighty-six-chair tramway, new this season, cost \$80,000 and is the longest of its kind, stretching over 6,330 feet. Instead of a long, tough trek up the snow-covered trails, the skiers sit down for a leisurely twelve-minute trip through the winter fairyland. Lest they freeze up en route, the passengers are provided with heavy canvas aprons that serve as wind breakers, snapping around the neck and covering the legs. Skis can

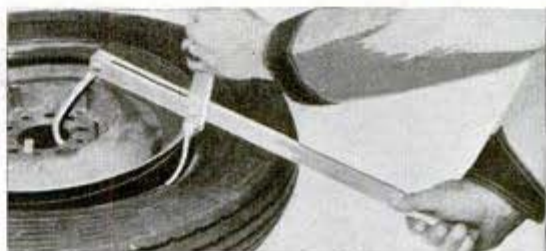


At left a skier boards a cable-hung chair for the long ride up the slopes of Mount Mansfield, Vermont. Part of this 6,330-foot chair tramway is seen above

be worn during the ride or held upright on the foot rest connected with the waist bar which keeps the rider in his chair. The chairway takes the skier to an elevation of 4,397 feet above sea level in a rise of 2,030 feet. It accommodates about 200 skiers per hour. At the summit there is a ski house with non-fogging, double plate-glass windows and a circular fireplace in the middle.

## ✓ Quick-Acting Hand Tool for Removing Tires Requires Little Effort

Designed particularly for dismounting tires from the new safety wheels that have an inner-flanged bead channel, a quick-acting tool requires little effort. It will handle all types of tires on wheels from fourteen to seventeen inches, and is especially helpful in removing tires from conventional type rims when the beads are badly rusted or tightly seated.



Removing tire with this tool requires little effort

MARCH, 1941

*The Key-Tool Co. 333  
Abron, Ohio*

R1441

# A ROAD TO MATCH



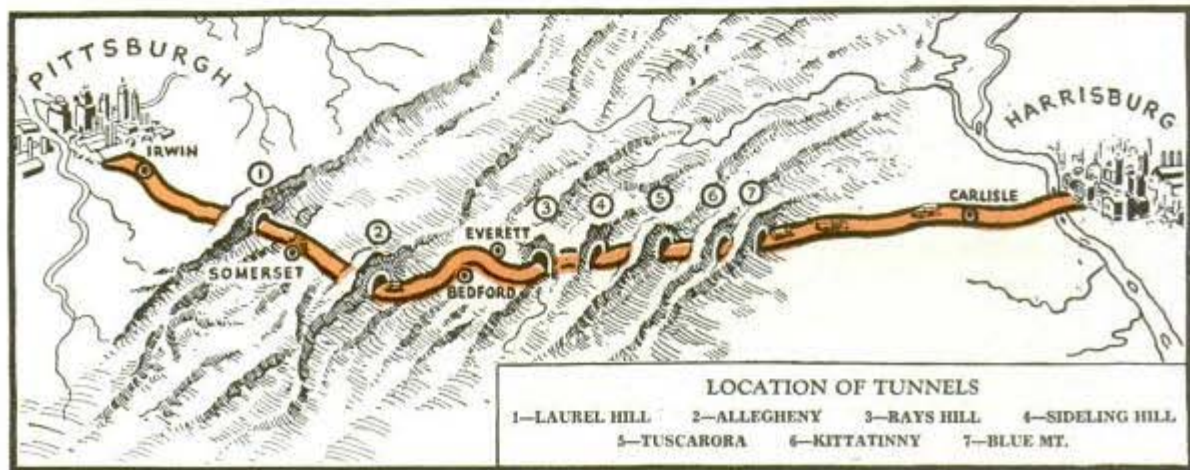
Left, leaving tunnel on Pennsylvania turnpike. Lighting is blue-green from mercury lights designed by Westinghouse. Right, light used at interchanges and tunnel approaches. Bottom, location of tunnels

**E**MBODYING the most modern principles of express highway design, the 160-mile Pennsylvania Turnpike connecting Pittsburgh and Harrisburg offers the motorist a route from the eastern seaboard to the west that is free from crossroads, stoplights and steep grades. As a consequence, it is America's first highway on which full performance of today's automobiles can be realized.

Instead of climbing over the Appalachian Mountains, always a formidable barrier between the east and the west, the turn-

pike goes through them. There are seven tunnels totaling six and seven-tenths miles in length which save 9,000 feet of vertical climb over existing routes. On open stretches the turnpike consists of four lanes, two totaling twenty-four feet in width running in each direction. A parkway separates the two two-lane roads. Approaching tunnels the four lanes converge into two lanes, each eleven and one-half feet wide.

Free from cross-traffic and constructed to by-pass all towns and cities, the turn-



H. L. Watson

K. 1441  
Marjorie  
Watson

James Caspell

# TODAY'S CAR



pike, which has been nicknamed "The Dream Highway," lends itself to exceptionally high speeds. On test runs automobiles have exceeded 100 miles per hour. However, the highway's main purpose is to provide a safe avenue for travel at uniform speed, sixty to seventy miles per hour if the driver desires, over the entire stretch.

(Continued to page 159A)

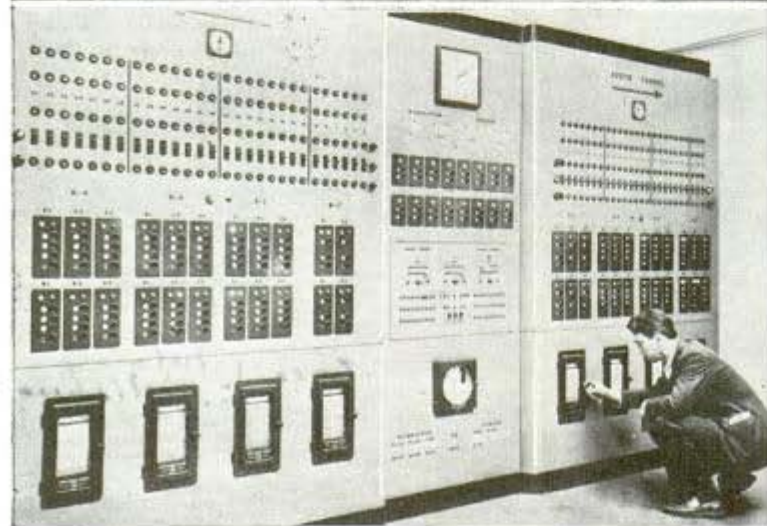


*Elec. Dept. Co.  
E. Pittsburgh Pa*

Westinghouse control panel (top) regulates and keeps record of all electrical operations in turnpike tunnel. Center, looking at huge ventilating fan used to provide constant supply of fresh air in tunnel. Left, straightaway on the high-speed turnpike

R1392.

# ✓ 'Electric Eyes' Aid in Policing Tunnel Traffic



Schemelady ny

Photoelectric cells perform a variety of duties in guarding and regulating traffic passing through the mile-long tunnel under East river, New York City, linking Queens and Manhattan. The Queens-Midtown tunnel includes two two-lane tubes, each having its own set of controls, and the traffic conditions of both tubes can be surveyed in a moment from one huge control panel built by General Electric company. Photoelectric counters show at a glance exactly how many vehicles are in each tube at all times, one counter adding traffic entering the tube while the other subtracts vehicles as they leave. A counter includes a beam of light shining from one side of the pavement to an "electric eye" on the opposite sidewall. Whenever this beam is interrupted by a passing vehicle the "eye" sends an impulse to the counter. If cars in any tube exceed a safe number, a signal is sounded at the central control panel and the flow of cars at the entrance is reduced. Another beam of light, thrown across approaches at a height of twelve and one-half feet, is interrupted by any truck higher than that, causing an electric eye to sound a horn as a signal for officers to halt the truck because it would be too high for the tunnel. Photocells also turn on lights at the tunnel approaches when it becomes dark, and aid in recording the amount of carbon-monoxide gas in the tubes.

Beam of light and photocell, top, count cars as they enter or leave the tunnel; similar arrangement above entrance warns officers if a truck too high for tunnel attempts to pass, center. Bottom, control board shows traffic conditions in tunnel, gives carbon-monoxide content in four sections of each tube, and has push buttons to turn on the ventilating fans



K1093

337



The continents meet at La Guardia airport, terminal of transoceanic and trans-American air lines. Here is its control room—eyes, ears and brain of the port—without whose "green light" no liner can land or depart. In the distance a transport skims just above the runway

*New York*  
Conf. Allen Warren Elliott, 120 E 84th St New York

K1093



One of TWA's Stratoliners wheels around the control tower, above. At left, a U. S. Customs official examines a passenger's luggage; being a port of entry into the United States, this international terminal has its own customs office

The industry was aviation and the infant was La Guardia Field, already something of a whopping prodigy because \$40,000,000 had been spent to make it the largest port of the skies, bigger than anything England, France, Russia or Germany could offer.

Today, still the baby brother of big-city airports, it has virtually zoomed out of its swaddling clothes. Already the field has sur-

passed all of its older rivals. More passengers arrive or depart on its far-flung runways than on any other of the world's many airports.

During the noon rush period, an air liner lands or takes off every fifty-six seconds.

In the blue, above its broad, brown

By Allen Warren Elliott

**O**N a misty morning a little more than a year ago, one of the most remarkable industrial babies ever born was ushered into existence almost exactly in the geographical and population center of New York City.



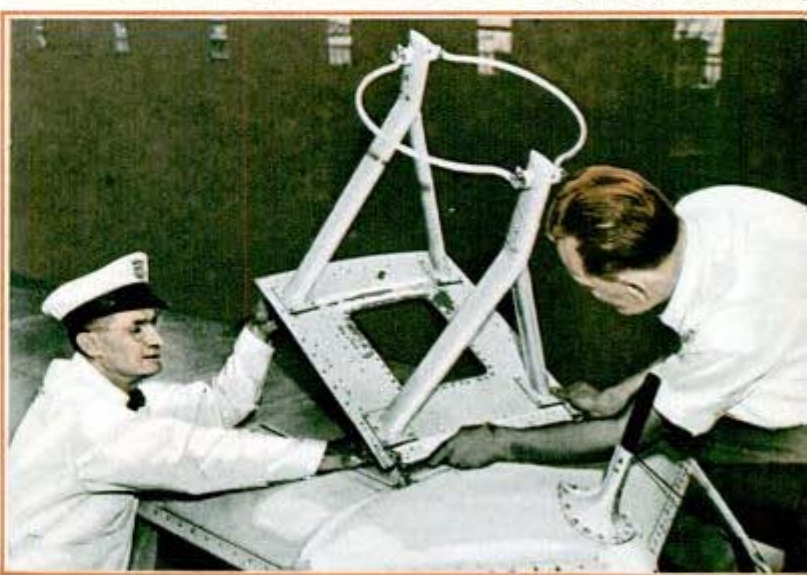
acres, the last generation's fantastic dream—of a sky actually dotted with giant planes sparkling in the sun—has become this generation's accomplished fact.

So jammed is this busiest cross-roads of the clouds with the huge, sleek silver birds of the air lines alone that a figurative "keep off the concrete" sign has been hung out for all other aircraft in the form of a special landing fee. Even Uncle Sam's army and navy planes have taken the hint to stay away unless on important and official business.

Between 5:00 and 6:15 p. m. daily, more than fifty scheduled air liners come or go. An average of more than 290 air liners alone land or take off daily and the total has hit 359 on a holiday.

Without restrictions, these figures would double and perhaps treble on a field already so lively that occasionally there is just enough room on the concrete loading apron for the scheduled transport ships, crawling in and

At upper right, an autogyro ferries in a cargo of mail. Below, installing directional antenna on cabin of United Air Lines "flying laboratory," which is based at the field. Bottom, manpower digs in to help out horsepower in a winter gale as a tractor struggles to maneuver a plane on a slippery apron





340 K1093  
 Dusk falls, red and white lamps blink along the runways and boundaries of La Guardia field and the lights of New York City surrounding the airport begin to twinkle, above. The evening planes and sky sleepers line up for final inspections before their night runs. At left, a Mainliner passes the Administration Building

out like gargantuan beetles. Sometimes, when low visibility hampers operations, ten or fifteen liners drone in monotonous circles at 1,000-foot intervals above the field awaiting permission to descend in turn, and land.

So quickly has this infant airport fulfilled the vision of its creators that a move was started to establish a number of branch airports north of New York City and across the Hudson in New Jersey so that passengers might be shuttled back and forth in small, fast ships to relieve congestion of the 558-acre fledgling field.

Originally the brain child of Mayor Fiorello H. La Guardia, the airport's activities have grown with amazing rapidity, thanks to the keen perception of the execu-

K1093



341

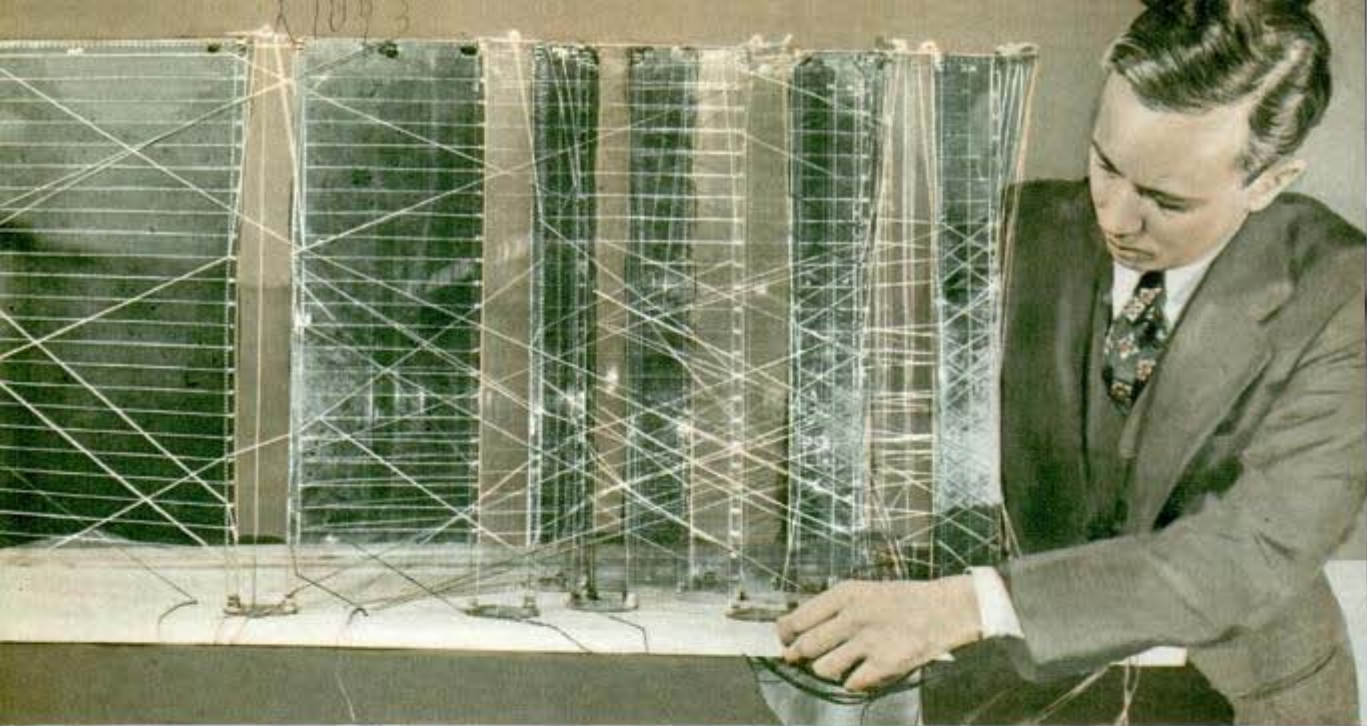
tives who direct the operations of the major air lines — American, United, T.W.A., Eastern, Canadian Colonial and Pan American.

Everyone saw the convenience angle of an airport centrally located within the largest city in America, with its time-saving advantages. But these men spotted one more factor that would give aviation itself a tremendous boost and they did not hesitate to offer the support which made the field practical.

Because the airport is surrounded by the densely populated city, it is almost impossible for a plane to use the field without passing over a crowded section of the metropolitan district. The result has been that each great ship that wings its way to and from the field is writing a story of speed and safety across the sky where all can see. Thousands who would not have thought of flying a year ago, have become accustomed to the idea. They are among the new patrons of pas-

At the top is a natural-color photograph of New York's International terminal — the base of Pan American Airways' operations between the Americas and Europe. At the right, one of the huge Clippers is hauled ashore on the beaching gear for its regular turn in "drydock" after a round trip overseas





342

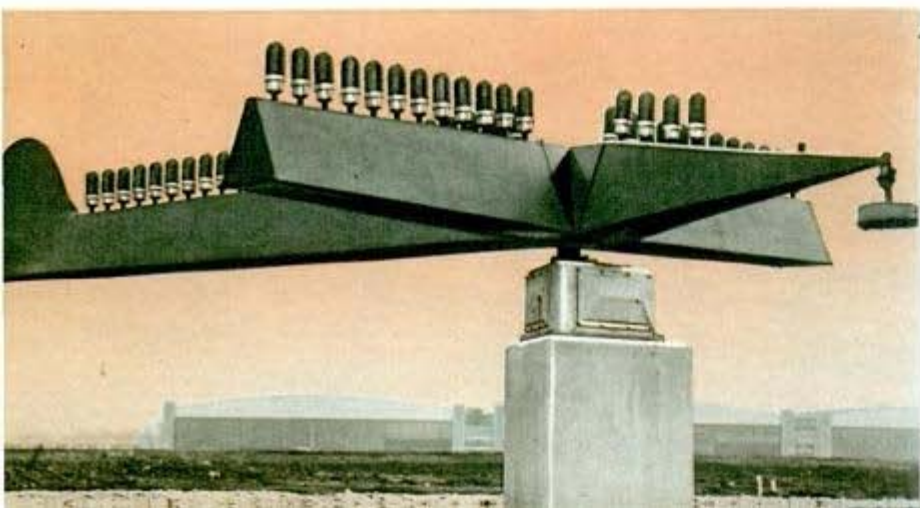
senger aviation. Proof of the advertising value of the location is the fact that more than one million visitors have paid a dime each merely to enter upon a platform skirting the loading apron to watch the air liners arrive and depart.

To manage this great stream of air traffic, an organization of more than 4,000 persons has grown up, enough to populate a good-sized town. Like a town, too, the airport has restaurants, bars, a florist, barber shop, newsstands, fire equipment, weather bureau, first-aid stations, telegraph offices, a photographer and a post office. In addition, being a port of entry for Pan American's air passengers from Portugal, The Azores and Bermuda and Canadian Colonial's from Canada, it has U.S. customs, immigration and health offices.

Spearhead of the management groups is a force of some fifty men under the direction of Commissioner John McKenzie, Major Elmer Haslett and Chief Engineer Joseph A. Meehan representing the city's control of the terminal.

This staff includes the twelve men who stand day and night vigil in the control room in a tower atop the administration building, the chattering and humming room which functions as the brain and nerve center of the airport, as well as its ears and eyes, co-ordinating the efforts of the air-line executives and Uncle Sam's Civil Aeronautics Board to keep things unsnarled.

Using every practical device common to airport control towers the world over, including more than \$30,000 worth of radio equipment alone, these traffic cops



That odd network at the top is a plastic, three-dimensional chart with which American Airlines can plot the location of any of its regularly scheduled flagships at any hour. Red bulbs on the automatic electric "wind sock," at left, show night-flying pilots the direction of ground winds. Wind direction also registers on a dial in the control tower as the "sock" swings

K1093

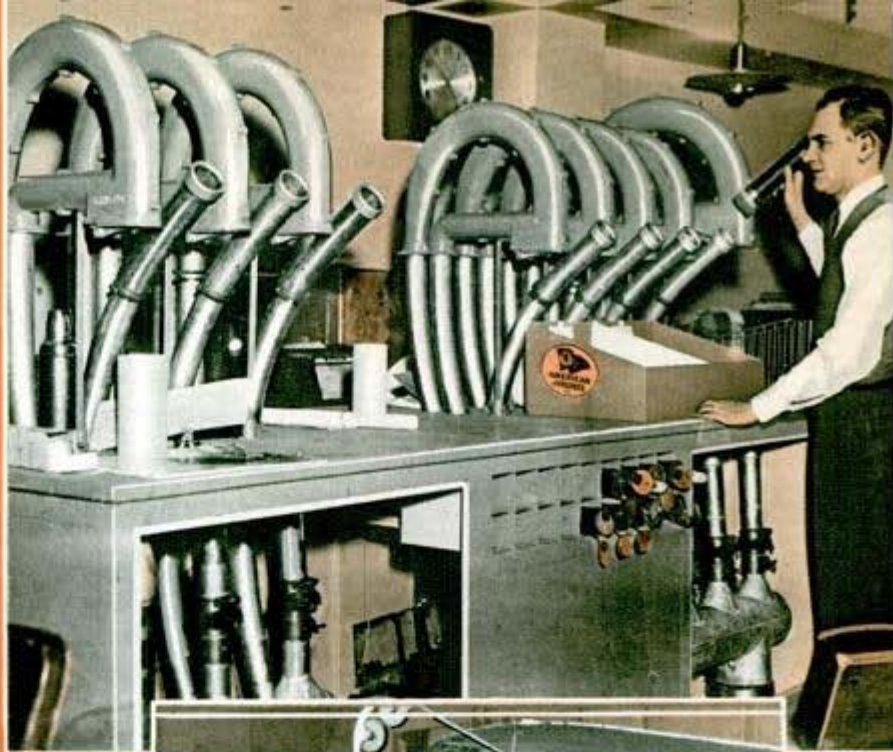
343

of the "Grand Central Terminal" of aviation bring the air liners down when they are within reach of the field, or dispatch them from the airport confines, whereupon their flights become the business of the flight superintendents of the individual air lines and the CAA Airway Traffic Control.

In daylight, these men depend largely upon their virtually unobstructed view of the field and its approaches. At night, however, they are aided by a clever electric mechanism which reproduces the field in miniature and reveals the passage of planes on the runways by lights that flash on and off as the aircraft trip the controls. The towermen deliver radio instructions to the pilots in the adjacent air or, awaiting the word to lift their ships, giving permission to land, taxi or take off.

Just as mechanically complex and precise are the individual communications systems of the air

Pneumatic tubes (top) connect the various points of operation of American Airlines around the field. Grease and oil are fire hazards in hangars, so the scrubber (right) has a rather steady job cleaning the concrete floors. The six-wheeled "crash car," below, is always ready for emergencies but has seldom been called into action



lines, which follow the flight captains and co-pilots from one field to another, never letting go until a local airport control takes over at Washington, Chicago, Los Angeles, San Francisco or some other distant terminal. American Airlines centers its communications, largest privately owned system of its kind in the world, at La Guardia Field where more than \$50,000 in radio equipment includes four transmitters in the area ten miles south of the field, and ten receivers on a near-by island.



At the top is an air traveler's first view of La Guardia airport. Below, prospective passengers on Pan American clippers, as they arrange passage, step unawares on a scale built into the floor and a clerk reads their weight on a dial concealed behind the counter. The purpose is to assure proper distribution of the ship's load

K1093

Even before a departing plane is out of sight of the airport, practically every station on the American Airlines routes knows it is in the air. The flagships report at intervals of about half an hour on weather, altitude and position. Teletypewriters criss-cross the nation with messages fixing the positions of flagships in flight.

A novel chart registers American flights scheduled for a given day. Instead of a flat map, the device is a three-dimensional chart of transparent plastic material through which separate vari-colored ribbons follow each scheduled route. At the top it resembles a system map of American Airlines. Down the sides are lettered the hours of the day. Strings, denoting airplanes, are fastened at the top at those points on American's system where planes are based. Red strings indicate twenty-one-passenger DC-3's, blue strings are for Skysleepers, while green  
(Continued on page 128A)

K1438 463 West St. New York City

## Bricks Test Storm Resistance of Phone Wires

To determine how well telephone wires will carry the extra weight of ice during snow and sleet storms, engineers string bricks along experimental open-wire lines at the Bell Laboratories field station in Chester, N. J. It has been found that an accumulation of ice one inch in radial thickness adds about twenty-two ounces to a foot of wire, or 200 pounds on a 150-foot span.



Outdoor laboratory crew hanging bricks on telephone wires in test to ascertain amount of ice the lines can endure in storm

## Vitamin C Locked in Milk by De-aerating

To prevent escape of its vitamin C content, a process of de-aerating pasteurized milk has been developed by three Cornell University professors. Vitamin C in a quart of ordinary pasteurized milk is equal to that contained in the juice of a slice of orange, but by taking air out of the milk it is possible for a quart to retain a vitamin C content equal to the juice of a whole orange. The de-aerating process is not expensive.

newspaper  
Dec 28, 1940

## Bayonets Thrust into Snow Man by Soldiers at Practice



Infantrymen get extra practice by jabbing their bayonets into snow man

Encountering a snow man on the grounds of Fort Dix, N. J., two zealous soldiers attached to company L, 174th infantry, took an opportunity to demonstrate an attack with bayonets. National guardsmen and draftees are receiving army training at the fort.

Garden hose so light that a child can handle it has just been put on the market, a fifty-foot length weighing only eight pounds, including its standard couplings; it carries about seventy per cent as much water as the conventional size.

B. F. Spoor & Co  
Akron Ohio

Charles Battaglia Joseph Duranillo  
130th Para Niagara Falls, NY

K1437

Science Service: Dec 19

### Chain Lifts Loaded Trucks to Top of Steep Incline



Taking it easy up a twenty-degree incline, men let Link-Belt conveyor chain haul load and themselves

Pushing trucks loaded with 500-pound bales of cloth up a thirty-foot slope, formerly done by hand, is now the work of a floor-type conveyor chain installed at a mill in Greenwood, S. C. The bales must be hauled from the ground level to a platform on the floor above where they are placed in motor trucks or freight cars for shipment. Laborers still shove the trucks to and from the conveyor, but are saved the heavy climb. Spaced at suitable intervals in the chain are pusher links that engage the truck axles and the workmen ride along by standing with one foot on the chain. Two truckloads at a time can be handled by the conveyor.

### Core of the Earth May Be Solid Instead of Liquid

Upsetting the widely held belief that the earth's core is liquid, laboratory experiments by Father Joseph Lynch at Fordham University point to the possibility that the center of the earth may be metal in which hydrogen gas has been dissolved. To substantiate the theory, atten-

tion is called to the fact that certain feeble earthquake shocks, called "shear" waves, which could not be transmitted through a liquid, reappear on the opposite face of the globe, although in greatly reduced form, after penetrating the core. This is regarded as evidence that the core has some rigidity and cannot be a liquid. The experimenters were able to reduce the rigidity of palladium by causing it to absorb, or "occlude," hydrogen. It was pointed out that due to the enormous pressures within the earth it would be plausible to imagine a metallic core occluding an amount of hydrogen sufficient to reduce the core's rigidity virtually to zero. While it is presumed that the gas would be hydrogen, the metal could be one of the many known to occlude hydrogen readily.

### Sweeper Cleans Twist Pile Rugs with Moist Powder

Cleaning twist pile rugs has been simplified by the development of a vacuum cleaner attachment that applies and removes a new rug-cleaning powder. The powder comes in moist form and is first sprinkled over the carpet, allowed to stand for one or two hours, and then removed by the vacuum process. The attachment fits one of the standard machines used for cleaning rugs with a liquid compound.



Special vacuum-cleaner attachment spreads and picks up powder used for cleaning twist pile rugs

Link-Belt Co. 307 Michigan Ave. Chicago

Matthews Cotton Mill

New York City

Placer, Reno, W. Va. 557

Director of Seismographic Observatory



K1448.

*Walter L. Martin Co.*

# Bomber Fast as Pursuit Ship Has Gun in Tail

*Baltimore Md*

Reported to have a speed in excess of 400 miles an hour, the Martin B-26, a new army medium bomber, flies faster than most pursuit planes now fighting in Europe. A gunner's turret at the rear improves firing power. Self-sealing fuel tanks and protective armor for vital parts are other features of the plane.



*If its 400-mile-an-hour speed is not enough to outstrip enemy pursuit ships, this Martin medium bomber built for U. S. army can pour bullets rearward from gunner's turret in tail*

*K1331*

*Acme.*

# Bugle Call into Megaphone Gets 'em Up in the Morning



Reveille sounds painfully loud these days to the boys in camp at Fort Jackson, S. C. When the bugler sounds "I can't get 'em up in the morning" he steps to a huge megaphone that blasts his notes throughout the camp. Mess call, he finds, does not require so much artificial amplification.

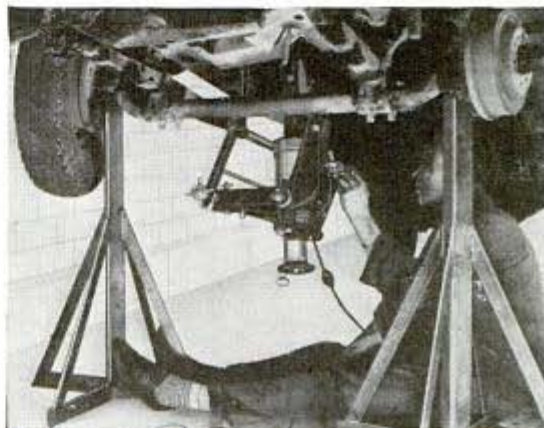
*The bugler at Fort Jackson, S. C., (left) covers plenty of ground with the help of a big megaphone suspended in a frame at his post*

*Club - Jim Fort Jack*

# Portable Crankshaft Grinder Saves Work of Dismantling the Car

*K1449*

Rod or main journals can be ground without removing them from the car by means of a portable crankshaft grinder now on the market. The operator can do precision work from a comfortable position, and the preset grinder will deviate less than one-thousandth of an inch from the setting. Alignment of crankpins with main journal is maintained at all times.



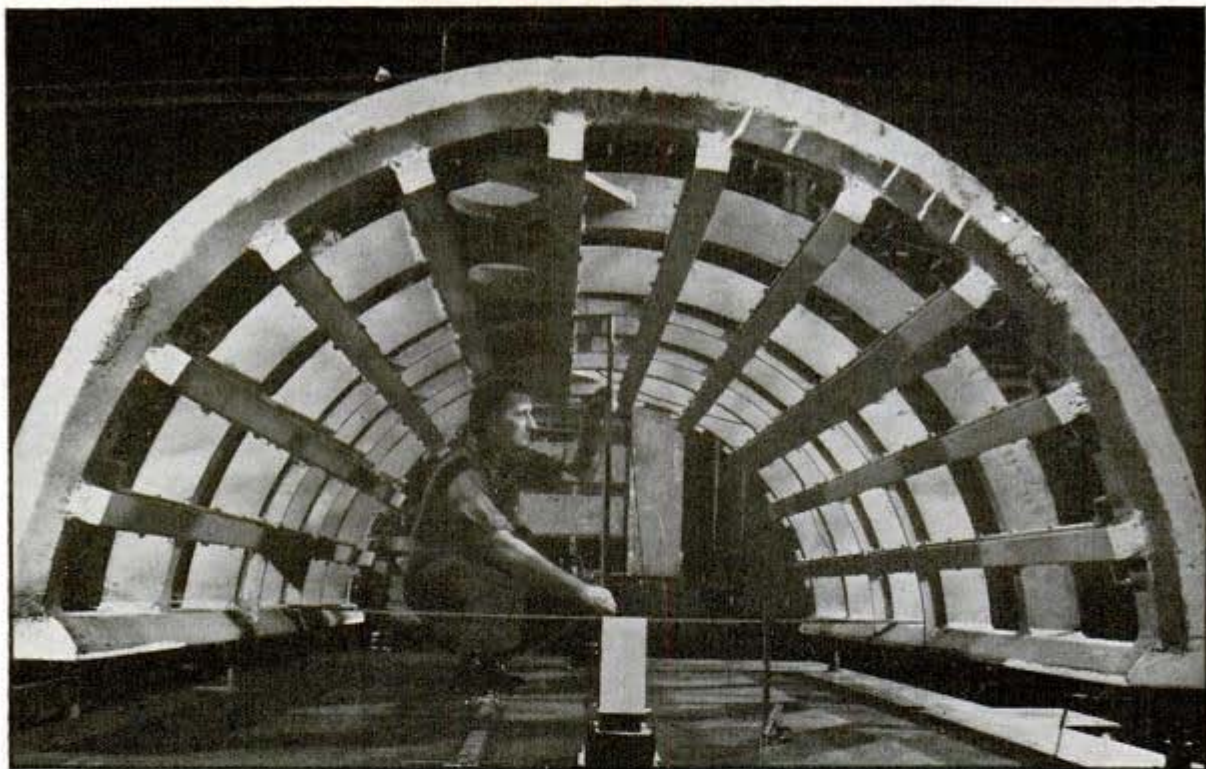
*Seated in a comfortable position under the elevated car, the mechanic performs precision work with the portable crankshaft grinder with the least effort*

*St. Louis, Mo.*

MARCH, 1941

*Sunbeam Products Co. 347  
9904 Manchester Ave*

V. 1138  
Allen Warren Abbott  
343 E 33rd Street  
**UNCLE SAM GETS UP**



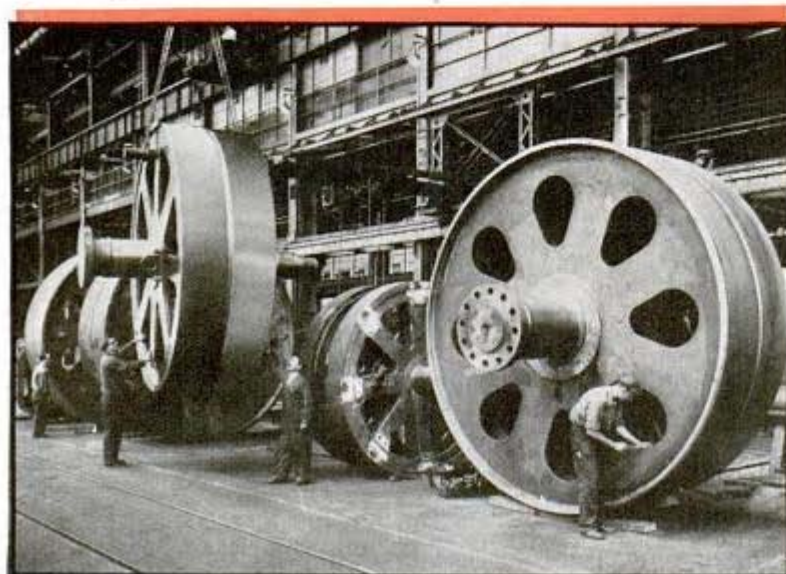
*Exact measurements are taken on layout floor of half of inner frame for hydrogen-cooled turbine generator being built in East Pittsburgh works of Westinghouse company*

**P**ICTURE Uncle Sam as a powerful, sleeping giant suddenly awakened in alarm and thrust into a frantic armament race. Imagine steam as the life-giving bloodstream of this industrial giant. Then the turbine—that revolving, efficient windmill of steam—naturally takes its place in

the defense setup as the indispensable heart of this peaceful giant who has turned warrior.

Today, the whirl of the turbine is the heartbeat of America's defense preparations. Uncle Sam has some 200 newly ordered warships and many auxiliary naval vessels scheduled to be built for \$4,274,437,356. Few of these ships will plunge their sleek bows into green sea until turbines have been installed to furnish the power for propulsion, for gun and turret action, for lights and for a dozen other essential functions.

New naval bases to service and repair these battleships, aircraft car-



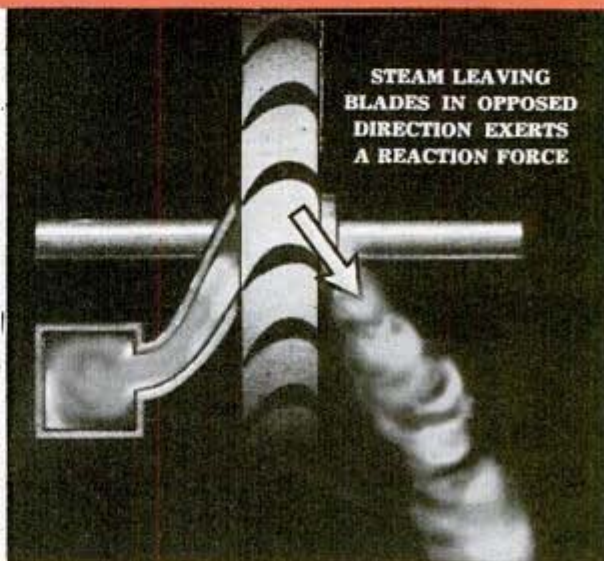
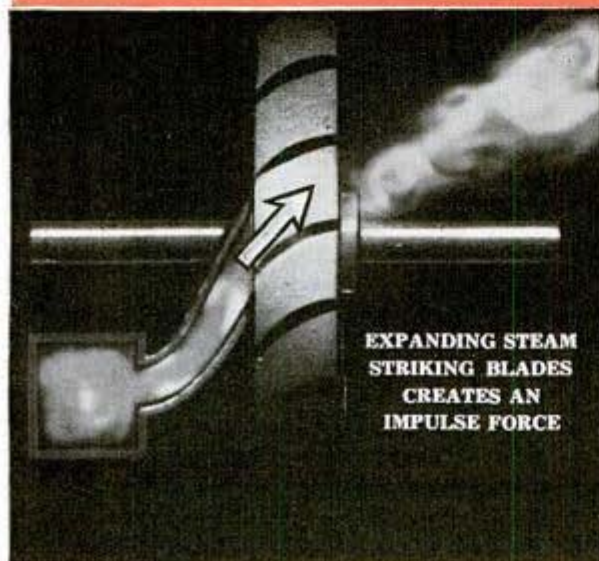
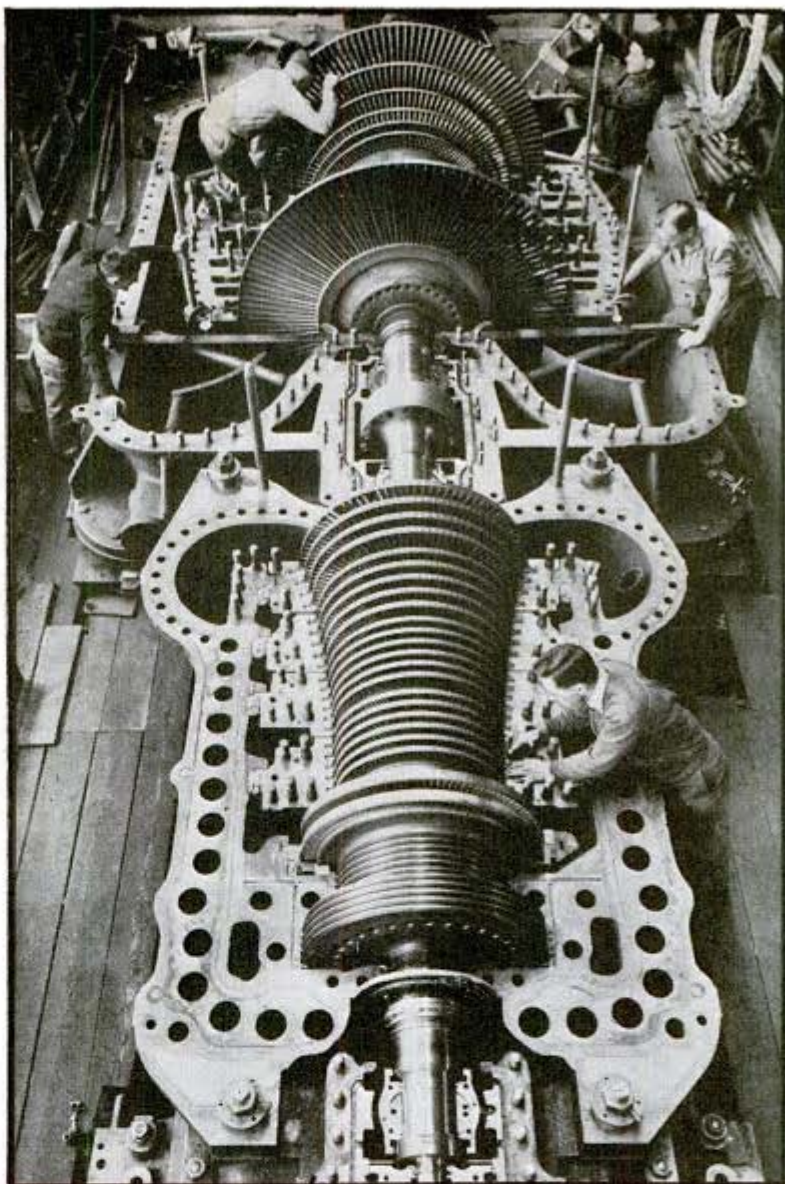
*Large marine reduction gears coming off the line. These link turbines and propellers that drive modern ships*

# STEAM

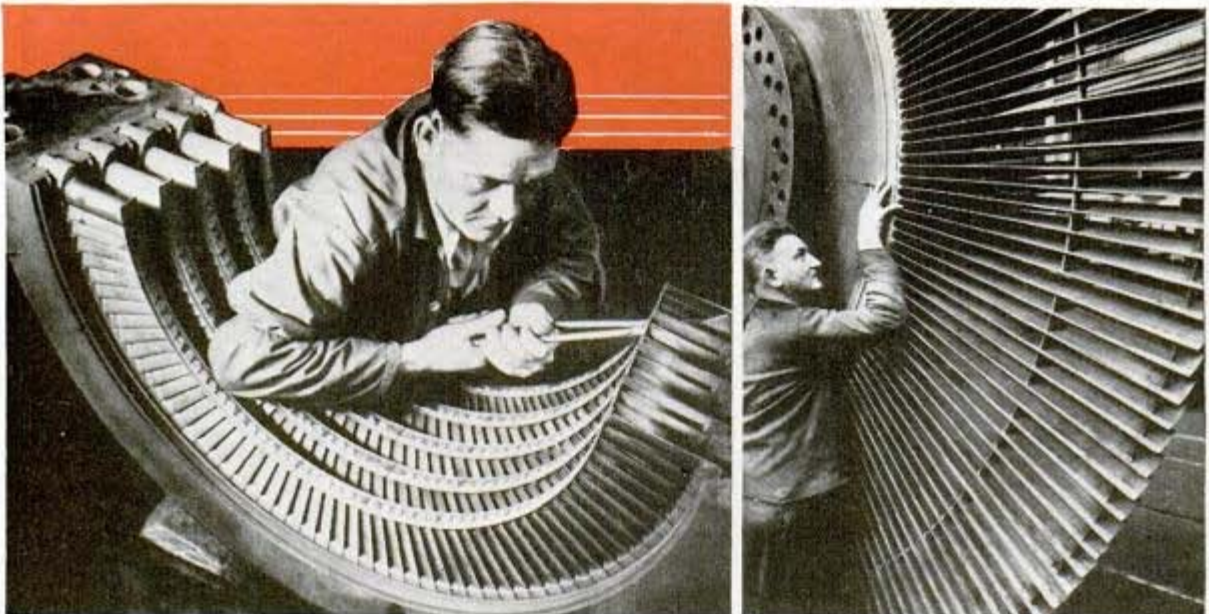
riers, cruisers, destroyers, submarines and lesser vessels are being rushed to completion. In many of these bases, not a lathe will turn or a re-assuring light glow until turbines have been built and installed.

Hundreds of factories are springing up to construct guns, gun carriages, tanks, trucks, powder, chemicals, ammunition, uniforms and scores of other essentials. Those which depend upon their own production of power from coal, oil or gas, and they are many, will be merely useless buildings until the first jets of steam coursing through turbines touch bright, modern machinery with

*Right, overhead view of turbine which will produce 35,000 kilowatts of electricity. Longest blades will rotate at 1,178 feet per second. Bottom, two photo-diagrams show how steam gives turbine blades a push as it enters, then a hick as it leaves in opposed direction*



K1138



*Left, final inspection of high-pressure blade ring. Steam strikes these blades at 500 miles per hour, sometimes more. Right, rotor blades each thirty-eight inches long have tip speed of 1,350 feet per second*

the magic wand of life. Central power stations, even in the biggest cities, have found that the defense program demand for electricity to empower hundreds of small, urban war-material plants, will require more generators and more turbines.

Forced to wait, in many cases, until turbines have been built for purely military ships and plants, are now on order some 340

cargo vessels, totaling more than 1,700,000 tons, a large proportion of which will be propelled by turbines, their rotating action slowed down to efficient speed by ingenious and precise reduction gears.

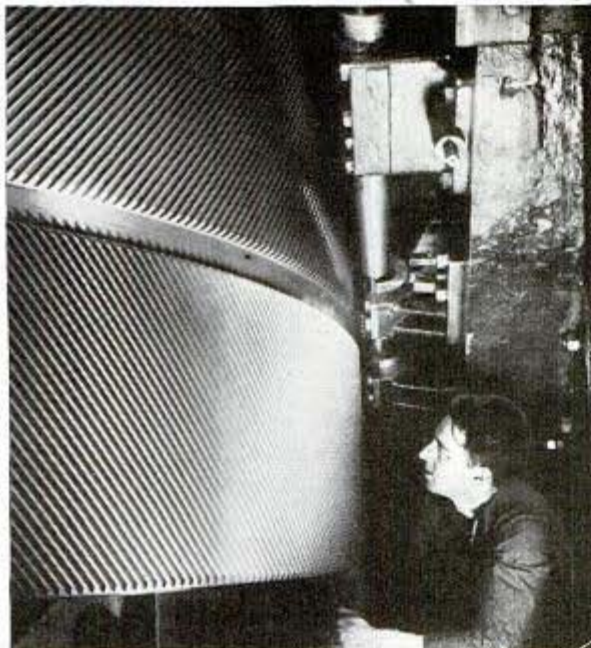
When it is considered that it takes from six to eighteen months to make a large-sized turbine for a warship or manufacturing plant and even two years to produce the largest sizes, the important relationship of this mechanism to national safety is startling. And, since there are only five corporations in the country equipped to manufacture large turbines, the turbine industry is just swinging into a stage of intense activity never before seen. Orders on hand total hundreds of millions of dollars.

Typical is the South Philadelphia turbine plant of the Westinghouse Electric and Manufacturing company where a \$9,500,000 budget is being expended for machine tools and new buildings to take care of \$64,500,000 in orders, including turbines for forty-five battleships, airplane carriers, cruisers and destroyers. A year or so ago this plant was competing for business in a comparatively normal market. Now it has enough turbines on order to tax ordinary capacity for five years. Machinery now ordered will total about 5,000,000 horsepower, of which 3,000,000 will



*Assembling rotor on medium-size vertical waterwheel generator in the Westinghouse East Pittsburgh works*

271038

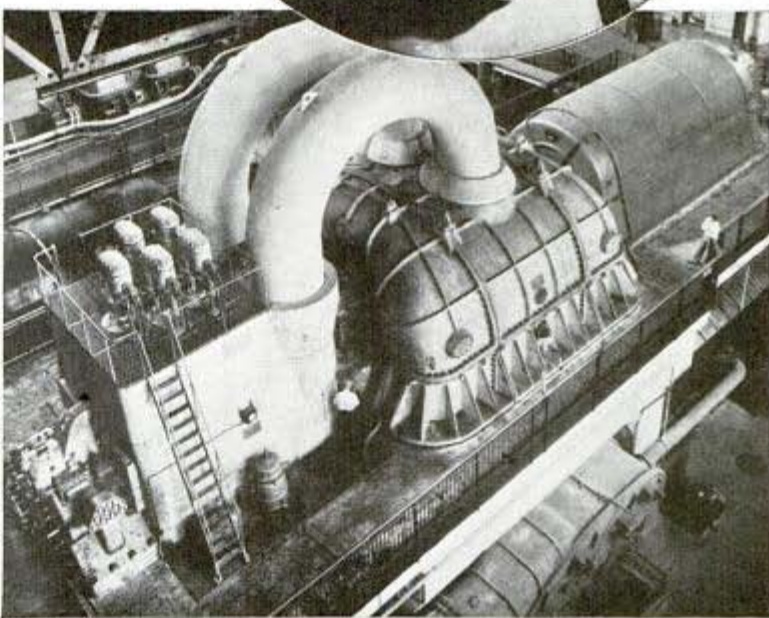


*Above, left, speed-reducing gears essential for harnessing steam power in ships. Right, installing stainless steel reaction blades which will be placed in high-pressure rotor of huge steam turbine. Circle, workman using large wrench on low-pressure section of turbine. Bot. om, gigantic single-shaft turbine which delivers 220,000 horsepower to generator*



drive navy ships. Steam turbines are put together on assembly lines, much like those of the automobile industry, except that placement of turbine parts is infinitely slower. Minutes in the automobile assembly line are more often weeks in the assembly of a giant turbine.

If you were to spend a year in a turbine plant watching these processes while a single great machine came into being, you would first stay weeks in the calculating, drafting and engineering departments in a disconcerting maze of figures on stresses, weights, temperatures, alloys, speeds, friction, clearances, horsepower, endurance and so on. Paradoxically, you soon would learn that the turbine is one of the simplest of mankind's important machine-age inventions in spite of all



(Continued to page 151A)

K1386 Thompson Products, Inc.  
2196 Clarkwood  
Cleveland Ohio

### Light Beams Test Alignment of Automobile Wheels



Testing wheel alignments of the entire car is a task of a few minutes with this three-lens beam system

Light beams are used to test wheel alignment and wear on the front end suspension parts of automobiles in one of the newest tools of the automotive trade. The instrument has three lenses. These flash the front, rear and side measurements on a screen visible to car owner and mechanic.

K1460

### Cradles Park Planes on Noses to Save Space in Hangar

Using wheeled cradles that stack airplanes at an angle, two men devoting only two minutes extra for each plane are able to triple the storage capacity of a hangar. One cradle is placed under each wheel, and



Parking-cradles stand airplane on its nose to save space in hangar. Sponge rubber protects propeller

a special nose cradle, lined with sponge rubber, supports the propeller. Standing on its nose in these cradles, any plane can be wheeled out of line without disturbing others. Eighteen feet of clearance between floor and ceiling is required, but hangars with lower ceiling can save considerable space by using only the wheel cradles.

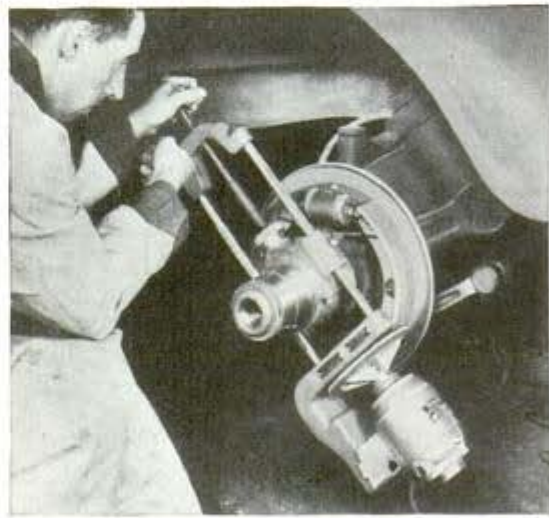
K1496

### Transmutation of Uranium 235 Produces Six Elements

When atoms of uranium U-235 are broken up in the process by which scientists hope to produce atomic power, it has been found they yield six different elements through transmutation. Each atom becomes divided into two pieces, each a different element. The results of this division, or fission, according to determinations of Drs. A. V. Grosse, E. Fermi and H. L. Anderson, of the Columbia University, fall into two groups, one of heavy elements, the other of lighter ones. In the first group are iodine, xenon, cesium, lanthanum and cerium, while in the latter is molybdenum.

K1459

### Grinder 'Breaks In' Brake Lining without Removing Drum



High-speed grinder quickly shapes new brake lining to an even fit without removing drum from car

To eliminate the breaking-in period necessary when new brake lining is installed in a car, a portable grinder that plugs into an electrical outlet shaves the lining while the brake drum is on the car. Designed to operate on any truck or car, the high-speed tool grinds the lining so shoes become concentric with the brake drums.

Route 1 we inces

Wynley Access Corp  
Manchester N.Y.

See 2  
Queneo & Luce

Budford Ohio

Leimpro Products, Inc.  
Lunham Road

# Midget Machines Aid in Fighting Forest Fires

Western. Western  
Auston. Western  
Pesa machinery Co  
Auston  
d.c.



Trailmaker, above, breaks path for baby trailmobile shown at top, left. Bottom, latter machine carries gasoline to run vehicles and fire-fighting apparatus



When a fire occurs in remote sections of Siskiyou National Forest, Ore., the rangers push through brush and trees, impenetrable to heavy loads, with toylike trucks of their own making. Two machines constitute a complete unit. One is known as the

baby trailmaker, and the other, the trailmobile, is a midget truck which tows one or two small trailers packed with fire-fighting equipment. The trailmaker runs ahead, building a trail for the trailmobile at the rate of three to five miles per hour. A straight blade serves as plow and grader, making cuts into upper slopes of hills and filling in the lower slopes in a single maneuver. Thus it roughs out a level "road" four feet wide, enabling the trailmobile to haul its load of supplies and provisions to the scene of the fire. The Lilliputian machines have four-cylinder engines.

Suggested trail holder -

Emb. Randolph Robertson 76 30  
New Hampshire Ave. N.W. Wash. D.C.

## Outline of Monocle in Lady's Veil Makes Latest Fashion

Veils having heavily rimmed peepholes at one eye are being offered as one of the latest fads for women. It produces the effect of wearing a monocle.



"Monocle" veil for women is one of the latest fads

## Man's Most Accurate "Yardstick" Is Light Ray of Mercury

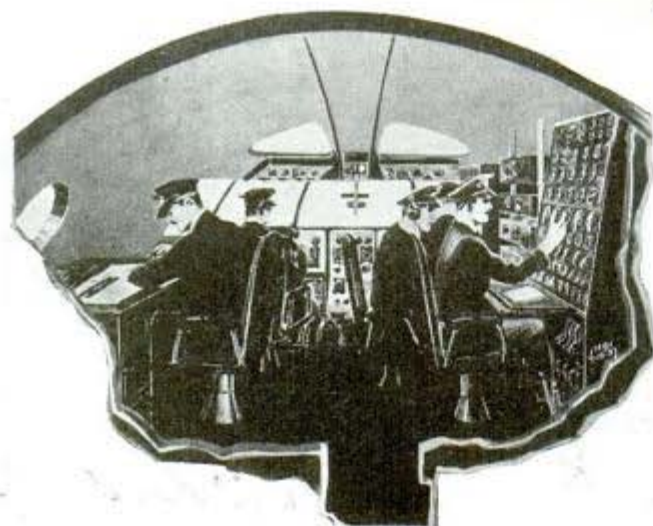
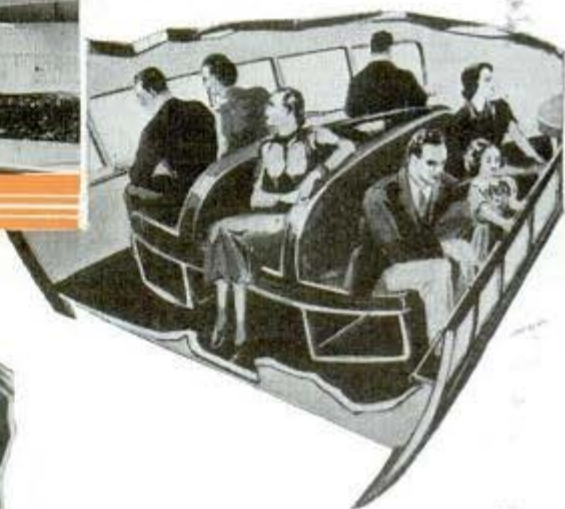
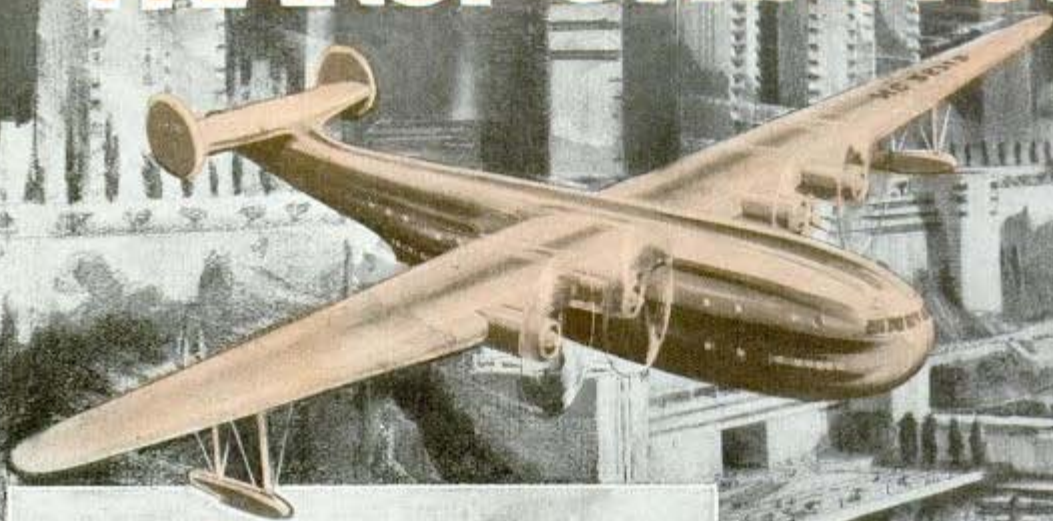
In the light ray from man-made mercury, science has found a "yardstick" of unbelievable accuracy which may become a new standard for measurement of length. Its wave length does not vary more than one fifty-billionth of an inch, a far more precise and reliable standard than the wave length of cadmium, now used by scientists. The new ray comes from mercury made from gold, in the University of California cyclotron, its atoms of equal weight.

Designed by Helen  
Lubert, 19 W. 59th St.  
New York

Designed by Helen  
Lubert, 19 W. 59th St.  
New York

Jacob Weiss  
and Mr. Luis Alvarez

# TRANSPORTATION



Top, drawing of "flying hotel" which might be plying the stratosphere if war had not delayed plans of the Glenn L. Martin Company, its designers. Center, left, design for big-city seaplane base created by the Austin Company. Right, drawing of observation room in "flying hotel." Bottom, drawing of same plane's control deck



K1252 Cont. Allen Warren Elliott  
343 E 33rd. New York.



Above, Hudson River skyline of New York City of the future, as Dr. C. V. Paterno sees it. Note autogiros. Right, the author's design for twin-stack liner in which space between funnels would be used for night club

By Otto Kuhler, 136 Liberty St  
Consulting Designer on Transportation  
New York City

CIVILIZATION has stood aghast at the role the airplane has played in altering the map of the world and changing the skylines of bombed cities scattered all the way from Europe to the Orient.

Before many years, when the world has had a chance to bind its war wounds and turn its attention to the improvement of what is left of civilization, the impact of the airplane on other forms of transportation is likely to be as awe-inspiring as those first mass-bombing attacks on the great city of London.

In fact, there is plenty of rational evidence that the railroad train, the ocean liner, the motorbus and the streetcar will be quite different from the mass transportation vehicles we now see on land, in water and in air. Modern industrial design is

very strongly functional. And as each of these vehicles is forced to change its purposes by pressure of competition from the airplane, it will change its form.

The airplane of the future, on the other hand, is very likely to retain its general lines as we know them, because, as the submarine is shaped somewhat like a fish, the plane is a rough copy of one of nature's most efficient inventions, the bird.

The long-distance air liners of the future, however, will be veritable flying hotels, so great that one of them could enfold the army's new 164,000-pound bomber under a wing like a hen nestling a chick. Only the power problem—the ratio between weight and the propulsion output of the relatively inefficient gasoline and Diesel motor—limits the size of aircraft today.

Developed by Electric Service Supply Co. Philadelphia, Pa.

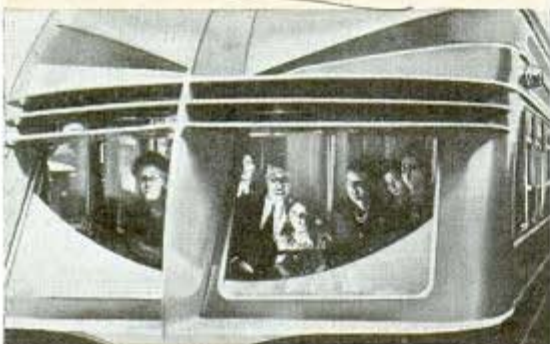
K 1257



Above, students and instructor at Pratt Institute building a model airport of the future in which wide-flung runways are condensed into small area by unique design. Left, double-end rail car which the author predicts forecasts double-end multi-car reversible train of the future



Station stops in Philadelphia's subway coaches are announced by automatic electrical device



Like something right out of the future is this rear-end view of the Milwaukee Road's Hiawatha train with rear-vision car, shadow aprons and fins for additional structural strength

During the various stages of progress the motive power of the plane may be the turbine using steam or mercury vapor or the rocketlike blast of exploding vapor created by the combinations of yet undiscovered chemicals. These power devices are probably destined to prove make-shifts, however, and the plane of the future is likely to be propelled by one, or all of three scientifically feasible methods.

One may be the sunplane, the most notable feature of which will be its enormously widespread wings, the surface of which will be treated so as to capture the power of the sun's rays and turn this energy into enough force to lift and drive the craft. These will need auxiliary power for cloudy days unless a new method of storing energy is discovered. Scientists of today are already moving little machines with this same sun power, so the sunplane is not at all unlikely to develop.

The second will possibly be the beam-

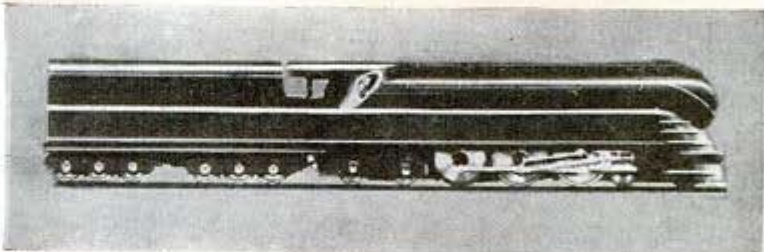
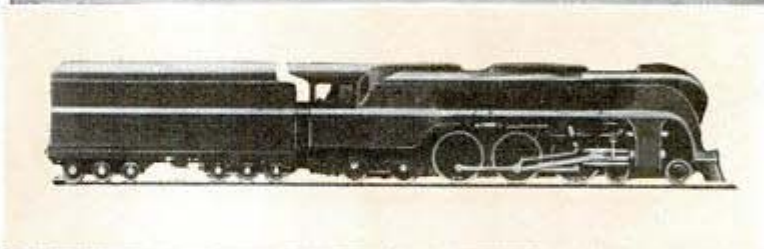
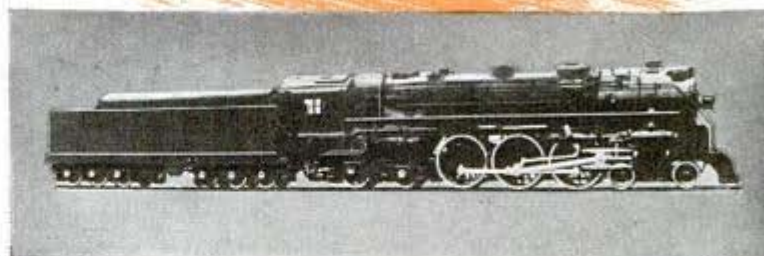
R 125.2

plane which will take its power from radio stations, just as airplanes of today are taking directional signals on beams from airport radio stations. Research engineers are already broadcasting power through the air and are lighting lamp bulbs with this unhooked energy. You may be able to get into your plane in Chicago, tune in for New York and "click" off you go.

The third likelihood is the magnetic plane which will sustain its flight by establishing its own magnetic field of sufficient strength to overcome the force of gravity and which will be propelled by the counter forces of attraction from one magnetic current to another, much as the glider of today uses air currents. Ships plying the ocean right now are setting up their own magnetic fields to offset the fatal attraction they hold for magnetic mines.

Whether turbine, rocket, sunplane, beamplane or magnetic plane, all of them are almost certain to take advantage of the greatest moving force that exists in our nook of the universe—the revolving action of the earth itself. It is pretty safe to predict that airplanes of the future will rise so high in the stratosphere that they will be able to overcome gravity and stand still in the great silent reaches of the sky and let the ground far below them fly past at a rate of more than one thousand miles an hour.

Just as the utter necessity for streamlining airplanes has already taught the builders of railroad equipment, ships, motorbuses, streetcars and automobiles the advantages of cutting air resistance and



Top, Rock Island Railroad's Rocky Mountain Rocket, constructed by American Locomotive Company, has locomotive streamlined by the author. Next four illustrations, reading down, show evolution of modern streamline in steam locomotive, with last one a glimpse of the future

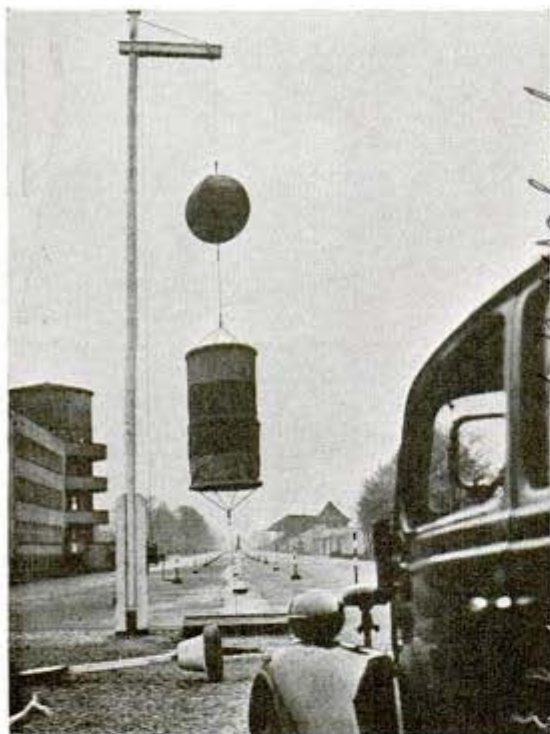
thus changed the shape of these vehicles in the past ten years, so will the giants of the air keep forcing more changes.

Flying freight trains of five and six planes of the autogiro or helicopter type

(Continued to page 144A)

K1387

# Air-Raid Signal on Highway Warns of Danger

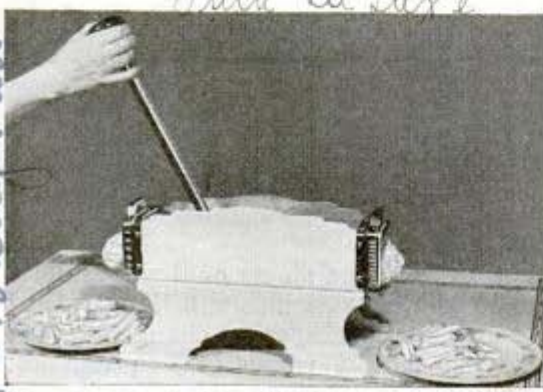


Display of this sign on German highway means an air raid is in progress and warns motorists of the danger

Yellow and blue signs are being raised along German highways in these days of war to warn drivers that air raids are in progress. Poles are set up near service stations where attendants can lift the signals when bombers approach.

## Double-Quick Vegetable Cutter Slices Up "French Fries"

Operated by a hand lever thrown to left and right, a vegetable cutter slices potatoes



Thrusting lever back and forth forces potato through slicers at ends in proper sizes for French frying

*Van Dengerke  
Antoine, 23 S Wabash  
Chicago  
K1468*

## Ice Package for Picnic Basket Keeps Food Cool

Food and beverages packed in a basket for a summer outing can be kept cool and refreshing several hours with a freezing unit now on the market. A special preparation sealed within a metal container freezes solid when placed in the refrigerator for a short period, and several frozen cans may be used in a large basket.

## Sander for Curved Surfaces Also Drills, Mixes Paint

Many a sanding, polishing and drilling job in industry or in the home workshop can be handled by a versatile electric unit just introduced. It is a combination tool



Upper picture shows the tool used as a drill; below, its flexible disk sands a curved surface

weighing five pounds ten ounces, light enough for easy handling. Its flexible-rubber sanding disk can be used on curved surfaces. Various brushes and buffing pads are available, and the machine is also furnished with a chuck accommodating drills up to one-fourth inch. Another attachment is a paint mixer. The disk has a speed of 1,000 revolutions per minute.

*C. J. Williamson Mfg Co  
52-72 B adler ave Newark, N.J.  
K1275*

*Wabash*

*Speedy Sander  
S. W. Clark  
American  
600*

*Dist. J. J. Leadstone  
14th floor. Merchants  
market*

KL 271. *Ameyars* *Chas. Eschelby* *Frage*  
*Biltmore Hotel, Los Angeles* *Daniel*

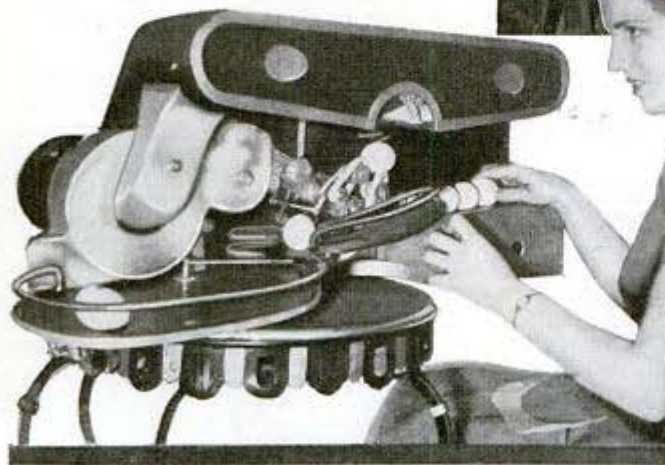
**Inventors Exhibit Beauty Aids and Mousetraps**

*Frage Daniel* *Bessie, Winter*



*Frank ...*  
 1212 Wilshire LA

Since a better mousetrap is certain to set the world beating a path to the inventor's door, no convention of inventors is quite complete without a new mousetrap on exhibit. So it turned out at a recent congress of American inventors; but the gamut of their latest "brain children" was wide, and many of the inventions were aids to feminine beauty and health. Above, for example, is an electrified compact; an electric bulb powered by a "fountain-pen" battery lights the face when the compact is opened



The helmet at upper right is no gas mask but a "glamour bonnet" for beauty parlors. The machine creates a vacuum in the bonnet and thus, says the inventor, circulation in the skin is increased and complexion improved. Below, at left, is the latest egg cleaner; eggs are carried on a high-speed endless conveyor belt of sandpaper and cleaned by friction. At right, the electric mousetrap. When the mouse enters the runway two metal pincers grip its neck and administer an 8,000-volt shock for fifteen seconds, then drop the mouse through a trap door

*Clara ...*  
*Richard ...*  
*942 W. 35th St. Pacifico, Calif.*

*Edw. C. Jordan*  
 559 W. Colorado  
 Glendale, Calif.

# KEEPING AHEAD of the

*Water Curtain.  
Lodd and Burroughs, Inc.  
Hire Sale Term*



At left, nailing on strips of "tiles" which resemble ceramic tiles and help fireproof the home. Right, curtain of water flowing down roof furnishes cool shade. Below, pumping dry mineral wool into attic for insulation—result, a cooler house in summer, warmer in winter

ONE sure sign of spring is that annual urge to "do something" about the house and furniture.

Perhaps it's because we stay at home more in the cold season and get a bit tired of looking at the same walls, floors and furnishings. Whatever the reason, the recent growing demand for change in the home has stimulated the invention and manufacture of more and different furnishings, gadgets and building materials than ever. Hundreds of these innovations will be found in your favorite department store, furniture showroom or building supply house this spring with possibly one exception, and this exception is likely to produce the greatest change of all in the home when it is ready for market.

The research experts of one of the greatest electrical corporations in the world are perfecting a newly patented method of turning glass bricks, such as home owners

are now installing as walls for brightening up hallways and foyers, into electric lights.

The use of spot illumination by electric bulbs will start to vanish from the modern homes. The very walls which make interior lighting necessary will provide it. In



*General Electric & Nela Park, Cleveland Ohio*

*Mr. Allen Warren Elliott  
343 3rd St. N. Wash. D.C.*

*29163*

*H.W. Johns. Manville Co. 228 40th St. New York*

# JONESES



Sliding panel in lower sash (above) permits washing entire window from inside. Right, glass walls brighten the hall; below, circular parchment disk reflects light from bulbs in base of lamp

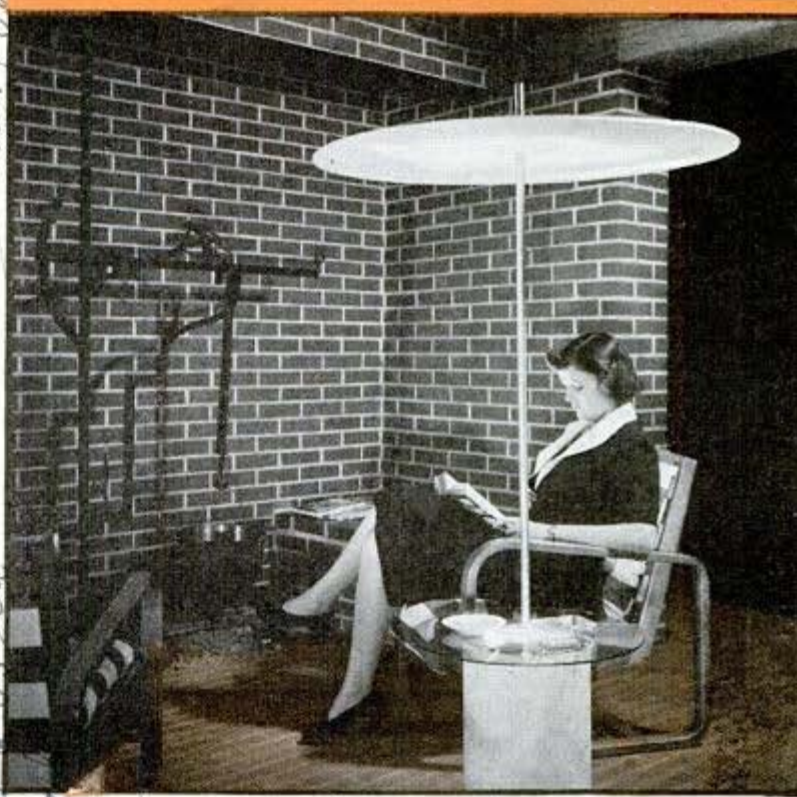
daytime by glass walls admitting sunrays. At night by the flip of a switch lighting up walls themselves.

Illumination may be made dim or bright, as desired. Pleasing combinations of soft colors may be made at will.

The glass bricks will be hollow with the air pumped out and an ionizable gas such as neon, argon, xenon or mercury vapor substituted at low pressure. Thin metal plates will be imbedded in the mortar to serve as electrodes. Fluorescent paint in the mortar or on the surface of the glass will give a luminous glow and diffuse the lights throughout the wall.

Ultraviolet lights will turn any room into a health-giving solarium and the home can be made germproof by rays already used for the purpose.

The use of luminescent material in carpets and floor paints, already on the market, will permit the floors themselves to help light the room,



Designed by  
Allison Hardyce

*Young Tomorrow*  
*New York World*  
*Window Co. 220*  
*W-42 may*  
*11/63*

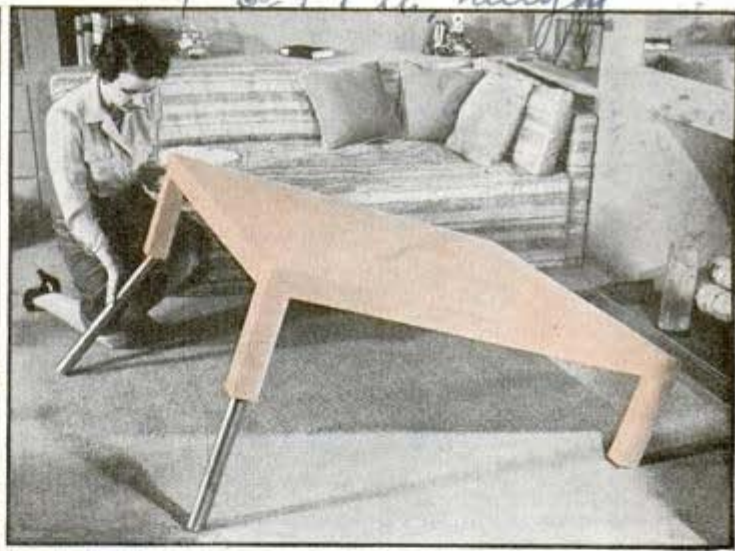
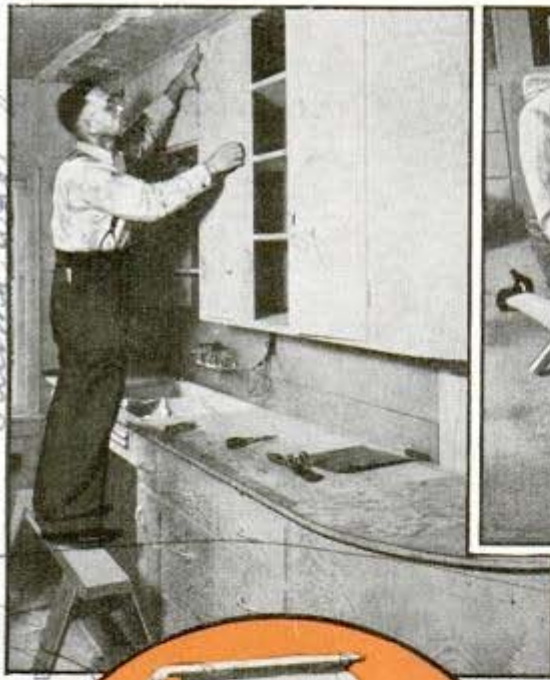
*Safe & Co.*  
*12, 3 & 55 St.*  
*New York City*

*Pittsburgh Plate*  
*Glass Co.*  
*2222 Grant*  
*Blade*  
*Pittsburgh*

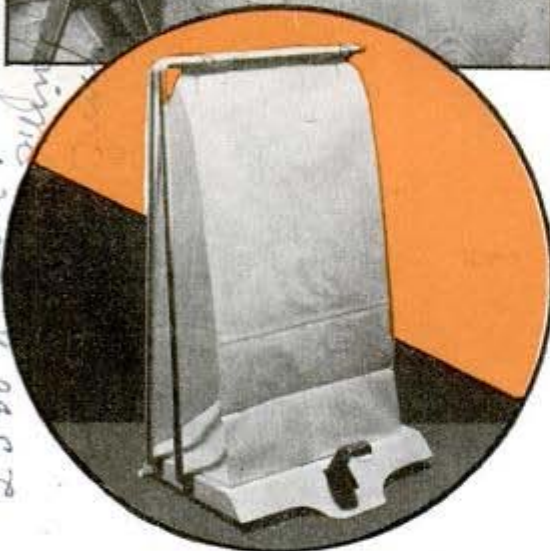
Table Virginia Cennell, Inc  
119 E 44 St. New York

1163

Langley Fir Plywood  
A. King, Tacoma, Wash.



Upper left, modernizing kitchen with plywood bonded with plastic-impregnated paper, stronger than natural wood. Right, raising coffee table to dinner-table height by inserting brass rods in legs. Below, stepping on pedal opens disposable garbage sack



Edwards mfg. Co  
2330 N. 2nd St. Dayton, Ohio

vored for permanent wall fixtures, will appear this spring in a great variety of portable lamps.

Making attics into bedrooms, and cellars into playrooms will get a new impetus from manufacturers of wallboards. These materials now not only come in curved surfaces, making rounded corners and artistic niches simple, but in reversible color combinations with different hues on each side and the color material built in, not painted on. Surface problems of wallboards have been solved so they will take wallpaper, paint, calcimine or enamel. Gypsum layers make some fireproof. Plywood, now bound together with plastics, is stronger than natural wood, and the finishes are more uniform.

cutting current costs. Ceilings, pictures and even furniture can be made to glow.

The window, as we know it, will no longer be necessary, since its principal functions, supplying light and air, can be supplanted by the new glass bricks and air-conditioning equipment.

Another revolutionary illumination control device, so small it can be hidden away under a couch or on a shelf, will be on the market this spring. Using the photoelectric cell, it turns on the lights in dark hallways, staircase wells and corners as evening shadows fall, and turns them off again early in the morning. Circuits can be so arranged that lights on the dark side of the room will flash on at dusk and those near windows will remain off.

Automobile slip-cover material is being applied like wallpaper or with zippers or buttons, on living and bedroom walls, because of durability and the pleasing effects of the fine, woven stripes. Leather is finding favor as wall covering in better-class homes, particularly in libraries, where it harmonizes with bookbindings, and in powder rooms, where it gives the whole room the effect of a cosmetics case. Cork layers on the walls and floors of children's playrooms deaden noise and lessen the danger of a hard bump from a fall.

Folding walls are being used to cut portions of living rooms with kitchenettes, bedrooms with studio couches, and alcoves. Some of these extending walls are masked

Eveready Electric Co  
W. Chicago, Ill.

Certain Seed Product Co  
101 E. 41 St. New York City



K 1163, Cork Insulation Co  
 Commerce Bldg  
 New York City



Lower section of playroom wall and floor (above) is of compressed cork; toy shelf forms ladder to upper bed. Upper right, modern end table used as typing desk; circle, stirring and mixing foods while cooking; bottom, "jib window" forms door to terrace

with heavy textile material when pulled out. When pushed in, the concealing cloth looks like drapes.

One recently designed living room has a nicely finished, glass-paneled wall which turns out to be a garage door. When a button is pressed, the door slowly rises and vanishes into the ceiling and the family can walk right into the garage, get into the car and drive off.

Windows are being converted into doors by replacing the wall below them with two sections on hinges. A sawed-down door can be used. This gives the family a new, around-the-corner entrance and exit to porch or terrace. When the hinged section is closed the window is still a window. It's called a "jib window."

Slanted glass roofs are being installed on porches, and curtains of running water are permitted to flow across, shading and cooling the porches while providing a restful atmosphere. The water is collected in drains at the roof's edge and pumped back to the highest point to flow down again.

Wall switchplates have not only blossomed out in hundreds of hues to match wall finishes, but they come with a variety of outlets for radio power, ground and antenna connections as well as lamps in the same plate. A tiny masked lamp may be thrust into a switch plug, faintly lighting the floor of a hallway.

Two new window devices make washing easy. In one, the window is divided into

(Continued to page 139A)



Edwin Eugene Charles  
 H 20  
 Lehigh University  
 Bethlehem

Drawings made by  
 James O'Connor Architects  
 162 E 37 St  
 New York

K1406

# Long Coil Spring of Plastic Shows Strength, Flexibility

Darius & Vivian Kimbler  
Chemical Co. Midland, Mich.



This "necklace" is made of transparent Styron, a plastic finding many uses in modern industry

As a demonstration of the flexibility and strength of Styron, a new plastic, a model draped around her shoulders a long coil of the transparent material, as if it were a gigantic necklace. The plastic is used in airplanes and automobiles, jewelry, bottle caps, combs and a host of other articles.

K1455

# Fats Can Help Win or Lose War in Besieged Country

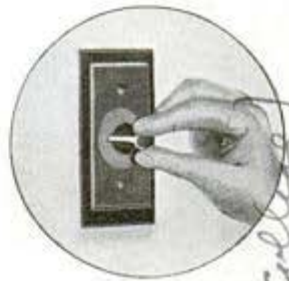
Lack of butter may become as vital as the lack of guns in determining the outcome of the present war. Without some fats in their food, people lose weight as well as morale, since fats digest slowly and have "staying" quality, while a meal without fats digests quickly and soon hunger contractions start—and hungry masses repeatedly have started revolutions. In Germany and German-dominated countries, oil-yielding plants such as poppies and flax are cultivated in an attempt to replace some of the oils formerly imported. An-

Commonwealth Edison Co. 72 W Adams

other problem that becomes acute with dwindling oil and fat supplies is that of soap, an important defense against dirt and the danger of germ-borne epidemics. Fats also are needed for making explosives.

# Three-Way Switch on the Wall Controls Intensity of Light

Three-intensity light fixtures mounted on the ceiling or anywhere in the room can now be controlled conveniently by a wall switch. By simply turning the indicator on the switch, the lamp is changed to soft, medium or brilliant light as desired.



K1364

# Ultraviolet Intensity Measured by "Sun-Tan" Ray Meter



Intensity of ultraviolet radiation from the sun or a "sun lamp" is measured by this new meter

Intensity of ultraviolet radiation is measured by a device invented by a Northwestern University professor with the cooperation of the United States Bureau of Standards. The meter not only facilitates the avoidance of an overdose of sunshine or sun-lamp exposure, but is useful commercially in measuring irradiation of food and gauging of germicidal lamp intensity.

Prof. Cashman

Margaret Kelly, Raymeter, 711 West 11th St. Washington

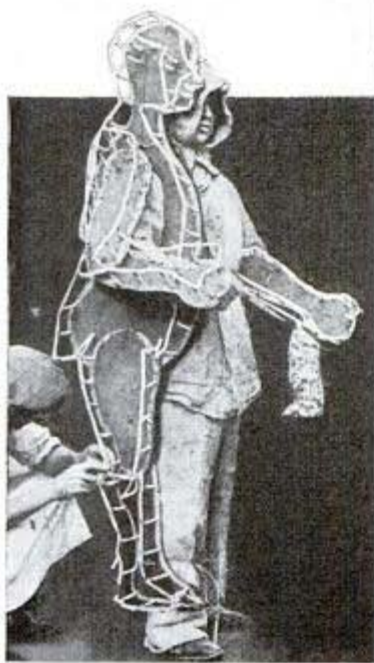
# Odd Togs Seen at Odd Jobs of War and Work



Military dress has changed quite a bit since the days of the British redcoats, whose scarlet uniforms were handsome on parade and impressed the enemy, but also offered perfect targets. The British soldier above is a sentry of a decontamination squad; gas has not yet been used in the current war, but he's ready for it, and the paper stuck on his bayonet point is chemically treated so that it will change color if gas is present



The "uniforms" of industry, like those of war, are functional. One odd example is the hop-field worker of England, seen above at his job of putting up strings on which hop vines grow. He walks on high stilts and wears square-toed clogs with wooden soles



That grotesque individual in the left-hand corner has the unenviable duty of providing animation for a moving fireworks display—in this case a boxing match. He carries the fireworks on a wooden frame and wears an asbestos suit for his health. In the center is a sand blaster, wearing the special headdress of his trade to keep sand out of his lungs and supply fresh air



R 1250

Capt. Randolph Roberts  
4630 New Hampshire Av. N.W.

# STOPPING BUGS

Feb. 2, Washington  
20 c.

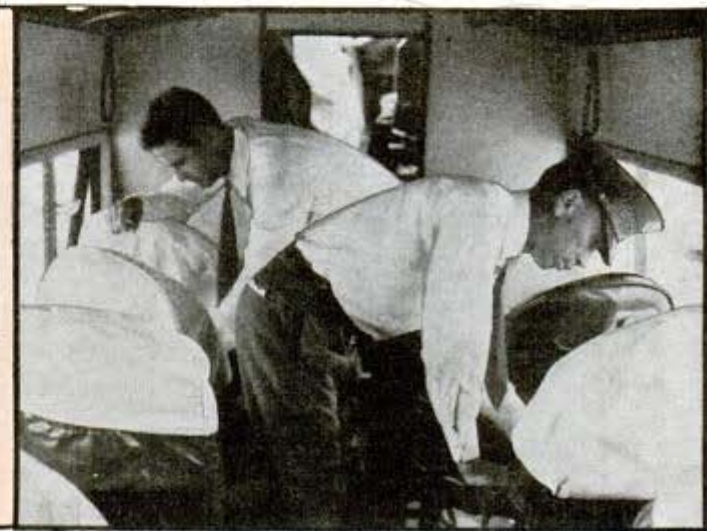


WHILE a federal inspector was checking the Mexican air express at Brownsville, Tex., recently, he noticed a small sack containing what looked like bean pods. It was addressed to a person in East Africa, but since it was not in bond, the officer examined its contents. One look revealed a veritable Pandora's box of bugs, five different kinds of destructive insects, not one of which had ever been found in this country. Altogether forty-one bugs and larvae were found.

The bag of infested beans was destroyed. If the bugs had escaped while passing through this country, the damage might have been enormous because the insects held the threat of destroying three to five of our major fruit and vegetable industries. Small wonder that all plants or plant materials capable of introducing a new insect pest or plant disease are excluded from the United States unless they can be made safe by certain treatments such as fumigation.

It has been estimated by J. A. Hyslop, Federal Bureau of Entomology and Plant

Wahaben Inspector Chamber



Top, Puerto Rican yam dressed as a doll was detected by sharp-eyed inspector. Below, workman in gas mask removing plants from fumigating chamber. Right, plane being inspected to prevent entry of alien bugs

# at OUR BORDERS



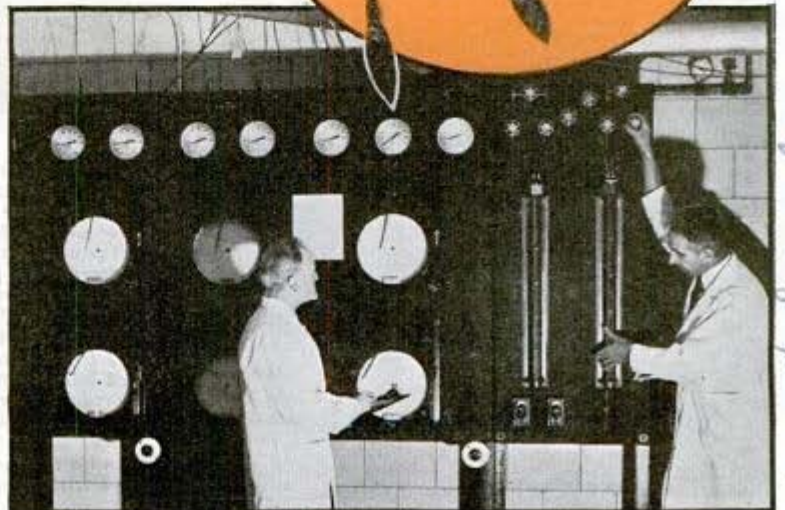
Above, fumigating cotton at San Francisco. Right, magnified view of white fringed beetle, an alien newcomer which destroyed up to thirty per cent of the potato crop in certain parts of Mississippi recently. Bottom, operating controls of fumigating chamber



*Washington, D.C.*  
 Quarantine that alien insects cause an annual loss of over 300 million dollars in damage to our fruit and vegetable crops. To halt invader bugs, the Federal Foreign Plant Quarantine Service maintains at every important port of entry, including railroad yards, seaports and airports, a staff of trained inspectors who examine all plant material likely to bring in bug enemies from foreign lands. There are official records of 20,000 of these. If even one is found, the shipment is fumigated, promptly returned to point of origin, or destroyed.

In this vital work, over 300,000 interceptions of insect pests have been made—any one of which,

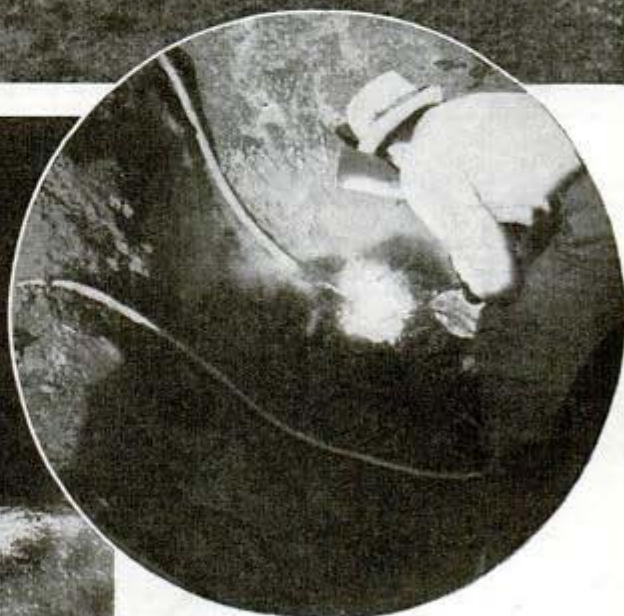
(Continued to page 124A)



*Bureau of Entomology*

K1369  
**Flaming Oil Lines in the Desert Saved by Sand**

Capt. Rene W.P. Leonhardt, 122 E 42 nd. head



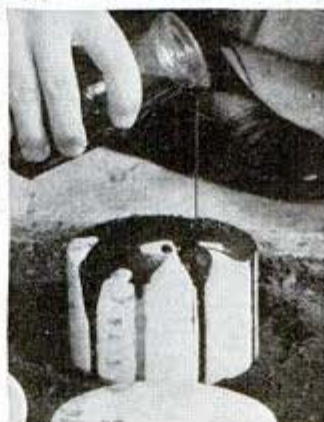
Saboteurs are striking constantly at Britain's vital pipe line that carries 30,000,000 barrels of oil a year from the Iraq fields to the Mediterranean. Buried only three feet deep in soil, it is easily vulnerable to attack and cannot be guarded by ground forces across hundreds of miles of desert. Royal Air Force pilots keep a steady patrol, and once a fire on the line is spotted by the fountain of flame and billows of black smoke—two such scenes are shown at left—word is flashed to headquarters and repair crews are flown to the scene within an hour. Sand is shoveled onto the break to stifle the flames (top), telephone service is restored, and a welder repairs the pipe (circle, above). Usually repairs are complete in five hours

K1380

Instructor Keith  
Martin

## Models Aid Study of Camouflage Problems

Seeking solutions to some of the problems involved in making factories and storage tanks invisible from the air in wartime, a class in Kansas City's art institute builds its own experimental models. Students erect plaster miniatures and then attempt to conceal them under various types of covering. Photographs made from several angles and under different lighting conditions indicate which coverings are most effective.



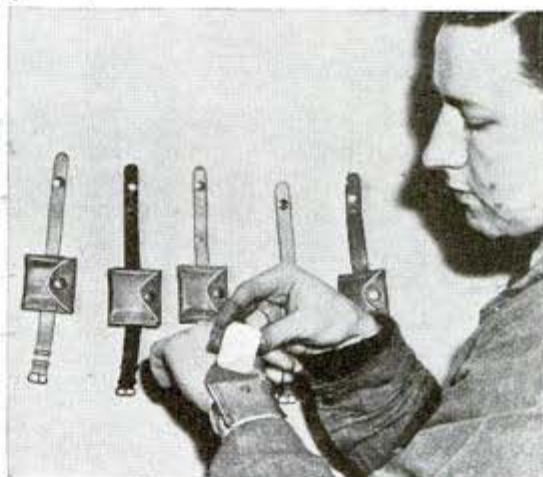
*Acme*

Above, preparing to photograph model of oil tank farm which has been partly obscured by covering some of the structures. Bottom, left, camouflaged tanks are barely visible in contrast to glaring white of untouched plaster models; right, pouring mixture of used crankcase oil and dirt on one of the tiny tanks

## "Wrist Watch" Warns Workers of Exposure to X-Rays

Research men working in the X-ray laboratories of the General Electric plant at Schenectady wear "wrist watches" that warn them when they are exposed to X-rays. Strapped to the wrist is a leather case containing a small piece of unexposed X-ray film. This is worn all day in the laboratory, and when developed it shows, by black spots on the film, any scattered X-rays to which the worker has been exposed. Thus he can guard against any overdose of the rays which might be injurious over a period of time.

*The worker at right is slipping unexposed X-ray film into the leather case to be worn on his wrist during laboratory work*



MARCH, 1941

Wedge World

369

K1329  
**Snowplow Runs for Hours  
 on Gallon of Gasoline**



*Price - \$40.00.*  
 Operator simply guides this snowplow, since a one-cylinder engine supplies the power to push it

All the heavy work of removing snow from the sidewalk is performed by a one-cylinder engine that powers the rubber-tired wheels of a snowplow now on the market. The operator walks, guiding it by handle bars. The plow runs four and one-half hours on a gallon of gasoline.

K1417  
**Holder Serves Lighted Cigarette  
 Each Time Lid Is Opened**

Operating on house current, a cigarette case lights the cigarette before you pick it



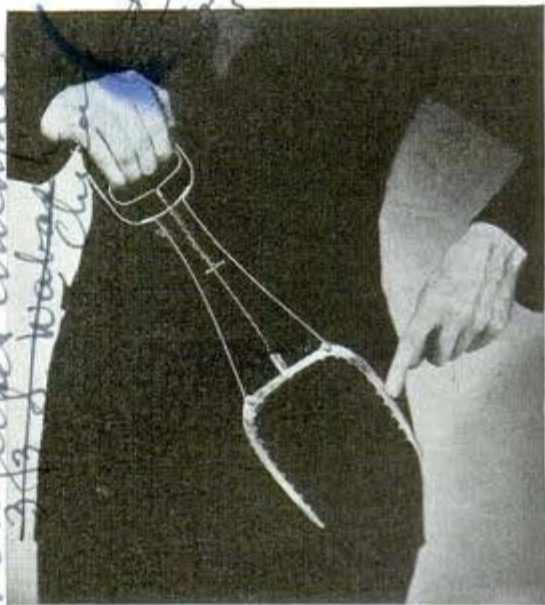
You can help yourself to a freshly lighted cigarette from plug-in holder which works automatically

up or offer it to a guest. The lighting unit goes to work automatically as soon as the cover is lifted. Holders are available for use in the home or office, and for attachment to the steering post of the automobile.

K1414  
**Secret of Low-Cost Liquid Helium  
 Found through "Lost" Sketch**

Using a recently discovered rough drawing which was made by Peter Kapitza, a scientist who has not been heard from since returning to Russia in 1935, Prof. Cecil T. Lane of Yale University has built a machine that produces liquid helium cheaply and quickly. By the new method a quart of the liquid is manufactured in about two hours at a cost of only five dollars, whereas the same amount heretofore has required twenty-four hours and cost fifty dollars. Professor Lane is using liquid helium in research to find a means of transmitting electrical energy without loss.

K1398  
**One-Hand Gaff Easy to Operate  
 Grips Large or Small Fish**



Gaff jaws grip fish tightly when handle is squeezed, a spring holding them open until you apply pressure

Controlled entirely by one hand, a clincher gaff is closed about the fish by squeezing the handle. The jaws, held open by a spring, grip like a vise and can handle any catch from one-half to twenty pounds. Made of polished steel and heavily nickelled, the gaff is eighteen inches long, opening to seven and one-half inches.

*Marble Cylms & Mt. G. Co. Sandstone*

*Gravelly Motor Plow  
 Cultivator Co. Sluicbar, W. Va.*

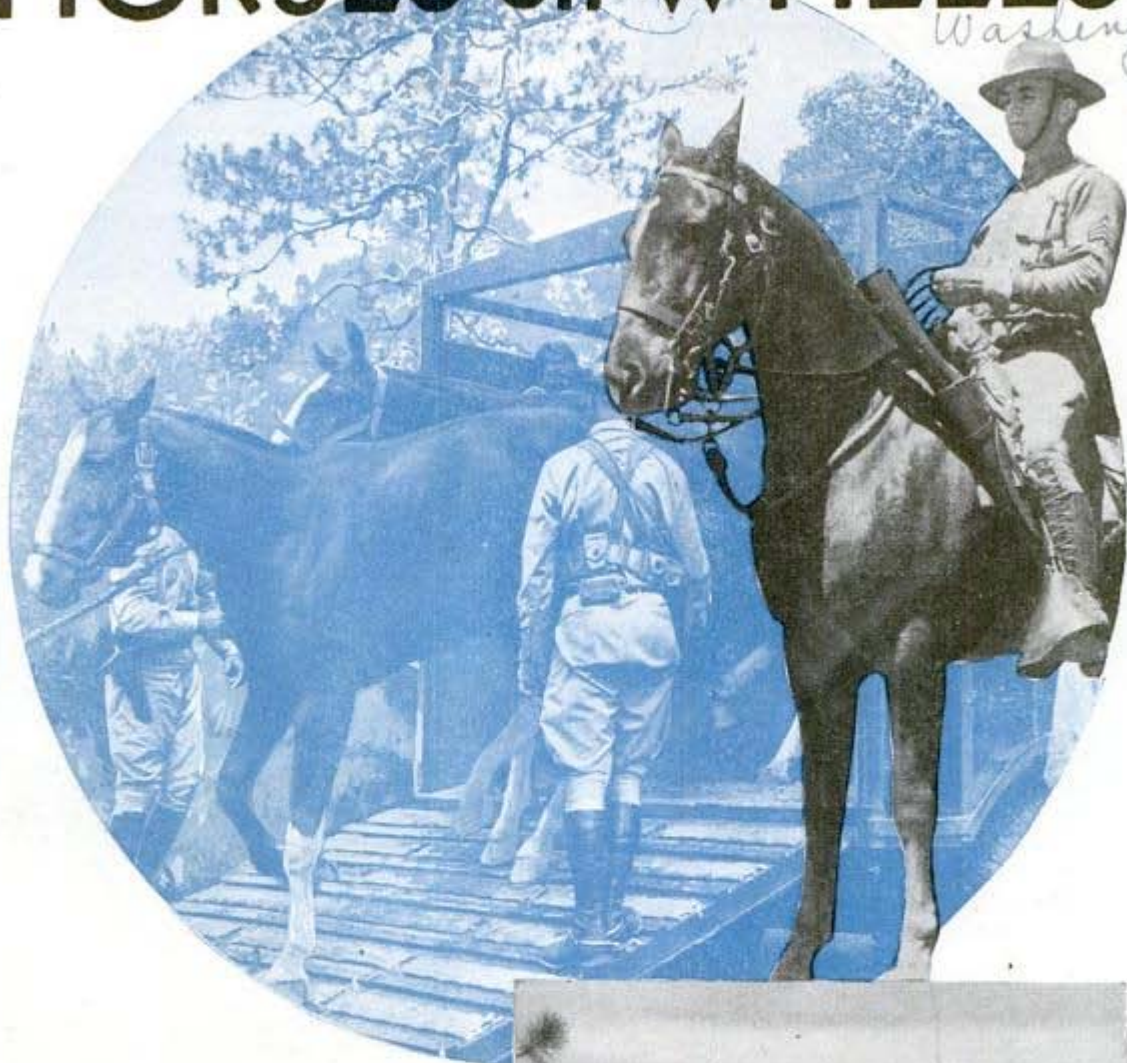
*Masterbilt Products Corp  
 212 7th Ave  
 New York*

*Rec Harca  
 Cecil T. Lane*



R 1105 Capt. Randolph Roberts 4638  
Apr 2 New Hampshire Ave. N.H.  
Washington D.C.

# HORSES on WHEELS



**H**ORSES haven't quit the army. Instead of crowding the cavalry out of business, mechanization has put a new and higher value on the mounted troops.

Thanks in large part to a series of tests recently completed at Fort Oglethorpe, Ga., the U. S. Army cavalry will soon be the heaviest armed in history and will carry the strongest firing power ever known. Strangely enough, the "reconditioned" cavalry, in sharp contrast with the situation a few months ago, will rely more on its horse strength than on its more publicized mechanical units—the tanks and small scout cars.

Our army has developed a new idea in warfare—"horses on wheels."



*Top, "horses on wheels" disembark; right, a cavalry trooper with semi-automatic rifle, .45-caliber pistol, a day's rations for himself and horse, blankets and tent. Below, maneuvering on ground too rough for motor vehicles*

41105



the Rockies and Appalachians. The new units would be valuable wherever good roads are scarce; for without good roads tremendous supplies of gasoline and oil for mechanical fighting units would be difficult to secure.

Besides the unit at Fort Oglethorpe, the Fourth Cavalry at Fort Meade, S. D., has also been equipped with a full component of horses on wheels, and in the immediate future seven additional regiments of this type are contemplated. Together they will have a personnel of 10,000 men and 700 horse

Tested first by the Sixth Cavalry at Fort Oglethorpe, the idea has been developed into a vital part of regular cavalry procedure. Horses, equipment and troops, are placed in truck-trailer combinations for transportation over long distances. Once at their destination, the animals are removed from the trailers and then used in a military way. Under such conditions the horses are fresh and can be loaded at once with war equipment and food supplies, ready to penetrate mountainous, swampy or heavily timbered areas which are impenetrable by mechanized vehicles.

This situation would be equally true whether our army fought at home or abroad. The modern horse outfits have many a spot in this hemisphere they can still call their own: in the swamps of the deep south; in the arroyos of the Mexican border; in



*Motorcycle scouts (top) go out in advance of cavalry reconnaissance squadron to hunt up the enemy and report on terrain. Troops in center, nearing contact with enemy, are accompanied by radio-equipped scout car. Below, a squad of eight prepares to entruck*

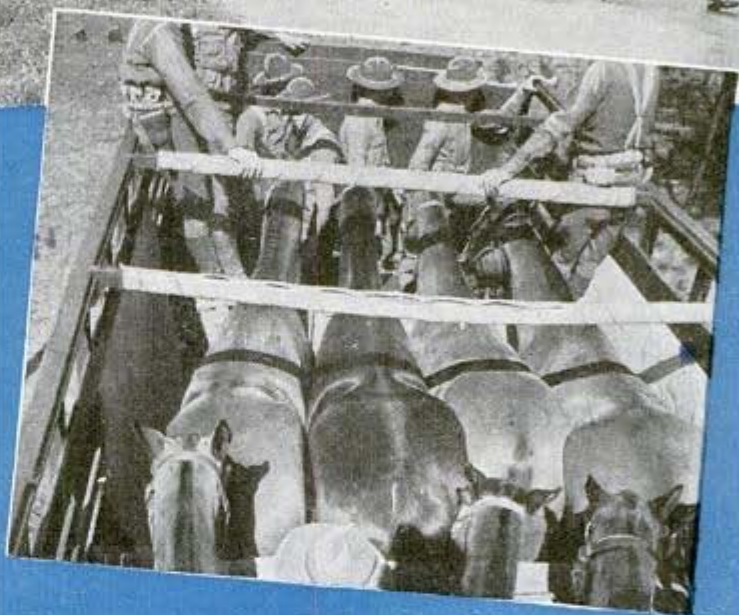




trucks. There will be one regiment for each of the nine corps areas. Incidentally, these figures are over and above the requirements of the major elements of the U. S. cavalry divisions. Total strength of all our cavalry within the next few months will be 35,000 men and 1,700 officers.

"Corps Cavalry Reconnaissance Regiment" is the official title of the new units. Each regiment includes seventy-six trucks

(Continued to page 114A)



*A seventy-mile ride on hard roads would wear out a pair of horseshoes, and horse-carrying trucks save thousands of pairs. Top, a caravan of trucks arrives in camp; center, inside a padded truck. Below, cavalry arrive at overnight camp and troopers rub horses' legs to relieve strain of forty-mile march*



K1419

### Buzzers Replace Bugle Call in Arousing Soldiers



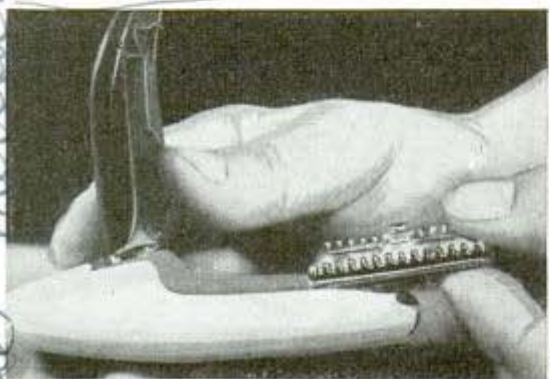
Corporal pressing button at 5:45 in the morning to arouse soldiers with buzzers that replace the bugle

Bugle calls have been replaced by electric buzzers to awaken soldiers of headquarters company, 174th infantry. Each morning at 5:45 a series of buttons is pressed to turn the men out of bed, their tents having been wired by the communications platoon of the company.

K1307

### Safety Razor Stores Extra Blades in Its Plastic Handle

Especially convenient for travelers, a compact safety razor can be stored in its own handle, and there is room to spare for



Compact razor for travelers is stored in its own plastic handle which has extra space for ten blades

The Boyer Campbell Co  
6540 Antoine St

ten extra blades. The razor is attached or removed from the plastic handle by twisting a tiny knob.

K1390

### Window in Welder's Helmet Replaced in Few Seconds

Removing and replacing the glass window of a new helmet for welders can be accomplished in a few seconds. The glass is held in a non-metallic holder with a slot in one end, and the slot is inside the helmet except when the glass is being replaced. At that time the holder is moved outward to permit insertion of the glass.



K1403

### Wall Table Hung from Molding Helps to Decorate Room



Wall table for small ornaments and framed pictures hangs from molding, two curved legs keeping it level

Having no legs to stand on, a wall table may be hung from the regular molding by cords or wire, or fastened to the wall with special bolts. Two legs curve inward, finding support against the wall. Made of walnut and attractively carved, the piece is built sturdily and will support ornaments or photographs.

Zangerle + Peterson Furniture Co  
Table Merchandise Dept

Cooper Safety Razor  
Cuts 3 5/8 years!

K1363

# Living Statues Are Coated with Special Paint

Various phases of physical education are symbolized by an athletic group famed for its "statuary" poses. In performances given before audiences throughout the country, the team depicts activities of the physical training division of Springfield College in Massachusetts. Wearing tight-fitting rubber caps and trunks, the men are completely coated with a special aluminum paint and glycerin mixture which gives them a metallic sheen to resemble silvered statues. The paint is not poisonous, and washes off easily with soap and water.



*Prof. Leslie Judd*



Posed group at top of page, called "The Sabre Men," represents class in fencing. Above, the director applying special paint to his "cast." Circle, sleek body of team member sparkles in its silver covering

*Bob Parsons*

*Pres. National Amalgamists, Inc. Seattle, Wash.*

K1421

## Antiseptic Ice Is Used in Ocean Fishing Boats to Help Save the Catch

Antiseptic ice used in fishing boats promises to save thousands of dollars worth of catch annually for the fishing industry in the Pacific northwest, while at the same time minimizing the odor of the boats. In one test with the new germicidal refrigerant, it was reported that an eleven-day-old cargo of salmon brought in from the sea had only slightly over one per cent of the

bacteria count found normally in catches kept with ordinary ice. To give the ice its bacteria-killing power, a powdered chlorine compound is mixed into the water before freezing. The powder, developed by Lawrence Frandsen, a Seattle chemist, does not lose its potency through freezing, and it destroys the bacteria in the water and most of those on the fish.

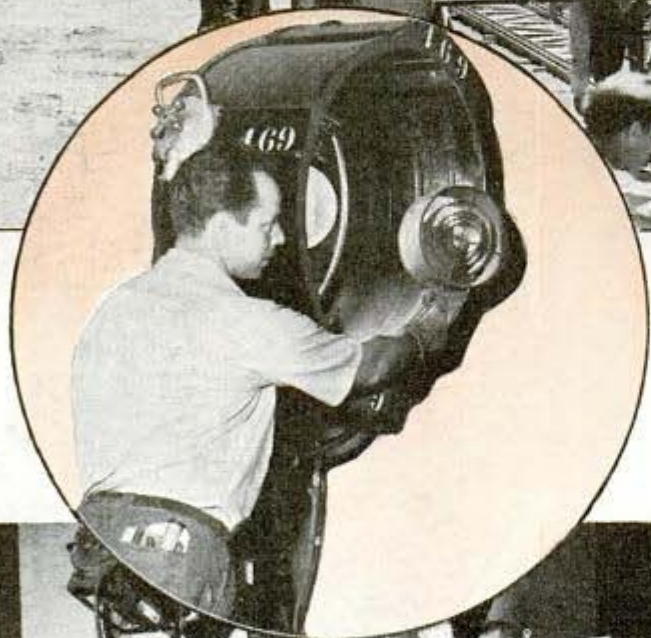
MARCH, 1941

*Refrigeration and Air Conditioning Nov. 1940*

375 *Frandsen*

R1114

# DAYLIGHT



Arc lights (above) reduce shadows on faces in scene from "Chad Hanna." Left, placing "spill ring" to break up beam of large incandescent lamp. Below, arranging stage lights for portrait

THE best boy up on the catwalk was following the instructions the gaffer shouted to him.

"Try hitting her with a keg, Jim, and put a snoot on the baby. I want some more silk on the broad. Flood your sky pans and then put a gobo on the matchbox."

This rigmarole was perfectly intelligible to the best boy and the rest of the "juicers" who were arranging the lights inside a sound stage at the 20th Century-Fox studio. In Hollywood a gaffer is a head electrician, his best boy is the second in command, and juicers are the rest of the electrical crew. Kegs, babies, broads,



Mr. Cmt. Thomas Almeraz, 3872 Franklin Ave. Los Angeles Calif.

K1114

# MADE *To* ORDER



*Above, a "juicer" trains his lamp down on floor set of "Tin Pan Alley." At right, a "scrim" in front of light reduces its intensity*

sky pans, and matchboxes are different sizes of lamps. A snoot is a tube that concentrates the light of a lamp, and a gobo is a mask.

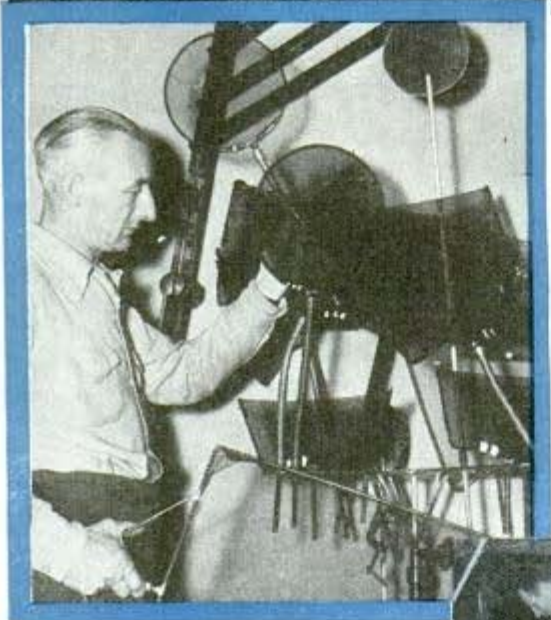
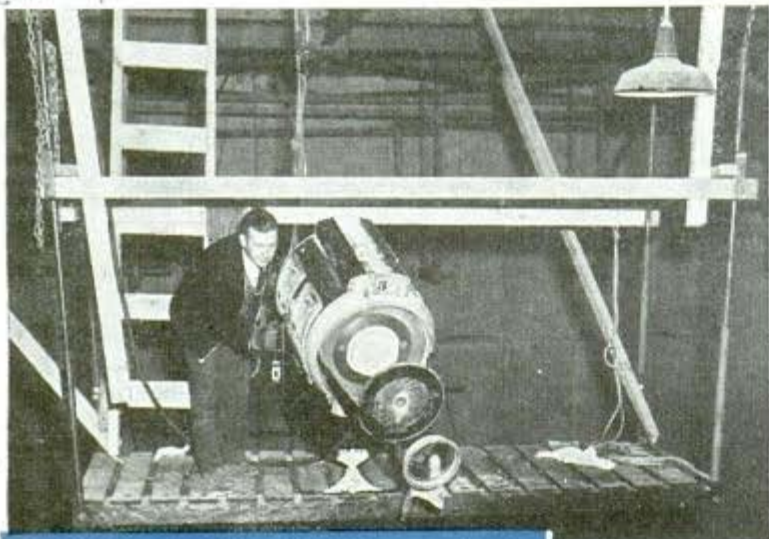
Lighting a motion-picture set is a black and white art. Possibly two dozen big lights above the ceiling elevation and a dozen more at camera level must be arranged and adjusted before the actors perform. Several hours elapse from the time the gaffer starts "roughing in" with lights until the director of photography has finished experimenting with a "dinkie" that removes the shadows from an actor's eyes, or has arranged a "lupe" that gives life and sparkle to an actress' hair. Two thousand amperes may be required to light an average set and as much as 20,000 amperes has been used in filming a Technicolor spectacle.



MARCH, 1941

*Ref: Sam Israel, Orshly  
 Dept. 20 Century. Fox Film Corp  
 West Los Angeles, Calif*

10101



cents her cheek bones, another who has a broad nose may be side-lighted to provide a faint shadow.

Clever lighting affects your mood, explains Leon Shamroy, one of the directors of photography at 20th Century-Fox, because of the background that it gives the picture. Bright sharp lighting is used for comedies to make them gayer to the audience. Strong shadows help accentuate a character picture and in a morbid play or mystery the lighting is purposely

made sketchy to give you a feeling of suspense or impending disaster. Contrast of lights and shadows helps a dramatic scene and flat front lighting provides a realistic illusion of drabness to a scene of squalor.

Every scene is a different problem in lighting although ordinarily the set is first flooded evenly with light to illuminate it for the camera. Back lights and cross lights are then arranged to outline the actors and furniture, and to give the scene an impression of depth. By now the cameraman takes a hand to provide the finishing touches. An actor seated at a table possibly needs to be lighted a little more strongly. A 150-watt

Illumination for the camera is only one purpose of the lights. A clever cameraman and his gaffer can use their lights to help make you laugh or cry. With lights they focus your attention on one actor at a time without your being aware of it. With lights they give a three-dimensional illusion to the screen. A villain appears sinister because the lights make him so and your favorite actress looks the way she does because a lighting formula has been worked out that enhances her good points and hides her blemishes. One star may be lighted from above because such an overhead light ac-

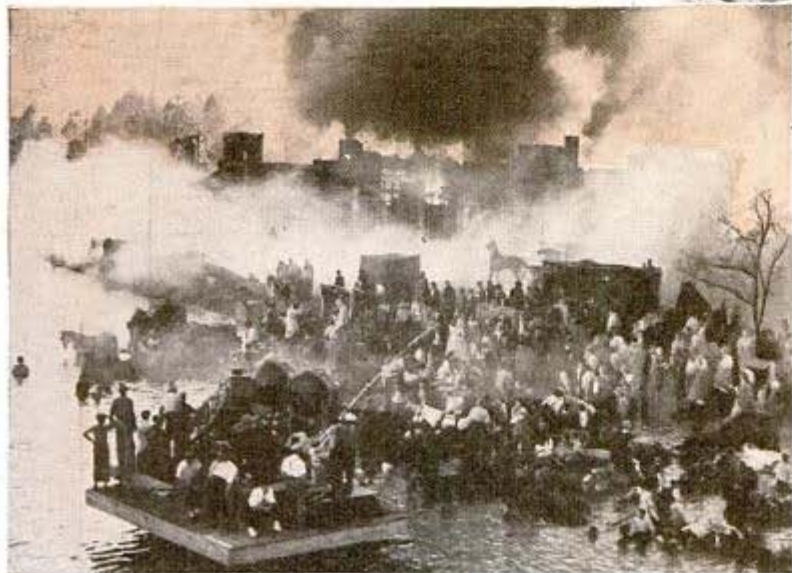
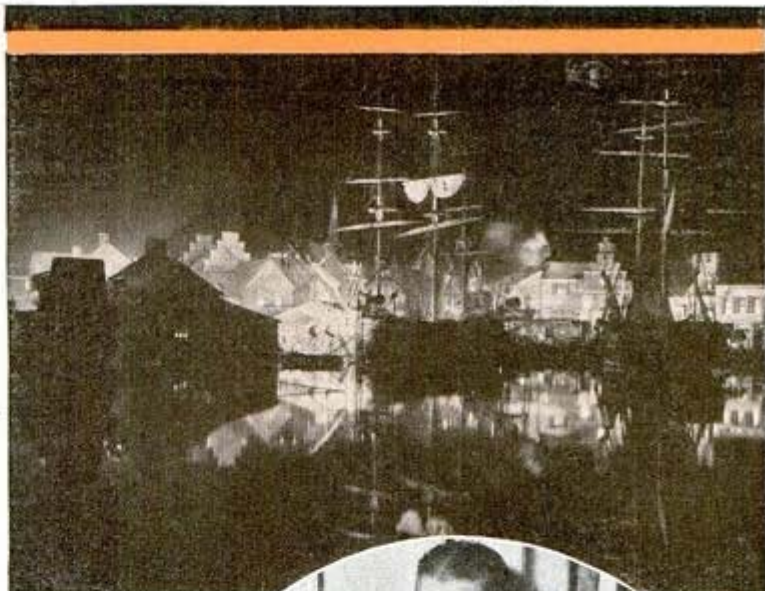
*With iris and lens mounted in front of it, the large arc lamp at top is used as "focal spot light" to follow action of dancers on floor. In center are "scrims" of various shades and shapes, used to modify glare of stage lights. At bottom, "juicers" on an overhead catwalk train their lights down on the set*



"peanut" is adjusted to put a sparkle in his eyes. If the actor is to arise from the table a "traveling composition" of light must be designed so that he remains lighted evenly as he moves around.

By now the cameraman has a dozen or so lights pointed into the set and he has to be careful to prevent some of the stronger lights from casting shadows into the areas illuminated by weak lights. The shadow of the overhead microphone is one trouble spot that must be watched.

Each picture has its lighting problems and each picture is different. In filming "Tin Pan Alley," Shamroy had to light a scene that showed a theater audience in the foreground and a stage in the background. The stage lighting, of course, had to remain brilliant during the performance, and the illumination on the audience had to be fairly bright. Part of the problem was to light the audience well enough for the camera to pick it up and still indicate brilliant lighting for the stage. Gauze



*Huge sun arcs used at night (top) illuminate large outdoor set forming part of town and waterfront. With multiple dimmer (center) the technician can reduce intensity of some lights and increase brightness of others. Even with daylight and flames of a burning set, big booster lights were needed to film mob scene at bottom*

"scrim" were used to diffuse the light over the audience and the final effect was a true representation of lighting inside a theater.

The camera can film the flame of a candle but it doesn't pick up the light that flame throws against a wall. So the juicers rig up a baby spot and turn it toward the wall to give the effect that is needed. If the director wants to show a person's face illuminated by a candle that he is carrying, the electricians build a hollow candle with a window in its side. The light

(Continued to page 137A)

R1335

## Movers Roll a 350-Ton Tank a Mile across Rough Desert



Tough orangewood logs were used as rollers as the huge tank was hauled, 300 feet a day, across a mile of rough desert

Visitors to the desert resort at Palm Springs, Calif., considered the big gas tank an eyesore, and so to placate their esthetic senses the movers were called in. The 350-ton tank was mounted on a special cradle, wooden tracks were laid to ease its path across ravines and over boulders to obscurity, and today the metal tower is a mile away from its original location. It traveled 300 feet per day. Native orangewood logs served as rollers, being the only available wood which would resist splintering under the heavy weight of the 100-foot tank.

## Bees Visit 2,500,000 Blossoms in Setting One-Day Record

Using an instrument known as a pollen trap, bee specialists are able to estimate closely the number of loads of pollen brought back to the hive by bees. In one colony the number of loads per day from February fifteenth to November first av-

380

Studies made by Frank Todd, Pacific States Bee Culture Laboratory.

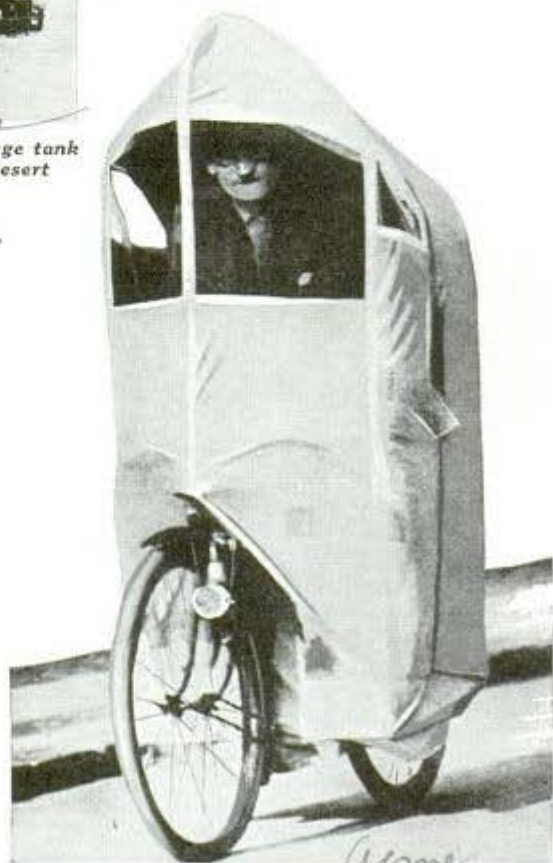
Dept. of Agriculture  
U. of California

eraged nearly 8,000. Since each load represents visits to eighty or more blossoms, this indicates that the bees got around to an average of about two-thirds of a million flowers daily. The busiest season for the bees is when the fruit bloom is plentiful, and during one day of the spring peak this colony brought in 29,000 loads of pollen. The bee experts estimate that to gather this quantity the bees probably called on 2,500,000 blossoms.

R1326

## "Covered Bicycle" Guards from Wind and Rain

Many ingenious adaptations of the bicycle have been evolved by Europeans since shortage of gasoline, due to the war, has limited the use of automobiles. One Frenchman in occupied Paris, faced with the necessity of using his bike through the winter, constructed a shelter that covers him from head to foot.

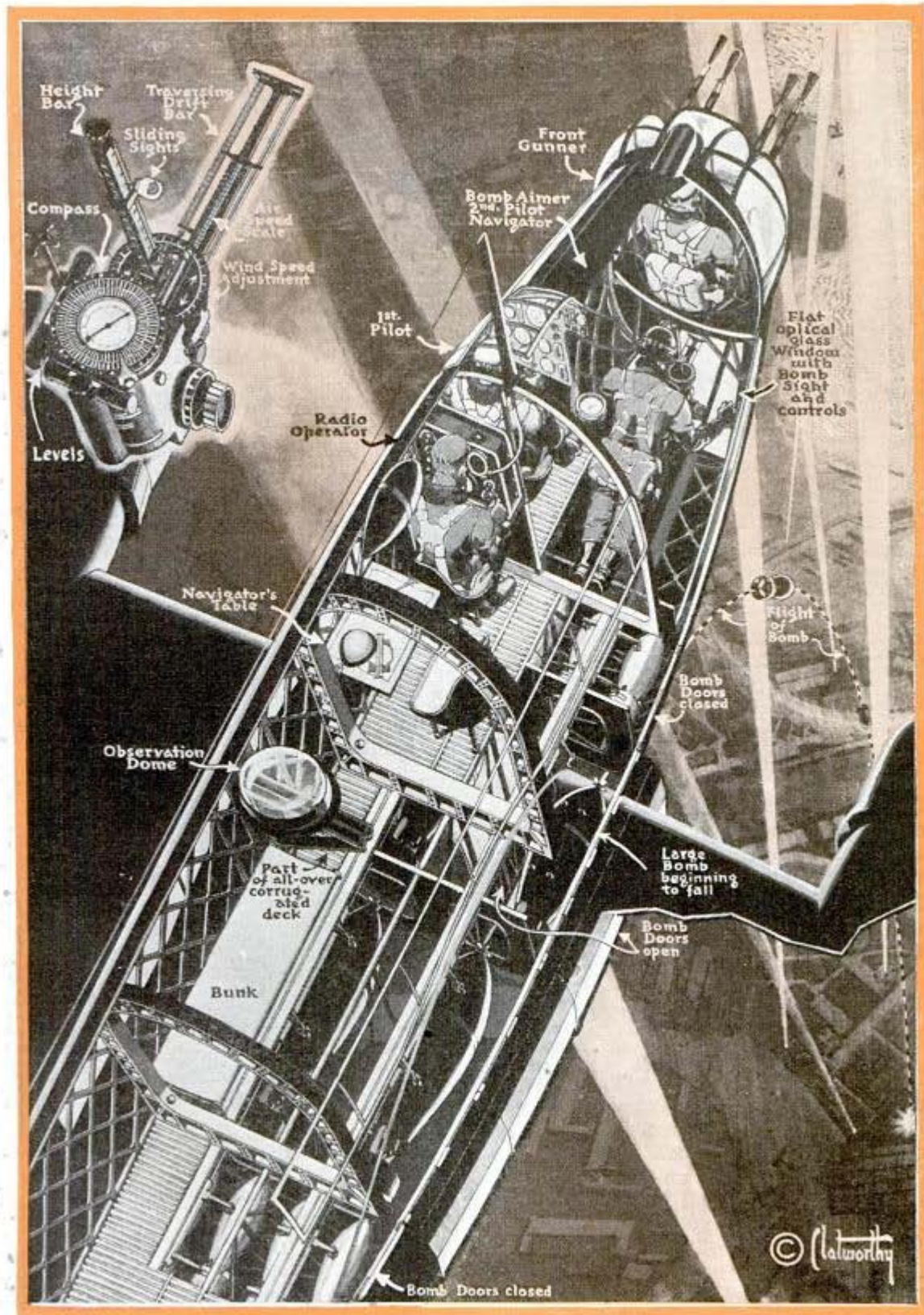


This rider has protected himself from cold wind and rain by building a tent-like shelter on his bicycle

POPULAR MECHANICS

Press house  
2675  
moving Corp  
Repeating Blum  
L.A. Calif

# How Bombardier Works Aboard British Plane



Here are principal details of a British Wellington bombing plane engaged in high-altitude bombing. Bombardier lies prone and releases bombs as sight comes on target. Details of bomb sight are shown at upper left

*841 Leaning Road  
London W. 16, England*

K1366

## Direction Markers on Signs Help Guide Motorist



Bar over numeral tells motorist he is driving north or west; beneath, (see inset) it means south or east

Motorists sometimes travel considerable distances in the wrong direction before discovering their error. This difficulty may be solved by a direction marker for highway signs introduced by Judge James G. Barber of Evanston, Ill., traffic and safety authority. The plan is to place a plain black bar, an inch wide and six inches long, either above or below the numerals designating the road number, depending on the general direction of travel. If the bar were placed above the numerals, the motorist would know he was traveling north or west on the road; a bar marker under the numerals would indicate south or east.

K1451

## Chemists Dissipate Airport Fog with Sulphur Chloride Spray

Chemistry may have the answer to the problem of dispersing fog at airports. In a large-scale experiment recently, scientists of Massachusetts Institute of Technology succeeded in clearing an area thirty feet high, 150 feet wide and 1,500 feet long by spraying the thick fog with eighty-five gallons of sulphur chloride solution per minute. When sprayed into a misty area it collects the moist particles of fog into drops which fall to the ground like rain. Airports equipped with hose lines and nozzles

1514 Elmwood Ave  
H. H. Co. Langhston  
Mr. W. H. Radford

Stanley Tool & new Britain, Conn

laid out along the runways might thus be able to clear the air as a plane comes in for a landing. A military application might be the use of fog-dissipating planes to spray the air over a fog-blanketed objective.

K1400

## Pocket Screwdriver with Spotlight Handy in Dark Corners

Equipped with a flashlight to light the way when working in dark places, a vest-pocket screwdriver carries standard batteries in the handle. It is furnished in two sizes, the smaller one being turned on by revolving a collar at the handle end, the other having a snap switch.



K1384

## Cabinet Built into Trunk of Auto Carries Salesman's Samples

An abundance of drawer space in the automobile for carrying samples is provided by a cabinet built into the trunk compartment. It is designed especially for use of salesmen in exhibiting their wares. A glass top protects the contents of each drawer, any of which can be drawn out its full length for demonstration purposes.



Large chest built into trunk compartment of salesman's auto contains drawers to hold samples

Clarkburg  
2196  
Thompson, Williams Co. Am.  
Cleveland, Ohio

German Railroads & Information  
June 11 W. 57th New York

# Heavy Army-Tank Aerial Resists Enemy Fire

Armored scout cars of the German tank division are equipped with heavily built radio aerials to resist possible damage by enemy fire and to brush aside obstructions. The cars are used for reconnoitering the enemy's position, concentration of troops and location of anti-tank artillery, transmitting the information and orders to the tank division which follows them. Sloping outer surfaces reduce the possibility of making a direct hit against the car.



*Canzer*

Aerials mounted on these German scout cars, built of extra heavy metal rods to withstand the rigors of war, are essential in keeping contact with other units of tank division that follow

# Midget Atom Smasher Whirls Electrons at Speed of Light

Electrons, the smallest negatively charged particles known to science, are whirled at almost the speed of light, 186,000 miles per second, in a midget atom smasher devised by a General Electric research worker. In the course of the whirling, which occurs in a glass doughnut about one foot in diameter, the electrons gain 2,300,000 volts of

energy, something hitherto requiring much larger apparatus and great insulation. The powerful little machine looks like a miniature atom smasher of the cyclotron type, but, unlike the cyclotron which can handle only positive ions, it accelerates electrons.

*Univ. of Illinois (1941)  
Mr. W. Kerst*



Doughnut-shaped miniature atom-smasher is shown here in special framework

# Saw Bores Hole to Make Start in Cutting Out Panel

Equipped with a drill at the tip for making its own starting holes, a small saw for cutting out panels may be used without the aid of a separate hand drill. The drill is sharp and requires only an ordinary push to make an opening for a start in sawing holes in walls or floors for work such as installing pipe or electric outlets.



*Wapach  
Chicago  
1029 R. 6201*

MARCH, 1941

*W. Kerst*

*West  
Lentgen & Associates*

K1342

## Plaster Cutter Makes Slots for Electrical Conduit



In one sweep across ceiling, twin wheels cut groove for installing electrical conduit, pipe or tubing

Saving time of electricians and building maintenance men, a motor-driven cutting tool quickly opens neat grooves in plaster walls and ceilings for installation of the new types of oval electrical conduit. Two thin abrasive cutting wheels that may be set at the desired width make clean cuts, and the plaster between the cuts falls out readily. Two handles and a trigger switch permit a firm grip for accuracy in following a line. The tool is also useful for cutting door and window openings in walls.

## Spring Grip for Lifting Fruit Jar Protects Hand from Scalding



To protect the hands from scalding while sterilizing fruit jars in the canning season, there is an automatic jar lifter with a grip that fits any jar. In fact it can be used as well for picking up

384

X-Pando Coff  
43-15 36th St

cloths or dish rags in hot water, opening tin cans of vegetables, and other purposes. The spring grip takes a sure hold on the neck of the jar just below the lid, for immersing it in boiling water.

K1379

## Cement That Expands as It Sets Forms a Leakproof Bond

An all-purpose cement that expands as it sets forces itself into the pores of the wood, or into the sides of any recess in metal, plastic or other material. Thus it forms a leakproof, vibration-proof bond that is virtually permanent and is unaffected by anything except heavy acids. After it has set, this cement can be drilled and tapped, ground and polished. It is a white powder, and can be colored by adding dry colors or painting.

K1388

## Slanting Curbstones Guard Tires Having White Sidewalls

Curbstones that slant upward from the street are being introduced to replace the type that rise abruptly, as protection for the white-sidewall finish of automobile



Autos can be parked along this sloping curbstone without risk of scratching white finish of tires

tires. There is another advantage; when a new house is built and the owner wishes to make a front driveway, he will not have to chip away part of the curbing if it already has the proper slope.

All the petroleum thus far produced in the world would not fill a cubic mile tank.

POPULAR MECHANICS

Leadstone 1482  
merchandise mail  
Proceedings  
1629

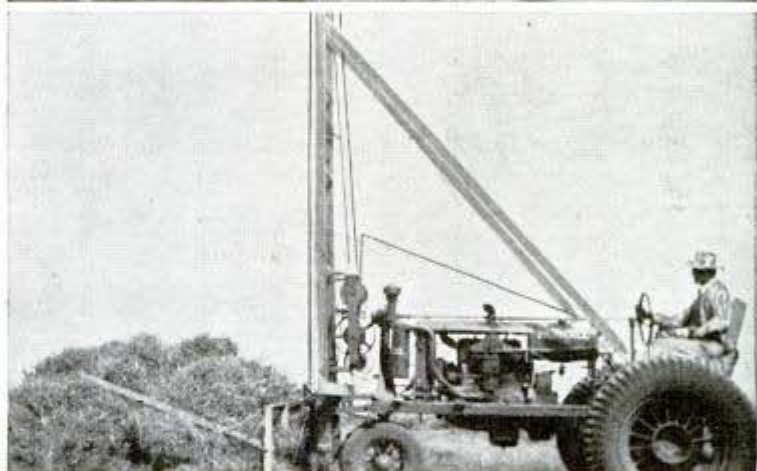
W. O. Bach. Elec. Tool Corp  
4627 W. Huron St. Chicago  
K1219  
G. Under Specialties  
Angela Child

Long Island City N.Y.

K1378 The New Method Farm  
 Equipment Co  
 Andanda, Iowa.

# Hay Rake, Loader and Stacker Run by Tractor

Fitting any make tractor, a versatile hay machine takes the place of loader, rake and stacker, operating equally well in shocked, windrowed or swathed fields. Capable of stacking or loading twenty or more acres of average hay or straw in one day, it will handle more than the average combine can cut. One lever controls the entire operation, either with the tractor in motion or standing still. The fork can be guided accurately to place the load gently in the spot desired, at any height up to sixteen feet, so one man working on the load or stack is sufficient. Besides handling hay, straw, manure, etc., the machine can be equipped with a large scoop for loading lime, sand or gravel, and corn or cobs. The entire rake head is simple and quick to attach or take off, since only two bolts are used to hold it in place. A winch mounted in front operates independently in performing many other tasks on the farm. The unit weighs a little more than 600 pounds, and when attached to the tractor it can go

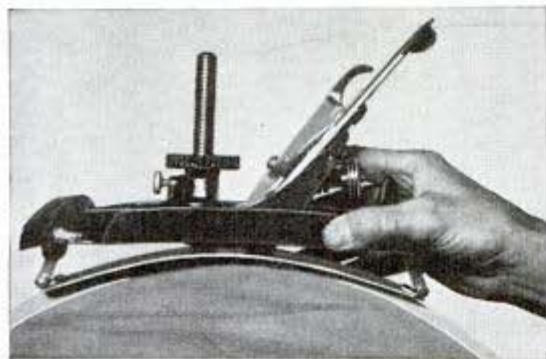


One man can operate the tractor-powered hay machine which rakes, loads or stacks the hay. Top, fork lifts large load as high as sixteen feet, placing it gently at top of stack. Bottom, picking up load with fork

anywhere a team and wagon goes, and no time need be lost in transporting it from one farm or field to another.

K1402

## Circular Plane Can Be Adjusted for Convex or Concave Surface



Flexible steel bottom of plane is adjusted to fit the work surface by means of the setscrew at top

By a simple adjustment of a setscrew at the top, a circular plane just introduced can be used for planing any curve or hollow down to a radius of twenty inches. It has a flexible steel bottom which changes the surface from convex to concave as the screw is turned. The cutters are adjustable endwise and sidewise.

(Pupils riding the more than 42,500 school buses operating in the United States, which carry a daily passenger load of 3,742,000, traveled more than 8,000,000,000 passenger-miles last year.

MARCH, 1941  
 Stanley Tool Co  
 New Britain, Conn. (Technology Review) 385  
 Nov. 1948  
 Материал, защищенный авторским правом



# SCHOOL for

*Above, a beginner all dressed up in 190 pounds of gear for first dive; in right hand is his sheathed knife. Right, a diver tries the open sea*

*Arthur J. Webb,  
from Montana*

**I**F YOU think diving is a glamorous profession, visit the Navy's Deep-Sea Diving School, at the Washington Navy Yard, and be disillusioned. Here, picked men are trained in the grim and hard business of rescuing sunken submarines, repairing ship bottoms, and doing a hundred and one specialized mechanical jobs on the bottom of the sea.

With every man a potential hero, facing injury and death in his routine daily work, the idea of developing diving "prima donnas" is discouraged at the outset. Students are sent down to their underwater jobs strictly in rotation, and for periods depending upon their strength and ability—just as they will be later sent down as reg-

ular divers of the navy. Candidates are volunteer boatswain's mates, gunner's mates, carpenter's mates, torpedomen, or shipfitters, between the ages of twenty and thirty. They must be sound in body and sober in temperament. A man with weak heart or lungs, or who gets excited easily, would never do for strenuous work fifty fathoms under the ocean. So much stamina is needed that no man in the navy is allowed to go down more than ninety feet, after he reaches forty years of age.

Contrary to the general opinion of divers as big, husky, bruiser-type men, best diver material comes from men who are rather thin, muscular, and wiry. Prospects twelve per cent overweight are rejected, on the grounds that fatty tissue absorbs nitrogen faster than does muscular tissue, thus making fat men more susceptible to the "bends" than thin men. As diving dresses come in only three sizes, divers must also be between five and a half and six feet tall.

Of the six months intensive training,





163 Miller St. W. B. 13

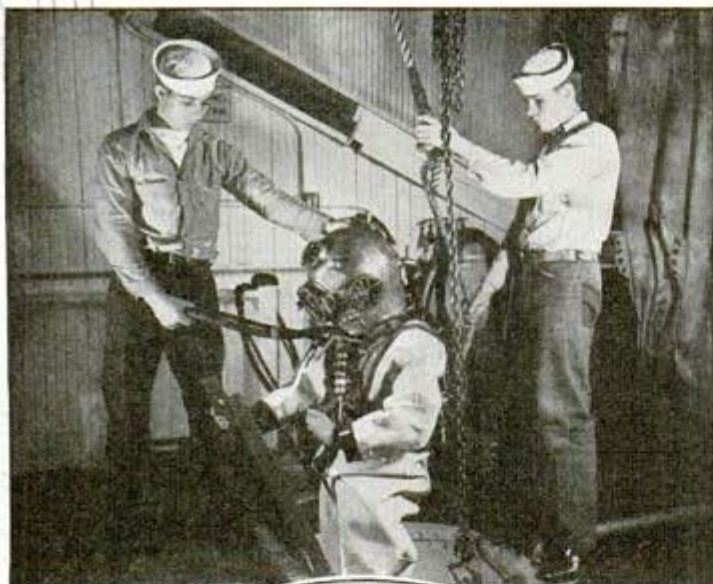
# DEEP SEA DIVERS

one-fifth is spent in classrooms, studying pumps and air pressures, first aid and resuscitation, physics and mathematics of diving, and the theory of diving operations. The remainder is devoted to practical mechanical work that might be required in an emergency, and to actual diving.

After a thorough physical examination, and before his first dive, a student is put into a recompression chamber where air pressure is built up to fifty pounds to the square inch. This is to determine if high air pressures can be equalized on both sides of the ear drums. If pain or nausea is experienced, the man must forget a career as diver. If he reacts normally, however, he then goes to the "topside"—the



Top, left, tender shuts air intake valve after diver blows to surface; right, giving oxygen in recompression cell. Bottom, taking a lung test



room above the diving tank—where fellow students help him into the cumbrous and grotesque gear which is the working clothes of his profession. As life may depend upon the proper adjustment of a valve, or the tightening of a nut, the job of dressing must be done with meticulous care.

The diver first dons heavy, long-legged and sleeved woolen underclothing and woolen socks to keep him warm and to prevent the diving dress from chafing. In cold water, three outfits of woollens may be worn. Then comes the dress, made of fabric and rubber, which covers the body to the neck. The back of the legs are laced up to prevent the legs from becoming overinflated and toppling him over.

Next come shoes, weighing seventeen and one-half pounds each; lead belt, eighty-three pounds; breastplate and helmet weighing fifty-four pounds. A heavy leather strap, buckled at both ends to the belt, is passed between the diver's legs to keep the belt from sliding up and the helmet from rising above the head. Completely dressed, the diver-to-be clumps awkwardly to the ladder of the tank, weighted down with 200 pounds of canvas, rubber, bronze, and lead. Last-minute instructions given, a tender fastens the faceplate of the helmet, gives two taps on top of the "hat," and the novice clammers down through the air lock into the steel tank which is to be his "classroom."

In this tank, student divers first learn to walk; then they learn to work. When a diver is sent down on a rescue job he must be able not only to

(Continued to page 122A)

*Two taps on top of helmet give signal that all is ready for a dive (top). Center, performing a repair job under water. Bottom, signaling to diver in tank by mallet taps*

## Viewer and Projector Replaces the Sample Kit

Instead of carrying a heavy kit of samples, the salesman today can show his customers his full line of merchandise with a combination viewer and projector for photo transparencies. A bright image is shown on the seven-by-seven inch ground-glass screen, or the picture can be thrown on a wall screen. From a distance of eight feet an image three feet wide is projected. The instrument was designed particularly to show dental and medical X-ray films, Kodachrome and other slide films; for salesmen who wish to show full-color pictures of their line; for window and salesroom displays, and for home use.

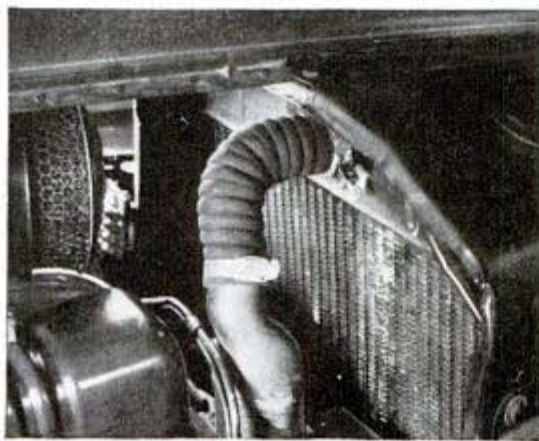


At the top the projector throws the image on a wall screen; below, the opposite end of the instrument is used as a viewer

### Electric Rubber Sheeting Heats Aviator's Suit

Self-heating suits for aviators, which have been introduced recently, use a new type of rubber sheeting as a heating element, instead of the customary current-resisting wires. The rubber is converted into a resisting conductor by the addition of certain chemicals during the rubber mixing process. Made into sheeting, this rubber throws off heat when connected at the ends so an electric current will pass through it.

### Flexible Hose Can Be Bent to Fit Most Auto Radiators



Spiral construction of hose permits it to be bent so it can be made to fit radiators of most autos

Capable of being bent into any shape, a flexible radiator hose is designed to fit virtually all cars. It is furnished in three-foot lengths and six different diameter sizes. These may be cut with a knife to any required length. A built-in spiral wire coil prevents collapse of the tube. Now instead of carrying a stock of more than 150 pieces of hose curved to fit various makes of cars, the dealer merely needs a supply of flexible hose in each of the six sizes.

☐ Stamped, self-addressed envelope, sent to our Bureau of Information, will bring you the name and address of the maker of any article described in Popular Mechanics.

United States Rubber Co. 1230-6, 4 Ave  
New York

The novel Corp.  
629 Washington Ave

\$39.50

K1353

K1355

Максимум информации бесплатно

K1337

**G-Man's "Draw" Is Clocked  
by Timer in a Split Second**



As the finger is withdrawn from contact button (see inset), timer begins operating and continues until bullet clips target

Any public enemy shooting it out with a G-man will have to be plenty quick on the "draw." Technicians of the Federal Bureau of Investigation have contrived a special timer to measure the time it takes a government agent to draw his pistol and fire from the hip. The average time for the sharpshooting G-men is one second. In making the test, the agent presses his trigger hand on a contact which stops the clock hands. As he releases the contact to draw his pistol the timer starts operating and its needle moves until the impact of the bullet on the target stops it.

K1416

**Three Pictures on Two Films  
Made by New Color Method**

By a color photography process just patented, three separate pictures are taken on two films instead of the conventional three films sensitive to greens, blues and reds. In the new system the front film records blues, the rear one is coated with two

emulsions—the top or front one sensitive to green, the bottom one to red. Between them is a layer of gelatin which permits removal of the top one without damaging the lower. From the red-and-green film a print is made on another film which shows a combination of the two colors; then the green layer is bleached out of the original dual film, leaving only the reds. This is placed in contact with the combination film print, and using these two as a negative, another print on film is made. The result shows the distribution of the greens, and thus corresponds to the original top layer of greens which has been washed away. This film showing the greens, combined with the original blue-sensitive front film, and the rear red-green film from which the green was washed off, provide the set of three negatives from which finished pictures can be printed by several processes.

K1360

**Metal Goggles Guard Eyes  
from Shrapnel Splinters**

Special metal goggles to protect the eyes from flying fragments of shrapnel during an enemy bombardment have been introduced in England. Circular pieces of metal which drop down over large eye holes have narrow cross slits through which the wearer can see his way to shelter.



Cross slits in metal disks that drop down to cover the eye holes let the wearer see way to shelter

Science Service  
Dec 12, 1940

E. I. Ide & outside removed Bull by technicians, Ft. B. T. Washington, W. D. C. 224163

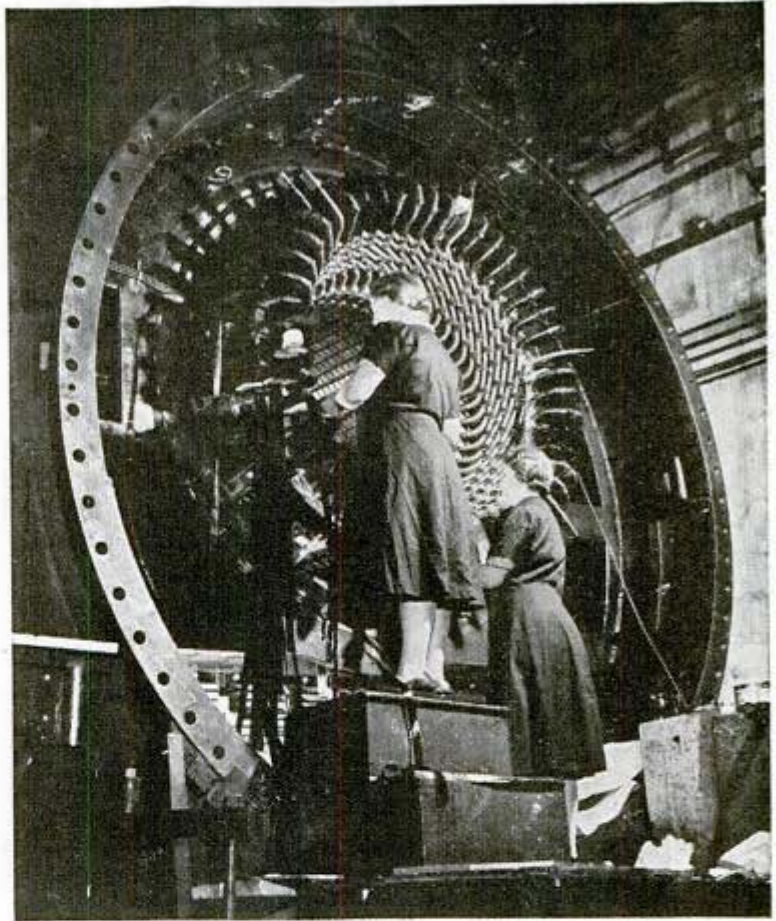
Pat: Vogel B. Sease  
Pat: Sease B. South Overhill  
Pat: Sease B. South Overhill

R1375

# Giant Generator Can Light 1,000,000 Lamps

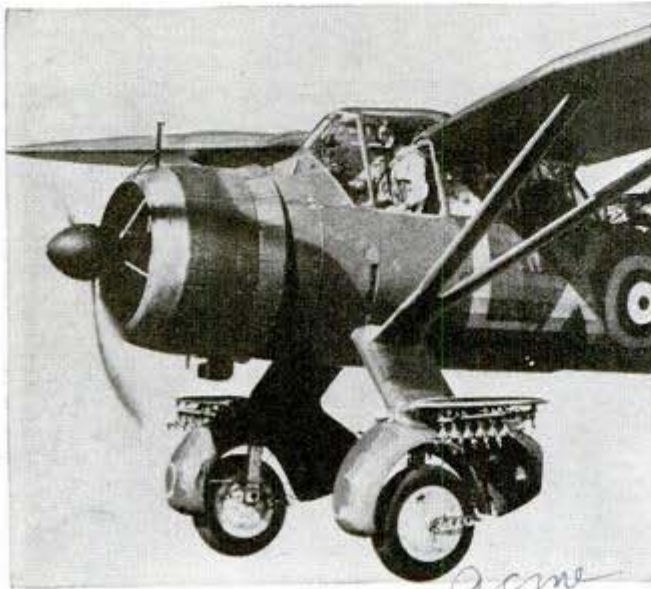
One of the largest turbine generators ever built, recently completed at Westinghouse plant, will develop 65,000,000 watts, enough to light 1,000,000 sixty-watt lamps, at 13,800 volts and sixty cycles. Women workers aid in building these power champions by winding insulating tape on the current-carrying conductors. The generator will be installed in a power station in New York City. A thirty-five-ton rotor body, which will be placed within this unit, will have a surface speed of 400 miles an hour, developing energy which, if released, could hurl the rotor half a mile into the air.

*Women shown winding tape on current-carrying conductors help emphasize titanic proportions of turbine generator. Power emanating from this giant will be sufficient to light 1,000,000 sixty-watt lamps*



R1357

# Stub Wing on "Pants" of Plane Carries Bombs or Food



*From the multiple racks under the abbreviated wings on undercarriage, food can be dropped to troops, or bombs upon enemy*

Racks on which small bombs can be hung, or food, water and ammunition can be carried to isolated troops, are mounted on stub wings projecting from the undercarriage of one of the new British military planes. The high-wing monoplane was especially designed for army cooperation work. One of its regular assignments is to spot enemy artillery. The Lysander plane is powered by a Mercury radial engine and has a top speed of 230 miles an hour, with a range of 600 miles.

The automobile industry directly or indirectly gives employment to 6,500,000 persons annually, and since the first automobile show has paid wages totaling above \$85,000,000,000.

*Auto Manufacturers Assn.* 391

# PREPARING our HOME

*Capt. Thomas E. Shinson Jr.*  
*Franklin*  
*Los Angeles*



Above, fireman operating siren. Below, left, railway rifles of coast defense. Right, map showing concentration districts and open areas of Los Angeles

States is at peace, yet today, in Los Angeles, the Major Disaster Emergency Council is preparing for an emergency, and in other parts of the country officials are studying ways to defend the noncombatant population if war should come.

Recently the War Department announced that it is preparing pamphlets that tell civilians how to help themselves under conditions of modern warfare, giving information on bomb shelters, first aid, air-raid warnings, and defense against gas. It has already instructed munitions plants and other possible military targets that their buildings should be arranged in irregular patterns to hamper straight-flight bombing, that underground shelters should be built for employes, and how to camouflage buildings with mottled painting.

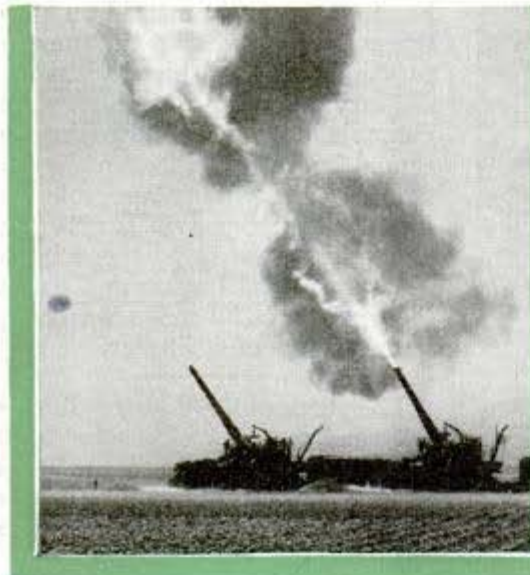
Because the region is highly important as a producer of petroleum, airplanes and auto tires, and because it would be imprac-

**G**ENTLEMEN, we want to know which office buildings in the city are bomb-proof. We need to know whether our storm drains would make safe air-raid shelters. We have to learn at once the best locations for alarm sirens."

The meeting at which this speech was made was not in a war-threatened European city but in Los Angeles, the fifth largest city in this country. The United

Because the region is highly important as a producer of petroleum, airplanes and auto tires, and because it would be imprac-

Ref: Basil E. Rice, Coordinator, Mayor's Disaster Emergency Council  
 2224 S. G. St. L.A.  
 Los Angeles

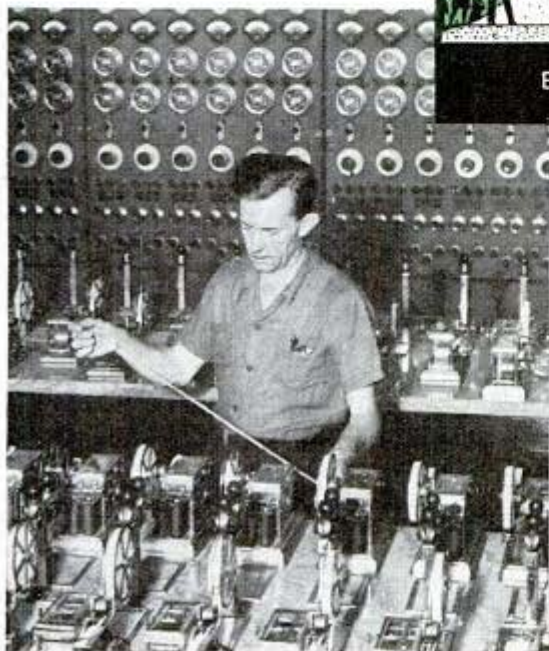


# DEFENSES

K1179

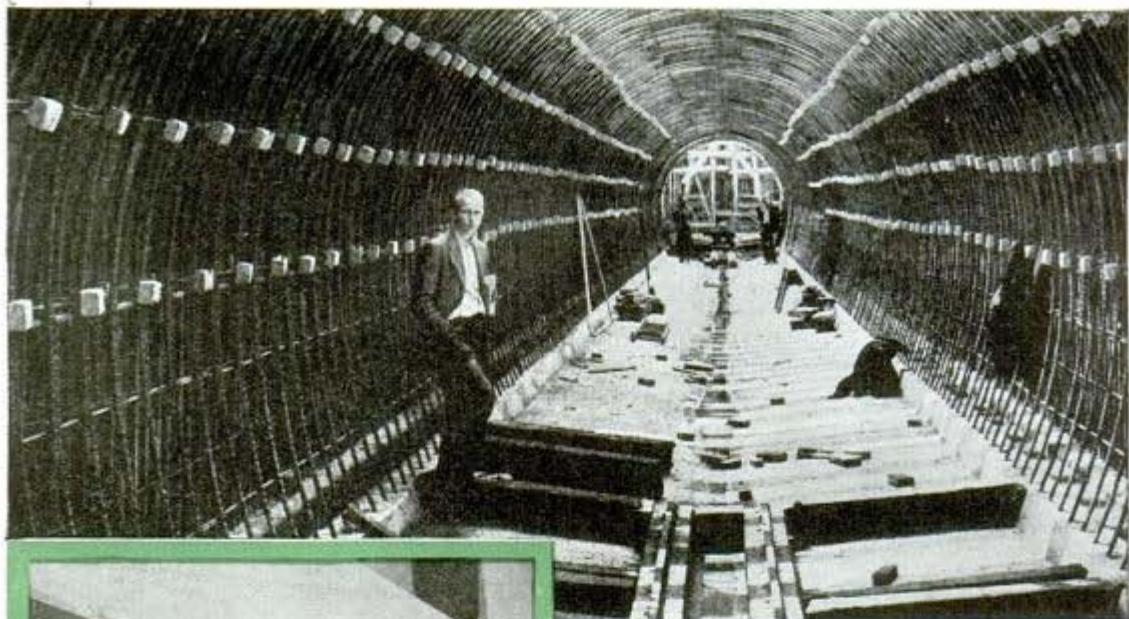


Above, Coast Artillery headquarters during practice firing. Right, sketch of typical underground shelter. Bottom, part of fire alarm, emergency phone and code network that operates on batteries



tical to move the population quickly in time of war, Los Angeles people must stay at home. So for the past year the emergency council has been studying safety measures. Several European countries have been asked to outline what they have learned about passive civilian defense, and the replies have helped to guide the work.

The first move was to map the most potentially dangerous areas of the city. These are the districts that surround aircraft factories and other probable military objectives, and are classed as "A" zones. "B" zones are congested areas and "C" zones are thinly populated. Voluntary evacuation to the country in time of war would be urged of all inhabitants and in addition all residents of "A" zones would be required to move to the safer "C" zones. Workers who are em-



*Top, underground storm drain, under construction, might be used as air-raid shelter. Center, huge concrete buttresses in earthquake-proof building housing emergency council. Bottom, plotting course of "enemy" bombers from information supplied by civilians*

ployed in the "A" zones would be allowed to remain there only during working hours.

Los Angeles has some 6,000 buildings more than five stories high and the lower floors of some of these are comparatively safe from the effects of bombs. A committee has studied the construction of each and has listed the relative safeness of all the buildings.

Another committee, looking for big air-raid shelters, investigated the storm drains under the city. These drains, built of reinforced concrete, are buried as deep as forty feet below the surface. Some are large enough to push freight cars through

and are dry nine months of the year. Engineers have prepared plans for building stairways down into the drains at convenient places and for installing ventilating apparatus. This information, including the materials that would be needed and the places where they may be obtained, is filed away against the time it might be needed. The same committee investigated small air-raid shelters and this information likewise is ready.

For small family shelters, architects are abandoning the idea of redesigning cellars because the entrances easily may be blocked by debris. Concrete "pill box"



back-yard shelters have been designed that would protect occupants from everything except a direct hit and some of these are being studied by the United States Housing Authority.

People are already asking what they may do to protect themselves, and in one community several architects and engineers are suggesting that those who can afford it may construct a dual-purpose room, either underground or buried in a hillside, that ordinarily would serve as a game or rumpus room and that in time of need would be an effective bomb shelter. The technical group has designed five different sizes of such subterranean shelters, the most elaborate of which is really a furnished apartment that has its own air-conditioning system, operated by a motor-generator. All such buried shelters could be entered from the house and would have a three-layer roof consisting of a concrete detonation slab a few feet below the surface, a deep layer of sand, and then a thick reinforced concrete ceiling.

For new office buildings, roofs that would reduce the destructive effect of direct hits are being considered and in some cases plans have been made to reconstruct the top floors of existing structures.

Another part of the work in Los Angeles has been to plan an air-raid alarm system for the city. Hand-operated sirens are preferable to those operated by electricity because of the chance of power failure. The locations for siren stations have been picked out.

An information committee is designing placards, posters, and information sheets that tell the public how to act and what to do during an air raid or other kind of invasion. Every school child can be given instructions within two hours after the need arises and the outlines of radio and newspaper announcements have been prepared in advance.

The Major Disaster Emergency

(Continued to page 143A)

MARCH, 1941

## 'Dummy' Cockpit of Air Trainer Teaches Co-ordination

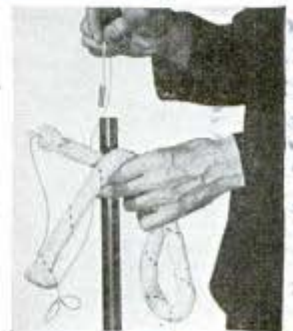
Air corps cadet uses this cockpit to learn how to co-ordinate hands and feet before he flies a plane



Part of the ground instruction given flying cadets at Cal-Aero Academy's air corps training center, Oxnard, Calif., consists of manipulating controls in a cockpit, called a "co-ordinator," which is reproduced from a training plane. For the first lessons, the stick and foot controls are locked together, thus forcing the student to co-ordinate his hands and feet. Later the connection is removed and the cadet practices co-ordination without mechanical assistance, just as he would in flying an airplane. If he makes a mistake in co-ordination, a bell rings and does not stop until the error is corrected.

## Oil-Soaked Rope Packed in Gun Barrel Stops Rust between Seasons

Storing an oil-soaked rope, now on the market, in the barrel of your gun when it is put up for the winter, keeps rust from forming within. The "wicks" are larger than the bore and longer than the barrel, thus excluding air and moisture. The rope is soaked in the oil just before placing it in the gun.



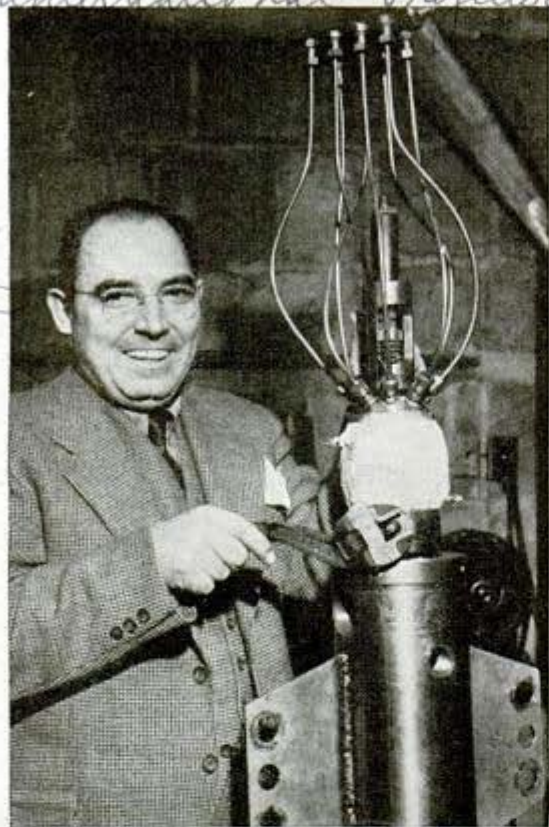
395

Marble Arms & Mfg Co. Island Stone

*K1385 Co 90 sold in New York*

## Rocket-Type Super-Engine May Revolutionize Planes

*100 International Protection*



*Acme*  
**Built on the "rocket" principle, this jet propulsion engine is proposed as a booster for the takeoff**

*Wm. & B. Myers*

Two hundred miles an hour may be added to the speed of fighter planes if the claims made for a newly invented engine are realized. This motor derives its power from the intermittent detonation of mixed fuels, carbon disulphide and nitrous oxide. The inventor says his engine would enable a bombing airplane to carry eighty-five per cent higher loads, and would save one-third of the takeoff time and distance.

*Wm. & B. Myers*

### Cash Box Helps in Budgeting by Keeping Funds Separate



*Wm. & B. Myers*

Budgeting your cash that is to be spent for a variety of definite purposes is simplified by a budget box containing six separate compartments. Each compartment contains

*K1309 Electric nut*  
the money allotted for one class of expense, such as rent, food, clothing or entertainment. Printed labels, supplied with the box, may be attached to the compartments to designate their classification. Each compartment has a slot for inserting coins and a circular opening for bills.

### C-Clamp/Worked Like Pliers Is Adjustable to Job

To help speed up production where small parts must be held together for drilling, filing or riveting, there is a C-clamp that operates like pliers. Once the adjustable jaws have been set to grip the work, only the handles need to be manipulated when inserting or removing the material. The clamp opens to one and one-quarter inches.

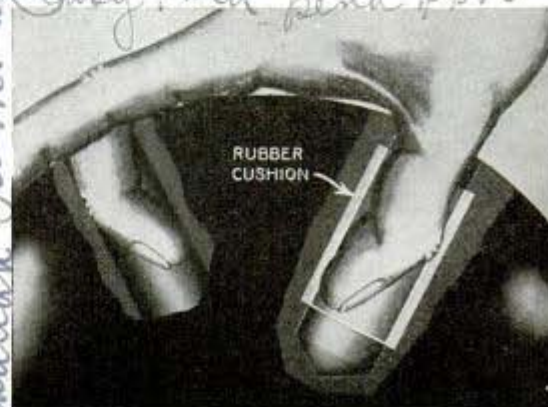


*K1365*

### Rubber Grip for Bowling Ball Lessens Hand Fatigue

*Acme*  
*Easy Hold pend \$1.00*

Less fatigue and slipping, and improved control and accuracy are claimed for a bowling ball having a rubber cushion built into the hole for the thumb. Replacing the hard, glazed hole surface with a rubber bushing provides a sure grip and helps the player avoid dropping the ball. Although a bushing only in the thumb-hole is said to be sufficient, the bowler may have one installed in the finger holes also.



**Rubber bushing shown in thumb-hole of bowling ball prevents slipping, reduces fatigue and helps score**

POPULAR MECHANICS

*Wm. & B. Myers*  
**Bowling Ball**

K1346

# War Calls Out Muscles and Outdated Engines



Both Germany and England are exerting themselves to conserve precious gasoline, and wherever human muscles can do a job they are doing it. Witness, above, the pleasure boat that made its debut recently at Berlin. It has a propeller with chain and sprocket drive calling on arm and leg power; not so romantic as paddling a canoe, but it gets places. At upper right a Londoner pedals to work in a "Velocar," of French origin. In the two-seater model both driver and passenger provide the motive power of the toylike car



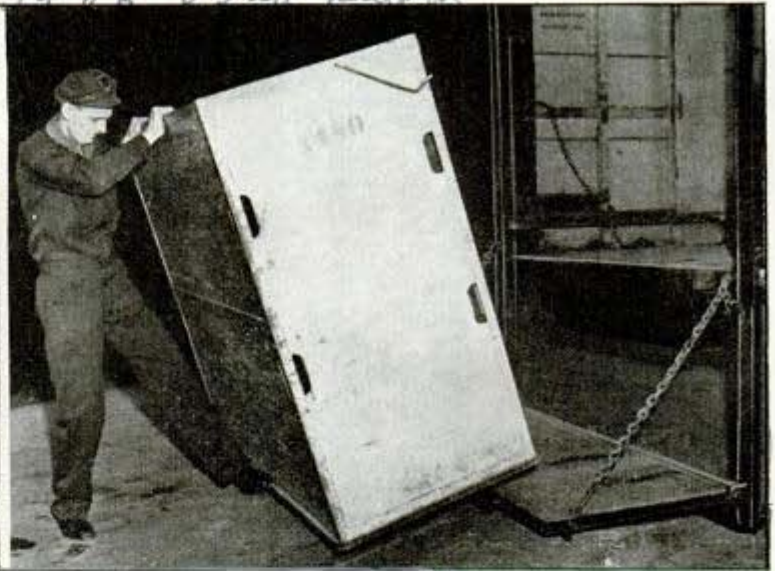
In Europe, hungry airplanes and tanks, torpedo boats and trucks and industrial engines drink gasoline greedily. Virtually all of the available fuel supply is reserved for the war effort, and that leaves little for the commuting motorist or sportsman. The fuel famine thus is bringing back motors reminiscent of earlier days, and even leg power. Remembering the electric automobiles of a generation ago you'd hardly recognize the streamline coupe above as a battery-driven car, but such it is, seen touring the streets of Paris at thirty miles an hour. Batteries are charged overnight. At left is a motorcycle in blockaded Sweden, driven by charcoal-generated gas

MARCH, 1941

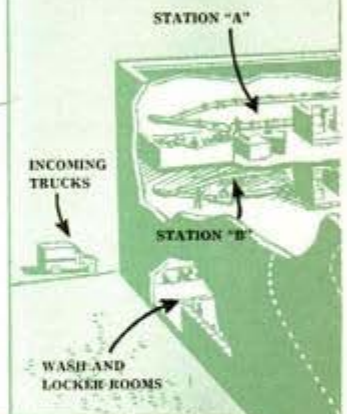
*Cl. W. E. Heising  
Stockholm  
Sweden*

*Gene*

# MECHANIZING



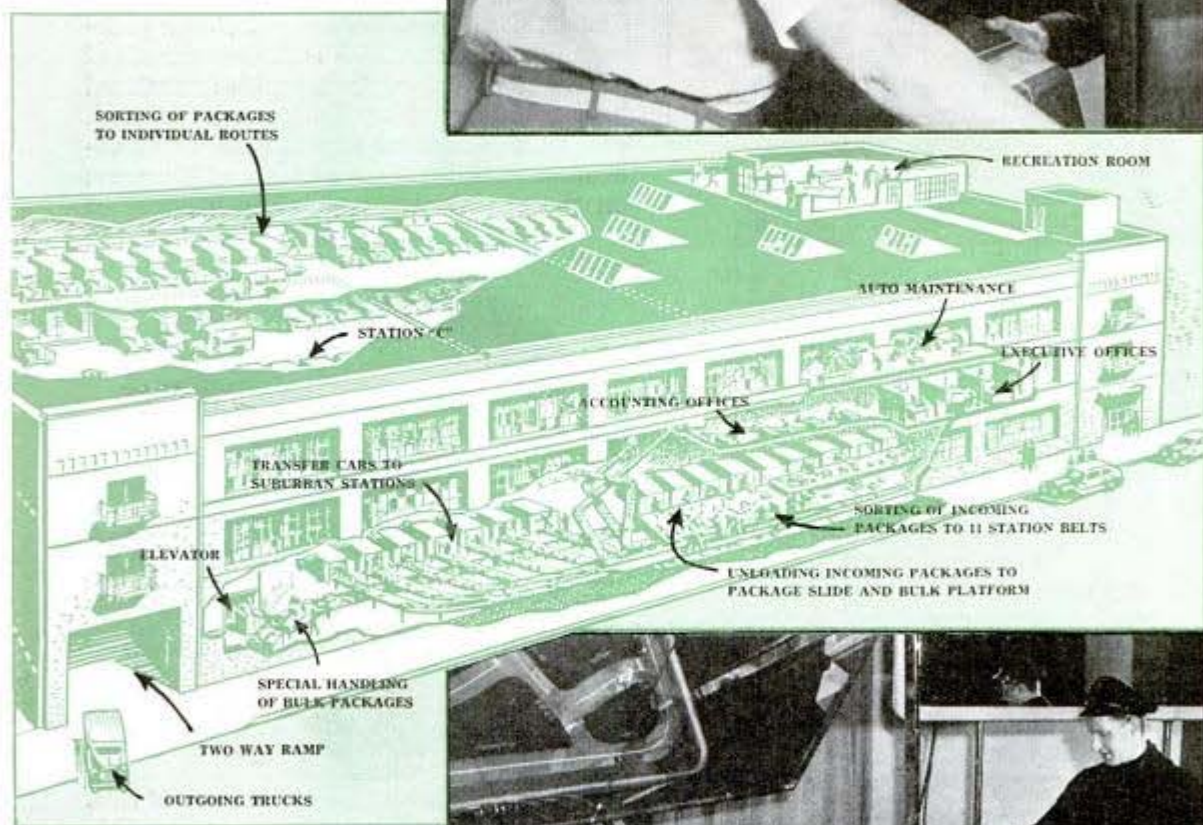
From a single boy on a bicycle to a nationwide service whose trucks travel more than 20,000,000 miles per year—that's the story of United Parcel Service which delivers hundreds of thousands of packages a year in sixteen cities. The "delivery boy" organization specializes in handling deliveries for retail stores. Above, left, driver checks up on himself before starting day's run. Right, loading parcel-filled container on tailboard of truck. Tailboards of some trucks are elevators which hoist the containers to level of truck floor



Circle, coils on roof of test truck help regulate motor temperature and prevent overheating during deliveries. Bottom, left, conveyor in floor moves heavy packages. Right, conveyors bring sorted packages to slides for loading

# the "DELIVERY BOY"

Right, part of the driver's job is to make a good impression. Center, typical package-handling station, with sorting, loading, special handling and other posts indicated. Note drivers' recreation room on roof. In the station a package is never handled if a machine can move it. Conveyors are used wherever possible. For instance, the sorting device, called the Pit, has ten belt conveyors moving into and out of it at one time and a 168-foot steel-slat conveyor set in the floor moves bulk packages in the New York plant



Right, drivers are encouraged to take safe-driving tests. This device simulates actual road conditions. At inspection each morning the drivers are given the final admonition, "Drive safely today." Their safety record is exceptionally good. The trucks are kept spotlessly clean and the company is now experimenting with a washing system that uses a quart of chemicals, fifty gallons of water, an air blast and three minutes to turn out a spick-and-span truck. A man opens a valve and a machine does the work



K139 3

## 'Venetian Blinds' in Goggles Shade the Wearer's Eyes



Notice that wearer's view is virtually unimpeded, yet overhead sun rays are intercepted by "blinds"

Tiny Venetian blinds are built into the top of a new type of sun goggles to shade the eyes from direct sun glare. The Venetian-like structure is an integral part of the lenses, formed by deep rectangular indentations in the lens material which are then filled with opaque liquid. While the uncolored lenses are about ninety-eight per cent transparent, the upper part intercepts overhead sun rays and casts a shadow on the eyes. In one type, the "blinds" are made of thin, flat wires.

## Padlock Jaws Closed by Screw Grip Like a Vise



Constructed along the lines of a vise, a screw-type padlock opens and closes its jaws when the threaded locking piece is turned, which can be done only with a key. The two halves of the lock are drawn together the same as they

would be with a half-inch bolt. If anyone succeeded in picking this all-purpose lock, he would find that on each quarter turn the tumblers fly out in locked position, requiring at least fourteen picking operations to unscrew the plug enough to allow the lock to be removed from the hasp. Keys are protected by secret key codes.

## "Noise Sleuth" Helps Silence Cars by Tracing Source of Sound

Tracking annoying sounds to their sources is the job of "noise detectives" at Ford Motor company. Some noises in the new models are easy to trace and rectify, but others require the application of scientific instruments in ferreting out the offender. One instrument is a vibration pick-up and analyzer, which is the outgrowth of stethoscopes, microphones with directional baffles and sound level meters. In difficult cases the acoustical expert places this vibration detector on a panel and observes on the electrical recorder the number of



By pressing this instrument against panel of auto, expert traces noise-making vibration to its source

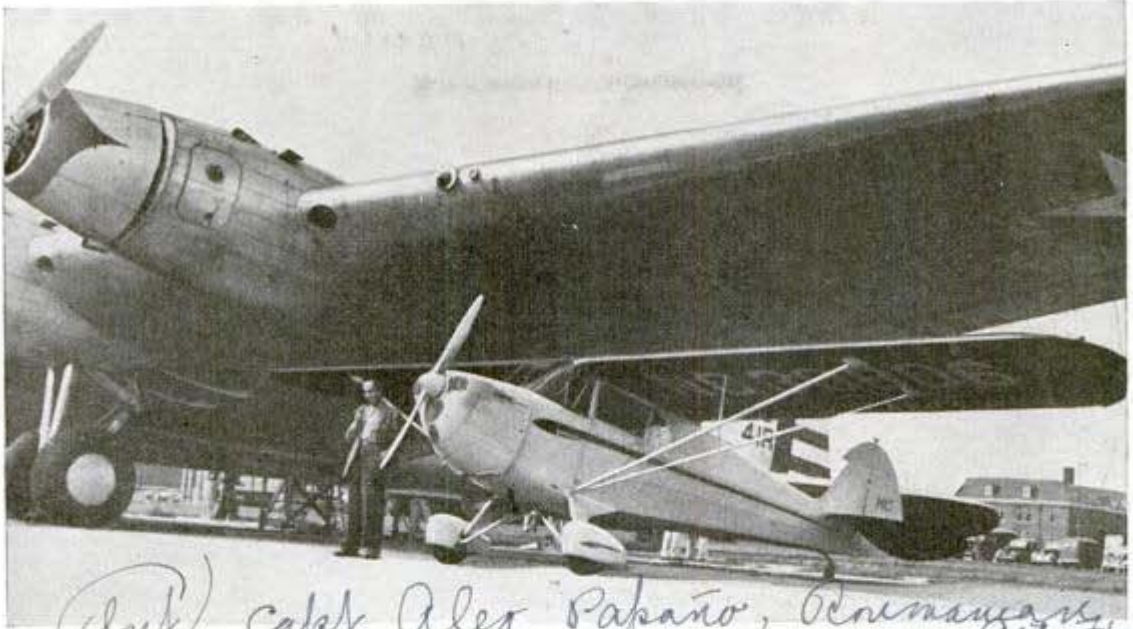
vibrations per minute at certain car speeds. If the vibration should be at the rate, say, of 2,100 per minute at twenty miles an hour, the engineer locates some shaft that revolves, or a part which reciprocates, at that rate. A study of that part frequently discloses the cause of the trouble.

Forest fires broke out on an average every two and one-half minutes during 1939, the 212,671 reported fires burning over 30,000,000 acres at a loss of \$40,000,000.

Chicago Lock Co  
2020 N Racine Ave  
#2155  
January 592 St. Chapin B.  
with Bend

K1334

# Huge Wing of Bomber Dwarfs Small Plane



*(sub) Capt. Alex Papano, Romania, all of one*  
The army's huge Boeing B-15 bomber was too big to get into the picture, and one wing furnishes a roof for a little Piper coupe. The scene is at Mitchel Field, Long Island

Some conception of the immensity of America's "flying fortresses" is gained by a comparison with the little private planes so familiar on airports throughout the country. The other day a Piper coupe, just

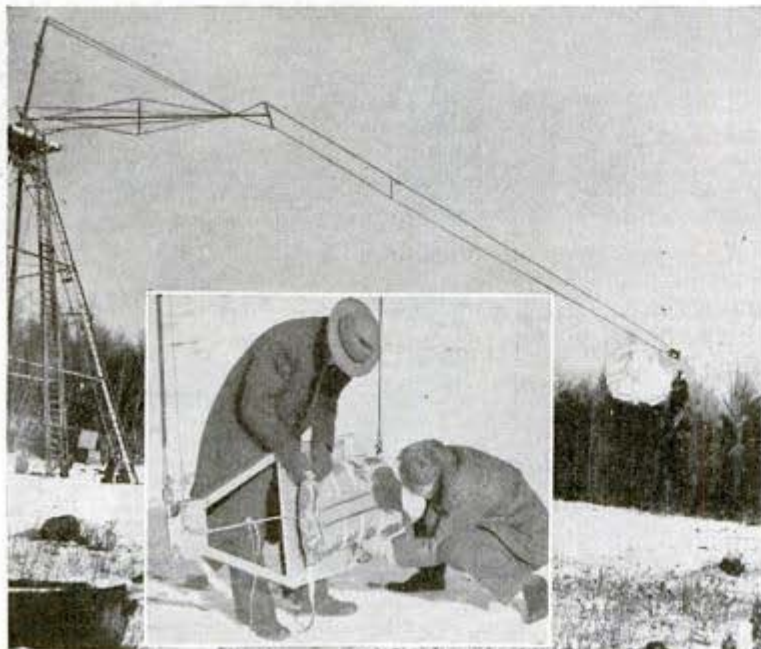
arrived at Mitchel Field, Long Island, rolled over beside a Boeing B-15, one of the largest planes in the world, and snuggled comfortably under the wing of the army bomber. The contrast was startling.

K13-36

## Whirling Dummy Tests Parachute for Slow-Motion Film

High-speed motion pictures of a parachute opening under controlled conditions

are enabling designers to determine the cause of parachute failure—a rare accident, but a disastrous one when it does occur. At Manchester, Conn., a fifty-foot tower has been erected from which a boom whirls a dummy and its parachute around a 200-foot circle. The parachute is released, and at the same instant the camera fastened at the end of the boom starts filming the action of the parachute. After photographing a number of tests under varying conditions, the engineers project the film at slow motion and study the operation of the 'chute.



In the inset engineers are fastening dummy and parachute at end of boom

*Pioneer Parachute Co  
Manchester, Conn*

R1069 Cont. Thomas G. Skimison Jr.  
3803 Franklin  
Los Angeles

# RADIO HAMMS

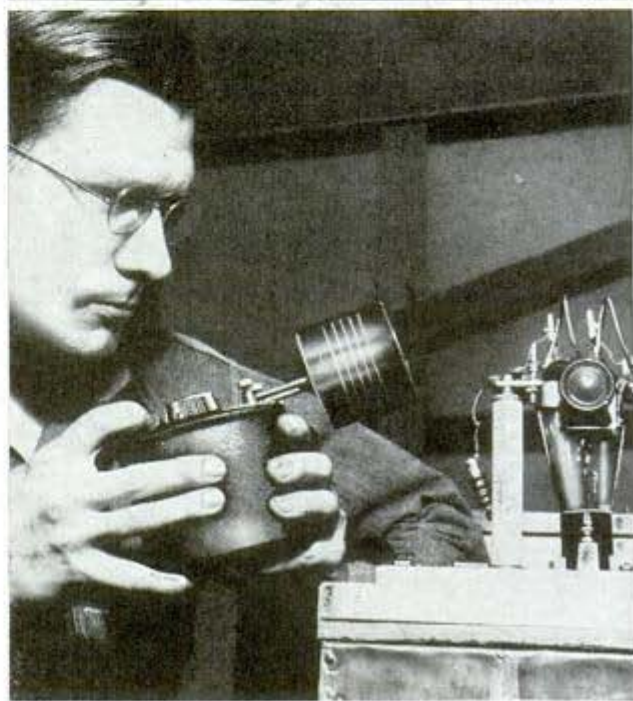


"YOUR radio transmitter is completely smashed by a falling chimney. How long will it take to borrow an old broadcast receiver from a neighbor and build a new transmitter from its parts?"

That's a sample of the questions that radio amateurs are being asked. Aware of the grave possibility that it may need to help defend America, the amateur world is preparing itself for action. Half a dozen different radio organizations are drilling over the air.

"Simulate destruction of your main transmitter. Rig up your emergency equipment and report back on the air as soon as you can," was another command that went out to members of one group. Recently when a club of amateurs assisted in nighttime army maneuvers, one operator was asked how much time he would need to get his portable station into operation in the field, without even a match to help him see. "Six minutes is the average time," he replied. The officers were skeptical but in less than that time he had opened up his suitcase set, attached a six-volt automobile storage battery, hammered a ground stake into the earth, slung his antenna to a tree, and was tapping out a call to the control station fifteen miles away.

The Army Amateur Radio System that is affiliated with the Army Signal Corps, the



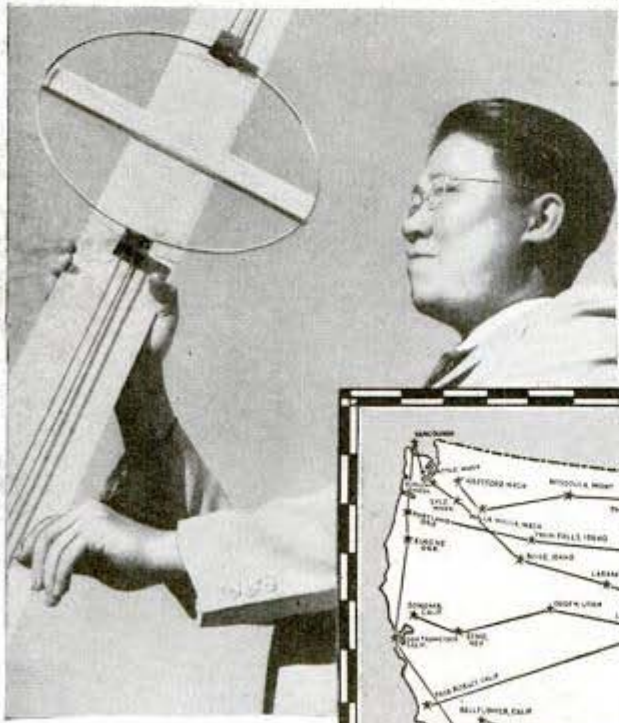
Top, left, amateur with lightweight key station in field. Right, transmitting equipment at emergency station. Bottom, measuring wave length



K1069

Naval  
U. S.  
Los  
Army  
Offi  
San  
A. R.  
Glen  
Maj  
Rice,

# PRACTICE for WAR



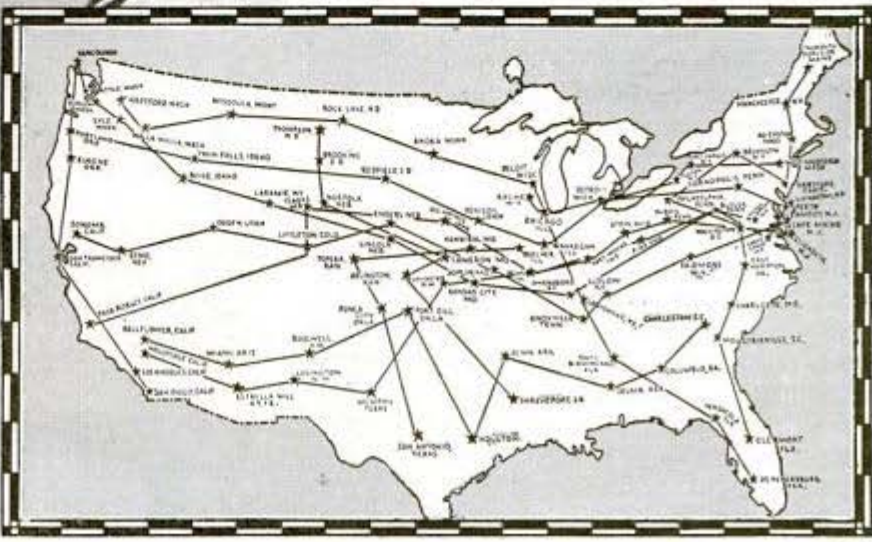
Naval Communication Reserve, and the Amateur Emergency Corps of the American Radio Relay League are the three main networks of amateur preparedness.

In time of war thousands of trained members of these nets would be taken in by the military services for active duty and many others would be detailed to guard various frequencies to detect enemy and spy messages. Restrictions governing amateur radio are being tightened and today all owners of amateur transmitting stations must be fingerprinted and show proof of citizenship. Communication with stations outside of the United States and its possessions is no longer allowed.

On several recent occasions zealous amateurs copied down code messages that didn't seem to make sense and forwarded them to the Federal Bureau of Investigation. All the messages were harmless, it so turned out, and were secret code practice messages of the army amateur net, which sometimes uses an obsolete cipher for training. The army amateurs use Z signals instead of Q abbreviations and they are trained to handle messages using army procedure. Close to 1,800 operators are members of the system, which is controlled by an officer in the Signal Corps message

*Top, member of amateur radio emergency corps throwing line over tree for stringing up a temporary antenna in the field. Left, antenna for radiating signals from small automatic transmitter*

*Right, map showing twelve trunk lines of American Radio Relay League. This system would be invaluable in a national emergency*



X1069



examination or age limit. A number of radio phone operators are members of the net but code predominates and is preferred because code operators are of more value to the military service and dots and dashes carry farther and are easier to read through interference. Several practice drills are held over the air every week. The army amateur group is fifteen years old and long has been recognized and used by the Red Cross. It is still the official communication system for that organization. In time of emergency any member station in the net has authority to handle emergency radio traffic on an army frequency authorized for army use only. During several major floods members of army networks have performed important duties.

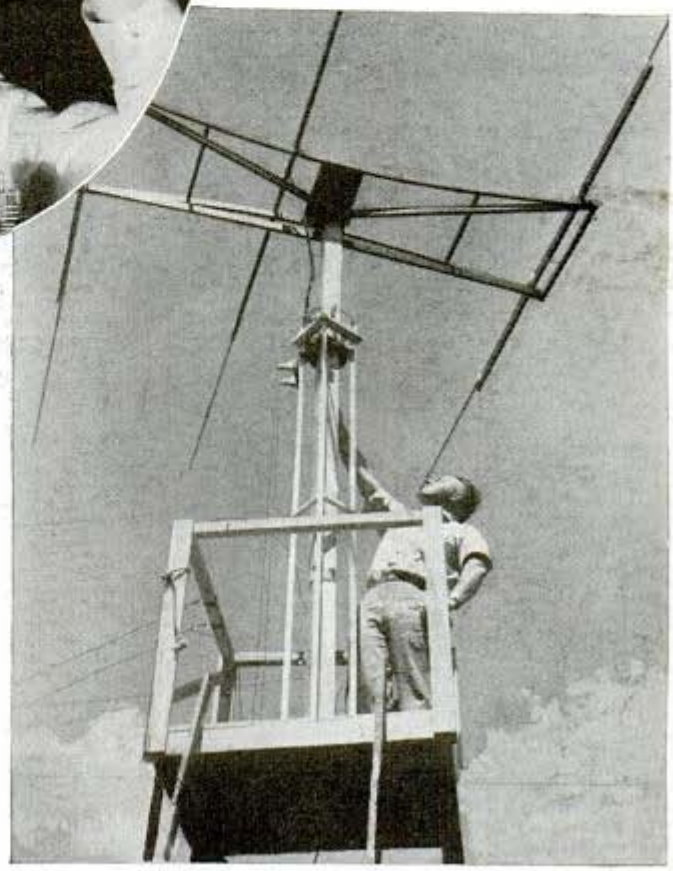
(Continued to page 118A)



*Top, amateur operator at station controls. Center, plug-in frequency coils used to change station's transmission wave length. Bottom, rotatable beam antenna*

center in Washington, D. C. The national army network is divided into nine corps area networks each under the corps area signal officer, and these in turn are made up of state nets. Each state net consists of a number of local networks that are comprised of groups of amateur stations.

The army amateur network is not a part of the military service. To join it you need to have a reliable transmitter, be able to operate at least fifteen words a minute and conduct yourself and your set properly. There is no physical



K1332.

# Soldiers Use Boats to Ferry Tank over River



Army engineers ferrying medium tank across river. The ponderous machine is lashed to a couple of flat-bottom boats which serve as pontoons, and men in the boats use oars to help guide and propel it

In demonstrating river-crossing technique, companies A and B, fifth engineers, at Fort Belvoir, Va., recently showed how two flat-bottom boats could be used to float

a medium war tank when they encounter water too deep to ford and too wide to bridge. The tank was lashed between the boats, and soldiers ferried it across.

## Chair Folds Up Three Ways into Sixteen-Inch Package

Suitable either for dining-room use or as part of a card-table set, a folding chair can be collapsed into a compact package sixteen and one-half inches square. Despite its triple folding arrangement it is sturdy enough to support a heavy weight and stand hard usage. Pressing a small bar under the seat releases the mechanism to permit quick and easy folding. The chair is available in various styles and coverings.



Chair is shown folded, erect, and in process of folding

## Smoke Screen in Air-Raid Shelter Kills Air-Borne Germs

Air-raid shelters in London soon may be subjected to germ-killing smoke as a result of tests made at the Portslade research laboratories in Sussex. The two most effective out of six tested varieties of smoke screens are incense, such as is used in churches, and smoke emanating from smoldering cardboard soaked in saltpeter. Gear-grease heated on electric plates also had a killing effect on the bacteria.

MARCH, 1941

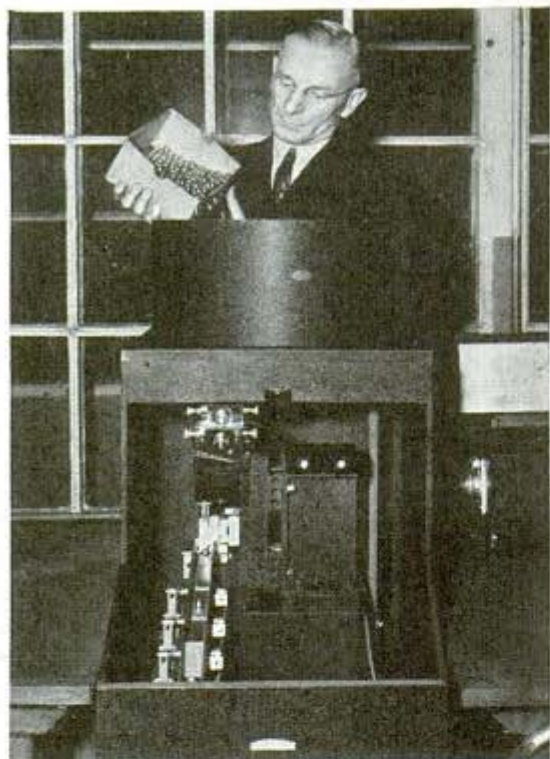
Mr. C. C. Taylor  
and A. H. Baker

Chair Service  
No. 1640

Ferguson Bros. 66 Lake Shore

K1393

## "Fitness Test" for Bearings Notes Millionth-Inch Error



Ball bearings poured into hopper at top are fed into classified bins at a rate of 5,000 per hour

Ball bearings must be "tailored to measure" within a tolerance of millionths of an inch at the Ford Motor plant, and a special machine has been devised to check the dimensions and roundness of the balls. After measuring the balls electrically, it sorts them into five different classifications. Balls fed into a hopper at the top drop into the classified drawers at a rate of 5,000 an hour, being checked for oversize, under-size, under-high limit and over-low limit; any ball not perfect in shape and dimensions will open a trap door and fall into its proper receptacle. Perfect balls drop to the bottom of the machine.

*clearborn mech*

*March 1940*

*Chicago, Illinois, March 16, 1940*

## Water Reacts with Compounds It Dissolves, Chemist Says

Assumptions of chemists that neither water nor chemical is changed when the latter is dissolved in water have been challenged by Dr. David Harker of Johns Hopkins University, who found by experiments that most inorganic compounds actually react chemically with water when

*Baltimore, Md*

dissolved. Aluminum chloride, for example, breaks up into ions of aluminum and chlorine in a water solution. The aluminum ions unite with six molecules of water (hydrogen and oxygen) to form a large molecule of aluminum, hydrogen and oxygen—a strong acid.

K1823

## Stereoscope Holds Seven Views Mounted on a Disk

Still making a bid for popularity, the old parlor stereoscope is now being offered in a compact, "streamline" form, showing pictures mounted in disks that contain seven colored stereographs each, instead of the traditional card that holds but one view. Tripping a lever at the top of the new stereoscope, which is made of durable plastic, brings the next picture into place, and this may be repeated until the seven have been seen. Originals for the views are made with a special miniature camera, using natural color film. Pictures are paired opposite each other on the disk, and when viewed through the apparatus they give a three-dimensional effect.

*New Master \$1.50*



Disk of seven pictures, top, loads into stereoscope. Bottom, lever at top edge turns disk to change scene

*418 W. 6th St. Los Angeles*

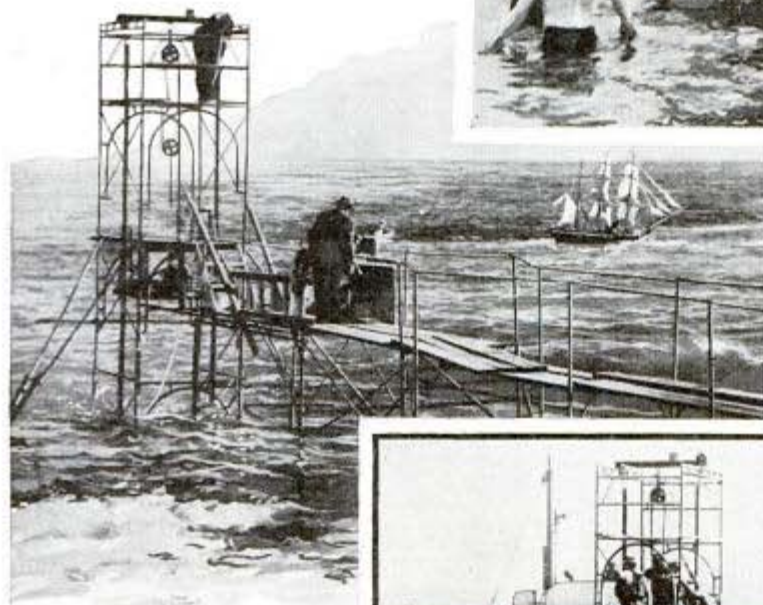
издательский центр «Спутник»

K13/2. Capt. Albee Warren Albee  
 847 2333  
 847 2333

# Wind Machine Sails Model Ships to Sea Battle

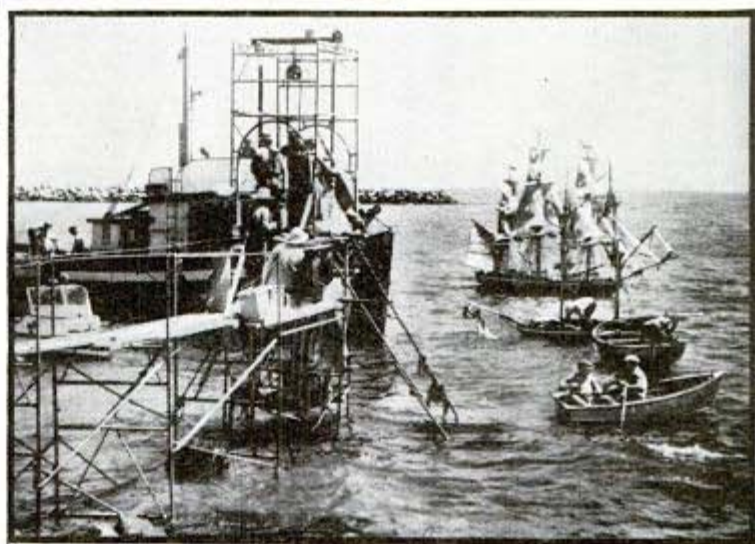


In their realistic battle at sea the British brig "Beetle," above, catches fire under a broadside from American frigate "United States." The scene at right gives a better idea of the actual size of the ships; the movie-camera crew wades in to steady the model while one man adjusts sails



To create effect of waves breaking over the bow, the model was towed (left) at high speed some distance from camera, and camera speed was increased about four times normal. Below, battle has ended and a movie technician has boarded the burned "Beetle" to clean up the wreckage. Tug, launch, rowboat and dinghy all participated in filming

Because it cost too much to build and burn a warship of 1812 type for the movie "Captain Caution," scale model ships were built. More than 100 men helped operate wind machines to fill the tiny sails, towed the vessels with rowboat or launch and waded in to move tiny figures on decks to simulate battle action. Camera crew worked on platform that was raised or lowered with changing tides to keep camera a foot above water



K966 Cmt. Marshall Perham  
1128 S. Normandie Ave.  
Los Angeles

# INVISIBLE DEATH



Top, making street survey with movie camera to show what man at the wheel sees, a method of tracking down illusions. Below, an eye test with the Adaptometer for vitamin A deficiency

**G**ET into a highway accident in the future and you'll more likely be subjected to blood tests and biophotometer examinations than a quiz by the district attorney. For a revolution is brewing in traffic accident investigation.

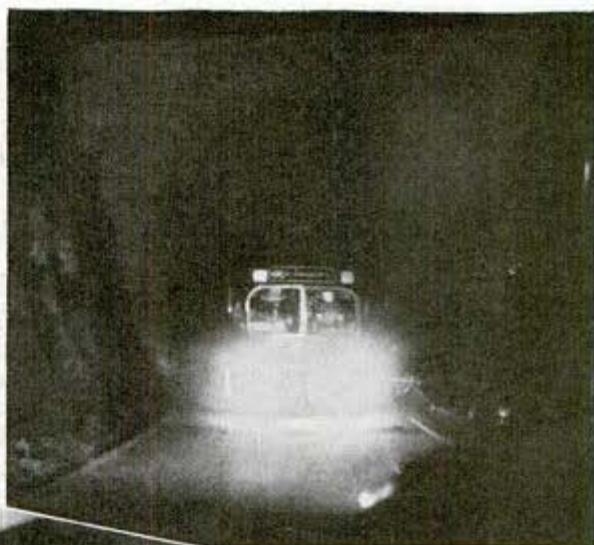
Recent discoveries indicate that accidents are not as often caused by negligence as by an unseen passenger—Invisible Death—who snatched control at a critical moment. New instruments reveal the true culprits as clearly as X-rays reveal bones.

Leading ally of Invisible Death is carbon monoxide—a colorless, odorless, non-irritating but deadly gas, which strikes by lulling its victims into unsuspecting sleep. We have known the existence of this lethal gas for a long time, but only now are we becoming aware of its significance in traffic.

Carbon monoxide induces not only a full, heavy sleep, but also a partial sleep during which the victim is fully conscious, perhaps

filed on mark 9.66

# on the ROAD ..



*Above, if headlights look like this you have vitamin A deficiency; right, how lights should look. Center, hapcolite machine testing exhaust for leaks. Bottom, muffler of car whose driver fell asleep from too much carbon monoxide*

not aware of drowsiness, but as unable to control his reflexes as if he were thoroughly intoxicated. Experts estimate that in no less than one third of all accidents involving human error, this condition enters in.

Insurance companies discovered that drivers of older trucks on long hauls were more prone to go to sleep at the wheel than operators of newer models. To learn why, hundreds of cars were stopped on state highways and their drivers submitted to hemoglobin tests. Well over half gave evidence of carbon-monoxide poisoning!

These tests reveal the presence or absence of CO in the blood, but not the quantity of it or its source. To trace these

(Continued to page 116A)



K1361 Pasadena Calif

### 'Skyscraper' Steam Cooker Adds Units as Needed

Steam Cooker



Six different dishes are nested to be cooked over the same burner by the "skyscraper" steam cooker

An entire dinner can be cooked over one burner by using a "skyscraper" steam cooker invented recently. One, two, or even ten units can be used, the pots fitting into each other in a vertical stack. The bottom pot is set over the burner, and the steam cooks food in all the pots.

Wide World

and Quincy C James

garage business, but a new jack makes it possible to free the muffler in less than five minutes, even when "frozen" to the exhaust pipe. The tool clamps on the exhaust pipe. A metal lip presses onto the muffler and by means of a pressure screw can exert as much as twenty tons pressure.

### "Prolon" Is Name of Newcomer to Synthetic Fiber Family

Taking its place among the group of synthetic fibers such as nylon and rayon is "prolon," the new name for what has been called "casein wool," made from casein obtained from milk, soybeans and other sources. This name was suggested by F. C. Atwood, of Atlantic Research Associations, because, as he states, the fiber itself is not casein only, but a combination with other materials, and neither is it wool. Yet it acts like wool in some cases, although it may resemble silk or fur in other cases. Mr. Atwood predicts that soon we will be buying clothes and other articles of prolon.

newcomer

### Clip Board Has Built-In Light for Making Notes at Night



Flashlight bulbs in metal case at top of this clip board light the paper while officer writes report

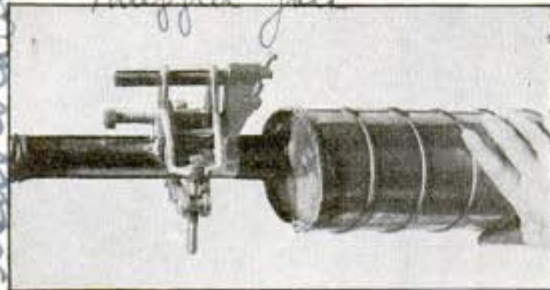
Police officers, truck drivers and others who must take notes or write reports after dark find a lighted clip board handy. A metal case at the top holds two flashlight batteries, and the twin bulbs are screwed into sockets in a recessed opening. They are turned on by a switch at the side.

Pure Science

### Jack to Remove Any Auto Muffler Exerts Tons of Pressure

Removal of automobile mufflers is a common and frequently a tough job in the

muffler jack



Clamped to the exhaust pipe, this jack will force the muffler free within five minutes

2866

Blaidell - My Co 1512

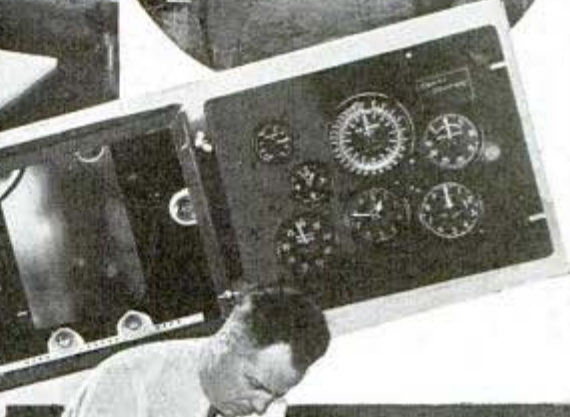
Long Beach Calif

POPULAR MECHANICS Forest Metal Rodent Co 319 Forest Ave



K1310 Capt. Charles Wolf Roberts 4630  
New Hampshire Ave. N.W.  
Apr. 2, Washington  
D.C.

# Robot Observer Records Test Flight on Film



*Emil Hennich*

Engineer, top, studies film on special projector; circle, knee pads formerly used by pilots in making notes of test flight. Strip, center, complete photographic equipment, and, at right, it is assembled for installation

*Wayton Dhe*

No longer need a test pilot rely entirely on pencil notes and memory for making his report when he roars an experimental plane into the clouds. For he can now take along a robot "photographic observer," developed by air corps technicians at Wright Field, that records instantaneously on a film, by pressure of a trigger switch, the readings from a bank of seven to fifteen instruments, depending on the space available for installing them. The apparatus consists of a thirty-five millimeter movie camera equipped with a lamp housing to provide uniform lighting for the special set of instruments duplicating those on the

pilot's instrument board, together with any other gauges and meters that may be desired. After recording a flight, the developed film is projected through a machine which enlarges each frame on a ground glass screen for studying the results of the test. Photographic records are of special value in tests where instrument readings change rapidly, as in take-offs, in finding the plane's rate of climb at various altitudes, and in determining the altitude at which the plane gives maximum performance. With the new "silent partner" aboard, the pilot may devote his entire attention to maintenance of uniform speeds.

2-11-39. Capt. Randolph Robert  
 4630 New Hampshire Ave NW  
 Wash DC

# COMBATTING



Above, member of fumigation crew wears mask and carries flashlight and can of fumigant. Right (upper photo), pumping fumigant into corner. Lower photo, golf bags damaged by rats

Office of Health Education

**UNCLE SAM** is waging a new war on the rat which causes damage estimated at \$2,500,000,000 each year. Rats destroy property, food and merchandise; they invade homes, factories, farms and ships and they cause fires by carrying matches to their nests and by gnawing insulation from electric wiring.

In this latest fight against the rat, every section of the country is cooperating. In charge are the U. S. Public Health Service and the Fish and Wildlife Service. Enlisted in the war are farmers, grocers, doctors, businessmen, manufacturers, college boys, school children and home-owners. In fact, every type of person.

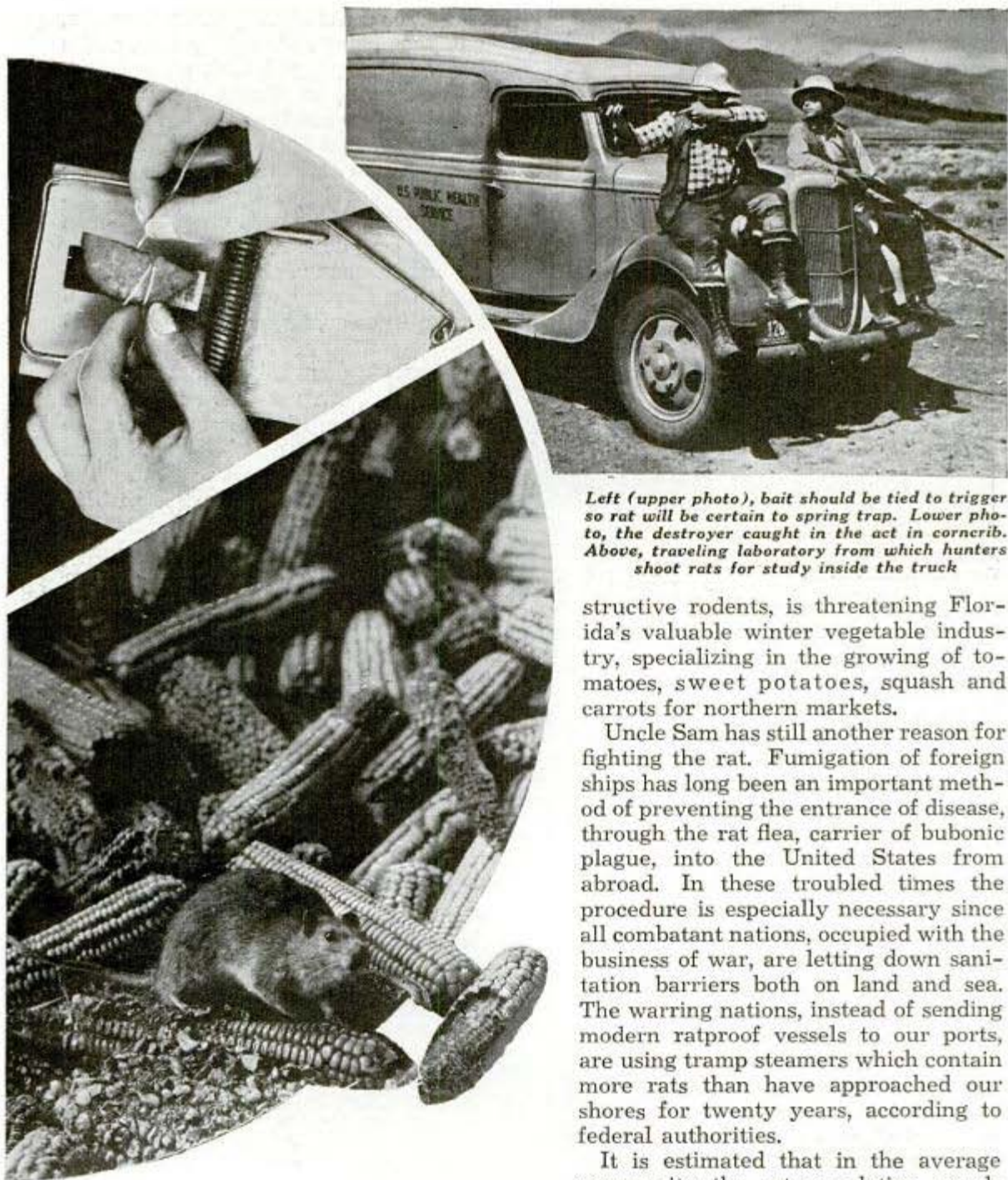
Leading cities along the Atlantic and Pacific coasts are improving their trash dumps so that no longer are they such large-scale breeding grounds for rodent pests. Galveston, Tex., has adopted a wholesale plan for poisoning rats that permits most residents of the surrounding region to buy, for an astonishingly low price, poison bait that is placed by each purchaser in favorite rat

haunts located in the vicinity of his home.

As for the mid-west, especially the corn belt, this section is now achieving marked success with a new portable device that poisons rodents which breed in cornercribs and granaries. This apparatus sprays liquid gas into storage places worth millions

R1189

# the RAT MENACE



*Left (upper photo), bait should be tied to trigger so rat will be certain to spring trap. Lower photo, the destroyer caught in the act in cornerrib. Above, traveling laboratory from which hunters shoot rats for study inside the truck*

structive rodents, is threatening Florida's valuable winter vegetable industry, specializing in the growing of tomatoes, sweet potatoes, squash and carrots for northern markets.

Uncle Sam has still another reason for fighting the rat. Fumigation of foreign ships has long been an important method of preventing the entrance of disease, through the rat flea, carrier of bubonic plague, into the United States from abroad. In these troubled times the procedure is especially necessary since all combatant nations, occupied with the business of war, are letting down sanitation barriers both on land and sea. The warring nations, instead of sending modern ratproof vessels to our ports, are using tramp steamers which contain more rats than have approached our shores for twenty years, according to federal authorities.

It is estimated that in the average community the rat population equals that of human inhabitants. On the farm the ratio is about two to one, while in the big corn and granary regions it sometimes jumps to six to one. Rats are very prolific, producing an average of five litters annually, of four to nine rodents each. The Public Health Service estimates that two rats

that previously were impenetrable to poisons and fumigants.

Practically all the states in the mid-south, especially Georgia and Tennessee, are staging trapping or poisoning campaigns in cities, counties and townships. The cotton rat, one of the world's most de-

R1789



Photo courtesy  
U. S. Public Health Service

reproducing over a period of five years, will increase to 940,369,969,152 animals, provided all the parents are healthy.

The cost of feeding a rat is generally estimated at one-half cent a day or nearly two dollars a year. Assuming that the number of rats in the United States equals that of the human population, the yearly cost of feeding these dangerous pests amounts to approximately \$250,000,000. As the value of material destroyed or damaged by rats in addition to what they actually eat is estimated to be ten times this amount, the annual cost of maintaining our normal rat population reaches the staggering sum of \$2,500,000,000.

The new portable apparatus for fumigating corncribs and granaries, devised by federal scientists, consists of a container for liquid hydrocyanic acid, equipped with

an air pump and spray hose. When not more than ten pounds of gas is needed, the fumigant can be applied quickly. In fumigating corncribs, granaries or freight cars the storage place is sealed, one door being left slightly ajar, and a spray rod, equipped with an ordinary spray nozzle, is thrust through the opening. The rod is connected with the applicator, and liquid acid is forced through the nozzle by means of air pressure developed by a hand pump. One application of gas often results in 100 per cent destruction of the rats.

Most common variety of rat in America is the Norway or northern. Dirty-brown in color, its average weight varies from ten ounces to a pound. Usually the northern rat that ruins a corn crop in the summer is the same rat that invades the home, the warehouse, the restaurant or the public building in the winter. It builds a nest outside when it's warm and inside when it's cold. Most northern eradication campaigns are held in October and November, just after the animals start making themselves comfortable for the cold months.

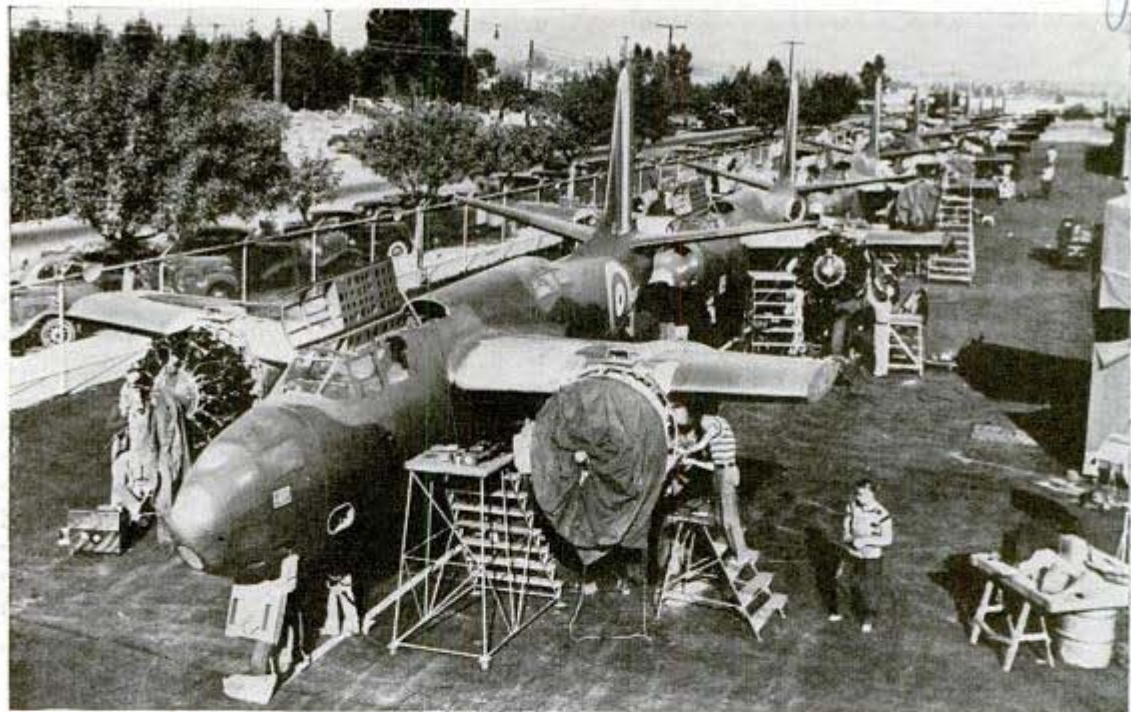
Uncle Sam's newest weapon for fighting the Norway, or northern, rat is a sort of "torpedo" made

(Continued to page 130A)



Top, using a poison pump aboard ship. Center, electrical wiring from which rats have gnawed the insulation, creating a fire hazard. Bottom, covering rat hole with tin is one means of keeping the pests out of the house

*K1341 Douglas Aircraft Corp., Santa Monica Calif.*  
**Bombers Line Up Outdoors for Final Touches**



*Alme*  
 Twin-engined bombers lined up in outdoor assembly line at Douglas factory to speed production of war orders. Some of these ships will be flown across the country for delivery to agents of Britain

Assembly lines for the new Douglas twin-motored DB-7 attack bombers move out of doors, where there is plenty of room for the planes to spread their wings, as the

ships near completion. Bombers intended for Great Britain are flown from the factory in Santa Monica, Calif., to New York before being released for war duty.

*K1354*  
**Small-Size Milling Machine Relieves Large Units in Shop**

By performing milling operations on small pieces at low cost, a bench milling machine combines economy and efficiency in tool rooms and shops where "bottle-necks" are frequently created by tying up larger machines with small work. The diminutive miller accurately handles the full range of millwork from heavy slabbing and facing to light end milling, keyways, finishing and layout work.



*K1370*  
**Corn Used as Locomotive Fuel on Argentine Railroads**

Unshelled corn is being used in the Argentine as fuel for railroad locomotives and electric power plants. Experiments proved that corn could be used as cheaply as coal, wood or fuel oil. The government, which purchased the corn at twelve dollars per metric ton, or 2,204 pounds, is selling it to the railroads and utilities for less than five dollars a ton.

*Baby-size miller relieves big machine of small jobs*

MARCH, 1941

*Argentine Ministry of Agriculture*

*Atlas Press Co. Kalamazoo, Mich.*

K1376

Twelve-Track Sound Film Gives Six Hours Music



Sound reproduction in the home may be revolutionized by this method of recording on movie film

Twelve parallel sound tracks can be recorded on a special movie film, one-third the thickness of present film, under a new sound-reproduction method. Music or sound effects recorded on a 450-foot roll will have a running time of six hours, and various portions of the roll can be selected for playing by the touch of a button.

K1338

Wired Card Table Has Outlets for Electric Lights

Electric outlets are provided at two corners of a folding card table so that lamps can be plugged in to furnish light for the



In place of the bridge lamps, a toaster or percolator might be plugged into the outlets in this table

Science Service  
Dec 10, 1940

bridge game. Besides the "mushroom" lamps shown, other electrical appliances can be plugged into the outlets.

K1394

"Sulfa" Drug May Cut Mortality of Surgical Patients

Another new drug of the "sulfa" group, just announced to the medical profession, gives promise of reducing or ending the danger of infections after abdominal operations. Although fairly soluble in water this drug, sulfanilylguanidine, proved to be very poorly absorbed from the digestive tract and thus lingered in the lower alimentary canal to fight the germs always present there. Dr. Warfield M. Firor, surgeon at Johns Hopkins hospital and medical school, gave patients the sulfa drug before performing operations in the abdomen and reported that it freed the alimentary canal of bacteria and allowed the wounds to heal without infection.

Waltmore, Mo.

Portable Pipe Organ Is Played While Set Up on Table



Miniature organ, standing on table, can be played by one person while another operates the bellows

Small enough to be set up on a table, a portable pipe organ can play melodies within the range of its keyboard. Air is pumped by means of a hand bellows behind the instrument. The organ was shown recently in Berlin, Germany.



# The CRAFTSMAN

## BREAKFAST NOOK *folds flat against wall*

FROM its appearance when folded, one would never suspect that the compact unit shown in Fig. 3 could be lowered to make the sturdy breakfast nook shown in Figs. 1 and 2. It is just the thing for the small home or apartment, and it can be made inexpensively with hand tools. Fig. 7 shows clearly how the various parts are hinged together to fold properly. Corrugated fasteners are used in assembling the three rectangular frames which support the rear ends of the seats and the table. These are made double from  $\frac{3}{4}$ -in. stock as in Fig. 6, although, if you wish, the open center frame can be assembled from  $1\frac{1}{2}$ -in. stock. The combined height of the front legs and rails must equal the height of the rear frames to assure the seats and table being level when lowered. The legs, patterns of which are given in Fig. 5, are cut of  $\frac{3}{4}$ -in. stock, Fig. 4. The circular detail of Fig. 6 shows how they are fastened with dowels to the crosspieces at top and bottom.

Plywood is excellent for the seats and table as it saves considerable work otherwise necessary in gluing up separate pieces. Begin hinging the parts flat on the floor, arranging them in the position shown in Fig. 7. Twenty 2-in. butt hinges are required. First join the two side frames to the center one, then hinge the top and seats, leaving about  $\frac{1}{8}$  in. clearance between the panels. The front-leg assembly is attached  $13\frac{1}{2}$  in. down from the top.

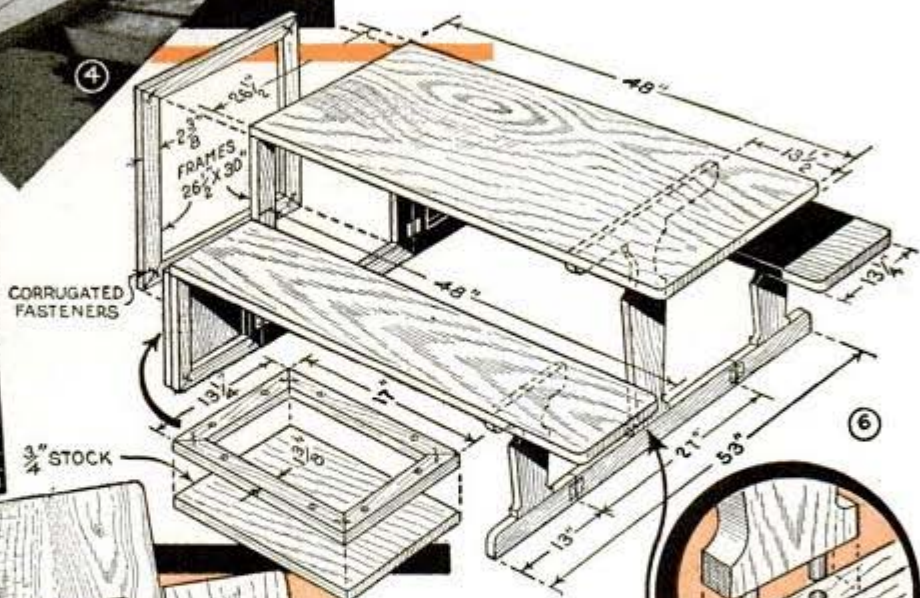
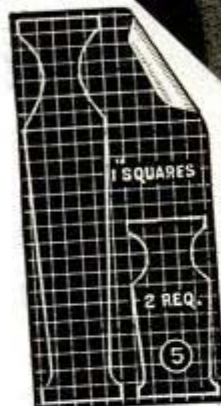


Simple, yet sturdy, this folding unit is ideal for the small home or apartment

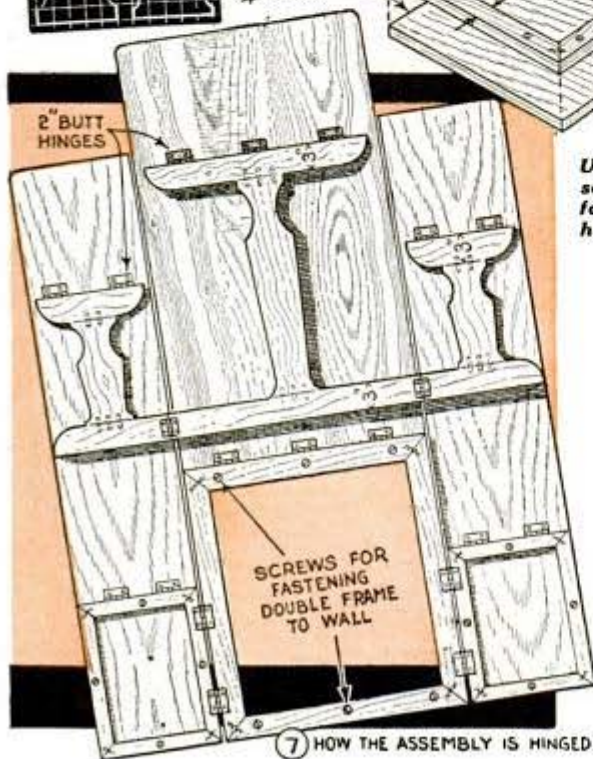
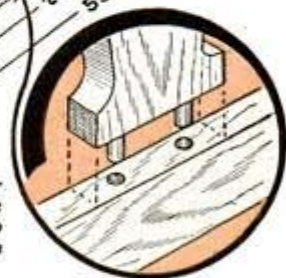




To fasten the nook to the wall, screws are driven through the lower edge of the center frame and into the baseboard. At the top, a filler strip must be inserted to bring the frame plumb with the wall, after which screws are driven through this to meet wall studs. No catches are needed to keep the assembly folded. In painting, it is best to remove all the hinges. Round the outer corners of the table and the seats, and sand the surfaces smooth. Apply a thin priming coat to the wood, followed, in order, with two of enamel. If desired, the nook can be made less noticeable against the wall if the wood is painted to match. Or, it can be finished to contrast pleasingly with the woodwork.



Use  $\frac{3}{4}$ -in. plywood for seats and table, solid stock for the rest, and paint to harmonize with the kitchen



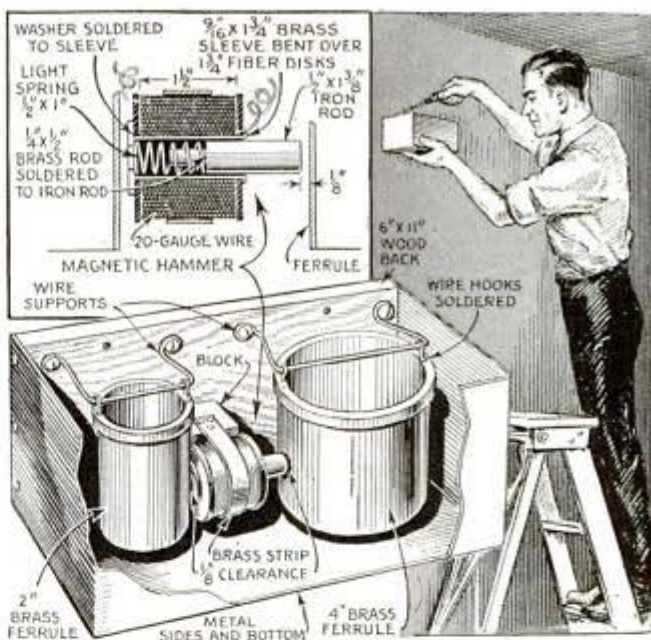
## Quick Way to Wash a Kitchen

When wiping down soiled kitchen walls which had been painted, one woman found that she could do the job quickly without cleanser and hard rubbing. All doors, windows and ventilators were closed tightly, after which a kettle of water was boiled vigorously on the stove. The oven was then heated and the door allowed to stand open. After half an hour of this steaming process, walls, ceiling and woodwork were wiped down, using plenty of soft, dry cloths. For best results, it was found advisable to work rapidly.



# Dual-Tone Door Chimes in Compact Unit

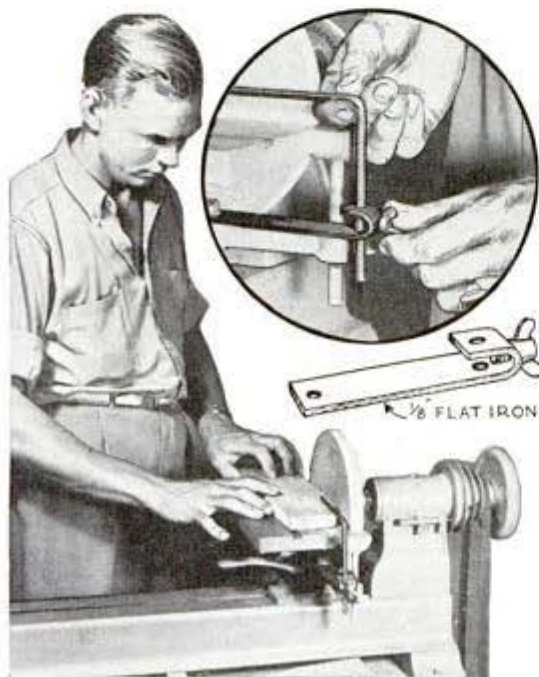
Assembled in a neat box that can be hung on a wall, these door chimes have tones that compare favorably with expensive chimes, yet do not have long tubes. The unit consists of a solenoid coil, the core of which serves as a magnetic hammer, and two brass ferrules 2 and 4 in. in diameter, which you can obtain from your local plumbing shop. To make the solenoid, first wind the coil on a spool  $1\frac{1}{2}$  in. long and  $1\frac{3}{4}$  in. in diameter, as indicated in the upper detail. The spring shown inside the coil should be just strong enough to push the plunger against the right ferrule after the current has pulled it against the left ferrule. Mount the coil on a wood block and suspend the ferrules from wire hangers. While wire hooks soldered to the ferrules can be used, a better tone will result if small holes are drilled through the ferrules so that they can be hung by means of cords. For best results, use a transformer with an output of 18 to 24 volts. When



the circuit is closed by pushing the door-bell button, the small chime is sounded, and when the circuit is broken by releasing the button, the large chime is sounded. —Fred Kaufholz, Cheyenne, Wyo.

## Hold-Down on Lathe Disk Sander Protects Your Fingers

To avoid injuring his finger tips when using a lathe disk sander, one craftsman



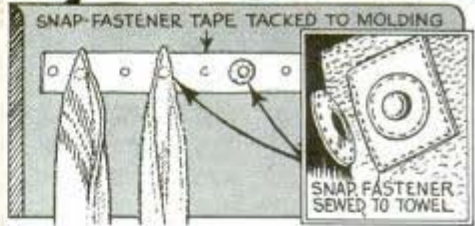
uses this jig to hold the work in place on the table firmly. It is simply a piece of  $\frac{1}{8}$  by 1-in. flat iron bent as shown, and drilled to take a  $\frac{1}{4}$ -in. L-shaped rod. The curved end of the rod support is also drilled and tapped for a thumbscrew to permit adjustment. The pivot bolt on the lathe-table support crossarm holds the jig in place.

## Threads Cleaned with Bobby Pin

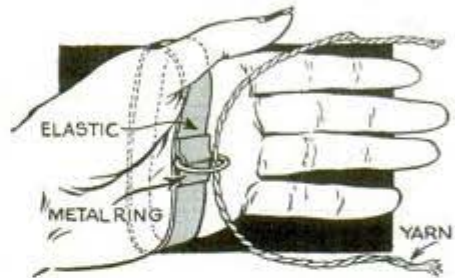
A simple tool for cleaning threads that are filled with grease and dirt can be made in a few seconds from a bobby pin. The ends are bent out as shown, after which the pin is squeezed together, lined up with the threads, and turned. If one operation does not produce a thorough job, turn the pin through again.



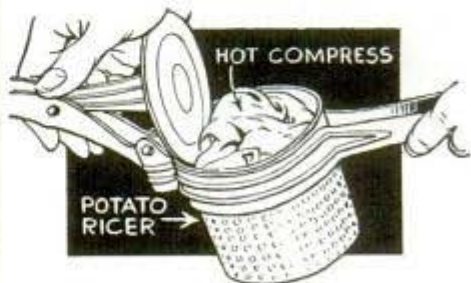
# Solving HOME



You'll save line space when drying towels and dishcloths if a pair of lines are spaced a distance equal to the width of the towels and the pieces pinned to both lines as at the left. By tacking one part of a length of snap-fastener tape to the molding of your bathroom, you will have a handy place for hanging a number of towels. The tape carrying the other half of the fasteners is cut into small sections, which are sewed to a corner of each towel

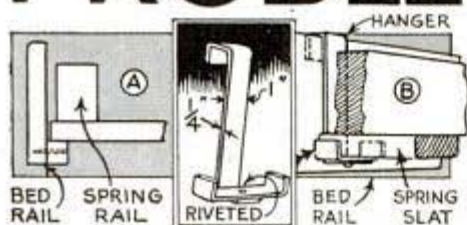


Slipped over the edge of a cake tin as at the left, a clean clothespin provides a cool handle to steady the tin while removing a hot cake. Instead of constantly pulling the yarn between the thumb and forefinger and along the palm of the hand while knitting, which may soil the yarn, attach a metal ring to an elastic band as above and slip this over the hand. The yarn can be held loosely without contacting the palm

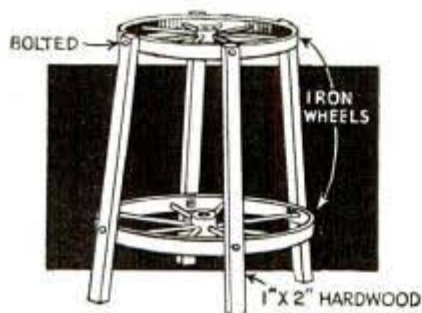
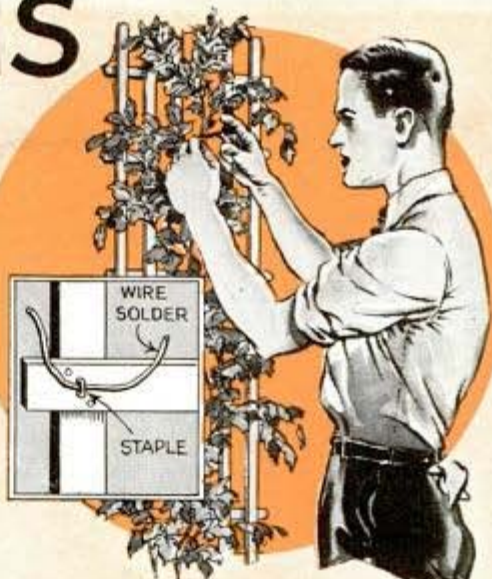


If there is no pull cord or ring on the bottom of a kitchen window shade and it is difficult to avoid soiling it by handling, cut strips of Cellophane, twist them, and attach them to the shades with gummed cellulose tape. The next time you have to wring out hot compresses, use a potato ricer as above. With it, you can squeeze out water much hotter than the bare hands can stand

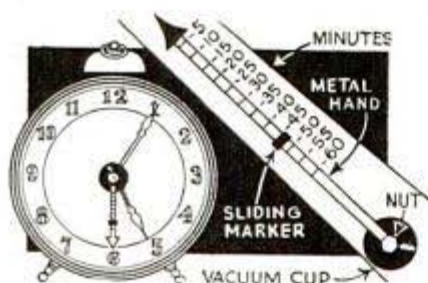
# PROBLEMS



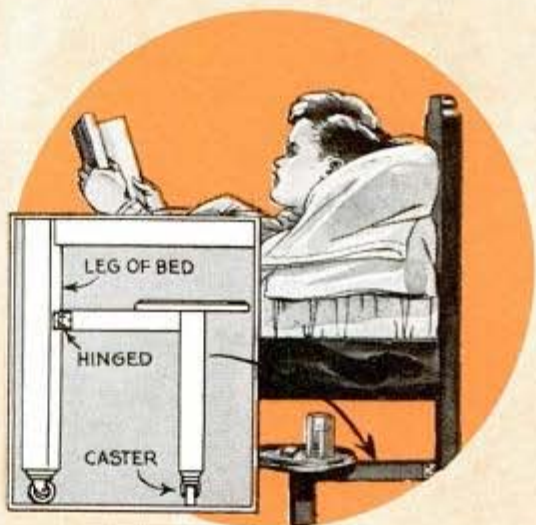
Right, when putting climbing roses on a trellis, attach them with lengths of wire solder stapled in place. Then it will be easy to remove the roses for winter protection. If the slat-supporting cleat on a wooden bed rail, detail A above, splits or pulls away from the rail, provide iron hangers to hook over the rail and support the slats as in detail B



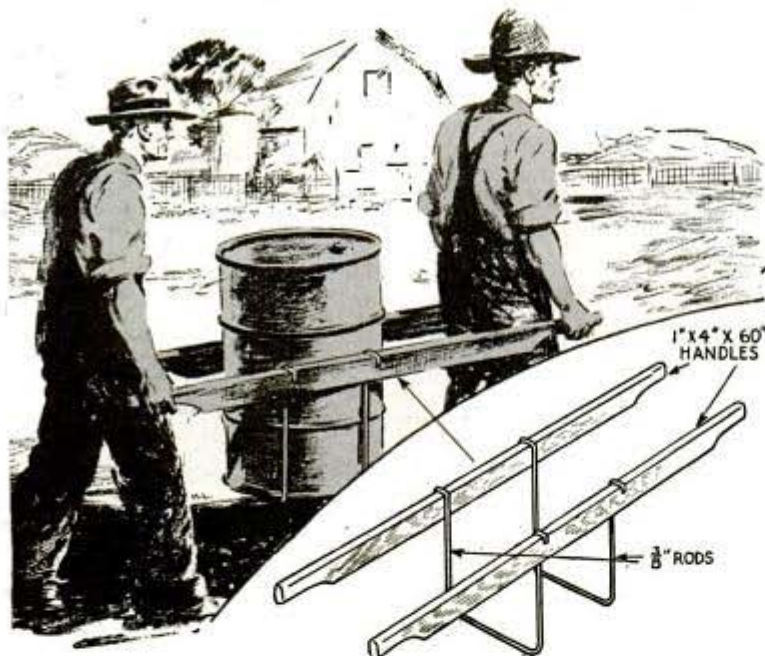
Sleeves of garments hanging in a closet close to the entrance will not catch between the frame and door, when closing the latter, if a perforated wood strip is attached to the door near the edge as at the right. The strip should run the length of the door. A sturdy stand for a wash tub is made by assembling two wheels and wooden legs as above. The upper wheel should be slightly smaller than the lower one



The swinging tray at the right provides a low night stand for a small bedroom. When not in use, it is swung under the bed. The arm of the stand is hinged to the bed post, and the end of the leg is fitted with a caster. Above, extra hand pivoted to glass face of a clock with a vacuum cup serves as a time reminder when cooking. In use, the hand is set at the desired hour, and the sliding marker is moved to designate the minutes when cooking is finished



## Heavy Oil Drums Easily Loaded on This Two-Man Carrier

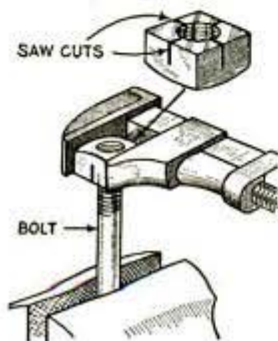


To simplify the task of moving several oil drums across a muddy lot, one farmer improvised a carrier from a couple of 2 by 4-in. pieces, about 5 ft. long, and two lengths of  $\frac{3}{8}$ -in. iron rod, bent to the shape indicated. To load the barrel, it is tipped one way and then the other to permit each rod to be slipped under it, after which the handles are fitted under hooked ends of the rods. The loading procedure is reversed to remove the drum. The ends of the 2 by 4-in. pieces are rounded and sanded smooth to provide comfortable grips.

## Liquid Wax on Window Slide

If you have trouble with your windows sticking during the winter months, apply a small amount of liquid wax where the sash slide in the frame. When dry, the windows will slide easily.

## Nut "Die" Cleans Bolt Threads



When threads of a bolt are damaged or clogged with rust, hardened paint, etc., they can be cleaned by the use of a nut slotted as shown. Spread the cuts slightly and start this face of the nut

first over the bolt threads. By the time the intact part of the nut comes into use, the four cutting edges, acting as a die, will have recut the fouled threads.—Miss Dorothy Walt, La Crescenta, Calif.

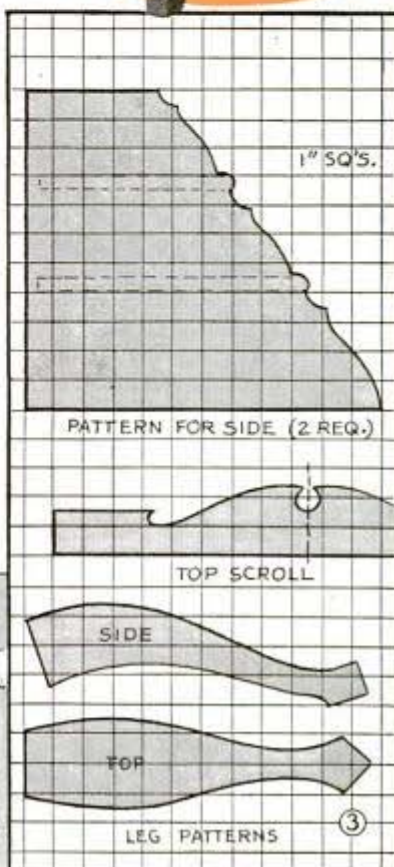
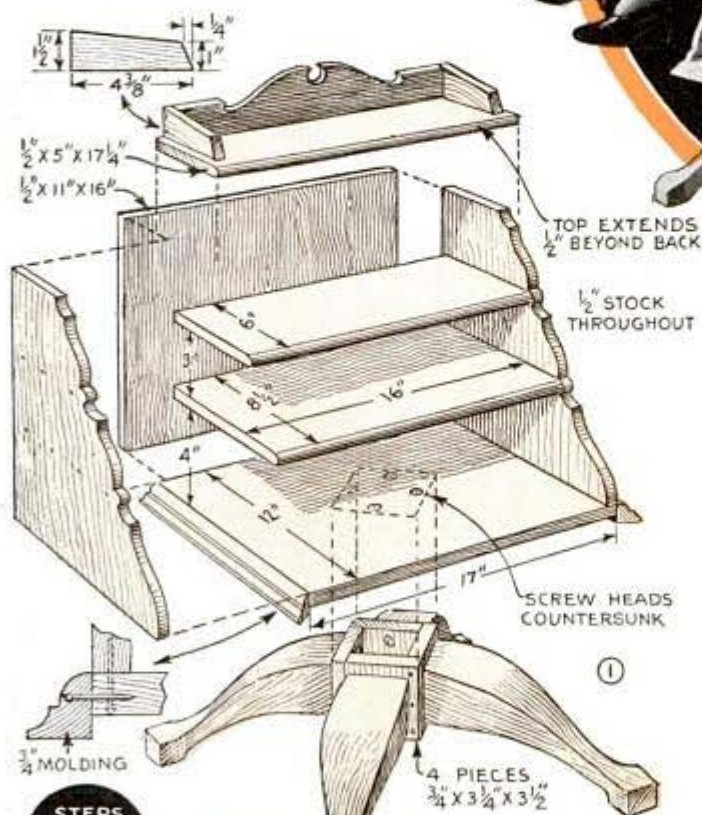
## Baby Buggy Ramp for Porch Steps

Having a porch with several steps up which a baby carriage had to be taken each time it was wheeled into the house or onto the porch, one man made the ramp shown for ease in handling the carriage. It is made from pine lumber and has cleats in the middle which serve as steps, and rims along the outside to keep the carriage from being run off of it accidentally. If desired, the ramp can be placed near one side of the steps, leaving part of each one open for regular use.—Harry Alpert, New Haven, Conn.

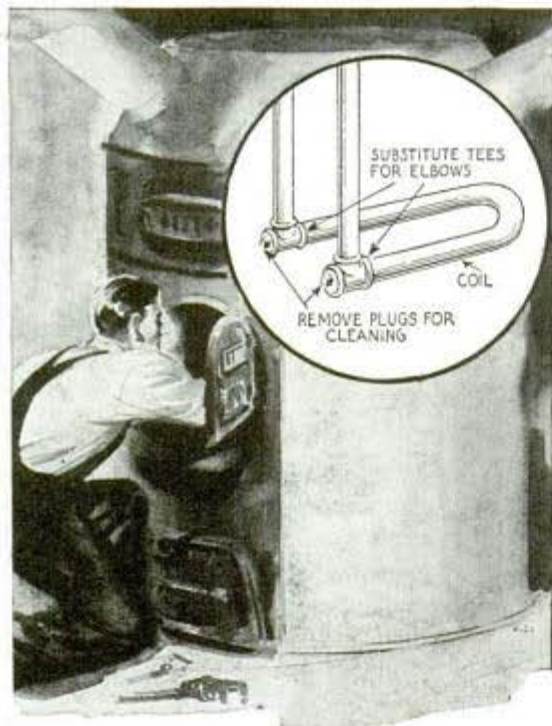


# Chairside MAGAZINE RACK

THIS magazine rack permits the magazines to lie flat on three receding shelves which makes it easy to select them. Fig. 1 shows the general assembly. Solid stock is best, although plywood can be used. Fig. 2 details clearly how the legs are bandsawed to shape, following patterns given in Fig. 3. Then they are screwed, from the inside, to a built-up center column, after which the assembly is joined to the upper section before the shelves are fitted in place. A molding around the edges of the base conceals the end grain.



## Furnace Coil Has Plugged Tees for Easy Cleaning

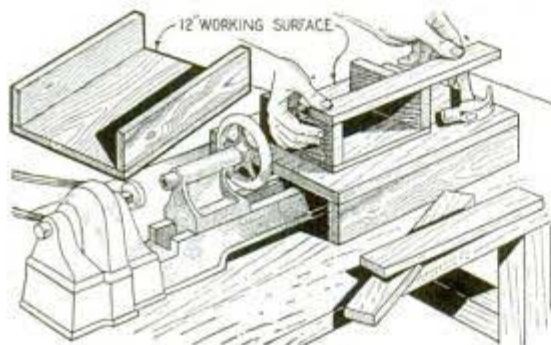


Frequent replacing of hot-water coils in furnaces can be avoided by substituting pipe tees for the elbows to permit easy cleaning. As each tee has a plug screwed in one end, it's a simple matter to remove the plugs several times a year and run a wire, with a small chain tied to it, around the loop. Pulling the chain back and forth cuts the deposit in the pipe.

—D. E. Wiant, East Lansing, Mich.

## Covering Lathe on Small Bench Increases Work Surface

Due to limited space in my home workshop, most of the machines are mounted on one bench, which also must serve as a worktable. I found that by pushing the



tailstock forward on my lathe and fitting a boxlike frame over the bed as indicated, I could gain still more work surface when the lathe was not in use. As the frame merely sets over the bed, it is removed or replaced in a jiffy.

—W. C. Wilhite, Carlinville, Ill.

## Stocking Held Straight on Line by Marbles in Toe

You'll not be troubled with stockings getting tangled on the clothesline on a windy day if three or four marbles are dropped in each one before hanging them out to dry. The marbles provide just enough weight in the toes to prevent the wind from wrapping the stockings around the clothespins and line.



## Portable Typewriter Anchored with Rubber Bands



Annoyed at the creeping of his portable typewriter in rapid operation, a news reporter anchored it with a couple of stout rubber bands and a thumbtack.

The tack is pushed into the table top; the rubber bands are then hooked over it and snapped around the feet of the machine.

## Cork Shrunk to Fit Small Bottle

When the only cork you have on hand is just a bit too large for a bottle, put it in a pan of boiling water and it will shrink enough to fit the bottle. This method is especially handy when stopping bottles containing chemicals as the cork expands as it dries, providing an air-tight seal.



—William Swallow, Brooklyn, N. Y.

# Modern FINISHES

for your Furniture Projects



## Bleaching

WITH the increased use of small spray-painting outfits, and the many new types of paints and lacquers recently developed, the craftsman can duplicate the finest finishes seen on manufactured furniture. Beautiful blond tones in ambered walnut, honeytone maple and harvest-wheat mahogany, interesting novelty effects such as limed oak, bone white and pickled pine, as well

Photo courtesy  
American Furniture Mart



MAKE TEST STRIPS TO SHOW ACTION OF BLEACH ON WOOD

as smart contemporary finishes such as antique maple and natural birch are all within his scope. The man with the brush is not altogether out of the picture either, as most of these finishes can be applied nearly as well by hand brushing.

**Bleaching:** One of the basic processes for many of the newer finishes is bleaching, which entails the removal of the natural wood color with various chemical solutions that you can buy. Most of the solutions consist of two liquid chemicals, which are mixed together in the proportions of about four-to-one immediately before using. Apply the bleach to the wood with a rubber sponge as in Fig. 1. Wear rubber gloves as all bleaching solutions are corrosive. Get the work wet evenly all over, and let the bleach dry on the wood. Most commercial bleaches having a hydrogen-peroxide or similar base, when thoroughly dry, leave





⑥ *Limed Oak*

nothing in the wood to harm the finishing coats. One application of the bleach is generally sufficient. Check the effect before you start, on a test strip as in Fig. 2.

**Toning:** Toning, Fig. 4, is the second basic process. This calls for the spraying of a semi-transparent undercoat to lighten the wood rather than the more expensive and longer bleaching schedule. It is not successful on dark wood like walnut, but very successful on naturally light-colored woods such as birch and maple. The toner is made by adding white lacquer, 1 part, to clear flat lacquer, 4 or 5 parts, as in Fig. 3. This mixture is sprayed directly on the bare wood. Its semi-transparent nature does not obscure the grain, but at the same time it makes the wood much lighter. On oak and mahogany, the toner should be made with tan lacquer instead of white.

**Honeytone maple:** This attractive effect of blond wood, shown in Fig. 5, can be worked on white maple or birch by toning. Spray a thin coat of white toner directly on the bare wood after sanding. Finish with two coats of water-white lacquer. This is almost as clear as water and does not have the amber color of ordinary clear lacquer. It should be used on all extremely light finishes. If a bleaching instead of toning process is used, bleaching is the first operation, followed by three or four coats of water-white lacquer.

**Ambered walnut:** The light amber fin-

BLOND FINISHES	
FINISH	APPLICATION
AMBERED WALNUT	Bleach. Stain with amber stain. Apply sealer coat of thin lacquer. Fill with natural filler. Finish with clear lacquer.
HONEYTONE MAPLE OR BIRCH	Tone with bond toner, using 1 part white lacquer to 4 parts clear flat lacquer. Finish with water-white lacquer.
HARVEST-WHEAT MAHOGANY	Bleaching will give required wheat color. Fill with natural filler lightly tinted with raw sienna color in oil. Lacquer.
PICKLED PINE	Bleach. Stain with gray stain for pine. Finish with water-white lacquer.
PICKLED PINE	Spray toner coat (gray or cream). Apply white wiping stain and wipe for highlights.
LIMED OAK	Bleach. Seal. Fill pores with white paste wood filler. Finish with water-white lacquer.
TWEED MAHOGANY	Bleach. Seal. Fill pores with red paste wood filler. Water-white lacquer.
HEATHER MAHOGANY	Bleach. Seal. Fill pores with white paste wood filler. Finish with water-white lacquer.
OLD-WORLD WALNUT	Bleach. Seal. Fill with natural filler lightly tinted with burnt umber. Seal. Shade clear lacquer.



⑨ *Silver Oak*

ish so popular on walnut can only be obtained by using a commercial bleaching solution. Toning, if carried to a stage of light coloring, will completely kill the grain of the wood, giving the piece a painted appearance. Start by applying the bleach. Let it dry on the wood overnight and then sand lightly with No. 6-0 paper. Dust the work, and stain it with a non-grain-raising, quick-drying stain. This should be light amber color and should be thinned as much as needed with the required thinner until the tone is just a shade darker than the bleached color of the wood. Seal the stain with a wash coat of shellac to prevent further darkening of the wood by the oil in the filler. Apply natural (transparent) filler. Let dry thoroughly. Finish the schedule by applying two or





SPRAYING BONE-WHITE LACQUER COAT

APPLYING WARM-BROWN WIPING STAIN

WIPING STAIN WITH SOFT RAG

three coats of clear gloss lacquer, rubbing the last coat to a satin finish.

**Limed oak:** To produce limed oak, Fig. 6, bleach the work with a commercial bleach. Stain or leave the wood in its natural bleached color as you desire. Apply a wash coat of water-white lacquer. Fill the pores of the wood with white filler. This can be obtained ready-mixed or made by adding zinc-white oil color to natural filler. Use only water-white lacquer as a top coat over this finish—ordinary clear lacquer will spoil the color.

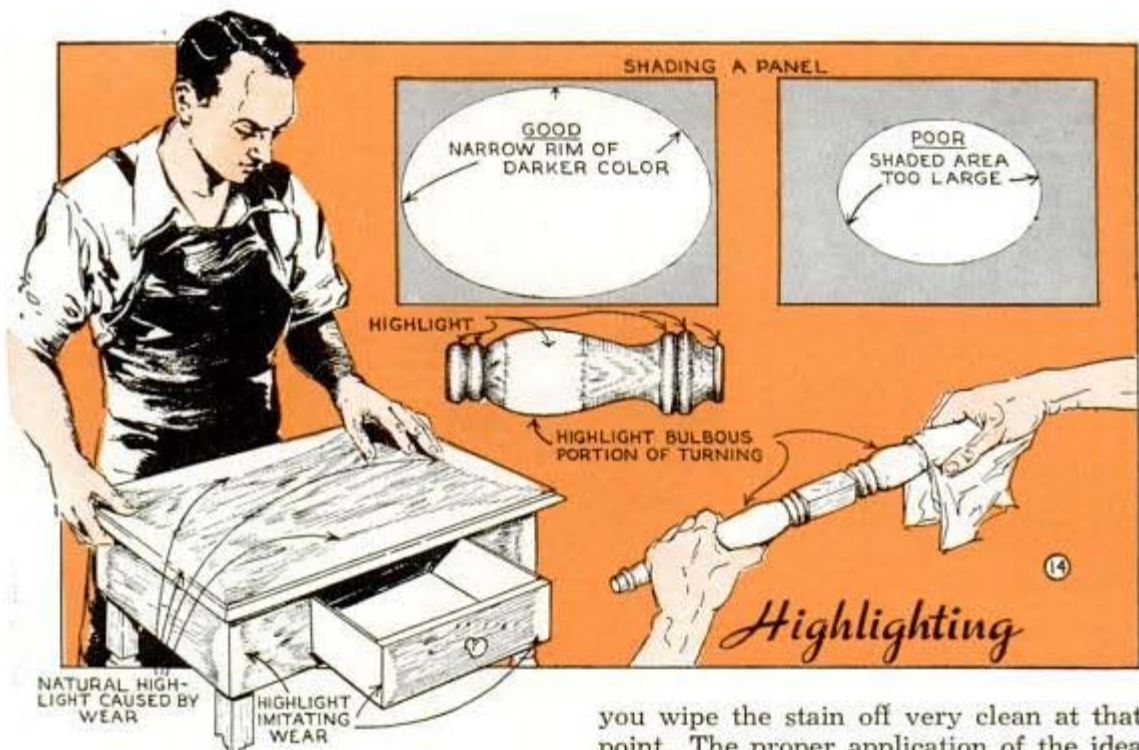
**Silver oak:** This is similar to limed oak but is obtained by the toning method. Mix light gray lacquer, 1 part, with clear lacquer, 3 parts, and spray directly on the bare wood until an even color is obtained. Fill the pores of the wood with white filler, Fig. 8, and finish with water-white lacquer. Many novel effects can be obtained in this manner, Fig. 9, using different colors for the toner.

**Other blond finishes:** All other blond finishes, Fig. 7, feature the same application of the basic processes already described. Mahogany, bleached and filled with white filler, is known as "heather mahogany." When filled with red filler (made by adding red oil color to natural filler) the delightful pink tone is called "tweed." Bleached mahogany with a natural filler is one of the most attractive in the blond mahogany group and is variously known as "harvest-wheat mahogany," "bronze mahogany," etc. After obtaining an almost white wood color by bleaching, the worker can give the wood a coat of



diluted stain to produce almost any color desired.

**Bone white:** Bone white, Figs. 10, 11 and 12, is a popular enamel finish. Start by giving the work a coat of bone-white enamel. This is purchased ready-mixed and is simply an off-tone shade of white which the finisher can mix himself, if desired, by adding a little black or brown lacquer to white lacquer. Next, spray or brush a coat of warm brown wiping stain. Wiping stain is ordinary oil pigment stain, but somewhat more concentrated. Before the stain dries, start to wipe it off with a soft rag. This operation is called high-



lighting. A few pointers on proper highlighting will be given later. After wiping and after the stain is dry, the finish is completed with two coats of clear lacquer.

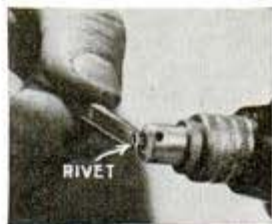
**Antique maple:** The popular color for maple pieces in Early American styling is a red-orange, usually sold under the label, "antique maple," Fig. 13. After staining, the work should be coated with orange shellac or clear lacquer. Staining alone seldom gives the mellow aged appearance so essentially a part of this finish, making it necessary to apply a second coat of stain to obtain highlights. This second stain coat is a warm brown wiping stain, the same as used in the bone-white finish. It is sprayed or brushed on the work and then wiped off rather cleanly. Even on areas wiped perfectly clean with a dry cloth, a portion of the stain will remain on the wood to give a shaded effect to the finish. Extra clean highlights are obtained by wiping the stain with a rag moistened with benzine. After the wiping stain has dried, the work can be finished with clear lacquer or varnish.

**Highlighting:** This technique plays an important part in the bone-white and antique-maple finishes already described. Highlights can be obtained in many different ways, but these few remarks are confined to highlighting with the use of wiping stain. The basic principle is easily understood—if you want a light-colored area,

you wipe the stain off very clean at that point. The proper application of the idea is best learned by observing store furniture and doing a little experimenting. In most cases a very clean wiping should be practiced. Turnings are easy—just wipe them from end to end. In this way you will hit only the high spots or bulbous portions of the turning, and this is the correct technique. On panels, leave a narrow dark rim around the edges, spreading a little at the corners, and wipe the center portion clean. The highlighted area should predominate, as shown in Fig. 14. The rule of natural wear often serves as a guide. Notice how a table top is highlighted at the natural wearing points. Highlight small drawers along the outer edges—the area which the hand would naturally polish through wear. If you fail to get a good-looking job the first time, sponge the work clean with benzine and try again.

### Rivet Is Collet for Small Shanks

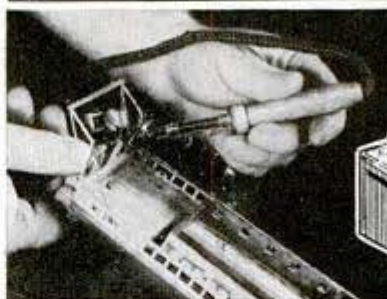
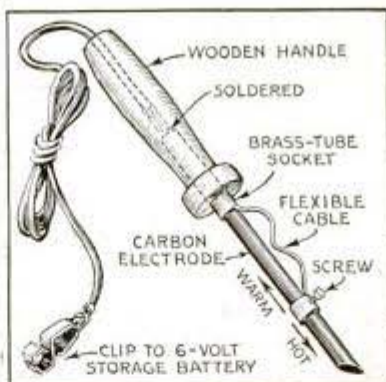
Chucks on small hand grinders can be made to accommodate shanks to accessories that are smaller than the specified size by using a collet or adapter made from a hollow rivet.



Merely select a rivet of the right size, split one side and insert it in the grinder chuck.

# Soldering Outfit Has Simplified Heat Control

For soldering various types of work requiring a range of temperatures from a mild to an intense heat up to 3,000° Fahr., and even for light welding, you can make this simple soldering outfit, which works on the current supplied by a 6-volt storage battery. A carbon rod is provided with a wooden handle at one end and a ring that can be slid to any position on the carbon. The ring has a small setscrew so that it can be tightened on the rod for good electrical contact, and it is soldered to the end of a length of flexible cable, which goes through the handle and connects to one terminal of the battery. The position of the ring on the rod determines the heat produced at the tip when it is contacted with the work, the latter being connected to the other terminal of the battery, with or without a foot switch. Placing the ring close to the tip produces considerable heat but when the ring is near the handle, the carbon rod offers much more resistance to the passage

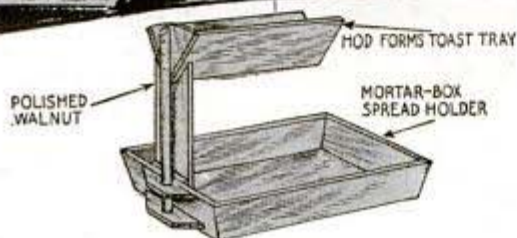


of current and a low heat at the tip results. Micro-projector carbons used in sun lamps and scientific instruments are best for small and delicate work.

—Alexander Maxwell, Evanston, Ill.

# Small Model of Plasterer's Hod Serves as a Tray for Toast

Providing an unusual toast and spread holder for a breakfast nook, this model of a plasterer's box and hod is made from a



piece of thin walnut. While dimensions for most of the parts are not critical, the sides of the hod should be 2 in. wide and long enough to accommodate ordinary pieces of toast. Size of the box depends upon the dishes commonly used as butter and spread containers.—Lester P. Young, Culver, Ind.

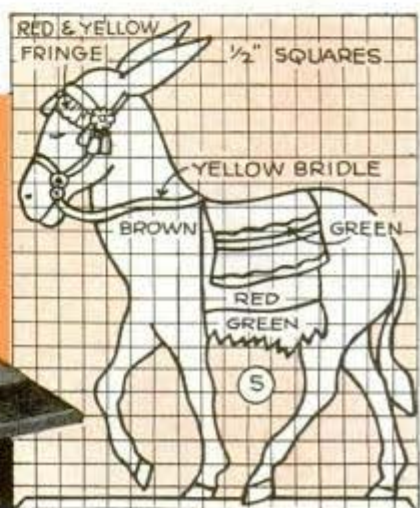
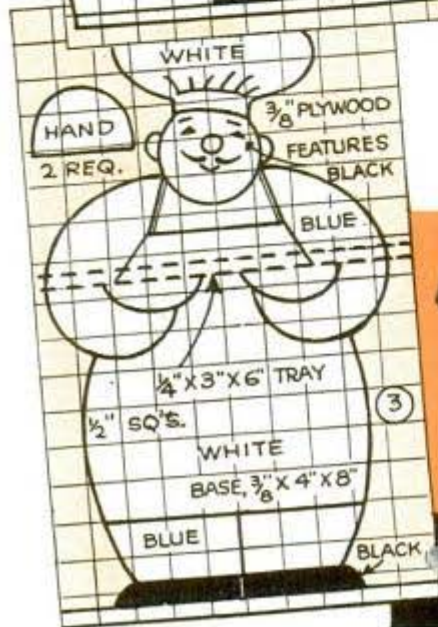
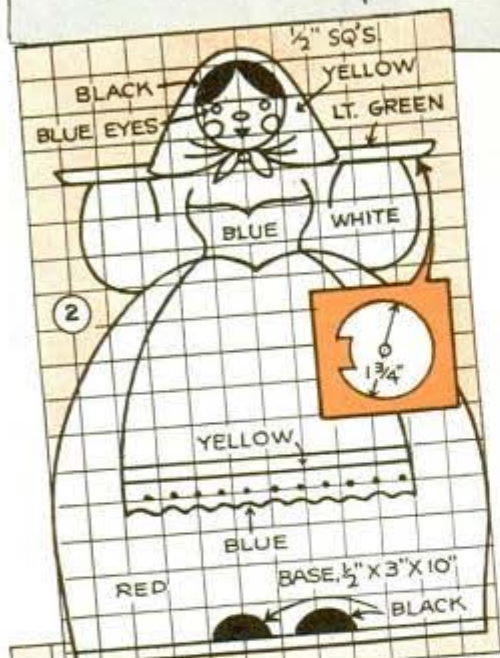
# Rubber Disk Holds Drills in Case

Your small drills will not spill from the case when it is overturned or dropped on the floor if it is provided with a "friction" holder. Cut a disk of rubber from an old inner tube and fasten this with a tack over the center of the case so that the edges of the rubber slightly overlap the drill holes. The rubber will provide the friction to hold the drills in place.



# Jigsawed PLANT and

By Bess Livings



ADDITION color and life to any interior, these distinctive plant and flower holders provide appropriate settings into which the flowers blend.

The jolly peasant girl in Fig. 1 carries a tiny pot of flowers in each hand, while a row of them can be set on the shelf or base. Plywood,  $\frac{3}{8}$  or  $\frac{1}{2}$  in. thick, can be used for both figure and shelf. Draw the figure on a sheet of paper ruled off in  $\frac{1}{2}$ -in. squares as in Fig. 2. Allow a space equal to the thickness of the base to extend below the line of the feet. The shelf, which measures 3 by 10 in., has the front corners rounded. A recess is cut in the back edge of the shelf to take the lower edge of the figure, which is attached with glue and brads or small screws. Then, the feet will appear to be resting on the base. Small disks of  $\frac{1}{4}$  in. plywood or  $\frac{1}{8}$  in. pressed wood are glued and bradded to the arms, the disks being recessed to fit over the bonnet. Appropriate colors for the various parts are also suggested in Fig. 2.

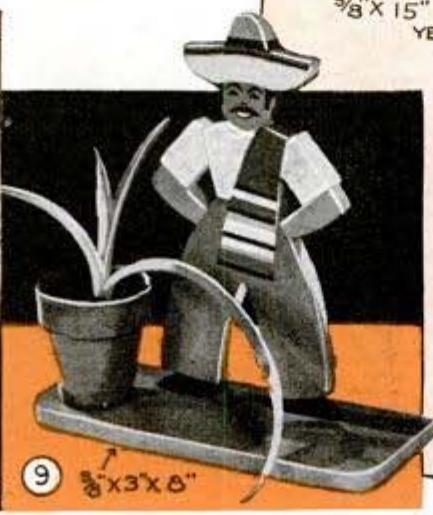
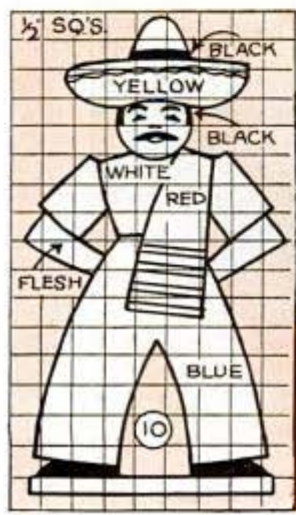
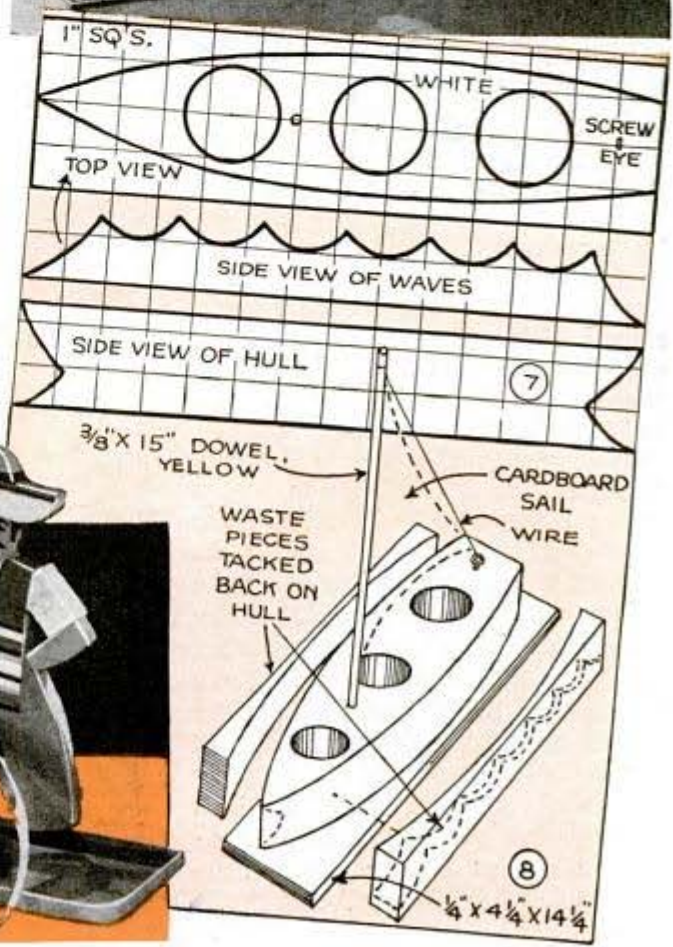
The chef design shown in Fig. 3 is carried out in similar fashion except that he holds a tray on which you can place small pots of parsley, chives and herbs for flavoring. It may be hung on the

# FLOWER

## Displays

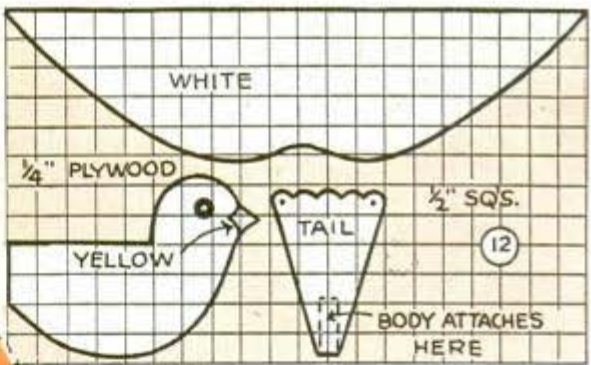
wall or placed in a window. A wooden bead can be bradded to the face to form the nose. Figs. 4 and 5 show a burro plant stand. In this, two small baskets contain suitable plants. The baskets are brightly colored woven coasters used for tumblers, or you can crochet little bags for the purpose. Small pegs are glued into the feet and base to hold the two parts together.

The sailboat plant holder, Figs. 6 to 8, goes well in the living room, or as a dining-table centerpiece. Its mast and stay not only serve the purpose of ornament but also lend ideal support to clamoring young vines. The hull is bored to take three pots  $2\frac{1}{4}$  in. in diameter. Both the hull and the pieces representing the waves are cut from a 2 by 4-in. block of white pine. Fig. 8 shows how the assembly is mounted on a plywood base. For a little cactus plant a Mexican figure gives an appropriate setting, Figs. 9 and 10. The spread wings of the little snowbird, Figs. 11 and





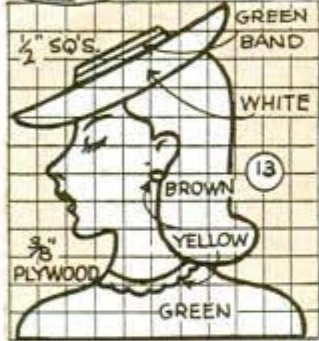
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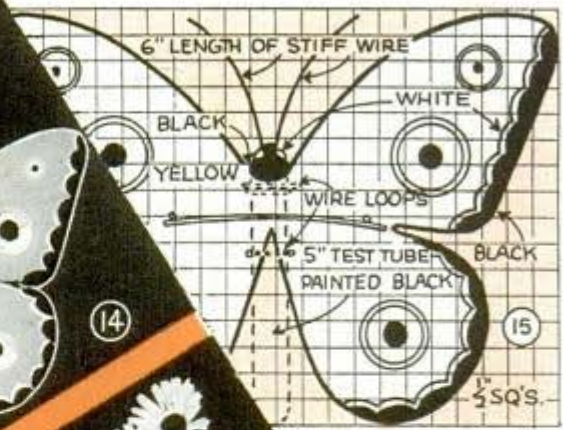
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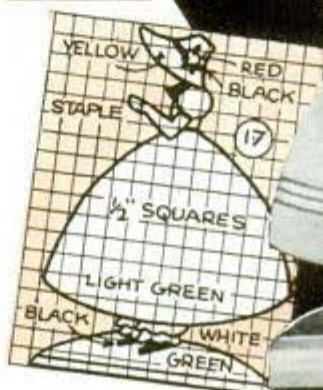
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17



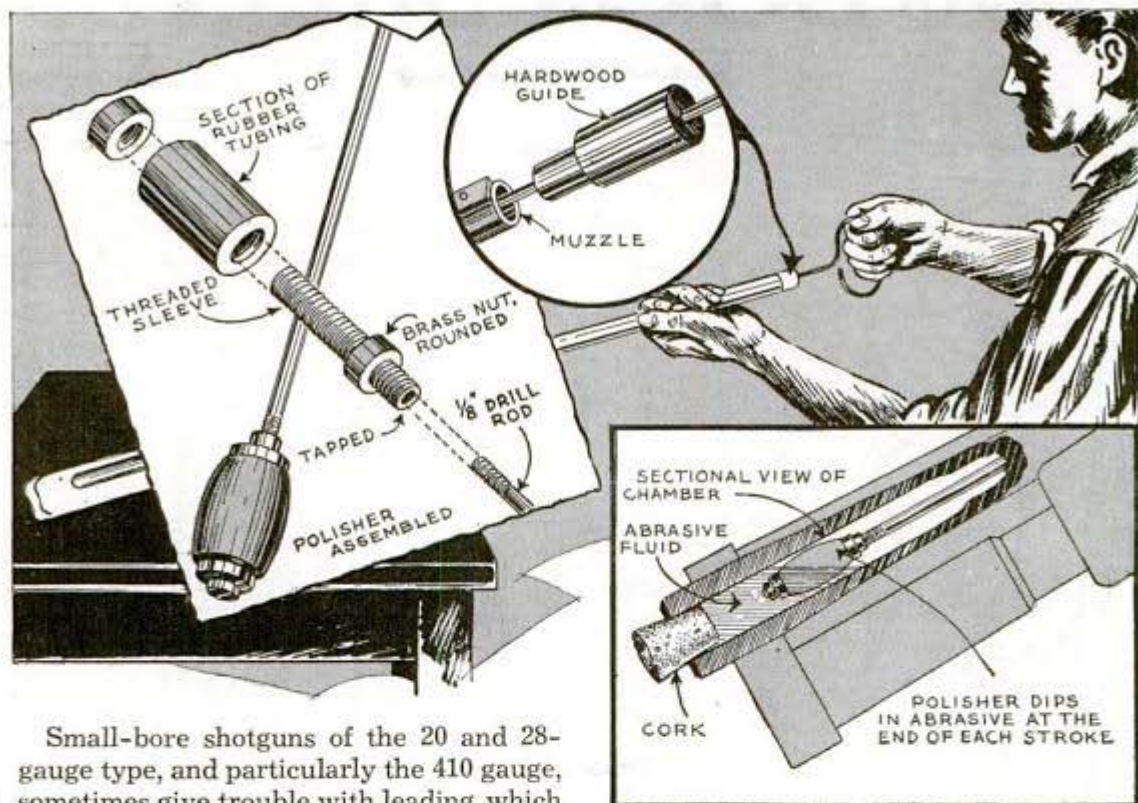
18



12, form a shelf for plants. The body is attached to the tail with two flat-head screws, countersunk, after which the wings are centered on the top of the body and nailed in place. Two holes are drilled in the tail to facilitate hanging the shelf.

Three types of simple wall vases, incorporating a five-cent test tube you can get at any druggist, are shown in Figs. 13 to 18 inclusive. In case of the butterfly, the test tube forms the insect's body and is held by wire loops. Fresh flowers, used singly or as a cluster, seem part of the girl's hat, Fig. 16, the test tube being concealed behind the figure. In Fig. 18 the quaint, hoop-skirted maid primly holds a blossom, the stem of which is invisible to the observer and goes into the test tube. A small staple on the back of her hand keeps the flower in the desired position.

# Mirror Polish in Small-Bore Shotgun Barrels



Small-bore shotguns of the 20 and 28-gauge type, and particularly the 410 gauge, sometimes give trouble with leading, which often persists regardless of whether you use chilled or drop shot. Although leading causes no particular harm in itself, it does make thorough cleaning difficult and is apt to result in a rusted barrel. One thorough honing with a polisher made as detailed will usually stop the leading completely and, if you're careful, will not in any way affect the shooting qualities of the barrel. To make the polisher, get a rod 10 or 12 in. longer than the barrel, and thread one end. Slip a short length of rubber tubing over a threaded length of  $\frac{1}{4}$ -in. brass rod, which is screwed to the end of the cleaning rod.

Tightening or loosening two brass nuts on the brass rod adjusts the diameter of the rubber tubing to a snug fit in the bore. The long rod passes through a hardwood plug or guide, in the muzzle end of the barrel, and the breech, or chamber end, is plugged with a cork. The polishing abrasive is made by mixing jewelers' rouge with light oil to the consistency of heavy cream. A small quantity is poured in the barrel and the polisher and guide are inserted. A few minutes of polishing with full-length strokes will generally cure the trouble.

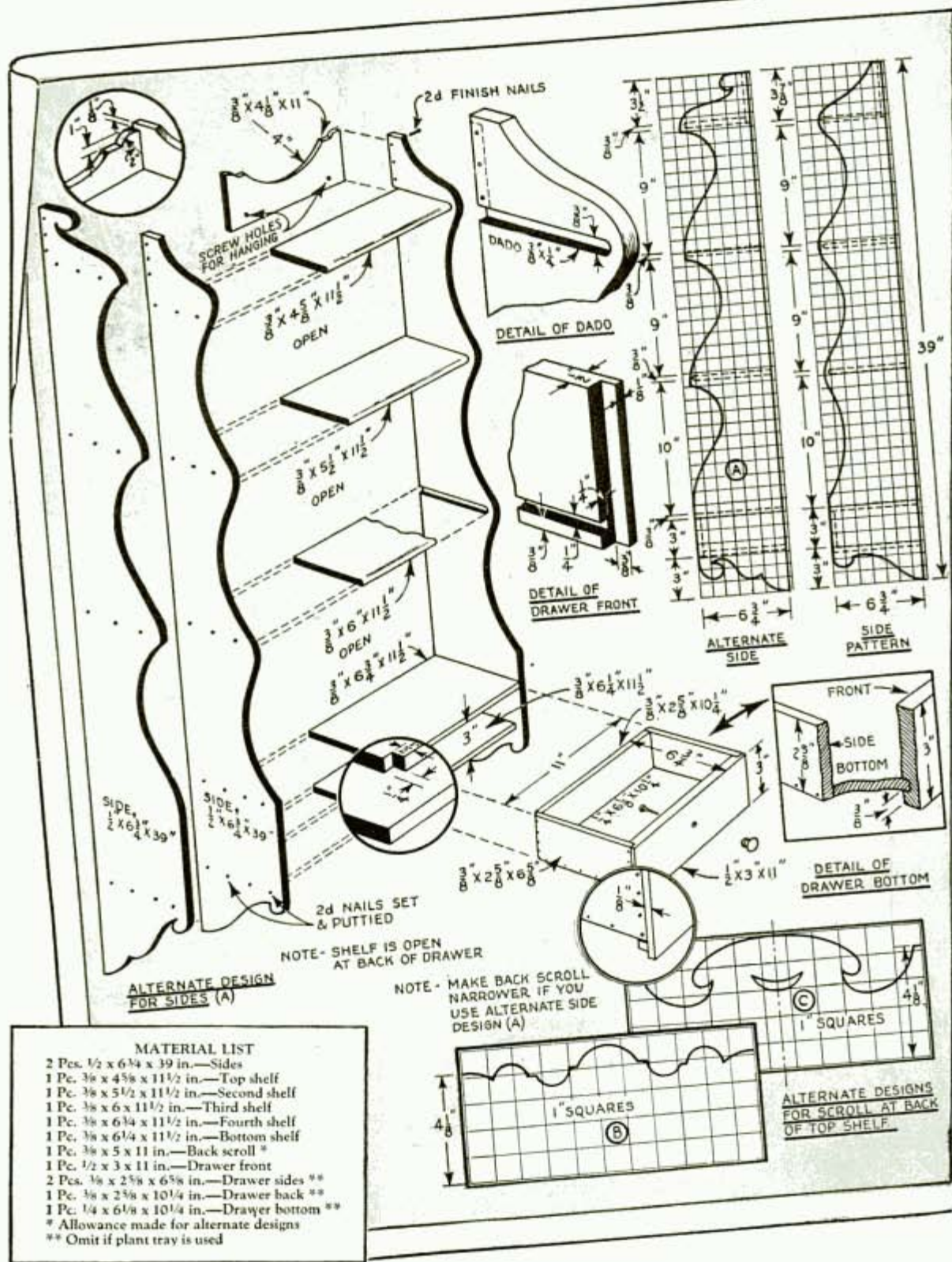
## How to Get Good Bond Between a Patch and the Plaster

When repairing holes or cracks in plaster it is necessary that the edges of the old plaster be wetted thoroughly if the patching material is to make a good bond at the joint. As water is hard to apply without spilling it over the wall and floor, a simpler method is to mix a fairly heavy glue size and put it on with a brush. Because of its heavier consistency, it is much easier to apply. The hole should be filled immediately and the plaster smoothed over with the sizing brush so that the surface will be

ready for paint, paper or calcimine when dry. If a large hole is to be repaired, try a piece of wallboard cut roughly to the shape of the opening and undercut at the edges. Screw this securely to the lath and then patch around it. In case the wallboard is thinner than the original plaster, shim it out with thin strips of wood. This method will produce a much smoother job for the amateur than trying to replaster a large area.

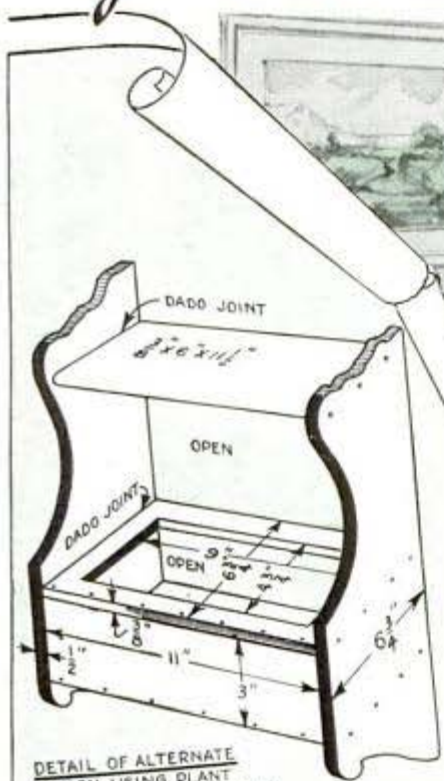
—Maurice W. Patterson, Auburn, Wash.

# These BOOK SHELVES



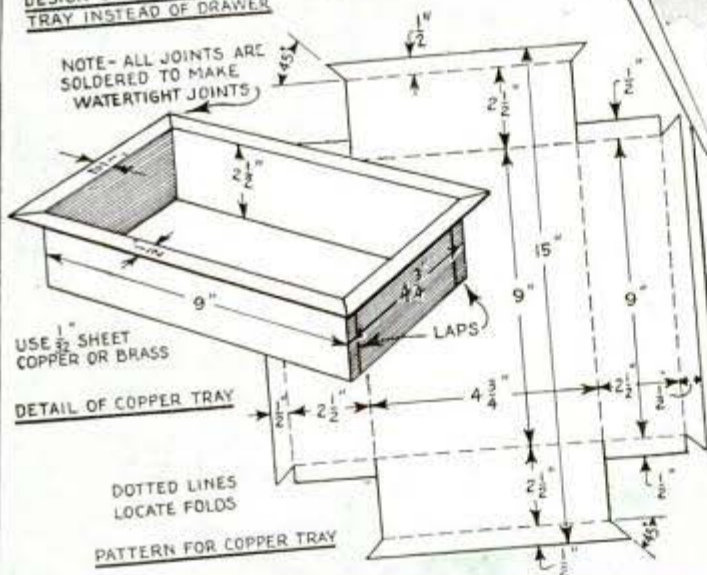


# go well in pairs



DETAIL OF ALTERNATE DESIGN USING PLANT TRAY INSTEAD OF DRAWER

NOTE - ALL JOINTS ARE SOLDERED TO MAKE WATERTIGHT JOINTS



USE  $\frac{1}{32}$  SHEET COPPER OR BRASS

DETAIL OF COPPER TRAY

DOTTED LINES LOCATE FOLDS

PATTERN FOR COPPER TRAY

Arranged as a pair on either side of a fireplace, window or door, these long, narrow shelves provide an attractive display space for books or bric-a-brac. A little drawer at the bottom of each provides a handy place to keep playing cards, pencils, keys, etc., or a metal-lined plant tray may be substituted for the drawer. This plan gives you alternate designs for the scroll-sawed sides, as well as for the scroll at the back of the top shelf



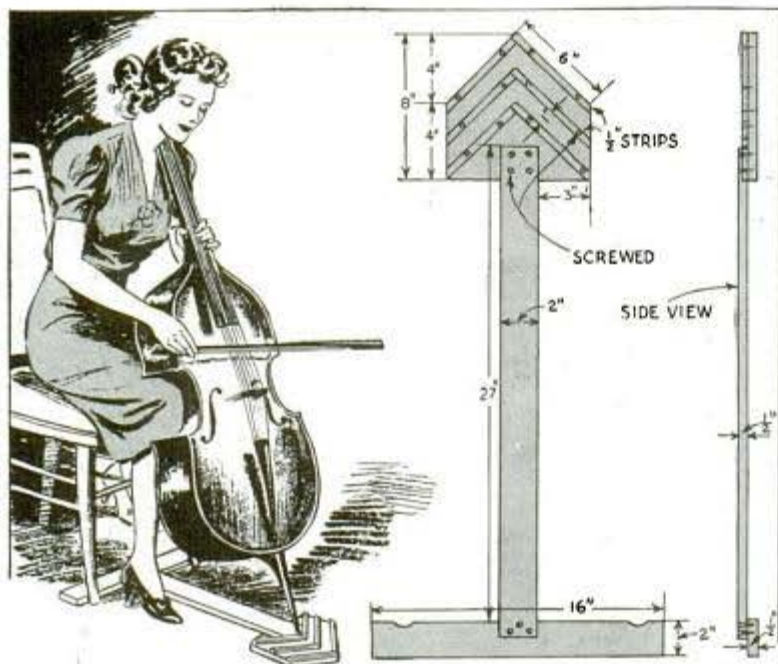
FOLDED HERE

JOINT

A BLOCK AND Mallet ARE USED TO BEND TOP FLANGES OF TRAY

DADO CUTS ARE MADE WITH A SAW AND FINISHED WITH A CHISEL

## Slipping of 'Cello' on Floor Prevented by Simple Support



If you play a cello or other string instrument that rests on the floor in front of you, a support like the one above to prevent the instrument from "creeping" will be helpful, especially if you are a beginner and have not yet mastered the technique of holding the instrument in place. One end of the support fits behind the front legs of the chair on which you sit while playing, and the other end projects in front of you as indicated. Pairs of wood strips or cleats nailed to the front of the support at right angles to each other keep the instrument from slipping.—I. M. Fenn, Chicago.

## Pebble Finish on Concrete Wall Improves Its Appearance



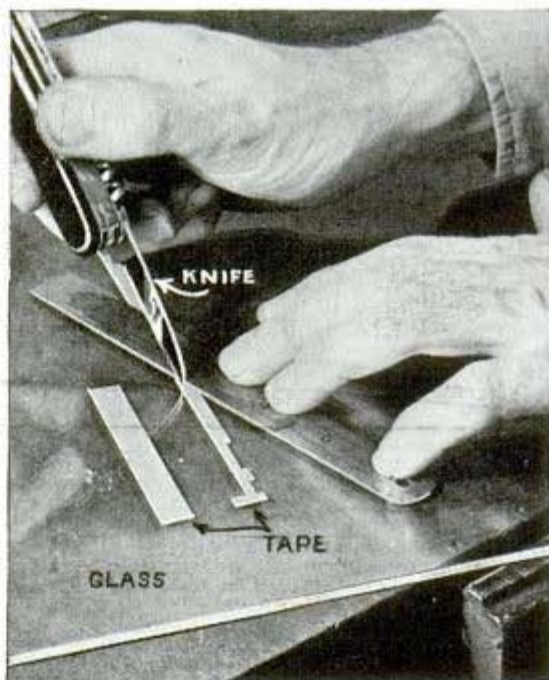
When making a concrete wall, one home owner produced a neat appearance on the outside of the wall by covering it with coarse gravel of uniform size without mixing it in with the cement. To do this forms

were built in sections, covered with hot hide glue and sprinkled with screened gravel before setting them up. After the concrete was poured, moisture softened

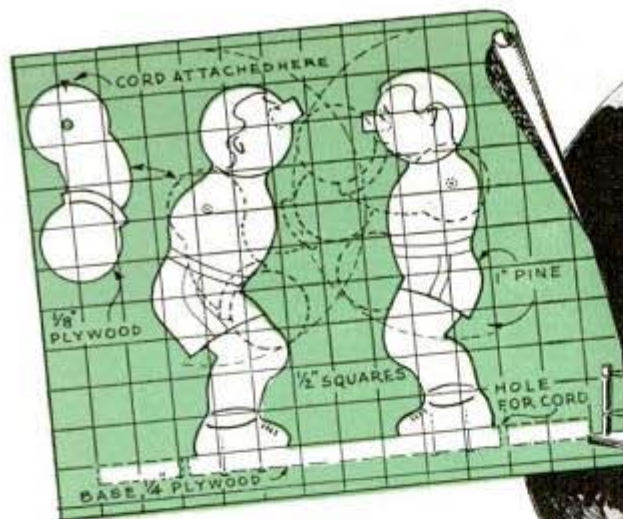
the glue and the forms were removed easily, leaving the gravel spread neatly over the surface of the wall. When the cement has set, any excess glue that clings to it can be washed off with a garden hose.—Dale Van Horn, Lincoln, Nebr.

## Fine Lines Masked Accurately for Painting

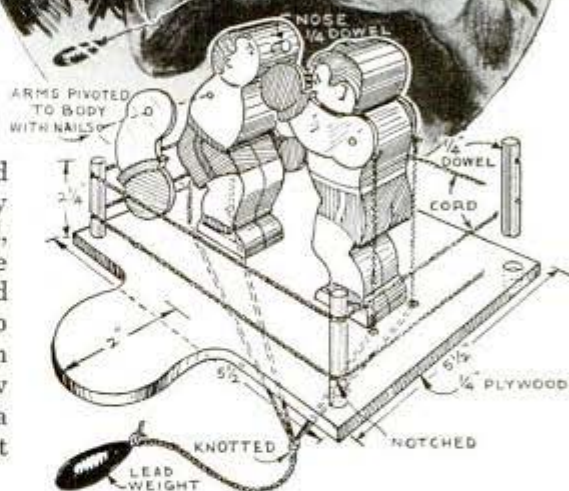
Often when applying lacquer or enamel with a spray gun, the craftsman desires to mask narrow lines or other fine details. Adhesive tape for binding photographic lantern slides and color transparencies is ideal for this purpose. To cut the tape, spread it out with the tacky side next to a sheet of clean glass and use a sharp-pointed knife or a razor blade to cut strips of the necessary width. Then transfer the cut pieces to the work with a pair of tweezers.



# Plenty of Fun and Action with These Boxers



Punching each other in a realistic manner, these bantam boxers will delight any small boy. Animation is obtained by moving the "ring" or base with a slight rotary motion to swing a lead weight, which is attached to the arms by cords. The figures are cut from 1-in. wood, the arms from  $\frac{1}{8}$ -in. plywood and the base from  $\frac{1}{4}$ -in. plywood. The figures are nailed to the base, and the arms are pivoted to swing loosely from the body. All four arm cords are tied together about 3 in. below the base, and then to a 2-oz. weight with a 3-in. length of cord. Four dowels support two pieces of cord which form the ring.



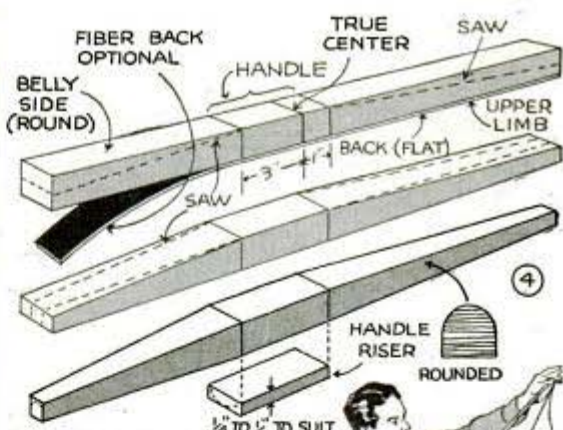
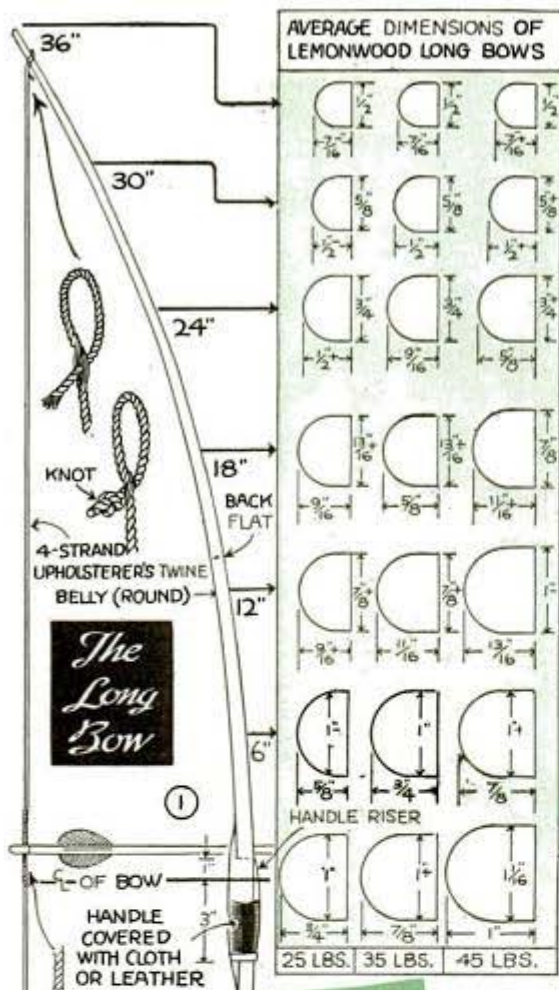
## Glass Etched Mechanically with Shot and Emery Powder



No chemicals are required to etch designs on glass with a simple mechanical process in which you use some lead shot, a little emery powder and a stencil cut from heavy paper which has been well coated with varnish. The shot and emery powder are put in an old tumbler, after which the stencil and glass are held over the open end while shaking the shot as shown. The shot becomes embedded with particles of emery powder, which quickly grind away the smooth finish of the glass.

## Repairing Small Leaks in Boats

Leaky boats may be sealed watertight with a molten mixture consisting of rosin, 30 lbs., and tar, 10 gals. Melt the rosin and add the tar with constant stirring.



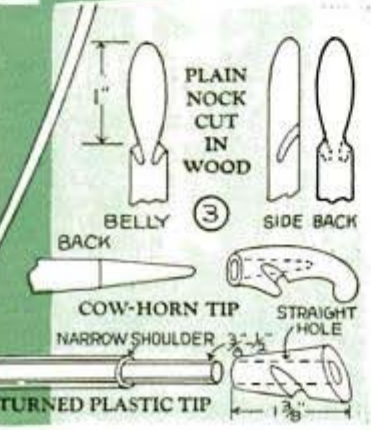
**FORMING THE LONG BOW**  
TAKE DIMENSIONS FROM BOW SECTIONS AT LEFT



**SIZE OF TACKLE**

REACH	ARROW	BOW *
54-56 IN.	22-23 IN.	NOT UNDER 4'6"
57-59 IN.	23-24 IN.	" " 4'9"
60-62 IN.	24-25 IN.	" " 5'
63-65 IN.	25-26 IN.	" " 5'3"
66-68 IN.	26-27 IN.	" " 5'6"
69-71 IN.	28 IN.	" " 5'10"

\* LONG BOWS. FLAT BOWS CAN BE A LITTLE SHORTER IF DESIRED.

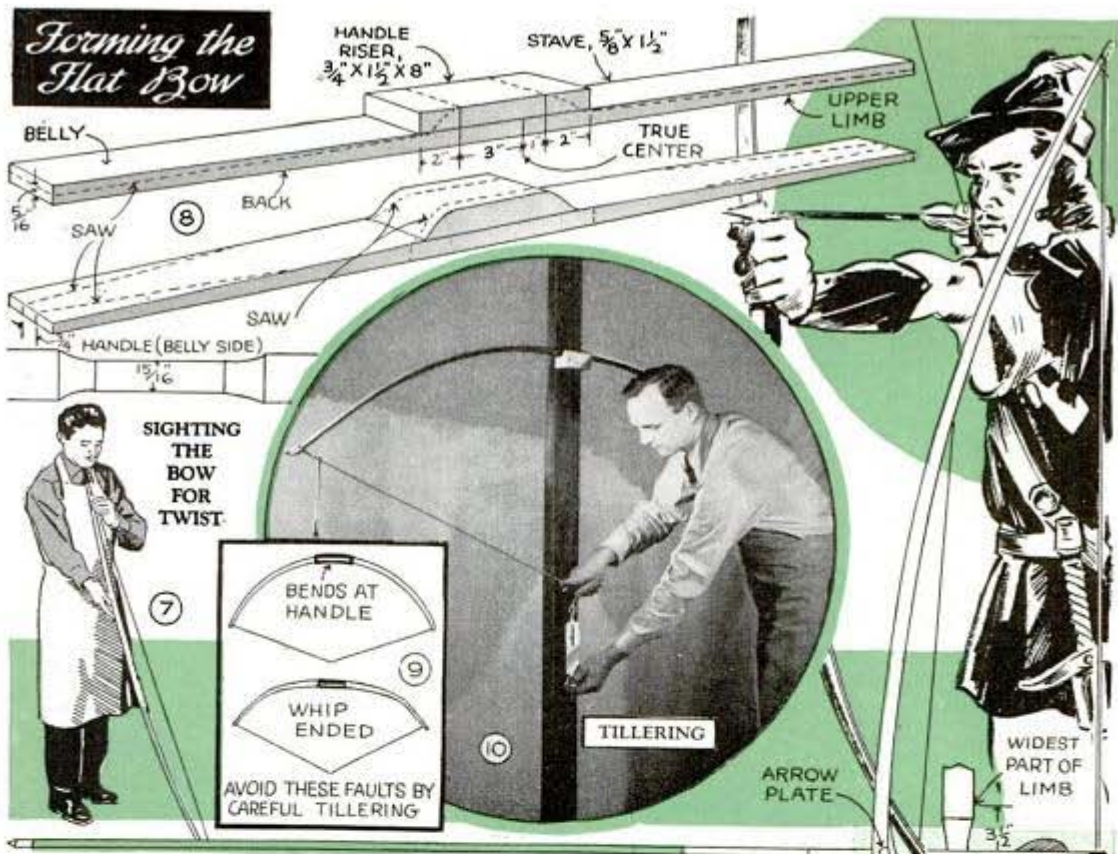


# SHOOT A

**WHETHER** you try to land six in the gold for a perfect fifty-four or take your archery with a dash of small game hunting, you will find keen enjoyment in this ancient sport. Making the tackle is simple.

**Size of tackle:** The first thing to know is what size of bow and length of arrow to use. This depends entirely on your physique, and particularly your reach. If your reach is 64 in., you can use an arrow 25 to 26 in. long, with a bow not less than 5 ft. 3 in. from tip to tip, Fig. 5. The weight of the bow, that is, the number of pounds pull required to draw it, depends on your muscular development. Most men can draw a 50 to 60-lb. bow, but a 35 to 40-lb. bow is the best weight for general shooting, and good scores can be made with the 25 and 30-pounders.

**The long bow:** The long bow has a deep or "stacked" body, which is generally recognized as the best type of bow shape. A stave of lemonwood for a long bow will cost you about one dollar. Square up the stave to a little over the dimensions at the handle of the weight bow you intend to make. Bandsaw the wood, Fig. 4, and then round off the belly side with a plane or wood rasp. Cut

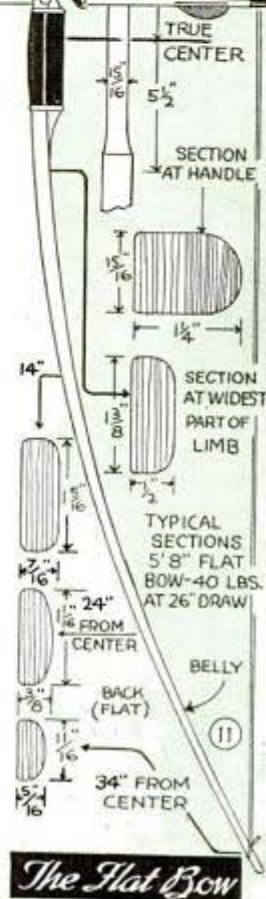


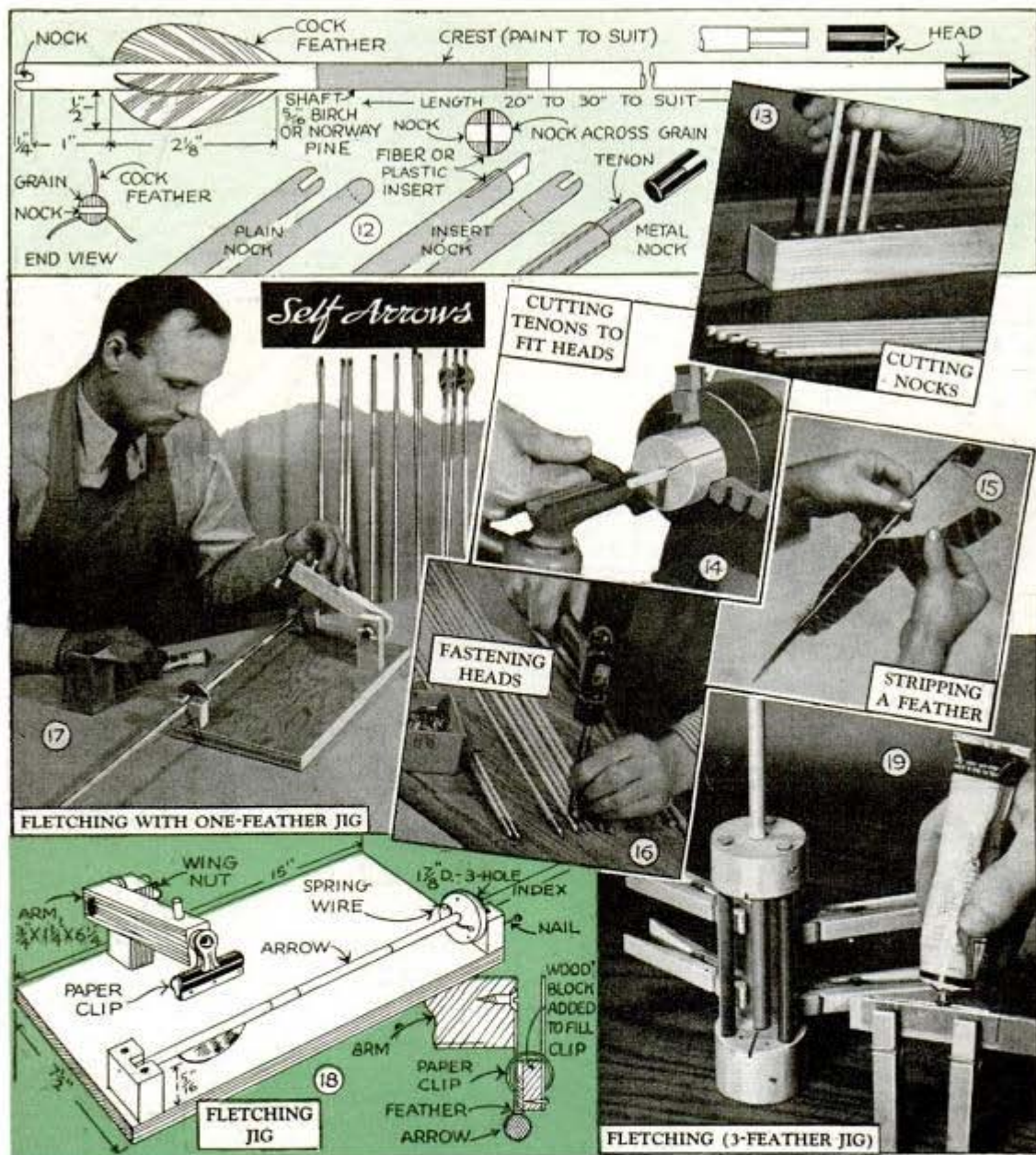
# BOW FOR FUN

the nocks 1 in. from each end, Fig. 3, using a round file, Fig. 2. Make a bowstring from upholsterer's twine, as shown in Fig. 1, and brace the bow as in Fig. 6. When the bow is braced the height of the string from the center of the bow should be about equal to the width of the hand and thumb with the latter stuck out as in Fig. 28. You can now "tiller" it to check the bend of both limbs, at the same time measuring the weight with a spring scale, as shown in Fig. 10. Bend the bow gradually. Take off a shaving here and there to equalize the bend. Take your time. You can always take off more wood, but you can't put it back on again. The bow should be quite stiff for a distance of about 6 in. at the center, and should then curve evenly to the tips. The beginner's most common fault is to make the bow "whip ended," Fig. 9. Besides checking the curvature, sight down the bow as you work and note if the string cuts the center of the belly, as in Fig. 7. If it throws off to the side, your bow has a turn in it. This can be corrected by taking off wood opposite the turn.

If desired, you can back your bow with red or black fiber attached with waterproof glue before the shaping is started. Instead of cutting plain nocks, you may decide to purchase and fit a set of cow-horn tips, or, you may want to turn them from colorful plastic. It will be noted, Fig. 3, that plain nocks are not cut across the back of the bow as this would weaken the wood. The groove in horn or plastic tips, however, is let into the back.

**The flat bow:** The flat bow is easier to make than the long one

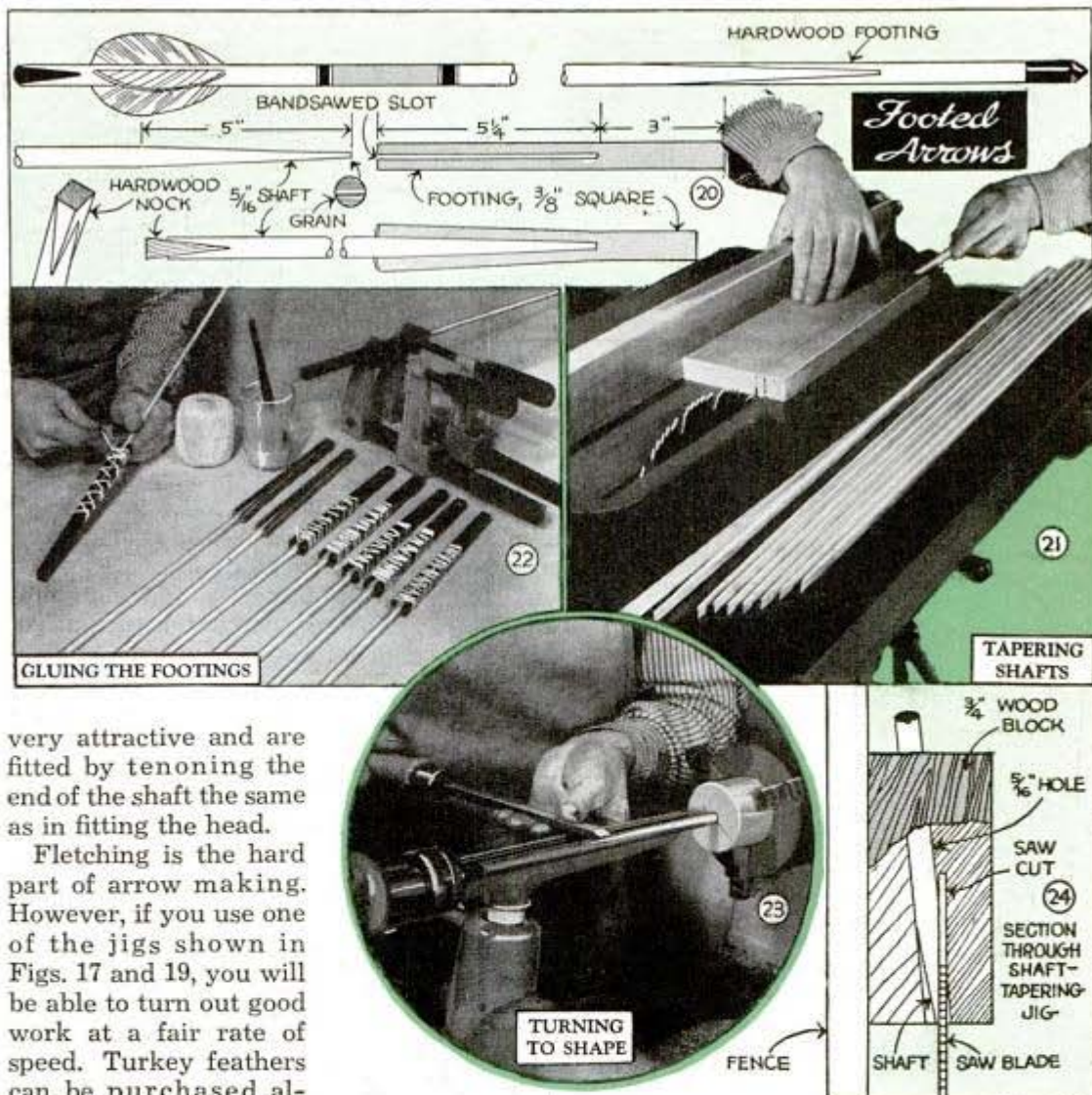




and can be 3 or 4 in. shorter for the same length arrow. The same general method of bandsawing is used, Fig. 8, but the belly side is only lightly rounded off. Typical sections of a 40-lb. flat bow are given in Fig. 11. The handle riser can be the same or of a contrasting wood to the bow itself. The narrow plate, which prevents wear, is inlaid, using a  $\frac{1}{16}$ -in. disk of  $\frac{1}{8}$ -in. plastic.

**Self arrows:** A "self" arrow is one made from a single piece of wood. The simplest way to make self arrows is to buy a construction kit, which includes the  $\frac{1}{16}$ -in. dowel sticks, feathers and heads. Birch is the best wood to use. The various parts and dimensions of the arrow are shown in

Fig. 12. First put on the head. A number of different ones can be purchased, but for average target work the brass parallel pile head is most satisfactory. Cut the tenon on the end of the shaft by turning on a lathe, Fig. 14. If you are careful, the head will be a drive fit and will hold securely. If the head is a bit loose, anchor it with a few punch taps as shown in Fig. 16. Cut the arrows to the required length and then cut the nocks. Plain nocks can be cut easily by running the shafts over a circular saw, as in Fig. 13. The nock should be across the grain. If you want more strength at the nock, insert a thin slip of fiber or plastic. Aluminum or molded-plastic nocks are



very attractive and are fitted by tenoning the end of the shaft the same as in fitting the head.

Fletching is the hard part of arrow making. However, if you use one of the jigs shown in Figs. 17 and 19, you will be able to turn out good work at a fair rate of speed. Turkey feathers can be purchased already cut, or you can strip your own feathers by grasping the vane at the tip and pulling outward, as shown in Fig. 15, afterward cutting the vane to the required shape. The one-feather fletching jig shown in Figs. 17 and 18 is built around a paper clip. A disk of plywood, which slips over the shaft, is drilled with three small holes to supply an indexing head, and is prevented from slipping by means of a piece of spring wire. One feather at a time is clamped by the paper clip and pressed into position. Any type of adhesive can be used. Celluloid cement has the advantage of quick drying and the ability to anchor on lacquer, thus allowing the shafts to be painted previous to fletching. Waterproof glue on bare wood is the most durable. In the three-feather jig, the feathers are held between metal plates, one plate of each set fitting into grooves in

the top and bottom members. The upper ring is removable, being a press fit over the three spacing dowels.

**Footed arrows:** Footed arrows are more decorative and more durable than self arrows. The footing is made from any tough hardwood, and is slotted for a distance of 5 1/2 in., Fig. 20. Shafts are usually Port Orford cedar or Norway pine, and are tapered to fit the slot in the footing. Perfect tapering of the shafts can be done by the circular-saw method shown in Figs. 21 and 24. The taper should be made with the flat of the grain. The shaft is assembled to the footing with waterproof glue and the assembly is then clamped or wrapped with twine or rubber strips as in Fig. 22. Other than a special tenoning jig, the best method of rounding the footing to match the rest of the shaft is by turning, Fig. 23. Nocks



for footed arrows are usually of the same wood as used for the footing. The insert is let into the end of the shaft, and is later rounded off and grooved in the usual manner.

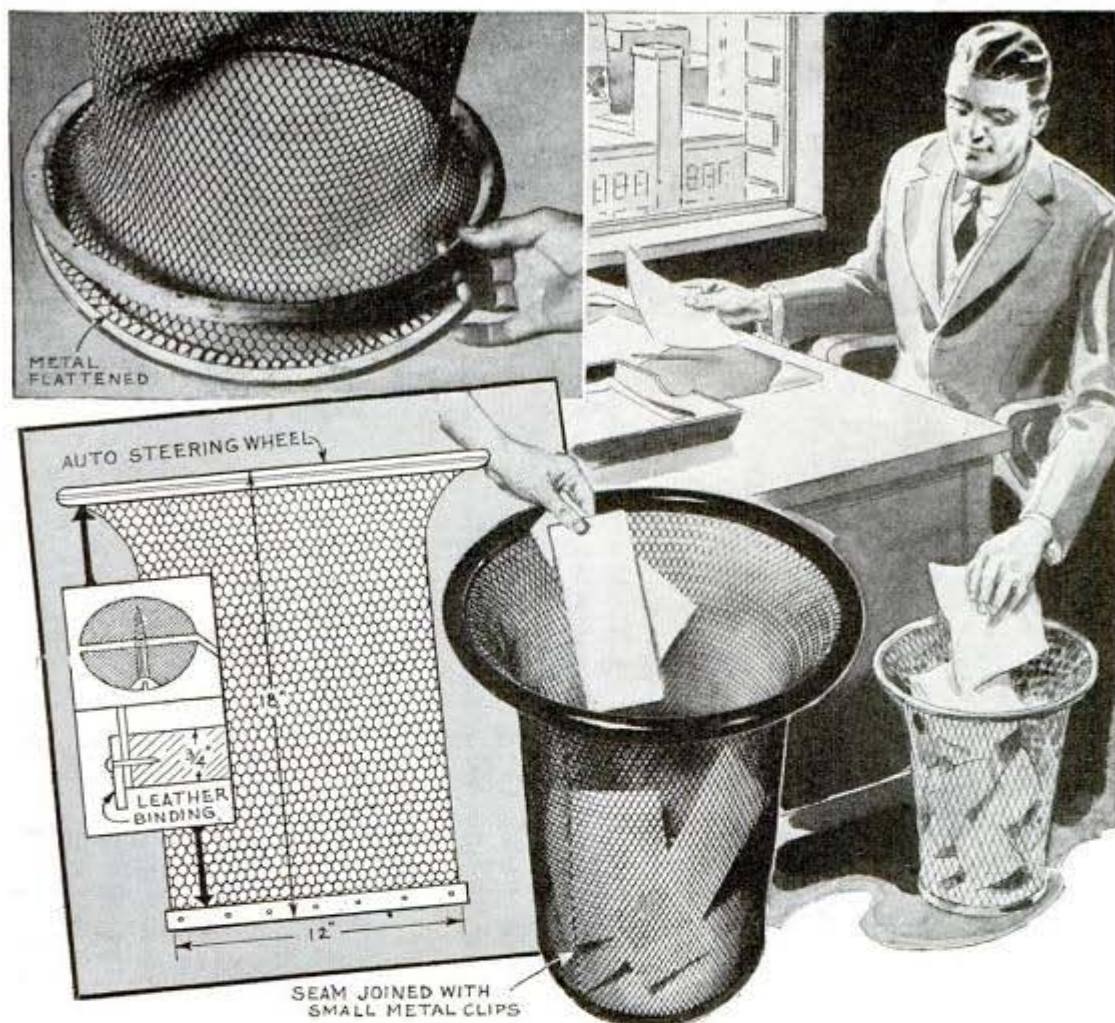
**Accessories:** If you want to be comfortable while shooting, you will need an arm guard and a finger protector. Any kind of leather band around the wrist and forearm will do for the guard, its purpose being to take the lash of the bowstring as the arrow is let loose. A simple finger tab of soft leather shaped as shown in Fig. 25 will provide protection for your fingers, or you may prefer to make or buy a three-finger shooting glove. An excellent target can be made by cementing four or five layers of corrugated cardboard together, painting the rings directly on the cardboard or on a piece of oilcloth. A simple target stand is made from 3/4-in. lumber, as shown in Fig. 27.

**How to shoot:** Stand with your feet well apart, left side facing the target, as shown in Figs. 26 and 29. Hold the bow horizontal and fit an arrow across the arrow plate. Grasp the arrow with the thumb or first finger of the left hand, Fig. 30, and with the right hand twirl the arrow until the cock feather is perpendicular to the bowstring. Adjust your grip on the string, as shown at the right in Fig. 25, and start the draw. Pull back slowly until your right hand comes to a fixed "anchor" point on your jawbone, Fig. 31. In this position, the string should be under and in line with the right eye. Aiming is done by sighting over the tip of the arrow to some fixed point previously determined as the correct point of aim at the distance being shot. Fig. 32 illustrates this method of aiming.

*How To Shoot*



# This Wastepaper Basket Can Stand Hard Use



Strong and neat, this handy basket is made from a strip of metal lath, the wooden rim of an auto-steering wheel and a strip of heavy leather. The ends of the lath are joined with small metal clips, and the top edge is stretched out to the same diameter as that of the steering-wheel rim. Then, the edge of the lath is flattened, and the rim of the wheel sawed in half horizontally, after which the halves are fas-

tened one on each side of the lath with wood screws. These are driven from the underside. The lower edge of the lath is stapled to a wooden disk 1 in. thick and 12 in. in diameter. A heavy leather strap tacked in place with round-head brass nails, extends  $\frac{1}{8}$  in. below the bottom to serve as a floor protector and to make the basket noiseless when moved.

—Benj. Nielsen, Aurora, Nebr.

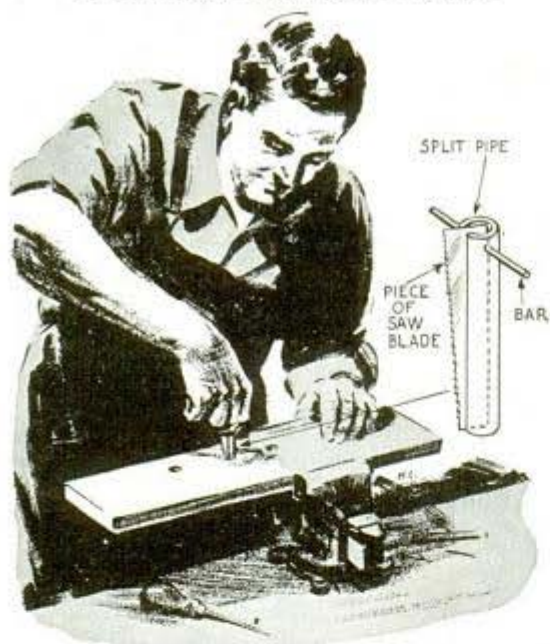
## Weather-Beaten Finish on Wood Is Produced by Rotating Wire Brush

A weather-beaten effect on new wood may be obtained by holding it against a rotating wire scratch brush so that the brush revolves with the grain. The brush removes the soft wood readily and leaves the normal grain patterns. After the piece has been brushed, it is shellacked with either clear or orange shellac to assist in

bringing out a complete weather-beaten antique result. Wood which has been given this roughening treatment becomes especially useful for wall plaques, signs, etc. Sheet lumber also may be passed over a wide set of wire scratch brushes to produce antique paneling.

—H. R. Alley, Northbrook, Ill.

## Reamer Made from Saw Blade to Enlarge Holes in Wood



The next time you have to enlarge a hole in wood and there is no tool at hand for the job, you can make one in a few minutes. Just split a length of pipe along one side to take an old keyhole-saw blade. Squeeze the edges of the slit tightly against the blade by hammering the pipe. Then drill a hole near the end of the pipe for a handle. In use, insert the reamer into the hole and twist it back and forth.

## Clean Contacts Increase Life of Flashlight Batteries

Unless the contacts at each end of the flashlight case and at the lower end of the bulb are clean, the slight corrosion sets up



a resistance in the circuit. This tends to shorten the life of the batteries by requiring excessive current to overcome the resistance. By cleaning all contacts when you install a new battery, it will last longer and provide a brighter light.

## Necktie Rack Holds Oilcan

Many of us seem never to have a suitable holder for an oilcan around our workbenches with the result that it is tipped over often and oil spilled over the work. However, if you have a necktie rack like the one shown, it can be altered to provide a handy holder. If you do not have such a rack, one can be purchased cheaply.



## Bobby Pins Make Connectors on Toy-Train Tracks



The loss of a few stub wires, usually provided as connectors for toy electric-train tracks need not prevent the operation of the plaything. Simply bend bobby pins and

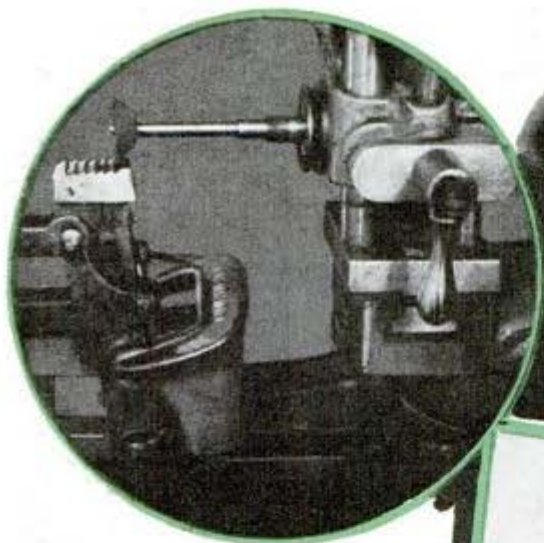
employ these as substitutes. The pins will fit snugly into the sockets and provide the contact necessary to carry electric current.

## Soap Roughens Glossy Showcards for Easy Lettering

To prevent colors "running" when applied to some grades of showcard stock, sponge the surface of the card with soapsuds. This will give the "bite" to the card so that the margins of letters or decorative designs will be clear cut.



# Renewing Worn Teeth of Pipe-Wrench Jaws



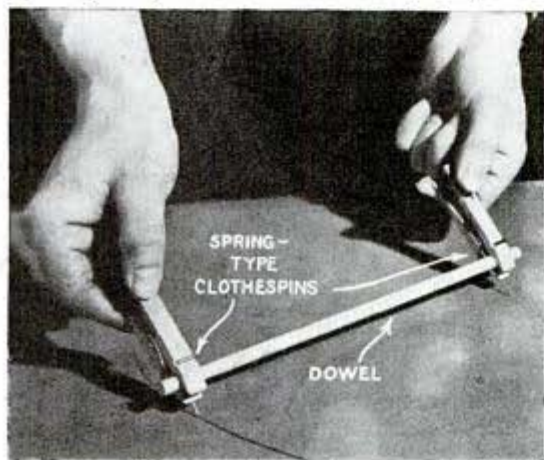
If you have a tool-post grinder with a vertical adjustment for your lathe, you can earn extra money by renewing worn pipe-wrench jaws for plumbers, steamfitters and other mechanics in your locality. You can devise your own set-up, which consists of a vertical member bolted to the lathe bed on which to clamp the wrench jaws. The detail above shows a set-up for grinding handle jaws. The detail at the right shows how the removable jaws are ground. The internal grinding

spindle is used with a wheel of medium hardness, the face being dressed to a bevel corresponding to that of the worn teeth.

## Emergency Trammels Made from Dowel and Clothespins

On a job that requires the use of trammels and there are none at hand, you can quickly improvise them from a length of

dowel rod and two spring-type clothespins as indicated. One jaw of each clothespin is fitted with a sharp point, after which the pins are clamped over the dowel. Spacing between the two points is adjusted quickly by moving the pins as desired.



## Proper Care of Paintbrushes

When putting away brushes that are being used in oil paint for a day or so, wrap each brush separately in paper and immerse them in kerosene. This will preserve their shape and prevent the paint from drying. When the job is finished, the brushes should be rinsed thoroughly in kerosene and then washed in soap and warm water.

Mrs. for miniature landscape - Son L. Landreco  
 Cincinnati Grocery - Sanford Fla

# MINIATURE in trays, bowls

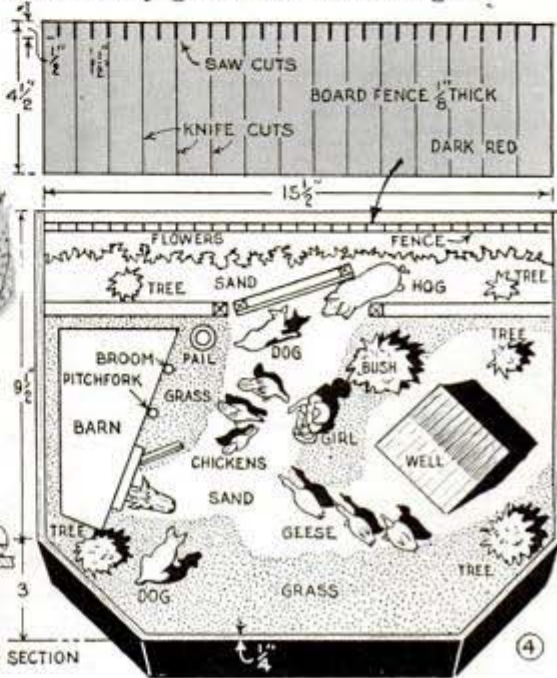
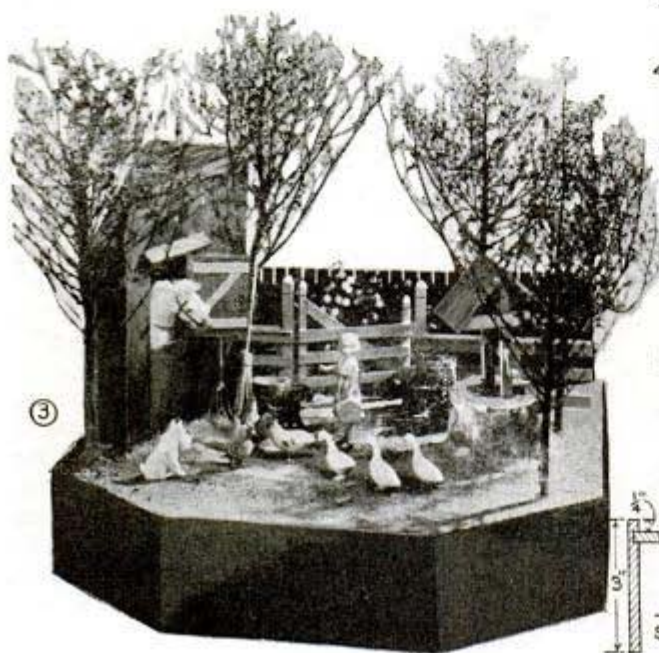


By R. W. MADDEN

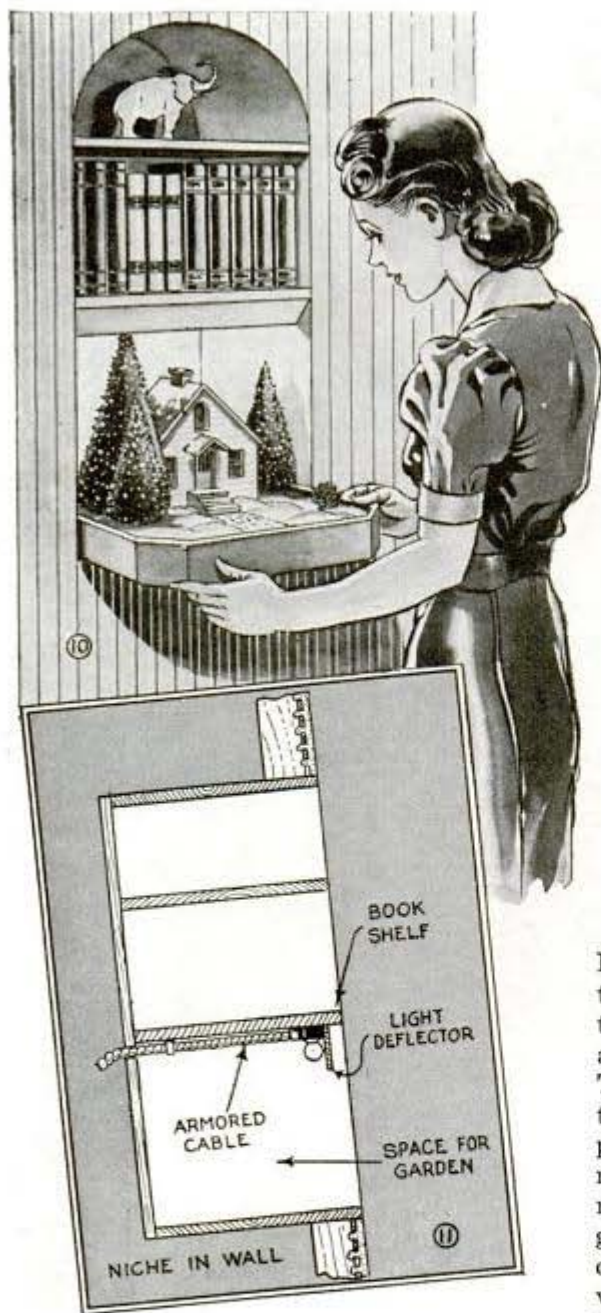
WHETHER it's a fairy house, garden or barnyard scene, or almost any other subject of your own liking, no special artistic talent is necessary to design and make miniature gardens in bowls and trays, which are highly attractive ornaments on wide window sills, in wall niches or on small tables. The plants either may be artificial or they may be real, depending on what is simulated. Other props such as fences, gates, buildings, wells and garden

furniture can be made from odds and ends. Small animals, birds and other tiny porcelain figures of correct proportional size can be picked up in the dime or variety store. Small pebbles represent stones and large ones simulate rocks. A little portland cement mixed with water goes a long way as mortar for building walls, and the use of plaster-of-paris should not be overlooked.

First of all you decide where you want to place the tiny garden and how large a







later painting it blue and gluing a piece of Cellophane over it to look like ice. Paraffin, dropped from a lighted candle over the stones and pebbles, looks surprisingly like snow.

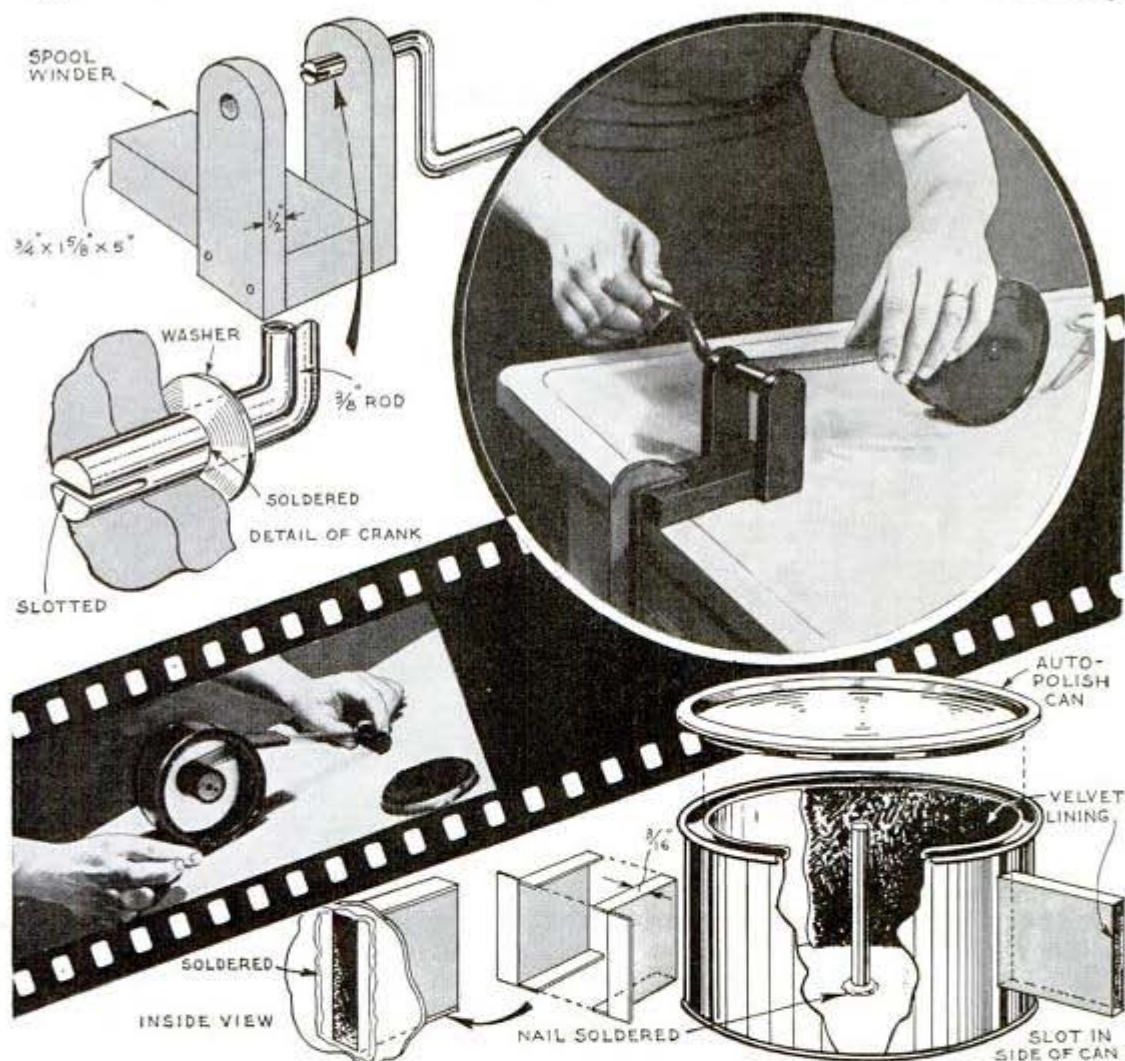
The barnyard scene in Figs. 3 and 4 was built on a small wooden base of plywood especially shaped to fit in a wall niche as in Fig. 10. The fence, gate, well top and barn front were made from 1/8-in. wood available in orange boxes. These, as well as the trees were glued and bradded to the base. Earth is simulated by a layer of papier-mache, which can be made by soaking strips of newspaper to form a pulp, and adding glue. When this has been applied to the plywood it will stick, and when dry it is painted with glue on which sand is sprinkled for paths, and sawdust, dyed green, for grass. Various details for a barnyard scene are shown in Figs. 8 and 9. Note that the head of the horse is glued to a small box which is attached inside of the cut-off barn, just behind the door opening. As the inside is in shadow, the fact that the horse is incomplete will not be noticed. The fencing and well shown in Fig. 9 can be used for other scenes besides the barnyard.

A cozy corner in a garden is depicted in Fig. 6, which includes a garden seat, gate trellis and a gazing ball. Details showing the construction of these parts and their arrangement are given in Figs. 5 and 7. The gazing ball is a silvered Christmas-tree ball, the neck of which is inserted in plaster-of-paris, put into the socket of a miniature candlestick. Model airplane cement is ideal for gluing the parts of the gate and other garden furniture. In this case live plants are used, and the pan, which was used in place of a bowl, was dropped into a large hole cut in a "stage" so that the edge of the pan, painted green, projected just over the edge of the hole. For miniature gardens it is best to select plants that do not require much water. No flowers were used in the model shown. Ferns and small pot plants last longer and require less care. The plants in this particular garden cost \$1.20. For illumination of a miniature garden placed in a wall niche, a small lamp arranged over the garden as shown in Fig. 11, will set it off to best advantage, a light shield or deflector being provided so that observers do not see the lamp itself.

supply you with the needed materials. The soil should not be pressed down but merely crumbled through the hands when filling.

Figs. 1 and 2 show a winter scene in a 6-in. bowl. A layer of cement and sand, mixed with enough water to form "mud" is poured over a layer of cinders. The house, which was cut from a block of wood and painted previously, and also the pine trees, which are simply Christmas ornaments with snow-tipped branches, are set in the soft cement. A few stones and pebbles can be added. You can make a small depression to represent a pond or lake,

# Spool Your Own 35-mm. Film and Save Money



With a light-tight container for bulk film and a winding stand, both homemade, the miniature-camera owner can save as much as 75 per cent on the cost of film by buying it in bulk and loading his own cartridges. The bulk film container is a large can with a nail soldered in the center of the bottom and a  $\frac{3}{16}$ -in. slot in one side over which two pieces of tin are soldered to form a small, flat sleeve that extends about  $1\frac{1}{4}$  in. from the can. The sleeve and the inside of the can, including the lid, are lined with long-nap black velvet. The winder is made of wood, with a crank bent from steel rod, slotted to engage the slot in the cartridge spool. To load film, turn out the light, slip the bulk film on the nail in the can, thread it through the slot 2 or 3 in., replace the lid and turn on the light. Slip the exposed end of the film into the slot of a spool on the

winder, turn the lights off again and then wind the film onto the spool as shown in the circular photo. Some bulk film is notched to show when the proper amount for 18 or 36 exposures has been wound on the spool. With unnotched film, 20 turns will wind 18 exposures; 28 turns, 36 exposures. Remove the filled spool from the winder, replace it in the cartridge, leaving about 3 in. of film protruding, and it is ready for the camera and you are ready to load another spool. Be sure to wind the emulsion side of the film toward the core of the spool and replace the spool in the cartridge properly. If this is not done, it will be impossible to load the film in the camera correctly. It is highly important that equipment and hands be clean and dry and that no dust or scratches get on the film while it is being spooled.

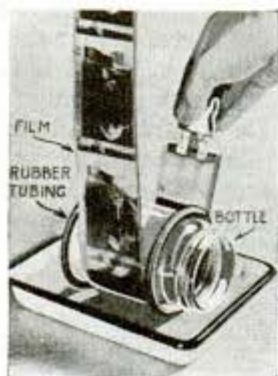
## Photographer Carries Extra Lens in Metal Holder Slipped on Belt



Considerable time can be saved on jobs that require numerous lens changes if this holder is used to carry the extra lens. Worn on the photographer's belt, the lens is out of harm's way and yet is always available without groping in the camera bag. The holder consists of a piece of sheet metal cut as indicated in the lower detail and bent as shown by dotted lines. Three sides are bent to form a receptacle for the lens board, while the fourth side makes a loop through which the belt passes. The lower end of the belt loop is soldered to the back of the holder.

—Everett Rudloff, Oceanport, N. J.

## Fruit Jar Keeps Film Submerged During Tray Development



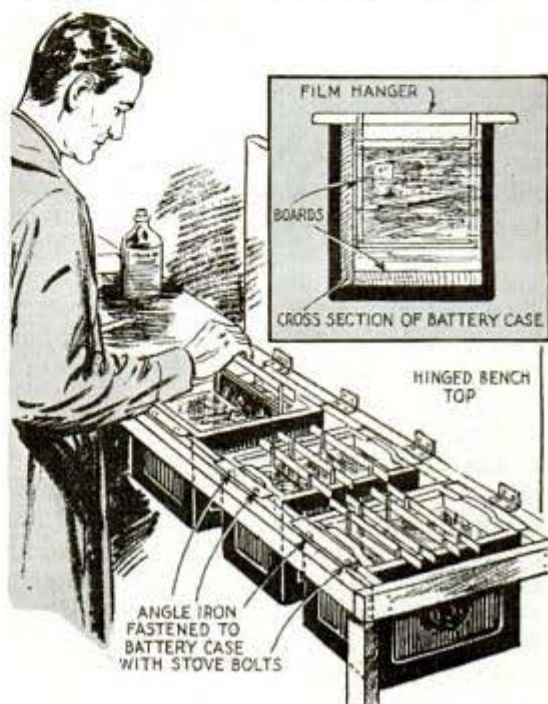
A fruit jar with a rubber "tire" around each end will keep roll film submerged in the solution during tray development. It is particularly useful when developing in total darkness or when a small amount of developer is being

used for economy. The "tires," made of  $\frac{1}{4}$ -in. rubber tubing, are cemented to the jar with rubber cement. Select a jar with no rough spots on the outside and one heavy enough to stay on the bottom of the tray while the film is being passed back and forth under it.

## Developing Tank Mounted under Darkroom Bench

Space can be conserved in a crowded darkroom by mounting the cut-film developing and fixing tanks under the hinged top of a bench. My tanks are hard-rubber cases from old storage batteries. Strips of angle iron bolted to the ends of each case rest on wood rails mounted under the bench top. The two pieces of wood shown in the sectional drawing are placed there to take up space so the tanks will hold exactly 1 gal., and should be coated with acid-resistant paint. It is important that old battery cases be washed thoroughly with a saturated solution of baking soda and water, to completely neutralize any traces of acid, before they are used for photographic purposes.

—Frank Sedlak, Cleveland, Ohio.

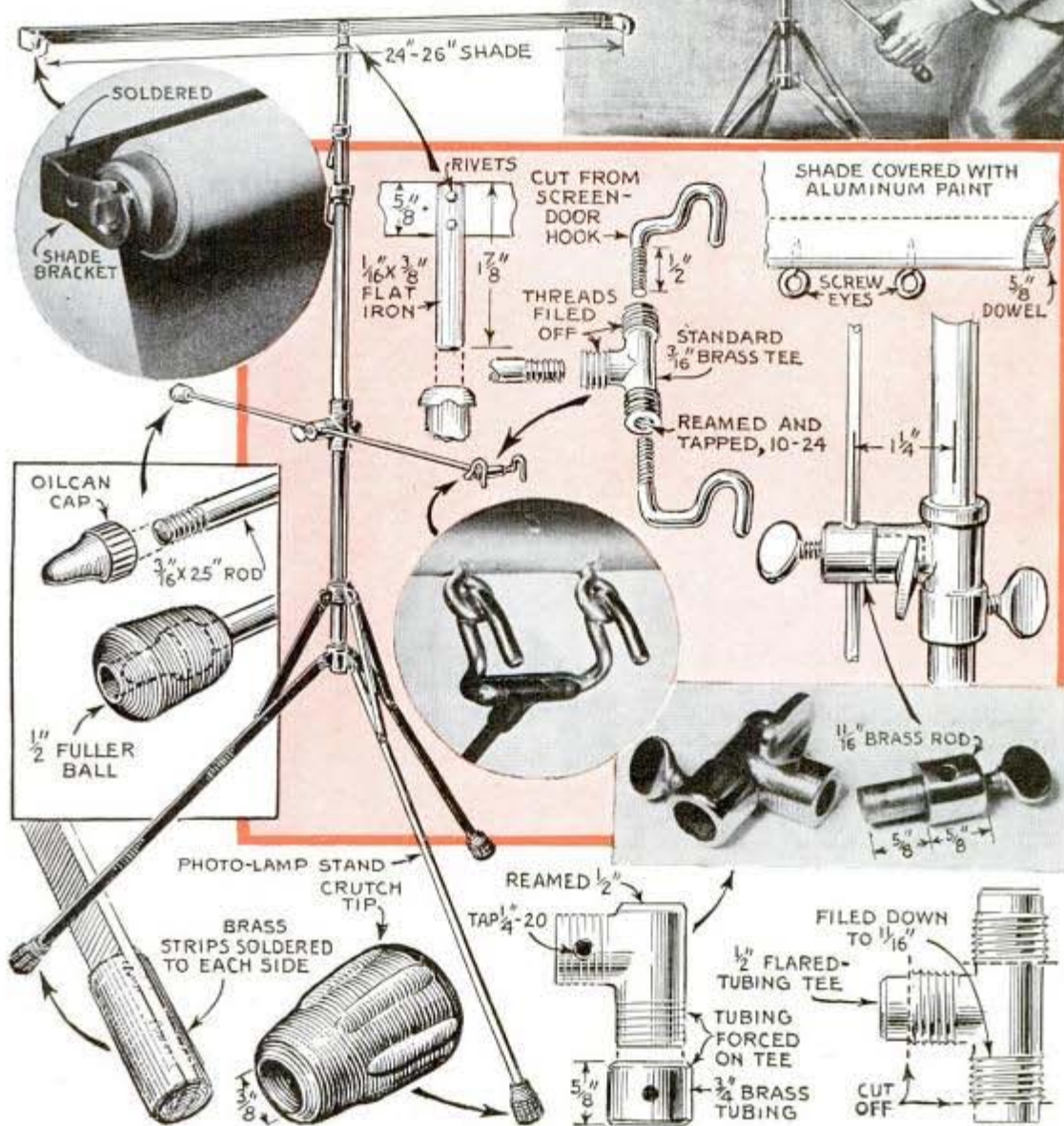
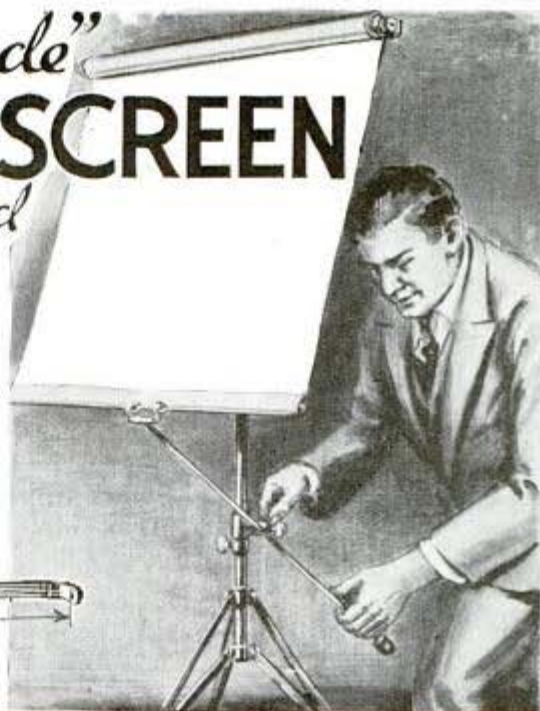




# Portable "Roll-Shade" REFLECTOR SCREEN

on a photo-lamp stand

For still photography in the home or studio, and for movie making, this adjustable reflector can be folded quickly and takes very little space for transportation. It consists of a 28 by 70-in. light-colored window shade, which is given a coat of fine aluminum paint, and is mounted on a telescoping photo-lamp or music stand. You slip rubber crutch tips on the feet and make the two crosspieces; the upper one holds the shade roller and the lower one keeps the shade taut as far down as desired and at any angle required. Two screw eyes driven into a dowel, which fits in the hem of the shade, permit attaching the shade to the double grip on the lower crosspiece



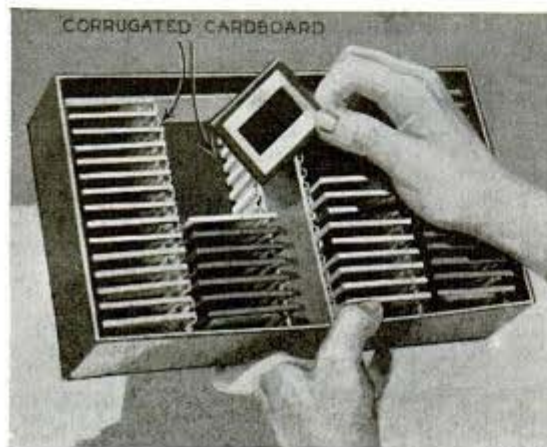
## Coffee Table Is Convenient Easel for Copying Photos at Home



Amateur photographers who occasionally wish to copy a photo, drawing, or a piece of printed matter will find a glass-top coffee table convenient for holding the copy flat. The camera can be mounted on a tripod with the head tilted down at a 90° angle as shown, and moved up or down to the proper height. One or two floodlights can be clamped on the tripod head or to the legs. When copying extra large work it may be necessary to straddle the coffee table with the tripod to center the camera over the copy. With reflex or plate-back cameras, focusing can be done as usual; with others, the distance must be measured carefully.—E. F. Whiteside, Wilmette, Ill.

## Slides Are Arranged Neatly in File Between Corrugated Strips

Any cardboard or light wooden box about 2¼ in. deep can be made into a neat



file for 2 by 2-in. slides by fitting it with strips of corrugated cardboard. For ease in removing the slides, the strips should be about 1¾ in. wide and they can be fastened with rubber cement.

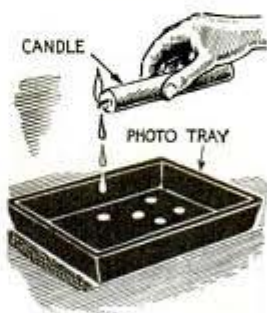
## Jar Cover Keeps Dust Off Lens of Camera or Enlarger

An oiled-silk or Pliofilm jar cover like the one shown will keep the lens of a camera or enlarger from becoming covered with dust while it is not in use. The covers are made in various sizes and

it is easy to find one to fit any lens. There is elastic in the opening of the covers, so they always fit snugly around the lens barrel.—Allen Fiske, Chicago.



## Drops of Candle Wax in Tray Aid in Removing Prints



To aid in removing photo prints or film from the bottom of your developing trays, put a few drops of wax from a lighted candle onto the bottom as shown. These will keep the prints or films

from adhering to the smooth bottom and hold the edges up where they can be grasped readily with the tongs.

## Safe Way to Carry Filters

Your filters will always be with you when needed if they are carried in a spectacle case fastened with small screws to the inside of the camera-case lid.

They also will be kept clean and there is no danger of their being scratched by coming in contact with other accessories.



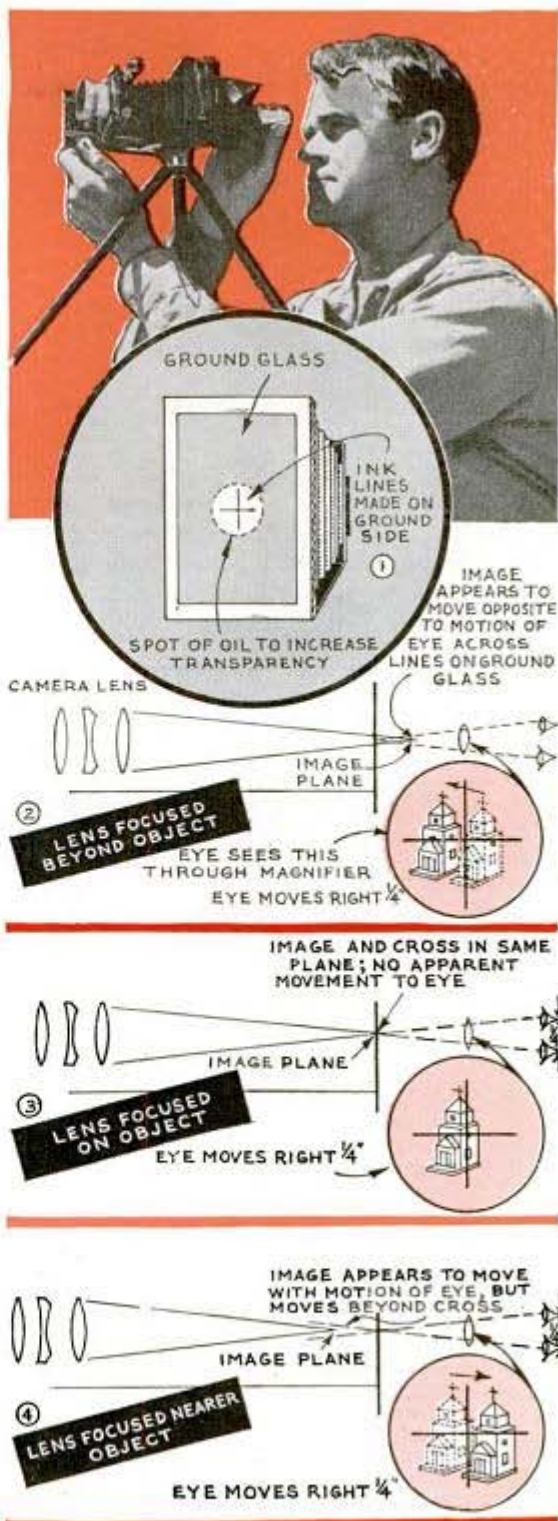
# Checking Focus of Ground-Glass Cameras

**I**F YOUR camera has a ground-glass back, you can check the focusing scale or make a new scale by an exact yet easily applied optical method of focusing. When a camera is in constant use or has been subject to severe treatment, it is wise to be sure that the focusing scale is still in its proper adjustment. This can be done very accurately by the method called "parallax focusing," which makes use of an apparent shifting of the image when the eye is moved under certain conditions.

In the center of the ground glass, on the ground side, rule a 1/2-in. cross, as in Fig. 1. Cover the cross with a drop of fine oil and spread it evenly with a dust-free brush. A permanent job can be done by cementing a 1/2 in. glass disk over the cross with Canada balsam or lacquer. The oil (and also the cement) has the effect of lessening the grain of the ground glass and allows the actual image to be examined with a small magnifying glass.

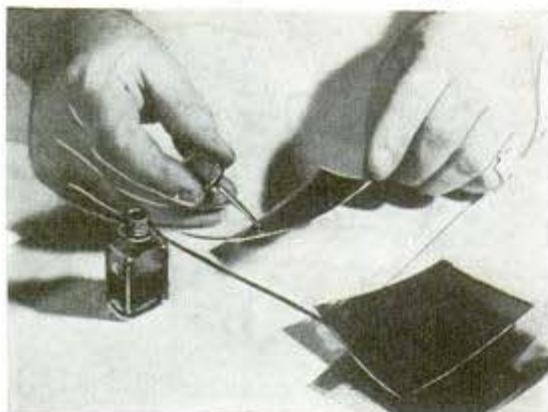
Set the camera on a tripod or other secure base and open the shutter. Focus on a distant object with sharply defined vertical lines. Place the magnifier so that the cross is focused sharply, and adjust the camera so that the image is seen close to the line. Hold the magnifier in a fixed position and move the eye slowly back and forth sideways; 1/4 in. usually being sufficient. If the image seems to move over the cross, as in Fig. 2, the lens is not properly focused on the object. When the image moves in a direction opposite to that of the eye, the image plane lies between the ground glass and the magnifier, and the lens is therefore focused beyond the object. Or, if the object is so far away that it may be considered at infinity, the lens is too close to the ground glass for anything to be in focus. If the image seems to move in the same direction as the eye, then the condition in Fig. 4 exists; the image is formed in front of the ground glass. Adjust the camera lens until the image remains stationary, and the object is in accurate focus. See Fig. 3.

Other distances should be measured accurately and focused in the same way. Repeat the focusing several times before engraving the appropriate marks on the scale. To use this method of focusing to determine the allowance required when using red filters (many lenses are not fully cor-



rected for red-light waves and produce a red image at a greater distance from the lens), make the same checks with a red filter on the lens. In checking focusing scales, always use the lens at full aperture.

## Rubber Cement Used as Opaque Can Be Rubbed Off Negative



A good opaque, for blocking out portions of a negative, can be made by mixing enough lampblack with rubber cement to color it thoroughly, and thinning the mixture slightly with benzol so it will brush out smoothly. This opaque, which is ap-

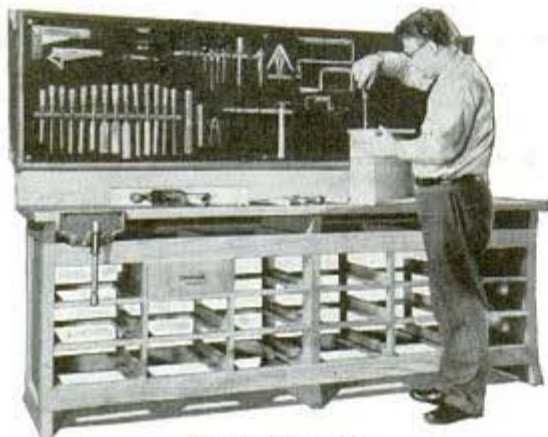
plied in the ordinary manner, dries quickly and adheres indefinitely. To remove it, it is only necessary to rub the material off with the fingers.

## Filters Made from Sun Glasses Held on Lens by Wire Loop

In an emergency, filters can be made from horn-rim sun glasses and they can be held on your camera lens with a length of insulated wire. Ordinary cotton-covered bell wire is good for the purpose. After carefully cutting the nose bridge and removing the temples, either one of the lens frames is fitted with a wire loop to slip on the camera lens.



## It's a Pleasure to Use Motorized Tools



Cabinet Bench—898

**DRILL PRESS—895:** Pipe fittings.  $\frac{1}{2}$ -in. chuck and ball-bearing spindle. 28 in. high—25c.

**WOODTURNING LATHE—1056:** Self-contained unit, mounted on stand. 4-speed belt drive—25c.

**CIRCULAR SAW TABLE—910:** Angle-iron frame. 24 by 36-in. table. 10-in. blade—25c.

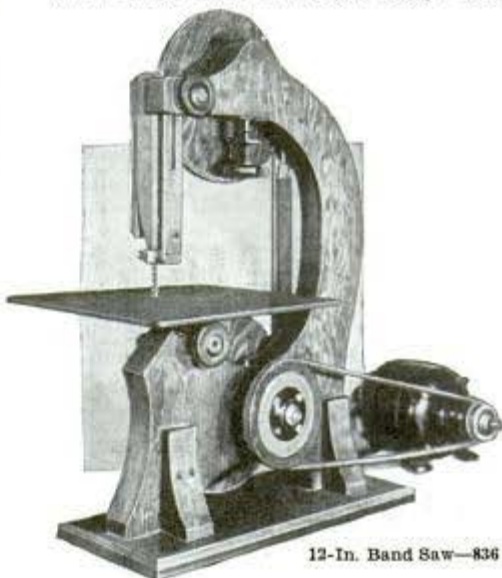
**22-IN. SCROLL SAW—771:** Pipe fittings and hardwood. Has sewing-machine drive—25c.

**"STROKER" BELT SANDER—1057:** Ideal for wide boards. Wooden framework. Table adjustable—25c.

**VERTICAL SPINDLE SANDER—560:** Wood table 10 by 17 in. Has  $2\frac{1}{2}$  by 4-in. sanding drum—25c.

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**12-IN. BANDSAW—836:** Smooth running and sturdy. Cuts 2-in. stock easily—25c.



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## 2-WAY AMATEUR TELEVISION

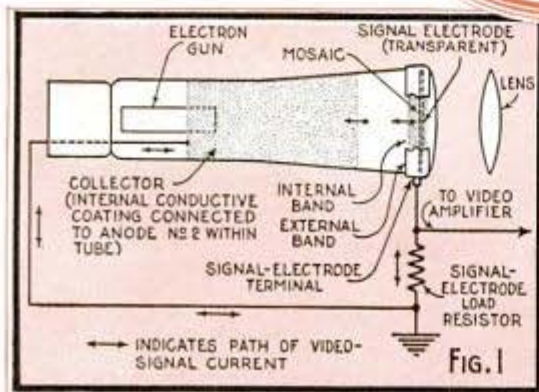
**T**WO-WAY "ham" television, with amateur phone voice accompaniment, is now a practical part of amateur radio as recently demonstrated with equipment of comparatively low cost. The first 2-way system was set up by the W2USA Radio Club between club headquarters at the New York World's Fair, and on the top floor of the 40-story Daily News building eight miles away in Manhattan. A similar demonstration was later given before a convention of the American Radio Relay League at Indianapolis.

This 2-way system provides 120-line television pictures on the 2½-meter band. Each transmitter is of 25-watt rating; simultaneous voice transmission and reception is conducted in the 56-60-megacycle band. In the New York demonstration shown in photo No. 1, the television pick-up camera is being operated by Wil-



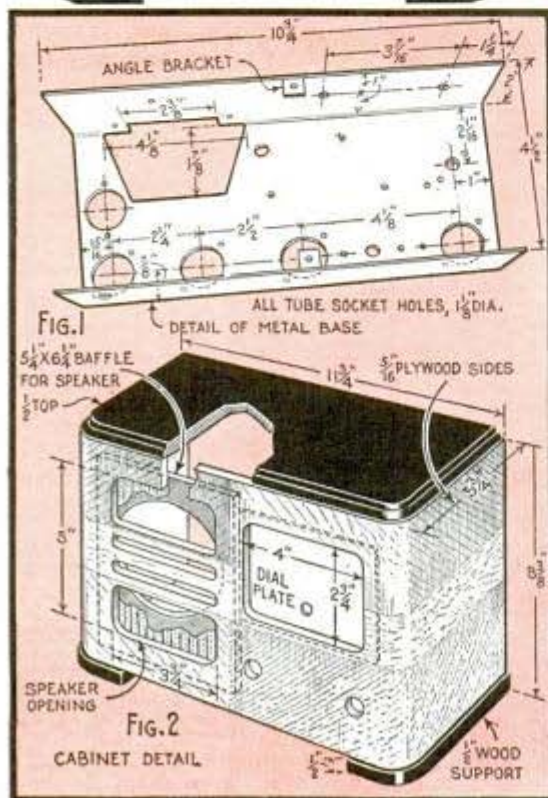
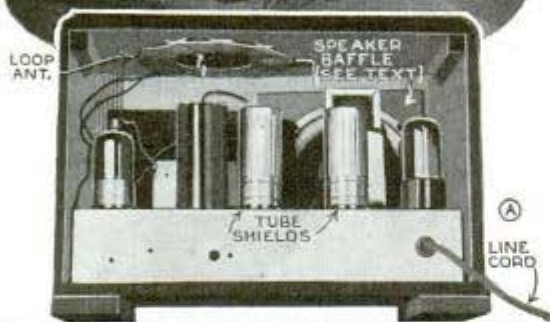
liam Meissner, W2HYJ. The voice sending and receiving equipment is shown in the center with Arthur H. Lynch, W2DKJ, talking to, and looking at, Fred Cusick, W2HID, who is at the other end of the 8-mile radio path. These club demonstrations were made to show the possibilities of homemade amateur television

equipment. The picture shown in photo No. 2 was photographed at the Fair end of the circuit as it was televised in New York City. A functional diagram of the low-priced RCA type-1847 amateur television pick-up tube employed, is given in Fig. 1. The television transmitter and receiver used at each station can be duplicated by any amateur for less than \$300. This includes tubes but does not take the 5-meter voice channel into consideration as such equipment is already in common use.



# 1941 LITTLE GIANT

By Frank M. Lund

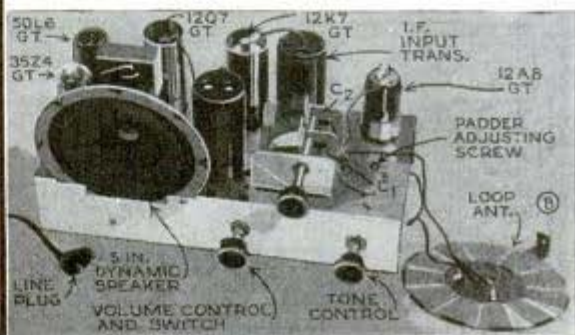


THOSE who have built previous "Little Giant" receivers appearing in March issues of Popular Mechanics Magazine will note that this 1941 model, of the most popular low-cost a.c.-d.c. set, is now a 5-tube super. Costing no more than the former 4-tube tuned-radio-frequency receivers, and just as easy to build, it is an excellent general-purpose broadcast set with unusually good tone, volume and distance-getting ability. A full superheterodyne, it employs two shielded I.F. transformers instead of the usual one used in small supers.

Easily portable, it has built-in antenna, automatic volume control, and a tone control that really performs as it should. Other features include: low hum level, latest type tubes, 5-in. dynamic speaker and no ballast tube to heat up the cabinet. All materials are available from the large radio parts mail-order houses. When purchased in kit form the I.F. transformers and the padder condenser can be obtained pre-balanced; however, simple balancing directions are given in this construction article.

The sheet-metal chassis base is detailed in Fig. 1. All dimensions are given for those who wish to make their own; however, formed and drilled bases are available for those who are not equipped to do so. The cabinet may be built in the home workshop, or similar blank cabinets of practically the same over-all dimensions given in Fig. 2 are available from parts houses. A small baffle cut from a piece of corrugated cardboard is placed behind the speaker grille opening which is backed with a piece of grille cloth.

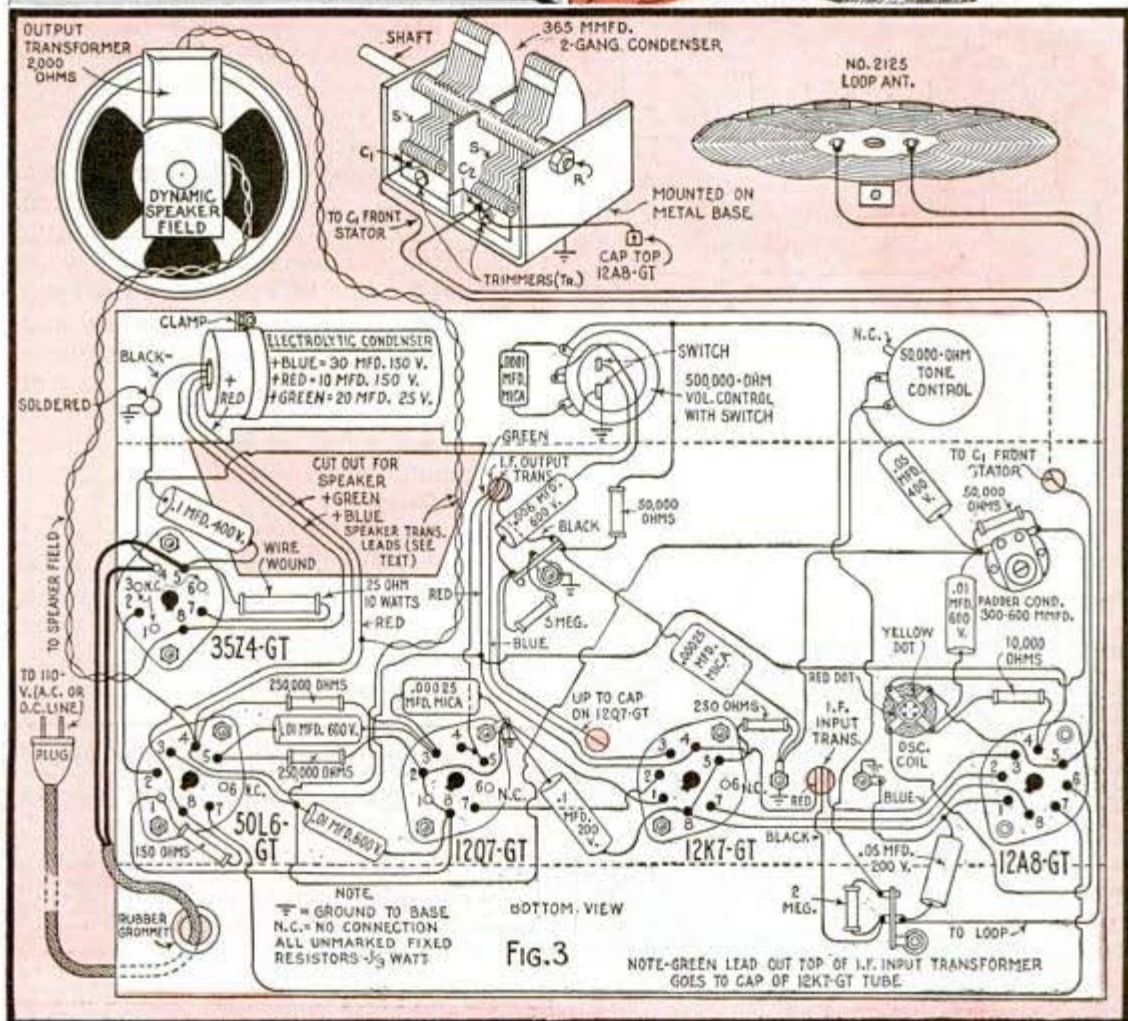
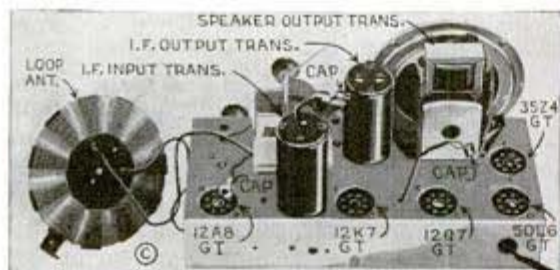
Various views of the receiver chassis are shown in photos B, C, and E; photos A and



# A.C.D.C. SUPER FIVE

D are rear and front views of the completed set housed in the cabinet detailed in Fig. 2. A simplified wiring diagram is given in Fig. 3. Please note that this underside view shows all wiring and parts in their respective positions under the base and all connections running up to the I.F. transformers, tuning condenser and speaker mounted on top of the base. The speaker is placed in the

(Continued to page 134A)



# U.S. Broadcast Station 'Moving Day' March 29



ON March 29, 1941, new Federal Communications regulations go into effect which will change the positions of 777 standard broadcast stations on the dials of 50,000,000 radios in the United States. The purpose of this station frequency shift is to reduce interference as provided by the recently ratified treaty drafted in Havana, Cuba, two years ago, by representatives of Canada, Cuba, Mexico and United States.

If your broadcast receiver employs push-button tuning you must either re-adjust the push buttons yourself, or have a radio man do it for you. In most cases, especially where the mechanical method of automatic push-button tuning is employed, any set owner can make the necessary adjustments himself by means of a small screwdriver, as no special instruments or radio knowledge is required. This mechanical cam, or lever type, mechanism is quite simple and commonly used systems are shown in the accompanying photos, and diagram Fig. 1-A. Photos A and B show two varieties of the heart-shaped cam system, and photo C is an interior view of a system where the tuning condenser rotor is coupled mechanically to a rocker plate, either with a gear wheel or pulley. Other systems include motor-driven and condenser substitution methods of more complicated nature, and many set owners will prefer to turn such sets over to their local radio serviceman, qualified student or radio experimenter to whom such adjustments are familiar routine. The table shows the shift for various frequency groups; for exact frequency assignments in your locality, consult your local newspaper.

Assuming that your set is of the mechanical variety, photos A and B, in which the tuning condenser shaft is actuated by the heart-shaped cam mechanism when you push down either a button or plunger,

(Continued to page 132A)

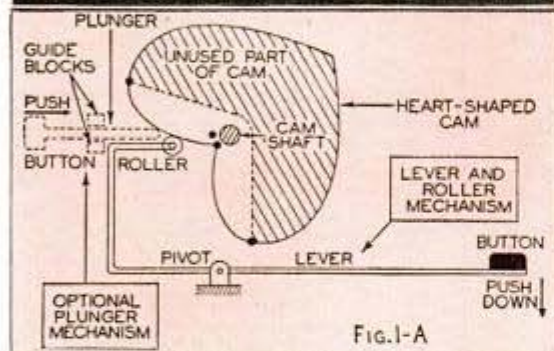
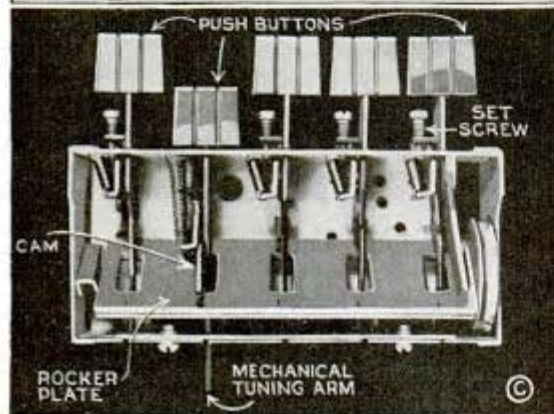
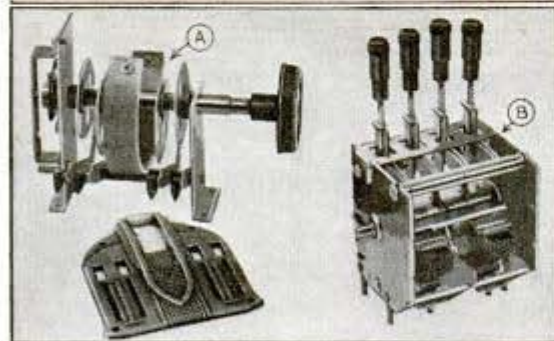


FIG. 1-A



## FREQUENCY SHIFT TABLE

550-720 K.C.	→	No change
740-780 K.C.	→	Up 10 K.C.
790-870 K.C.	→	Up 20 K.C.
880-1450 K.C.	→	Up 30 K.C.
1460-1490 K.C.	→	Up 40 K.C.
Local 1500 K.C. stations	—	down 10 K.C.



# HELPFUL RADIO HINTS

(A) An easily installed inter-room call system, combined with a radio receiver, offers the businessman an opportunity to listen in on flash news or stock reports, and, by merely shifting a fingertip control to "talk-listen" positions he can communicate with a stenographer in an adjoining office as illustrated in sketches Figs. 1 and 2. The external 2-way P.M. speaker is equipped with a 50-ft. cord. This system also may be used in the home to save time in answering door calls

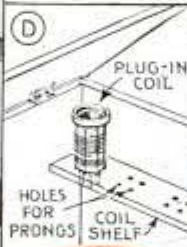
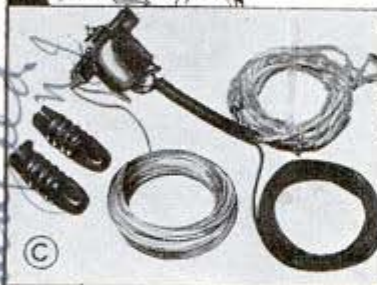


FIG. 1

(B) Pilot light bulbs may be given identifying colors with a lacquer kit now available. (C) Noise eliminating antenna system which also provides for an extended frequency range to include FM reception; antenna is L-type instead of doublet



FIG. 2



(D) Handy shelf in receiver cabinet for spare plug-in coils. (E) Socket shield for single-ended tubes in high-gain amplifiers. (F) Remote point radio silencer when telephone is in use; fixed condenser and push button are connected near end of indoor antenna; button shorts antenna to ground on water pipe



(G) Compact filters for eliminating radio interference caused by fluorescent lamps and other electrical appliances in the home. Two flexible leads connect across the supply line either inside the appliance or where line enters unit. (H) Antenna installation designed to eliminate noise from power line. Erected as high as possible above ground, antenna is at right angles to line; dotted line shows optional lead-in method. (I) Coil makers' kit contains all material except wire to construct practically any type of coil used in radio receivers



*James Mullen Co. 150 Exchange St. Malden, Mass.*

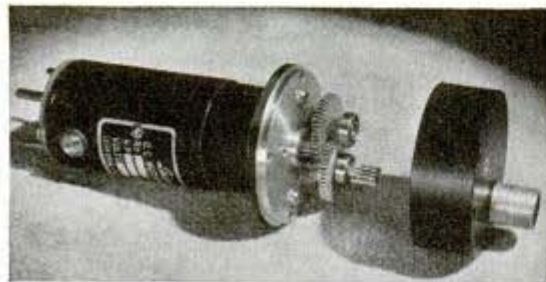
## Streamline "Pocket Size" Set in Aluminum Case



Small, streamline, and full of "pep" this compact little receiver is housed in a light aluminum case only 8 in. long,  $2\frac{7}{8}$  in. deep and  $4\frac{1}{2}$  in. wide. Entirely self-contained, with built-in loop antenna and tiny speaker, it employs four miniature tubes that operate on one ordinary  $1\frac{1}{2}$ -volt flashlight cell A-battery, and one  $67\frac{1}{2}$ -volt B-battery. Plays anywhere without external connections; raising lid turns on set which has automatic sensitivity control.

## Electromagnetic Clutch

This motor with electromagnetic clutch is designed to provide a motor drive system of general application, wherein the driven member is abruptly stopped or started in response to an electrical current, or control signal. Suitable for many types of remote-control systems, such as automatic radio direction finders, power-operated rotating beam antenna systems, pho-



**NEXT MONTH—How to Build a Miniature Tube "DX" Set That Works on Flashlight Cells.** An ideal "first set" for beginners and a distance getter with volume that will please any builder; in two 1-tube low-cost units for headphones or speaker. Covers broadcast and extended short-wave bands. Also—A 20-Watter for CW

Climate Mfg Co  
4835 Alameda  
Chicago  
to-cell controlled apparatus and similar applications that will present themselves to designing engineers and experimenters.

## Decade Resistance Box

Available in three useful ranges, these boxes consist of wirewound resistors connected to tap switches to provide the serviceman and experimenter with a means for determination of replacement resistors in radio sets.



## Radio Equipment for Small Planes



Transmitting and receiving apparatus and a new type of antenna reel system are now supplied by the manufacturer of this small two-place plane. The equipment is installed complete with headphones, microphone and other accessories.

Blueprints covering radio construction articles in this and past issues are available for 25 cents each. Original material lists, with names of manufacturers and dealers, can be obtained from our Radio Department upon receipt of postage.



# SHOP NOTES



## REAMERS and How to Use Them

By C. A. Crowley

WITH the use of a reamer you can enlarge slightly the size of a hole in metal to within .001 in. of the desired finish size, or even closer. There are various kinds of reamers available, which differ in their own particular purpose and advantage. Some of these are shown in Fig. 1.

A hand reamer of either the straight or spiral fluted type, as in the two left-hand details of Fig. 1, is used for finishing to size where a very accurate hole is required, after the hole has already been rough-reamed to within a few thousandths of an inch undersize. These reamers are ground straight except for a short distance at the end where they are slightly tapered to enable them to enter the drilled hole. A hand reamer never should be used to remove more than .005 in. of metal.

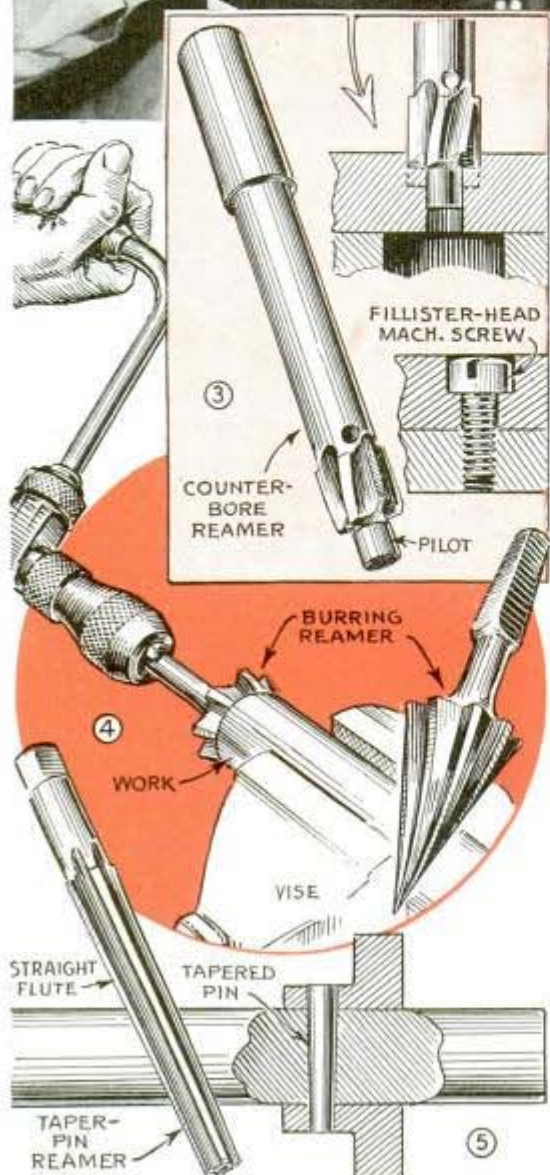
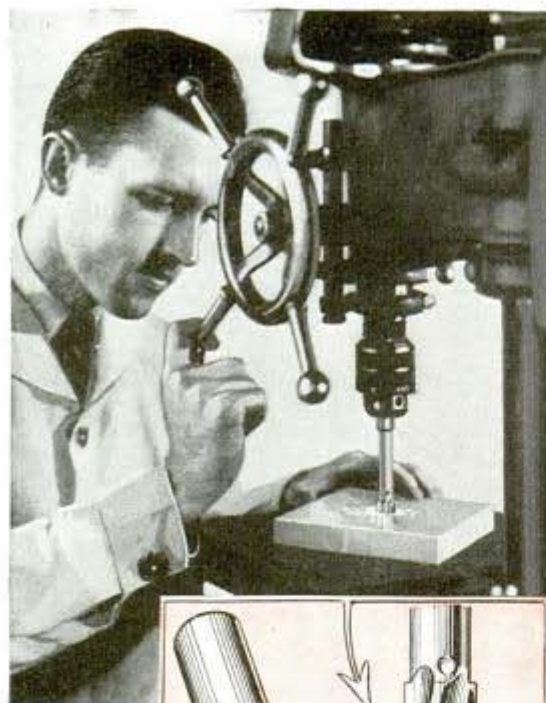
Fluted machine reamers may be of the straight or tapered-shank variety. The cutting edges extend the entire length of the flutes and the teeth are beveled slightly at the end so that the tool will enter the hole. While such a reamer produces a smooth and accurate hole, it cannot be used



REAMER CHUCKED IN A TAP WRENCH

to remove much metal and the size of the drilled hole therefore should not be more than .01 to .015 in. less than the finish size.

Another type of reamer is known as a rose reamer, differing from the fluted type in that all the cutting is done by the beveled end and not by the fluted body, which extends above the cutting end and fits closely in the reamed hole to serve as a guide for the cutting end. Rose reamers remove more metal than fluted reamers and are often used for rough-reaming, later finish being done by means of a fluted chucking reamer, or for still greater accuracy, by a hand reamer. In general appearance a rose reamer resembles a fluted chucking reamer such as shown in Fig. 1, except for the differences mentioned. Rose



reamers will not be injured when a hardened jig bushing is used for guiding in the normal way, while the cutting edges of a fluted reamer may be dulled, when using a jig bushing, on account of side thrust if the hole and the jig are not perfectly aligned.

A shell type of reamer, shown at the extreme right in Fig. 1, is drilled lengthwise concentrically so that several different sizes can be interchanged on the same arbor. In addition to the types mentioned, there are also adjustable and expansion reamers as shown in Fig. 1; adjustable and expansion shell reamers; repairman's taper reamers, Fig. 2; counterbores, Fig. 3; pipe-burring reamers, Fig. 4; taper-pin reamers, Fig. 5; countersinks, Fig. 7, and also combination drills and countersinks, Fig. 8.

Whether or not a hole is to be reamed, and how carefully it should be reamed, depends on its purpose. Holes for bolts and screws, whether body size or tap size, are not generally reamed. Where an accurate, close fit is necessary, a hole is invariably reamed, as for instance, a hole for a mandrel on which work is to be placed for further machining, as in the case of a pulley. In some cases, sufficient accuracy can be obtained by machine-reaming only; in other cases the required accuracy can only be obtained by hand reaming. Holes that are to be reamed should be drilled  $\frac{1}{64}$  to  $\frac{1}{32}$  in. less than the finished size. After drilling, it is best to follow immediately with the machine reamer, without disturbing the setup or unclamping the work, so that the reamer will follow the drilled hole. Speed for reaming should be somewhat less than the speed for drilling. The feed should not be too rapid or the reamer may tear. It is always best to err on the side of feeding too slowly rather than too fast. Cutting lubricants should be used as in drilling most metals; lard oil or other suitable cutting oil being used on steel. No lubricant is used in the case of cast iron. A reamer should be started into the work with great care; otherwise, it may chatter and spoil the mouth of the hole. It is frequently better to start the reamer by hand, pulling the belt if necessary, in order to start it true.

Work may be reamed in a lathe, as shown in Fig. 6. The work can be left on the faceplate or in the chuck after drilling, and the drill in the tailstock is replaced with a reamer. The reamer can then be fed in while the work is turned. The speed should

be somewhat less than that used in drilling.

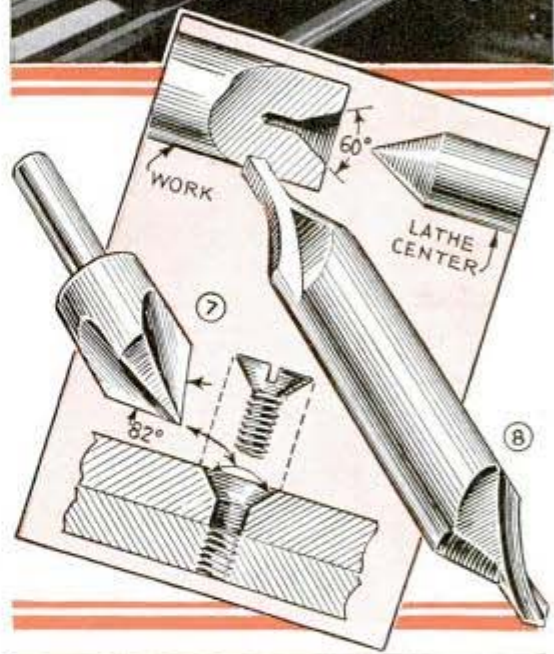
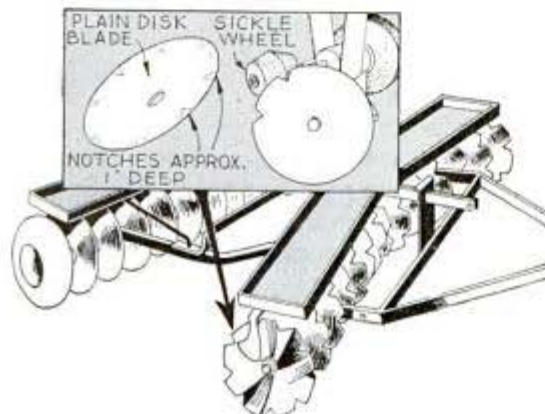
If the hole is to be hand-reamed, it first should be machine-reamed to within .005 in. of finished size. The hand reamer never should be used except with a tap wrench, and great care is needed to start the hand reamer straight. The reamer should not be forced into the hole, but should be advanced carefully and evenly. A burr on a reamer may spoil a hole. Consequently, before using a reamer, it is best to feel the cutting edges, and if there is a burr, remove it with an oilstone. Reamers should never be turned backward under any circumstances.

The counterbore, shown in Fig. 3, is used for making the recess for a fillister head screw. The guide or pilot is the size of the drilled hole, so that it fits snugly yet without binding. The pilots are generally interchangeable so that the same size cutter can be used for a number of screw sizes. The cutter head is the size of the desired hole. The countersink shown in Fig. 7 is used for enlarging the mouth of a hole to cone shape for a flat-head screw. This type of countersink, ground at an angle of  $82^\circ$ , should be distinguished carefully from the  $60^\circ$  countersink used to ream out the centers on lathework. A combination drill and countersink is also available for making lathe centers, as shown in Fig. 8.

### Disk Harrow Blades Notched to Cut Cornstalks

When disking cornstalks trouble often experienced with clogging of the disk harrow can be avoided by grinding equally spaced notches in each blade of the front gangs of a tandem disk. The notches catch loose stalks and pull them under the gangs where they are cut into short pieces.

—W. C. Lammey, Naperville, Ill.



### Shaft Clearance Measured Easily Without a Micrometer

Shaft clearance in a worn bearing can be measured without a micrometer in a few minutes. First measure the length of the shaft  $L$ , push it part way back into the bearing and measure distance  $I$ . Now move the end of the shaft from one extreme to the other and get distance  $D$ . After marking down these dimensions in inches, multiply the movement  $D$  by distance  $I$  and divide by twice the length of shaft  $L$ . The result will be the clearance in inches.





## Plumber's Force Cup Holds Bulbs Safely on Stepladder

To avoid dropping light bulbs while changing them, one school janitor employs a plumber's force cup. A hole in the top step of the ladder receives the handle of the cup and a section of rubber hose tacked on the handle serves as a depth stop.

## Round Cork Is Good Container for Thumbtacks



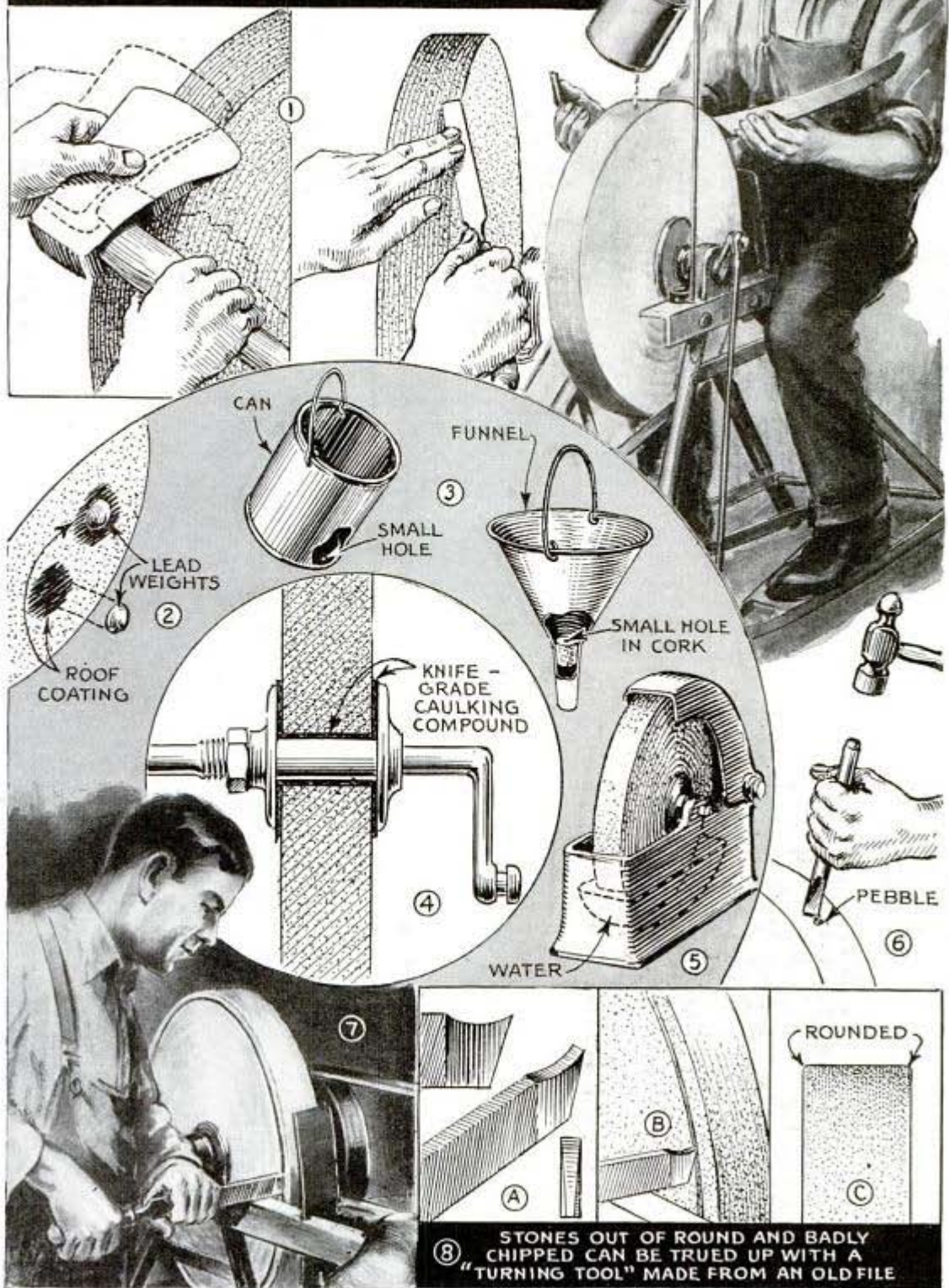
A clerk in one factory who had to put up bulletins frequently, used a round cork such as a fishline float, to carry thumbtacks for the purpose. A string was run through the cork and hooked over a button on his clothing. In this way, there was

no danger of the tacks working out of the holder in his pocket, which often happened when the tacks were carried on the regular card.

## Servicing Your Grindstone

Due to its slower cutting properties and low surface speed, a grindstone is still preferred by many for sharpening certain highly tempered tools and for other grinding operations such as lapidary work. In the course of service, the grindstone and the fine-grained stone known as the wet grinder wear slowly out of round, although slight irregularities affect the usefulness of the stone but little. On stones still in fair condition it is possible to prolong the service period when sharpening a tool by simply shifting it from side to side as in Fig. 1, to bring the edge into contact with the entire grinding surface. Sometimes a stone will be considerably out of balance even when there is little eccentricity. This can be corrected by attaching a number of small lead weights to the side of the stone with roof coating or a similar adhesive as in Fig. 2. If a grindstone is loose on the shaft remove the latter by carefully unscrewing the flanged nut. Then coat shaft and flanges with a knife-grade caulking compound before re-assembling. This keeps out water and "cushions" the stone on the shaft, Fig. 4. Applying water a drop at a time to the stone is best and can be done by using a can or funnel suspended above as in Fig. 3. If you have only intermittent use for a stone of the type shown in Fig. 5, don't allow it to stand for long intervals with a portion submerged. Sometimes a pebble will turn up on the surface of the stone as in Fig. 6. Occasionally you can chip it out whole, but usually this is not advisable. Rather chip it away piece by piece until slightly below the surface, using a cold chisel. After the stone wears away more you can remove it altogether. Stones out of round and badly chipped should be trued up by cutting down the face about  $\frac{1}{2}$  in., using an old file as a turning tool as in Figs. 7 and 8. Grind the end of the file to the shape shown at A. Then rig a belt drive for the stone and use the file in the manner shown in B. Once the waste is removed, true the new face and round the corners as at C, Fig. 8. This makes the stone as good as new. Always be sure that the tools are clean and free of grease or oil before grinding. If this is not done, the pores of the stone may become clogged with these impurities, which will cause the abrasive surface to glaze over and ruin its effectiveness.

# Servicing Your GRINDSTONE



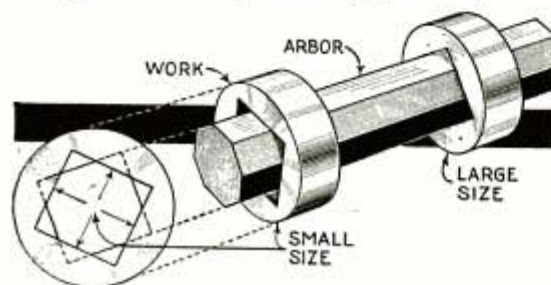
## Tank Pipe with Flexible Joint Easily Detached from Pump



For easy removal of a tank supply pipe at the windmill pump, cut the pipe about three feet from the bowl and slip on a length of snug-fitting radiator hose as shown. This makes a joint stiff enough to keep the bowl from falling to the well platform, but is sufficiently flexible so that it can be detached and swung to one side when desired.

## Octagon Arbor for Square Holes

To save time driving work on and off an arbor, it is always advisable to mount two pieces at once whenever possible. In the case of work with square broached holes it is possible to do so, by making the arbor octagon and milling four sides so that one piece can be driven well up the arbor. The other four sides are larger so that the second piece will only drive up part way. As

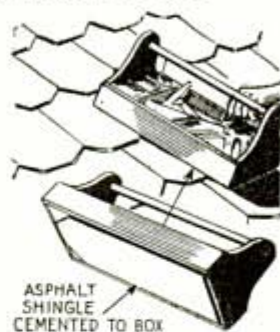


both pieces can be driven on and off in almost the same time as one, it is obvious that a good deal of time can be saved if the arbor press happens to be some distance from the lathe on which the operator is working on this particular job.

—H. Moore, Kirkstall, Leeds 5, England.

## Shingle on Bottom of Toolbox Prevents Sliding on Roof

Working on an asphalt shingle roof, one man prevented his toolbox from sliding by simply cementing one of the prepared shingles onto the bottom of the box, with rough side down.



Friction between the rough surfaces of the roof and the shingle prevent slipping.

## Fuller Ball and Pipe Make Handle to Grip Small File

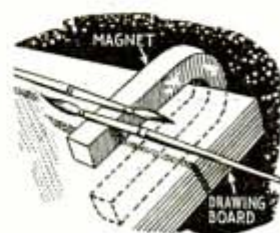


By forcing a fuller ball into the end of a length of  $\frac{1}{2}$ -in. pipe, and driving the tang of a small file through the hole in the rubber, you can provide the tool with a comfortable

handle. The sharp edges of the pipe at the ends should be rounded with a file to protect the hands.

## Magnet Holds Lettering Brushes

One showcard writer keeps a couple of lettering brushes handy on his workboard by using a magnet taken from an old magneto. The magnet hooks over the top of the board in the manner shown. The metal ferrules of the brushes adhere to the magnet.



The magnet hooks over the top of the board in the manner shown. The metal ferrules of the brushes adhere to the magnet.

Used powder puffs make excellent pads for cleaning white shoes.

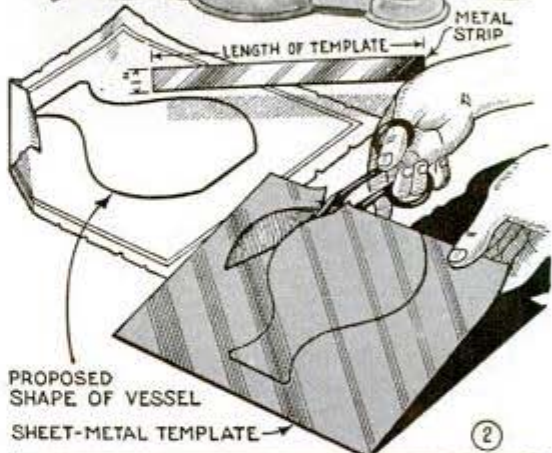


# Shop CALCULATIONS *simplified*

By J. B. MULLIN

**SHORTCUTS** in measuring areas, volumes and dimensions of irregularly shaped objects—procedures that are “unorthodox” in that they deviate entirely from customary mathematical methods, may often prove to be great timesavers and give accurate results.

**Volume of vessel:** The volume of a vessel such as a vase that you may be designing, can be calculated before making it, and by knowing its capacity, you can make alterations accordingly. In a case such as is illustrated in Figs. 1 and 2, you draw the full-size cross section of the vase on a piece of sheet metal, pressed wood or even on heavy cardboard of uniform thickness. Cut out the template and weigh it carefully. Then weigh a rectangular strip, exactly 1 or 2 in. wide, of the same material as the template and just as long (in inches). Weighing should be done on a sensitive balance as in Fig. 1. If the pieces are small, it may be necessary to use a jewelers' or

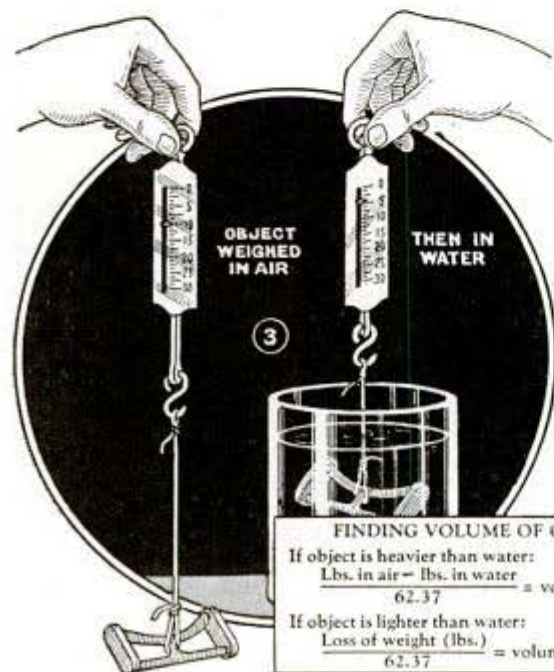


**FINDING VOLUME OF VESSEL**

First find average diameter of vessel which equals  

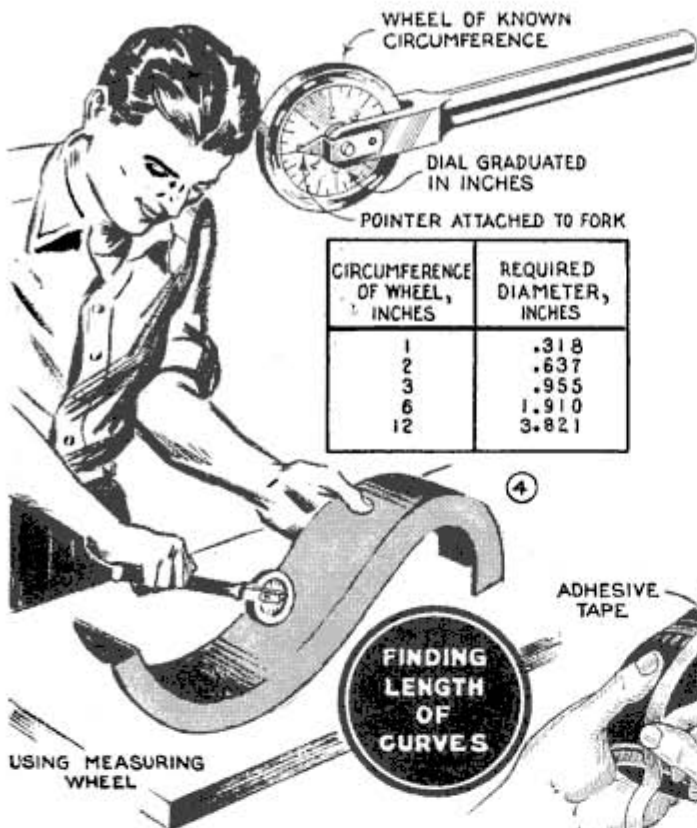
$$\frac{\text{weight of template}}{\text{weight of rectangular strip}} \times \text{width of rectangular strip}$$
 Then volume equals:  

$$3.1416 \times \frac{\text{average dia.} \times \text{average dia.}}{4} \times \text{length}$$



druggists' balance. Then it's a simple matter to calculate the volume of the base in cubic inches by a little multiplication and division as indicated in Fig. 2. To convert to fluid ounces, multiply by 0.554 and to convert to gallons, multiply by 0.00433.

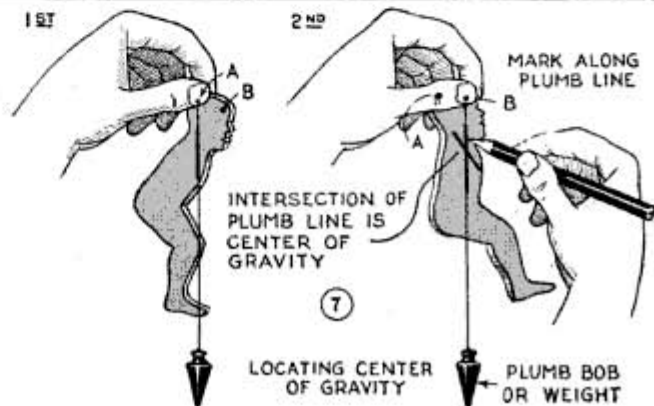
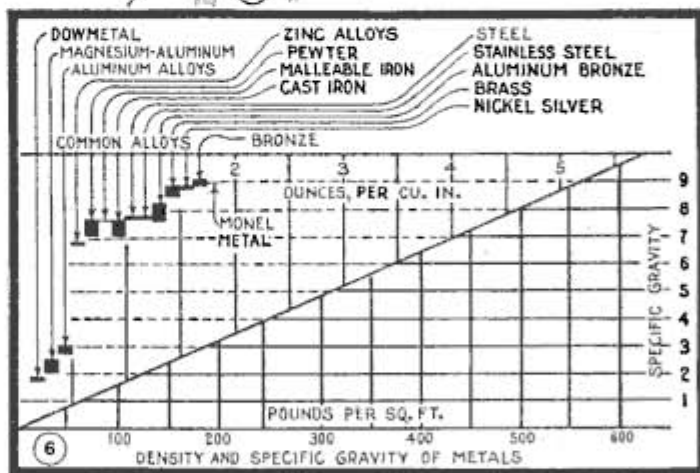
**Volume of irregular object:** The volume of an irregularly shaped, solid object is calculated as shown in Fig. 3. Its weight in air is first found and then its weight while immersed in water, suspending it by a fine wire. Then follow the equation given to get the volume in cubic feet. If the loss of weight is known in



found in Fig. 6. To use the chart, find the specific gravity of the casting alloy, if known, along the right-hand margin of the chart, and read straight across to the diagonal line. Directly above this point along the top of the chart you will find the density of the metal in ounces per cubic inch; and, directly below, the density in pounds per cubic foot. For those cases in which the specific gravity of the alloy is not known, the "blocks" along the left side of the chart are marked with the names of the common casting alloys, and the height of the block indicates the range of specific gravities covered by each alloy. For example, the block for brass shows a specific gravity of 8.4 to 8.8; and its density will be between 4.8 and 5.1 oz. per cu. in.

ounces, the volume in cubic inches is found by dividing by 0.578. If the object is lighter than water, its volume can still be found by this method if a weight heavy enough to submerge the object is fastened below it. First weigh both object and weight while the weight is submerged but the object is in air, and then weigh while both are submerged. The loss of weight is used as before to compute the volume.

**Weight of metal needed for a casting:** The weight of metal required for a casting can be determined if the volume is known. The volume can be found easily by the methods described, using the pattern for the casting. If cores are used, the volume of the cores should be subtracted from the gross volume to find the net volume of the finished casting. The weight of metal required is found by multiplying the volume by the density of the metal to be used in the casting, as



Therefore, a brass casting of 10 cu. in. will require between 48 and 51 oz. of brass, depending on the exact composition of the brass used.

**Length of curved lines:** The length of a curved line can be found by using a measuring wheel, Fig. 4. For convenience, the circumference of the wheel should be divided into an exact number of inches and fractions of inches. The fork in which the wheel turns can be ended in a pointer, and the edge of the wheel graduated in fractions of an inch. A rubber band set in a groove in the surface of the wheel turned in the surface of the wheel will help to prevent slippage. Where small irregularities of contour make the use of a measuring wheel impractical, lay a strip of adhesive tape along the contour, as in Fig. 5, which can be measured after removing it, taking care that the tape does not stretch.

**Finding center of gravity:** Finding the center of gravity of any flat or plane part. The part or a cardboard pattern the same size is suspended together with a plumb bob from any point near its edge, as in Fig. 7. The position of the plumb line along the surface of the piece should be marked. Then the object is suspended from another point, and the plumb line is again marked. The intersection of the two plumb lines then marks the center of gravity.

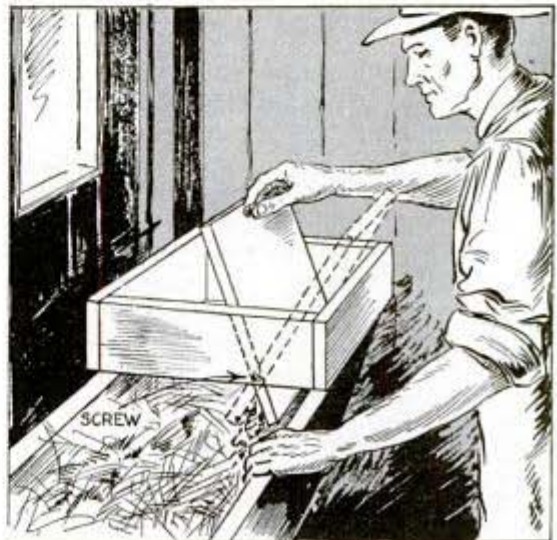
**To locate center of a broken wheel:** To find the center and diameter of a wheel or gear, when only part is available, is shown in Fig. 9. Lay the piece of wheel on a sheet of paper and draw the outline of the rim. Then draw two straight lines between any two points on the rim. From the centers of these lines draw lines at right angles to them, and the intersection will mark the center of the wheel.

**Area of irregular flat surface:** The area of a flat surface having an irregular outline can be found readily by cutting a cardboard or sheet-metal template the same size and shape and also a square of known area. Both pieces are weighed, and the area of the irregularly shaped surface is found by dividing the weight of the template by the weight of the square, and then multiplying the result by the area of the square.

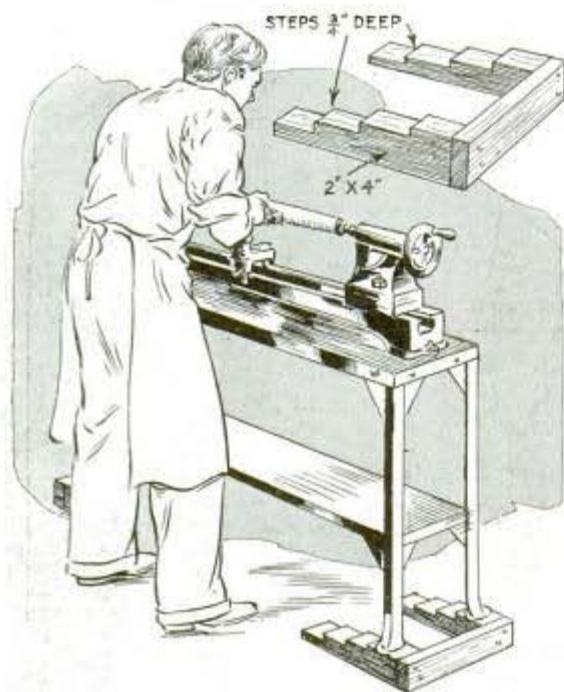


## Dump-Bottom Feed Box Cleaned Easily Before Filling

To keep barnyard fowls from getting into feed boxes in the horse mangers of his barn, and to make the boxes easy to clean and sanitary, one farmer provided them with pivoted bottoms. These could be swung up into the position indicated by the dotted lines, when not in use.



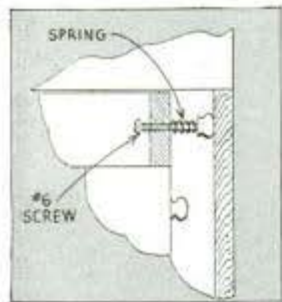
## Height of Lathe Stand Adjusted with Step Blocks



Especially useful in varying the height of lathe stands to suit a number of individuals using the same machine, these step blocks can be made from a length of 2 by 4-in. stock in a few minutes. Four identical pieces 10 in. long with steps  $\frac{3}{4}$  in. deep are cut and placed under each leg of the stand as shown. End cleats are then cut to fit and nailed in place, making each pair of steps a single unit that can be adjusted whenever desired.

## Panel on Machinist's Tool Chest Opened by Springs

Machinists who have difficulty in opening the front panels of their tool chests can avoid this trouble by equipping the top drawer pulls with springs so they press against the panels under tension. To do this, cut off the rivets and drill and tap the pulls for No. 6 screws. Reassemble each one with

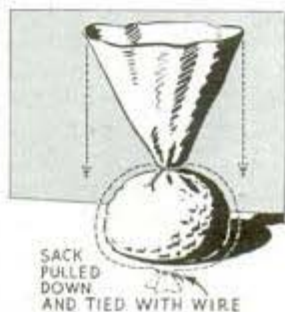


a long screw and a light coil spring as shown, allowing the pull to press lightly

against the panel when closed. As the lid is raised, the panel will automatically tilt forward, and may be caught with the hand. Slight pressure against the panel will hold it in place while closing the chest.

## Ordinary Sack Used to Ship Heavy Materials

To save the use of double sacks when shipping heavy materials such as nuts, bolts, washers, etc., a telephone company uses ordinary sacks in the following way: The sack is filled about one-third full and tied tightly with wire. The unfilled portion of the sack is then pulled down over the filled portion, and tied again as shown by the dotted lines.



## Plate Scraper Serves as Spatula for Printers' Ink

On many printing jobs, especially in small shops, it is necessary to ink in small quantities direct to the operating rollers. If a steel knife is used for this purpose, there is danger of damaging the roller composition. In such instances, a rubber plate scraper makes an ideal spatula.

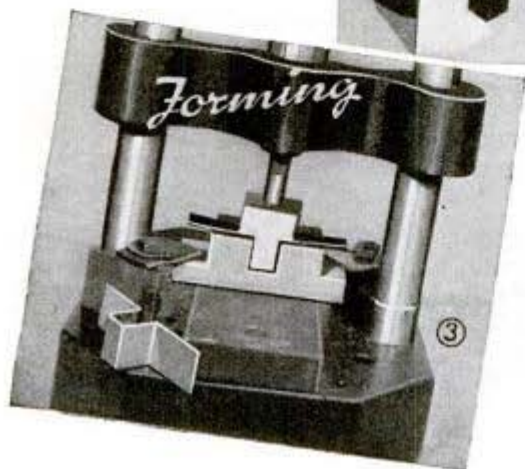
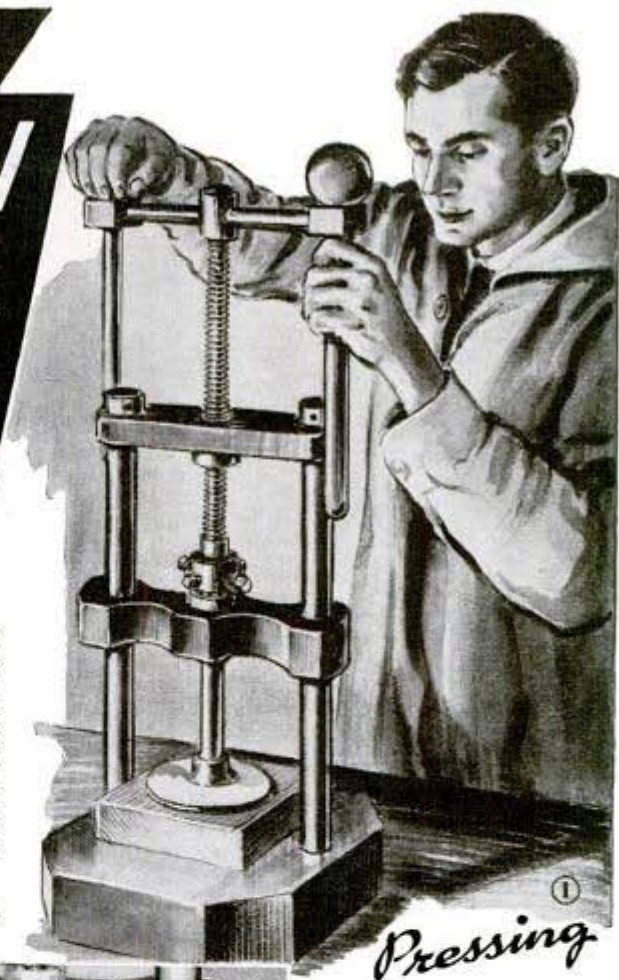


# Two-ton SCREW PRESS *from scrap parts*

By H. J. CHAMBERLAND

**C**APABLE of exerting a pressure of 4,000 lbs., this husky little screw press can be put to a number of uses in the small machine shop. Besides being useful as an arbor press as shown in Fig. 1, it also can be used for forming and for stamping medium-gauge sheet metal, using special-shaped dies as in Figs. 2 and 3.

Dimensions for the various parts are given in Figs. 4, 5 and 6. Holes in the base, ram and beam of the press must register accurately. To drill these in line, the ram, which rides the vertical posts, is clamped temporarily to the top surface of the base. Locations of the three holes are prick-punched, center-



drilled and bored through into the base with a  $\frac{1}{2}$ -in. bit. Then the ram is removed and clamped to the beam, which is the crosspiece at the upper end of the posts, and holes are duplicated in this, using the holes in the ram as a guide. This should give you three accurately

aligned holes in each of the three parts. Next, the outer holes in the base are drilled out to  $\frac{3}{8}$  in. and tapped to receive the threaded ends of the posts, Fig. 5. The center hole in the base is enlarged to 1 in.

The holes in the ram are likewise bored out, using a  $\frac{5}{8}$ -in. bit in the post holes. The center hole is enlarged to receive the casehardened tool-shank adapter, while the center hole in the beam is bored on the lathe to receive tightly the  $1\frac{3}{8}$ -in. screw-housing bushing, shown in section in Fig. 6. Both the tool-shank



Most of the parts are machined from standard cold-rolled steel. The shape of the ram and base is optional

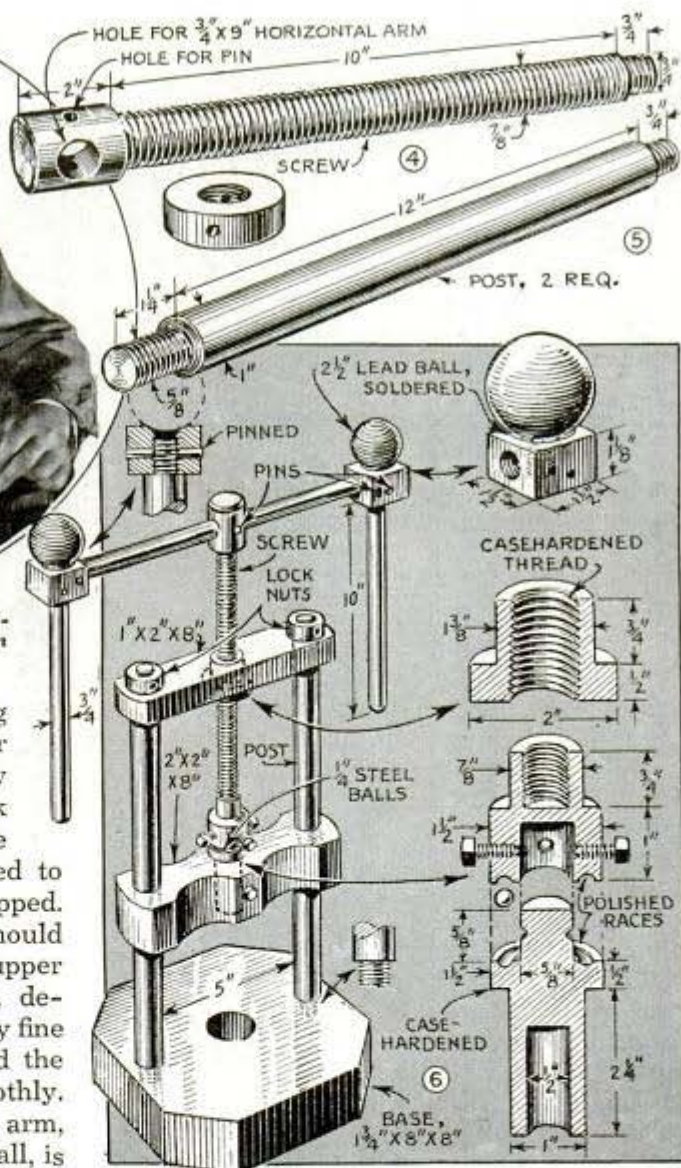
adapter, and the screw-housing bushing are force fitted. The latter should be tapped to thread snugly on the screw. The two 1/4-in. lock nuts which hold the beam to the upper end of the posts are pinned to prevent the threads from being stripped. The shouldered end of the screw should fit tightly also in the end of the upper portion of the ball-bearing race, detailed in Fig. 6. In assembling, apply fine lapping compound to the ram and the screw to make them operate smoothly.

The horizontal screw-actuating arm, which measures 3/4 by 10 in. over-all, is equipped with a cast-lead ball at each end to accelerate the screw for rapid adjustment. These are flattened and soldered to squared blocks which in turn are pinned to the threaded ends of the two vertical arms. In place of the lead balls, steel or cast-iron blocks having a corresponding weight can be substituted, attaching them by allowing the tenoned end of the vertical arms to pass completely through the end blocks and into the ball.

## Compass Helps Locate Switch Box

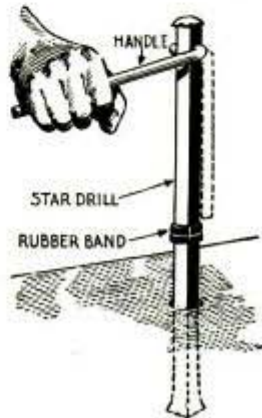
When a wall-switch box has been plastered over, I find its exact location with a small compass. This is moved along the wall and when the compass passes over the box the needle will deflect strongly.

—Robert K. Urie, Enumclaw, Wash.

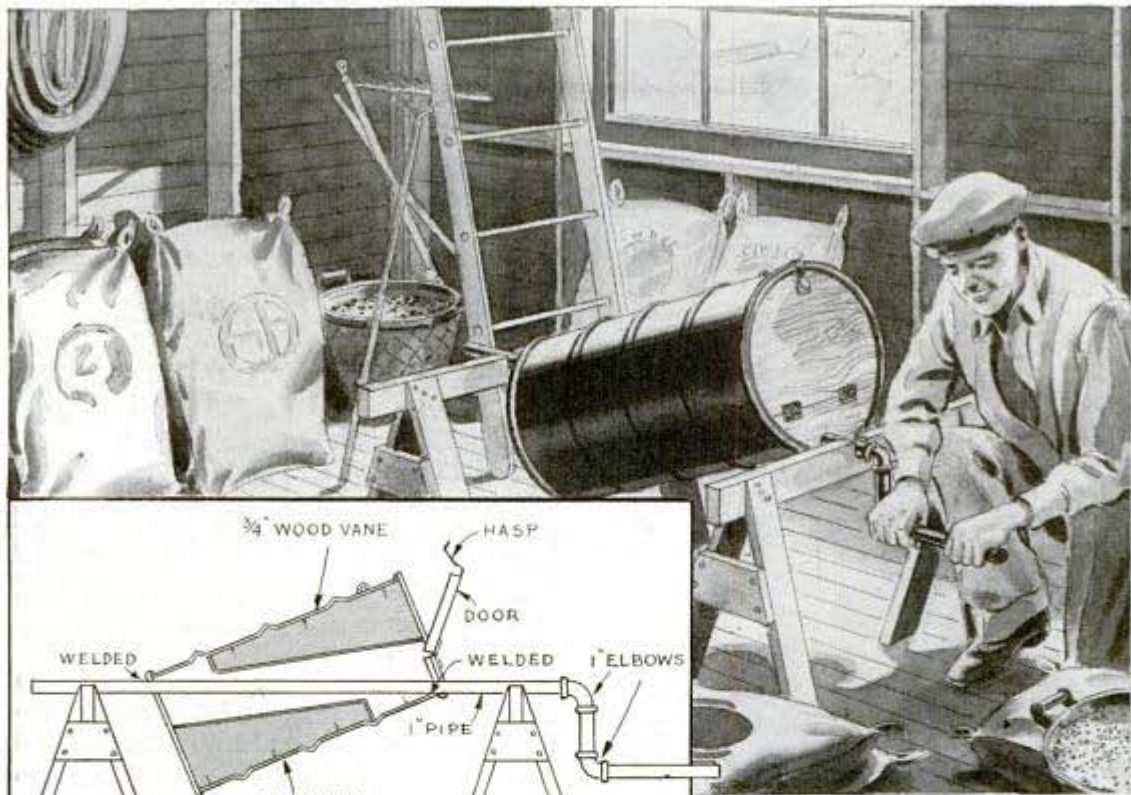


## Twist Handle Loosens Star Drill

If you are often annoyed by having a star drill wedge in the hole so that it is difficult to loosen or remove, drill a hole in the end of the shank and insert a hook bent from 1/2-in. steel rod about 8 in. long. A rubber band slipped over the drill will hold the rod out of the way when not needed, and the rod may be swung out quickly to horizontal position.



# Tumbling Barrel Is Inexpensive Seed Treater



Handy for treating oats, corn and other seed grains before planting, this tumbling barrel also mixes ground feeds, or it can serve as a small concrete mixer. It consists of a steel oil drum having a pipe axle run-

ning through it diagonally, the drum being welded to the axle at each end. The drum is fitted with a hinged wooden door. The assembly is set on two sawhorses, which are notched to take the axle. Two wooden vanes attached inside the barrel with screws aid in mixing the contents thoroughly.

## Ice Marked Off for Hockey Game with Salt and Ochre

To mark the ice with indelible boundary lines for a game of hockey, mix equal parts of salt and red ochre powder and apply as shown. The salt will melt the ochre into the ice to leave a line that will last as long as the ice remains frozen.

## Effective Cockroach Exterminator

A non-poisonous powder which will destroy cockroaches, water bugs and similar pests can be made by thoroughly mixing borax, 9 oz., cornstarch, 2½ oz., plaster of paris, 2 oz., and cocoa, 1½ oz. The powder is sprinkled freely around their haunts. Continue using the exterminator for several days after the bugs have disappeared.



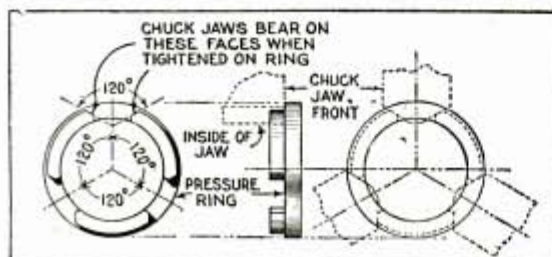
## "Wiggle Rod" Inside Grain Spout Prevents Clogging



Consisting of an old pitchfork handle and a spike, this simple addition to your grain spout will prevent it from clogging without attention. Just drill a hole in the shut-off slide, as shown, to take a spike which has been driven in the lower end of a discarded pitchfork handle. To install, slip the handle up into the spout and allow the spike to drop down into the hole in the slide. This anchors the rod so that it will move back and forth with the slide, loosening the grain so that it will flow freely.

## Ring Aids in Grinding Chuck Jaws to True Up the Ends

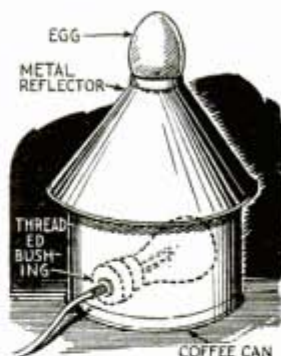
When it is necessary to true up the jaw ends of a universal lathe chuck, the ring shown will aid in doing a good job. It is turned from steel to the shape indicated. In use, the ring is placed in the chuck and the jaws run down into the openings. These are of a size to permit the ends of



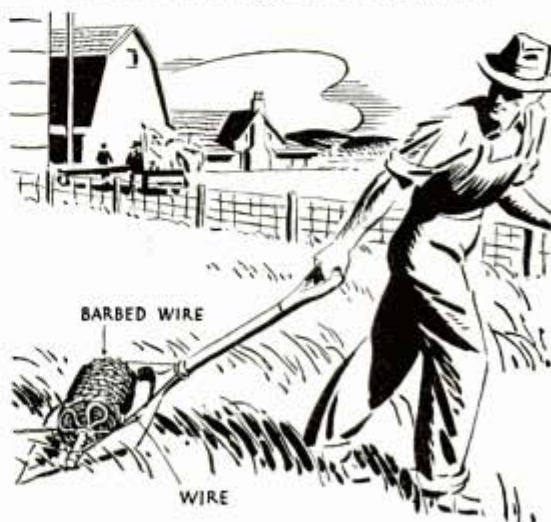
the jaws to project through them slightly. Then by grinding from inside the ring, it is possible to tell at a glance when the ends of the jaws are true in relation to each other.—John Pinto, Chicago.

## Improvised Egg Candler

Made from a 1-lb. coffee can and a metal light reflector, this egg candler makes it possible for the poultry man to do quick and accurate grading. In use, the reflector is set over the open top of the can as shown. The lamp socket is attached to the side of the can by first punching a hole and inserting a threaded bushing of the proper size to screw into the socket cap. After the cord has been drawn through the bushing and the socket re-assembled, a nut turned onto the outer end of the bushing holds the assembly in place.



## Grain Scoop Is Safe Conveyance for Stringing Barbed Wire



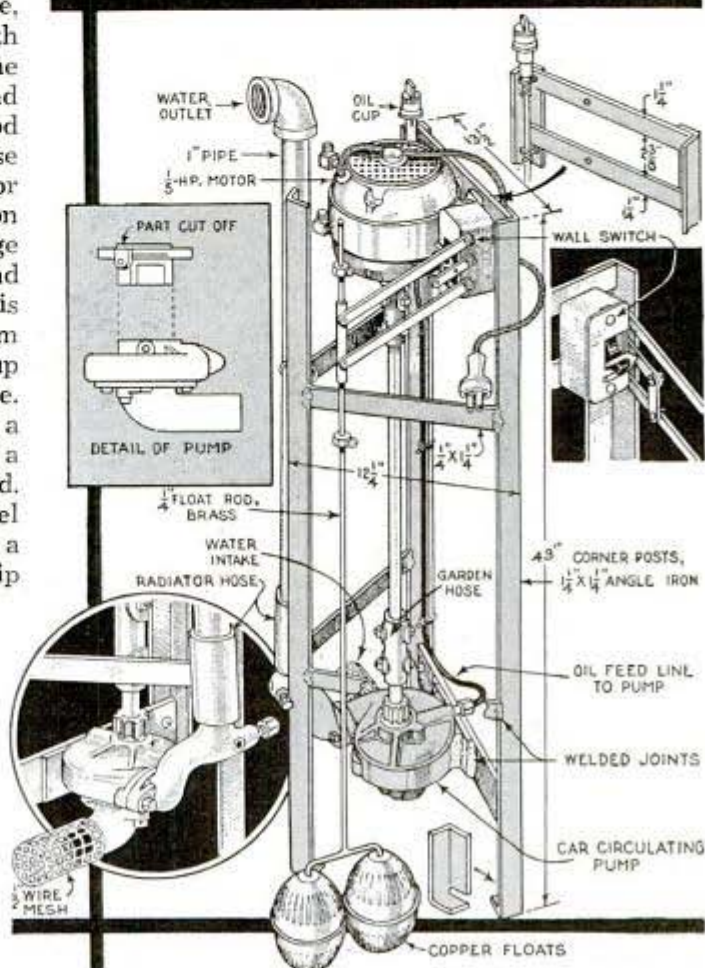
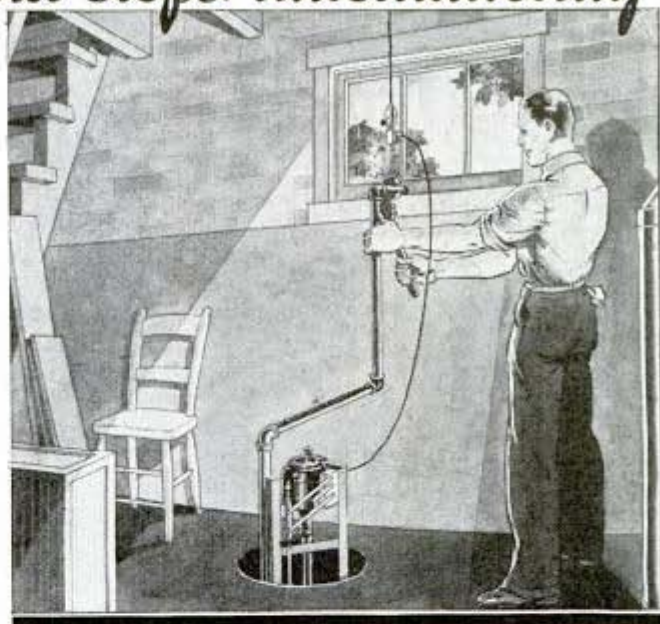
Looking for an easy way to unroll barbed wire, one farmer solved the problem by using a grain scoop to carry the spool. A piece of broom handle slipped through the spool forms an axle. The roll of wire is held on the scoop by a couple strands of wire wrapped around the ends of the broomstick and the scoop handle.



# Basement SUMP PUMP

*starts and stops automatically*

**W**ATER in a basement where there are no sewers need not worry you if you use an automatically controlled sump pump like this one. Assembled at a very small cost, the pump will handle more than 50 gals. of water per minute. It consists mainly of a small electric motor, a centrifugal pump from an old car, an angle-iron frame, float and switch. In this case, the frame was welded together, although it can be assembled with rivets or stove bolts. As pumps of this type are not self-priming, it is necessary that the pump be submerged in a sump hole below the basement floor and connected to the motor with a shaft or a length of small pipe, connections being made with pieces of garden hose bolted to the ends of both the main shaft and the motor and pump shafts. Good pumps for the purpose are those used on 1927 or 1928 Cadillac or LaSalle cars. The only alteration necessary is to cut off the flange as indicated in the upper left-hand detail. Lubrication of the pump is done by running a small tube from the pump to an oil or grease cup located at the top of the frame. Two copper floats attached to a rod operate the switch, which is a regular wall switch, as indicated. This is operated by two parallel strips pivoted to the switch box, a metal fork being provided to slip over the switch knob to raise it up or down with the motion of the arms. A piece of tubing pivoted to the outer ends of the arms, takes the float rod. Two adjustable collars on the rod permit regulating the depth of the water in the sump hole by spacing them the required distance on each side of the tube.—W. L. Curtis, Arlington Heights, Ill.



## Steel Oil Drums Halved Easily with Reground Cold Chisel



Before cutting a number of steel oil drums in half, I ground the cutting edge of an old cold chisel to the shape indicated. This tends to curl the chip down. The chisel edge always should be held parallel with the work.—F. M. Womeldorf, Ithaca, N. Y.

## Dump Truck Removes Boulders on Mountain Highway

A maintenance patrolman who covers highways in mountains, removes heavy boulders from the road single-handedly by using his dump truck. This is done by rais-



ing the dump body and chaining the boulder to the rear end. When the body is let down, the boulder is raised sufficiently to clear the ground so that it can be hauled away.—Bill R. Hoard, Wenatchee, Wash.

## Bits Carried in Drill Handle Made from Grease Gun

In addition to making a good handle for your hand drill, an old grease gun of the type shown also provides a convenient place to carry a number of small bits. When the bits are changed, they can be put back in the holder easily, eliminating the possibility of losing them in shavings or scraps around the shop.



—G. Marks, Chicago.

## Weather Strip Prevents T-Square Sliding on Board

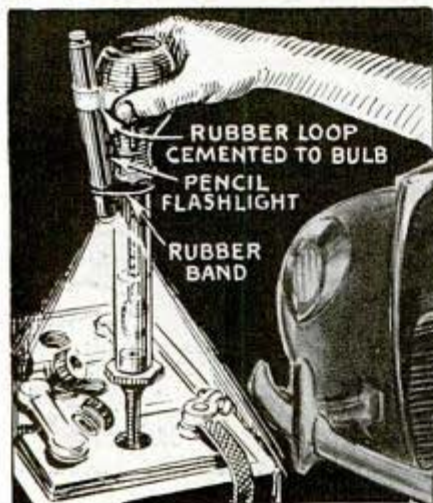


To prevent a T-square from sliding too easily on your drawing board, nail a length of rubber weatherstripping on the left-hand edge of the board at such height that the cross-piece of the square will rest upon it when the blade is pressed against the board. The friction of the rubber will hold it firmly and eliminate much of the usual arm and finger strain.

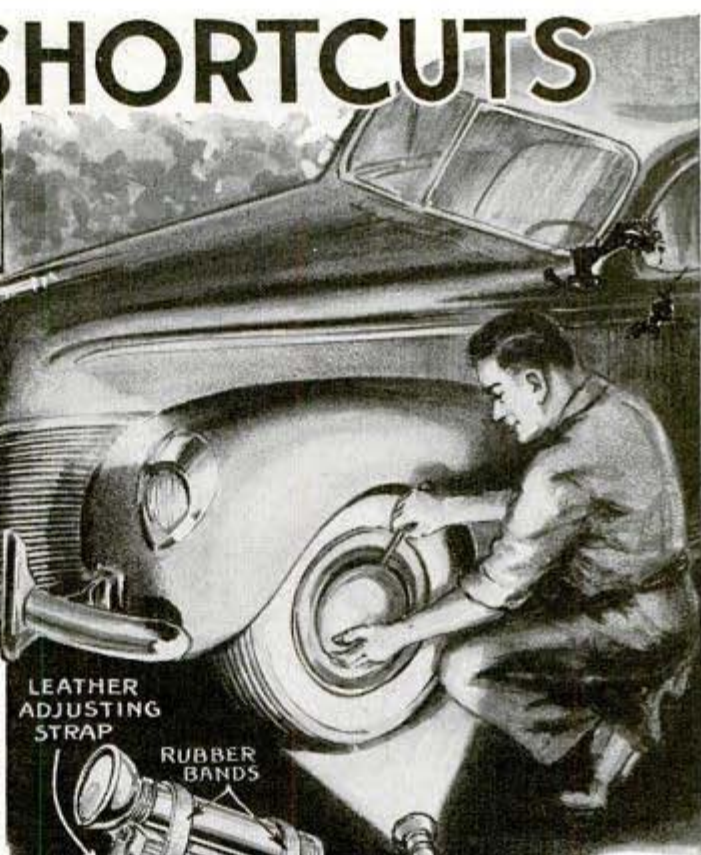
## Sanding Drum for Drill Press

Needing a sander to use on his drill press, one craftsman quickly improvised a drum from a 2-in. wooden cylinder. A hole was drilled through the cylinder to take a bolt snugly, and long enough to be chucked in the drill press. Masking tape was then wrapped around the cylinder, adhesive side out, to hold the abrasive paper in place.

# AUTO SHORTCUTS

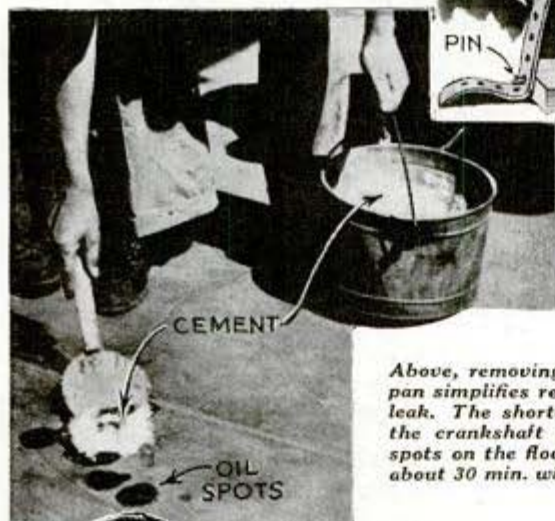


Above, pen-type flashlight attached to a battery hydrometer simplifies checking batteries at night. Light directed where you want it when changing a tire is possible by using the adjustable flashlight holder shown at the right. It takes little space when folded flat and stored in the car tool compartment



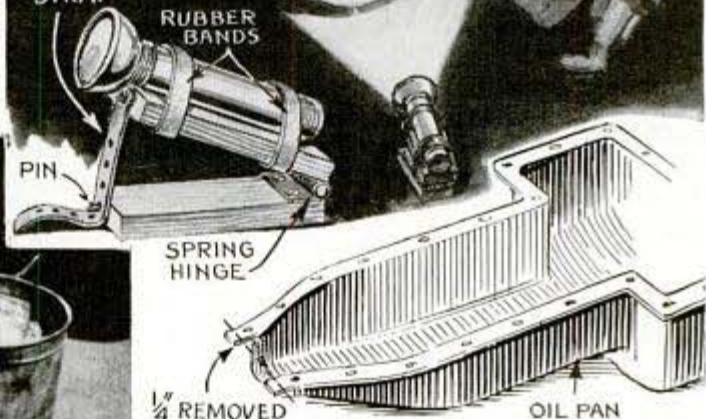
LEATHER ADJUSTING STRAP

RUBBER BANDS

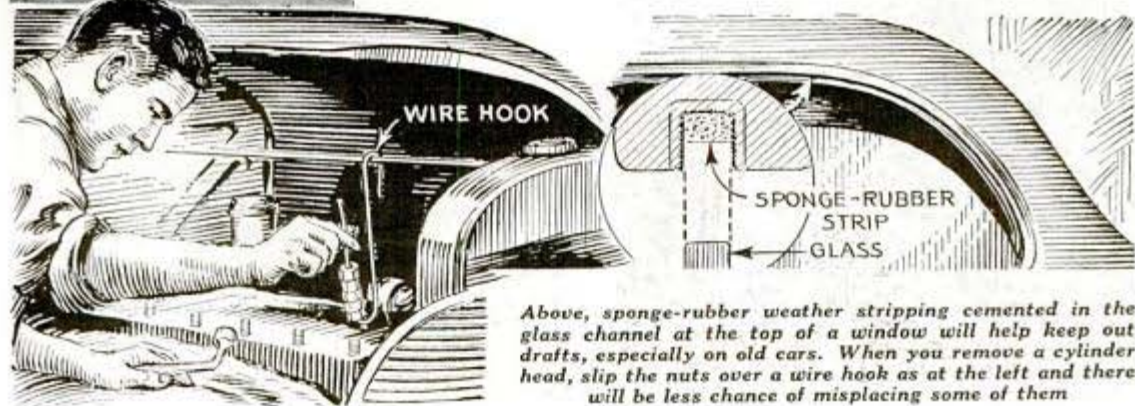


CEMENT

OIL SPOTS



Above, removing  $\frac{1}{4}$  in. of metal from the front end of a V-8 Ford oil pan simplifies replacing it, and does not damage the pan or cause an oil leak. The shortened pan will slip into place without jamming against the crankshaft pulley. Left, portland cement sprinkled on fresh oil spots on the floor or driveway of a garage or filling station and left for about 30 min. will absorb the oil and leave the floor clean when swept up

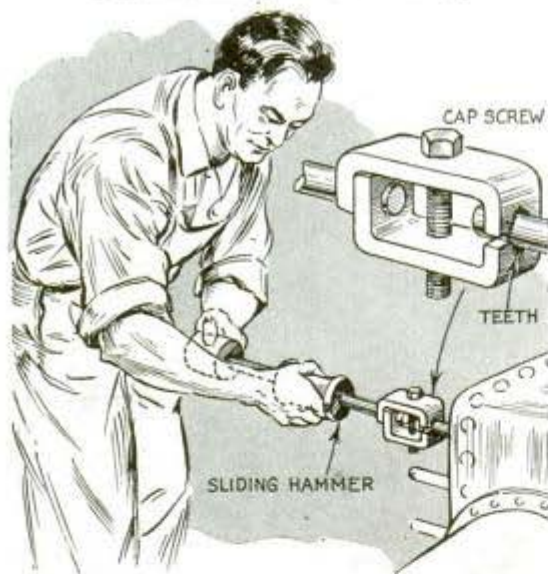


WIRE HOOK

SPONGE-RUBBER STRIP  
GLASS

Above, sponge-rubber weather stripping cemented in the glass channel at the top of a window will help keep out drafts, especially on old cars. When you remove a cylinder head, slip the nuts over a wire hook as at the left and there will be less chance of misplacing some of them

## Sure-Grip Pin Puller Has Teeth Cut in the Jaw Surfaces

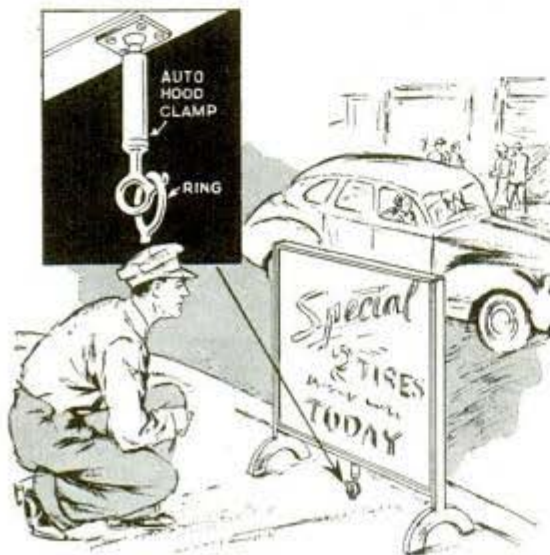


Here is a pin puller that is unusually efficient in its action and grip. Made from high-grade steel that can be tempered, the U-shaped jaws have teeth filed in their gripping surfaces, and are attached to a shaft on which slides a heavy piece of steel to serve as a hammer. The jaws are clamped on the pin to be removed by a large cap screw.

—C. H. Willey, Penacook, N. H.

## Auto-Hood Clamp Anchors Sign Securely to Curb

A gas-station operator, who uses a portable sidewalk sign, prevents it from being blown over by merely screwing an auto-



hood clamp to the underside of the frame, as shown. The clamp is placed so that it will be in position to engage a ring-and-staple assembly fastened in the concrete.

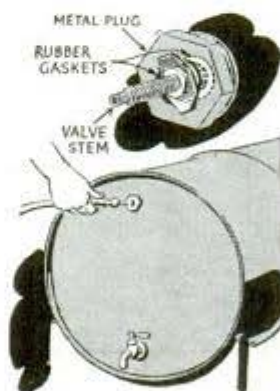
## Lag Screw Expands Battery Post for Good Connection

Instead of bushing a battery post when the terminal clamp is too large to make a tight connection, drill a  $\frac{3}{16}$ -in. hole in the post and cut a slot down the center of it with a hack saw, as shown. Then



slip the clamp in place, tighten it, and turn a short lag screw down in the hole. This produces an expansion-bolt action and forces the post against the inner walls of the clamp, making a perfect contact.

## Air Pressure Applied to Drum Speeds Removal of Cold Oil



To facilitate removal of cold, heavy oil from steel drums, one service-station owner applies 3 or 4 lbs. of air pressure to the drums. To do this, a metal bung is drilled and fitted with a tire-valve stem as indicated, using

rubber gaskets to make the bung and valve airtight—Lester E. Howe, Oroville, Calif.

## Polishing Ball Bearings Easily

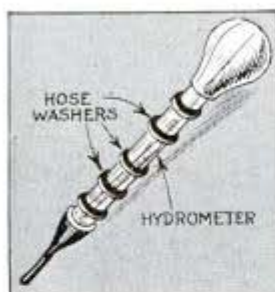
An easy way to polish the balls of a bearing is to take them out of the race and keep them in kerosene for a few hours if



the time can be spared. Drill a hole slightly smaller than the radius of one of the balls in the end of a short broomstick. Apply a little emery-and-oil mixture to the in-

side of the hole and place one of the balls in it. Turn the stick over and run the ball over a coarse wood surface for a minute or so, using a rotary motion. The ball will rotate in the recess and the abrasive mixture will remove all traces of rust and dirt, leaving the surface spherical. Treat each ball in this manner.

### Battery Hydrometers Protected by Rubber Washers



An inexpensive way to protect a battery hydrometer against accidental breakage is to slip four or five large garden-hose washers over the barrel, spacing them evenly as indicated. In these

positions, the washers will absorb most shocks to which the barrel is subjected.

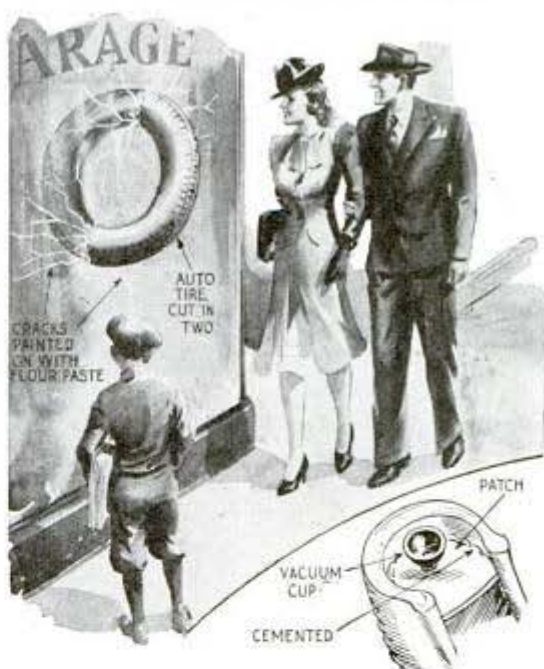
### Striped Windshield on Motorcycle Seen Easily in Dark

By painting black and white stripes on the front surface of his motorcycle windshield, one cyclist found that motorists could see the machine much easier at night. It takes only a few minutes to do the job which helps to reduce one of the hazards of riding a motorcycle at night.

—Lloyd Moore, Chariton, Ia.



### Illusion of Tire Through Window Is Novel Attention Getter

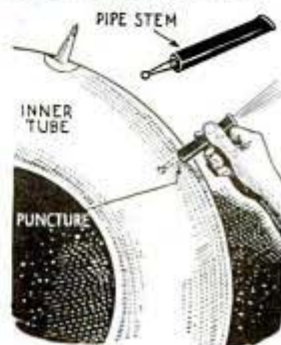


Appearing at first glance to have been thrown halfway through a large window of a garage, this tire attracted a lot of attention. Still more baffling was the fact that jagged white cracks radiating from where the tire seemed to pass through the glass could be seen plainly, yet the glass between these points remained unbroken. To produce this illusion, the tire was first cut in half. Then large suction cups were fastened inside the tire halves close to the ends, and one half of the tire stuck on the outside of the glass and the other half on the inside, aligning the parts so that they appeared to be in one piece. The cracks were painted on the glass with flour paste, using a small brush.

—William P. Keasbey, Des Moines, Ia.

### Pipe Stem Deflates Inner Tube

A punctured inner tube can be deflated quickly without removing the valve by simply forcing a pipe stem with a drinkless attachment into the hole. The round ball makes it easy to insert.



## Shield on Knob of Gear Shift Protects It Against Grease

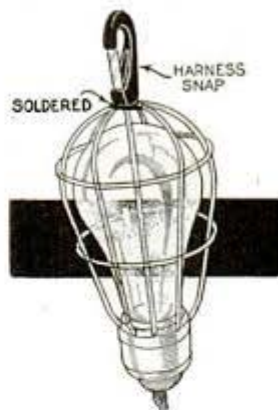


When giving a car a driving test, one mechanic slips a shield over the knob of the gear-shift lever to protect it against his greasy hands. A sack made by cementing

or sewing a rubber disk in one end of a piece of inner tube provides a lasting shield, although a number of small paper sacks can be kept on hand for the purpose, if desired. The sacks can be discarded when they become too soiled for use.

## Trouble Lamp with Snap on End Not Dislodged Easily

There will be no possibility of this lamp being dislodged just about the time you get all set to start working underneath a car, because it is snapped in place. The snap is of the type that is used on harness and is soldered to the end of the lamp shield in the same position that the hook is located ordinarily. It is best to use a large snap of approximately the same size as the hook, which is cut off to permit attaching the snap.



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# Horses on Wheels

(Continued from page 373)

for carrying horses, sixty ordinary trucks for carrying equipment, ninety-two scout cars and 247 motorcycles. Each horse truck carries one complete cavalry squad, consisting of eight men, eight horses and all saddle equipment, personal equipment and weapons. The weapons comprise 295 machine guns of .30 caliber; 125 anti-tank machine guns; 340 sub-machine guns; twelve anti-tank guns; 1,550 pistols, and 436 rifles. In the theater of war the horses easily will be able to carry this equipment. The maximum load placed on an average army horse is 250 pounds.

The new units give our military high command a strategic mobility—the ability to cover long distances, to get horses, equipment and men quickly from one battlefield to another. Once on the battlefield the horse is the most sure-fire mobile ground instrument available. The big advantage of the horse-truck idea is that it brings horses on the battlefield fresh so that a cavalry mounted element can keep up with the fast-moving tempo of modern warfare. In the field, of course, the horse supplements the tank, following up closely and seizing localities overrun by tanks.

Today we maintain in our regular cavalry only 10,000 horses; at the end of the World War the figure was 30,000. However, in the army's reorganization plan, cavalry is being brought back to its wartime strength of 20,000 horses and 35,000 men. Very soon our cavalry will consist of about sixty per cent horses and forty per cent motor vehicles.

This flexible combination of horse and mechanized cavalry will give a corps commander a means of securing ground information of enemy forces in almost any situation, regardless of weather or the state of the roads. An army corps is composed normally of three divisions, with corps troops such as heavy artillery, engineer, quartermaster and signal corps added in order to provide a balanced fighting force. The cavalry reconnaissance regiment henceforth will be considered a regular part of normal corps troops.

Army horses must undergo the same rigorous training as their riders. Tests prove that an army horse in rough terrain can average 100 miles in twenty-four hours, fully equipped for battle. He can do

150 miles in forty-eight hours—no more. He can average fifty miles a day for ten days and forty miles a day indefinitely. A well-trained horse can average a much faster rate in dense woods and mountainous regions than can any mobile machine.

The army's official horse-fighting unit is a squadron, consisting roughly of 450 men, under a major. The squadron in turn is split up into three troops of 150 men each, with a captain in charge of each troop. The troops are organized under three rifle platoons and one machine-gun platoon.

Cavalry is the major element which accords security to the larger groups by reconnaissance, counter-reconnaissance, screening and covering. Reconnaissance is the job of finding out where the enemy is and what he's up to; counter-reconnaissance is preventing the enemy from finding out what your troops are up to. Screening and security is to permit the uninterrupted advance of the main body and to prevent a surprise hostile attack.

Once the main warring bodies come into contact, American cavalry with its preponderance of firing power is available to participate in the battle proper; and is used customarily against the enemy's flanks and rear. In case of a retirement, the cavalry assumes the brunt of delaying hostile pursuit by fighting the rear guard action.

Most Americans seem to have the mistaken notion that the horse can't exist on the modern battlefield. He couldn't, if he were used in the old close or massed formation, for he'd be an easy target. But with modern wide apart formations and his ability to move rapidly out of range, or into concealment, the horse makes far less of a target than a slower component.

That the horse can not only live on the battlefield but that he is of great value in modern warfare, is evidenced by the conquests of the German army in Holland, Belgium and France. In these maneuvers the Nazi troopers are reported to have utilized no fewer than 791,000 horses, (many for draft purposes) undoubtedly the largest cavalry force ever used.

It is interesting to note that the Germans don't carry a fifth as many machine guns in their cavalry as we do. The American cavalry carries the strongest firing power the world has seen.





**PRIVATE KELLY'S PIPE WAS SMELLY**  
*—but he's out of the dog house now!*



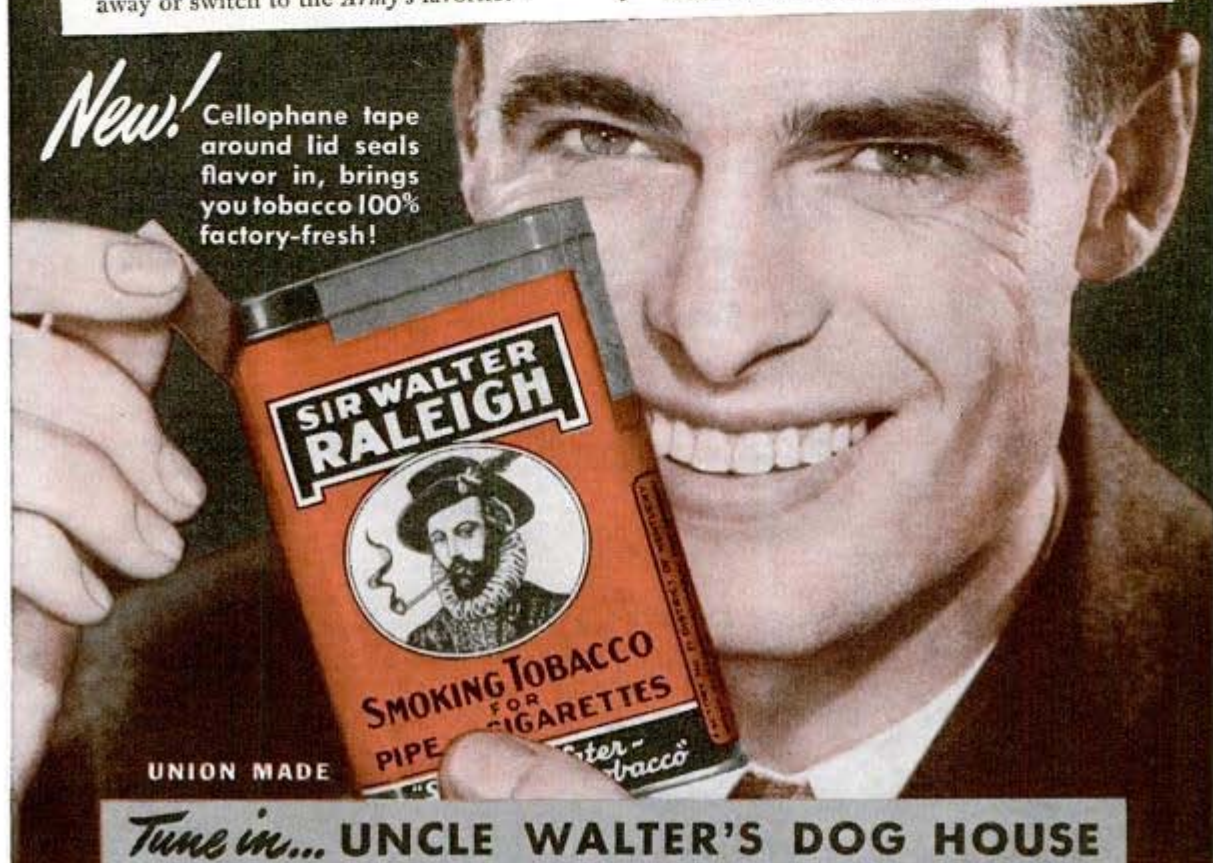
**"NO BLANKETY-BLANK** rookie who smokes such blankety-blank tobacco can ever marry *my* daughter! Phew! Either *stay* away or switch to the *Army's* favorite!"



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# Invisible Death on the Road

(Continued from page 409)

important clues, scientific detectives evolved the hapcolite machine, which filters air, and indicates the fractional amount of carbon monoxide it contains.

Next, tests were made on human guinea pigs to determine how much carbon monoxide was required to cause trouble. They disclosed that an infinitesimal amount of the gas, if breathed long enough, can do disastrous damage. It is 300 times more soluble in the blood than oxygen. Therefore, once it enters the blood stream, it has a tendency to stay—indeed, to be built to higher concentration with each breath.

If as little as four-one-hundredths per cent of the total volume of air were carbon monoxide, four or five hours breathing would build the blood saturation up to forty per cent, and at this point, most persons become unconscious.

The hapcolite machine revealed that forty-six per cent of all machines on the road carry that concentration or higher in the air breathed by the drivers!

Further tests indicate that much smaller quantities dull human reactions tremendously. Normally, the human eye can see movement in an arc of 180 degrees. Blood saturation of twenty-five per cent carbon monoxide often reduces that to ninety degrees.

A victim of twenty-five per cent blood saturation might drive into an intersection and never see an approaching car until the last instant—and then his reflexes would be too slow to avoid a crash.

Persons driving only for short periods are not immune to CO paralysis. Any incomplete combustion generates the gas, so our machine civilization has furnished it in large doses. Leaks in exhaust lines allow seepage into the air they breathe. Exhausts of other cars on the road exhale enough poison to kill a regiment. Unknown to them, their reflexes are lulled. Finally there is an accident, and their only excuse is, "I didn't see him. I don't know why."

Well, what are we going to do about it? Unfortunately, there is no pat solution. Automobile exhausts will always emit CO, but if the exhaust lines and their gaskets are in good order, you will be fairly safe. They should be regularly inspected.

In addition, a few simple don'ts should

be observed. Don't drive close behind another car, truck or bus; the exhaust will hurl lethal doses of CO through your radiator. Don't drive with your windows closed. Don't fight sleep: get out and walk around.

Invisible Death has another ally—night blindness, due to vitamin A deficiency. The extent of this menace is widespread, but so recently discovered, that not a single motor-vehicle department requires a scientific test of full night vision for an operator's license.

Estimates have been made from recent findings that ten per cent of the drivers experience difficulty in seeing after dark, and when they face glaring headlights, they become entirely blind. Yet they never suspect they are anything but normal.

With the new biophotometric devices for testing night vision, called Adaptometers, vitamin A deficiency can be detected readily. Tests are made in a dark room with blackened walls; light is focused directly into the eyes until the pupils are "bleached" or open wide. Then the light is cut off, and the subject is timed as his eyes endeavor to adjust themselves to the darkness, and see a light of much less intensity.

The third great ally of Invisible Death is optical illusion. Sometimes it is caused by physical factors in the operators, sometimes by external factors. Recently in California, a car driving at night swerved with a howl of brakes, smashed a lamp post, and narrowly missed a pedestrian. There was no other car near, yet investigating officers could not shake the driver's story he had seen headlights approach at right angles.

Going over the way he had come, the "lights" were discovered. At a corner house was a large window, with twin fish bowls in it. A fireplace and the motorist's headlights threw reflections in them that looked so like headlights coming out of the intersection that the driver was absolved.

City planning departments already are attacking obvious sources of illusion, but others, like the fish bowls, are never suspected until tragedy results. Some police departments have made motion-picture surveys of intersections, to learn just what the drivers see when they approach. The problem of traffic safety is never solved, but safety engineers are making headway.



# NEW GLUE DISCOVERY

brings modern resin-bonding  
to your workshop!

**THE** biggest news in glue since Casco Powdered Casein! *Cascamite* brings you as great an advancement over casein glues as Casco brought you over all other glues 10 years ago! Look at *Cascamite's* advantages:

**EASY TO MIX**—*Cascamite* dissolves almost immediately in cold water. No waiting, no heating. Easier, simpler than mixing Casein.

**STRONG**—Shear tests on hardwood prove *Cascamite* is stronger than the wood, even after prolonged water soaking.

**WATERPROOF**—*Cascamite* is completely waterproof. Safe for boats, all outdoor construction.

**DURABLE**—*Cascamite* joints are inert, unaffected by mold. Makes joints that withstand any climate.

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**ADAPTABLE**—For veneering and indoor work, *Cascamite* can be extended with ordinary household flour to make strong water-resistant joints at low cost.

**ECONOMICAL**—*Cascamite* costs more than casein *per pound*, but it is spread *thinner*. When extended with flour, *Cascamite* costs no more than casein.

*Cascamite* is *reliable*. It is made by Casco, manufacturers of industrial glue for over 30 years... makers of Casco Powdered Casein Glue... America's pioneer in development and manufacture of synthetic resin glue. *Cascamite* is sold by all leading Hardware, Paint, Lumber Dealers. 25¢, 50¢ and 85¢.

## CASCAMITE POWDERED SYNTHETIC RESIN

TEST IT YOURSELF  
SEND 10c FOR  
GENEROUS TRIAL CAN  
AND BOOKLET

CASEIN COMPANY OF AMERICA, Dept. PM341  
350 Madison Ave., New York, N. Y.

Here's my 10¢. Send me trial can and booklet, "Mighty Facts on Cascamite."

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

My Hardware Dealer's Name and Address \_\_\_\_\_

K1069

# Radio Hams Practice for War

(Continued from page 404)

Like the A.R.R.L., the army nets handle and relay messages free of charge upon request, although the messages can't be of a commercial nature. Their over-seas relay stations are often busy with traffic for Hawaii, Guam, and the Philippines.

One type of cipher sometimes used by the army radio amateurs involves the use of a key word or phrase, from which is derived a numerical key. If we assume the "Literal" key to be "PUBLICITY," (nine letters) these letters are numbered from 1 to 9 according to their alphabetical sequence. The first letter of the alphabet which appears in the key word, is numbered 1, the next 2, etc. In case two or more like letters appear in the key word, they are given consecutive numbers, thus:

Figure 1

P	U	B	L	I	C	I	T	Y
6	8	1	5	3	2	4	7	9

The plain text is written underneath the numerical key, in lines extending the whole length of the key, as follows:

P	U	B	L	I	C	I	T	Y
6	8	1	5	3	2	4	7	9
N	O	T	I	F	Y	Y	O	U
R	N	E	T	C	O	N	T	R
O	L	S	T	A	T	I	O	N
B	Y	R	A	D	I	O	E	X
A	C	T	H	O	U	R	A	N
D	M	I	N	U	T	E	W	H
E	N	T	H	I	S	M	E	S
S	A	G	E	W	A	S	C	O
M	P	L	E	T	E	L	Y	D
E	C	I	P	H	E	R	E	D
B	Y	Y	O	U				

The columns are now transcribed, from top to bottom, in numerical order; column 1 first, then column 2, etc., and at the same time the cipher text is divided into groups of five letters, thus:

TESRT ITGLI YYOTI UTSAE  
 EFCAD OUIWT HUYN I OREMS  
 LRITT AHNHE EPONR OBADE  
 SMEBO TOEAW ECYEO NLYCM  
 NAPCY URNXN HSODD

The cipher message is now ready for transmission.

To decipher the cryptogram, the receiving operator divides the total number of letters in the cryptogram (95) by the num-

ber of letters in the key word (9). The result is 10, with 5 as remainder. On cross-section paper, he writes the key word, using one square for each letter, deriving the numerical key as explained above (see Fig. 1). Underneath, he outlines a figure containing 9 columns. Nine columns of 10 squares each will give only 90 squares, so he must add 1 square to the bottom of each of the first 5 columns, in order to have one square for each letter of the cryptogram. He inscribes the first 11 letters of the cryptogram in column 1, from top to bottom; the next 10 in column 2, and so on until the entire cipher text has been inscribed. This will completely fill the figure, and the message needs only to be re-written according to word lengths. It reads: NOTIFY YOUR NET CONTROL STATION BY RADIO EXACT HOUR AND MINUTE WHEN THIS MESSAGE WAS COMPLETELY DECIPHERED BY YOU.

The Naval Communication Reserve is a definite part of the naval establishment. Members are subject to active duty in a national emergency. Applicants must be American citizens, between eighteen and thirty-five years of age, and must pass a physical examination. Men with no knowledge of radio are taken in as apprentice seamen for training. Amateur members who operate their own stations are enlisted as first or second-class seamen and their stations make up part of the navy reserve network. All members must normally attend a weekly drill at which studies and examinations are conducted, as well as code, blinker, and flag-signaling practice.

The American Radio Relay League is the oldest of all amateur groups and in more than 100 emergencies since 1914, including storms, earthquakes, and floods, member stations have rapidly transmitted and delivered important messages. During the Los Angeles flood of 1938, the amateur operators handled traffic for seventy-two hours for the police, the telegraph companies, and for other agencies. Newspapers were served with news via the amateur network and the first pictures of the flood to reach eastern newspapers were transmitted by radio from an amateur station. The A.R.R.L. has a number of transcontinental trunk lines for handling traffic

(Continued to page 120A)

# Car Engineering **NEVER SLEEPS**



## **Car engineers don't use guesswork with spark plugs**

Almost *any* spark plug will "get you by" if it is the right size for your engine. But that's not good enough to satisfy the engineers who labor, day and night, to assure you the last ounce of performance in automobiles and trucks.

It wouldn't be good enough for you, either, if you knew what those engineers know. And they've learned it from brutal test miles, by the hundred thousand. It's those miles that lie behind the AC Spark Plugs which you buy and use.

*New AC's every 10,000 miles will more than pay for themselves*

Performance and reliability,—*proved on the proving ground*,—are the reasons why AC's are selected for standard factory equipment on more motor cars and trucks than any other make of spark plug.

Remember this next time your service man recommends new spark plugs. Don't be content to take "just any plug that fits." Insist on genuine AC's—the spark plugs that satisfy the most exacting engineers in the world.

### **CLEAN PLUGS GIVE MORE "PEP"**



Dirty or worn plugs rob you of as much as 21% of your engine's power—and waste up to 10% on gas. Have them cleaned and re-gapped, every 4,000 miles, by "the AC Method"—5c a plug.

**Get Plugs CLEANED where you see this Sign**



AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION • FLINT, MICHIGAN

K1069

(Continued from page 118A)



## Go to it... AND GET THERE FAST!

What's a lake without a boat? You can fish in farther spots, picnic in more secluded places, if you go the Old Town way. Explore the quiet coves, or race across the sparkling waves with a speedy, smart and dependable outboard boat. Treat yourself to a new thrill. Safe and seaworthy. Well-braced for the heaviest motors. Built by Old Town to "take it" for many years of sport and service.

**FREE CATALOG** shows just the model you need. Write for one today! Also rowboats, sailing dinghies, canoes. Address: Old Town Canoe Company, 733 Main Street, Old Town, Maine.

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and these are served by feeder lines that reach all parts of the country. In the last several years a number of local amateur emergency corps have been organized inside the membership. Besides main transmitting equipment, many emergency corps members have portable equipment, operated by storage batteries or small gasoline-driven generators, that can be transported by car or on foot to difficult locations. One emergency group in southern California has 300 members who are building a master control station for handling traffic between the small portable sets.

In Los Angeles, the Major Disaster Emergency Council, which is a behind-the-scenes organization that would take over the handling of relief and public safety in event of a major disaster, has enlisted sixty amateur operators who with their portable equipment are ready to handle emergency communication in time of need. The system consists of twenty-one portable transmitters and receivers and a powerful central station that is ready for instant operation. The amateur operators wear a special uniform and each has special instructions concerning his duties. If the Los Angeles area were ever threatened by invasion or air raids the disaster council would swing into action at once. Of course, the volunteer radio section would be depended upon to provide emergency communication facilities.

In all part of the country, amateurs are preparing themselves against a possible "M" day. In fact, they have already started to participate in national defense because a number of them have answered the call of the Federal Communication Commission for trained, intelligent men who are needed to man the new long-range surveillance and direction-finding radio interceptor stations that are being built as part of the national defense program. These stations, some of them mobile, will keep a twenty-four-hour watch on all communication channels to locate and track down all unauthorized or suspicious radio transmitters.

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## Get Into This Business Now—

a business which is so new that it is practically without competition. This should enable you to make really BIG MONEY. Hotels, homes, clubs, or office buildings offer tremendous possibilities. Our new DETERGER washes upholstered furniture, electrically, right in your customer's home, with a new soapless soap whipped into DRY suds. *No liquid touches the fabric*, therefore the furniture is ready for use soon after cleaning. We have helped hundreds of men get into business for themselves with our automatic equipment. Several great railroads and many of the world's largest hotels use our machines.

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The Deterger is ready to use when you receive it, so you ought to be taking in big profits the first day. We want more honest, ambitious men. If you are that kind of a man we can help you get started for yourself in a business with tremendous possibilities.

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"I cleaned seven living room sets and fourteen chairs as well as twenty-five automobile interiors the very first month and took in \$279.50." M. Parker wrote: "Did a twelve hour job at our country club and collected \$40." C. Childers sent us a list of thirty-nine pieces which he cleaned and for which he was paid \$121.00. Barrett says, "Made \$28 in eight hours. On other job made \$11 in two and one-half hours." It should be easy to expand this business by adding machines and hiring good men to run them. Look into these opportunities now. Send for free book.



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Only a limited amount of money is needed for a down payment, the balance you send on easy terms. Many men find it possible to make far more than the cost of the machine in a short time and it should be easy for you to take in many times the amount of each payment before it comes due. Every machine is fully **GUARANTEED**.

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Write with electricity any name or design on the hardest and finest tools and instruments, or any metal, like writing on paper with pen or pencil.  
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### GARDEN AND SMALL FARM Tractors

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And so—by applying that percentage to readers of this magazine, we know that 57,256 pipe-smokers are missing the *one* tobacco they'd like best!

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It smokes clean—sweet—without bite. Never leaves stale pipe odors in the room. (Even the ladies approve the aroma.) Try it—today—and see!

15¢ GENEROUS SIZE  
POCKET TIN



A Product of Philip Morris

## *Kimm* School for Deep Sea Divers

(Continued from page 388)

maneuver in icy darkness, but perform difficult mechanical jobs. He must be able to measure holes accurately, chip off rivets, drill and saw steel plates, calk broken seams, attach flanges and pipe fittings, cut and weld with an electric torch. The men first learn these jobs at the workbench, then carry them out at successively greater depths to 300 feet.

Although the water in the tank is only twelve feet deep, pressures equaling those encountered down to 300 feet are produced



Notice the telephone mouthpiece with which the diver can talk to his tenders aboard ship

by pumping compressed air on top of the water. To keep the water from crushing the diver's body, the pressure of the air which the diver breathes, and which fills his dress, must be even higher than that of the water—reaching, at 300 feet, nearly 200 pounds to the square inch, or a total of 200 tons on the man's entire body!

Thinking and movements become retarded as the diver goes deeper. At 300 feet simple tasks become so strenuous that the diver often gets "woozy," fumbling about in a daze and claiming over his telephone that he is doing things which he is not. Sometimes a man goes unconscious. The reason is not definitely known, but it is thought that the nitrogen absorbed into the blood and tissues may not be as inert as generally supposed, but may have a chemical effect on the body.



Kim

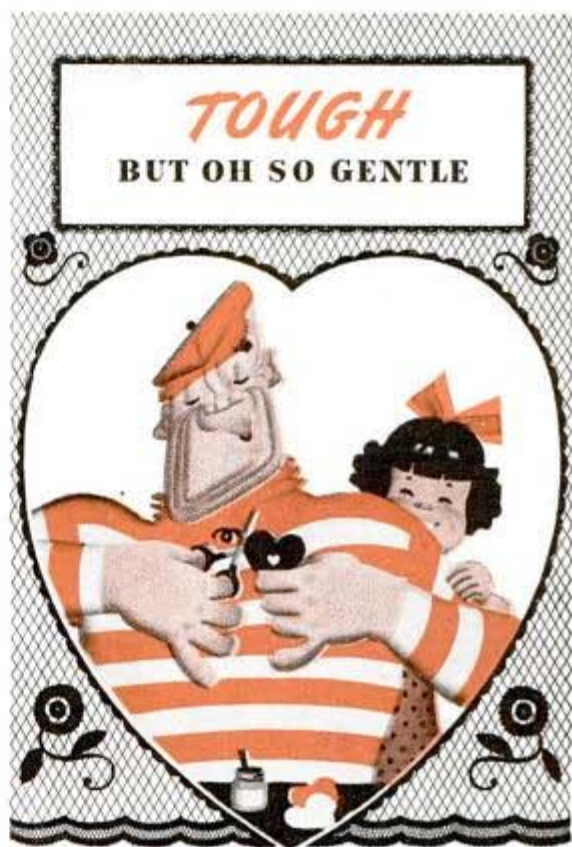
In good weather, diving students test their tank experience on the bottom of the Potomac river, where they learn to recover lost articles, repair wharf piling, inspect ship bottoms, and work hand pumps used in shallow diving. For deep work in the open sea, the school's diving boat "Crilley"—named after Frank Crilley, who distinguished himself in the salvaging of the submarine F-4, off Honolulu in 1915—stands out to a spot off Piney Point, Md., where men struggle for two or three weeks rigging pontoons, and learning to maneuver a rescue chamber, such as was used in the heroic rescue of thirty-three men from the ill-fated "Squalus."

Smoking is permitted to diving students, but alcohol is strictly forbidden. If a man goes on a drinking spree, he must refrain from diving for at least forty-eight hours. Alcohol changes the heart rate, first speeding it up and then slowing it down. Both of these changes handicap a man working under high air pressure. Alcohol also promotes the absorption of nitrogen into the system.

Although no serious accidents have ever happened at the school, under actual working conditions the diver is constantly stalked by death. Two of the most serious accidents that can befall a man are a "blowing up" and a "squeeze." In the former, a diver blows quickly to the surface due to excess buoyancy. Because of the rapid decrease in water pressure, his dress may burst. If he loses a shoe, he may dive headfirst and drown. If he escapes these difficulties, he must inevitably get the dreaded bends, unless he is sent down again immediately, or put into a recompression chamber.

In a "squeeze," a diver falls a considerable distance while under water. The outside water pressure becoming suddenly greater than the air pressure within the dress, the diver's body is jammed up into his helmet. He is generally killed instantly. In a number of cases it has been impossible to remove a diver from his helmet after a squeeze.

And what is the reward for this work and risk? Graduates of the Deep-Sea Diving School are designated as Divers, First Class. As such they rate fifteen dollars a month extra pay, plus a bonus at an hourly rate while employed in actual salvage operations in depths over ninety feet!



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**TOUGH on Oil-Pumping • GENTLE on Cylinder Walls**

● Extra quarts of oil are not the only extra cost of driving an oil-pumping car. Oil-pumping warns of even greater expense to come—it usually means that rapid cylinder wear has started.

You can avoid all this and restore your car's performance by installing Hastings Steel-Vent Piston Rings at first sign of oil-pumping.

Note to Used Car Buyers: Ask the dealer if it's Steel-Vent Reconditioned. It's a better buy if it is.

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**HASTINGS**  
STEEL-VENT PISTON RINGS  
*Stop Oil-Pumping.*  
IN CARS, TRUCKS AND TRACTORS

41250

## Stopping Bugs at Our Borders

(Continued from page 367)

were it introduced into our fruit orchards, grain fields, ornamental plants or trees, might prove to be as serious as some of the many devastating insects already introduced from abroad.

The bureau has on record more than 7,000 bug pests which infest crops and livestock in foreign lands but which have not yet established themselves in the United States. Among these are the spiny bollworm which has damaged seventy per cent of the cotton crop in parts of India; the rice straw borer, that almost wiped out the entire rice industry of Hawaii several years ago, and the melon fly, a serious enemy of melons and a number of garden plants.

Quarantined fruits, vegetables and many other articles carrying noxious pests are often concealed in ingenious ways to evade the quarantine officer's inquisitive eye. Sometimes the smugglers carefully scoop out the centers of bread and stuff the holes with forbidden mangoes and avocados. Elaborate vests, belts and suspenders have been detected. False bottoms in barrels, alleged to be filled with permissible plants, often conceal fruits and vegetables that are not supposed to enter. Plant cuttings have been discovered carefully stored away in lingerie.

In addition, insect pests are inadvertently smuggled in. Baseballs, papier-mache chocolate eclairs and many other articles are stuffed with cotton which sometimes carries the pink bollworm. Small dolls made of cornhusks, and mechanical chickens that can be manipulated to pick rice from a small bowl have been found swarming with diseased or harmful bugs, and brooms and brushes made of broomcorn often carry the dread European corn borer. Old burlap that has been used for the covering of cotton bales, then resold for other packing purposes, has been detected while infested with bollworm.

Today the Department of Agriculture maintains 170 inspectors and seventy-two collaborators located in thirty-nine maritime ports and twenty boundary points of entry. They work in cooperation with the customs, immigration and post-office authorities, inspecting vessels, railway cars,

(Continued to page 126A)

**NEW!**  
**WEEZEL**  
**HAIR BAIT**  
for 41

**3**  
*Great*  
*Baits*

There's a new thrill awaiting fishermen who use the new WEEZEL baits, either HAIR or FEATHERED type.

CASTING SIZE: 1/4-oz. 19 colors, 2-actions-in-1-bait, HAIR or FEATHERED type — \$1.00.  
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MUSKIE-SALTWATER: 1-oz. 19 colors, 2-actions-in-1-bait, feathered type only — \$1.50.

\* The transparent WEEZEL box in casting and fly rod sizes is ideal for storing your bait after use.

Write for handsome free three-color folder! If your favorite dealer can't supply you, order direct from us. THE WEEZEL BAIT COMPANY 6006 Wooster Pike, Fairfax, Cincinnati, O.



## Sani-Flush

Cannot Injure Aluminum  
Cylinder Heads or  
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**CLEANS OUT AUTOMOBILE RADIATORS**



## NEW Molybdenum NAIL SETS

You can demand *real service* of these new Millers Falls nail sets. They offer: *tough molybdenum alloy steel points*, well cupped for good bite; *oversize square heads*, to take solid blow and *lie still* when you put them down; and *new type knurling* for sure grip. Already at many good hardware dealers, or sent postpaid—two popular sizes (2/32" and 3/32" points) for only 25c. Slip a wrapped quarter into an envelope and mail *today* with coupon. Satisfaction guaranteed, or money back.

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**2 POSTPAID FOR ONLY 25¢**

Tool Book 42—240 pages crammed with pictures and details of hundreds of fine tools—sent promptly for 10c to cover postage and handling; or FREE with nail sets. Send for yours *now*.

FREE with  
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RIDE  
of  
RIDES!*

For new thrills, new fun, ride an Indian—there's nothing like it! 1941 Indians are power-packed streamlined beauties, built with Indian's exclusive "Spring Frame" that floats you over the roughest roads as though they were super-highways. No jolt, no jar—just easy comfort that leaves you fresh as a daisy after the longest ride. But "Spring Frame" is only one of the features that make these the greatest Indians ever built.

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**FREE!**



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PM-3

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"Last year I sharpened 2309 hand saws, for which I got \$1154.40. The Foley Saw Filer has made a good living for me"—John Joseph, Calif. Louis P. Wadovick says: "I have filed 764 saws in spare time." Thor Nedribe, Iowa, says: "I have filed 550 saws, made \$350. As I'm a Carpenter, I just file saws in spare time—have more than I can take care of." With a



## FOLEY AUTO-MATIC SAW FILER

you can do expert work easily, quickly, without eyestrain. The Foley files hand, hand and circular saws better than the best hand filer. The new Model F-16 is the result of 40 years' experience in building saw filers, and is unequalled for accuracy, ease of adjustment and long life. Patented jointing principle brings uneven teeth back to uniform size.

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## SUCTION SPONGE Cleans Cars New Way!

**AMAZING INVENTION!** Banishes auto-washing drudgery. Cleans linoleum, woodwork, windows like a flash. Auto owners, housewives will shout it. **HOT SELLER FOR AGENTS AND DISTRIBUTORS.** Dealers cleaning up big money.

**SAMPLE OFFER** Samples sent on trial to first person in each locality who writes. No obligation. Get details. *Be first—send in your name TODAY!*

**KRISTEE CO.,** 672 Bar St., Akron, O.

aircraft, automobiles, passengers and their baggage, and shipments of plants, vegetables and nursery stock. They dispose of contraband material and supervise fumigation or other required treatment of cotton, broomcorn, seeds, plants and other plant products.

A package recently received by Washington, D. C., plant inspectors appeared, at first glance, to consist of a number of heavy magazines. But their weight was so out of proportion to their size that the inspector opened the "magazines." He found many bunches of contraband nursery stock, alongside of which a couple of potatoes had been packed to afford moisture. Each dummy periodical was ingeniously made. A few plants were loosely rolled into a magazine, then plugs cut from a tightly rolled magazine of similar appearance were inserted in the open ends of the roll. A wrapper was then pasted around the completed package, making it look exactly like an actual periodical ready for mailing.

Plant inspectors at the port of New York not so long ago were under orders to stop the entry of all yams from Puerto Rico. One day a Puerto Rican family, mother, dad and baby, arrived on a steamship. When their baggage was examined nothing illegal was found and the family hastened to leave the vessel. So fast in fact, that the officers became suspicious, the more so because the baby was keeping a strangle hold on her doll. One of the inspectors grabbed the doll from the tot and undressed it. Picture his surprise when he found it wasn't a doll at all, but one of the prohibited yams.

Airplane travel between nations, especially now that transoceanic flights are scheduled regularly, continually carries with it the possibility of bringing in pests which have not been known in this country. As long ago as 1929 when the Graf Zeppelin made her second trip to this country, the federal inspectors found on the plant material aboard the great airship, twenty species of insects, six of which had never been found in this country.

☐ If you will send stamped, self-addressed envelope to our Bureau of Information, you will be given the name and address of the manufacturer of or dealer in any article described in this magazine.



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Roller Skates

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Noiseless Rubber Tires

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Solid Steel Wheels

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	V	V-2	V-3
Hex	1/2"	3/8"	3/16"
Thread	3/8"-24	1/4"-32	1/4"-32
Thread Length	3/32	3/32	3/32
Weight, Grams	8	3 1/2	2 1/2

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**Model One**, with chuck and 1/8" collet, only \$9.85.

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**10-DAY TRIAL** If your dealer does not handle Moto-Tools, order direct... we pay postage if you send money order or draft. Or, send only \$1, pay postman balance plus postage.

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Write for **FREE CATALOG** of Dremel Tools, Equipment, and special combination offers.

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Would you like to own a business where it was possible to take in as much as \$148 the first week, as did L. A. Rowe in his new business?

We want more reputable, honest men. These men need not have any special experience or more than ordinary ability, but they must be honest and courteous.

To such a man we offer an opportunity to start in business for himself. If you are that man you can make far above average profits in the rug washing business—a high grade business all your own.

### NO SHOP NECESSARY

The rug washer cleans rugs like new on the customer's floor. Anyone can run it. Electricity does the work. A quick, thorough and highly efficient method that removes dirt and grime, thus bringing out the natural beauty of floor coverings.

There are hundreds of customers in your vicinity and nearby towns. The business should grow steadily. Simply wash a few rugs or carpets. These customers tell others as well as giving you their work in the future. Soon you should have a prosperous, money making business. Send coupon for booklet explaining everything.

### PROFITS ENOUGH TO PAY FOR HOME

Men take in \$100 to \$150 in a single week. R. E. Traynor took in \$56 in one day and nearly \$800 in one month. W. F. Drake took in \$186 in three days and \$152 one Saturday night and Sunday. You, too, should be able to enjoy a large income.

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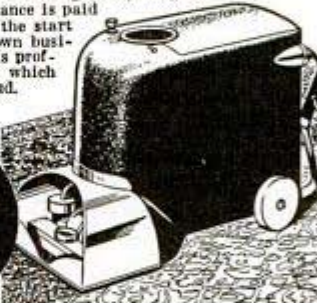
C. J. Wright wrote, "Did \$100 business in six days with never a complaint." That is the nicest part of this business. Customers are more than satisfied because of the fine cleaning job you do, and because you do the work right in the home, so they do not have to be without rugs and carpets.

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**FYR-FYTER FACTORY, Dept. 80-63, Dayton, Ohio**  
**FINE BUSINESS FOR MEN PAST 40**  
*Say you saw it in Popular Mechanics!*

# "Grand Central" of the Airways

(Continued from Coloroto Section)

strings indicate fourteen-passenger day planes. The various strings trace the movements of the flagships from their base stations to various destinations according to the schedule of operations at a given time.

TWA has an ingenious and concentrated control unit about the size of an office switchboard which performs around 300 separate electrical tasks. In addition to six transmitters and seven receivers near the field, TWA has two auxiliary transmitters at Newark. United, Eastern, Canadian Colonial and Pan American all have their individual facilities.

Aside from the elaborate radio set-up, landing and take-off are rendered comparatively simple and definitely foolproof by lights and a network of four broad, white runways ranging in length from 3,500 to 6,000 feet and from 150 to 200 feet in width, one of which is in line with the field's directional beam, permitting blind landings by instruments. These runways are connected with each other and the International Terminal or seaplane base which is a part of the field, by a web of intersecting concrete strips so arranged that the craft may speed into the particular runway made most desirable by the current winds. The lights are a scientific accomplishment in themselves and their number and power may be judged by the fact that they consume enough kilowatts to illuminate 600 or 700 miles of city streets.

Above the control tower is the most powerful airport beacon in the United States, a shaft delivering 13,500,000 candlepower and revolving six times a minute. Together with most of the thousands of red, green, blue, white and yellow bulbs, this beacon is operated from the control tower.

Many lights, however, are self-operating, like the four large red globes which warn night fliers of a 125-foot standpipe two miles from the field. An electric-eye device turns on these lights outlining the hazard at the approach of darkness or on the descent of a thick fog. In daylight and in clear weather, it switches the circuit off. Also it keeps a record of everything it does.

Lines of red neon lights stretching 3,000 feet on posts point the way toward the runway which divides the field southwest by northeast, enabling a pilot to orient himself. An electric "sock" in the shape of an

arrow, strung with red bulbs, gives him wind direction at night and automatically registers its findings in the control room. The apron is banked with powerful floodlights, taxi lights guide a plane on ground to the proper runway and the field itself is rimmed by eighty-five boundary globes, hooked up on two circuits so that failure of one set of alternate lights would leave the others burning.

The hangars, seven for land planes and one for seaplanes, each larger than Madison Square Garden and big enough to hold a football game, crowd and all, are brilliantly lighted and each contributes illumination to the near-by portion of the field. Often far into the night in these structures—so gigantic they have twenty-five-ton doors—overallled crews groom the liners for their journeys. There are half a dozen or more mechanics for each man who flies, and in addition there are radio wizards, propeller experts, brake specialists, instrument repairmen, painters, carpenters, upholsterers and a host of other men who keep the ships in shape.

In these hangars and the offices of the metropolitan airport is a community of workers with almost a single interest, aviation. They talk it, study it, practice it—almost all thinking beyond their job, puzzling out an angle that will advance the cause of their avocation. Their general aim, according to Chief Engineer Meehan, is to leave nothing to the human mind that can be done by a mechanism.

Hundreds of devices are thought up and tested; like Pan American's concealed scales which tattle on fat people without their knowledge while they are chatting with a clerk; like the thermocouple unit which takes the temperature of a motor and reveals its ailment; like the stethoscope which counts an engine's heart beats, or the "bump-o-graph" which registers the turbulence of the air during flight, or the magnetic flux machine which reveals metal faults too small for the eye to see. Each is contributing toward the advancement of flight.

None, however, is likely to equal the bright idea of setting a huge flying field right down in the middle of a great city so that airplanes could become as familiar to cliff dwellers as are birds to a farmer.



You may worry  
about that  
antique chair

## but here is one worry you can avoid

The jolt to your wife's prized antique chair when Uncle Henry sits down is nothing compared with the pounding road shocks constantly transmitted to the chassis parts of your car. You can't save your chair but you can save your car—

Save it from premature wear of "king pins" which causes "wheel shimmy"—save it from wear that causes rattles and other chassis troubles.

Just drive in where you see the red and white sign "Let Us Marfak Your Car" and get Texaco's famous 40-Point Chassis Lubrication Service from a trained expert.

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**METROPOLITAN OPERA** every Saturday afternoon, NBC. See local newspaper for time and station.



TEXACO'S 40-POINT CHASSIS LUBRICATION SERVICE AT ALL TEXACO AND OTHER GOOD DEALERS

K128

## Combatting the Rat Menace

(Continued from page 414)

by placing about one-half teaspoonful of bait, composed of red squill poison and meat, fruit or vegetables into a paper napkin and twisting the ends. It is small enough to be carried into rodent harborages, resulting in the destruction of thousands of rodents. Squill is a powder made from a kind of sea onion native to the Mediterranean countries. Our government regards it as superior to phosphorus, arsenic, barium carbonate and strychnine as a large-scale raticide because unlike the other poisons, it is relatively harmless if eaten by humans, pets or domestic animals.

During the past several years the Bureau of Biological Survey, now the Fish and Wildlife Service, and the Public Health Service have assisted in more than 150 cooperative county, city and town eradication campaigns in all sections of the country in which over 800,000 pounds of squill bait were used, in addition to 400,000 traps. It is officially estimated that not less than 8,000,000 rats have been destroyed.

A novel plan now in operation in Texas for poisoning rodents on a wholesale scale has the cooperation of eighteen towns and villages in the Galveston district. Thousands of citizens are assisting and the chamber of commerce is in charge. Citizens pay twenty-five cents per package of twenty-five separate poison baits made of squill; meantime, all the main rat harborages in the city are being located, studied and destroyed. Today the local health departments urge all citizens of the Galveston region to keep their premises clean of garbage, and businessmen to have their buildings ratproofed. Ratproofing can be done cheaply, at an average of around five dollars a building and the economic and health savings therefrom are tremendous, the authorities emphasize.

The Public Health Service maintains fumigation crews at each American port. If the port of origin of an incoming ship is an area in which an epidemic is known, the vessel is fumigated. Its hold is covered with canvas and the crevices in the door are sealed to make it airtight. Porous disks containing hydrocyanic gas are distributed throughout the ship. The lethal properties of this acid make it necessary for fumigators to don gas masks in their work. In this

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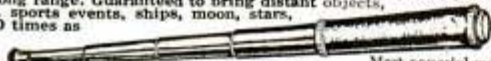
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KW8<sup>a</sup>

connection three new pieces of equipment have been developed in recent months. One is a hand pump which forces the gas into the tiniest rat harborages. It can be operated by one man. The second is a foot-pump that operates in somewhat similar fashion. The other apparatus is a more efficient type of gas mask that protects the fumigator against the fumes.

Federal experts urge that all householders, hotel and apartment house owners take such important steps as covering garbage cans, cleaning alleys and destroying rat paths to and from their nests to places where their food is found. Cellars in farm and home should have floors of concrete. Holes in walls around water or sewer pipes should be filled with concrete to the full width of the wall. Cellar windows must be screened with heavy wire netting of one-quarter-inch net, for mice can easily penetrate the larger size netting.

Keeping food from rats is important. Provisions, flour, seed and grain always should be kept in wire-covered boxes. Plastering of a stone or brick wall in a cellar or compartment is desirable, for this makes it too smooth for the rat to climb. Rodents may be kept from traversing the top of the cellar wall by a tin barrier, closing the spaces between two joists that rest on the wall.

K1328

### Glycerin Made from Petroleum to Avert Shortage in War

During the first world war, the price of glycerin rose to seventy cents a pound, but now ample supplies of this important war material at a reasonable price are assured by discovery of a process for making glycerin from petroleum. While it is a base for explosives, in peacetime glycerin is used largely in the manufacture of varnishes and lacquers, as well as for impregnating materials like Cellophane and parchment, and in processing tobacco. Glycerin has been made as a by-product of soap and the fat splitting industries, and its price has been extremely erratic, fluctuating from ten to thirty-two cents a pound in the last twenty years. With the new method of production it is believed that the price will remain more stable irrespective of the demand.

Chicago Tribune 12/14/40

Dr. E. C. Williams

MARCH, 1941

Smith Development Co.  
Meriville, Ind.

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Federal Schools Bldg., Minneapolis, Minn.

## Broadcast Station "Moving Day"

(Continued from page 458)

and your particular set has a main tuning knob on the side of the receiver as in photo A, you will note a large setscrew in the center of the knob. Loosen this screw a turn or two with a screwdriver to throw all present push-button settings out of adjustment. Permit the set to warm up for about 15 minutes. Now depress the first button to the left, which should correspond with the highest frequency station marked on the button. Hold the button down and accurately tune that station in with the main tuning knob. Now take your hand off the knob and carefully release the button. Do the same thing with the next button and so on down the line to the last button on the right. After all of the buttons have been set, hold the main tuning knob firmly and tighten the setscrew. This completes the job that anyone can do, as it is no more difficult than ordinary manual tuning. In some heart-shaped cam systems the individual cam is released by loosening the push-button knobs themselves as in photo B. In this system turn each of the knobs slightly to the left. Then proceed as before to depress the button and set the main tuning dial to the station wanted. In this case, however, the button is tightened while it is still held down.

The lever or rocker-plate systems, photo C, are similar in adjustment to the heart-shaped cam systems. In many cases, a setscrew is located directly under the knob and is easily accessible by merely pulling off each knob. Turn each setscrew slightly to the left to release settings. Then, with button lever depressed with screwdriver, tune in the station, and, with the button lever still down, tighten the setscrew and proceed with the next station button.

To simplify the procedure of retuning a push-button set for the new frequencies, let us assume that you live in Chicago. Your push-buttons are now set for WENR, WBBM, WGN and WMAQ; their frequencies in the order given were 870 K.C., 770 K.C., 720 K.C. and 670 K.C., respectively, and you now want to retune them for push-button operation on the new frequencies. Referring to the frequency shift table you will note that in this case it will be necessary to reset only two buttons, WENR to 890 K.C. and WBBM to 780 K.C.



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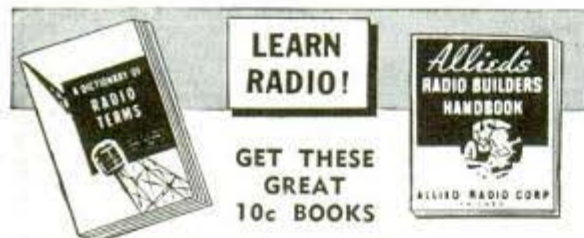
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**60 Second Demonstration**  
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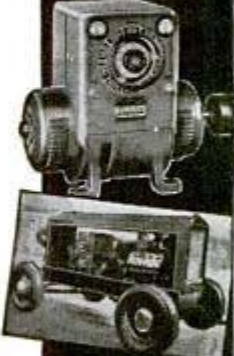


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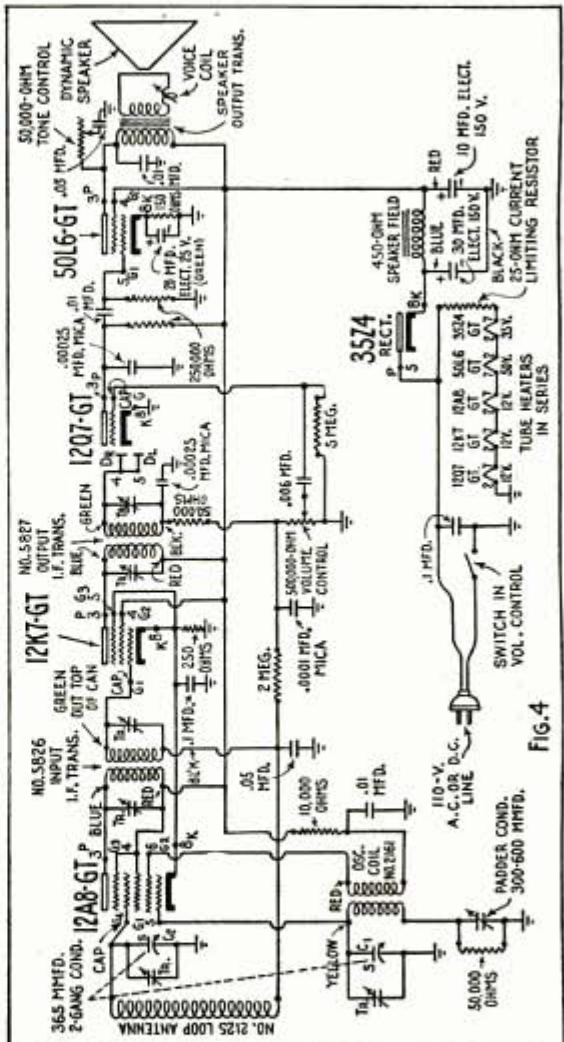
"A TON OF STRENGTH IN EVERY DROP"

THE BEST LIQUID FISH GLUE

## Little Giant A.C.-D.C. Super Five

(Continued from page 457)

position shown in photo B and is fastened to the base by means of two short machine screws. Flexible leads to the loop antenna should be long enough to enable the builder to mount the loop in the top of the cabinet as shown in photo A. Although good distant reception is possible with the



loop mounted in this position, greater sensitivity and range can be obtained by bolting the loop on 2-in. bushings out from the rear of the cabinet, in a vertical position.

All leads to the type DX I.F. transformers and oscillator coil follow standard color code, and there are only two connections to make to the DX No. 2125 flat-type antenna loop. The tuning condenser is a counter-clockwise type with trimmers, and is mounted directly on the metal base. A de-

(Continued to page 136A)

# How To Choose New Power Tools

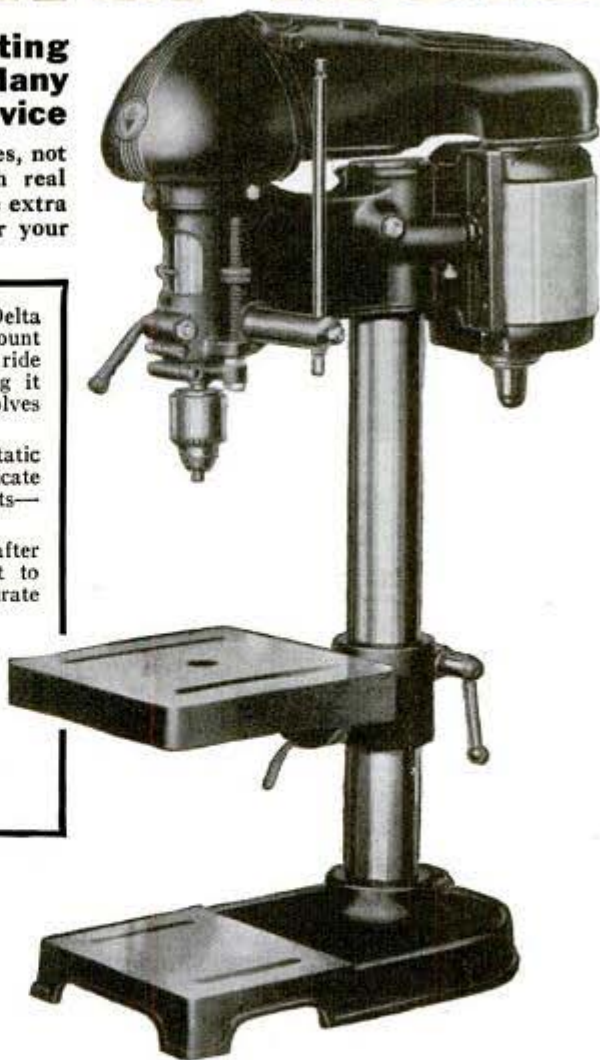
## Vital Points to Look for in Selecting Power Tools That Will Give You Many Years of Accurate, Satisfactory Service

In all motor-driven tools there are "built-in" features, not visible to the naked eye, that determine how much real machine value you are getting. In all Delta tools, these extra quality points are present. In selecting new tools for your shop—make sure you are getting such features as:

1. **PRE-LOADING OF BALL BEARINGS**—As used in Delta tools, pre-loading of ball bearings puts a definite amount of pressure on the bearing races so that the ball bearings ride against both of the races all of the time—thus making it impossible for the bearing or the shaft in which it revolves to run out of true.
2. **DYNAMIC BALANCING**—Superior to ordinary static balancing of revolving parts. Done with special delicate electrical apparatus, it locates and corrects all heavy spots—so that the revolving part is in perfect balance.
3. **PRECISION GRINDING**—A special extra process, after turning, that assures extra accuracy and closer fit to more exacting tolerances—that means more efficient, accurate service from your tools.
4. **"ACME" THREADING**—Another extra quality feature used on many Delta machines—a more expensive flat face thread with a steeper groove—that assures longer life and greater accuracy.
5. **"DIAMOND BORING"** of all bearing seats insures a snug, tight fit so that the bearing is always held in perfect position making it impossible to shift or come loose—another feature of accuracy.

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Here is a 14" Drill Press that performs efficiently wood and metal drilling, sanding, routing, mortising, shaping and grinding. Every workshop can use this new versatile tool. It takes drills up to 17/32" in diameter; also takes all standard wood bits with 1/2" shanks; and can be used for boring holes up to 2" with standard multi-spur bits. With proper Delta attachments, this drill press becomes an efficient mortising machine, making square end mortises 1/4" to 1/2" wide of any length—also sander, grinder, shaper and router. Has many special features. For full details see the latest Delta Catalog.



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**ACCURATE SHOOTING WITH CHAMBERED AIR**

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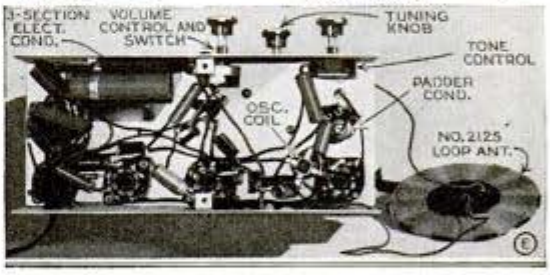
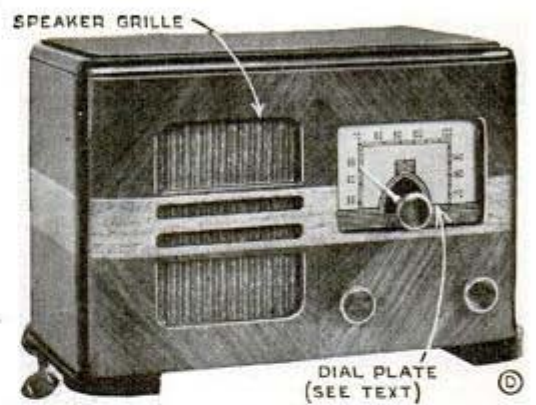
Tiny Tim powered by the famous Continental Red Seal Engine is easy to own—easy to operate and easy on your pocketbook. And if you are a dealer, you'll find it easy to sell. Easily carried. Push button starting. Automatic shut off. Heavy duty generator. 7-9 hour gas tank. Write today.

**CONTINENTAL MOTORS CORPORATION**  
MUSKOGON, MICHIGAN

(Continued from page 134A)

tailed list of the original materials used is available from Popular Mechanics radio department without charge. All parts are easily available and inexpensive, but must be of good quality for maximum results. Use No. 18 hook-up wire with push-back insulation and make all leads as short as possible. If operating on a d.c. line supply, it may be necessary to reverse the plug in the wall socket for correct polarity. On a.c. lines, reversing the plug will often eliminate line hum.

To balance set outside the cabinet, place loop in a vertical position, and tune in



some station at about 1,500 k.c., or with the ganged condenser plates about  $\frac{7}{8}$  out. Turn the trimmer (Tr.) on the rear (C<sub>2</sub>) condenser section of the variable condenser with a small screwdriver until the station is heard at maximum volume. Next tune the set to a station at about 600 k.c., and adjust the padder condenser screw that extends through a small hole in the top of the base, at the same time keeping the station tuned in with the dial knob, until the station comes in at the loudest volume. The oscillator section (C<sub>1</sub>) trimmer (Tr.) should be set  $\frac{1}{8}$  turn from tight. After the above operations are completed, again tune in some weak station near 600 k.c. and adjust trimmers in tops of I.F. transformers for maximum volume. The blueprint number for this article is R-288.

## Daylight Made to Order

(Continued from page 379)

from an electric light inside shines through the window on the actor's face. The imitation candle has a stub of real candle on top and the camera catches the flame of this stub as well as the illumination that the hidden light bulb provides. Wires from a battery in the actor's pocket are carried up his sleeve.

Even on a partly darkened set the ordinary ray of a flashlight is too dim to be recorded, so when the script calls for an actor to use a flashlight the juicers build a small but powerful arc light inside the case and the actor trails its wires behind him as he walks across the room.

Lighting a cigar or cigarette in the dark is another piece of business that depends on the electricians for its effect. The actor holds a small electric light concealed in his hand when he strikes the match. The light dims and glows as he puffs, an electrician out of camera range operating a rheostat that controls the current.

Another hard one the juicers solved was finding a way to create broken reflections such as the rippling of water reflected on the side of a boat or on the faces of actors who are leaning over the rail. The way it is done is to lay pieces of broken mirror glass in the bottom of a shallow tank below the actors, fill the tank with water, and shine an arc light on the mirrors. When the water is agitated the strong light that is reflected from the mirrors is broken up and the shadows ripple and move just as if they were reflections from small waves.

Arc lights fell into disfavor when sound arrived because their sputtering noise was picked up by the microphone. Incandescent lights ranging up to ten kilowatts replaced them, but now the arc is coming back because the use of fine-grain carbons makes them silent and many directors like the effect obtained when they are mixed with softer lights. Less light is being used today than ten years ago because the new film emulsions are more sensitive.

If he can arrange it, a smart director likes to film his outside scenes inside a sound stage. It is sometimes better to build a house inside a sound stage than to film it out of doors. The reason is that on the stage the director can control his lights and

(Continued to page 139A)

## IS YOUR CAR PRE-'41?



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Edison ALONE makes the 10 mm TYPE spark plug to fit pre-'41 cars.

If so, modernize its power with Edison HC<sup>®</sup> Spark Plugs.

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## HC SPARK PLUGS

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THAT CHARLES IS  
DOING SO WELL IN HIS  
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WASHING WALLS**

6 times faster and better than by hand.

Charles Stille took in \$217 first 10 days. We want more men to go into business for themselves. Customers everywhere—homes, schools, offices, stores, churches, lodge halls, hotels all have walls that need washing. You don't have to rent a store or office. You operate this business from your home. The expense for materials is small. What you take in is practically all profit. On a \$10 job cost for materials is about 20c. Write now for complete facts on this Von Schrader Wall Detergent which washes paint beautifully and postpones repainting many years.

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Say you saw it in Popular Mechanics!



(Continued from page 137A)

shadows to the exact density he wants, while outside the quality of the sunlight may change and the shadows lengthen as the scene is being recorded.

Even when they are shooting out of doors few cameramen rely on the sun alone. Large pieces of gauze suspended overhead are used to reduce the sun's intensity, reflecting boards are placed around the actors to light up the shadows, and artificial lights ranging from baby spots to sun arcs are turned on to help achieve the same quality of effect that the cameraman can obtain indoors.

## Keeping Ahead of the Joneses

(Continued from page 363)

six panes top and bottom. One pane in the bottom section slides up so the arm may be thrust outside. The other type has a sash within a sash in the top section and the interior sash can be pivoted, again leaving the arm room to reach out.

Venetian blinds have come down from the luxury level and may be bought for two dollars a window, made of heavy cardboard, reinforced with wood strips. They can be washed and neither rain nor sun will harm their finish. Tape which holds the slats need not be replaced when soiled. New decorated tapes come with clips to fasten over old tapes.

Furniture is feeling the urge toward change. A modernistic end table, shaped like a U laid sideways, can be used to hold a typewriter for a writer who prefers the ease of an upholstered armchair. What appears to be a graceful desk becomes a sewing machine when opened. Tables fold into the walls of tiny, city apartments.

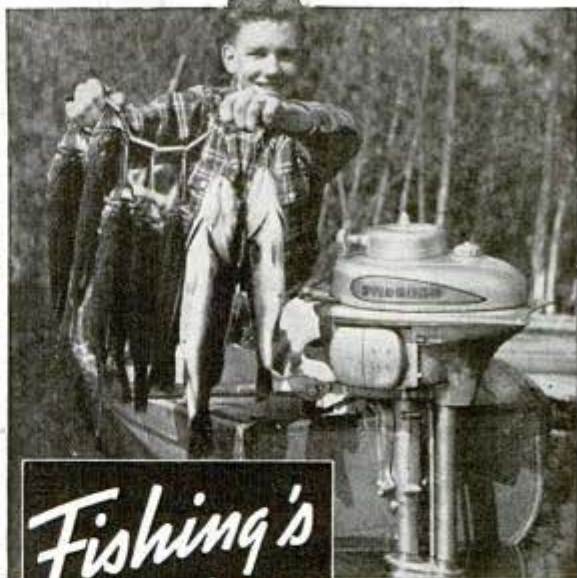
Natural wood and novelty finishes are being photographed upon furniture surfaces. Covering picture frames, lamp shades, wastebaskets and table tops with textiles zippered on is becoming a fad. The number and variety of tables, chairs, window seats, divans and cabinets which can be whisked into beds at night is growing steadily.

In the bedrooms, doors are wallpapered to increase the apparent size of the room, closet shelves are lined with quilting and leather, and window draperies are looped through rings on each top corner so that

(Continued to page 140A)

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"Four"

Take the word of a swift-growing army of keen fishermen that fishing's more fun with a FOUR! More fun getting to choicest fishing spots, with Evinrude's matchless Four-cylinder smoothness and thrilling power flow to speed you on your way. More fun, with a Four's responsiveness, slow trolling speed, and eager start-

ing ease. More fun, too, with such features as twist-grip throttle control . . . propeller-protection clutch . . . Co-Pilot steering . . . a host of other features!

**NOW, FOR AS LITTLE AS \$122.50** you can enjoy Four-cylinder performance! Four great "Fours" to choose from — and five other models, including the famed Sportsman and Sportwin, now with full reverse. Visit your Evinrude dealer — you'll find his name in your classified telephone directory under "Outboard Motors". Catalog Free. Address **EVINRUDE MOTORS**, 4651 North 27th Street, Milwaukee, Wisconsin.

*Evinrude Motors of Canada, Peterboro, Canada*

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Send me free book, "A File for Every Purpose."

Name \_\_\_\_\_

Address \_\_\_\_\_

(Continued from page 139A)

one piece of material covers both sides of a window and hangs gracefully across the top. Curtain rods are made in zigzag sections so curtains will fall into pleats.

In the kitchen, tables can be hooked onto the sink when in use and folded up for concealment in wall or cabinet. Electric dishwashers on wheels can be rolled from sink to closet. Garbage receptacles made of waterproof paper can be discarded; foot pedals open and close them. New stoves have control panels as elaborate as autos.

A two-foot rubber clothesline with rust-proof hooks stretches eight feet when desired. A new mending tape can be ironed onto a torn sheet where it hardly shows. Plastic shelf edging can be wiped clean and lasts indefinitely. Kitchen doors are glass paneled to eliminate dangerous collisions.

A circular food bar has been devised for large kitchens so most operations like mixing, kneading, toasting and percolating may be done without taking more than a step or two. It is also arranged so that dad can cook his breakfast when the family is away without moving from a swivel chair on rollers. The ingredients and cooking equipment for his breakfast read from left to right around the circle.

In the bathroom, shower hooks come in bright-colored plastics. Wide edges on bathtubs make comfortable seats while dressing. Clay is replacing iron as bathtub material and it has a glasslike finish. A new cabinet contains a heating element to keep the room warm in the winter and to dry out wet towels and washrags. In the summer it is a storage receptacle for linens. Bathroom linen closets have glass doors and plastic index tabs for shelves so that the number of sheets, towels, etc., on hand may be determined at a glance.

Shower curtains are coming equipped with little chromium-plated magnets which, attached to the bottom are attracted to the tub, thus holding the wet curtain away from the body. And to cap it all, the new bathtubs come snugly covered in overcoats of scuffproof, acidproof and waterproof material so that they cannot be damaged in delivery. After installation, the overcoat peels off and there is the new tub, sparkling and clean without a scratch.

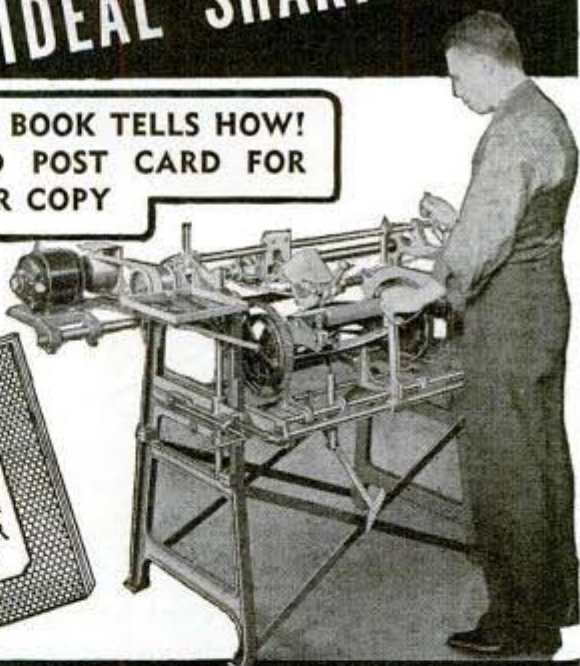
Indeed, the revolutionary spirit of change will be knocking at everyone's door this spring.

# EARN MORE MONEY sharpening lawnmowers on the IDEAL SHARPENER

The Ideal Lawnmower Sharpener offers you an opportunity to make MORE money in your spare time. Yes, it will even build up a permanent business for you. Every home is a prospect for business, year after year. The Ideal Lawnmower Sharpener is a machine that grinds all makes of lawnmowers in 15 to 20 minutes. The usual charge, \$1.00 to \$1.50 per mower. Easy and simple to operate. Just plug into a light socket in your basement or garage, and you're on the road to success. When lawnmowers are sharpened on the Ideal, they run like new. Every customer is satisfied. G. A. Blanchard, Mass., writes, "I sharpened 300 mowers in two months." Walter Roth, Mich., writes: "I bought my Ideal in May 1939 and sharpened 867 mowers that year, and 893 mowers in eight months of 1940." Howard Hellen, Minn., writes: "I sharpened 745 lawnmowers, sold 60 used mowers and grossed \$1,000.00 from Apr. 5 to Sept. 15." The Ideal Lawnmower Sharpener is heavily constructed and will last for many years. It is designed to sharpen all reel knives and straight blades accurately. Write today for the book that tells you HOW you can earn MORE money and establish a PERMANENT business with the Ideal Lawnmower Sharpener.

FREE BOOK TELLS HOW!  
SEND POST CARD FOR  
YOUR COPY

HOW TO  
BUILD A  
Profitable  
BUSINESS  
OF YOUR  
OWN



**THE FATE-ROOT-HEATH CO.**  
341 Bell Street Plymouth, O.

**SIMPLE! FAST! EASY TO OPERATE! GRINDS MOWERS IN 15 TO 20 MINUTES**



## Free Catalog

Ready March 1

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At last, a precision grinder within your means. You save 2/3 by finishing our semi-machined castings, on your own lathe. HURON handles both internal and external grinding. Accuracies to .00025". Mirror finish easily obtained. Grinds valves, pistons, bushings, shafts, hard or soft, holes, lock centers. Sharpens reamers, milling cutters. Does eccentric drilling; laps; polishes; acorns of other uses, for home workshops, garages, machine shops. Write for FREE illustrated folder and full information.

Huron Machine & Tool Co., Dept. B-3, Yale, Mich.



Semi-Machined Castings Only \$5.95

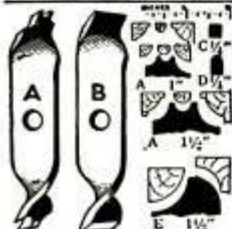


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Class pins, club pins, rings and emblems. Finest quality. Reasonable prices from 30¢ up. Write today for our attractive, free catalog.

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STATE SIZE HOLE. POSTPAID  
John A. Sandstrom, Box 317, Stow, N.Y.

MARCH, 1941

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SAFE!  
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- Most complete line ever offered, at real money-saving prices.
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(106)  
Please state the kind of boat you are interested in

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LONG CASTS—NO BACKLASHES

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Anyone can learn to cast in 5 minutes—now fishing's fun for all the family. Fish at night without backlashes.

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NEW GLOLITE WONDERBAIT—glows 5 hrs. if exposed 3 minutes to sun or flashlight. 50¢ postpaid (90¢ value—limited supply). Send cash or stamps.

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Shakespeare BALANCED TACKLE

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## A Revelation—Our new 1941 Catalog of "HARD-TO-GET" MATERIALS

For Industrial Arts Departments in Schools, Institutions, etc., Furniture Repair Men, Cabinet Makers, Souvenir and Antique Shops, Homecrafters, etc. Send 10¢ cash or stamps for this new catalog.

A few of the items we sell: Chest hardware, locks, hinges, supports, tray lifts, copper trim, also mouldings, overlays, etc. Finishing materials, glue, stain, varnish, abrasive papers, sanding blocks, stick shells, etc. Upholstering supplies, coverings and tools. Electrical findings for lamp manufacture, also clusters and indirect fixtures. Chair cane, splines, reeds, craft fibre cord, etc. Trays and glass liners for smoking stands. Large line electric and spring clock movements, with and without dials. Complete line Venetian Blind hardware, cord, tapes, etc. Table slides and supports. Tea wagon wheels and casters. Wood dowels, also dowel screws, do-wel centers, wood screws, hole buttons. Large line card table leg supports. Bed hardware of every description. Desk pens complete with (monels and fastening without base. Water transfers, inlays, small mouldings, etc. Glides and casters, office chair casters, wood legs and K. D. chair frames. Small box hardware of every description. Large selection pulleys, knobs, handles, hinges, locks, catches, etc. Perforated steel pans, chair braces, revolving chair fixtures, rocker springs, candle-sticks, sockets, billboard clamps, banquet table hardware, metal drawer slides, brass jack chain, drawer follower blocks, etc. Many styles corner braces, bolts, etc. Step ladder braces, pilaster strips, sliding track and sheaves. Typewriter desk hardware, blawings, mirrors, nut level hardware, salt and pepper inserts, music box movements, etc. Bar pins for novelties, dress clips, etc. Catalin plastics, crib hardware, swivel top table fixtures, sectional bookcase hardware, clamp nails, electric pens for burning, etc.

THURSTON SUPPLY COMPANY, Dept. PM, Anoka, Minnesota

**ASK BASS FOR HIS NEW  
CINE BARGAINGRAM**

Fascinating collection of thousands of bargains in 8-16 and 35 mm SILENT AND SOUND equipment... Get your free copy by writing to Department P

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179 W. MADISON ST., CHICAGO, ILL.

## LEARN CHAIR WEAVING

Easy, fascinating, restful hobby or part-time business. Weave chair and stool seats our easy way. We teach you and furnish complete materials—cane, reed, splints etc. WRITE FOR COMPLETE WEAVING INSTRUCTION BOOKLET AND PRICE LIST—10¢.

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**FOR YOUR CLUB**

Knit your group closer together and enhance pride of membership with pins or rings. Bastian's big selection, low prices, traditional clean-cut quality work has led the field for 46 years.

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## Fastest Sighting Combination Known

**MARBLE'S Flexible Rear Sight and Sheard Gold Bead Front Sight**

Look through peep to gold bead and center instantly on target. Coil spring keeps rear sight in true shooting position. Can be locked down. Interchangeable discs. Price, \$4. Gold front sight that never blurs. Price, \$1.50. Give make, model and rifle cal.

**Marble Arms & Mfg. Co. 578 Delta Ave., Gladstone, Mich., U.S.A.**

## MYSTERIOUS DEVICE WELDS BRAZES AND SOLDERS

ANYONE CAN OPERATE

Now, an electric welding, brazing and soldering Torch, complete with power unit, goggles and supplies. **WORKS INSTANTLY off any light socket.** Does a thousand and one repair jobs at amazingly **LOW COST** on aluminum, iron, steel and other metals. **Indispensable for Auto, Body and Fender Repairs, and home repairs—shop, factory, farm, engineer, janitor, sheet metal, radio and bicycle repairs.** Anyone can handle without previous experience with our simple **10-DAY HOME TRIAL** Write at once for Special Introductory Low Price Offer. Try 3 in 1 Electric Torch for 10 days at our risk, or get one free by helping to introduce it. **ELECTRO-TORCH CO., 2613-NN Michigan Ave., Chicago**

## Preparing Our Home Defenses

(Continued from page 395)

Council of Los Angeles was formed in 1933 as an official body that could take charge of public safety, health, and comfort in case such a disaster as a major fire, earthquake, or pestilence should ever strike the city. Fourteen committees that contain in their subdivisions some 2,000 trained key men are capable of taking immediate charge of any sort of rescue or rehabilitation work. Each committee chairman has two alternates and no more than two of these three may be out of the city at the same time.

The city is divided into fourteen concentration districts and in each of these an assembly area, consisting of a golf course or other large open space, has been selected as a safe place where the residents might gather in an emergency. Red Cross activities are coordinated with the emergency council and committees are ready to erect tents and temporary hospitals and to provide food as well as sanitary and lighting facilities for the concentration camps. The committees have arranged with industrial concerns to release all items that might be needed in a major emergency, from portable lighting plants and trucks to beds and bread. Committee members know where to obtain the supplies and have the authority to requisition what they need.

The disaster council is a group of trained volunteers that can do far more than an army of well-intentioned but untrained men in time of need. Under the direction of Basil E. Rice, coordinator, every detail that might hamper its operation has been solved ahead of time as much as possible. The water committee, for instance, has installed shut-off valves at strategic points in the city water system so that if breaks should occur, no matter in what part of the system, the damaged section can be bypassed. Nearly all gasoline pumps these days are electrically driven, so the committee in charge of fuel for emergency vehicles has arranged with the major oil companies to provide manually operated pumps at known locations, against the day when disaster might interrupt the power supply.

The headquarters of the council are in a special concrete building regarded as the most earthquake-resistant structure in the

(Continued to page 144A)

## NEW PROCESS REVOLUTIONIZES PISTON RING PERFORMANCE

✕ "Graf-Flox" is not a mere plating process — it's a treatment of the metal itself.

✕ "Graf-Flox" rings eliminate the run-in period. Friction is cut to a fraction . . . fuel saved . . . pep and power is added.

✕ "Graf-Flox" guards against scuffing, scoring, seizing.

Through 12 long months of laboratory research, Burd scientists sought the secret of longer life for both piston rings and cylinder bores, surer sealing, new freedom from sticking and sluggishness throughout ring life. Skin-deep beauty treatments or surface platings were not enough. Finally came "Graf-Flox," with an inherent self-sealing surface . . . inherent self-lubrication that reduces ring friction and frictional heat to a fraction, stands ever on guard against scuffing or scoring . . . inherent immunity to heat and resistance to wear throughout the long life of the ring. Twelve months more "Graf-Flox" treated rings took the test of the race tracks, often starting races without a run-in, and won more than their share of places in the money.

BURD PISTON RING CO.  
Dept. 101-C Rockford, Illinois

# BURD

"Graf-Flox"

## PISTON RINGS

DEALERS!  
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Write today in  
your territory  
for Burd  
"Graf-Flox"  
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BURD PISTON RING CO., Dept. 101-C, Rockford, Ill.  
Please send folder on BURD "Graf-Flox" Piston Rings and bulletin, "TIPS from an Expert Motor Mechanic."

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Build a Trailer easily in spare time with world's best line of trailer parts, axles, hitches. Complete working blue prints only 10¢. Universal Draw Bar, readily attached to any car. SEND 10¢ TODAY FOR CATALOG.

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"DO A DAY'S PAINTING IN AN HOUR"

# SPEEDY SPRAYER



ONLY  
**\$9.25**  
WITHOUT MOTOR

Clean, Oil-Free Air — Always!

• Just think! Now with a portable SPEEDY SPRAYER you can spray-paint 4 to 5 times faster than hand-brushing! And so much easier! Sprays paint, enamel, varnish, lacquer, insecticide and moth-proofer. Also inflates tires. Pays its cost in savings of time and materials. No piston! No rings! Diaphragm compressor delivers clean, oil-free air always! Never needs oiling. New streamline outfit, complete as shown. Only \$9.25 without motor. At dealers or direct.

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# DURO Super Value BALL BEARING DRILL PRESS

NEW DRILL PRESSES that have been specially designed in response to the demand for a high quality machine of large capacity and in the low price field. Refinements not usually found in Drill Presses selling in this price range are included as extra plus values.

Head, base and table are heavy gray iron castings machined to the same close tolerances as other Duro machines; the six-spined spindle is made of special alloy steel  $\frac{3}{8}$ " in diameter; spindle pulley is independently mounted in the head casting on two New Departure Ball Bearings; a third New Departure Ball Bearing at the lower end of the spindle absorbs radial and thrust load; a long, heavy self-lubricating bronze sleeve bearing in the quill prevents whipping. Spindle travel is  $3\frac{1}{2}$ "; drills to center of 15" circle. Equipped with  $\frac{1}{2}$ " Jacobs Chuck.

For full information on America's Finest and Most Complete Line of Power Driven Machines send for free copy of 1941 catalog.



**DURO METAL PRODUCTS CO.**  
DEPT. PM-15, 2653 N. KILDARE  
CHICAGO, ILLINOIS

**SUPER VALUE**

world. The council maintains two separate radio stations at its headquarters as well as emergency telephone equipment, magneto-operated, that tie in with the city's telephone system. Airplane pilots, doctors, demolition contractors, explosives engineers, motion-picture lighting technicians are only a few of the variously trained men who have been selected for volunteer duty.

To get the jump on "D" day, if it ever happens, nearly every part of the organization rehearses its duties once or twice a year. Organized at a time when the world was at peace, the emergency council has adapted itself to handle the tasks that the threat of war presents.

R1252

## Transportation of Tomorrow

(Continued from page 357)

operated by automatic multiple controls are likely to be hauling lighter products, materials, packages and mail through the air in great quantities. A case of ripe oranges ordered by a St. Louis merchant in Florida in the morning can be picked, packed, shipped and received in far-off Missouri the same day by airplane freight, at costs kept down by the same economical methods now used in hauling long strings of railroad express and freight cars. Very heavy and bulky freight probably will stay with railroads. Glider planes are already being towed by bombers in Europe. Other planes are carrying small tanks and boats suspended beneath their fuselages.

Since it is the habit of man to build his large cities near a body of water only the inevitable increase in air traffic is needed to make seaplane bases as common as bus terminals and railroad stations throughout America. Into those bases on the waterfront close to business districts, small seaplanes will take passengers and packages to and from outlying airports. Helicopters and autogiros will land airplane passengers on roof and pocket-handkerchief fields in parks and on modern housing developments. One new apartment house group in New York City has its autogiro field as a convenience to future tenants.

And what will all this do to the railroads? Well, first, the railroads will drop most of the long-haul passenger trains. Who will want to travel long distances at sixty

### RE-STRING RACKETS AT HOME • EARN MONEY •



**WITH THE WONDER VISE**  
It's pleasant, profitable work. No experience or skill required. Easy to learn. Full line of guaranteed **Stringing Tools, Frames, Gut and Silk Strings**. Every item high quality.  
**W. A. BICKEL & CO.**  
137 N. Marion, Dept. A-31, Oak Park, Ill.

### PRESTO! ANYONE CAN MASTER GLAZE

- LEAVES HARD GLASS-LIKE FINISH
- EASY TO APPLY
- WILL NOT FINGER-MARK
- NO OILY FILM
- NO SMEAR OR STREAKS AS WITH WAX
- LASTS SIX MONTHS TO A YEAR
- SAVES YOU MONEY



Car Owners! Meet Master Glaze—the sensationally different luster for new and used cars! Not a wax—not an oil polish—not a paint!—nothing that "smears" over the surface.

**MASTER GLAZE** is a unique discovery—a creamy liquid—quick and easy to apply! Gives a hard, glass-like surface. Even gasoline cannot dull it! Lasts six months to a year! Amazing luster—beautiful, sparkling clean and brilliant! Doesn't finger-mark—doesn't smear! A match box full glazes an entire car. Seals the pores—protects! **NOTHING LIKE IT!**

**AGENTS**  
An unusual opportunity! Quick, flashy demonstrator. Big profits. Good territory. Write today!  
**FREE Offer!** Write now for **FREE BOOK-LET** and **FREE TRIAL OFFER**. Just send your name and address. Write **MASTER GLAZE CO., 7720-237 W. Harwood Ave., Milwaukee, Wis.**

K1250

to seventy or even 100 miles an hour on the ground when they can go from 300 to 1,000 miles an hour in the air—except some of us old-fashioned people of 1941? The railroads will carry most of their traffic on short quick jumps, say, from Cleveland to Toledo or Baltimore to Richmond. Trains will be limited to about five cars and you will find no locomotive puffing away gallantly at the front. The motive car will be placed in the center with a pancake engine beneath the floor. The engineer will operate his Diesel-electric or gas-turbine engine by remote control from a forward compartment, surrounded by passenger seats. At the end of the run, he will take his control handle and move back to the other end and the train will soon glide back in the opposite direction with no wasteful or laborious switching of engines from one end to the other. Runs will be frequent. This is foreshadowed by double-end rail cars already in operation.

The sleeping car will gradually vanish from the scheme of things, because of short runs, and the companies now manufacturing them will go into the entertainment and luxury field with television cars, game cars, buffet luncheon cars, and other cars which will attract the passengers' dollars by making the short trip a pleasant one.

Trains will become distinguished articulated units, sparkling with color so that the "rainbow railroad yard" will come into existence with lines of smooth, short, varicolored trains, each as individual as the run it makes. As the reciprocal steam engine and coal vanish from the railroad picture, the smoke, soot, grime and drab-colored trains will go with them.

Cars will remain about the same size because of the limitations of standard track gauges. But interiors will be gay and seats will be more like deck chairs on a steamship, reclining if desired, with the weight of the body balanced according to the distribution of its weight and the flow of the bloodstream. This will lessen traveling fatigue and car sickness. Radios built into the seats will enable each passenger to hear the spot news and get entertainment without disturbing the person next to him.

Railroad stations will include huge garages for buses, which will be smaller and will function mainly on the very short hauls as highways become more and more

(Continued to page 146A)

## Old Age Policy Pays up to \$50 a Month!

Needed Protection, Ages 65 to 85,  
Costs Only 1 Cent a Day

The Postal Life & Casualty Insurance Co., 345 Postal Life Building, Kansas City, Mo., has a new accident policy for men and women of ages 65 to 85.

It pays up to \$500 if killed, up to \$50 a month for disability, up to \$25 a month for hospital care and other benefits that so many older people have wanted.

And the cost is only 1 cent a day—\$3.65 a year!

Postal pays claims promptly; more than one-quarter million people have bought Postal policies. This special policy for older people is proving especially attractive. No medical examination—no agents will call.

**SEND NO MONEY NOW.** Just write us your name, address and age—the name, address and relationship of your beneficiary—and we will send a policy for 10 days' FREE INSPECTION. No obligation. This offer limited, so write today.

## EARN MORE MONEY GRINDING LAWN MOWERS "THE UNIVERSAL WAY"

### FULL OR SPARE TIME

Build a Business of Your Own in Your Basement or Garage and earn \$135 a month. Mr. Felber of Ind., writes: "My UNIVERSAL GRINDER is faster and more accurate than any other grinder. Its efficiency enabled me to sharpen 450 mowers in 4½ months." More than paid for itself the first month. Every customer satisfied. **Only on the UNIVERSAL** can the inside face and edge of stationary blade, as well as the edge of the reel blades, be ground to proper clearance **ALL IN ONE SET-UP** without removing any blade from the mower. Tool Grinding Rest included.

"The Universal Way is the Modern Way" Write for Free Folder

Rogers Mfg. Co., Dept. 3A, Lindsey, Ohio



FLOATING DRIVE is swell!

Ride 100 Mi. for 50¢

**Auto-Glide**

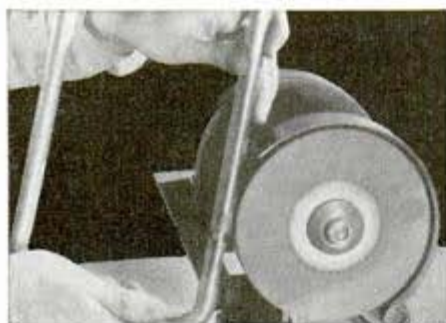
\$115—and up

The leader, for years! Now greatly improved with "Floating Drive!"—sensational new centrifugal principle that applies power with the ease and speed up, slow down, stop and start again—simply by touching hand accelerator! You can't "kill" the engine even on steepest grades. Improved and strengthened throughout for even easier, safer riding. Powerful Cushman engine, almost 3 H.P., carries rider and good load 100 miles for only 50¢!

**WRITE!** Send for new illustrated booklet if Auto-Glide not handled by your dealer. Send today! CUSHMAN MOTOR WORKS, Dept. P-3, Lincoln, Nebr.

**DEALERS: WRITE!**

## How to smooth a weld



● Here's how to smooth a welded joint in a jiffy! Just remove the excess metal with an Aloxite Brand Aluminum Oxide Grinding Wheel. Then finish off the surface with a Carborundum-made slip stone or Aloxite Brand Aluminum Oxide Abrasive Cloth. These and other Carborundum Brand Abrasive Products can help you save time and effort in hundreds of ways on your home workshop projects.

## Grinding an automobile crankshaft



● Crankshafts are easily finished to amazingly close limits of surface and dimensional accuracy with special wheels by Carborundum. These wheels are made of exactly the same abrasives that are used in the manufacture of the Carborundum Brand Products that help make work in your own shop easier and more fun. Send 10c for souvenir sharpening stone and 95-page illustrated manual on home craftsmanship.

**CARBORUNDUM**  
ABRASIVE PRODUCTS

Write Dept. M-31

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REG. U. S. PAT. OFF.

Niagara Falls, N. Y.

{Carborundum and Aloxite are registered trade-marks of  
and indicate manufacture by The Carborundum Company}

R1252  
(Continued from page 144A)

congested, and for the automobiles of passengers which now stand out in the weather if they drive to the train. Buses will find it difficult to compete along railroad routes because the trains can overmatch them with speed, comfort and economy. Street-cars will meet the conveniences of the bus and passenger car, or find themselves in museums.

And the great, sleek, hooded liners that will ply the sea will change their appearance with their function. The luxury trade, which demands ornate staterooms, half a dozen dining rooms to suit the mood or the occasion, and precise service, will lose its grip on the ocean transportation. Passenger ships will develop into real mass transportation vehicles with passenger lists ranging from 3,000 to 5,000, low fares, very small and efficient staterooms, like those now in Pullman cars, huge cafeterias where everyone is on a par, whether millionaire or traveling student, three-dimensional color talking pictures, television and night clubs. The European passage will require around three days. Decks will be covered over and the protected space will be flung open to all passengers who will buy tickets of a single class. Lifeboats will be housed in niches built into the sides of the vessels and really dependable automatic machinery will lower the boat in time of need.

No one will demand an outside room in the liner of the future because the ship will be one giant, enclosed unit with health-ray, germ-destroying glass admitting light, and with air conditioning supplying air at the right temperature and humidity. Man will make his own weather at sea.

## Little Giants of Industry

R1217  
(Continued from page 331)

by repeatedly photographing the movement of the paper particles, the engineers are often able to predict what tides and currents are actually doing in the bodies of water represented by the models.

Similarly, river, canal and ocean experiments are conducted with models in other branches of government service and in such educational research organizations as that of Massachusetts Institute of Technology. In fact, the universities and technological institutions are among the most

(Continued to page 149A)

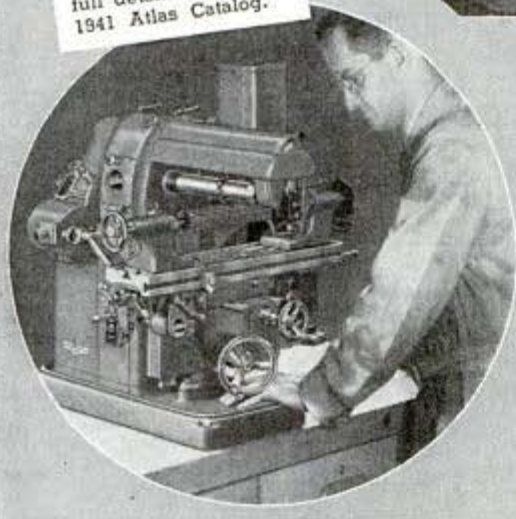
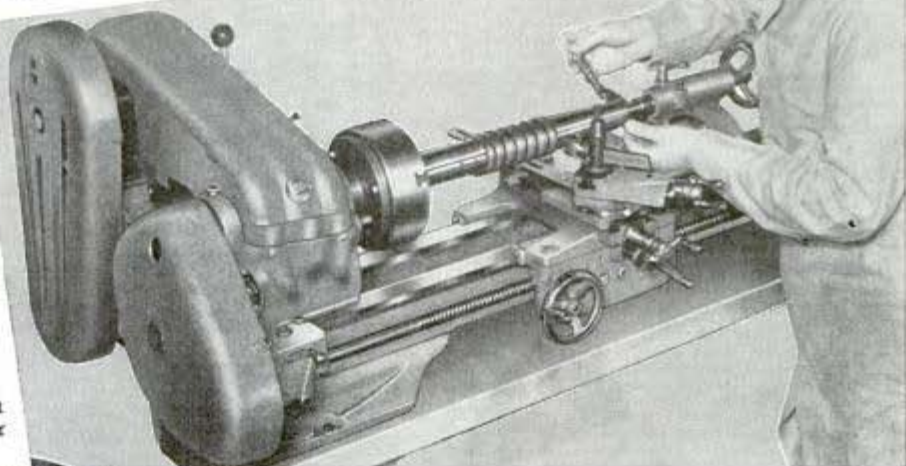


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Industrial tool rooms, metal working shops, and workshop owners everywhere praise their modern features, versatility, and accuracy. Prices as low as \$107 less motor, 6" lathes, \$66.50.

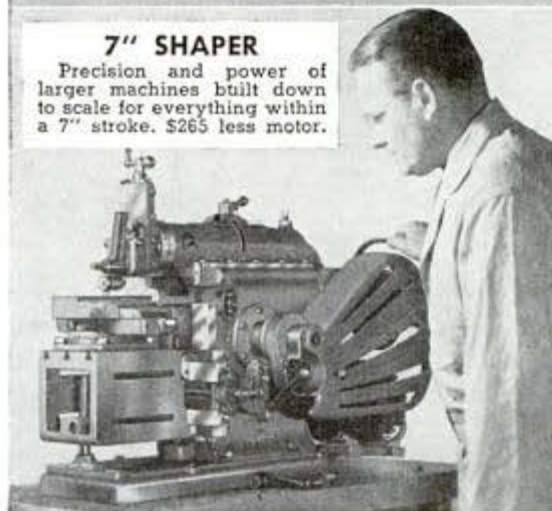
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Dept. 250—200 East Ontario St., Chicago, Ill.

K1217

(Continued from page 146A)

prolific producers of miniature models, used for instruction or to solve practical problems posed by an industry or a governmental agency.

One important application of miniature models is their use to forecast the appearance of an office, skyscraper, hotel, apartment or industrial plant.

In times gone by when a manufacturer ordered a factory built, he had a pretty good idea of what it would look like—a rectangular box with rectangular windows, so many to a floor. Lately, however, modern scientific discoveries have changed the construction industry. Air conditioning has eliminated the necessity for windows. Improved lighting and heating methods have changed ceiling heights. Smoke-control devices have often ruled out the need for towering chimneys, long the familiar landmark of the factories. Private airports have nudged factory buildings over to one side and baseball diamonds and recreation fields have squeezed in on the other. Garages and parking spaces are fitted in. Buildings are functional, laid out to follow the efficient lines of mass production, to take advantage of the force of gravity and to fit the machinery they house.

Things have come to a pass where the industrialist is asked to invest a million or two in a building which he cannot visualize even with the help of blueprints and sketches. As a result, the construction of remarkably accurate structural miniature models has grown into a new art and science until it is becoming difficult to distinguish a two-foot model from a five-story factory building by comparing the photographs of both.

Nowhere is the use of models so important as the automobile industry, where executives operate on the thumb-rule theory that, no matter how clever and efficient the design of next year's automobile may be, it simply won't sell unless it "looks right." These men know that if a proposed automobile does not "look right" it will not be accepted by the average purchaser.

Therefore during the period when the designing rooms of the automobile corporations are functioning at top speed there comes a time when the model is master of the gigantic industry. Thousands of sketches have been discarded, the best

(Continued to page 151A)

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Gives Your Hand a Ton Grip!



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SUPER-FLIER ACTION  
TREMENDOUS GEAR-OPENS AUTOMATICALLY  
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TAKES THE PLACE OF A SECOND MAN

Most powerful, most useful hand-tool! Grips with terrific pressure, and locks to work with non-slip grip, remains locked with hands removed! Makes "impossible" jobs easy. Is actually a portable Vise Clamp, Super-Flier, Pipe-Wrench, Open-End Wrench, Locking Wrench, Toggle-Press—ALL IN ONE! Ideal to hold small work for filing, grinding, drilling, etc. Holds anything, round, square or otherwise. Works in close quarters, at any angle. Adjustable to ratchet-like or super-puller action. Light, trim, handsome. Finest alloy tool steel. Nickel finish.

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"The Ripmaker" Saves hours of tedious hand sawing. Has 4" combination rip and crosscut blade, oilless bearings and 8"x33/4" steel table adjustable so that pieces up to 1" thick may be cut (pieces up to 2" by turning stock). Base, saw support and table adjusting slide, heavy iron castings. Adjustable ripping fence.

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Trucks, Tractors and Airplanes Easily Installed in 5 minutes. No adjustments.

**DISTRIBUTORS WANTED**  
Big Profits. Write today for unusual money making offer to handle this remarkable device. Pleasant work—be your own boss.

**WRITE FOR SAMPLE OFFER**  
We will let you try it on your own car for thirty days—no write today.  
J. A. STRANSKY MFG. CO. 751-C PUKWANA, SO. DAK.

(Continued from page 149A)

have been selected and then the model-makers get in their work.

They spend days and weeks molding next year's cars in quarter-size clay models, adding to a contour here or flattening a bulge there, working constantly and nimbly, using clay kept at exact temperatures in special electric ovens.

When completed the models are given the eye test to see whether they will "look right" from all angles. Those models which pass this visual examination are then placed in wind tunnels where they are struck by a 100-mile-an-hour blast created by airplane propellers. If the model sways unduly under the force of the wind, the finished car will do the same. So a change is made in its form. If a fender or bumper sets up a hum, this hum would be a shrill scream in the full-sized automobile at high speed. Another change is necessary. The model finally accepted is so much like the car to be constructed that a clever photographer would make it hard to distinguish between them in a picture.

So, in recent years the modelmaker has become an artist in his own right and the expert at his craft seldom finds it necessary to seek a job.

History records that nearly fifty thousand years ago the cave man first began to perceive that if the tiny head of a cow was painted on a rounded bulge in the cave wall, it looked more natural than if daubed on a flat surface. He was the first modelmaker and the bovine head was the first attempt at a model. Since then, modelmakers and miniature models have had a long road to travel, but they seem to have arrived at their goal of perfection and their position of importance at last.

## Uncle Sam Gets Up Steam

(Continued from page 351)

the necessary calculations. In fact, it is only a series of windmills snugly fitted in a metal casing. When steam is forced in at one end, it causes the windmills, or blading, to rotate at tremendous speed. Being attached to a shaft, they cause the shaft to turn. When the shaft is coupled to a generator, electricity is produced. Or, geared down, this shaft supplies power to turn a propeller.

(Continued to page 152A)

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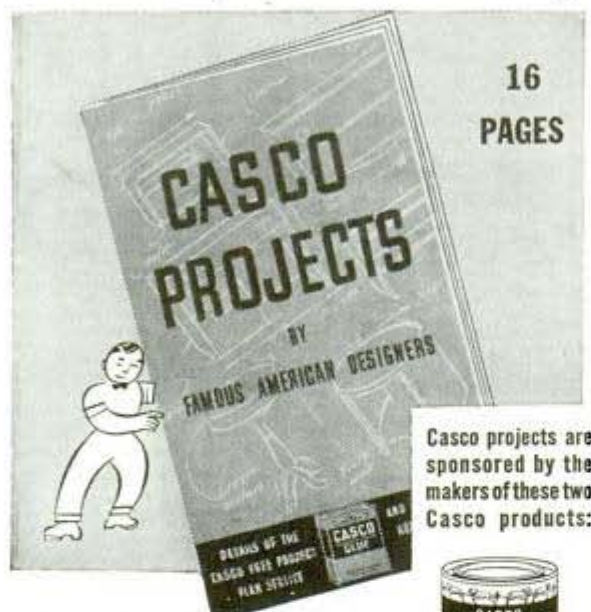
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When sheaves of blueprints of your turbine had been dispatched to the various points in the factory where blades would be milled, or extruded through dies or forged, depending on their size, where solid steel shafts weighing up to thirty tons would be turned, where the huge casings, divided into top and bottom sections would be cast, you would follow. And day after day you would watch picked crews of machinists concentrating on single sections. Most interesting, perhaps, would be the days spent watching the blades being fashioned, usually of stainless steel, and so accurately placed that when the turbine parts are expanded by operating temperatures as high as 900 degrees Fahrenheit, clearance would result with minimum escape of steam in the space necessary to keep each blading from striking the surrounding housing. One one-hundredth of an inch is common clearance.

So rugged they can withstand steam pressure of 1,250 pounds per square inch and take the continuous hammering impact of 1,400,000 pounds of steam per hour in a large turbine, often as many as 11,000 blades are installed with watchmaking precision in a single job. The slightest deviation in their relation to each other would result in a screaming complaint from the interior of the turbine when it was placed in service.

You would learn the secret of their efficiency by which these blades have enabled turbines to displace reciprocal steam engines in so many places and turn eight ounces of coal into enough electricity to burn ten 100-watt lamps an hour.

Placed laterally with relation to each other, the blades are so curved that steam, often rushing in a rate of over 600 miles an hour, first pushes the blade and then, passing through, gives it a parting kick, sending it whirling around at a tip speed of 850 miles an hour, sometimes more.

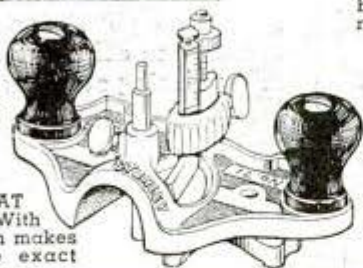
You would notice that bladings vary in size and that when they are connected to the shaft to make a rotor, they often form two groups one in general larger than another. Here you learn another secret of their power, the tandem connection of a high-pressure rotor with a low-pressure rotor which enables some turbines to use the same steam twice and then send it back

(Continued to page 154A)

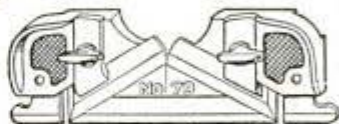


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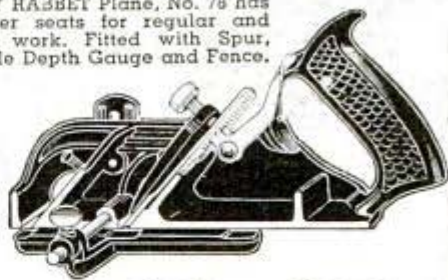
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(Continued from page 152A)

to the boiler condensed into clean, oil-free water.

Entering the casing, the vapor first speeds through the smaller, high-pressure rotor which in turning cools and expands it. Then it is piped overhead and into the low-pressure rotor where larger blades are able to extract more force from the steam.

## How Fast Can We Fly?

(Continued from page 323)

future it may be that cockpits will be built so that the pilot lies on his stomach, facing forward, to help keep him conscious while maneuvering at high speed.

Too, by practice a pilot can increase his resistance to fast changes of direction. If Headle had room for passengers in the P-38 he could keep them unconscious as long as he pleased simply by making turn after turn that were sharp enough to affect them without being so sharp as to affect himself.

At high-flying speeds gunnery becomes something quite different from what we are accustomed to. At wide-open throttle some modern planes can fly faster than a heavy revolver bullet. A gun fired broadside at another plane on a parallel course must be pointed considerably ahead of the target because wind resistance will give the bullets a curved path. These days a pilot could even fly into bullets that he fires from his own gun if he points the gun up at a slight angle to give the bullets a trajectory that will bring them down into his flight path at the same instant that his plane reaches that point.

Airplanes in the 500-mile-per-hour class not only were an impossibility a few years ago but it was then generally assumed that speeds much in excess of that figure never could be attained. The text book supposition has been that the highest possible airplane speed is represented by the speed of sound minus drag. This is based on the fact that at the speed of sound, which is 750 miles per hour, compressed air begins to pile up in front of the wing, creating tremendous resistance. Other factors reduce this highest probable speed down to around 600 miles per hour.

But Hall L. Hibbard, chief engineer of

(Continued to page 157A)



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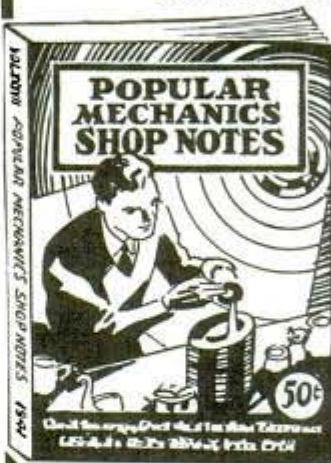
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12286  
(Continued from page 154A)

the Lockheed Aircraft Corporation, like a number of other leading designers, has a different idea about top speeds.

"The trouble with the speed-of-sound theory," Hibbard says, "is that airplanes have already moved faster than the text books say they can. Planes have been dived at 625 miles per hour. In several cases where speed governors broke, propeller tips have moved faster than 750 miles per hour. The fact is that the speed of sound is no barrier at all but simply an obstacle that must be overcome before planes can fly faster.

"One estimate is that 2,000 horsepower per ton of weight would be needed to move an airplane 750 miles per hour. Our best engines today weigh in the neighborhood of one pound per horsepower, so while an engine might conceivably fly itself that fast it could not have any airplane or pilot attached.

"More power out of lighter engines would be one way to beat the problem, but some more efficient answer probably will be found. For instance, is there any way by which we can prevent the compression wave from forming in front of the wing?"

Lockheed has just finished a \$150,000 wind tunnel in which air speeds up to 260 miles per hour will be developed and in which high-speed problems are going to be attacked. One program will hunt the answer to boundary layer control, control of the thin layer of air that touches the surfaces of a wing and that seems to get "sticky" at high speeds. Boundary layer studies possibly may point the way to eliminating or dissipating the compression wave in front of the wing, and permit higher speeds. Opposite-turning propeller blades on the same shaft, being studied at Stanford University, is another improvement that may help airplanes fly faster.

The P-38, the fastest thing yet to come out of Lockheed's speed department, is a fantastic airplane. First, because it is an ungainly monster that resembles no other airplane on earth. Second, because it has the easy handling characteristics of a normal airplane in spite of its terrific speed.

Record-smashing planes of the past were stressed right up to the breaking point, they were stripped down to bare essentials, their hopped-up engines had to be re-

(Continued to page 159A)

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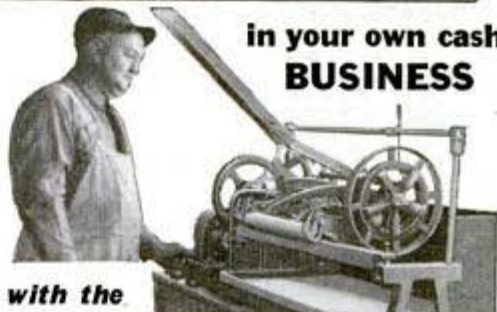
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Say you saw it in Popular Mechanics!

(Continued from page 157A)

placed after every run, and they carried limited fuel. Every landing was a separate adventure. On the other hand, the P-38 lands easily and safely. Its fuel capacity gives it an extended range, its engines require only normal servicing, and it carries the usual armament, radio, and other facilities in addition to its pilot. Fast as it is, it is a sturdy and reliable plane.

The plane's wing resembles that of a bi-motored transport and its two opposite-turning Allison in-line engines develop approximately 2,000 horsepower. The pilot sits amidships over the wing. The double tail group is attached to the wing by two booms. Weighing more than six tons and having a wing span of fifty-two feet, it is a lot of airplane for the single pilot on board.

Lockheed's speed department has experimented with all sorts of designs in its quest for more speed. Flying wings have been studied and tail-first airplanes that appear to be flying backward have been considered. No one knew what the P-38 would look like before it was designed and today no one can say what a 1,000-mile-per-hour airplane is going to look like.

"Eight hundred and 1,000-mile-per-hour airplanes aren't in sight yet but they are on their way," Hibbard declares. "The problems that such speeds present are difficult but are not as difficult by comparison as the problems that man had to solve before he could fly at all. Now that we know how to fly much of the work of designing and building a plane that will pace the sun has already been done."

## A Road to Match Today's Car

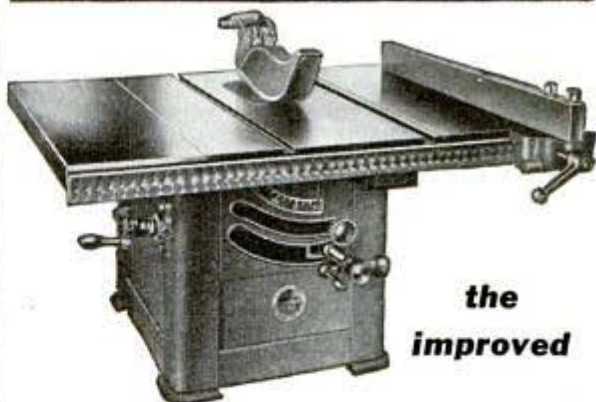
(Continued from page 335)

At one point the motorist has a twelve-mile stretch of highway that is free from curves. Where curves are employed, a system of progressive curves is used, leading up to the sharpest curve required.

Multi-color lights make the turnpike not only the safest lighted motor road in the world but also the most colorful. Yellow sodium vapor illumination is used at tunnel approaches and outside traffic interchanges where vehicles enter and leave the highway; the interiors of the tunnels are bathed in the blue-green light of mercury lamps, and white light from incandescent

(Continued to page 161A)

**YOU WANT THE BEST!**



the  
improved

## WALKER-TURNER 10" TILTING ARBOR SAW

Only in a Walker-Turner 10" Tilting Arbor Saw do you get all of the valuable features listed here. Get most for your money by selecting Walker-Turner Machine Tools

- 1—Geared shock-proof motor for greater efficiency.
- 2—Heavy cast iron and steel tilting assembly, precision-machined for accuracy.
- 3—Jam-proof "gun carriage" elevating mechanism for raising and lowering saw blade.
- 4—Special steel saw spindle mounted on precision ball bearings.
- 5—Heavy cast iron table strongly reinforced for rigidity and accurately ground to a plane surface. Size 25" by 32" with extension tables.
- 6—Safety guard with anti-kickback pawls.
- 7—Steel ripping fence welded into box section insures rigidity with lightness.

**\$59<sup>50</sup> to \$65<sup>50</sup>**

(motor and accessories extra) Shipping weight 210 lbs. without motor.

## WALKER-TURNER MACHINE TOOLS

DRILL PRESSES • LATHES • GRINDERS • RADIAL MACHINES  
SHAPERS • BAND SAWS • JOINTERS • BENCH SAWS  
JIG SAWS • FLEXIBLE SHAFTS • SURFACERS



Walker-Turner Co., Inc.  
131 South Ave.  
Plainfield, N. J.

Send me your new Walker-Turner Catalog, describing all of the Walker-Turner Machines.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

# BIG MONEY!

ASSEMBLING MEAD'S

## New PORTABLE KI-YAK

IN A FEW DAYS AT HOME!

—from Complete  
Cut-To-Fit Construction  
Kit!

Weigh  
as little  
as 20 LBS.

Use with PADDLE!  
OARS! SAIL! MOTOR!

Assemble for PROFIT  
or Personal FUN!  
NO Experience Needed!

MEAD'S perfected, patented, aluminum-arched Cut-To-Fit Construction Kit GUARANTEES successful assembly easily, quickly, *INEXPENSIVELY*—in a few days at home with simple hand tools without previous experience. Build yours for personal sport use, or sell at splendid profit! Mead's quality KI-YAKS (available in 5 models, kits or factory assembled) are beautiful and PORTABLE. Take yours anywhere by hand or car for paddling, sailing, racing, outboarding, touring, fishing, camping, hunting. Dependable, seaworthy, durable. THOUSANDS in use. Strong as a giant—light as a feather! More fun at less cost! Double-Blade Paddle or Oars now included with your KIT! Write or Rush Coupon below for Free Colored Circular, low Factory-To-You prices!



Write for lavishly illustrated **FREE Circulars!**

Gentlemen:  
Please rush your FREE New Colored KI-YAK Circulars, low Factory-To-You Prices! (Please Print Plainly.)

NAME.....  
STREET & NO.....  
CITY.....STATE.....

**MEAD GLIDERS**  
15 S. MARKET ST. Dept. B-31 CHICAGO, U.S.A.

## GARDEN TRACTORS



### SPEEDEX

6-H.P. riding type, 3 & 5 H.P. walking types, also 1-H.P. cultivator for the small tracts. Prices start at only \$94.50 with cultivator and equipped with rubber tires.

Before you buy—Write for FREE 48 page illustrated folder.

**POND GARDEN TRACTOR CO.**  
Box 216D43 Ravenna, Ohio

**SpeedWay DRILL 7.95 GRINDER 5.95**

**KIT 14.95**

**ROUTER 3.95**

**STAND 3.95**

**GRINDER 5.95**

**QUALITY TOOLS**  
... products of SpeedWay, for 30 years leading manufacturers of electric tools. Specialty versus high torque 110V universal tool motors. Improved designs, correct speeds, 1000 RPM Drill with diecast handle has 1/4" capacity in steel. 20,000 RPM Hand Grinder has speed essential for efficiency and eases for both 1/4" and 3/32" arbors. Drill and Grinder sold singly or together with 5 accessories in fitted Steel Kit. Stand taken either drill or grinder. Router Frame converts grinder into router. Bench Grinder is complete with motor. Write for Circulars. SpeedWay Mfg. Co., 1842 S. 2nd Ave., Cicero, Ill.

**HAUCK FLAME GUN KILLS WEEDS**

2000° F. controlled heat quickly, easily destroys weeds (seeds and all), poison ivy, crab grass, insects, etc. Keeps driveways, fences, irrigation ditches, orchards, etc. clean. Hundreds home and farm uses. Burns kerosene. Inexpensive—safe—easy to use. 10 day trial. 7 popular priced models. Write today for free catalog and prices.

**FREE CATALOG**

**HAUCK MFG. CO.**  
134 Tenth St., Brooklyn, N.Y.

**DO YOU WANT a new business profession of your own, with all the trade you can attend to? Then become a foot correctionist, and in a few weeks earn big income in service fees,—not medical nor chiropody—easy terms for home training, no further capital needed, no goods to buy, no agency. Established 1894. Address Stephenson Laboratory, 1 Back Bay, Boston, Mass.**

**HOLD-E-ZEE AUTOMATIC GRIP SCREWDRIVERS**

Hold, start and set-up screws in unhandy places. Gripper instantly released by spring action, sliding up out of way when not in use. Finest material throughout, chrome vanadium blades; many have transparent, insulating unbreakable handles. (Illustrated.)

No more expensive than ordinary screw drivers. Models for recessed-head screws. Handless even. Get one today. At auto-supply, hardware or electrical stores.

**UPSON BROS. INC.** 86 EXCHANGE ST. ROCHESTER, N. Y.

**AGENTS 300% Profit SIGN LETTERS**

For Store Fronts and Office Windows. Anyone can put them on. Free Samples. Liberal Offer to general agents. **METALLIC LETTER CO., 438 N. Clark St., Chicago**

In answering an advertisement with a coupon, be sure to write name and complete address clearly.

K144

(Continued from page 159A)

lamps illuminates buildings at the interchanges. An emergency system, powered by storage batteries, will take care of possible failures of the regular lighting system. Lighting in the tunnels is supplied by 1,060 mercury vapor units, each with a capacity of 250 watts, giving a minimum visibility along the tunnel of more than 1,000 feet, or more than is necessary to provide maximum driving safety at sixty miles per hour, and more. This equipment was supplied by Westinghouse Electric and Manufacturing company.

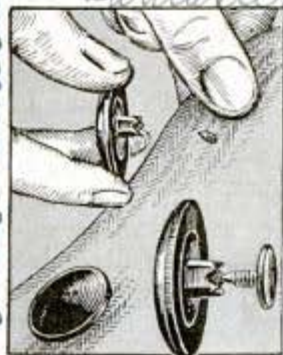
Among the additional safety features of the highway are: reflector markers throughout the length of the road; wide shoulders on the outside of each roadway so that vehicles may be pulled entirely clear of the pavement when parking; powerful ventilating equipment to maintain fresh air in the tunnels; combination towing and fire trucks for use in the tunnels and elsewhere; a two-foot, nine-inch emergency walkway through each tunnel, and 1,200-foot acceleration lanes on which a car entering the turnpike from another highway may pick up speed and merge safely with traffic on the turnpike.

Important in national defense is the fact that the two twenty-four-foot lanes of the turnpike permit easy movement of motorized troops. Its structure is sufficient to carry the ten-wheeled anti-aircraft guns, which are among the heaviest of mobile military equipment.

A toll of \$1.50 is charged for the 160-mile run.

### Two-Piece Threadless Button Attached by Screw

*Louisville*



Fastened to the garment by a screw instead of needle and thread, a two-piece plastic button is easy to take off or put on. It cannot become unscrewed accidentally because of a floating cap which must be pressed slightly

when attaching or detaching. To attach, the pointed screw is forced through the cloth and then turned into the button.

MARCH, 1941

*Threadless Button Co.  
Box 17 5, Louisville  
Ky*

## IT'S TAKING HOLD



### Here's Why

WELDWOOD PLASTIC RESIN GLUE IS

- ✓ WATERPROOF
- ✓ STAIN FREE
- ✓ ROT PROOF
- ✓ TREMENDOUS STRENGTH
- ✓ QUICK ACTING
- ✓ COLD SETTING PLASTIC

Write for full particulars

UNITED STATES PLYWOOD CORP.

616 West 46th St. New York, N. Y.

If your hardware dealer cannot as yet supply you, send us his name and address with 25¢ for large can and glue manual.



WELDWOOD GLUE is guaranteed, tested and approved after years of shop use by United States Plywood Corp., the world's largest producers of plywood, a product in which perfect gluing is of major importance.

## WELDWOOD PLASTIC RESIN WATERPROOF GLUE

In answering an advertisement with a coupon, be sure to write name and complete address clearly.

## ITCH STOPPED in a Jiffy -or Money Back

For quick relief from itching of eczema, pimples, athlete's foot, scales, scabies, rashes and other externally caused skin troubles, use world-famous, cooling, antiseptic, liquid D. D. D. Prescription. Greaseless, stainless. Soothes irritation and quickly stops the most intense itching. 35¢ trial bottle proves it, or money back. Ask your druggist today for D. D. D. PRESCRIPTION.

*Reader  
save letter  
held*

161A

# POPULAR INVENTIONS

For Your Home

(Continued from page 20A)

## Magazine Rack Used as Desk When Inverted in Lap



Here the floor rack for magazines is laid on its side for use as a convenient writing desk

Dual service is performed by a combination magazine rack and lap desk. Primarily a floor stand for magazines or for carrying books, when inverted it serves as a convenient desk for writing notes.

## Wire Frames Hold Hot Dishes

Hot casseroles may be brought to the table for serving without danger of burning the hands or ruining a polished top surface, if the dishes are placed in heavy-duty metal frames offered the housewife. Legs on which the holder stands allow cool air to circulate under the hot dish,

doing away with the need for hot pads; and the natural-finish oak handles never get hot. Made in shapes to fit both oblong and round dishes, the holders come in seven sizes to take all styles of popular ovenware.

(Continued to page 163A)

MAKE YOUR  
BEST EVEN

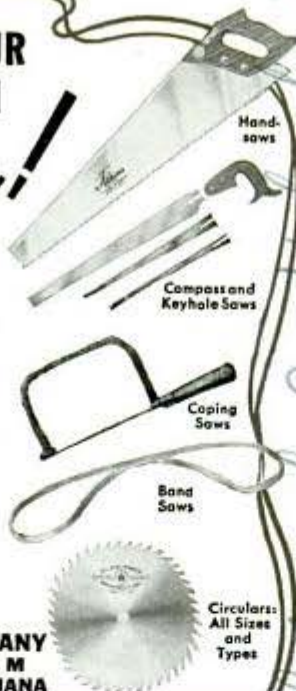
# Better!

• To give your ability as a craftsman in wood free rein, follow this proved formula. First check your bench to be sure you have the right saw for every job. Then fill in the missing types—and replace the worn-out or inefficient ones—with Atkins Silver Steel Saws. Made to highest performance standards, they cut straight and true. Their knife-keen teeth stay that way longer. They need less filing. Your hardware dealer has them in a full range of kinds and prices.

Send 10c for Book  
"HOW TO DO IT"

Shows efficient shop layouts, with numerous tool suggestions.

**E. C. ATKINS AND COMPANY**  
426 S. Illinois St., Dept. M  
INDIANAPOLIS - INDIANA



Circulars:  
All Sizes  
and  
Types

# ATKINS SAWS

Silver Steel

## SAFETY FOR WELDERS

ONE-PIECE-BACK, HEAT-RESISTANT  
WELDERS' GLOVES ONLY \$1.55 A PAIR

Speed work. Save money. Steel-Grip Welders' Gloves have entire back cut in one piece from our special tanned, heat resisting, shrink-proof leather. No seams in back. No burning through seams, no ripped seams. Wool breaker sewed inside insulates hands from heat. Flinger seams welted at points of greatest wear. Wide strap reinforcement at thumb seam. Try a pair. Built to outlast several pairs of ordinary gloves. It costs less to have the best. Order by No. 13475 now. Ask your dealer or order direct. Only \$1.55 a pair.

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Learn HOW hundreds of businesses are boosting sales with 1c Messages—produced on the spot with new, patented, **CARDMASTER**. Just send name for **FREE** illustrated book of money-making ideas for your business and complete Unique Advertising Plans. Write today. **CARDMASTER Co.** 315 W. Hubbard St., Dept. 83, CHICAGO



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1941 MASTER MANUAL

Get the Brand new Constantine Master Manual for Woodworkers and Big 1941 Bargain Book, listing and describing over 100 different kinds of wood in 980 different items in veneers, lumber, panels, inlay work, turning squares, and helpful woodworking aids. Printed and illustrated articles on How to Make Inlaid Pictures; How to Make Veneered Panels; How to Finish Different Kinds of Woods. A source of supply for you in small sized quantities—every kind of wood you are looking for. Send 10c today in stamps or coin. **ALBERT CONSTANTINE & SON, INC.** 791-L, East 135th St., N. Y. C.

10c

*New began were woods C. miles. much*



Edwards Mfg. Co. 2339 N. Hart  
 1939

**POPULAR INVENTIONS**

For Your Home

(Continued from page 162A)

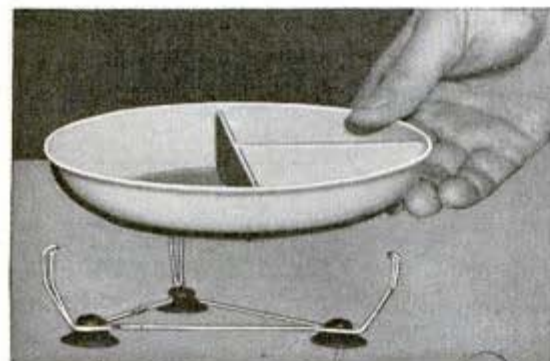
**Disposable Bag for Garbage**  
**Saves Washing Container**



Hooked on a metal rack, a moistureproof bag for garbage opens at the touch of a toe. When filled, it is easily disposed of and then replaced with a fresh bag.

**Baby's Plate Held by a Frame**  
**Secured with Vacuum Cups**

Rubber vacuum cups anchor a frame that holds the baby's plate securely on the table or high-chair tray. The wire frame has three prongs that fit around the edges.



MARCH, 1941

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**EASY TO READ**

Easy to read—guaranteed for one year. The crack-proof white surface is bonded to the steel—protects it from rust. Favorite Wyteface is easy to clean, hard to kink, durable. 25, 50, 75 and 100 ft. lengths. Mail coupon today for free sample of the line and illustrated folder.

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LOOK FOR THIS DISPLAY

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 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_

**New! BARGAINS FOR WOOD WORKERS**

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**148 PAGES only 10¢**

**Craftsmen! Get This Big Book of Rare Woods, Veneers, Inlays, Plywoods, Jig Saw Patterns, Tools and Supplies**

Just out! Big new 1941 Bargain Catalog No. 14 for Woodworkers. Send for yours TODAY. 148 pages—20 color pages including rare and domestic woods in FULL NATURAL COLORS. Every page crammed with fascinating projects—new inlay methods—short-cut wood-finishing processes—hundreds of fascinating scroll saw projects for making book ends, tables, lamps, furniture and novelties.

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Big bargains in rare woods from Asia, Africa, and the Indies. NEW LOW PRICES. Complete stock of American woods, veneers, inlays, ornaments, hard-to-get hardware items, tools, etc. Immediate shipment at real money-saving prices. Get this book TODAY. Send only 10¢—coin or stamps—refundable on first order.

**CRAFTSMAN WOOD SERVICE CO.**  
 2729 S. Mary St., Dept. C-4, Chicago, Ill.

Harold F. Hunt, President, CRAFTSMAN WOOD SERVICE CO.  
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Enclosed find 10¢ (refundable on my first order) for which please send me your big new 1941 Catalog No. 14.

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Meinkey-Bayne Co  
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**MORE REASONS than ever  
for BUYING NEPTUNE!**

1941 NEPTUNES offer every modern convenience—quick starting and smooth operation—at lower cost than you would pay elsewhere. See them before you buy. They're QUALITY motors, built for years of service.

Eight models—1.5 H.P. to 18 H.P. with three alternate fitting trims.



**NEPTUNE  
NEED  
A SEZ:**

For a danged sight more fun fishin', brother, buy a NEPTUNE!

Synchronized gas and spark control; calibrated needle valve control; positive cooling; improved underwater silencing. Available with or without streamlined tank, starter and shroud.

**MORE for LESS \$38<sup>95</sup> UP**



REVERSE—360 DEGREE PIVOT.



IMPROVED ALTERNATE FINING.



RECOIL STARTER.



AUTOMATIC PILOT.

**MUNCIE GEAR WORKS, Inc.**

MUNCIE, INDIANA, U. S. A.

New York Office: 45 E. 17th St.      Gramercy 7-8310

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**Buy NEPTUNE**

Send for FREE Literature

**BUILT FOR SALT WATER AS WELL AS FRESH WATER**

**HERE'S THE CHAMPION GAS MODEL**

**The COMET ZIPPER**



DESIGNED by CARL GOLDBERG!

The gas model which has won more contests than any other in its class! Breath-taking climb—2,000 feet per minute; sensational floating glide! Kit contains finished prop, motor mounts, plywood firewall, many other finished parts. FULL-SIZED PLANS. Wing span 54 inches. Postage 25c, or order from dealer.

**395**  
**BIG NEW CATALOG!**  
Shows newest WAR PLANE and BOATS; gas models, R. R. cars, race cars. Send for stamps.

**COMET MODEL AIRPLANE & SUPPLY CO.**  
129 W. 29th St., Chicago—688 Broadway, New York—Dept. P3

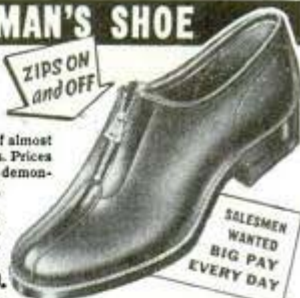
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**NEW KIND OF MAN'S SHOE**

The new sensation in men's shoes — The Chippewa Clipper. It zips on and off in a "jiffy". Right now is the right time to get into a dignified and highly profitable shoe business of your own with this fast seller, and a complete line of almost 250 styles of dress, work and sports shoes. Prices as low as \$1.98 a pair. Free 10-second demonstrator sells super-comfort air-cushion shoes like magic.

Manufacturer established 35 years wants salesmen. No experience needed. Write for complete sales kit. It's free!  
**MASON SHOE MANUFACTURING CO.**  
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ZIPS ON and OFF!



SALESMEN WANTED BIG PAY EVERY DAY

Have you seen the big values offered by DEDHAM KAYAKS? They can't be beat! They're strong-safe-rugged & economical. And they're so easy to build, too!

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Genuine beautiful ROCKDALE UP Monuments, Markers, Satisfaction EASY or Money Back. Free lettering. Free TERMS catalog. Freight paid. Compare our prices. Rockdale Monument Co. Dept. 378 Joliet, Ill.



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For catalog, samples, 48-page Trafford Portfolio, send 25c (returned on 1st \$1.00 order). Experimental Kit \$3.00 postpd. Trafford, Dept. 801, 360 Worthington St., Springfield, Mass.

**PUSH BUTTON CONTROLLED GAS TANK LOCK**



NO KEYS—Electrically operated from dashboard. One model fits all cars including fender door type. Greatest thing out! Sells on sight! Fully guaranteed. Distributors, dealers, here is your money-making opportunity. Write for free literature and NEW sales plan.

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**4000 OPPORTUNITIES**

Household goods, display card items, wearing apparel, cosmetics, foods, jewelry and toys are a few of the thousands of articles shown in this exciting catalog, for salesmen, agents and dealers.

260 PAGES

Check-full of interesting money makers. Sales ideas that may increase your earnings \$2 to \$15 a day and thrilling values, galore. Each and every item sold under a money-back guarantee. Get your copy by sending for it today!

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Say you saw it in  
**POPULAR MECHANICS**

SEE  
The Rings  
of Saturn  
—  
The Moons  
of Jupiter

ONLY  
**\$395**  
50 POWER  
REFLECTING TELESCOPE  
Amazingly Low Priced

Study the wonders of the heavens—the mountains of the Moon, the planets, comets, stars. Strange thrills! Hours of fun—with this big powerful reflecting telescope. **EACH MONEY FOR YOURSELF.** Charge 10¢ for a look at the moon. **NOT A KIT.** A splendid instrument, sturdily built in three inch, heavy metal tube with machine ground, hand finish reflecting lens—38 inches long finished in black crystallized enamel. Will last lifetime. Guaranteed that you see the Moons of Jupiter. Can be used to take telescopic pictures and as a spotting scope for target practice. Complete and ready for use. Nothing else to buy. **TEN DAYS FREE TRIAL.** Rush only \$1.00 now. Pay balance (\$2.95) plus postage when postman delivers. Keep ten days. If not more than delighted, return telescope and money will be refunded.

KUMFY PRODUCTS, INC., Dept. P-500  
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## CLAMPS

The biggest need in most home workshops is more good clamps—clamps for gluing, holding, drawing-up and for setting-up work. They are the extra hands for the 1-man shop. Don't spoil or delay work for want of clamps. From over 40 types of clamps we have selected these as the first for homecraft use.

ADJUSTABLE CLAMP CO.

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**PONY** Miniatures 9 types 1 1/2 to 2 1/2 inch cap. Not toys but fine tools with 100 uses.

Catalog FREE Ask your Dealer

**PONY "50"** Fittings go on ordinary 3/4" pipe. Any length. Send \$3.00 plus postage (6 lbs.) for fittings for two "50" Clamps. Also "Pony" No. 52 Fittings for 1/2" pipe—2 sets for \$2.00 plus postage.



**Jorgensen Hand Screws** Genuine "Jorgensen" Hand-screws grip at all angles, never slip, split or loosen. All sizes. Send \$3.20 plus postage (7 lbs.) for 2 No. 1. Hand-screws—open 6".



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Beautiful Gold Colored. New Styles. 5 Year Guarantee. Large Sizes—Penny Each. Tremendous Demand. Amazing Profits. Write for FREE Samples—Starting Outfit. Hurry! ATLAS Sign Works, 7941-A Halsted, Chicago.



5¢ Model Builders Catalogs

Buy these easily made "Cat" Harbors 22" Bobs \$1.40, Junior \$2.50, 80" Senior \$3.95. Other content and scale types. Send for big Atlantic Catalog \$2

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Cleveland Model & Supply Co., Inc.

4508A25 Lorgin Ave., Cleveland, O.

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**FITS IN YOUR OLD COAL OR WOOD STOVE. Cooking, Heating**  
Why shovel coal and ashes? Enjoy quick even heat, much or little, by turn of valve—better cooking, baking, heating. Latest improved 1940-41 model—different changes or better—guaranteed 30 DAY TRIAL. **QUICK HEAT at TURN of VALVE**

at **Amazing LOW PRICE**

Ordinary cheap oil into one of the quickest, hottest fires known—will not clog up—no cups or wicks. **WRITE QUICK for SAMPLE BURNER—FREE** Offer To Agents—a 1 cent postcard will do. Startling low price makes sales easy—be first in your locality—write today. **NORTHWEST MFG. CO., 290-C, Mitchell, S. Dak.**

## HOT WATER SPEED KING with



### From Any Electric Light Socket

MILLIONS of homes, stores and offices everywhere need **SPEED KING**—the new, amazing **Water Heater**—that heats water boiling hot so fast it takes your breath away. No mess! No waste of time or fuel! Just a simple "plug-in" at any 110-volt light socket—and presto... just the amount of hot water you need for the bath, for shaving, for dish-washing. **CHEAPER** because you don't have to heat gallons when you need only a few quarts. **FASTER** because the intense electric heat goes directly into the water. Sells fast on a 60-second demonstration. Small in size—fits the pocket, easy to carry. Anyone can afford it.

**60-SECOND Demonstration Amazes Housewives**

## SAMPLES for AGENTS

I WANT you to know the almost uncanny heating action of this speedy water-heating invention. Write quick for my **SAMPLE OFFER**—a post card will do. Get an actual **SAMPLE SPEED KING** for demonstration. You can make plenty of cash as my agent. **HURRY!** Big season starting now. **SPEED KING** solves the hot water problem when furnaces shut down. Act quick and I'll show you how to make the fastest money of your life. Send No Money! — Just your name.

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**NAME** \_\_\_\_\_  
WRITE your name and address in the margin, clip & mail this coupon or send penny postcard to Dept. 163.  
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**Address** \_\_\_\_\_  
**City** \_\_\_\_\_

**NU-WAY MFG. COMPANY**  
Dept. 163, Walnut Bldg., DES MOINES, IOWA

## HANDEE Tool of 1001 Uses

A whole shop full of tools in one. Does just about everything on metal, wood, alloys, plastics, horn, bone, glass, etc. Nothing like it for your own hobby enjoyment or as a gift. Uses 300 accessories to grind, drill, polish, rout, cut, carve, sand, saw, sharpen, engrave. AC or DC socket. Wt. 12 oz. 25,000 \$18.50 postpaid with 7 Accessories.



### HAMMER-SMITHING—Fascinating New Art

with the **Artisan**



This marvelous new hobby tool enables anyone without experience to make, for a few cents each, decorative pieces from aluminum, copper, brass, pewter or silver and give them a beautiful hand hammered finish that defies detection from expensive hand wrought articles. Plugs in any socket. Wt. 1 1/2 lbs. Speed 800 strokes a min. \$29.50 postpaid with Accessories.

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**SELF**  
**CONFIDENCE**

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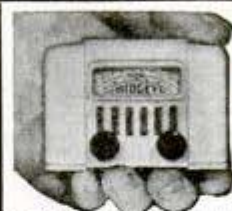
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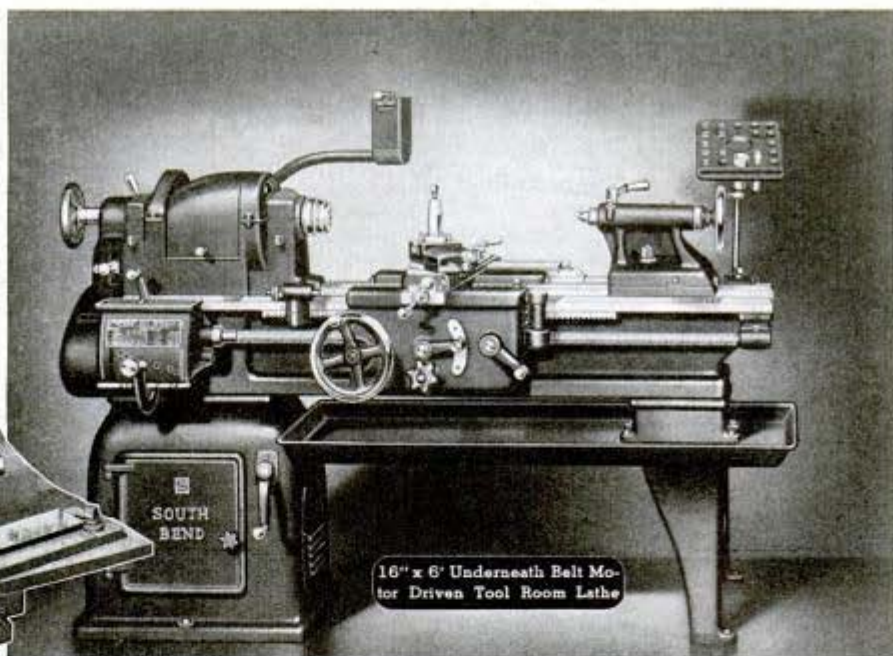
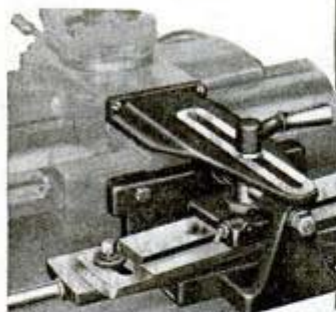
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