

WHERE TO GO THIS SUMMER

POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERST

REGD. TRADE MARK, GREAT BRITAIN, No. 410428

APRIL
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SEE PAGE 568



"A Black Panther Isn't
Half as Treacherous
as a *Blow-out!*"

says

FRANK (*Bring Em Back Alive*) BUCK



A TYPICAL BLOW-OUT ACCIDENT—DON'T LET IT HAPPEN TO YOU

HEAT CAUSES BLOW-OUTS—
THE LIFE-SAVER GOLDEN PLY
RESISTS HEAT—PREVENTS
THESE BLOW-OUTS



FREE! Handsome emblem with red crystal reflector to protect you if your tail light goes out. Go to your Goodrich dealer, join Silvertown Safety League, and receive one FREE. Or send 10¢ (to cover packing and mailing) to Dept. 453, The B. F. Goodrich Co., Akron, Ohio.



New kind of tire protects you from dangerous, high-speed blow-outs!

"I'd rather try to 'bring back alive' a roaring lion than bring myself safely through another blow-out accident," says FRANK BUCK. "When that tire blew out—when my car plunged off the road at those rocks—there was nothing I could do to avoid the crash. Now I'm playing safe by riding on Goodrich Silvertowns."

* * *

Don't drive around on dynamite. At today's high speeds, terrific heat is generated *inside* the tire. This heat causes rubber and fabric to separate. A blister forms. It grows bigger and bigger until suddenly BANG! Your tire blows out. *Anything might*

happen. But in Silvertowns the rubber and fabric don't separate. The Golden Ply invention resists internal heat. Blisters don't form. These high-speed blow-outs are prevented before they get started.

No Extra Cost!

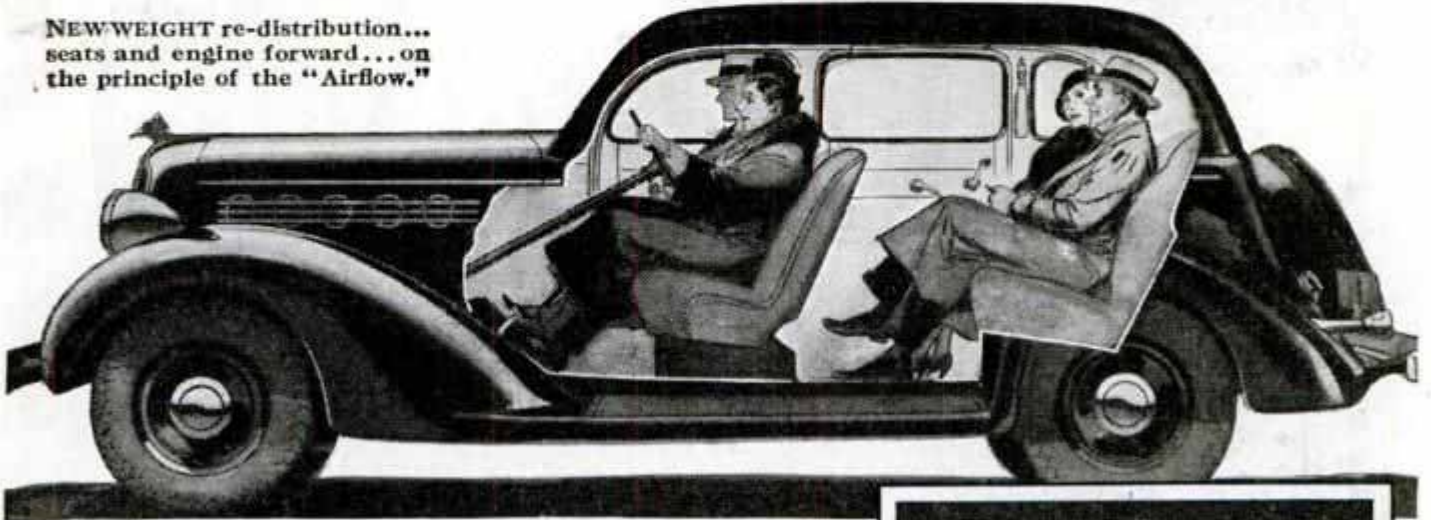
See the new Safety Silvertowns. Press your hand on the extra-thick, deep-grooved tread. Feel the big, husky Silvertown cleats grip. Then you'll know why they also give you maximum protection against dangerous "tail-spin" skids. Remember, Golden Ply Silvertowns cost not a penny more than other standard tires.

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The **NEW Goodrich Safety Silvertown** WITH LIFE-SAVER GOLDEN PLY

Straight Facts about PLYMOUTH'S Startling "FLOATING RIDE"

NEWWEIGHT re-distribution... seats and engine forward... on the principle of the "Airflow."



Showing How "Back Seat Bounce" and "Spring Gallop" were Outlawed by New Plymouth Engineering Principles

PLYMOUTH'S "FLOATING RIDE" is called the year's greatest advance in riding comfort. As one engineer put it—"I've never before driven a car like this. It 'glides' over bumps and ruts."

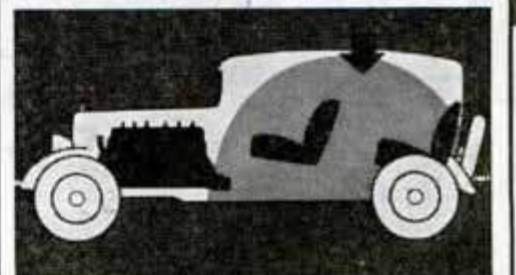
Like all outstanding engineering feats, Plymouth's "Floating Ride" started with a fundamental change in car design.

The ordinary method of placing car weight called for stiff springs in the front, where weight was less, and long, flexible springs in the rear, where weight was greater. This spring variation caused uneven, "gal-

loping" action on bumps.

Plymouth engineers began by re-distributing car weight on the principle of last year's famous "Airflow" cars. They moved engine and seats forward. Result? Back seat riders sit forward of the rear axle, away from bumps and "spring gallop." There's more leg-room.

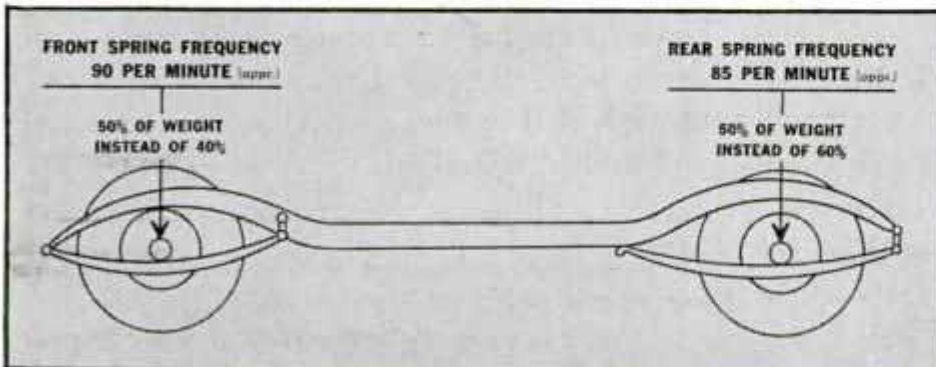
Then Plymouth engineers developed a new kind of stronger, "livelier" front spring, made of "Mola" Steel... which aids in reducing oscillation frequency to 90 per minute, compared to 135



ORDINARY CAR, showing engine position. Center of weight is in rear. Back seat riders sit directly over rear axle.

per minute in an ordinary car. They added a sway eliminator at the front to give new safety on curves.

Go in to see these history-making Plymouth features at any Dodge, De Soto or Chrysler dealer. Drive it—test its "Floating Ride." Convenient purchases by the Official Chrysler Motors Commercial Credit Plan.



PLYMOUTH'S Correct Weight Re-Distribution divides axle load equally, brings in new spring action, makes possible a stronger, better-riding car.

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FIFTY YEARS OF PROGRESS

In 1885, fifty years ago, the American Telephone and Telegraph Company was formed.

There were few telephones then and service was slow, uncertain and limited to separate communities. In that year the largest number of telephones in any one city was 8400, in New York.

New York now has 1,500,000, Chicago 800,000, Philadelphia 350,000.

From your own Bell telephone you may talk with any one of 17,000,000 other telephones in this country and most of those in foreign lands. Today, 93% of all the world's telephones are within reach of the Bell telephone in your home or office.

This year marks also the Twentieth Anniversary of the opening of the first

transcontinental line, from New York to San Francisco, and the Eighth Anniversary of the opening of transatlantic service.

The work of improving Bell telephone communication is never ended . . . it goes on and on toward a constantly higher standard of service. Further improvements as important as those of the past half-century will come through Bell System research, manufacturing and unified operation.

To make your telephone service dependable, 94 per cent of the Bell System's 80,000,000 miles of wire is now in storm-resisting, lead-covered cable. Sixty-five per cent of it is buried beneath the ground.



BELL TELEPHONE SYSTEM

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April, 1935

Vol. 63, No. 4

Special Features

Medicine Advances	481
Joys of the Open Road . Coloroto Section	
Search for a Perfect Oil	498
Hunting Lost Bonanzas	504
Newsreel of the Air	508
Adventures of the Power Explorers	516
Tackle Tips for the Fisherman	524
Fighting the Bug Smugglers	530
Secrets of the Big Leaguers	536
Stunts of the Movie Magicians	540
Dinner Table Tricks	546
Training a "Fighting Act"	552
Hazards of Creating New Colors	558
Flying Around the World	568
With the Master Bowlers	574

(Continued on next page)

Rough Riders of the Dirt Track

IF you seek the ultimate in thrills, get behind the wheel of a racer and try to keep up with the wild-eyed pack on a dirt track. The drivers do most of their steering with the foot throttle and their cars are in a skid nearly the whole distance. Piloting a dirt track racer is a hazardous and exhausting business and requires a special kind of driving skill. Winning such a contest is partly luck, partly skill and the rest is sheer nerve. Next month's Coloroto section of eight pages is devoted to the exciting adventures of the dirt track drivers and cameramen risked their lives to obtain some of the pictures which illustrate the story.

Next Month

WHEN your car balked, you used to take it to a dirty garage, surrender it to the tender mercies of a greasy man with a monkey wrench and a screw driver—and hope for the best. Today, automobile servicing has developed into an exact science. The modern service engineer, with his ingenious fact-finding and fault-correcting equipment, can give your car a thorough laboratory analysis. An article next month describes the newest servicing aids.

Going Up!

WITHOUT elevators our modern skyscrapers would be impossible and great cities could never have been built in restricted areas. In Manhattan 10,000,000 persons ride in elevators each twenty-four hours. Vertical transportation has advanced as rapidly as horizontal travel and the story of its development is a feature of the May issue.

Flying the Flyweights

MODEL plane builders who were pitching fragile toys powered with twisted rubber bands into the air a few years ago now are constructing miniature planes driven by tiny gasoline engines. These baby planes are setting records and present a fascinating new hobby. Read the article about them next month.

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finish is dull, first clean it with the new, improved Simoniz Kleener. You'll marvel how quickly it brings back all the lustre and beauty your car had when new.

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(Contents—Continued)

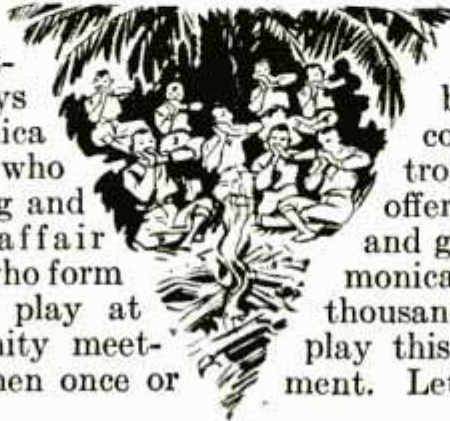
487
Best motor picture

- Accounting—heading tab for record book 529
- Airplane, Design
 - mudguards protect landing gears 523
 - office fitted for use of company executives 557
 - wind tunnel tests for full-size 567
- Amusement Devices—loop-the-loop, self-powered . . . 514
- Architecture—unusual lighting of latest town house . 576
- Arson—smoke fingerprints to trap firebugs 528
- Automobiles, Accessories—tire guards end danger from blowouts 549
- Automobile, Tire—heavy tread gives traction 544
- Automobile, Trailer—equipped as home of student . 543
- Automobiles, Truck
 - anti-aircraft equipment mounted on 522
 - signal amplifier makes passing safer 580
- Aviation
 - flying camera, aimed like machine gun 513
 - full-size planes tested in air tunnel 520
 - high-speed cameras study fuel combustion 521
 - message in snow aids search for plane 544
- Ball Bearings—steel, magnetic mop retrieves 527
- Bench—metal, lines up pipe and fittings for welding . 519
- Bicycle
 - horn and lamp unit works on one battery 503
 - speedometer shows mileage 557
 - touring America on a 534
- Boat
 - ambulance is fast and non-sinkable 533
 - "stretched" to increase size and speed 577
- Boats, Outboard—land crew flash signals to racers . 572
- Bonneville Dam
 - model aids study of the river 539
 - sixteen tires on tractor used at 497
- Bottle—screw cap tightened with hand tool 555
- Brick—one-man machine for making 523
- Cannon—use to fire power line over ravine 503
- Canvas—made fire-resistant 571
- Carbon-Monoxide—gas, an alarm for 545
- Cloth—electrically heated 503
- Dentistry—latest aids for treating dogs 572
- Dog—six-ounce puppy fed by medicine dropper 535
- Dog Racing—rubber turf gives better footing 566
- Dolls—artist develops business, making 497
- Earth—apparatus measures tilt of, as tides change . 535
- Electrical Apparatus
 - board shows plays of bridge game 556
 - cable connector lug requires no soldering 565
 - wiring connector used without soldering 545
- Electricity
 - "seas" far above earth 566
 - spinning disks seen as source of power 576
- Exposition—flowers decorate buildings 573
- Fishing, Ice—flag tripped when bait is snatched . . . 512
- Forestry—picture helps locate fires 515
- Furnace—coal, "fireman" for 522
- Furniture—lounge built like sleigh 576
- Gas Tanks—two-man carrier simplifies handling 551
- Golf—Dry Ice inside ball causes expansion 535
- Hammer—air-pressure, smooths car fenders 577
- Hotel—pirate castle changed into 529
- Household Devices 578, 579
- Lock—twenty centuries old still working 527
- Log—cannon from, resembles a "Big Bertha" 523
- Microscope—pocket, lighted with flashlight 512
- Model—navy carved in miniature 502
- Moth—electric exterminator destroys by gas 514
- Paint—long-handled brush 515
- Pencil—writes three colors 555
- Pendulum—swinging, shows rotation of earth 533
- Photo-Cell—detector locates hidden guns 507
- Police—accident squads, give first aid, take photos . 580
- Poultry
 - anti-picking guards for hens 549
 - metal nest identifies egg-layers 561
- Pulley—speeded up by moving motor 506
- Radio
 - hints for experimenters 585
 - taste and small by, in future 567

There's so many good times

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(Contents—Continued)

Radio, Apparatus
cars with masts for patrol work550
homemade wrenches for special uses586
portable a.c. voltmeter aids set checking586
portable five-meter transceivers581
semi-automatic key sends code faster.....501

Radio, Application—microphone detects engine noises573

Radio, Receiver
all-wave super built with standard parts584
farm set works on 32-volts d.c.582
short-wave set is self contained586

Railroad
cab on roof simplifies control506
mirror helps find flaws in cars561

Refrigerator—Dry-Ice control for any size566

Rubber—shim for use in garage or home551

Safe—split keys prevent thefts550

Saw, Circular—attached to truck differential519

Scale
coin-in-slot reveals heart beats and weight...528
handy, three-in-one weighs accurately543

Sculpture—photos copied with aid of dual vision...507

Sea Shell—artist turns hobby into money561

Sheet Metal—nibbling tool for home workshop....519

Shooting Range—in basement, extends underground.551

Tank Heater—gas converter, makes automatic....501

Target—dummy for treasury guards507

Telephone—cord of braided elastic will not tangle..566

Tool—tri-square with rectangular head556

Toys—train delivers farmers' mail557

Traffic—roadway with four decks for city traffic...545

Watch
accuracy tested on machine544
braille, for blind has raised dots512

Weather—compact indicator forecasts changes....571

Window—automatic catch locks at any height....539

AMATEUR MECHANICS

Baking Pans—false bottom, prevents cake from sticking618

Boats—nicked propeller causes outboard motor to race593

Book Ends—pair that telescopes609

Brace—attachment aids in drilling holes vertically..609

Camera—grafx, bulb-operated shutter release for.600

Canoe—sash cord buffer protects canvas covering..618

Cements—to repair metal objects602

Cleaning—a homemade spotting brush602

Clothesline—wire rings or loop hold prop.....599

Coaster—has auto steering wheel593

Crayons—wax, how to make613

Crowbar—made from steel pipe610

Disinfectant—efficient, and deodorizer615

Electricity—experiments with bell wire and iron...601

Feathers—cleaned with vacuum sweeper598

Ferns—house, cold tea fertilizes620

Filler—inexpensive for cracks596

Funnel—device for dropping liquids into mixtures..592

Furniture
built without nails595
kitchen soap case597
reading stand that straddles your chair614

Games—cardboard horses, race on strings.....602

Garden—tile over rhubarb, makes stalks long and tender594

Glass—column lines on newspaper aid in cutting...620

Hose—rubber, used as stop on keyhole saw594

Inner Tubes—used as arm guards when pruning...594

Jigsaw—guard protects fingers615

Lawnmower—space in garage to store592

Mirrors—colonial, how to make616

Models
insulated wire used as parts590
lettered with stencil592

Moles—old razor blades rid garden of594

(Continued to page 8A)

Promoted—when others were fired!

The Story of LaSalle Student Shaw



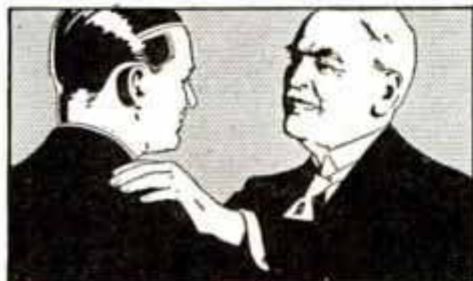
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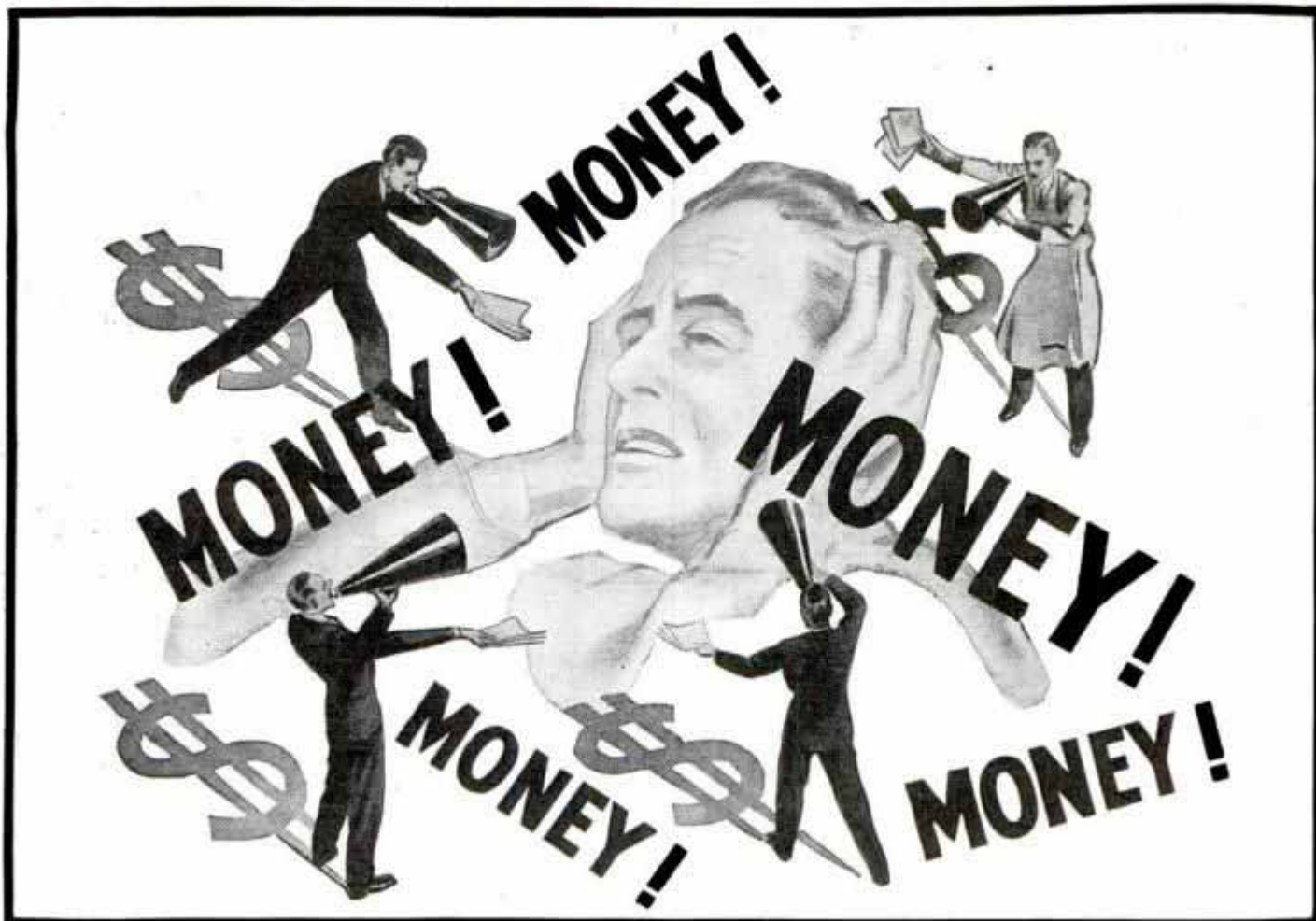
Age

(Contents—Continued)

Motion Picture—splicer and rewriter for film	615
Paint—spring handle holds small cans	610
Paper Clips—lengthen rubber bands for wrapping	596
Paste Boxes—tin strip that opens	614
Photography	
diffusing light of photoflood lamps	615
preventing splash when washing prints	618
Plaster—novelties cast in flexible molds	587
Poultry	
feed pans improvised from can lids	610
hobbles prevent scratching in flower beds	591
Seeds—tiny, sown with medicine dropper	592
Ship Models	
anchor cables from wire	618
sliding hatch covers improve	599
Skis—how to store, to prevent warping	600
Smokers' Accessories—ash tray clamped to reading lamp	591
Soap—for dry-cleaning solutions	610
Stovepipe—loose damper repaired with spring	610
Targets—rifle, old phonograph records, used as	600
Theatre—making stage sets for amateur plays	611
Tray—rubber, improvised, for acids	596
Vines—brackets hold on building	596
Vise—rubber balls cushion handle	596
Wax—how to obtain a fine finish	619
Wire—loop supports flowers	600
Wood Blocks—prevent dust gathering in stair corners	602
Yacht—"Vanja" model racing	603

SHOP NOTES

Automobiles—suggestions for repairing and care	637
Automobiles, Accessories—guard for lock buttons on car doors	639
Automobiles, Repairing	
carbon scraper from table fork	638
condenser prevents burning of contacts in headlight switch	639
exhaust-manifold gaskets, how to prevent blowing out	638
nuts to adjust bearings on connecting rods	638
rubber bands on cylinder head bolts protect hands	638
sand in carburetor causes trouble	639
set screw locks hinge pin on car door	639
sounding rod locates motor knocks	639
Automobiles, Trucks—tender for vegetable vendor	625
Bicycles—removable racks for	630
Blowtorch—lettering burned on crates with	629
Caliper—combination, for inspecting castings	630
Carpenter—sawdust pockets, as knee pads	624
Chalk Line—device levels	636
Clamp—holds two gluing jobs at one time	631
Drafting—tracing paper held with rubber cement	630
Eraser—blackboard, used as dry window cleaner	623
Files—homemade rotary, for carving wood	629
Fire Barrels—fitted with casters	626
Links—steel, attachment for grinding radii	630
Milling—template and dial indicator aid irregular	631
Milling Cutters—reground without annealing	627
Mimeograph—book covers used in making stencils	624
Models—maulstick, adjustable, aids in painting	635
Photography	
dry tissue better for fastening in folders	626
printing from wet negatives	636
wet negatives dried with rubber sponges	635
Plaster—mixed in rubber vacuum cup	625
Printing—cards dried with electric heater	640
Rivets—iron, heated without burning heads	636
Saws—hand, using your	621
Thermometer—recording, how to make	632
Tile—temporary sewer joined with inner tubes	626
Tool—for center-punching work	624
Trays—from tin cans for small parts	624
Vise—bench, utilizing as punch press	636
Wire—fence, cotter keys hold on steel posts	626
Workbench—renewing tops	629



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| <input type="checkbox"/> Wood Millworking | <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Sheet Metal Worker | <input type="checkbox"/> Coal Mining Engineer |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Steam Engineer <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Navigation <input type="checkbox"/> Air Conditioning |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Machinist <input type="checkbox"/> Toolmaker | <input type="checkbox"/> Steam Electric Engineer | <input type="checkbox"/> Boilermaker |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Patternmaker | <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Textile Overseer or Supt. |
| <input type="checkbox"/> Development and Protection of New Products | <input type="checkbox"/> Heat Treatment of Metals | <input type="checkbox"/> Refrigeration | <input type="checkbox"/> Cotton Manufacturing |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> Bridge Engineer | <input type="checkbox"/> R. R. Locomotives | <input type="checkbox"/> Woolen Manufacturing |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Bridge and Building Foreman | <input type="checkbox"/> R. R. Section Foreman | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Welding, Electric and Gas | <input type="checkbox"/> Gas Engines <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> R. R. Bridge and Building Foreman | <input type="checkbox"/> Poultry Farming <input type="checkbox"/> Radio |
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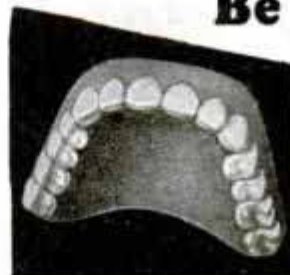
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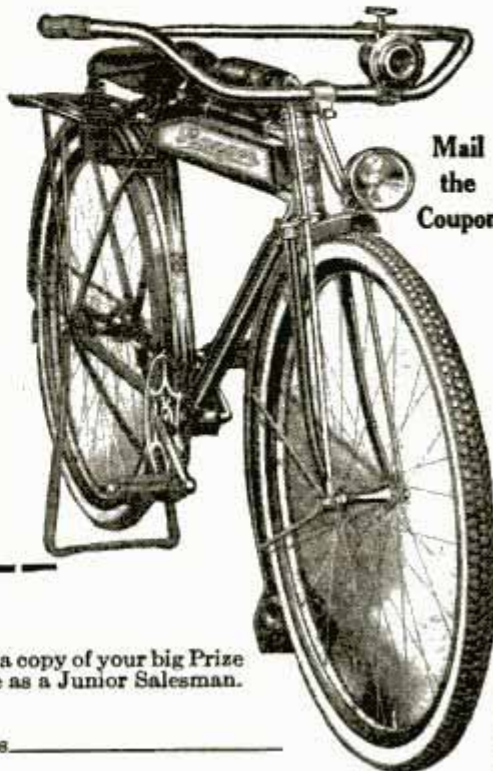
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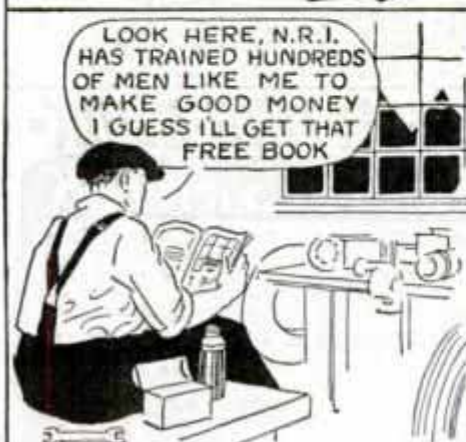
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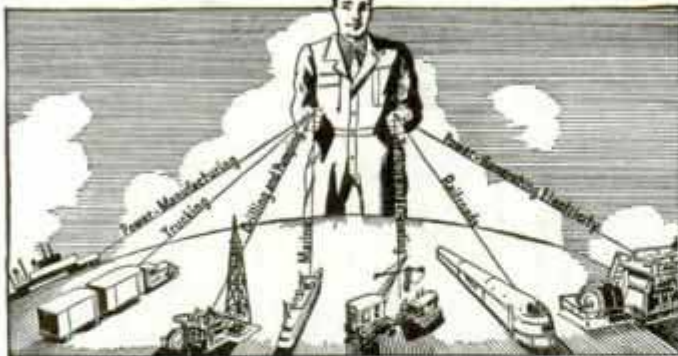
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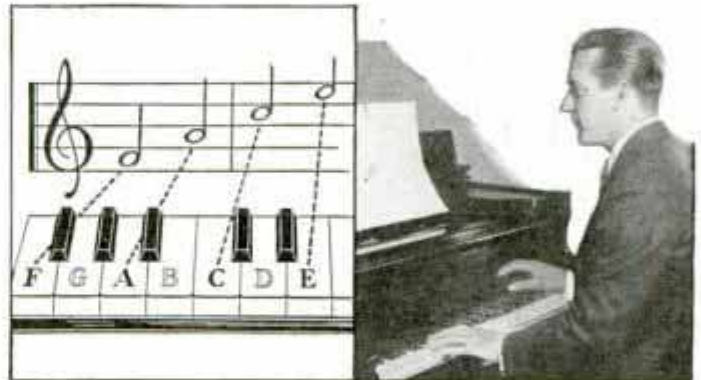
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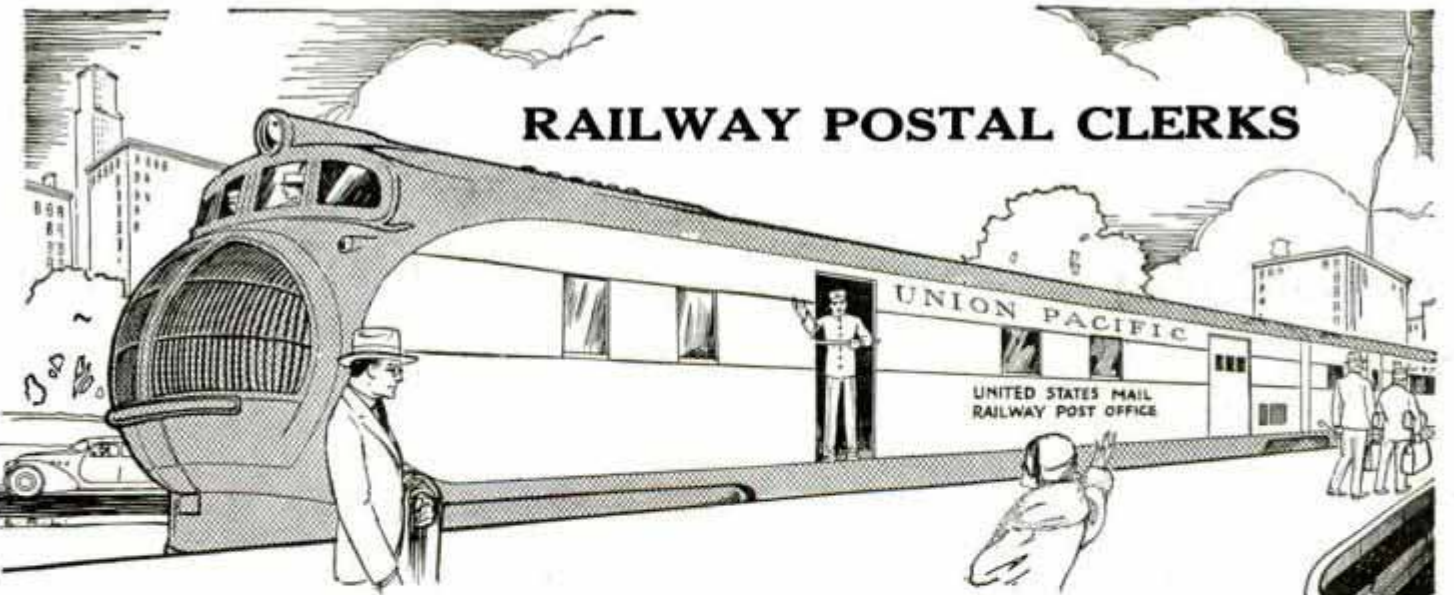
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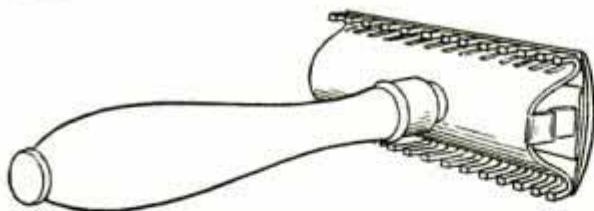
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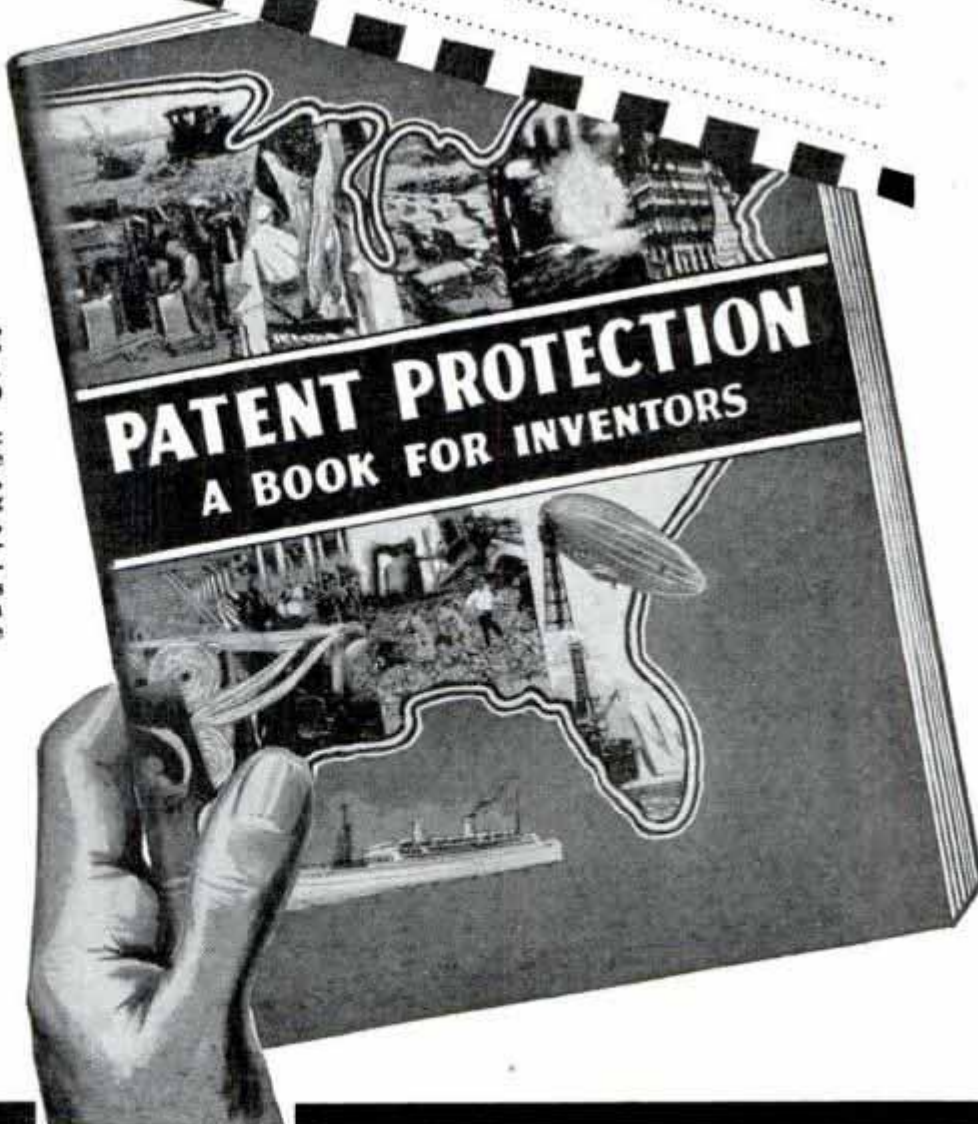
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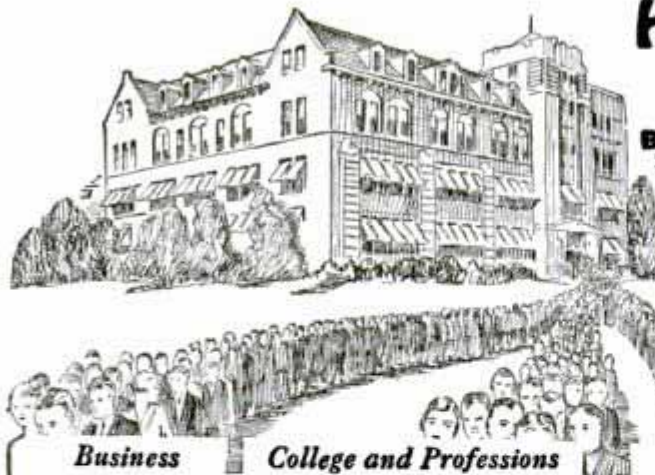
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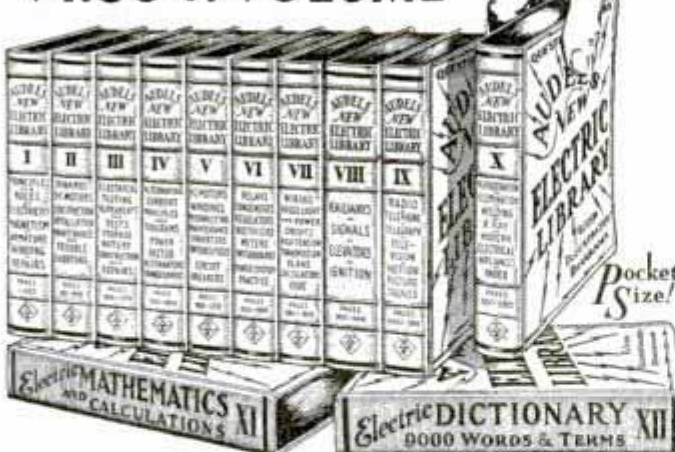
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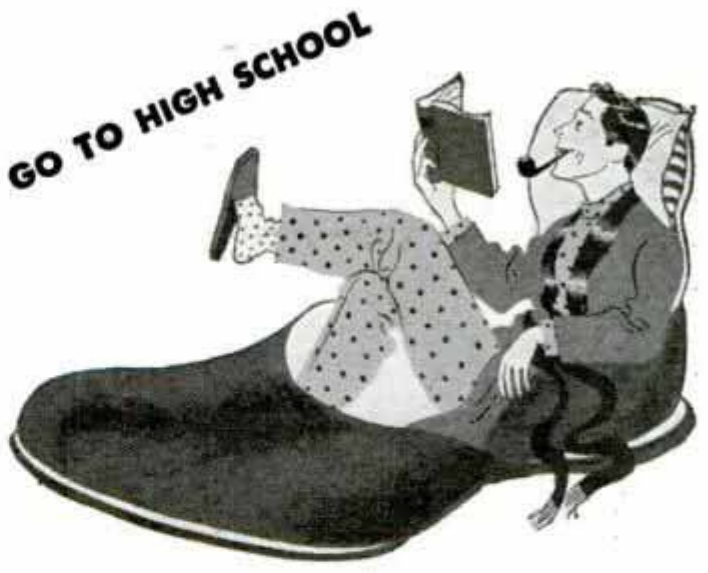
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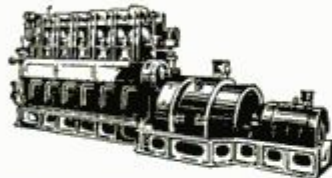
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WANTED—5,000 Men to buy slightly used college clothing. Business established since 1912. Free catalogue. Yale Clothing Company, Meriden, Conn.

LARGE, Steady profits. Make products yourself. Catalog free. Allied Research, 2217 N. Kilbourn, Chicago.

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

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

TWENTY New successful mailorder propositions. J. Home, 3949 Metropolitan, Chicago.

WIN Thousands cash! Send 25c. World Contests Magazine, 3 months. B949C, Seattle.

EARN Quick cash raising mushrooms in cellar, shed, attic. We buy crops. Guaranteed materials furnished. Easy, odorless method. Book free. United, 3848-BZ Lincoln Ave., Chicago.

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STAMP Brings clever money-making idea. "Exchange," 926 77th, West Allis, Wis.

STOP Working for others. Start profitable business at home. Key to Business Opportunities shows how free. Write. The Perry Company, 31 Bedford St., Boston, Mass.

VALUABLE Booklet describing hundreds of profitable mail order business free. Mail Order Service, S. Round Brook, N. J.

PRINT With Screenagraph. Reproduces oil paintings, designs, letters, sketches, in brilliant artists colors: on canvas, paper, wood, metal. New hobby, profession. Complete \$12.50. Beautiful sample 25c. Representatives wanted. McDaniel Co., 215 N. Fourth, Columbus, Ohio.

LEARN All about casting marble novelties in rubber molds. Cement secrets. Illustrated catalog and beautiful samples 3c. (So. Calif. business reserved.) John A. Payn, 945 Grande Vista Avenue, Los Angeles, Calif.

HOME Mailing stunts! Very fascinating and profitable. Further particulars 6c postage. National Services, Fairview, Birmingham, Ala.

FREE—Literature. Describing many money making plans. Shaw, 17 W. 125, New York.

COLLECT \$\$\$ Daily. Choice plan. Ten formulas. 50c coin. "Stonewall," 4749 - 36th, San Diego, Calif.

BARGAINS—Paint spray outfit, gasoline engine drive. Terms—trial. Helmick Paint Spray Exchange, M-455, Troy, Ohio.

24 LEGITIMATE "Home-office" profit-making plans, 25c. Free particulars. Educational-Service, 4932 Eighth, Philadelphia.

MONEY-MAKING And money-saving opportunities for you in our "Opportunity Envelope." Send 3c stamp for yours. Highlander Bros., Orange, Va.

RESILVER Mirrors. Plate auto fixtures, tableware. Portable outfits. Metalcraft, Arcade Bldg., St. Louis, Mo.

MONEY Making offers for dime. Free—Five double edged blades. Brandell, 817 1/2 Washington Ave., Des Moines, Iowa.

BETTER Business opportunities. Details, catalogue, 10c. "Nu-Era" Service, PA-140 Windemere, Detroit.

NEW Booklet—"The Trick of Touch Typewriting." Distributors wanted. Sample copy 10c. Island Press, 8236 Cornell Ave., Chicago.

CONCRETE Garden frogs. Metal mould makes hundreds quickly, 3x5 inches, \$1 prepaid. Bird bath mould \$15. Lamb grave marker. Owen Gardenware, 2500 Grinstead, Louisville, Ky.

MONEY In mail order business. 24-page book, 1935 edition, free. Midas Research League, Minneapolis, Minn.

DIME Brings big 60-page magazine spare-time money-making stunts, 3 months. Ward South, Fergus Falls, Minn.

START Mailorder business. Little capital. Guaranteed plan. 25c. Leewood, 1328 South 51st, Philadelphia.

BE Independent! Easy money-making plans 20c. Dowling, Dunellen, N. J.

FREE! Literature describing newest formulas, ideas, business plans. Barrett, 4241 Keystone, Chicago.

PROFIT With new products. Make, sell, repeat. Guaranteed formulas, special prices, leads. Biggest catalog free. Gibson, Chemist, BD-4702 No. Racine, Chicago.

SEVENTY-FIVE "Secret" opportunities, supply sources, free offers, etc., 25c. International Agency, P-4, Cincinnati.

START Your own business. Three money-making formulas with plan only 10c. Tuck, 6823 Arizona, Hammond, Ind.

STEADY Income from drained auto oil or discarded inner tubes. Instructions 25c. Charles, 12-AT, Norwood, Ohio.

BIG Money income illustrated booklet 3c. Morrow, 468 Sixth Avenue, Brooklyn, N. Y.

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

MANUFACTURE New, fast-selling novelties, toys, preparations, wood, metal and molded items. Free list patterns, processes. Manufacturer's, 3937A Tracy, Kansas City, Missouri.

"Earn Cash at Home." \$1.00 business plan. 100 cash customers names and valuable imprint circulars all for 25c. Southern Publishers, Box 1626-PM, Savannah, Ga.

LEARN Motion picture theatre business. Catalog free. Theatre Institute, 335 Washington, Elmira, N. Y.

EXCELLENT Income opportunity for serious minded men to own and operate a ready made business. Enormous increased demand for our electric burial protection service makes territory extensions advisable. Kindly outline business experience. Standard Alarm System, Inc., 75 Pearl St., Hartford, Conn.

GROW Mushrooms all year round—A steady income indoors, in cellar, shed or stable. Exclusive new process. Bigger, better, quicker crops—more money for you! Book free. American Mushroom Industries, Dent, 178, Toronto, Ont.

SENSATION. Home operated business. New. Nothing remotely like it. No competition. No selling. Customers come to you. Every man, woman and child needs your work. No experience needed. Complete business costs you only \$18. Can be earned back in week. Sample demonstration sent. 25c, coin only. Money back guarantee. Everdry, 10A West 26th Street, Minneapolis, Minn.

FIRMS That sell wholesale. Names, addresses, 10c. International Agency, P-4, Cincinnati.

SIGNS And showcards easily painted with letter patterns. Large variety of styles and sizes. Write for free samples. John Rahn, A-2120 Neva, Chicago.

STOP! Read! Act! Money for you! Profitable ways for establishing business at home. No canvassing. Write Hetzel, 802 Garden, Hartford, Conn.

I WANT To send you proof of the wonderful pulling power of Popular Mechanics Magazine's classified pages. What's your proposition? Write me today. F. W. Johnson, Manager, Classified Advertising, 209 E. Ontario St., Chicago, Ill.

PLASTEX Industries offers industrious men an opportunity to start a business of their own, manufacturing art goods, novelties, souvenirs, etc., in Plastex and marble imitation. 5c material makes \$1 articles. Rubber moulds furnished for speed production. Small investment brings big returns. You are just in time for the big 1935 business. Write for interesting booklet mailed free. Plastex Industries, Dept. A, 1085 Washington Ave., New York.

FREE Literature describing many money making plans. Belfort, 4042 N. Keefer, Chicago.

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

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

CHEMICAL Expert will furnish formulas and trade secrets. All lines. Lists free. W. L. Cummings, Ph. D., 223 Gordon Ave., Syracuse, N. Y.

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

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

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

"SCHEMER Magazine," Alliance, Ohio, prints schemes, ideas, business starters, formulas; winners—\$10,000 to \$50,000 reported. 37th year. \$1. Subscribe now. Six months special, only 30c.

OPEN A key-making shop. Start a permanent profitable business with a small sum. No skill necessary. Write for particulars. Beisser Mfg. Co., 411 E. Fort, Detroit, Michigan.

FREE Circulars describing how you can make big money in mail order business at home in spare time. Write today. Mail Order Institute, 609-H Marcy Avenue, Brooklyn, N. Y.

SURE Money, make 100 fine show cards per day better than artist can do them, no experience, just lay letters on card and use new invention of multi-color spray. Literature describing complete outfit with alphabet, sent free. Write today. New Spray Co., Box 226, Berkeley, Calif.

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

LIQUID Marble—Anyone can make! Colorful, glazed! Molded, brushed, sprayed. Rubberlike molds. Composition flooring. Big money making these! Particulars free. Marbleizing Service, Edwardsville, Ill.

SOAP Making, learn at home. No machinery needed. Write Pozoraa, Station F, Milwaukee, Wis.

LEARN Rubber composition mold making. No heat. No machinery. Inexpensive, durable. Great for novelty manufacturing. Imitation marble for casts, decorating, etc. All branches marbleizing and mold making taught. Dime brings mold and cast, rubber material for testing, assorted samples. Literature. Cowell Institute, Grayling, Mich.

OVER 100,000 Articles wholesale. Directory 10c. A-Wepeco, 3705 University, Des Moines, Iowa.

CHEMICAL Expert furnishes manufacturing formulas with complete working directions. Reliable individual service. Charges reasonable. Dr. Van Heeden, 4721 Lakepark, Chicago.

FORMULAS AND TRADE SECRETS

COLORING Of cement, old or new, chemically and permanently, five formulas \$2.00. Continental Cement Coloring Co., Box No. 1, Beverly Hills, Calif.

ANYTHING Analyzed. Practical formulas. Free list. Associated Chemists, Indianapolis, Ind.

FORMULAS, All kinds. Guaranteed. Catalog free. Kemico, 32, Parkridge, Ill.

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

20 METHODS, Cleaning fabrics, metals, wood. \$1. D. Scott, Box 477, Smiths Falls, Ont., Can.

20 PROVEN Formulas 25c, special formulas lowest prices, graduate chemist. Lexico, 835 Lexington, Cincinnati.

ANY Formula 25c or money refunded. Bradford Laboratories, Jackson, Tenn.

MAKE And sell krispy "Cheese Chips," "Golden Corn Chips." Thousands others. 25c each. Guaranteed. Stanley Surler, 11301 Jos Campau, Detroit, Mich.

TESTED Formulas 30c each. List free. Ogg Laboratories, Tampa, Florida.

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NEWEST Guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, RD-4702 No. Racine, Chicago.

AMERICA'S Leading formula list contains fast sellers, "hard to get" items. Unusual services rendered. Write today! Technical Service, 6805 Clark, Chicago.

WATERLESS Soap formula \$1.00, with ingredients for 1 gal. free. Missense Products, P. O. Box 372, Columbus, Ohio.

NEW Formulas, priced right. Lists. Chemist, 830 South 41 Street, Omaha, Nebr.

TWENTY Latest money-making formulas! 20c brings all! International Agency, P-4, Cincinnati.

FINEST Artificial honey, maple syrup, vanilla, lemon, purest ingredients. Filterless oil reclaiming, gallon 2c. \$1; three \$1.50. List stamp. Ralph Brooks, Arkansas, Wis.

HAIR Dye formula \$1.00. Wonderful Money back guarantee. Ernest Bennighofen, Anderson, Ind.

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

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

ANY Formula or process 25c. L. Buchman, 614 E. Jefferson, Syracuse, N. Y.

FORMULAS, Plans, Ideas. Literature free. Belfort, 4043 N. Keeler, Chicago.

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SEND For new big catalog. Chemical sets, microscope outfits, laboratory, biological and chemical supplies. Approved by experimental laboratories. Special 30 day offer now open. Send 10c now! Winn Co., Dept. 404, 124 West 23 St., New York.

CHEMISTRY Students' slide rule saves time, prevents failure. For details write MWC Company, 508 Andrus Bldg., Minneapolis, Minn.

POPULAR Chemistry. Nine back issues in color, \$1.00. Swedesboro, N. J.

FASCINATING Chemistry magazine contains loads of experiments, news, problems, queries, jokes. 5 cent stamp brings sample. Chicago Press, Dept. 203, 158 Carroll Ave., Chicago.

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

CHEMICAL Analysis. Industrial problems, and mineral assays. Estimates free. Lowell Bunting, Consultant Chemist, Royal Oak, Michigan.

MONEYMAKING OPPORTUNITIES

EARN Money sparetime making and selling novelty ash tray. Plan 25c coin. George's Shop, Watkins, Iowa.

THREE Books, mail order business—9c—refund. Dolson Herald, 30 Liberty St., Brooklyn, New York.

MONEY. Making new streamline lawn sets. Pattern and instructions, \$1.00. Earl Callender, Milburn, Ky.

BIG Money in renovating cement and marble surface, rusty surwails and tombstones like new. This field has amazing profit possibilities with no competition anywhere. F. E. Weidlich, Pierre, So. Dakota.

BIG Money electrifying spring clocks and building cases. Dime brings drawing and "How" book. Klocksters, Guttenberg, Iowa.

AMERICAN Homemaker Magazine. 3 months' trial, plans, offers, 25c. Mallmarts, P-4, Cincinnati.

BUY Old gold. Most profitable business of the hour. Complete instructions. Buying, testing, marketing easily learned. Furnished for \$1.00. Stamps accepted. Midwest Smelting Co., 139 N. State St., Chicago, Ill.

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

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

AGENTS WANTED

\$6.00 HOURLY. Amazing Karnu refinishes auto like new without rubbing, polishing, waxing or painting. Wipes on with cloth. Lasts 8 to 12 months. Free sample. Karnu, Dept. H-108, Cincinnati, Ohio.

DRUG And feed stores buy carded Kil-Rat. Small investment, big returns. Sample card 45c, refunded on first order. Farm Products, Flat River, Mo.

RUNPROOF'S Hose. Big demand. Protected territory. Dr. W. T. Abell, Alhambra, Calif.

MARRIED Man with spare time to distribute free samples coffee, flaxseed, food products and make customers. devote at least two hours daily and be satisfied with up to \$3 in an hour. Dept. Blair, Dent, 321-D, Lynchburg, Va.

MAKE Name plates and other glass signs. Instructions free with 25c sample. Progressive Sign Works, Station U, New York City.

ACTION Make big money quickly. Beautifully finished portrait of Father Chas. E. Coughlin, eleven by fourteen inches. Retail fifty cents. One dollar dozen. Sample ten cents. Eastern Sculptural Co., Slater Bldg., Worcester, Mass.

MEXICAN Feather pictures. Great profit. Send 25c (stamps) for \$1.00 worth sample and details. Mexican Art, Apartado 1593, Mexico City.

CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 18A.

CASH Income daily resilvering mirrors; replating metalware; making glass signs. Portable outfit. Sprinkle, Plater, 128, Marion, Ind.

AMAZING New cleaner, cleans everything, perfumes, disinfects, free sample. Brown Products, 2631 Barclay, Baltimore, Md.

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

\$2.00 HOURLY With new, scientific cream that mends all cloth easily, quickly, invisibly, without needle and thread. Stands laundering. Free sample. Sew-No-More Co., Dept. H-744, Cincinnati, O.

SOMETHING New in photo medallions and sterling silver photo rings. Big profits. Free catalog. Gibson Photo Jewelry Co., Inc., 835 McDonald Avenue, Brooklyn, N. Y.

500% PROFIT Making colored pencils for writing on store windows, show cases, etc. Various colors. Newest selling sensation. Repeat sales. Formula, complete instruction guide, 30c (coin). Colonial Products, Box 77, St. Catharines, Ontario, Canada.

THE Whirlwind seller—The Arrow. Sample 5c. G. M. Company, Washingtonville, O.

BE An independent local merchant. Make up to \$45 to \$60 a week supplying steady customers with groceries. I start you on no-risk trial. No capital or experience needed. Details sent free. Albert Mills, 8961 Monmouth, Cincinnati, Ohio.

MAKE Extra money! Write for our special offer and catalog of household deals, cosmetics, extracts, etc. Make big money selling your friends and neighbors. Clyde Collins Chemical Co., Dept. 15C-1, Memphis, Tenn.

450% PROFIT Magic gas lighter. No flint or flame. Lights gas instantly. Retail 25c. Costs you \$1.00 a dozen or 15 dozen for \$9.00. Sample 10c. New Method Co., Desk PMG-27, Bradford, Pa.

SELL Powdered spinach for acid conditions, weak stomach, constipation, poor blood. Sample 10c. 100% profit. Dr. McFerrin, Orlando, Fla.

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

BIG Money installing kitchen range oil burners. Bennett Company, Islip, N. Y.

AGENTS Look at these prices. 8 oz. Int. vanilla \$1.10 doz. 60 razor blades 40c. Box 12 aspirin tablets 30c doz. Boxes. Fix All liquid cement 75c doz. Ice box odor absorber 12c each. Bowl deodorizers 50c doz. Over 180 other products. Write, Drexall, 715 Kent Ave., Brooklyn, N. Y.

SELL Electric light bulbs, 1,000-hour guarantee. Send for new 1935 price list. Big profit. Southern Lamp Co., 1017 Seventh St., Washington, D. C.

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

100% PROFIT In the mystery cigar lighter. No flint or friction. What makes it light? No wind can blow it out. Retail 25c. Sample and sales plan 25c. New Method Company, Desk PM-27, New Method Bldg., Bradford, Pa.

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

AGENTS. Amazing profits selling door controls. Sample \$1.10. Thoroughly perfected. Marvelous invention. Larson Co., 335 S. Cedar, Inglewood, Calif.

DISTRIBUTORS. Amazing 2 for 1 plan sells moth pads like wildfire. Five new moth products. Bottom prices. Patterson H-Co., 3705 University, Des Moines, Iowa.

RELIABLE Person wanted each town for your own outdoor advertising business; experience unnecessary; no selling; good pay. Dawson Service, Cane Glardeau, Mo.

STROPS All types razor blades. Many other needs for them. Easy to sell. Sample 20c. Hand-E Handle Co., Wheeling, W. Va.

RAINCOATS. Zipper jackets, \$2.95. Lowest prices. Union made. Selling fast. Commissions advanced. Experience unnecessary. Outfit free! Royal, AB-724 Roosevelt, Chicago.

30-4"x14" SIGNS For \$1.00 postpaid. Samples 25c. Zim Sign Co., 322 S. Broadway, Los Angeles, Calif.

OPPORTUNITIES Galore—400 money making plans, ideas, etc. Write A. Wolfe, 2085 Valentine, New York City.

SELL Napco's noncompetitive cleaning products homes, stores, garages, institutions. Landau, 1124 22nd N. W., Washington, D. C.

SELL Tinted cards and glass signs. Circular free. Special-Kut Letter Co., Sidney, Ohio.

QUALITY Flavors, attractive 4-bottle deal; two 4-oz., two 8-oz. Costs you 31½¢, district manager's price. Sensational \$1 seller. Favorite, 2100 Kennedy Northeast, Minneapolis, Minn.

SEND Hose size for samples and opportunity for \$20 week job. Show sensational "Anti-Snag" guaranteed hosiery to friends. Dignified, pleasant work. Everything supplied. Wilknit Hosiery, Desk D-37, Greenfield, Ohio.

DISTRIBUTORS: A few quick easy sales daily nets you \$58.00 weekly. Represent manufacturer—Latex, amazing self sealing bandage that breathes. Wonderful demonstrator. Irresistible appeal. Exclusive territory. Neway, 24-H So. Clinton, Chicago.

MAKE Big money; commissions advanced; sell raincoats, zipper jackets; union made; latest style; quality; lowest prices; experience unnecessary; outfit free. Goodyear, LZ-712 Roosevelt, Chicago.

\$45 WEEKLY Selling Firefuse firealarms. Details free. Goldenrule, Kalamazoo, Mich.

MAKE Your own products! Get proven formula list. We furnish raw materials also technical service. Chemical Bureau, 6801 Clark, Chicago.

PROFIT With new products. Make, sell, repeat. Guaranteed formulas, special prices, leads. Biggest catalog free. Gibson, Chemist, RD-4702 No. Racine, Chicago.

STEADY Employment for women demonstrating "Smooth Tex" guaranteed hosiery. About \$21 weekly. No experience or capital. Complete equipment with sample hose supplied. Send size. Betterknit Hosiery, Outfit D-237, Columbus, Ohio.

GET Our offer for a real surprise. Earn \$5.00 daily in your spare time. Full time workers make much more. Mail postal for details. No obligation. A. Kennedy Co., Kokomo, Ind.

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

FIRST Aid for mechanic's cuts, wounds. Stops pain, kills bacteria, quick healing. You sell it to friends and industrial plants. Make big profits. Send 20c in postage for trial bottle. Link Chemical Co., Emporia, Kansas.

MEN'S Neckwear exclusive \$1.75 dozen. Information free. Capitol Neckwear, Norwich, Conn.

CLEAN Up this season selling new style sparkling, tinted signs. Easter, Mother's Day, Father's Day, graduation, President Roosevelt. Cost 4c; retail 25c. Sample free! Lowy, Dept. PA, 8 West Broadway, New York.

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

MAKE More money taking orders. Shirts, ties, underwear, dresses, hosiery, raincoats, coveralls, pants, uniforms. Outfit free! Nimrod Company, Department 8, 4922-28 Lincoln Avenue, Chicago.

HOTTEST Money-maker. Quality electric water heater. Retail \$1.95, wholesale 65c. agent's sample \$1. "Realproducts," 8608 Phillips, Chicago.

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

DOUBLE-EYED Self-threading needle packages, size 3/9. Blind people thread them. Invaluable for failing sight, necessary for good sight. Sample, particulars 10c. Agents wanted. Wm. Oglesby, Vandalia, Ill.

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

MAKE Products yourself. Formula catalog free. Kemico, 45, Parkridge, Ill.

AGENTS: Smash go prices. Santos coffee 12c lb. 4-oz. vanilla 8½c. \$1.00 size tonic 14c. Razor blades 10 for 8½c. 100 sticks chewing gum 12c. 150 other bargains. Experience unnecessary. Write Carnation Co., P.O. St. Louis, Mo.

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

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

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

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

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

"HOW To Secure Agents," a specially prepared booklet, tells of one of the most inexpensive methods in which to secure good live producing agents. It is free; write for your copy today! F. W. Johnson, Mgr., Classified Advertising, Popular Mechanics Magazine, 260 E. Ontario St., Chicago, Ill.

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

PORTRAIT Agents throughout the world. Lowest prices, portraits, frames. Catalog free. Picture Man Friedman, 528 Cornelia, Dept. 9, Chicago, Ill.

A BUSINESS Of your own—Making sparkling glass door plates, desk plates, numbers, signs, checkerboards, mirrors. Illustrated book free. Palmer Signs, 512, Wooster, O.

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

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

COSTS 1c—Sells 25c. Make non-explosive cleaner from Benzoyne Crystals. 1c gallon. Western Reserve Laboratories, 6615 Denison Ave., Cleveland, Ohio.

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

OVER 100,000 Articles wholesale. Large illustrated wholesale catalogs. Directory 10c. B-Wesco, 3795 University, Des Moines, Iowa.

PENNY Each. Popular sizes. Guaranteed. Window sign letters. Free samples. Atlas Sign Works, 7941 Halsted, Chicago.

REGULAR Income; home, office, no canvassing. McArthur Co., Desk 5, Butte, Mont.

HIGH-GRADE SALESMEN

FOR Dependable men—Steady sales position with fifty-year-old concern. Good line calendars, advertising specialties. Exclusive territory, good commissions. Merchants Publishing Company, Kalamazoo, Mich.

IF Figures talk with you, read these:—Jeschke sells \$36 1st 2 days; Dees \$75 1st 3½ days; Cullison \$111 1st 5 days. Established Raleigh dealers sell up to \$373 a week; best dealer averages \$320 week after week. They make these large sales because of Raleigh quality and methods. If you want to make more money, it will pay you to write Raleigh's, Box D-3-PPM, Freeport, Ill.

SALESMEN And distributors to sell battery accessory to garages, battery stations and automobile accessory stores. New item going over big. Non-Corrosive Washer Company, Rockford, Ill.

SELL Quaker's super-styled quality shirts. Big cash commissions; cash bonuses. Low prices. Ties, hose, underwear too. Complete new spring line ready. Samples free. Write Dept. P3, Quaker, Colonial Bldg., Broadway at 31st, New York.

SHOE Manufacturer's sales division wants men. Complete line includes more than 200 work, dress and sport shoes for entire family. Also special bargains at \$1.98 and \$2.98. Guaranteed quality. Good pay every day and your own shoes at wholesale prices. No experience needed. Complete outfit free. Write Consolidated Shoe System, Dept. D9, Chipewawa Falls, Wis.

MAGNETIC Cleaner—Entirely new. More effective than a vacuum cleaner. Sells for \$1.75. Make from \$5.00 to \$12.00 a day. F. S. Beveridge, Pres., Stanley Home Products, Inc., Box 453-A, Westfield, Mass.

SALESMEN: Acquainted with garages, filling stations, to handle local business. Write Colgra, 2630 N. Third St., Milwaukee, Wisconsin.

MAN—Handle regular store route. Place nationally advertised 5c-10c counter card mdse. New aspirin deal—6 tablets 5c. 85 other fast sellers. 100% profit. No investment. Samples free. World's Products Co., Dept. 4810, Spencer, Ind.

MAKE Big money steady. High grade coveralls, shopcoats, pants, shirts, summer suits. Advertising on back. Fast sellers. Free outfit. Strong Mfg. Co., 901 West Jackson, Dept. N-3, Chicago.

SELL Sanforized summer suits. No competition. Free outfit. Suit furnished. Bonus. Popular styles \$4.95 and \$2.00 commission and up. Service, E-1615 N. Damen, Chicago.

NEW Amazing portable theft-proof lock for drawers, doors (nothing like it), demonstrates instantly. Unlimited sales possibilities. Compact, attractive, genuine leather case permits carrying in vest pocket. Salesman's unusual opportunity for big money. Write now. Wonder Lock Sales, 53 West Jackson, Chicago.

100% PROFIT Big seller. New type Emerson electric water heater. Jiffy Electric Company, Hazel Park, Mich.

SALESMEN: Sell complete line gummed labels, calendars, memo books, and business stationery. Special features. Free deals. Write quick. Big comm. daily. Attractive sales portfolio free. Lionel, Dept. BC, 312 South Hamilton, Chicago.

SELL Process embossed printing \$3.95 thousand, with free cut service. Worth \$6.00. Nothing like it! Commission \$1.00, advanced. Experience unnecessary. Outfit free. United Engravers, F-6155 South State, Chicago.

NEW Sensational invention sells to men everywhere. No competition. Enormous profits. Rotofex Co., Room 511, 327 S. LaSalle, Chicago.

BIG Money in tire patches. Sell new auto tire patch to service stations, garages, etc. Tiger-Grip patches guaranteed 10,000 miles. \$75 weekly for salesmen or distributors. Protected territory. Write Economy Rubber Co., 743 Burkhardt, Dayton, Ohio.

YEAR'S Income in 3 months! New federal, state and code laws create immense demand for simplified record system every businessman must have to protect himself against fines and penalties. Millions users must buy again now. Our men selling 5 to 25 daily our officially approved, copyrighted Liberty Tax Record. \$3.50 cash profit every sale. Repeat commissions without callbacks. Live leads furnished. Big season now. Choice territories going fast. Commonwealth Publishing Company, 508 So. Dearborn, Chicago.

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2000 BUSINESS Cards \$1.50. Charles Specialty Co., 12-AS, Norwood, Ohio.

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NEW Type 29c font. Catalogue dime. National Type Company, Jackson, Mich.

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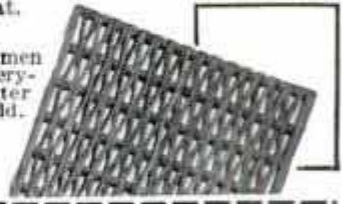
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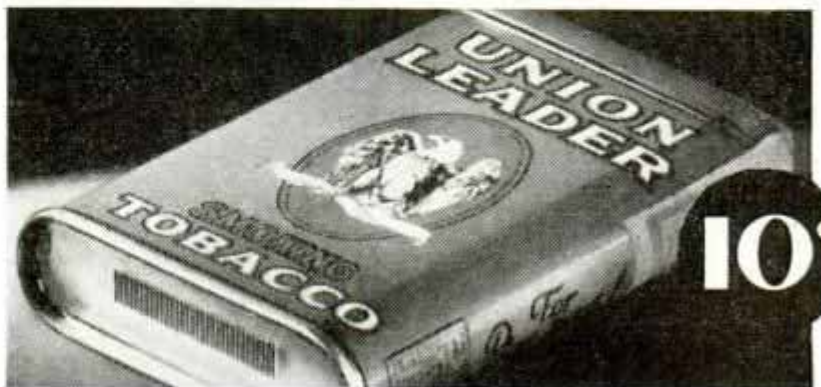
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Vol. 63

APRIL, 1935

No. 4

The LENGTHENING SPAN of LIFE

By Morris Fishbein, M. D.

Editor, Journal American
Medical Association

GLANDS have been the center of medical interest, particularly during the last ten years.

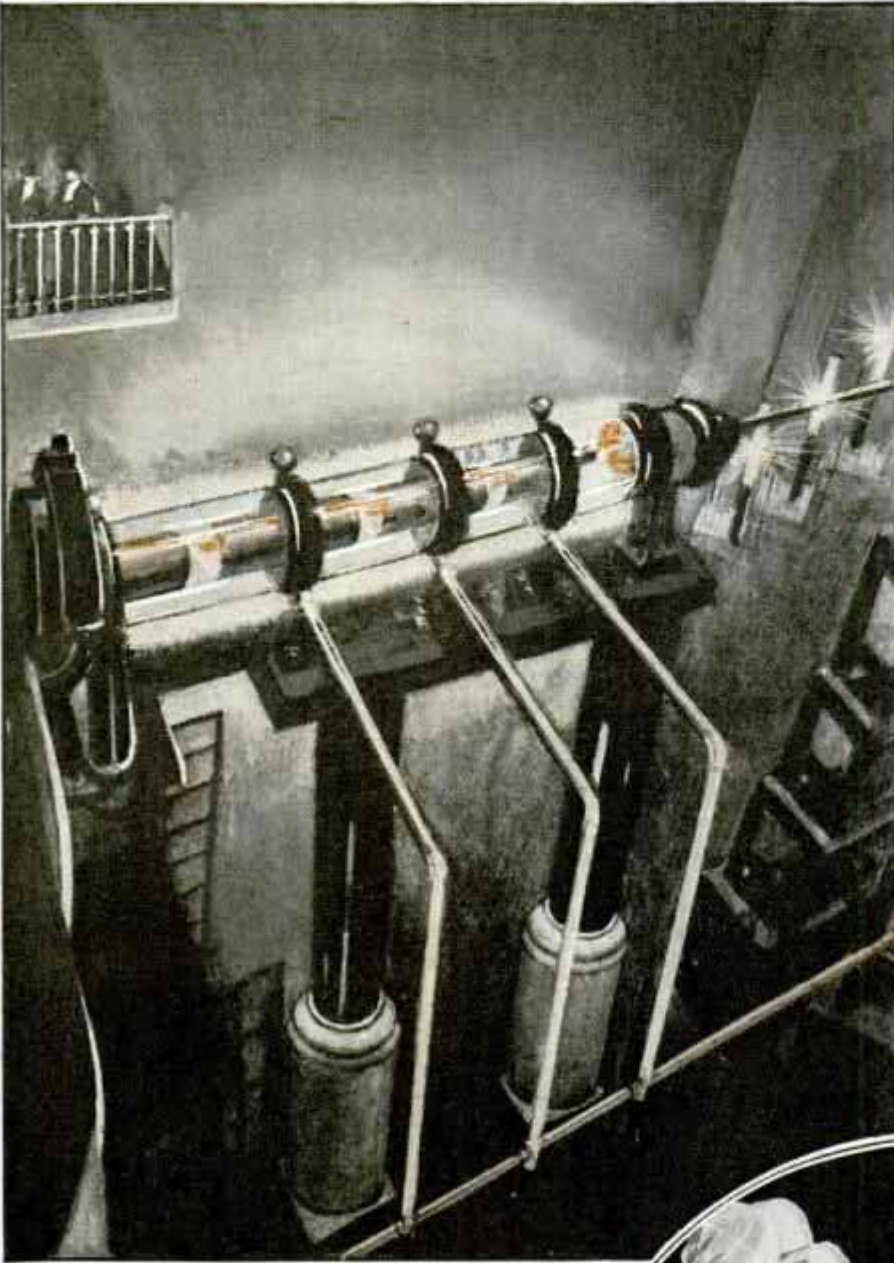
It has been established that they are an interlocking chain, and that the action of one may influence others. A remarkable piece of work has been the isolation from the cortex of the adrenal gland of another glandular principle, called cortin. By its use cases of Addison's disease, or bronze diabetes, are now saved when formerly death was inevitable.



Above, Patient Reclining on Motor-Controlled Tilting X-Ray Couch with Shock-Proof Tubes; Below, Apparatus Using Short Radio Waves to Produce a Bodily Fever

But probably the most significant of all recent work on glands has been the establishment of the fact that the liver and the wall of the stomach contain a substance vital to the building of red blood cells. The use of this substance permits a return to health of people with pernicious anemia, a condition formerly fatal.

The most important single observation of last year was the determination that the body develops not only hormones but also anti-hormones. In other words, as excess amounts of various glandular principles are poured into the body, the organs and tissues responsible for counteracting



Once upon a time we thought of food simply as fuel to make the body go. Today we know it provides also the vitamins necessary for growth and the prevention of disease. More than anything else, these researches have shown the importance of mineral substances for the health.

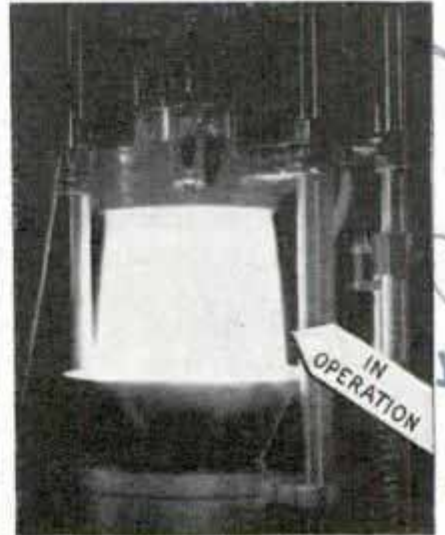
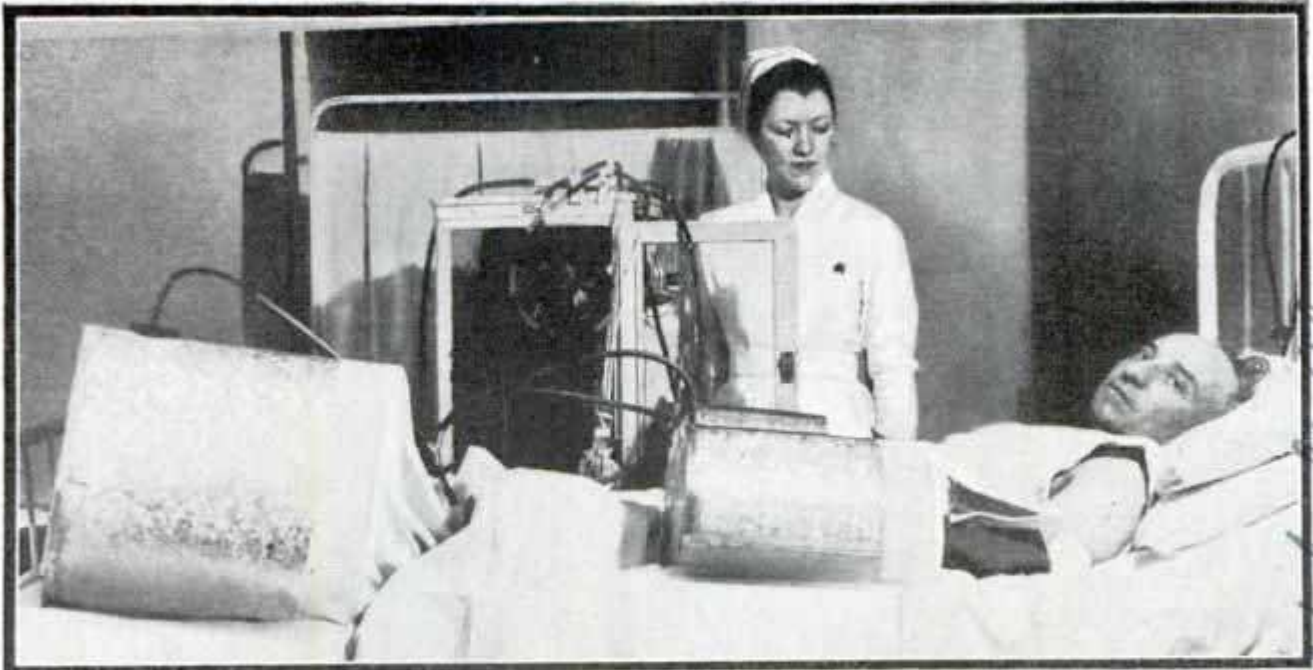
The vitamins now include A, B, C, D, and E. Vitamin A has been shown to be necessary for the maintenance of healthful tissue and for the general resistance. Its absence results in the appearance of a disease of the eyes called xerophthalmia. A relative deficiency of this vitamin results in a breaking down of the mucous membranes, particularly in the breathing tract, and this deficiency is therefore associated to some extent with the common cold and various

these effects produce anti-substances which limit the action of the hormones and keep the body constantly balanced. These observations emphasize the basic principle that the human body is essentially a self-regulating mechanism, and that under normal conditions it is impossible to get too acid, too fat, or too thin, too big, or too small. However, under abnormal conditions, such as result from disease or deficiency, or from destruction of any vital portion, the balance is broken and strange conditions result.

Next most significant after the discoveries related to glands have been the advances in our knowledge of nutrition.



An 800,000-Volt X-Ray Tube in Chicago Hospital, and Demonstrating Radio Surgical Knife on Piece of Beefsteak



Above, Apparatus Used to Revive Frozen Limbs by Alternating a Vacuum and Normal Pressure; Below, Irradiating Milk; Note Gas-Tight Film of Water between Carbon Arc and Milk

427 Randolph St. Chicago

respiratory disorders. Its deficiency is also associated with the development of certain skin diseases.

Vitamin B, when absent, results in the appearance of pellagra, for one portion, and of beriberi, for the other. It has also been found associated with disturbances of the gastro-intestinal tract and with loss of appetite.

When vitamin C is absent, scurvy develops. The absence of vitamin D results in rickets.

Among the most significant of discoveries in recent years has been the isolation in pure form of these vitamins. Thus, the isolation of vitamin C was first announced in 1934 as was the development in pure form of vitamin A, known as carotene, after it had been shown that the

yellow coloring material in carrots was among the richest substance known in this vitamin. At the same time, it was established that the halibut liver is the richest of all fish livers in vitamin A. Thus halibut-liver oil, added to cod-liver oil, produces the richest natural preparation of vitamins A and D. Cod-liver oil is the richest natural substance in vitamin D. Also it was shown that the ultra-violet rays of the sun, acting on the human skin, produce vitamin D in the human body out of a substance existing in the skin. Thus the use of the ultra-violet rays came into prominence and artificial sources of sunlight were developed.

Continuing these investigations, it was found that various food substances can be exposed to ultra-violet rays so as to cause

Machinery, Chevy-Burrell Corp.

600

them to contain vitamin D. Eventually it became possible to produce vitamin D in milk and bread. Because rickets is primarily a disease affecting infants and children, vitamin D in milk is considered to be one of the best ways of giving the children the vitamin that they need.

Rickets did not appear among human beings to any extent until window glass came into vogue. Ordinary window glass shuts out ultra-violet rays. The incandescent lamp provides no violet rays. If, however, a new type of lamp is used, it becomes possible to light the home or school and to provide enough ultra-violet rays to have a beneficial effect on rickets.

Rickets, it should be remembered, is a disease in which the long bones do not develop properly and in which there are deficiencies of other bones and teeth. Vitamin D controls the use of calcium and phosphorus in the human body and is in this way related to many convulsive disorders, as well as to rickets.

Since Pasteur established the germ causation of disease around 1890, the causes of many infectious diseases have been determined, modes of transmission established, and these diseases have thus been eliminated. Yellow fever, plague, cholera and smallpox are seldom seen in any civilized community. Typhoid fever is so rare as to be a medical curiosity. Diphtheria and scarlet fever are being brought under control. Yet even today the exact cause of measles, infantile paralysis, epidemic encephalitis or American sleeping sickness, mumps and chicken pox are not definitely known. However, investigations during recent years have greatly advanced our ability to control these diseases.

New studies of the germ of tuberculosis have developed new ways of attacking this disease. Particular attention has been given to inoculations of children with living

(Continued to page 134A)

ICE CUBES EJECTED FROM TRAY BY HANDY LEVER

Among the features of the latest Westinghouse electric refrigerator is a tray that ejects its ice cubes. A lever raises the cube separators above the tray so that the cubes can be removed easily. Another feature is a handy-jack ice-tray release that



Showing Easy Removal of Ice Cubes

makes it easy to remove trays that have become frozen in the chilling compartment.

WINDSHIELD IS CLEARED OF ICE BY SALT HOLDER ON WIPER

Ice can be kept off the windshield by a defroster consisting of a wiper to which is attached a receptacle containing salt. Rain dissolves some of this salt and carries it along the wiper blade to the windshield, lowering the freezing temperature. Frosting occurs when the temperature is just below freezing and rain is falling. Under such conditions the salt clears the glass.



Cone of Salt on Wiper Keeps Windshield Clear

69

Westinghouse
the sure

11-1-35

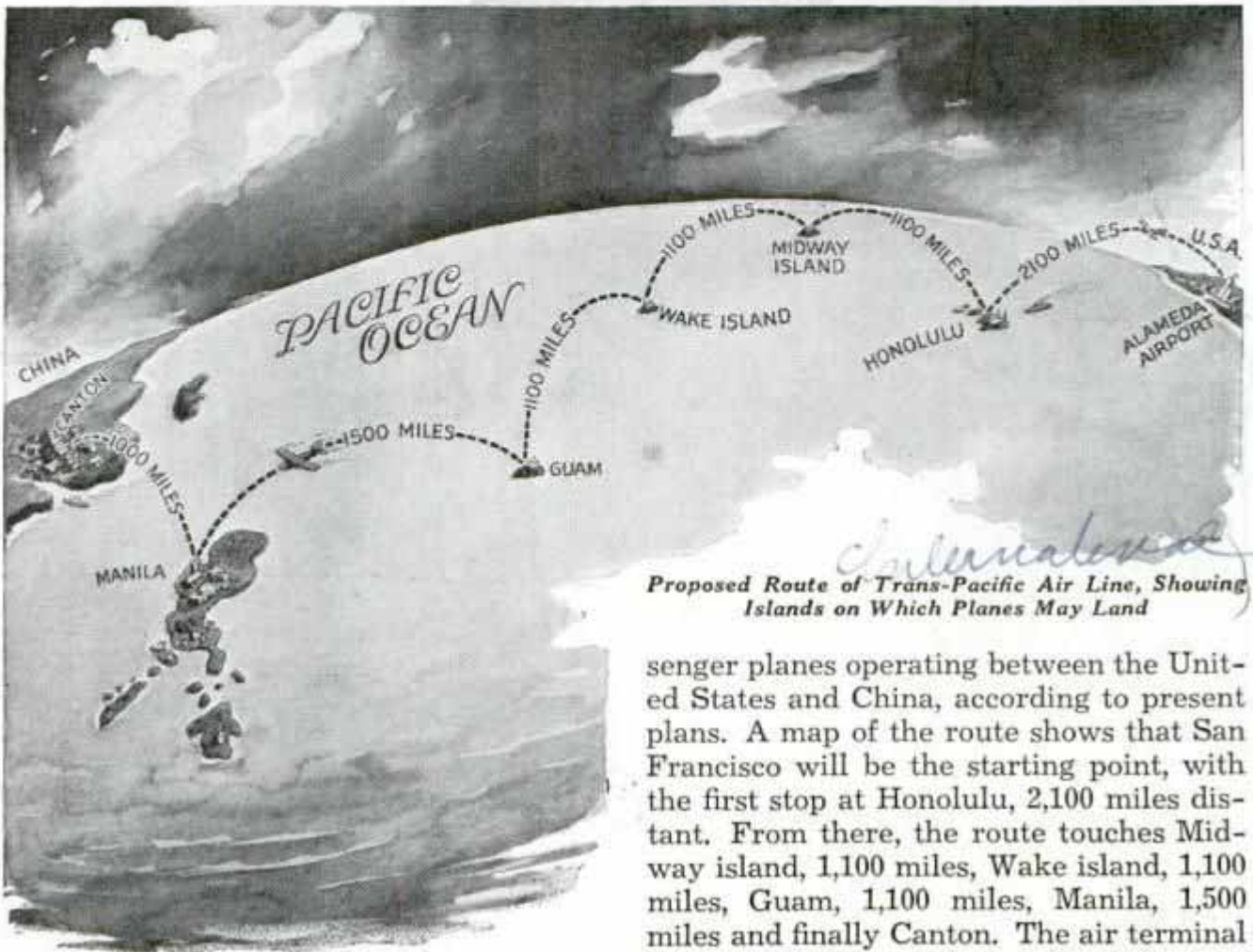
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Electric Mfg. Co. Pa.

second wiper

Applied Arts Corp.
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Trans-Pacific Air Liners to Touch at Islands



Proposed Route of Trans-Pacific Air Line, Showing Islands on Which Planes May Land

senger planes operating between the United States and China, according to present plans. A map of the route shows that San Francisco will be the starting point, with the first stop at Honolulu, 2,100 miles distant. From there, the route touches Midway island, 1,100 miles, Wake island, 1,100 miles, Guam, 1,100 miles, Manila, 1,500 miles and finally Canton. The air terminal on the American side will be Alameda, Calif. The navy department has been asked to build landing facilities on Wake island.

Several islands will be used as landing fields for the Pan-American Airways' pas-

Jack for Streamline Car Can Be Operated While Standing

Overhanging fenders of streamline cars and the independent wheel suspension on some of the modern automobiles often make jacking up a car a difficult task. As a result a jack has been developed which can be used on any car but which is suited particularly to the streamline models. This jack is operated from a standing position and is placed under a front or rear bumper. It has a detachable steel base and steel clamp screw, the brackets are heavy malleable castings and the gearing is machine cut to insure easy operation. It raises any car under 3,500 pounds with a few turns of a universal-joint handle.

Ⓢ A chemical product developed for the quick, emergency repair of automobile cylinder cracks is placed in the radiator.



Jack Which Is Placed under a Bumper and Operated Easily from a Standing Position

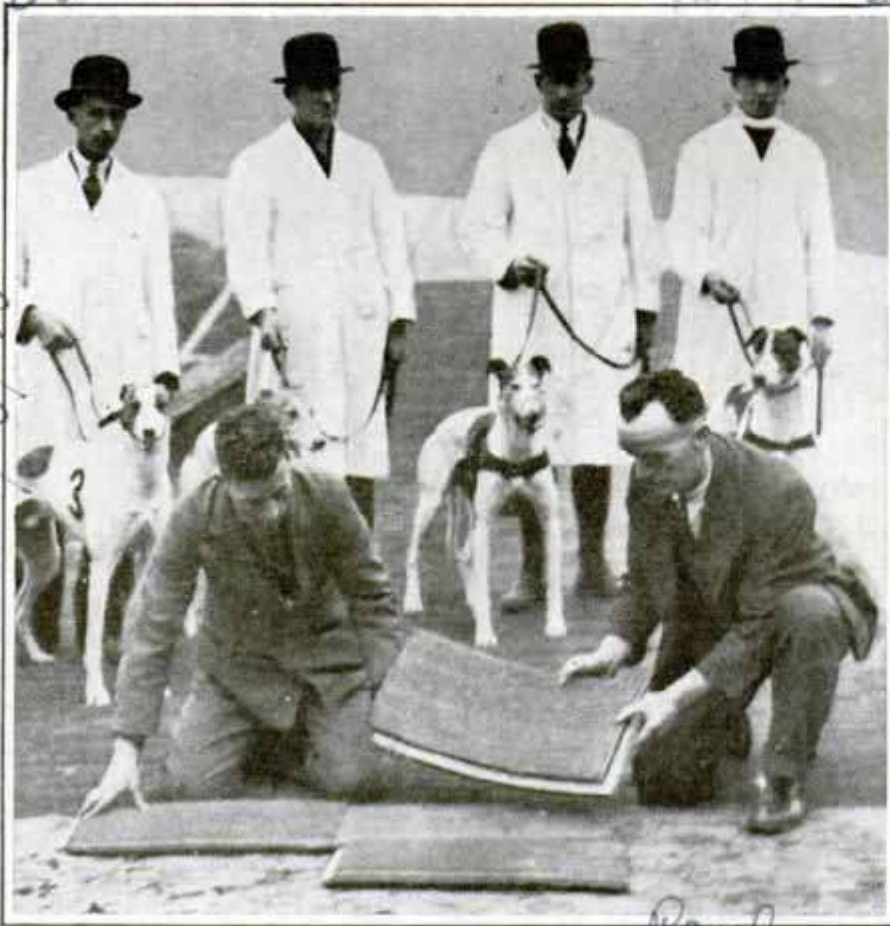
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Laying Rubber Turf on Dog Track While the Racers Are Held on Leash; the Material May Be Used on American Football Fields

RUBBER TURF FOR DOG TRACK GIVES BETTER FOOTING

Tested at a stadium near London, rubber turf is being used to surface the track on which greyhounds race. It is claimed that the material gives better footing after a rain than grass. The rubber turf also will be tested on football fields.

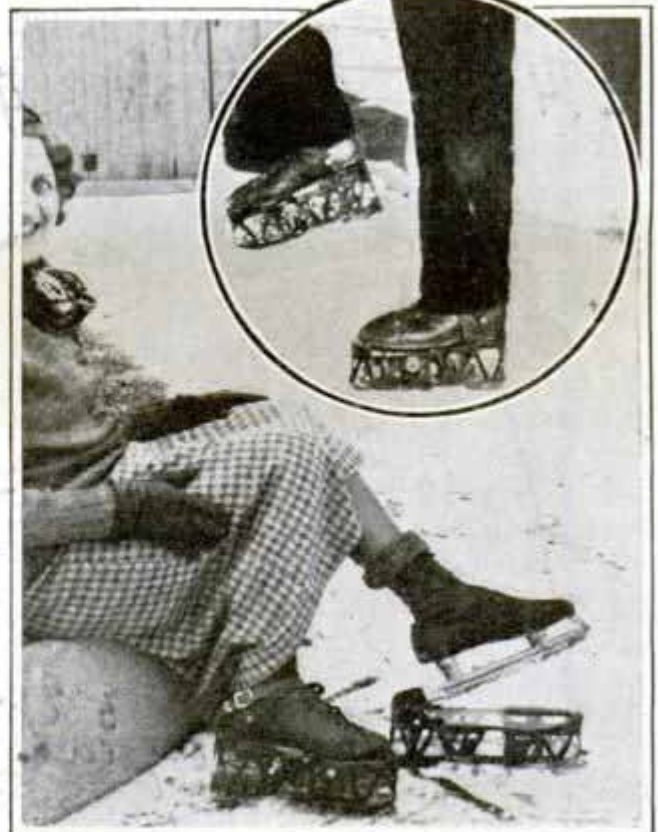
HANDY CABLE CONNECTOR LUG REQUIRES NO SOLDERING



Installed without soldering, a new electric cable lug provides a positive connection. The only tool required is a socket-head wrench to turn a hollow set screw in the lug. The powerful leverage of the wrench tightens the screw to give a good connection. There are eight sizes of the lugs to care for all wire sizes from 1,000,000 c.m. to No. 14, each size lug being adjustable to several wire sizes.

METAL OVERSHOES ON SKATES ENABLE WEARER TO WALK

Changing from street to skate shoes on arrival at the ice pond is no longer necessary if you are equipped with a pair of metal overshoes for your skates. The shoes are in the form of lightweight braces made of sheet steel, and rubber soles and heels give good traction on icy pavements. They clip around the soles of the skate shoes and fasten at the heels with a single strap around each ankle. They are high enough to clear the skate runners and form pockets in which the skates rest. By using the overshoes, the skater can walk from his home to the ice with skate shoes and skates on, removing the metal overshoes while skating and attaching them again when leaving the ice.



Metal Overshoes Which Are Donned over Skates

Branches - Newcastle & 13
Channing St. - Detroit - Phil
Boston - Portland

Crumble Electric Mfg Co

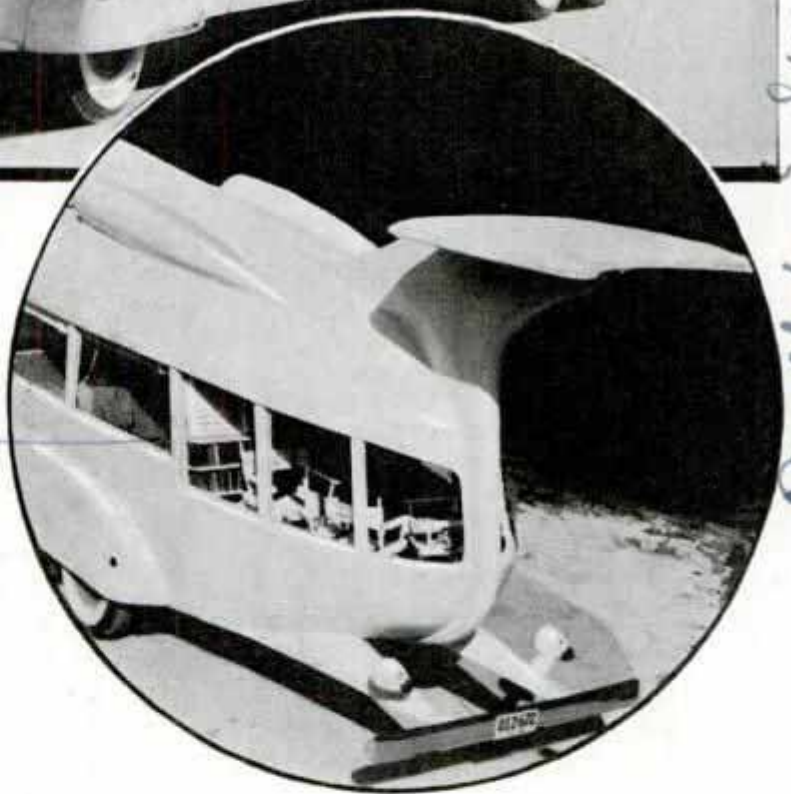
1930

Streamline Bus Is Like Dirigible on Wheels



White 10-ton truck

Some unique ideas in streamlining are incorporated in an ultra-modern bus constructed by three Los Angeles body shops and used as one of the "props" for a motion picture made by Paramount Productions. The script called for a daring and gaudy vehicle in which a featured orchestra was to do its cinematic traveling, and the bus which was designed is unlike anything ever built before. The multiple-wheeled vehicle looks like a dirigible on wheels. It is forty-seven feet from bumper to bumper. The driver is ensconced fifteen feet above the road in a glass-enclosed crow's nest jutting out from the roof, and below him the front of the bus is rounded and grilled like the modern streamline train. In the "cabin" are Pullman seats for thirty passengers and there is room for six more on the rounded observation platform. A tailpiece like an airplane rudder and elevator assembly juts out at the rear and the steel plate body is painted a battleship gray.



© Paramount Productions, Inc.
Front and Rear of Forty-Seven-Foot Bus Built for Movies; Note Crow's Nest for Driver

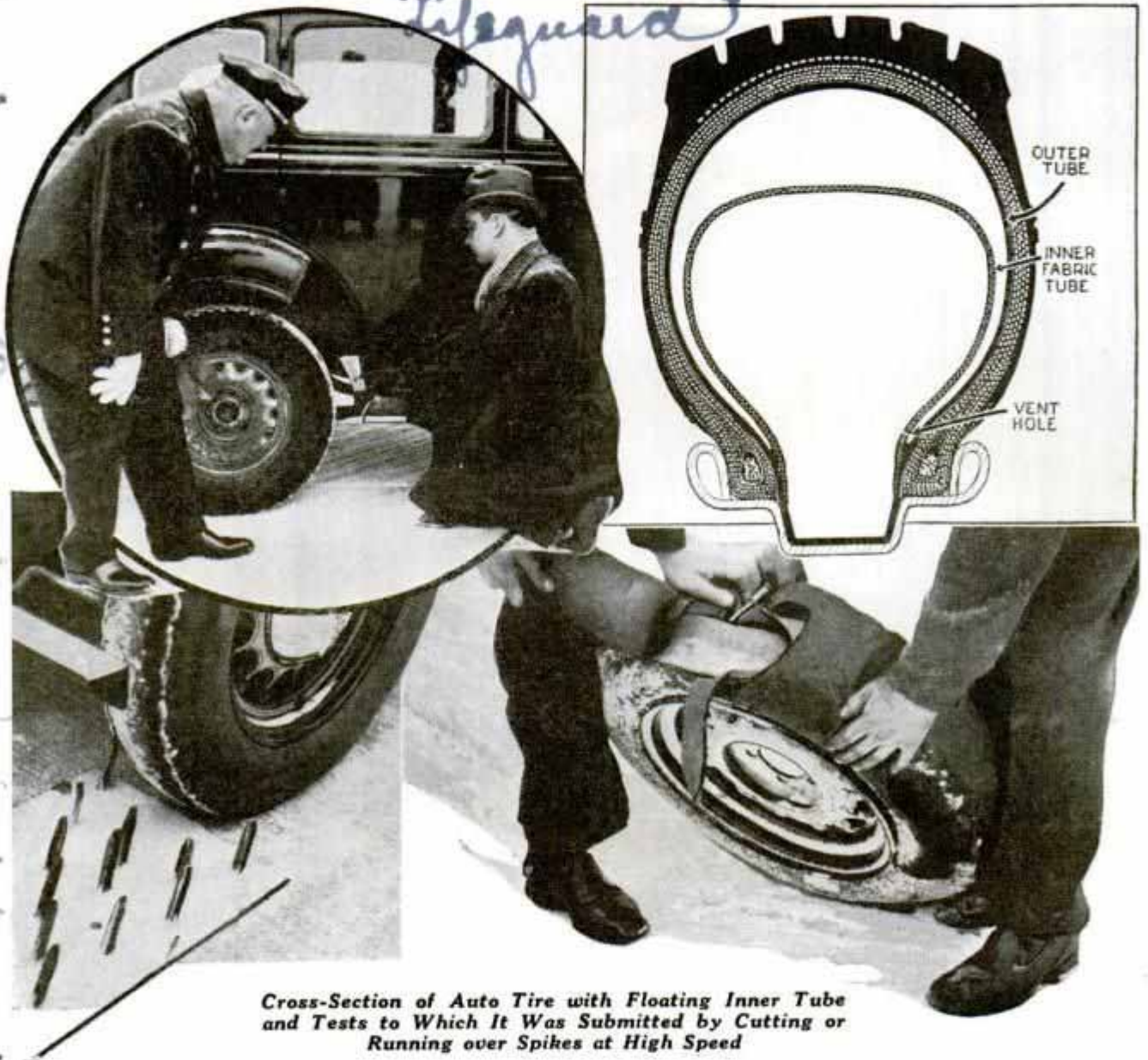
The seats can be converted into berths and the interior contains a small piano and a soda fountain. The chassis is that of a high-speed truck with two transmissions giving fifteen speeds forward and three in reverse. The driver uses extension rods to shift gears and the bus has a speed of nearly seventy miles an hour.

Used in carrying Green U.S. Marines in "Stolen Harmony"
Designed by Langdon Carney Works
717 S. Grand Ave. Los Angeles, Calif.
1935

4 W. 10 3rd St
New York

'Fabric' Inner Tube Lessens Blowout Hazard

Lifeguard



Cross-Section of Auto Tire with Floating Inner Tube and Tests to Which It Was Submitted by Cutting or Running over Spikes at High Speed

Development of an automobile tire with a "floating" inner tube has removed much of the danger of a serious accident from a blowout when traveling at high speed. The tire consists of a double tube, one inside the other and joined at the base, a single vent hole connecting the two air chambers. The outside tube is similar in function and appearance to an ordinary tube and fits against the inside of the casing, while the inside tube or "lung," built of two plies of fabric, floats free without chafing. When the tire is inflated, the vent permits the air to pass from the inner to the outer chamber, so that in ordinary service the inner carcass is under no strain. When a blowout occurs the air escapes from the outer chamber immediately but can escape from the inner one only through the small vent.

Thus only a portion of the air is lost in the blowout and the tire drops down slightly to ride on the inner fabric carcass which loses its air slowly. This permits the car to continue under control, giving the driver plenty of time to come to a gradual stop. Thus the tube, in effect, converts a blowout into a slow leak. Such tires have been blown out with dynamite caps, cut with a knife or run over railroad spikes at high speed and in each case the driver was able to bring the car to a stop under complete control.

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

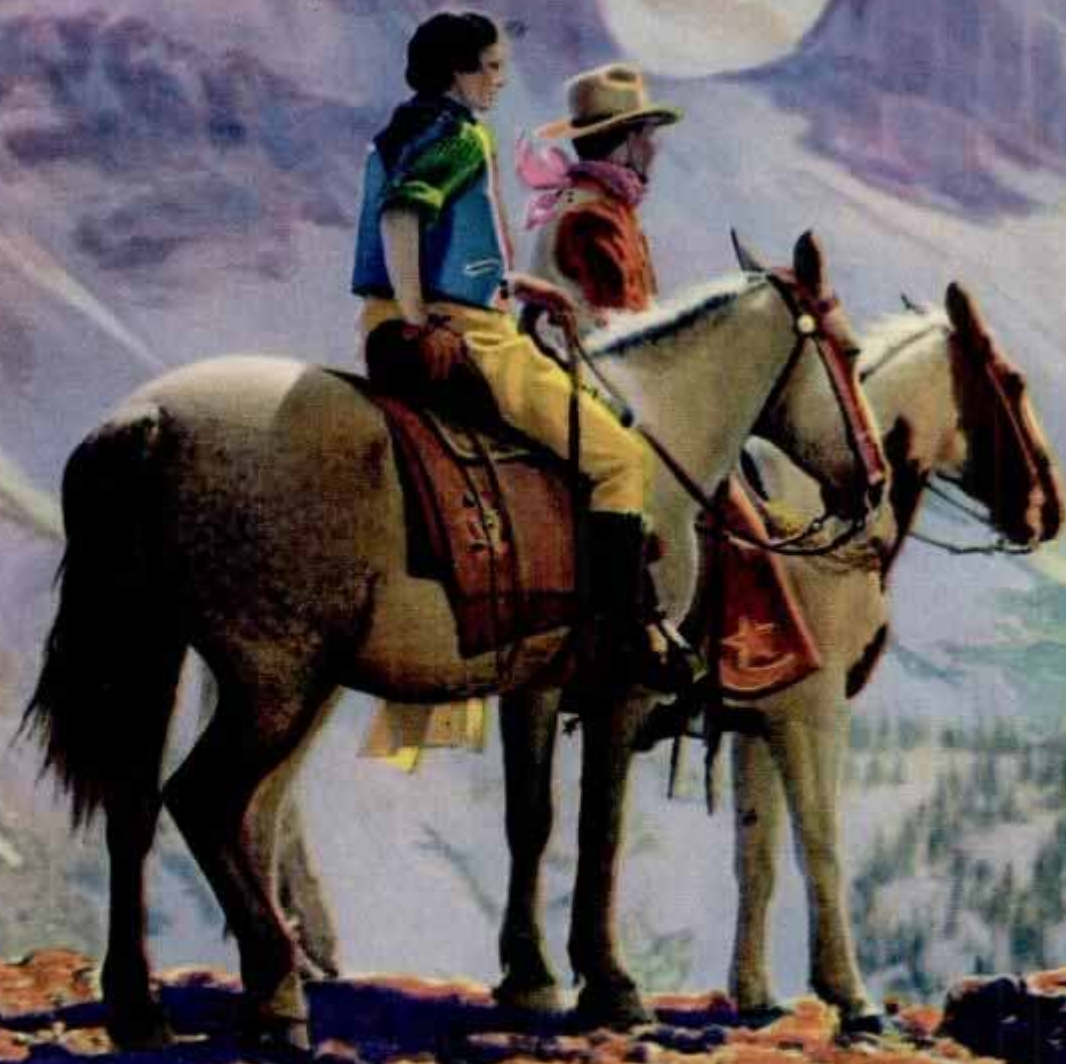
*John & County. 3109-12th
New Washburn
22 C*

JOYS of the OPEN ROAD

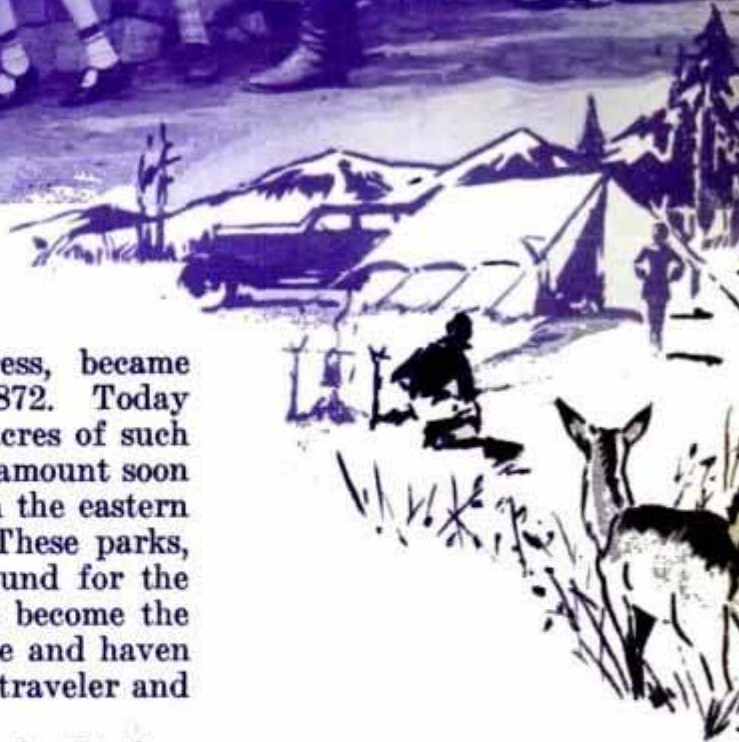
WHERE TO GO THIS SUMMER

D/632.

VIEWING the mountain
crag and snow of Glacier
national park, often re-
ferred to as the "Switzer-
land of America."



D1362.



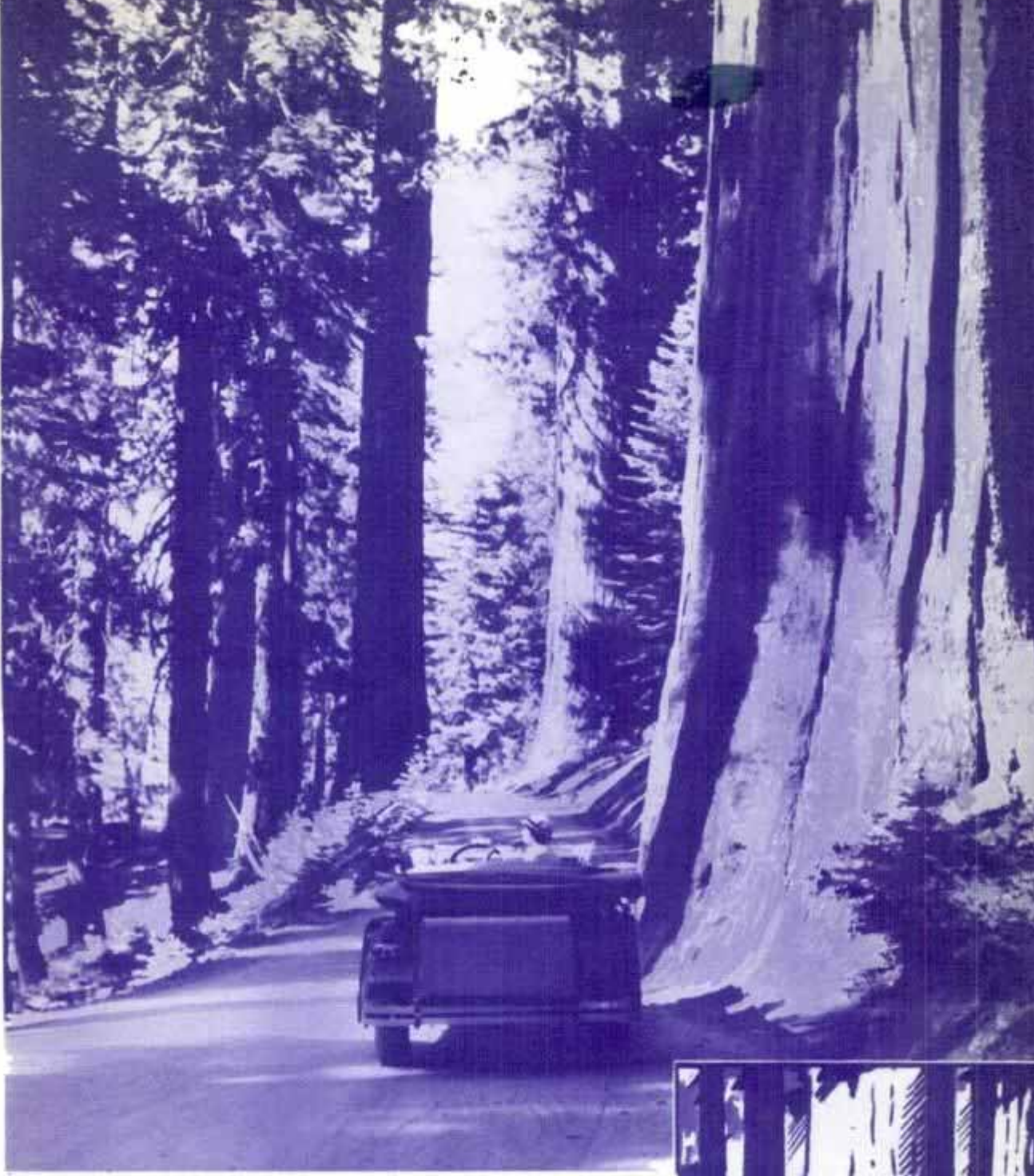
YELLOWSTONE, by act of congress, became America's first national park in 1872. Today there are approximately 8,500,000 acres of such parks in the United States and this amount soon is to be augmented by some 200,000 acres in the eastern and east central portions of the country. These parks, set aside by congress as "a pleasuring ground for the benefit and enjoyment of the people" have become the public playgrounds of the nation, the refuge and haven of bird and beast, the scenic highway of the traveler and the paradise of the jaded and tired.

Our national parks are a typical American institution. No other country in the world has set aside for posterity such marvelous areas of natural beauty and historic interest. It was left to free, democratic America to consecrate to the use and enjoyment of all mankind thousands of acres of the most beautiful and awe-inspiring scenery that can be found anywhere in the world.

This national park system ranges the eastern seaboard from Maine to the Carolinas; the west from Canada to

ENJOYING the view at Lookout Point on the loop trail north of Sunrise in Mount Rainier national park, famous for its glacier system.

P136A



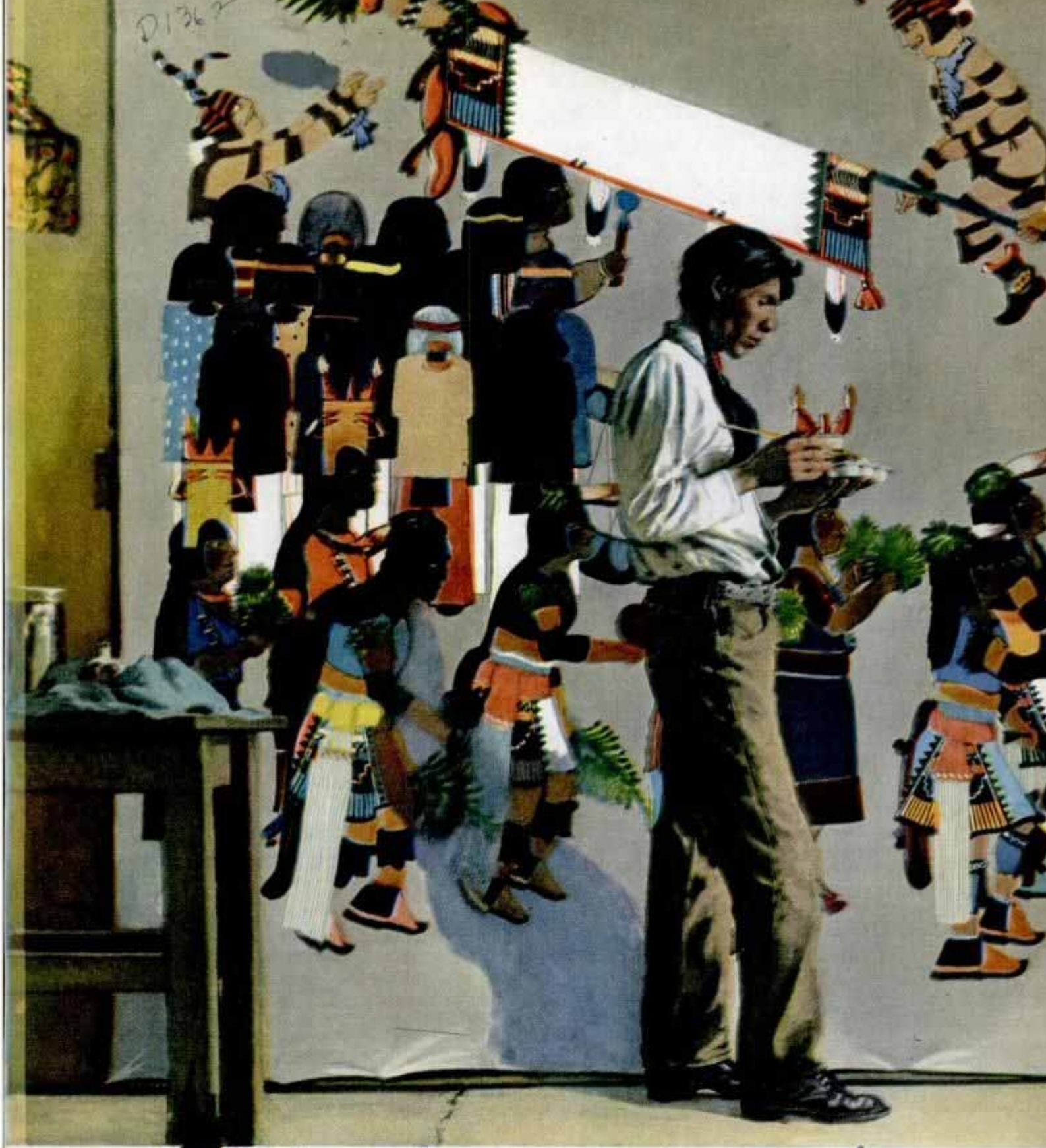
Old Mexico. Before a national park area can be set up it must measure up to a certain high standard of natural beauty and uniqueness, for nothing save the spectacular and extraordinary in nature can lay claim to national park privilege. For this reason each of our national parks is different.

Yosemite national park in California is noted for its romantic scenery, its gorgeous waterfalls, its mountains and valleys and the far-famed Valley of the Yosemite itself; Glacier park, on the boundary between Montana and Canada, for its great glaciers nestling close to its mountain crags; Mesa Verde in Colorado for its prehistoric Indian remains; Rocky Mountain for its sublime view as a part of the great Continental divide; Sequoia and General Grant in California for the giant trees, many over 3,000 years old; Crater lake for its marvelous lake of blue nestling in an extinct volcanic crater; Lassen for its active volcano; Carlsbad for its amazing caverns; Zion and Bryce in southern Utah for their wonderland of color; Hot Springs for its curative waters; Mount McKinley, for its tremendous game herds and faraway Hawaii for its tropical grandeur and volcanic wonders.

ONE of the beautiful drives in Sequoia national park in California, noted for its giant trees, some of them thousands of years old and one with a diameter exceeding forty feet.

Yosemite

D136



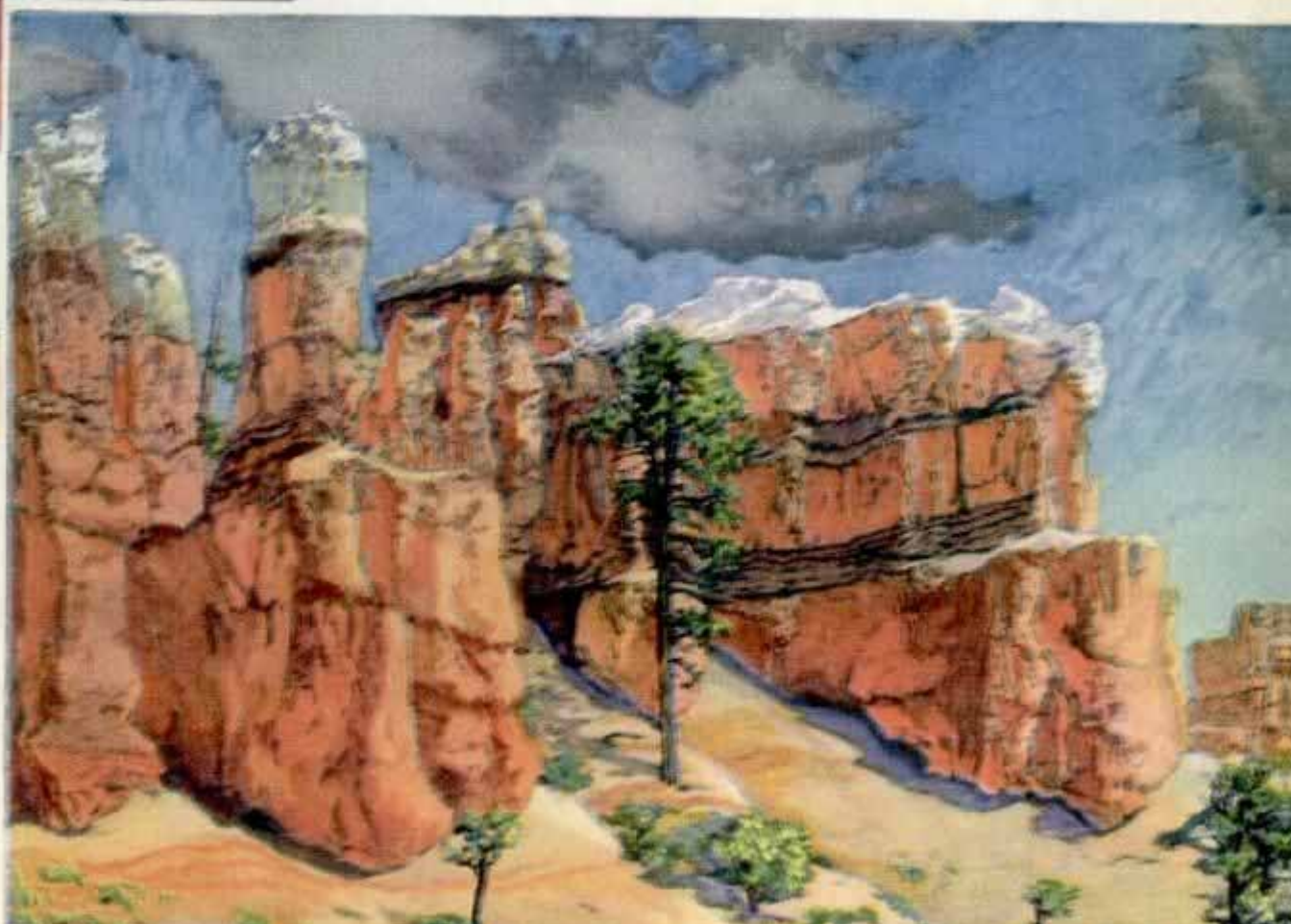
Agua Prieta, San Ildefonso Pueblos.

AN INDIAN artist in New Mexico and some of his work. Right, above, scene in the Carlsbad caverns where mountains, bottomless pits and huge amphitheatres are found 700 feet beneath the earth's surface. The caverns have been described as "like a Grand Canyon underground." Right, below, a natural "castle" in one of the western parks.



Carlshad Carans

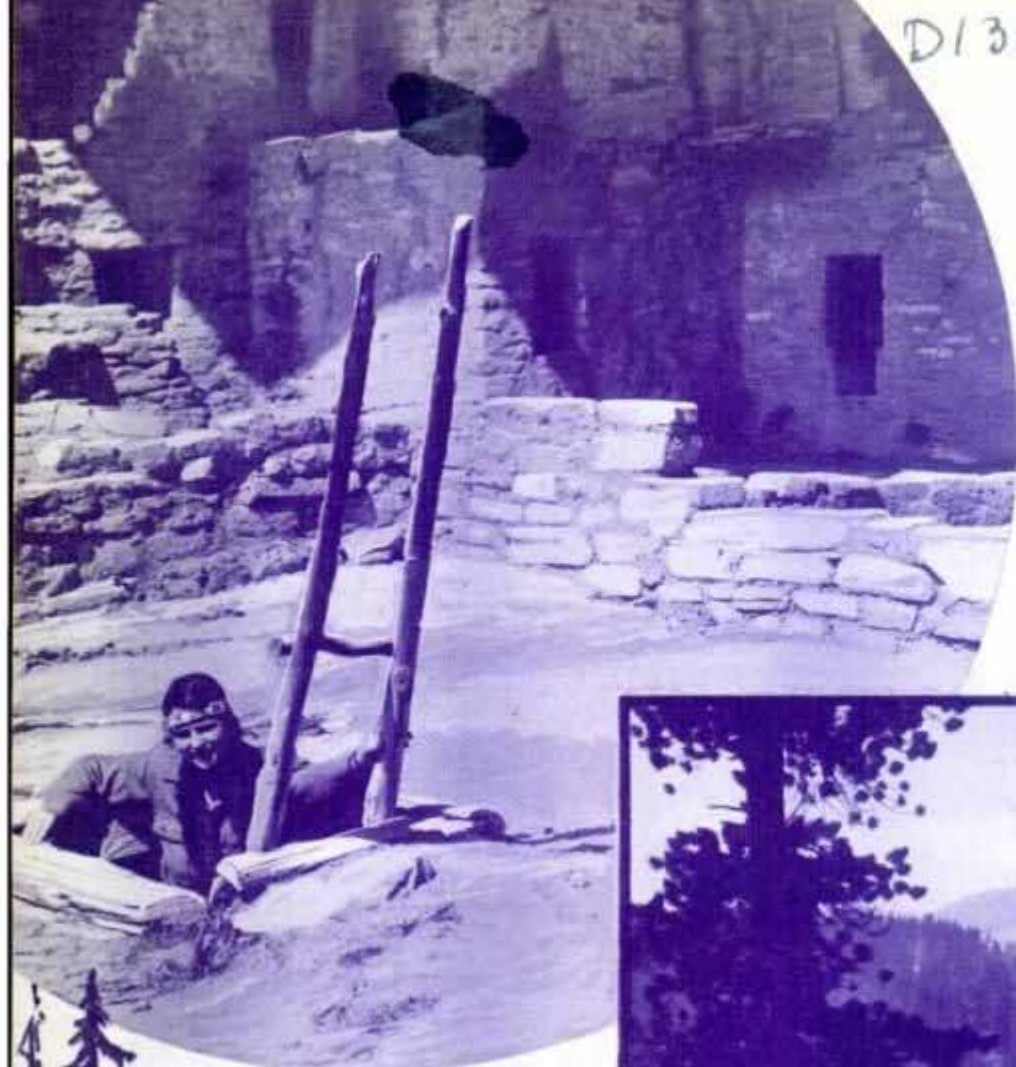
Deal
Castle
Bryce
Park
Utah



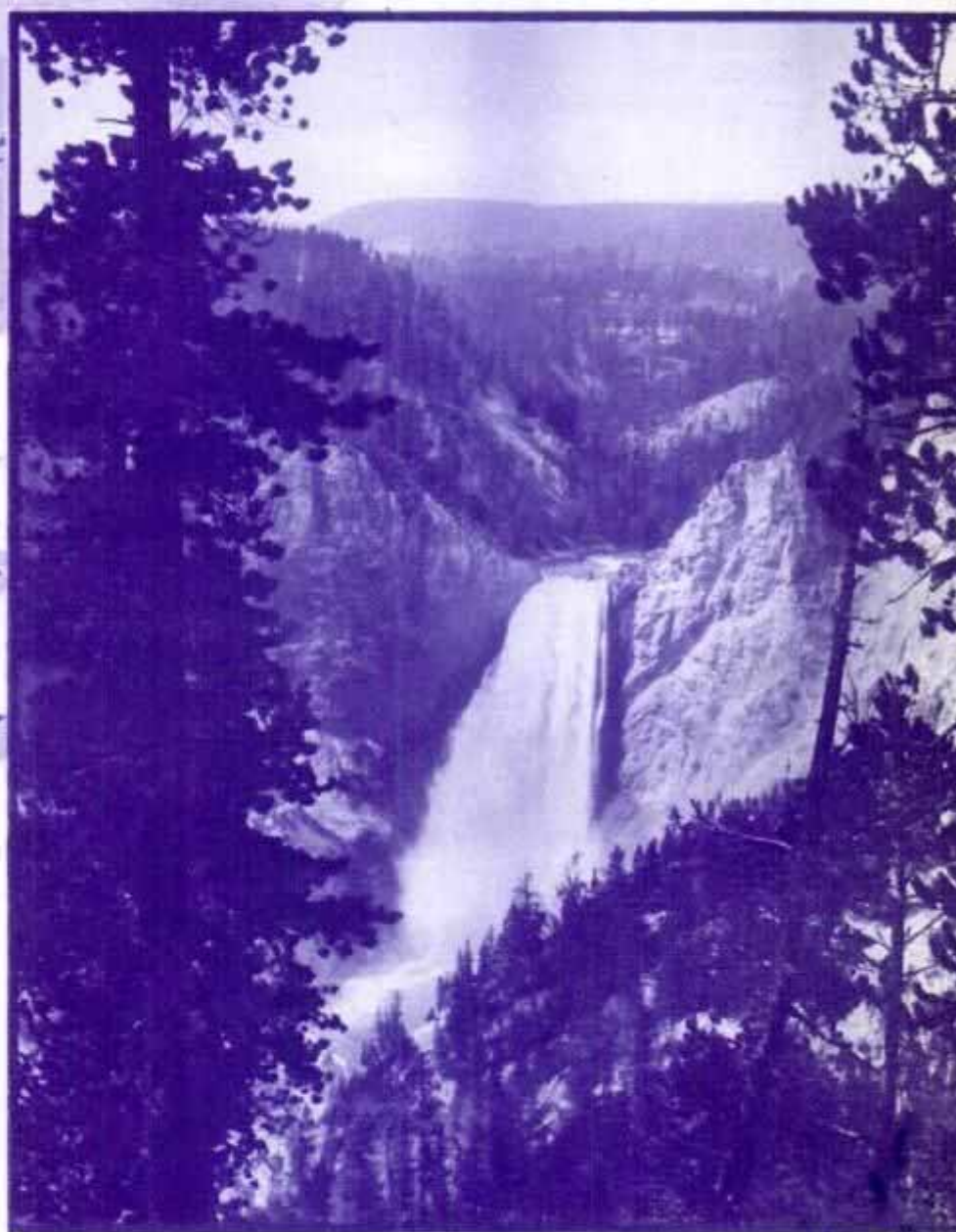
D1362

MESA VERDE national park is noted for its prehistoric Indian remains and this is the entrance to one of the homes carved out of the rocky mountain sides by the ancient cliff-dwellers.

*Keba
in Spruce
Tree House*



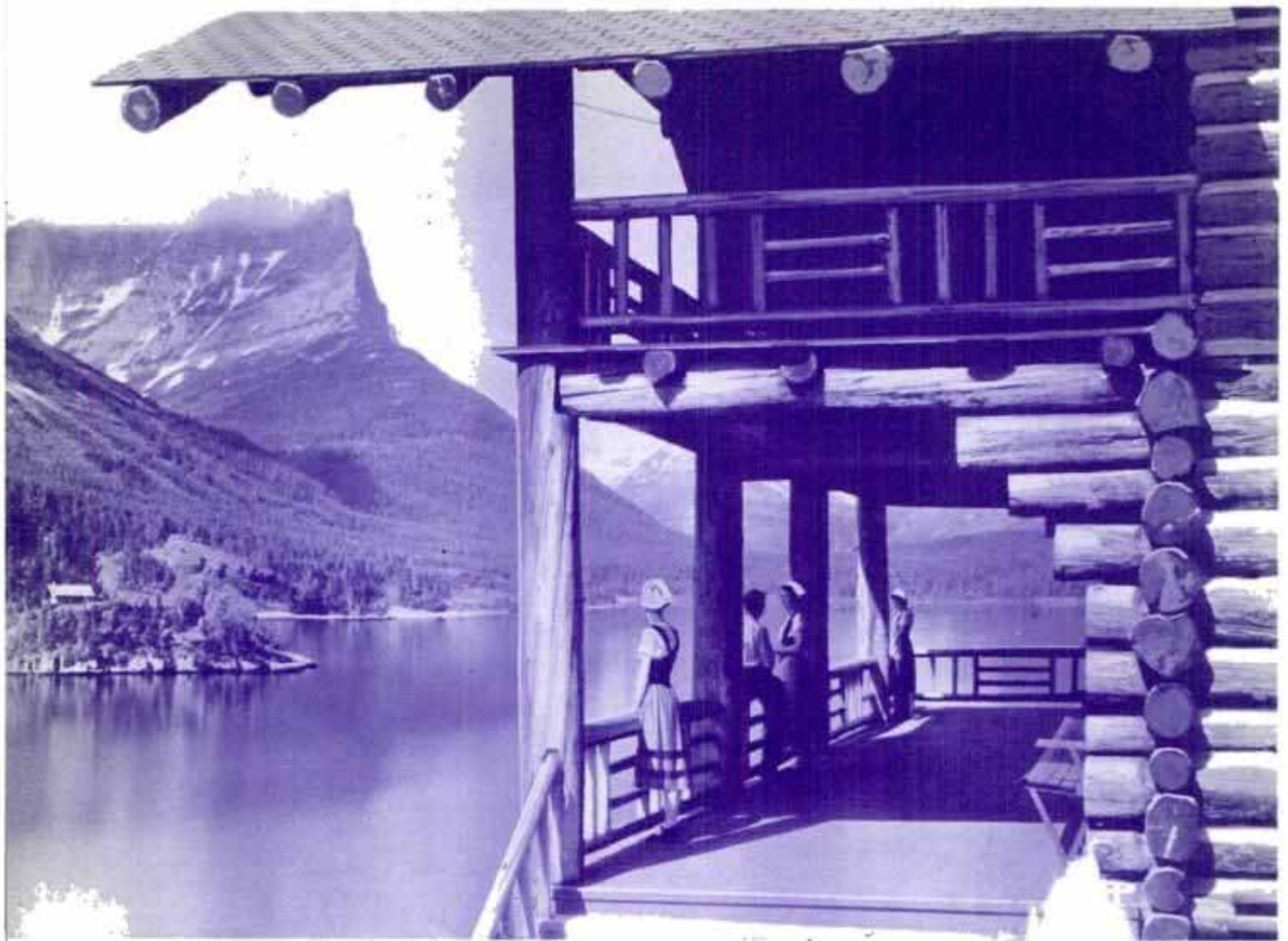
WATERFALL in Yellowstone park which contains nearly 3,500 square miles and is the largest of our national parks. This park is overflowing with amazing natural phenomena, not equalled in any other area in the world. Charming bits of water, woods and mountain scenery are discovered on every hand.



Mount Rainier, with its glacier system exceeding in size, interest and impressive beauty that of any other country, may be seen for 150 miles, and Yellowstone with its charming bits of water, woods and mountains everywhere, is re-

plete with great natural phenomena, not equalled in any other area in the world. But of all the long list of twenty-four parks none compares with the Grand Canyon of the Colorado. There is nothing like it anywhere in the world.

*Yellowstone
National Park
Grand Canyon
of the Colorado*



Its carvings and erosions are on a continental scale, etched against the background of a planet, showering color and mist impossible of description.

The west has until recently been the national park area of the United States but now the eastern half of the country is developing a series of parks that will rival in beauty and charm those of the west. Acadia national park in Maine heads the eastern list, a combination of picturesque mountain and rough seacoast. Further down the Atlantic chain is Morristown national historical park, less than a year old, where Washington and his troops spent much time during the revolution.

And down in Virginia, now being ceded to the federal government, is the Shenandoah national park, lying along the historic and beautiful Blue Ridge chain. Further down is the Great Smoky national park, the most picturesque mountain section of the east. Yet to be acquired is the Everglades national park in Florida, a bill for which is now pending before congress, and Isle Royale park in Michigan.

Although the national parks were established and are maintained for the benefit and pleasure of the people, they are also important factors in conservation of wild life. Elk and buffalo winter in Yellowstone. In Acadia are *(Continued to page 128A)*



VIEW from the main veranda of Going-to-the-Sun chalets in Glacier national park. It makes little difference what kind of sport you prefer—fishing, hiking, boating, horseback riding—all are offered in the millions of acres of national parks and you can select accommodations to fit your purse.



CLIFF palace in Mesa Verde national park in Colorado. Do not be misled into believing that if you have seen one of our national parks, you have seen them all. Each park lays claim to its own spectacular and extraordinary features, and each is different from the others.



Playing with Dolls Becomes Real Business



Artist with Collection of Dolls and Materials from Which She Makes Them; Note the Resemblance of Some of the Puppets to Certain World-Famous Individuals

Dolls are a hobby with Lucille Fink, artist, and she has become so expert in making them that the hobby is turning into a business. Some of the dolls are used in staging marionette and puppet shows for which she writes her own plays, while others are used as subjects for her still life paintings. Heads and features of the various dolls are fashioned from ordinary woods, plastic wood or clay, and the bodies are made of mattress stuffing and cotton. Suits, dresses and special costumes are sewn from castoff clothing.

on the Bonneville power and navigation project on the Columbia river. The tires are twenty by forty-six by ten inches and carry air at forty pounds per square inch. The tires serve as wheels, fitting over small hubs of the "buggy."

miss 477 Hermyng Place Chicago

see Jan. 1935-36

D/627

SIXTEEN DOUGHNUT TIRES MOVE HUGE LOADS OF EARTH

Sixteen big pneumatic tires of the doughnut type insure light bearing pressure for a giant tractor-hauled "buggy" having a load capacity of thirty cubic yards. This equipment is being used in moving earth



Sixteen Doughnut Tires Support This "Buggy" Which Has a Capacity of Thirty Cubic Yards

Tractor - Oils due

D 1494

Mr. Low
4 W. 103rd St
New York

The SEARCH for a



vantage to know the grade and viscosity of the oil which goes into the crankcase.

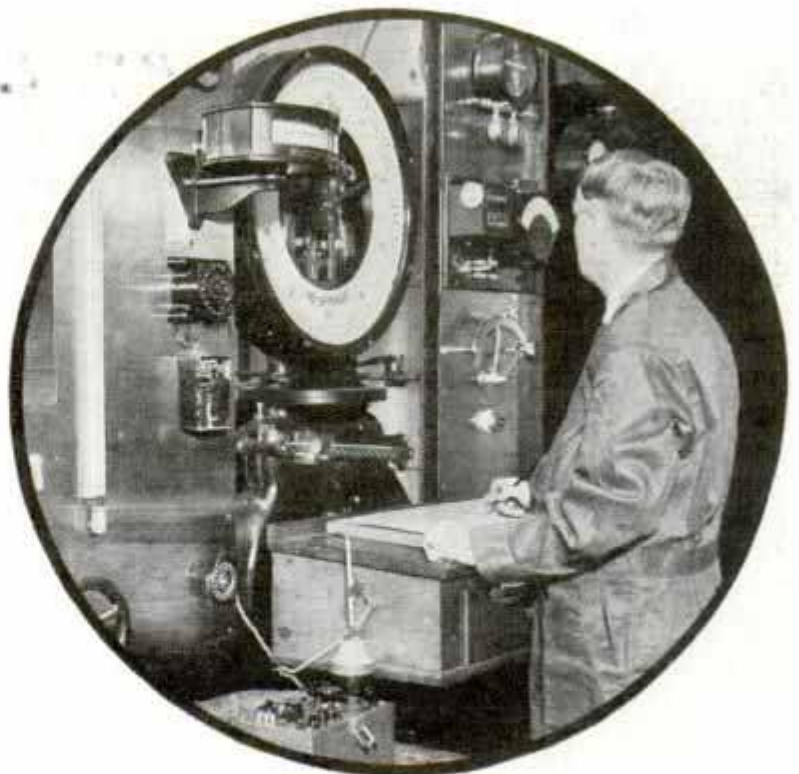
The modern car is capable of attaining ninety and 100 miles per hour, and this grueling pace causes the pistons to travel at the rate of 3,100 feet per minute, while flame velocities past the exhaust valve stems reach 100 miles per hour and the heat of the valve stems reaches 700 degrees. The strain of such speeds and heats are transmitted from the metal parts to the lubricants. If the lubricants can't absorb the strain, something cracks.

Several years ago Standard Oil of Indiana initiated the practice of refining oil by the use of a chemical, propane, also

HIGH-SPEED automobiles raise high temperatures and the combination is likely to cause trouble for your car unless you give some thought to lubrication.

On the firing line of research, many talented men are pursuing the mysteries of auto lubrication. A vast sum is being spent to gain more information about the properties of black petroleum and finding the ideal method for subtracting undesirable substances from crude oil.

Oil refining today is one of the most exacting and painstaking operations; it is chemistry and physics playing the part of mother and nurse to the automotive industry. It was recently established that fewer than one driver in ten knows the grade of oil prescribed for his automobile for various seasons. But if you intend to operate your car efficiently and economically, it is certainly to your ad-



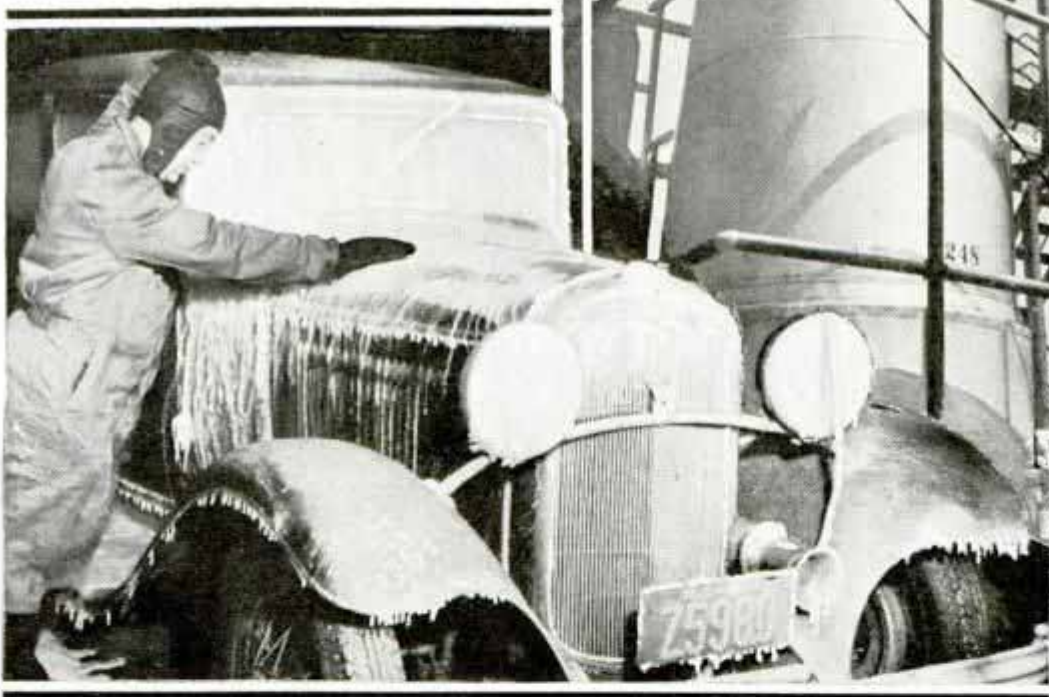
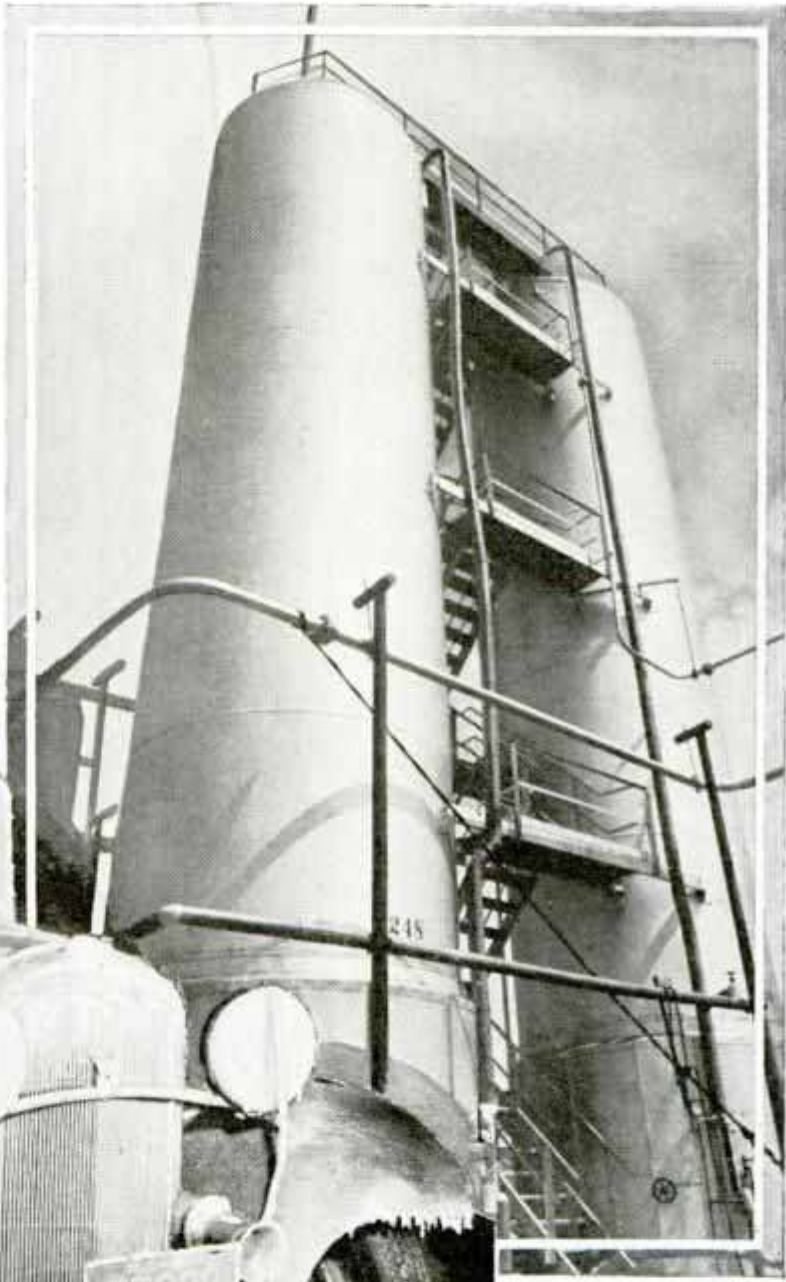
Above, Testing Effect of Low Temperature on Two Grades of Oil; Below, Scale Shows Load on Nearby Auto Engine

D 1494

PERFECT OIL

made from petroleum. That started a virtual revolution in the industry. Propane as a solvent removes certain harmful substances from the oil by "washing" them out, and not by any chemical action.

The first American refiner, Hiram B. Everest, of Rochester, N. Y., started with a crude still in which the gasoline and kerosene were boiled off the oil, yielding an oozy substance which passed for engine lubricant. Sulphuric acid refining marked a great improvement in Everest's process, but the acid residue created a problem



Testing Motor Oil in a Room Where the Temperature Is Forty Below Zero and the High Propane Towers of a New Jersey Oil Refinery

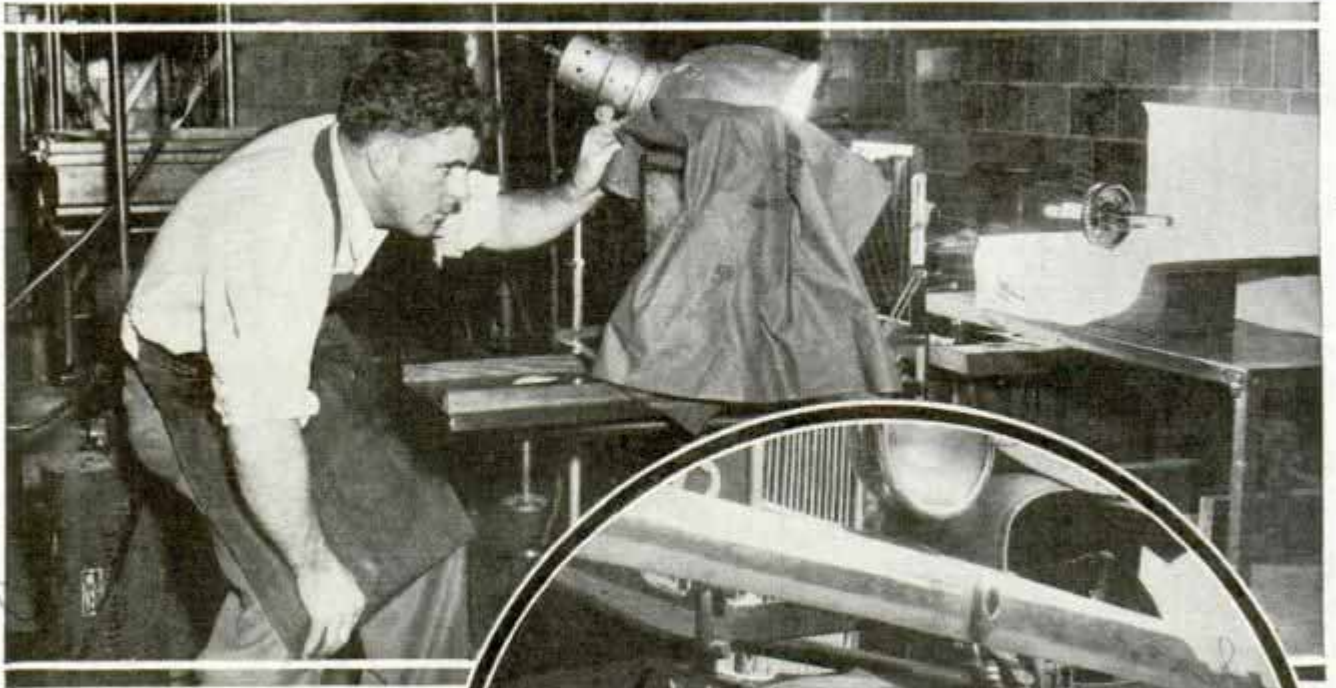
because the refiners did not know how to get rid of it. Clay refining came after sulphuric acid.

Clay and acid refining were responsible for most of our lubricating oil until solvent refining came into the picture. It is now widely used and the process is subject to many variations by different companies. The latest development in solvent refining was recently announced by the Socony-Vacuum Oil company, which spent \$3,000,-

000 in developing what it claims is the first oil refining process to make use of two solvents, propane and cresylic acid. One solvent washes away all substances which tend to form carbon; the other removes substances which tend to increase the viscosity at variable temperatures. In a transcontinental test run by Harry Hartz, the auto racer, only two and one-half quarts of the new Socony "clearsol" refined oil were consumed over a distance

Paulsboro

D-1494



Top, Photographing Gear as Part of Oil Test; in Circle, Using Lubrication Chart; Below, Test Car in Canada Used to Prove Best Grade of Oil

of 3,188 miles. Also to meet the requirements of modern autos, Standard Oil of New Jersey adopted the hydrogenation process. By adding hydrogen, chemically combining it with the crude oil, you actually increase the volume of the resultant lubricant. With hydrogenation, it is possible to make an auto lubricant out of coal, as is done in Germany today.

In refining crude oil, the Texaco company employs a de-waxing process, then it rids the oil of certain impurities by adding a solvent called "furfural," made out of rice hulls. Similarly, Standard Oil of Indiana starts with a de-waxing process and ends with a purification process in which "chlorox" is the solvent. The Imperial Oil Refinery, of Canada, uses phenol or carbolic acid as its selective solvent.

The Tide Water Oil company uses a fractionation process of distillation. The necessary apparatus is a furnace for turning the liquid crude into crude vapor, and a fractionation tower where the vapors are

allowed to cool and settle in the different sections of the tower according to their volatility. The lubricating fraction is drawn off and chilled to a low temperature before being pumped through a filter press which separates the bulk of the crystalline wax from the oil.

The Texas Co
1352 42nd Street
190 Battery Place
New York

[Handwritten scribbles]

29 W. 59 St
New York

The Society of Automotive Engineers has undertaken to educate the public away from the so-called heavy oils, and has advised refiners to stress the advantages of light oils. The use of lighter oils means an increased consumption, of course; on the other hand, the use of heavy oil accounts for an increased gasoline consumption. Before long such inexact terms as light, medium, and heavy oil are likely to disappear. Hereafter, the most convenient way to refer to an oil's body viscosity will be by the number system adopted by the Society of Automotive Engineers.

This method of choosing a motor oil is as follows: You receive instructions as to the proper oil from the automobile manufacturer. For ordinary weather conditions, this oil will serve your car adequately. But suppose a man in Chicago needs a change of oil on January 10. Since the temperature at that time of the year runs around twenty degrees, he should ask for 20-W oil. If, after changing, he should see a forecast of sub-zero weather, he is advised to change his oil or to dilute it with ten per cent of kerosene.

Between thirty-two and 100 degrees Fahrenheit, the S.A.E. recommends S.A.E. 30. For traveling at high speeds, or for temperatures higher than 100 degrees, it recommends S.A.E. 40 and S.A.E. 50. The designations 10-W and 20-W refer to special winter oils.

The oil which was sold on the market in 1925 would be the ruination of modern automobiles. The improvements in refining have leaped ahead with automotive engineering. It is plain that the high speeds and high temperatures developed by modern cars would greatly increase oil consumption were it not for the automobile's mechanical improvements. Hence, increased speeds have not added to the cost of giving a car the proper lubrication.

In tests with gears, one refiner discovered he could make two metal surfaces "seize" each other if he polished them very smooth and flat. Evidently, a very powerful cohesive force can exist between two clean metal surfaces brought close enough together. The new high-pressure lubricants have the property of forming a layer other than oil between the gear teeth. As to the real nature of this mysterious layer, little is definitely known.

FASTER KEY SENDS RADIO CODE AT FIFTY WORDS A MINUTE



High-Speed Key Designed to Increase Rate of Transmission of Radio Code

Between fifty and sixty words per minute can be transmitted by a semi-automatic key designed to speed up the sending of radio code. The key now used by the United States navy is said to be capable of transmitting only thirty to thirty-five words a minute. The new sending equipment was invented by T. R. McElroy, champion telegraph speed sender.

HOT WATER GAS CONVERTER MAKES TANK AUTOMATIC

Conversion of a range boiler into an automatic hot water storage tank is made



easy by a small gas heater about the size of a thermos bottle. The unit has no coils, a fin-type construction giving a heating efficiency of eighty per cent. An adjustable thermostat is provided to assure an extra supply of hot water when desired.

The burner has an automatic cutoff to guard against the flame being extinguished accidentally. Gas consumption is low, the maximum about six cubic feet per hour for heating five gallons of water.

23 Bay side St.
Worcester, Mass.
Mrs. J. J. Astor

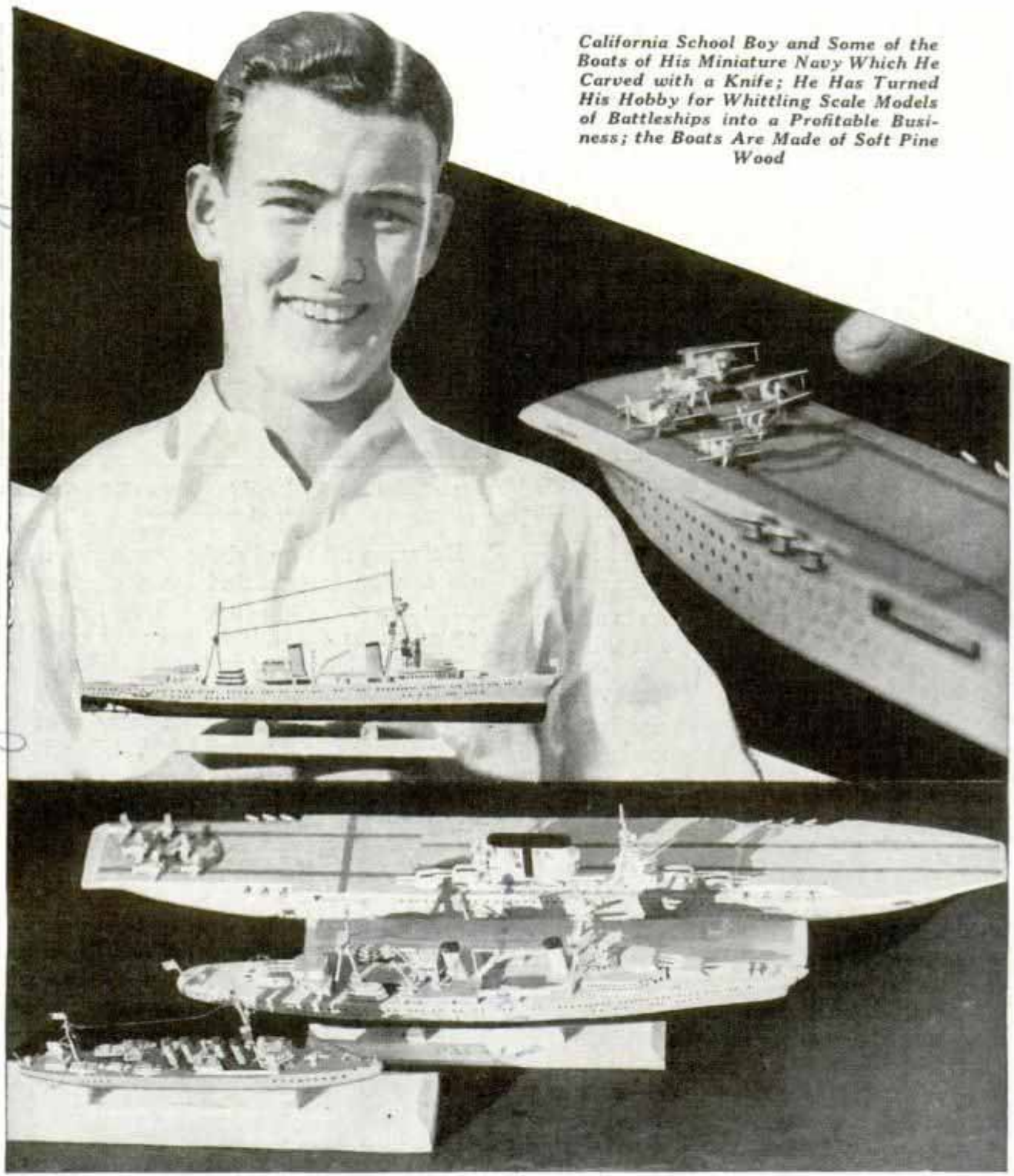
Chicago
United American

D-15-92
502

Mr. Bob Oushant
12 29 Ahmsted St
Long Beach, Calif

'Navy' Carved in Miniature by Boy Whittler

California School Boy and Some of the Boats of His Miniature Navy Which He Carved with a Knife; He Has Turned His Hobby for Whittling Scale Models of Battleships into a Profitable Business; the Boats Are Made of Soft Pine Wood



3351 Alta way, Long Beach, Calif

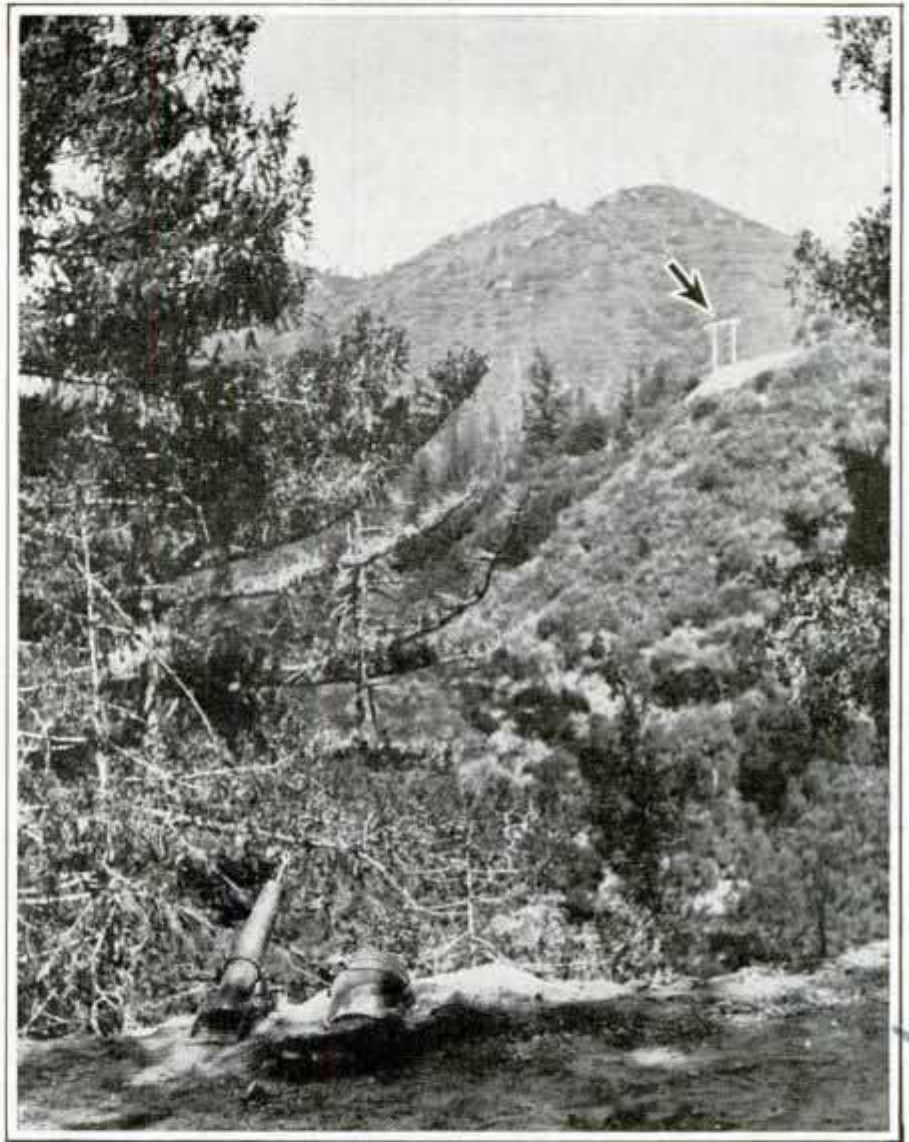
When the fleet anchored off Long Beach, Calif., Jack Rittmayer, a high school boy, turned a penchant for whittling into a profitable hobby. He began carving models of the entire fleet to scale dimensions of one inch for fifty feet. He completed fifteen ships, working two or three weeks in spare time on each. Navy folk and marine enthusiasts began hearing of the models and now the boy finds a market for

boats as fast as he can turn them out. He uses soft pine wood and his tools are a small penknife and a block plane.

Ⓢ Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information will be furnished by our Bureau of Information upon request, accompanied by stamped envelope.

Cannon Used to Fire Power Line over Ravine

In constructing a California power line it was necessary to string the conductors across several canyons and heavily wooded areas. The usual method for placing power lines is to lay them on the ground, then lift them into place on the towers or poles. This method, however, would have required clearing the trees from the right of way, so linemen used a cannon to do the work. The cannon was similar to those used to shoot lines to stranded ships and the projectile was a piece of steel shaft fitting loosely in the cannon and equipped with an eye-bolt to which a line was attached. This projectile trailed as much as 1,500 feet of rope and after some practice the workmen often shot the rope directly over the cross arms of the towers. It was then a simple matter to draw the conductor line into place.



Cannon Which Shoots Power Line over Heavily Wooded Areas; Arrow Indicates Tower at Which the Gun with Its Line Is Aimed

BICYCLE HORN-AND-LAMP UNIT WORKS ON ONE BATTERY

Operating on one standard No. 6 dry cell, a combination horn and headlight for the bicycle is designed for center mounting on top of the truss fork rods. The outfit is complete with battery case, all wiring and button for sounding the horn. A slide switch controls the headlamp. Scientific construction makes the lamp highly efficient when a Mazda No. 19 bulb, one and one-half volts, is used. Lamp and horn are



chrome finished, with a red finish showing through cross-bars over the mouth of the horn to give an attractive appearance.

ELECTRICALLY HEATED CLOTH

Cloth which can be warmed by electric current recently has been produced. Copper wire is inter-spun with cotton, silk, wool or rayon into threads which can be woven or knitted without special machinery. The fine copper wire is lacquered before spinning and fabrics containing the wire do not stretch or shrink. It has many possibilities including its use in rugs which might be connected to a light socket to warm a room and as a fabric for airplane wings, which could be heated to prevent ice formation, and for heated clothing.

Delta Electric Co.

Baswell & Anderson, Inc.

Baswell & Anderson, Inc.

D13 7/11
 Box 4693, Kansas City, Mo

D1645

D1582

De Luxe

celme - Berna 12/10/34

\$4.95

D 1422

54 1/2 Islander Plots
Los Angeles Calif



Bonanzas *the* FORTY-



Working an Old Digging, Panning Gravel and the Remnants of a Location Notice Filed on an Old Claim

A FEW months ago, a Nevada storekeeper shoved a pile of groceries across his counter—traditional prospectors' staples.

"Here's your grubstake, boys, and I hope you find a million!" he told the four men gathered there.

Today he is a fifth owner in a mine which is yielding tons of rich ore assaying as high as two dollars a pound.

Tired of combing the country for a new prospect, the four men went into the Chiquita mine, abandoned many years ago by owners who thought the vein exhausted. They tunneled through solid rock until they encountered a "stringer" leading to great values. The new owners had no trouble in finding capital to back them.

Now, in electrically-lighted tunnels, power machines are driving into the rock far faster than pick and shovel.

Are the old diggings exhausted? That's the question being discussed in mining centers of the west. Miners will tell you about old Frank Shore, who took 175 ounces of gold from a single pocket in the side of an old drift that missed the deposit by only six inches; or of the man who



NINERS Overlooked

Loading Burros with Sacks of High-Grade Ore, Ready to Be Shipped to the Smelter



Mining Camp from Which Prospectors Go into the Surrounding Hills to Work Old Diggings

drove his pick into the blank end of an abandoned tunnel and took out a twenty-four-ounce nugget, worth \$840.

Why didn't the old-time prospectors find all the gold?

One reason is that many were looking for gold in simple forms that could be easily smelted and readily recognized. Frequently they lacked the advantage of thorough assaying, or had to pass by low-grade ore on account of the cost of transportation. Then, too, few prospectors were scientifically trained.

Forty years ago, for example, the vein at the Stray Horse mine suddenly ran into a "fault," where the earth had slipped abruptly. An "expert" was called and reported that the slip was to the south. The owners tunneled southward 140 feet in barren rock and quit. Recently a new group went into the mine and drifted north. Within twelve feet, the original vein was struck and the miners loaded their first car with ore that returned \$27.58 per ton in gold.

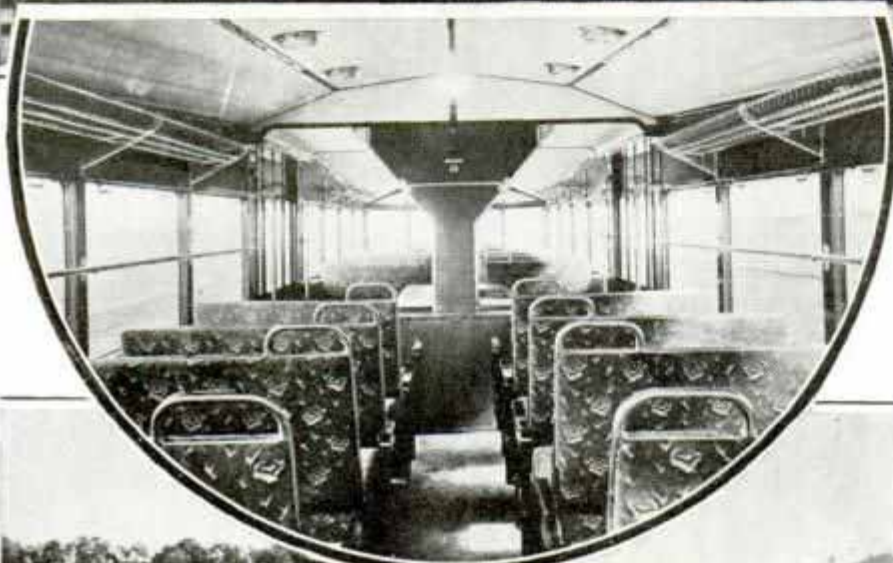
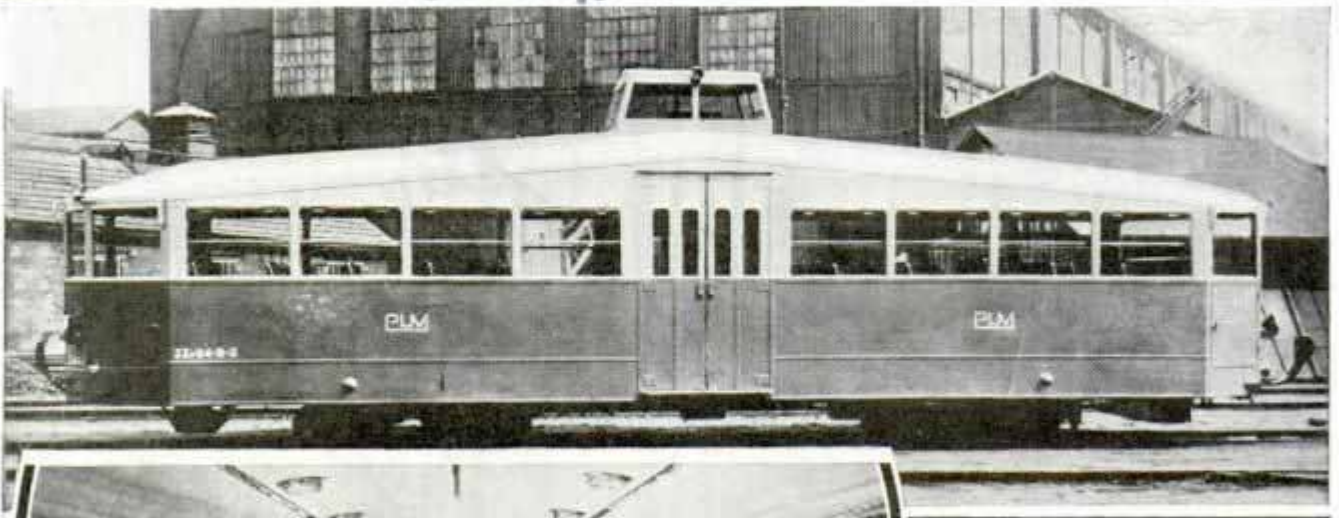
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D1324

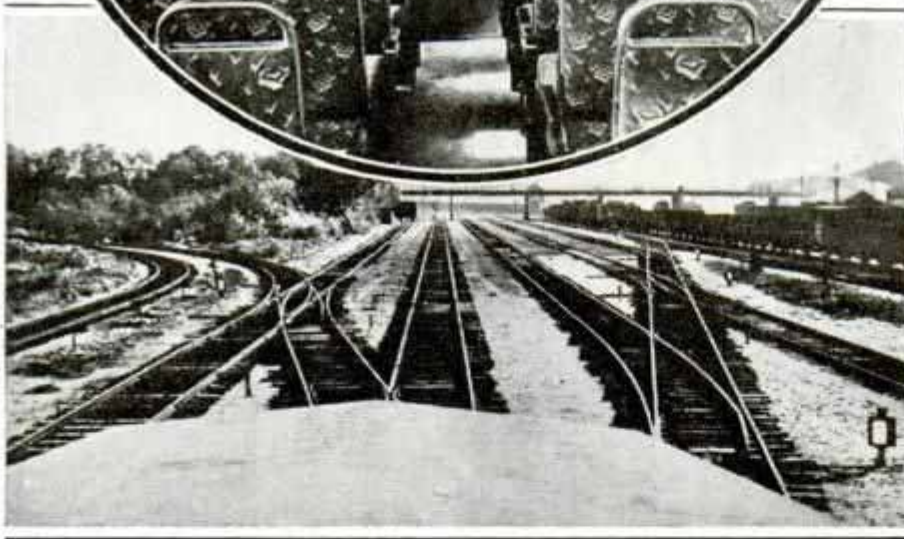
Construction, 114 rue
POPULAR MECHANICS

de la gare, Saint Denis
Seine St. Denis

Cab on Roof of Rail Car Simplifies Control



Top, Rail Car with Cab on Top; Center, Looking Forward; Bottom, View of Track from Driver's Cab



there is no driving compartment at the front. The engineer's cab affords a full view of the track.

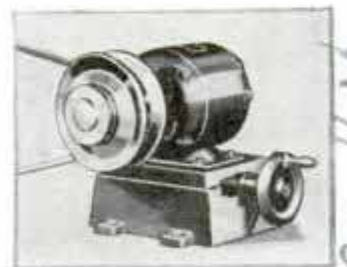
D1656

PULLEY SPEEDED UP BY MOVING MOTOR

By moving the motor base, the speed of driven machines can be increased or decreased through the automatic change in driving circumference of a new variable speed pulley. The pulley consists of two half pulleys with slotted faces permitting them to interlock and

Simplified control of a new French rail car is attained by raising the engineer's cab above the level of the car roof in the center of the vehicle. From that position, the engineer operates the Diesel engine and gears, in addition to opening and closing the doors for passengers. The doors are visible to the engineer through small windows in the cab. Since the car has reversible gears, the engineer merely reverses his seat at the end of the run and starts the return trip. Passenger seats are reversible also. Exceptional visibility for passengers is one feature of the car, since

give a drive effect to the entire pulley. Moving the base of the motor causes the half pulleys to approach each other and increase the circumference of the entire pulley or to separate and decrease the circumference. The variation in speed results from ability of the V-belt to drive from any diameter resulting from movement of the pulleys.



New York

Winfield H. Smith, Inc.
Manufacturers of Variable Speed Pulleys

PHOTOS ARE COPIED IN MARBLE WITH AID OF "DUAL VISION"

Making marble bas-reliefs from photographs has been made possible by a method developed by Albert H. Bumstead, of the National Geographic Society. The customary procedure is to make a wax, plaster or clay impression and then to copy on a marble slab. The new method utilizes a "dual vision" device which consists of a prism with two reflecting surfaces mounted on a steel arm clamped to the bench. The picture to be copied is held on a movable frame in front of the slab of marble. Lights mounted close by bring out the re-

D/650

make engraving

Washington D.C.



Searching a Jail Visitor for Hidden Weapons by Subjecting Clothing to Detector

The Courts Call to Shelby Ohio
Chicago - 8/2
W. March Ave
Thomas J. Hornaday



Marble Sculptor Using "Dual Vision"; Inset, Finishing Bas-Relief from Photo

... relief as it is cut in the marble. The sculptor marks identification points on the photograph and then, swinging the prism into position, gazes through it until he can see the image of the photograph reproduced on the marble. This usually necessitates adjustment of the picture or marble until the desired dual vision is established. The known marks on the photograph are then reproduced on the marble, being used as "base marks" of the bas-relief. After the rough outlines have been sketched on the marble, the artist completes the bas-relief from the photo.

D/615

SMALL DETECTOR FINDS GUNS HIDDEN IN CLOTHING

Weapons hidden in the clothing of visitors to some jails are detected by a small photo-cell device super-sensitive to metallic substances. Applied to visitors, the de-

vice indicates the presence of weapons and prevents smuggling them to prisoners.

D/664

DUMMY SERVES AS A TARGET FOR TREASURY GUARDS

Treasury guards at Washington are being encouraged to improve their marksmanship with a large dummy of a man serving as a target. Numbers on the target enable the accurate checking of hits and the scoring of the marksmen.



Dummy Used as Target by Treasury Guards

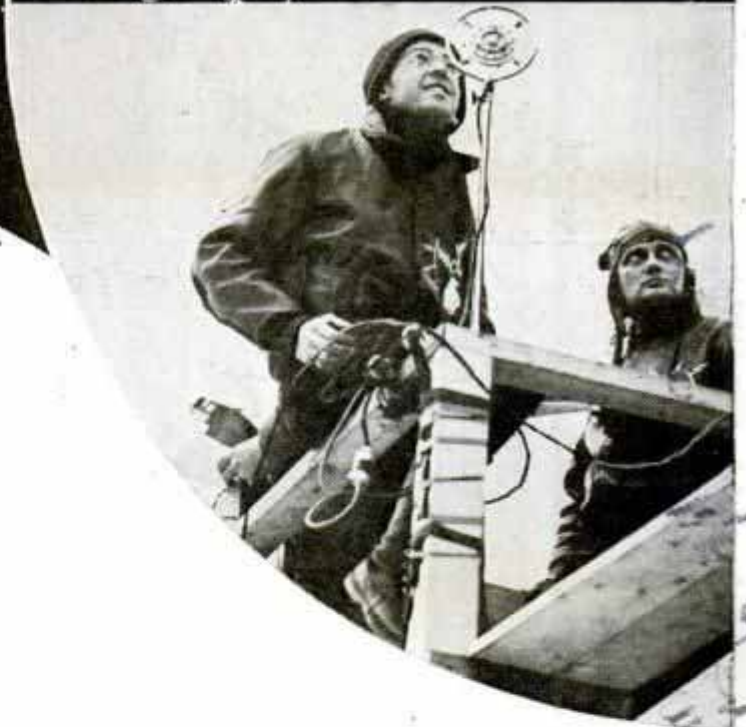
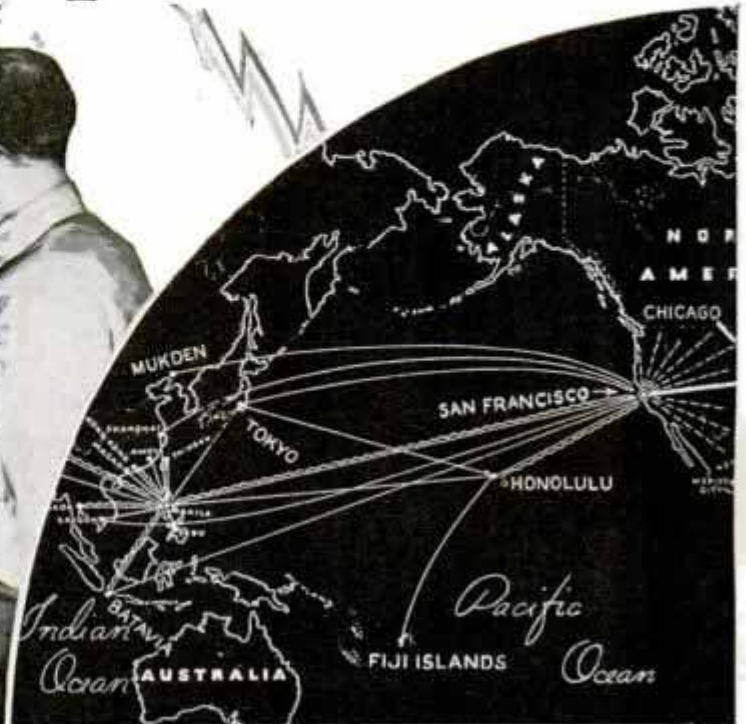
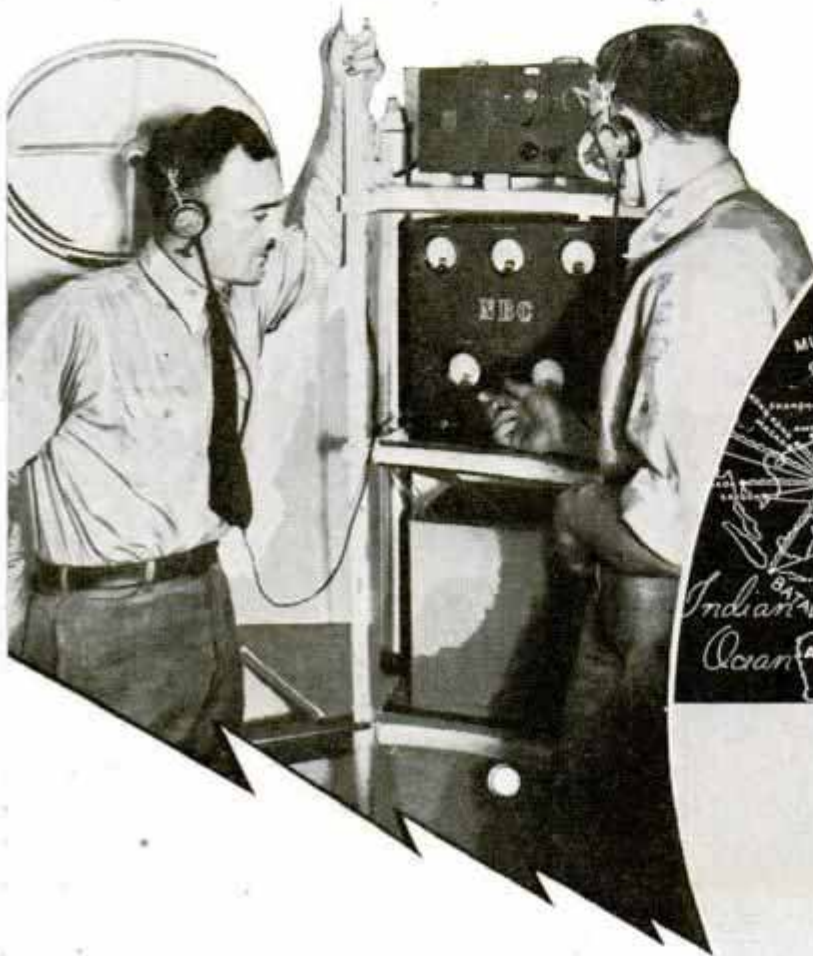
club

also Sletnick Carb
27 4 54
revised

one made by Paul W.

701610
228 69th
newsreel

"On the Spot" with the



TUNE in your radio on almost any important American broadcasting station, and you may hear the actual eruption of a volcano in Hawaii, a king speaking to his subjects on the other side of the world, an announcer broadcasting from a submarine or some other event which you will read about in tomorrow's newspaper or see in this week's newsreel.

This new radio science brings you events as they happen, not in a broadcasting station but on land and sea, in the air, and beneath the surface of the ocean. During the past five years, science has harnessed the radio short waves until they have become the important vehicle which carries news and other features of interest into the studio of your favorite radio station which rebroadcasts to you. And this rebroadcasting is done so rapidly that you may hear an event as it occurs.

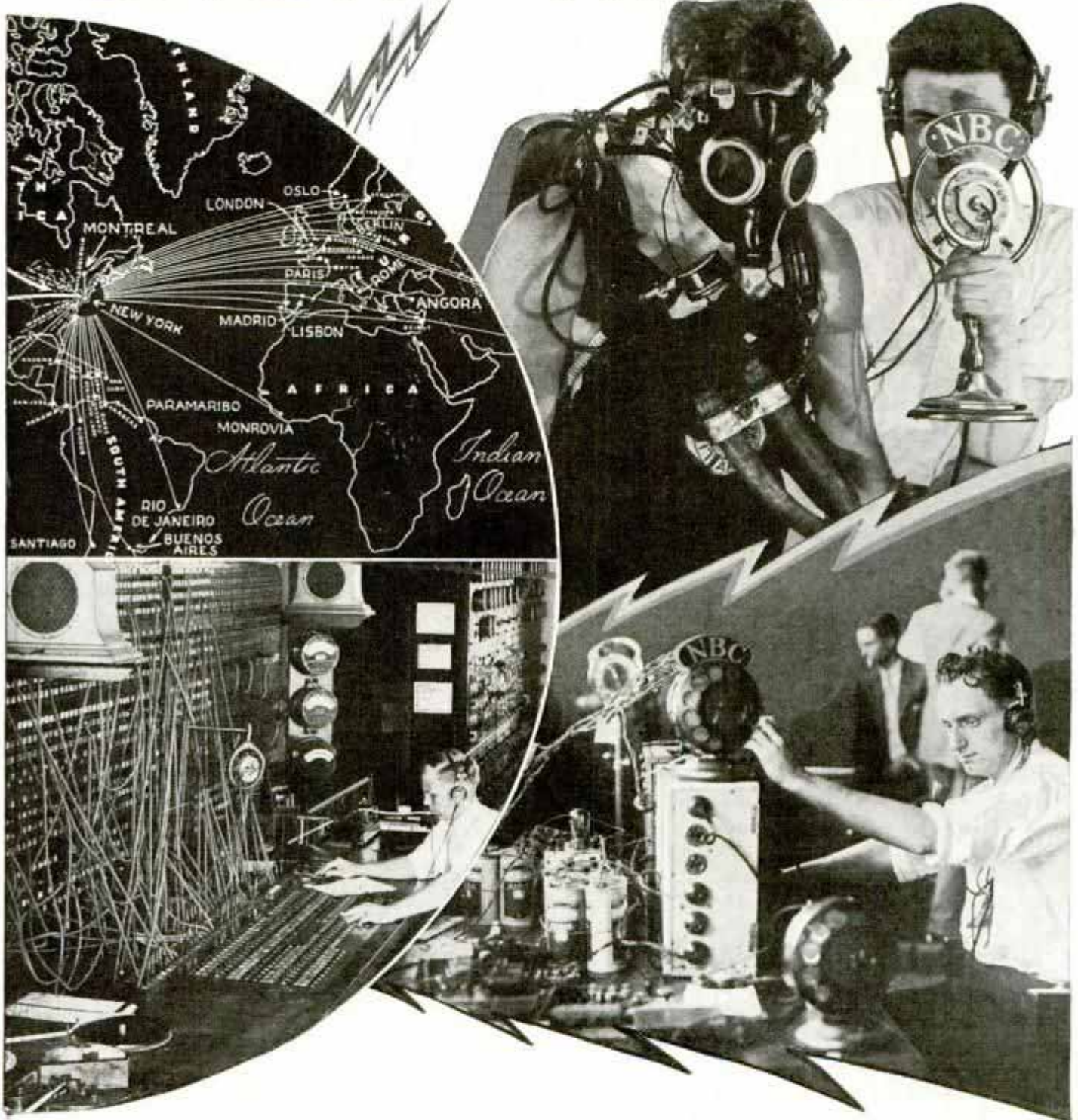
Previous to 1929, although there were occasional broadcasts of "on the spot" events, they were broadcast by announcers

Above, Short Wave Equipment in Stratosphere Gondola; Below, Broadcasting Ski Meet by Short Wave

whose voices traveled over telephone wires from the scene to the broadcasting station and the possibility of an eye-witness description was limited to the availability of the telephone "pipeline." Today the short waves have greatly supplanted the need for the telephone line, thus increasing the possibilities of "on the spot" broadcasting.

D160

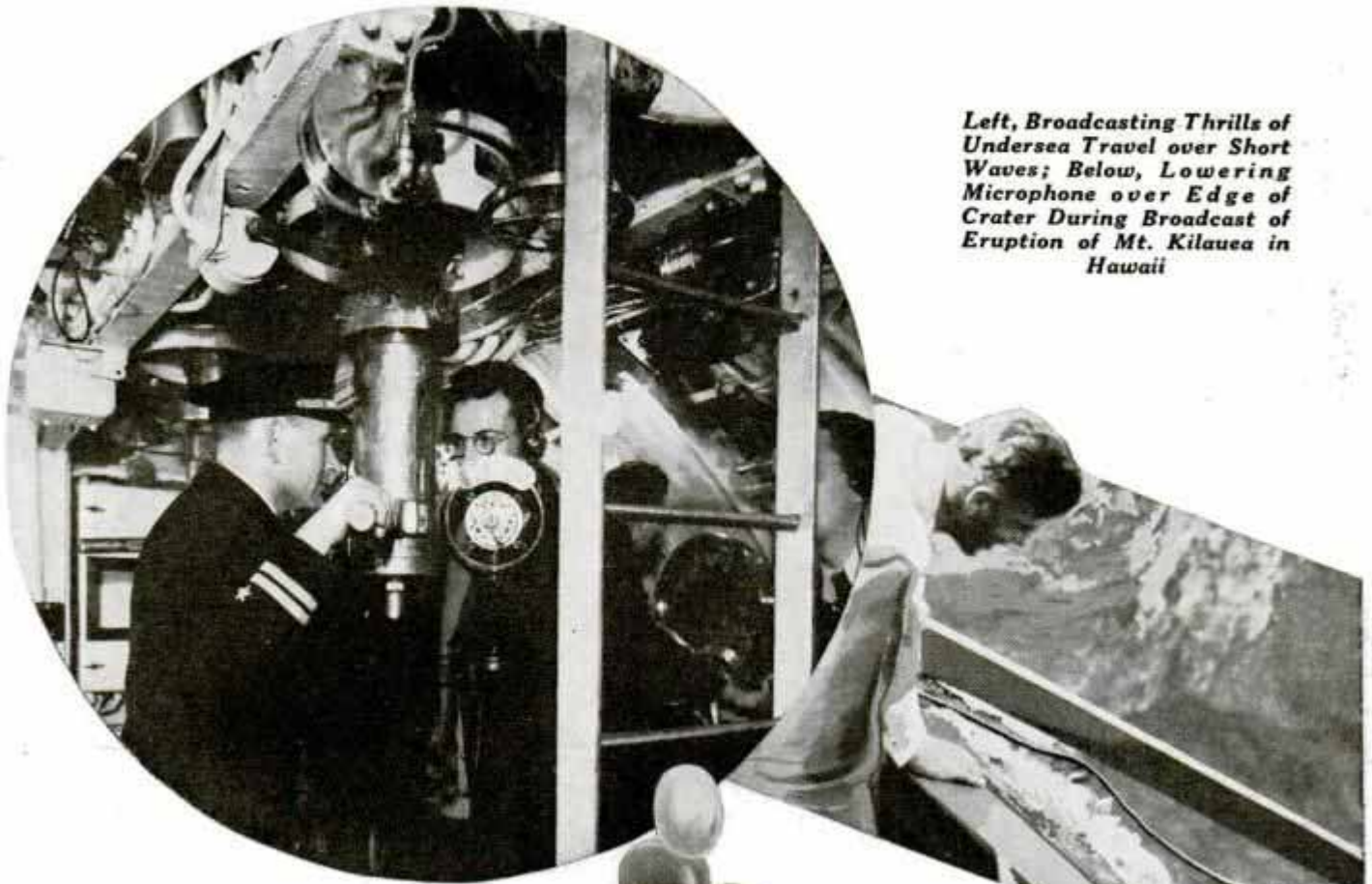
SHORT WAVES



Switchboard over Which Foreign Broadcast Is Relayed by Wire, Map Showing Some of Points Reached by Short Wave, Broadcasting by Short Wave and Field Station Where Broadcast Is Relayed

"So insistent have become the demands of radio listeners for 'on the spot' descriptions of outstanding events that during the past year we have had 322 rebroadcasts from sixty-three foreign countries and more than 225 rebroadcasts originating within the United States," states Burke Miller of the National Broadcasting com-

pany. "These rebroadcasts, constituting a veritable 'newsreel of the air,' have varied from an interview with the Russian ambassador aboard a tugboat entering New York harbor, to a running description of the presidential naval review as seen by observers at nine separate points; and from a description of the trial run of the



Left, Broadcasting Thrills of Undersea Travel over Short Waves; Below, Lowering Microphone over Edge of Crater During Broadcast of Eruption of Mt. Kilauea in Hawaii

Burlington Zephyr to the navy flight from San Francisco to Hawaii."

The science of rebroadcasting has fallen into two general classes. The first includes broadcasts from foreign countries which are received here and rebroadcast by the radio network on its regular domestic wave lengths. The second class includes short wave broadcasts by announcers of the broadcasting companies within the United States. These announcers and their engineers either carry portable short wave transmitting sets or ride in cars which carry these sets to broadcast to their parent station, which in turn rebroadcasts..

The broadcasting station orders its programs in advance from a radio communication company and they are "delivered" to the station just as a radiogram would be. R.C.A. Communications, Inc., with a transatlantic receiving station at Riverhead, Long Island, and transmitting station at Rocky Point, a transpacific receiving station at Point Reyes, Calif., and transmitting station at Bolinas, is the medium through which the program is received from or sent to a foreign country.

"If the National Broadcasting company



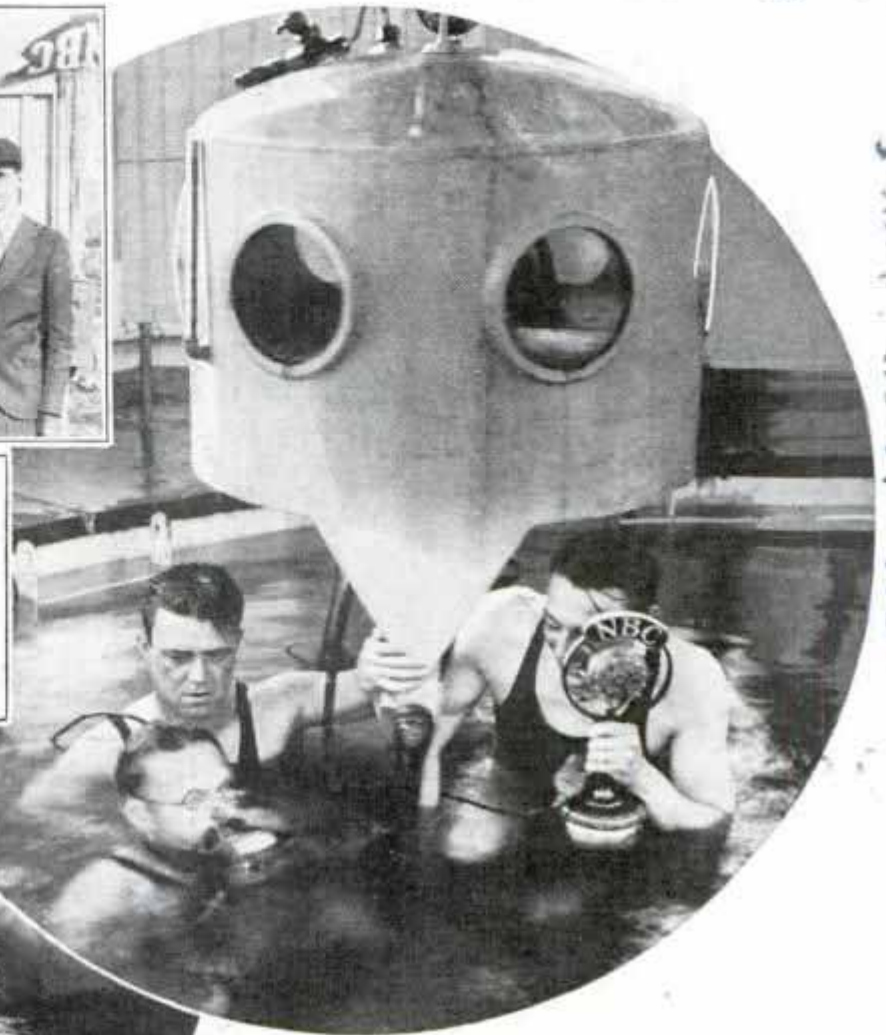
Balloons Supporting Antenna of Mobile Radio Unit; Their Use Is No Longer Necessary



or the Columbia System wished to receive a program from England," states William A. Winterbottom of R.C.A. Communications, Inc., "the program usually is ordered days or weeks ahead for delivery to the studios. We provide a point-to-point service, just as in the transmission of com-



Above, a Short Wave Crew Ready to Take the Field; Right, Ready for a Broadcast from the Life-Saving Apparatus Known as the Momsen Lung



mercial radiograms, except that the 'addressed program' is delivered to the broadcasting company's studio from our central operating office over high quality wire circuits, and is charged for on a time basis.

"One of the most important achievements in short wave development is known as 'diversity reception,' an R.C.A. development which to a large extent overcomes the 'fading' occurring on short waves. Diversity reception equipment consists of three antennæ spaced about 1,000 feet apart in triangular arrangement, each connected to a separate receiver. The outputs of the three receiving sets are added together with the result that, when the program to which the receivers are tuned fades out on any one antenna-receiver combination, the other two continue to

receive it clear and strong. The received program is passed along as an audio frequency signal by special wires to the central radio operating office of R.C.A. Communications. From there it is connected through a control board to the American network to which it is addressed."

The second class of rebroadcasting, that of an announcer broadcasting in the field to his own local station or network for rebroadcast constitutes one of the most thrilling modern professions.

"Almost any broadcast has been made possible by the rebroadcasting of short waves," says Mr. Miller. "The microphone now goes to the scene of action. The world is the limit! Science has been developing practical short wave transmitting apparatus until portable sets have become so compact that they have been used to broadcast from a descending parachute."

Of the portable sets, the "transient transmitter" offers a wide range of flexible possibilities. It weighs only twenty-four pounds. The transmitter proper is con-

(Continued to page 126A)

BRILLE WATCH FOR THE BLIND HAS RAISED TIME DOTS

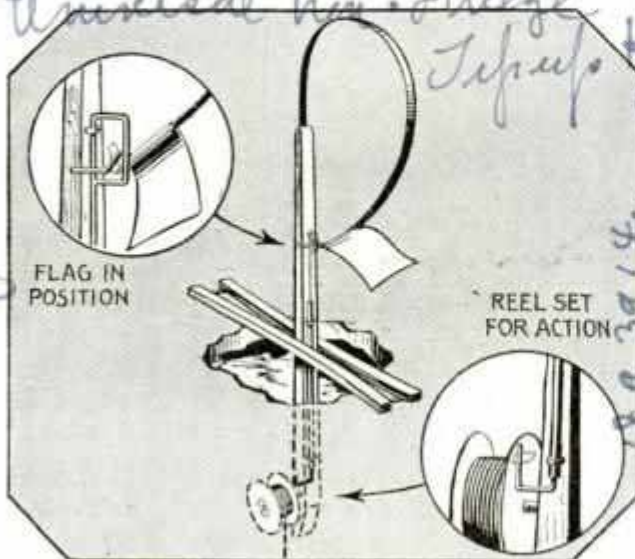


"Face" of Watch for the Blind; Raised Dots Replace Hour and Minute Hands

Raised dots replace the hands on a watch designed for the blind. The dial with the dots revolves under an opening, the top portion of which tells the hour and the bottom the minutes. The watch is fitted with a case to prevent damage to the dial.

FLAG FOR ICE FISHING TRIPPED WHEN BAIT IS SNATCHED

Lines do not become frozen or tangled in ice fishing if a tip-up, or tilt, with under-water construction is used. The reel



Tackle for Ice Fishing Which Prevents Lines from Becoming Frozen or Tangled

and line both are under water where they are unaffected by freezing temperatures. The mechanism causing the flag to spring up when there is a strike is enclosed in a brass tube permanently filled with a non-freezing lubricant. Thus, it is unnecessary to keep the water from freezing around the tip-up as with ordinary tackle. The equipment folds compactly for carrying.

POCKET MICROSCOPE LIGHTED WITH SMALL FLASHLIGHT

Only a small flashlight of the fountain-pen type is required to illuminate a portable pocket microscope, a tube projecting obliquely upward from the base acting as a socket to hold the light, the beam of which is directed into the hemispherical base. The instrument is designed for the



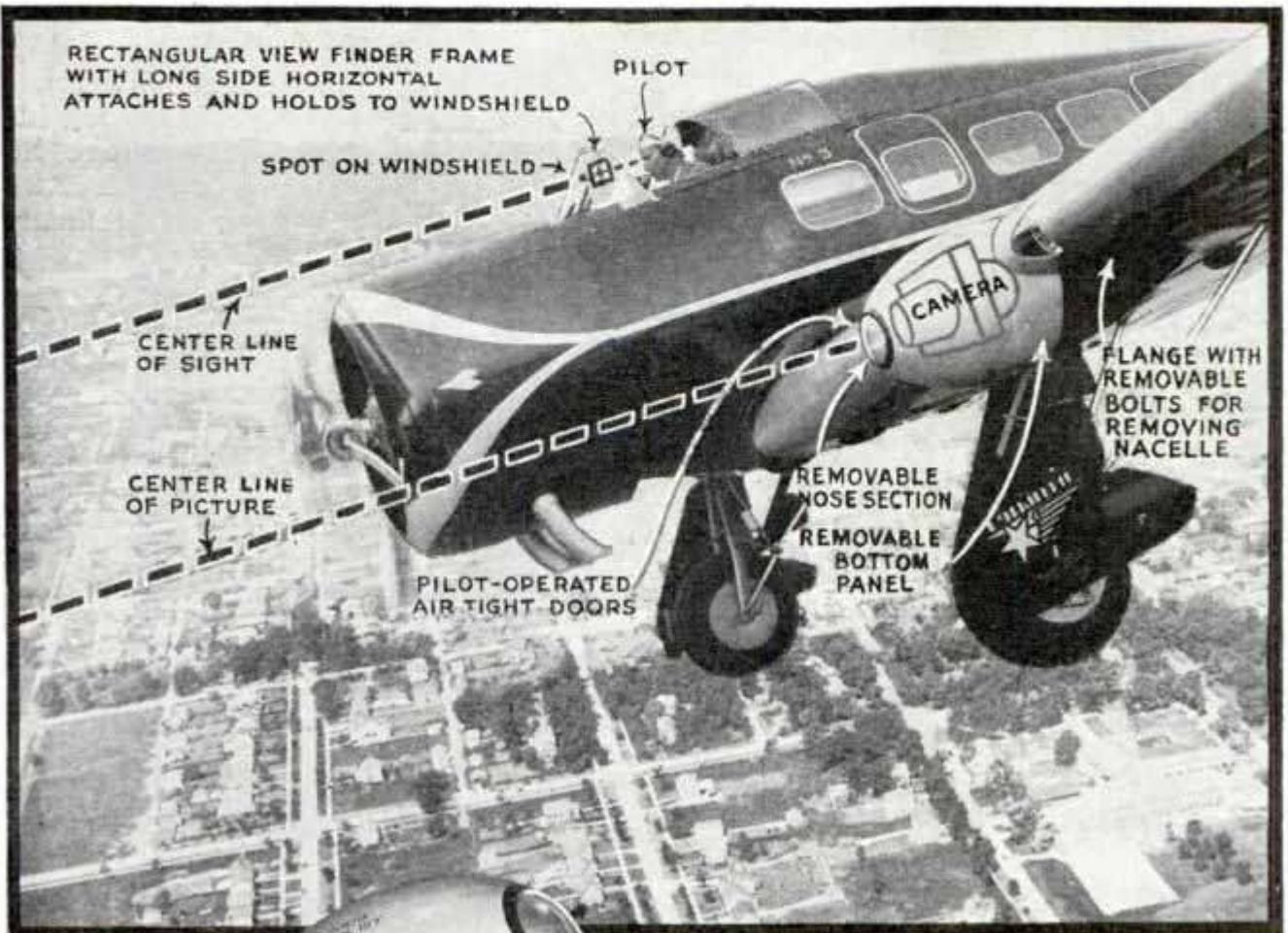
Light Is Furnished for This Pocket Microscope by a Fountain Pen Flashlight in Base

rapid inspection of paper, metal and other objects of flat, granular or irregular shape by mechanics, inspectors, students and engravers. Four different magnifications can be obtained. To examine an object, it is placed on a flat surface and the microscope is rested on top of it, the hollow base enclosing the small portion to be examined. The flashlight illuminates this portion, and light is intensified by the white enameled interior of the base. Focusing is done in the usual manner.

75¢. 5 for \$2.50

The Fishcrafters, Worcester, Mass. Esartner Corp. 1201 Wrightwood Chicago

D. 1688
to United Air Lines
United Airport, Burbank
'Flying Camera' Aimed Like a Machine Gun
Calif

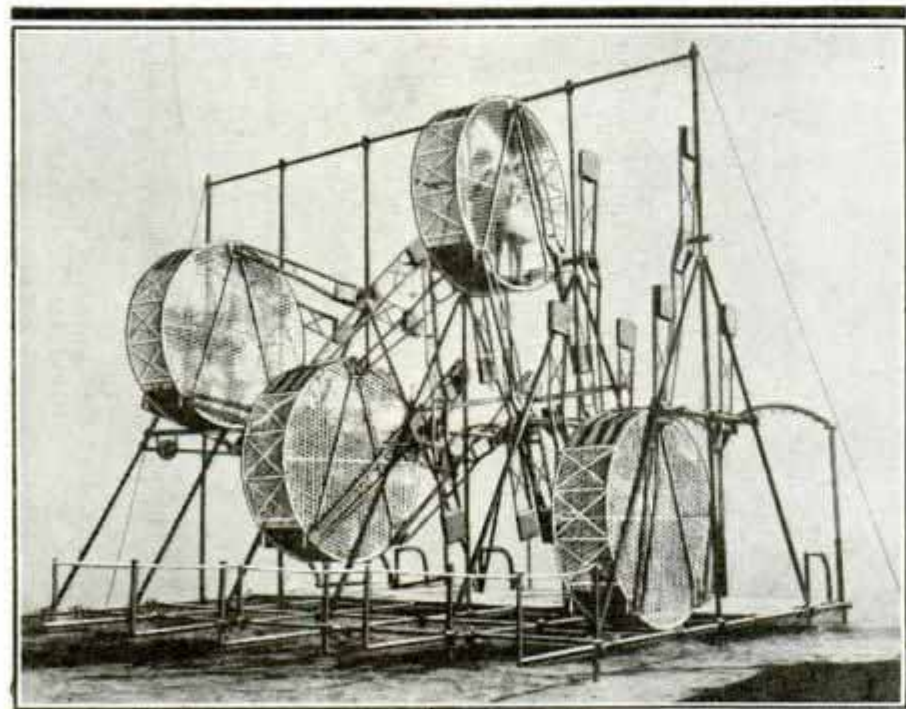


Top, Photo-Diagram of Camera Plane Showing Location of Camera in One Wing; Bottom, Installing Film Magazine in Camera Compartment Preparatory to Taking Aerial Pictures

Containing cameras that take pictures ahead, behind and straight down, a 300-mile-an-hour plane recently was completed by the Lockheed Aircraft corporation. One camera, built into the leading edge of one wing, about eight feet from the cabin, is aimed by pointing the nose of the ship at the subject to be pictured. A gunsight on the pilot's windshield serves as viewfinder. Then, as the plane speeds toward the subject, the pilot presses a button on the control stick, causing the automatic camera to snap a picture every two seconds. Auxiliary cameras are located conveniently for "shooting" pictures straight down and to the rear. These also work automatically. The cameras contain the finest aerial lenses obtainable. An automatic pilot device has been installed to allow the pilot-cameraman complete freedom to take pictures. The plane is rated at 300 miles per hour at 30,000 feet and can be equipped for either land or water service. Its cabin has seats for three passengers. The "flying camera" will be used by the Detroit News.

Burbank, Calif

Self-Powered Loop-the-Loop Is Latest Ride



then on, the car operates like the old rope swing, the rider providing momentum by moving his body. The more he swings, the more the car moves until it finally makes a complete revolution and loops the loop. The cage always is in upright position, assuring riders of complete safety. Several cages may be set up in the same framework and operated singly or simultaneously.

Top and Right, Latest Amusement Ride; Cages Remain Upright Even While Looping-the-Loop under Momentum Provided by Rider

Operated almost entirely by the rider, a new loop-the-loop amusement device has been introduced. Most of the mechanism consists of six arms extending above circular-shaped cars and equipped with heavy counterweights. When the rider steps into the car, an electric motor starts it. From



Electric Moth Exterminator Destroys Pests by Gassing

All forms of moth life are destroyed within twenty-four hours, it is claimed, by an electric exterminator consisting of an electrical unit with a controlled heating element and a metal container of liquid chemical. The heat generates a harmless and odorless gas in suffi-



cient concentration to destroy the moth eggs as well as other stages of moth life. The unit can be used in closets or small rooms. The electrical unit is plugged in and placed on a shelf, the container of fluid is placed on the electric unit and the cap removed. The exterminator then is allowed to operate for about twenty-four hours, the closet or room being sealed as tightly as possible for this period. The treatment is harmless to fabrics and when the closet is opened no offensive odor remains in the garment or the closet.

2-58

*Moth King Corp
759 W. 2nd Ave*

Panoramic Pictures Help Locate Forest Fires

Next summer, whenever a lookout observer in Lassen Volcanic National Park "spots" a fire, he will report something like this:

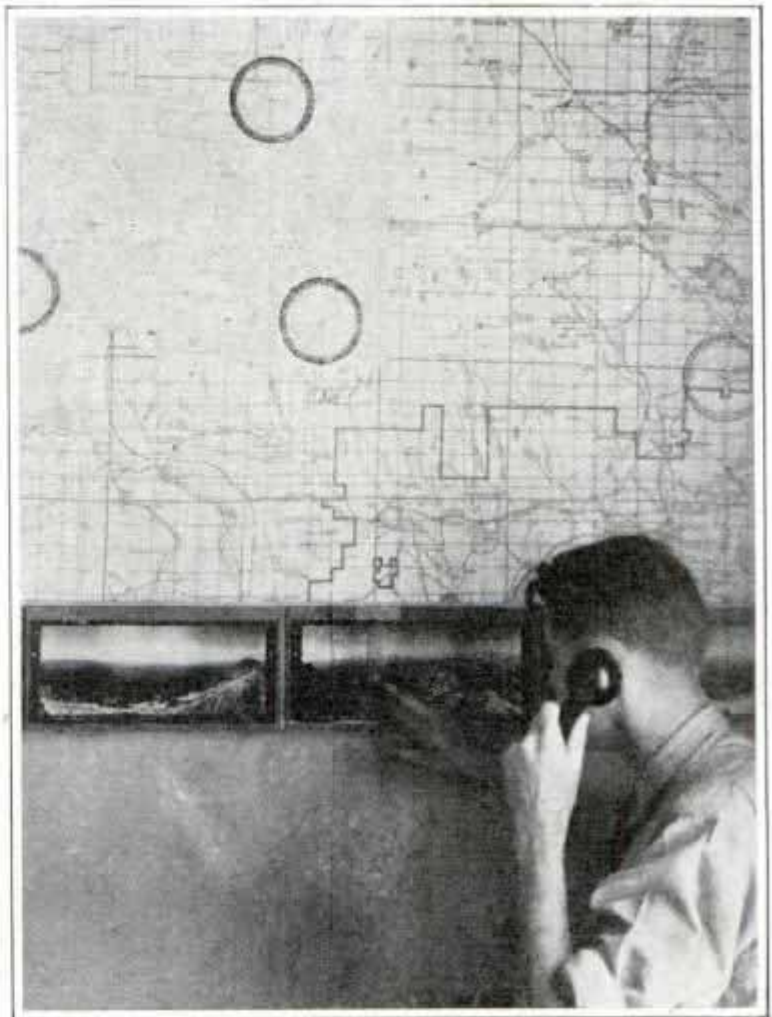
"Hello, calling the dispatcher at Park headquarters. This is the lookout on Mt. Harkness. Got a fire for you. The reading is 276 and vertical minus nine."

The dispatcher refers to a map, notes the location of the fire and on photographs, determines the nearest ranger or fire guard and calls him, repeating the information and within four minutes the fire fighters are on the way. The two readings contain the key to a simple system recently developed. Here is how it operates:

At the dispatcher's office and at each ranger or fire-guard station there are a map and set of photographs. The map shows each lookout point which is circled by a 360-degree protractor. The lookout spots a fire, determines the location on a finder by means of azimuth readings and phones the reading to the dispatcher who, on map protractors locates the direction of the fire from the lookout. Should two lookouts report, the point at which the readings intersect will be its location.

Frequently, however, two lookouts cannot see the smoke. Then all that is known is that the fire is somewhere on a line in a given direction from the lookout who can see. This lookout must supplement the reading by stating the fire is on a certain ridge or in a known canyon. This often is impossible so a new method has recently been developed.

By this method, panoramic photographs are taken of the country covered by each lookout. Copies of the photographs are in each station. On each copy, a horizontal base line is drawn, and graduations marked on a celluloid scale give degrees above and below this base line. A fire is located on the photograph automatically by the fire-finder instrument. The number of degrees below the base line that the fire occurs is phoned to the dispatcher who relays this



Locating Forest Fire with Panoramic Photos of Region after Lookout Has Told Direction of Fire from Him

information. The suppression crew take their photographs, run the scale to the azimuth reading and note the country indicated by the vertical reading. This is the location of the fire, and the men are able to "see" the country almost as well as the lookout himself.

LONG-HANDLED PAINT BRUSH



Varnish, shellac, liquid wax or paint can be applied easily on the floor by using a brush equipped with a four-foot handle. The finish can be spread evenly and four times faster

with the six-inch brush and the long handle makes it unnecessary to stoop.

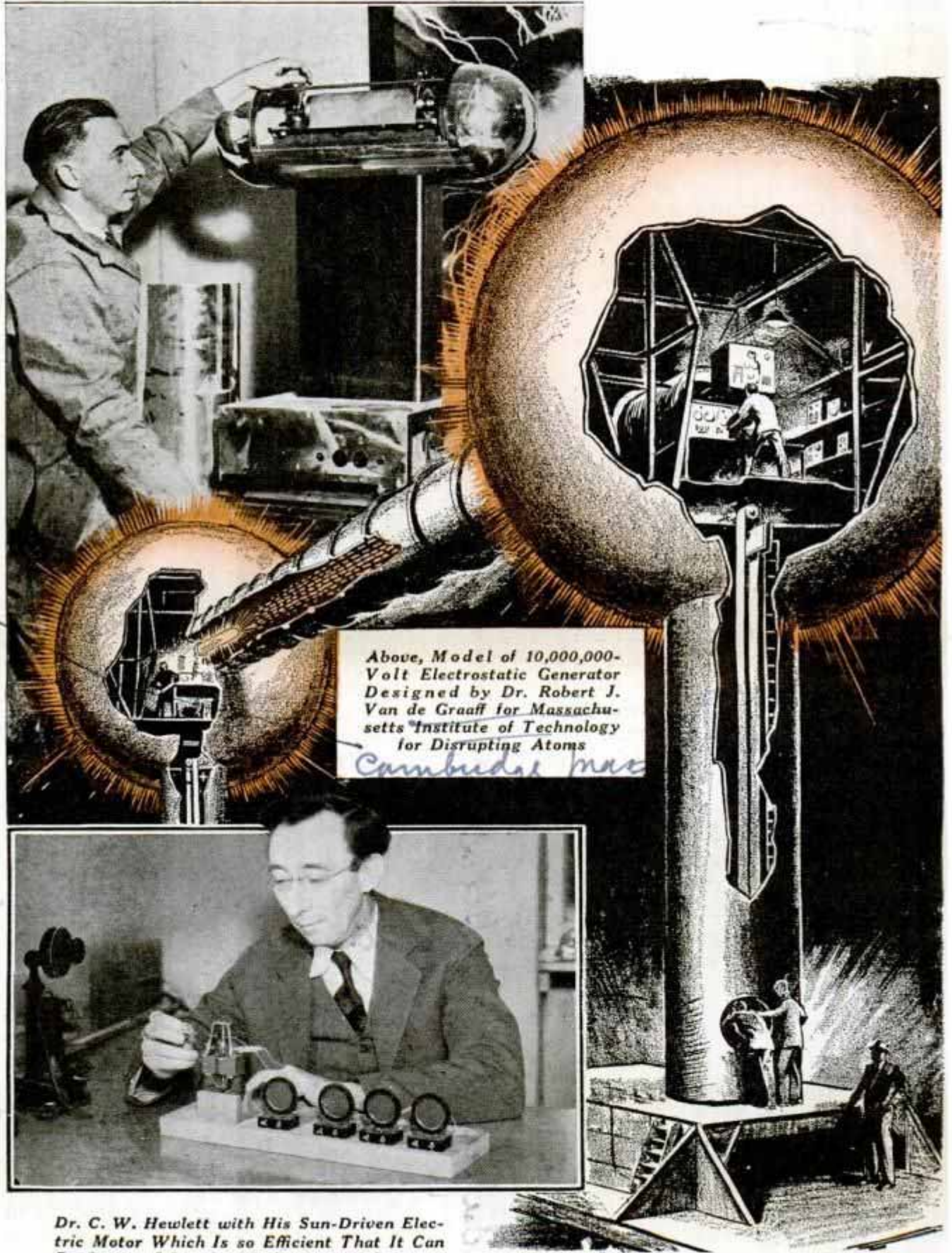
Super Clean Applicator
60.
29 Swabach
De Vol & Clay holds
111 49th New York

ee 17

Cent. Leon Glassman
4 W. 103rd St. New York

ADVENTURES of the

see - Feb 1934 - 176



Above, Model of 10,000,000-Volt Electrostatic Generator Designed by Dr. Robert J. Van de Graaff for Massachusetts Institute of Technology for Disrupting Atoms
Cambridge Mass

Dr. C. W. Hewlett with His Sun-Driven Electric Motor Which Is so Efficient That It Can Be Operated by the Light from a Seventy-Five-Watt Lamp; It Is Rated at Four Ten-Millionths of a Horsepower

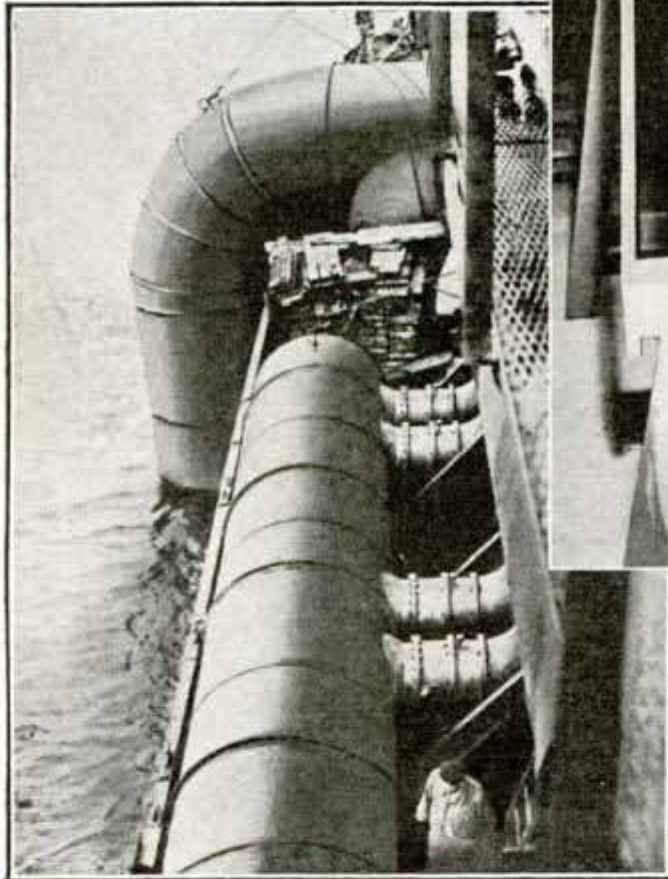
Diagram of Van de Graaff Generator, Showing Cylinders Mounted on Trucks and Aluminum Spheres

POWER EXPLORERS

WILL the Golden Age of mechanics and invention collapse for lack of power?

The power requirements of homes and industries are increasing at a rate which alarms fuel conservationists. The world consumes about 1,300,000,000 barrels of petroleum a year, while coal is being burned at the rate of about 1,500,000,000 metric tons yearly.

What will industry do when the ever-increasing demand for fuel



Above, Dr. Charles G. Abbot's Solar Cooker Which Concentrates the Sun's Rays to Develop a Temperature of 400 Degrees Fahrenheit in Twenty Minutes; Left, Ship Factory with Which Prof. Claude Expects to Produce Ice from Tropical Waters

see Jan-19 35-12

sends prices skyrocketing and makes uneconomical the operation of furnaces and engines which now do the hard work of mankind?

To answer this question some renowned men have turned their energies to power exploring. Dr. Charles G. Abbot, of the Smithsonian Institution, recently displayed a sun-cooker which puts to shame many fuel-burning devices. Within twenty minutes, Dr. Abbot's "solar heat collector,"

can reach 400 degrees Fahrenheit and more. He can either generate steam or supply heat to a cook stove that is odorless, clean, and economical in the extreme.

Dr. Abbot's sun engine is not, of course, intended for a region where the sun has a habit of hiding behind the clouds, but in southern countries, where the sun shines steadily, it can be used to good advantage.

As far north as Idaho, on a midsummer day, the sun rains 33,000,000 horsepower

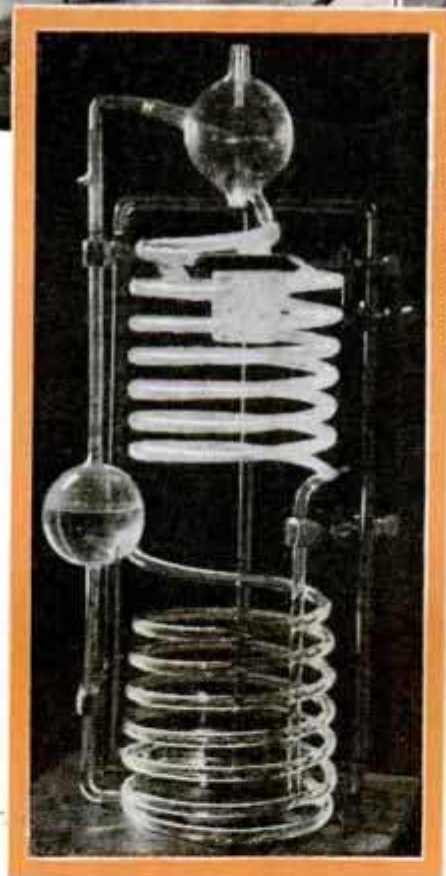
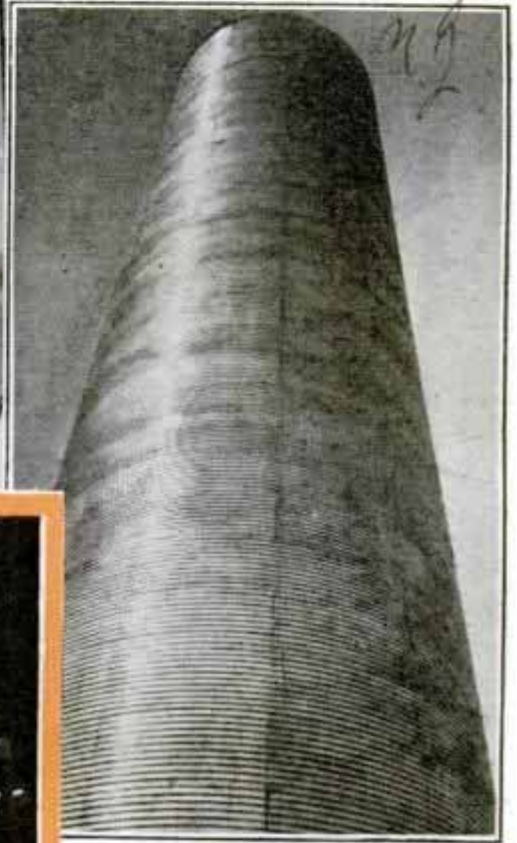
Washington, D.C.

see June 1932 P. 51

Julius Madaras at Motor of His Rotor Power-Plant and One of Revolving Cylinders; Below, Low-Temperature Steam Boiler Which Utilizes Temperature Difference between Wet and Dry Air

at West Burlington

Julius D. Madaras, Pres. Madaras Rotor Power Co. 2146 Broadway, Newark, N.J.



hours of energy on each square mile. And 1,800 times more horsepower falls on the Sahara desert in one year than is contained in all the coal mines on earth. If the earth were embalmed in a layer of ice 424 feet thick, the sun would melt it within one year.

Another power explorer, C. W. Hewlett, of the General Electric company, has developed an electric motor, rated at four ten-millionths of a horsepower, which takes its energy directly from the sun. The device which makes the sun power available to the motor is a super-sensitive photo-electric cell which converts ordinary sunlight into electricity. Even the light from a seventy-five-watt lamp is sufficient to run the motor. The efficiency of Hewlett's new generator photo cells is such that one watt of power can be obtained from about twenty square feet of cell area in direct sunlight.

That veteran power explorer, Georges

Claude, after proving the principle of a thermal ocean power plant, has embarked on a second power-exploring expedition, which takes him to the tropical waters off South America. This time he is attempting to utilize the sun's energy to convert water into ice at a very low cost. The freighter "Tunisie" has been converted into a floating fac-

tory, which will pump cold water from the ocean bottom through a tube 2,100 feet long. This cold water will be used to make the warm surface water boil, producing low-temperature steam. The steam will drive turbines, and the turbines will drive ice-making machinery.

At Burlington, N. J., another power explorer, Julius D. Madaras, is building a \$2,000,000 rotor power plant to make use of

Wide World

any breeze better than six miles an hour. This, too, is an attempt to harness the sun directly, for the sun generates "tides" of air.

Fifty heavy railway carriages, each carrying a rotor, will travel around a circular track and grind out the current simultaneously. Once started by power from the outside, the rotors are to be kept spinning by connection with the wheels.

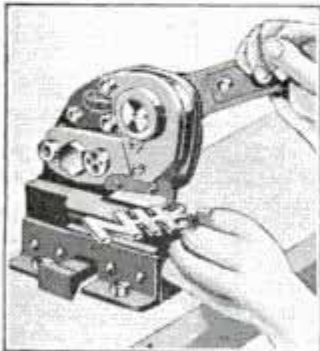
The sun bows respectfully to the moon in another power-development scheme, sponsored by a prominent power explorer, Dexter P. Cooper. He plans to harness the roaring fifty-foot tide at the Bay of Fundy, off the coast of Maine. The possibility of developing large quantities of power on this site has been studied for years by Cooper and his staff, who have made plans which are approved by the war department's engineers.

Half a million dollars have already been spent on the preliminary surveys, and no doubt remains that a tidal power station is entirely practical. The Bay of Fundy tide will generate 200,000 horsepower if the power project is confined to the American side. If the project takes in the Canadian side, it will generate 600,000 horsepower.

Those are some of the solutions which inventors and engineers are presenting in an attempt to maintain the progress of industry even in the face of a diminishing fuel supply.

HANDY METAL NIBBLING TOOL FOR HOME WORKSHOP

Handy for garage or the home workshop, a small hand-operated tool is available for shearing and nibbling sheet metal and for cutting rod stock without sawing.



Held in a machine vise, it will cut templates, designs and letters in any shape desired in one-tenth the time required for such work with ordinary methods. Two special blades are supplied for nibbling, one for inside and one for outside. The capacity of the rod cutter is five-sixteenths of one inch.

national machine tool Co. Boston, Mass.

CIRCULAR SAW IS ATTACHED TO TRUCK DIFFERENTIAL

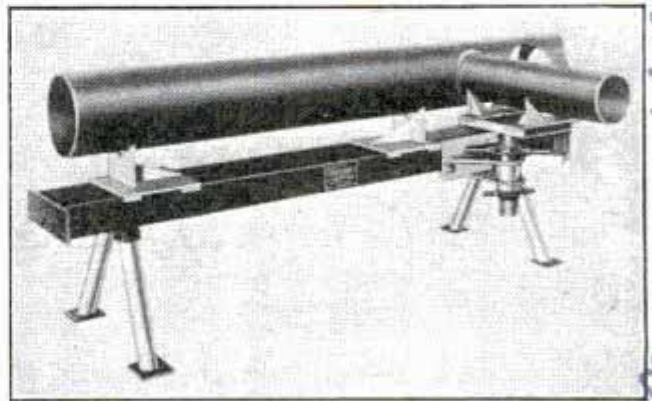


Circular Saw Being Operated from Truck Differential

Power to operate a circular saw is supplied by the car which hauls it by attaching the tool directly to the differential of the machine. By means of a clutch, the saw can be thrown out of gear, allowing the vehicle to use the engine for motive power.

METAL BENCH LINES UP PIPE AND FITTING FOR WELDING

Pipe, fittings and flanges can be lined up for welding by using a new metal bench. Four legs support a main bed consisting of two metal beams. An end plate to support the pipe is located at each end. The fitting to be attached to the main section of pipe is supported on a swivel table supported on a cross piece, the table being raised or lowered as desired.



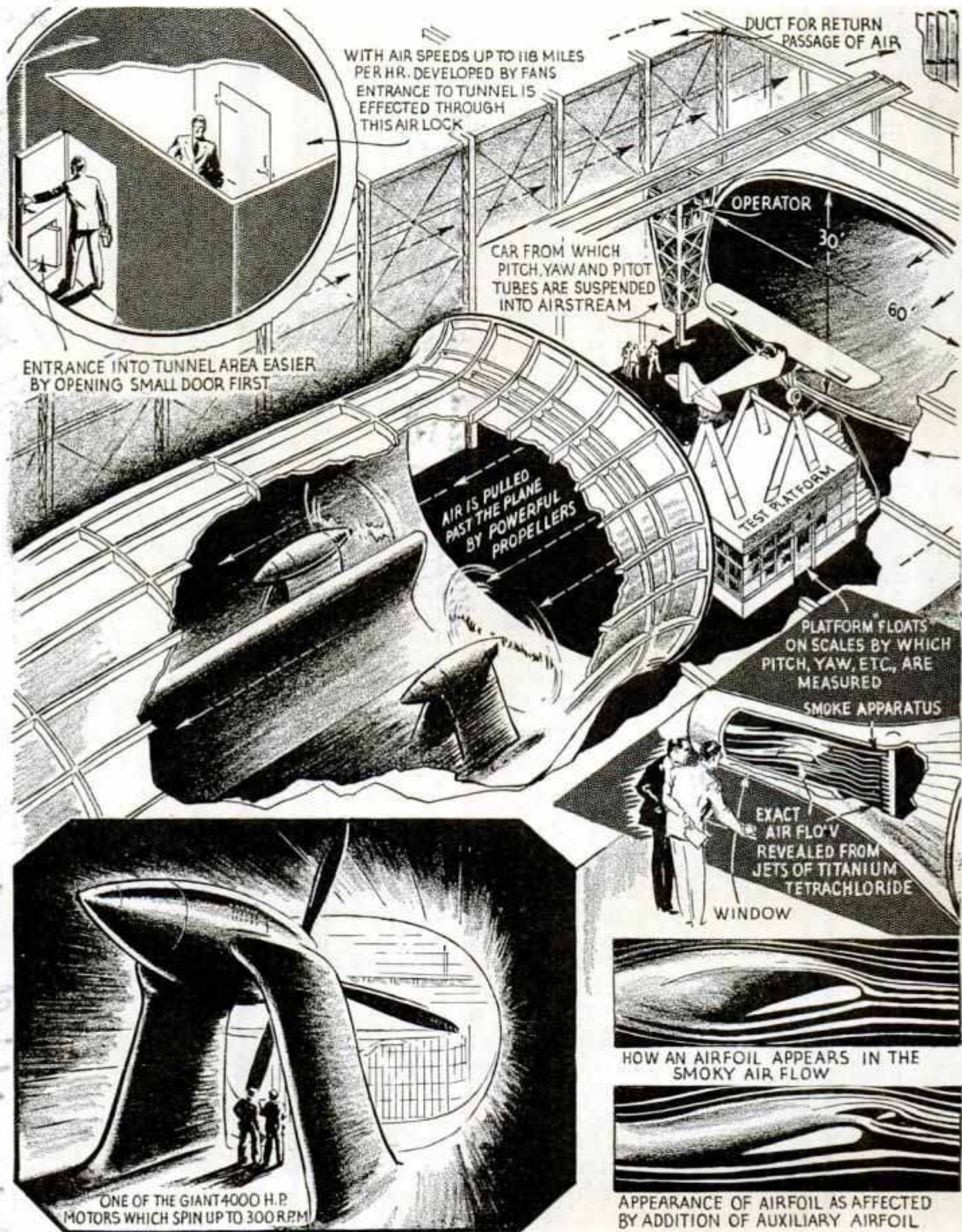
Pipe and Fitting Ready for Welding

Oster. Williams 2057 861 ab

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520

Full-Size Planes Tested in Big Air Tunnel

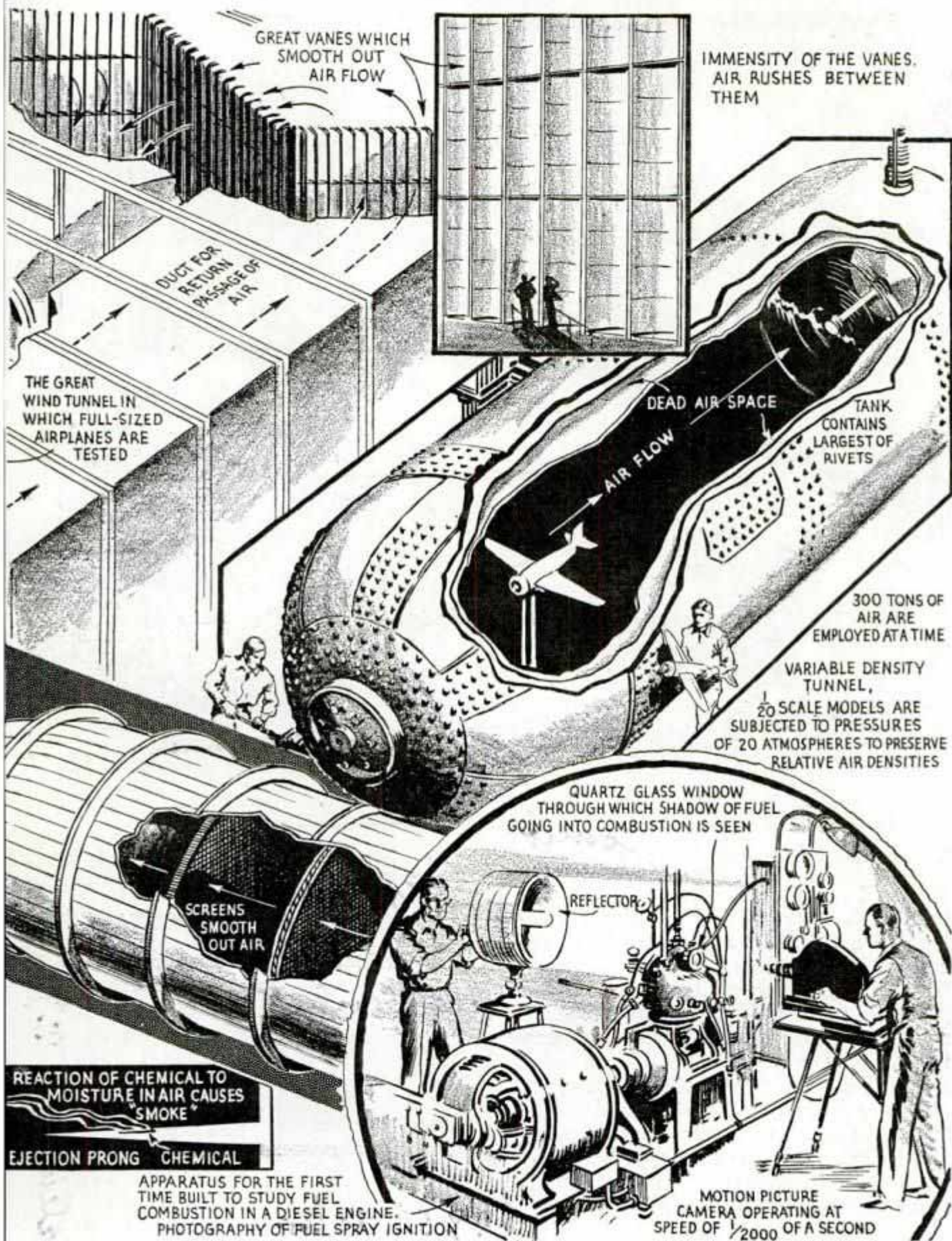


Drawings Courtesy National Advisory Committee on Aeronautics

Airplanes with a Wing Spread Up to Fifty Feet Can Be Tested in This Giant Wind Tunnel of the Langley Memorial Aeronautical Laboratories; Note Vanes Which Smooth Out Air Flow

Washington, D.C.

High-Speed Camera "Sees" Fuel Combustion

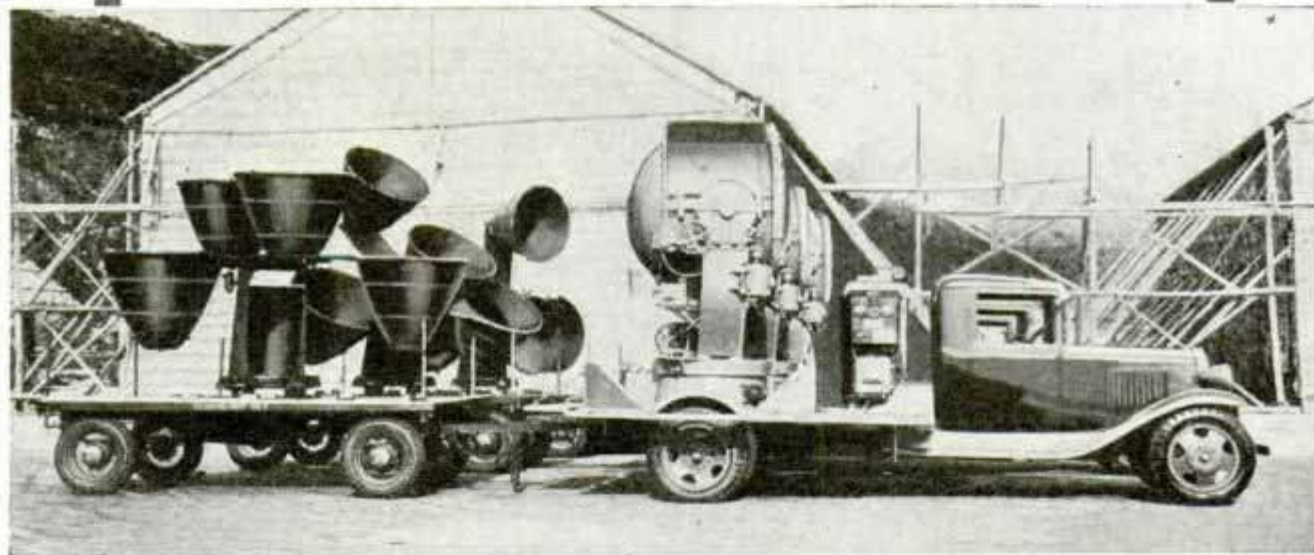
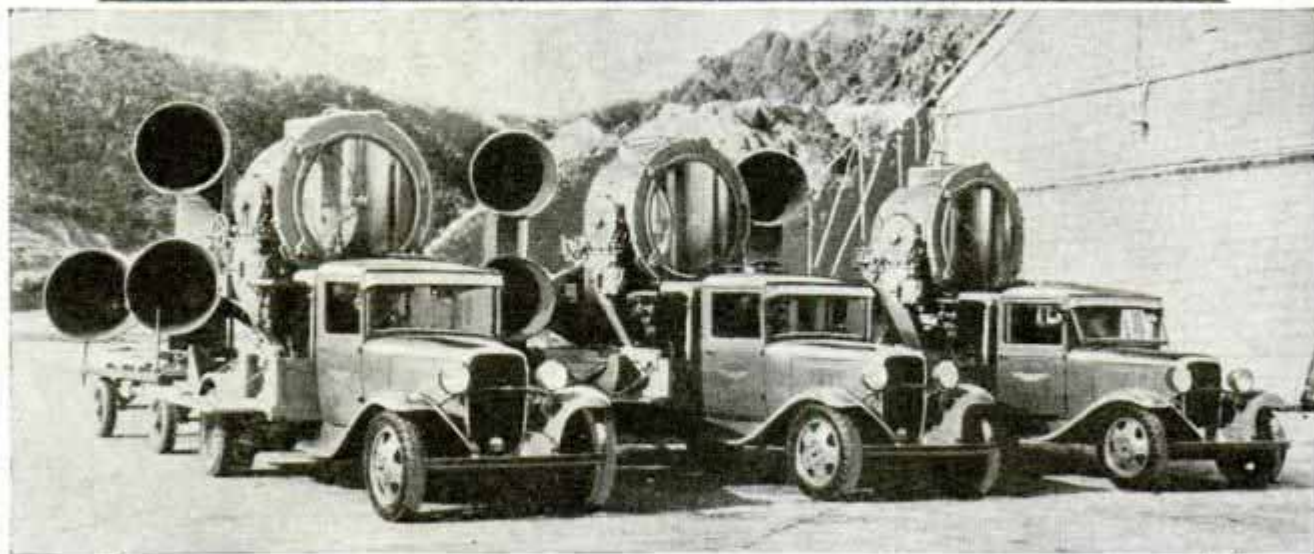


Variable Density Tunnel Where Models Are Tested at Pressures of 300 Pounds to the Square Inch and Drawing Showing How High-Speed Cameras Are Employed to Study Fuel Combustion

Trucks Bear 'Ears' and 'Eyes' to Spot Planes

*from Chevrolet Motor Co.
420 W. Milwaukee
Detroit, Mich*

D 1518



Anti-Aircraft Equipment Used in China Includes These Great Searchlights and the Electric Sound Detectors and Direction Indicators to Locate Enemy Planes

China is prepared to combat an air attack with the most modern anti-aircraft equipment, including a fleet of American trucks carrying powerful searchlights and generators to supply power to the lights and to their motor-driven elevating and transversing mechanisms. With each searchlight truck goes a trailer bearing an elaborate system of electric sound detectors and direction indicators, by means of which listeners learn of the approach of an airplane long before it comes within range of the lights or the anti-aircraft artillery.

E-53

"FIREMAN" FOR COAL FURNACE

Cheaper fuel can be burned in the coal furnace by using an inexpensive firing unit



\$47.50 dealer

that comes complete with room thermostat and automatic switch for controlling boiler pressure or hot water. It is operated by a sixty-cycle, alternating-current motor that is entirely inclosed. Buckwheat coal, smaller and cheaper than that used ordinarily, can be burned by the "fireman."

Germany is experimenting with a type of Diesel engine which burns oil produced from hard-coal tar.

*Dept. of Commerce
12/14/34*

*Report from American
Chrysler Technics*

*J. Randolph
46 330 Leaden*

"BIG BERTHA" MADE FROM LOGS LOOKS LIKE REAL CANNON

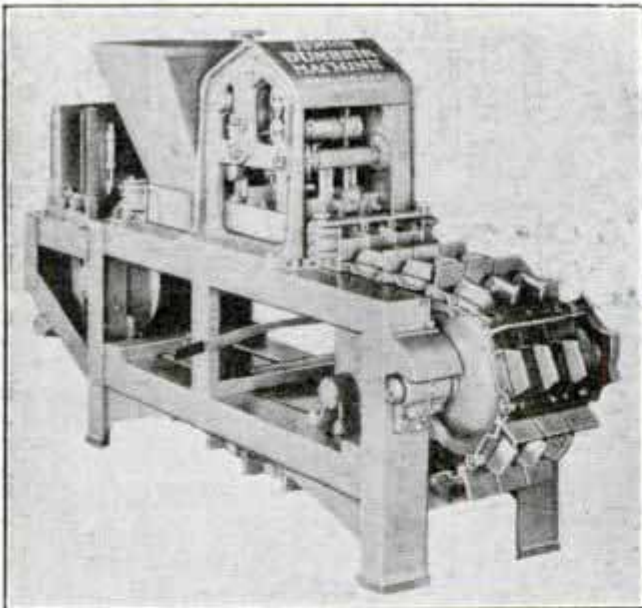
All the menacing appearance of a wartime "Big Bertha" is incorporated in a cannon made of giant Ponderosa pine logs which stands in the Chelan national forest in the state of Washington. The wood cannon, mounted on a dummy tractor also made of logs, is the work of some ingenious members of the civilian conservation corps who fashioned the big gun in their spare time.



This Is a Wooden Gun, But It Is Too Large to Be Called a Toy; the "Big Bertha" Is Made of Logs and Is Mounted on a Log Tractor

BRICKS MADE AUTOMATICALLY BY ONE-MAN MACHINE

Fifteen hundred bricks per hour can be manufactured by an automatic machine



Brick-Making Machine, Showing Molds on "Endless Chain"; One Man Can Operate It

that requires the services of only one man to remove the bricks as they are delivered at the end of the machine. The brick is semi-hollow and has a water-repelling surface. By removing two dividing plates, double and triple brick can be produced as easily as standard single brick. The material is fed from a hopper into all-steel mold boxes in the form of a continuous chain. This chain passes under a packer

that compresses the material to the hardness desired. A two-horsepower motor drives the machine.

MUDGUARDS ON PLANE WHEELS PROTECT LANDING GEAR

Mud and gravel tossed up by a plane's landing wheels often jam the retractable landing gear, making it impossible to lower or raise the wheels. To overcome this hazard, Lockheed Electra airliners now are equipped with bicycle type mudguards which are placed over the wheels. The guards keep mud from flying into the landing gear and when the wheels are retracted, they fold back out of the air stream with the rest of the gear assembly.



These Mudguards Protect Plane's Retractable Landing Gear from Flying Mud and Gravel

W. E. Huntley & Co
Lockheed Aircraft

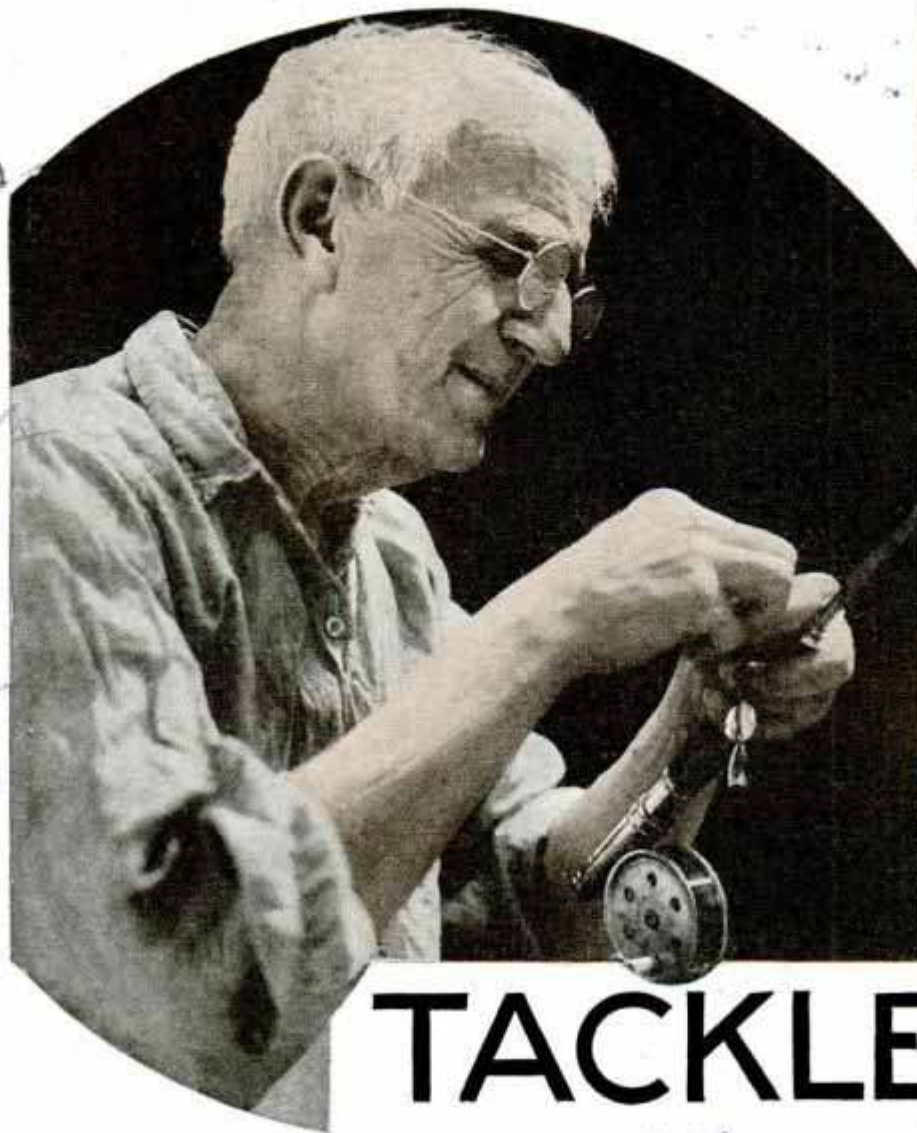
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TACKLE TIPS

By **BOB BECKER** *of Chicago Tribune Tribune Square Chicago*

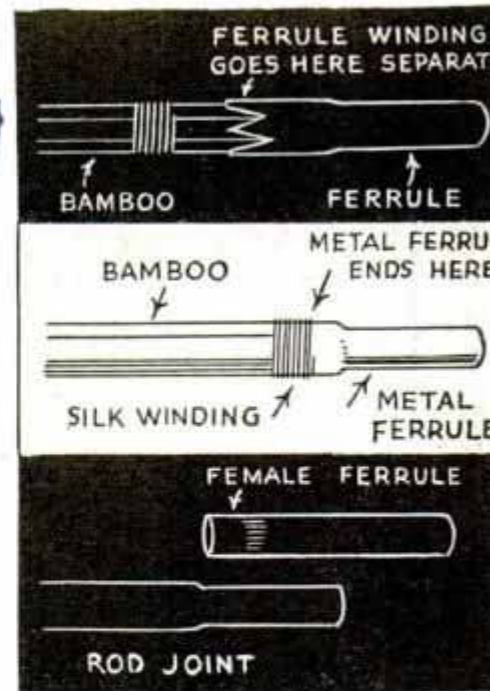
WHEN spring approaches, the average fisherman has several hours of "home work" in order to put his outfit in top condition for the coming season. To the real angler, these chores are more pleasure than work.

Invariably, a bamboo bait-casting, or fly-casting rod will show the need of work on wrappings, guides, ferrules and varnish.

First, take off the guides. An old razor blade is handy for cutting the windings. If the ferrules are loose, remove them for cementing. If one sticks, heat will loosen it.

Casting and fly-casting rods are apt to be badly nicked and the windings worn through. So remove both the varnish and the windings from the entire rod and start fresh from the bamboo. This is the only way to get a good-looking job and it gives you a chance to change the colors of the silk.

To remove the old varnish it is necessary to scrape the rod. A large, rather heavy blade is better than something smaller. Scrape with long strokes, up and down the rod. But if you bear down too hard you will dig into the thin protecting coating on the bamboo strips. Then use a fine



Spring Overhauling for Your Rod May Require Rewinding, Revarnishing and New Cement at the Joints Where the Ferrules Go



for the **FISHERMAN**



You Can't Land the Big Ones if Your Equipment Is in Poor Condition for the Contest of Strength

grade of sandpaper for rubbing down the whole rod. Next, clean the parts to which the ferrules are glued. Be sure and get all the old cement off.

Now we have "Old Faithful" slick and clean for the next step. To keep dampness out of the wood at the extreme joint ends—those that receive the female ferrules—apply varnish to the ends. Just a light coat will do. Failure to waterproof wood at the ferrules has much to do with breaks at these points.

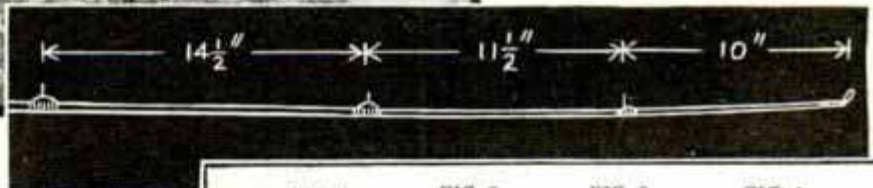
A standard brand of ferrule cement comes in stick form and to use it you need a candle, or gas flame. Hold the stick in the flame until it softens and then dab a little on the wood. Then heat the cement and the joint carefully. Keep turning it around and when the cement flows, direct it evenly over the sur-



the invisible knot isn't a knot at all. It is a trick of burying the end of the silk under the final turns in order to keep it out of the way, and to keep the silk from unwinding.

As you start to whip the guide, or any part of the rod, turn in one end of the silk so three or four turns are over it. As you wind, keep pressing the silk tightly into place. At the finish you are ready for the invisible knot stunt. Here is how it is done:

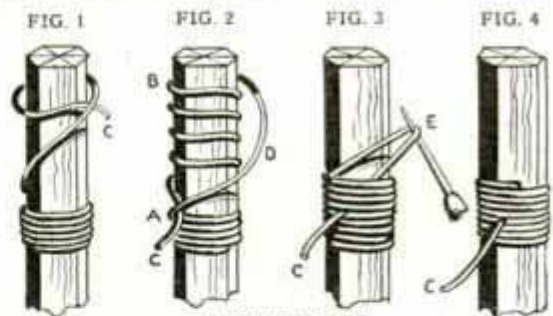
When near the end of your winding, press your thumb on the last tight coil of silk. Cut the silk so you have several inches left. With this end, take



face with a match. Quickly slip the ferrule over the wood, press it down tightly and again heat the ferrule over the flame for just a second or two. Excess cement oozing out can be wiped off while still warm.

Next we are ready to beautify the bamboo rod. Put a light coat of thin shellac on the wood. Brush it out well and you are ready for the winding of the rod, fitting the guides, and the final task of varnishing. There are endless color variations for winding that can be worked out. As to quality, I select a Grade A silk, which can be found almost anywhere. It is an unwaxed silk, and not the finest grade used in windings but Grade A is serviceable and not too heavy for most of us.

To wind the rod, use silk thread and wind evenly toward the center of each guide. Every fisherman must learn the way to start winding, and the secret of invisible knotting, or whip finish. Actually



- 1 The start of the trick to bury the thread end under the final turns of a circular winding.
- 2 Pulling several loose coils (B) around the rod. (C) the free end, is inserted under the coil (A)
- 3 After loose coils are laid up tightly against the winding the loop (E) is held tight.
- 4 The loose end (C) is pulled through and snipped off.

Schedule to Location of Guides on Short Bait-Casting Rod, and Steps in Rewinding a Rod

several turns in the same direction you did before. These coils will be loose but winding back toward that last tight whip around the rod. Slip the end of the thread under that last tight coil and transfer the final loose coils into tight ones and have them laid up against the completed section of the winding. Stick a small instrument,

8. 22

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such as a large pin, through the loop of the thread and pull it through the windings. The final flip is done by withdrawing the pin from the loop, and pulling the thread sharply. You are pulling the thread that comes out of the tight windings right underneath and out of sight. When that is completed, cut off next to the windings.

This method may be used for every solid winding. When the windings are in place, apply the final varnish. See that the ends are all snipped clean, then apply one or two coats of shellac to them. I use ordinary white shellac thinned slightly with alcohol. This is a regular rod varnish obtained from any sporting goods store.

To insure an even flow, warm the varnish in a pan of hot water. Brush it on smoothly, and after each coat—you will want to apply four or five—look out for dust. While the varnish is drying, hang the rod in a place free from dust.

Use rottenstone to rub down each coat of varnish. Do this lightly after the first coat so as not to injure the wrappings. After the third coat, you can apply more pressure and build up a glossy finish.

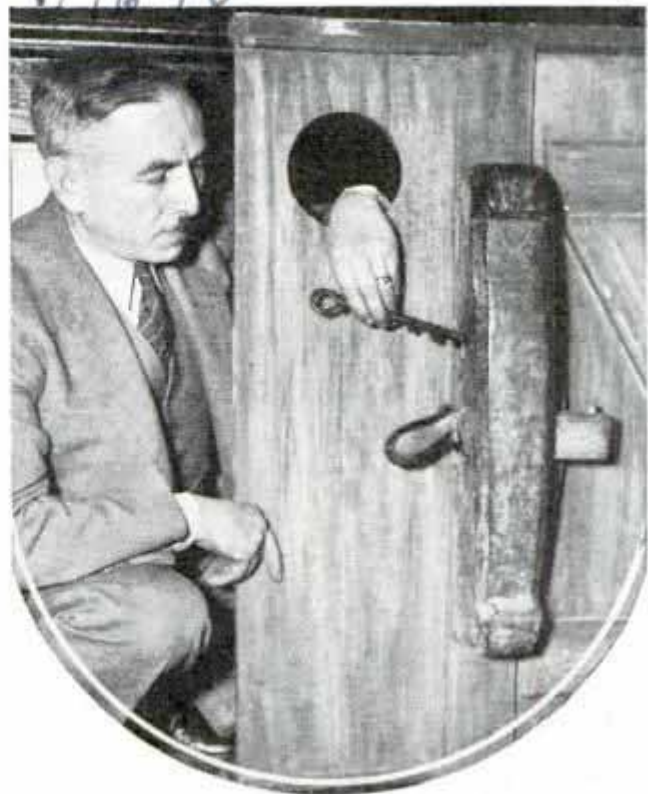
You now have a bamboo rod with firm, well-cemented ferrules, beautiful colored windings, and completely waterproofed and strengthened.

Now take out your reels. As you take a reel apart examine each part. There is nothing but sand and carelessness to worry about. Wash the parts in gasoline, rinse and put a tiny dab of grease on the moving parts. This grease comes in tiny capsules. Be sure the sand is out before you re-assemble the reel. Oil each part carefully as you put it together with a regular reel oil. Now adjust the reel and whirl it to be sure it is running freely.

Now is a good time to test the old line. Every fisherman knows about the amount of pull his favorite line will stand. Wrap it around your hands and pull. Perhaps it is stout enough, but usually it is an excellent precaution to put a new line on the spool.

Open the tackle box and empty everything out. Most of us find a little brown rust creeping around the edges. Wash it thoroughly with soap and water, then sandpaper off the rust spots. Take an oily cloth and go over the trays lightly, leav-

(Continued to page 120A)



Wooden Tumbler Lock with Key of Forged Iron Which Was in Use 2,000 Years Ago

LOCK TWENTY CENTURIES OLD STILL IN WORKING ORDER

One of the prized possessions of Charles Courtney, New York locksmith, is an ancient lock in use some 2,000 years ago on the entrance to a public bath in Jerusalem. It is still in working condition today. It is a wooden tumbler lock and the key is of forged iron.

5 30 W. 125th St

"MAGNETIC MOP" RETRIEVES STEEL BALL BEARINGS



Steel ball bearings and shot are retrieved in the General Electric research laboratories with the aid of a magnetic mop. Large quantities of the bearings are used and often spill on the floor.

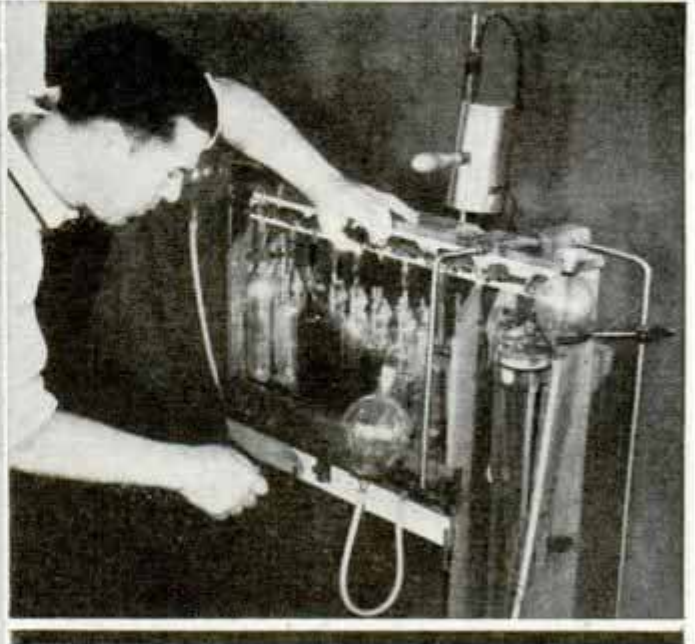
So an ordinary mopstick was equipped with a brass hopper, soft iron pole pieces and a sliding magnet controlled by a wire on the handle. When the magnet is down the pole pieces pick up the shot and when it is lifted the shot drop off the hopper into a receptacle.

Schenectady

Squad, Los Angeles City
POPULAR MECHANICS

D1587

Smoke "Fingerprints" Used to Trap Fire Bugs



Fireman Obtaining a Sample of Smoke and Chemist Analyzing Sample in Suspected Arson Case

Smoke from a burning building is being used by the arson squad of the Los Angeles fire department to determine whether the blaze was of incendiary origin. A sample of smoke is trapped by a fireman in a vacuum bottle and submitted for chemical analysis. A gas analyzing apparatus "fingerprints" the smoke, indicating what materials were burned to produce it. The presence of petroleum oils, alcohol, or other inflammables can thus be detected. If such a substance is not normally stored in the building, an investigation is started. The fire detectives also are investigating the fluorescing characteristics of the burned residues of inflammable oils under an ultra-violet light. By exposing a sample of the charred timbers where a fire started to the ultra-violet rays, they try to determine if any chemical was used.

form of a notched wheel above the delicate weighing spring. By synchronizing the action of this wheel on a lighted indicator, the person being weighed can watch his own heart beats. A measuring rod enables the patron to obtain his height.

D1667

COIN-IN-SLOT SCALE REVEALS HEART BEATS WITH WEIGHT

Heart beats, height and weight all are recorded by a coin-in-the-slot scale now available. The instrument is so sensitive that it not only indicates the rate of the heart beats but the intensity as well. This is accomplished by an oscillograph in the



Scale Which Indicates Rate and Intensity of Heart Beats at Same Time It Registers Weight

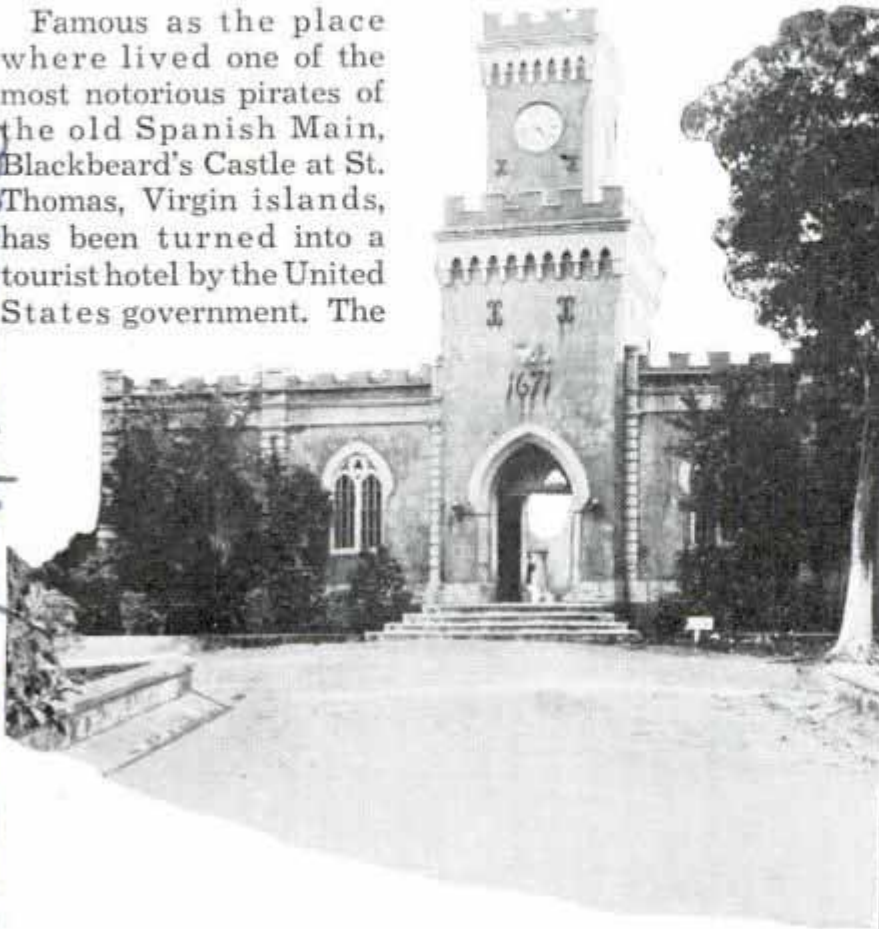
Fairbanks, Morse & Co
Wabash

D. 1965
John F. Cook
3109-14 St. N.W.
Washington, D.C.

Blackbeard's Pirate Castle Is Now a Hotel

Famous as the place where lived one of the most notorious pirates of the old Spanish Main, Blackbeard's Castle at St. Thomas, Virgin islands, has been turned into a tourist hotel by the United States government. The

Reader says this is old Spanish fort, not castle.



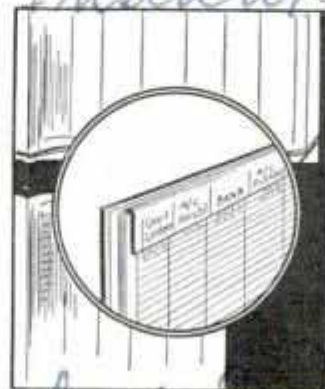
Two Views of Pirate's Castle in Virgin Islands; Photo at Left Shows Tower After Restoration as Inn for Tourists; an Excellent View of Incoming Ships Is Afforded by the Tower

pirate was Edward Teach, popularly known as "Blackbeard," but who called himself "Captain James Thatch." Teach is said to have engaged in privateering during the war of the Spanish succession. In 1717, he captured a large French merchantman and converted it into a warship of forty guns. From that time, he committed piratical outrages in the Spanish main, the West Indies and on the Carolina coast. His winter quarters were in an inlet of North Carolina. In November, 1718, Blackbeard was killed in a fight with two sloops sent by the governor of Virginia to rid the seas of the pirate craft. The tower in which Teach lived on St. Thomas held a commanding position over the sea. It originally was a Danish watch tower. A narrow room running the full length of the castle quarters above the first floor once was the dungeon in which were kept the negroes seized on slave-trading ships and later sold by Teach. In preserving the pirate castle, the government has retained all its pic-

turesqueness and charm. Five wings added to accommodate tourists were planned carefully to harmonize with the tower and tropical scenery. A dining terrace overlooks the harbor.

HEADING TAB FOR RECORD BOOK

Easily attachable to fly-leaf or backing of check register, journal or other type of columnar record book, an instant heading tab saves time on entries. After attachment, all pages are constantly headed. The tab also serves the purpose of an instant index and finder.



Handwritten note: ...with Am. Seath...

Handwritten note: J. W. Merrick
2100 ... 1903

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Candy
Chicago
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Los Angeles Calif

Fighting the



insects or plant diseases can generally be traced to some one willing to sell his plants regardless of the peril to the nation's food supply. Ignorant and innocent introductions by tourists and ships' companies on steamships and aircraft are to some extent condoned, though carefully guarded against, as are introductions on the gear of trains and automobiles and even on shoes and clothing. But the clever hiding of infected plant material with which border and seaport inspectors have had to contend has forced them to theorize that forces not so innocent are also at work.

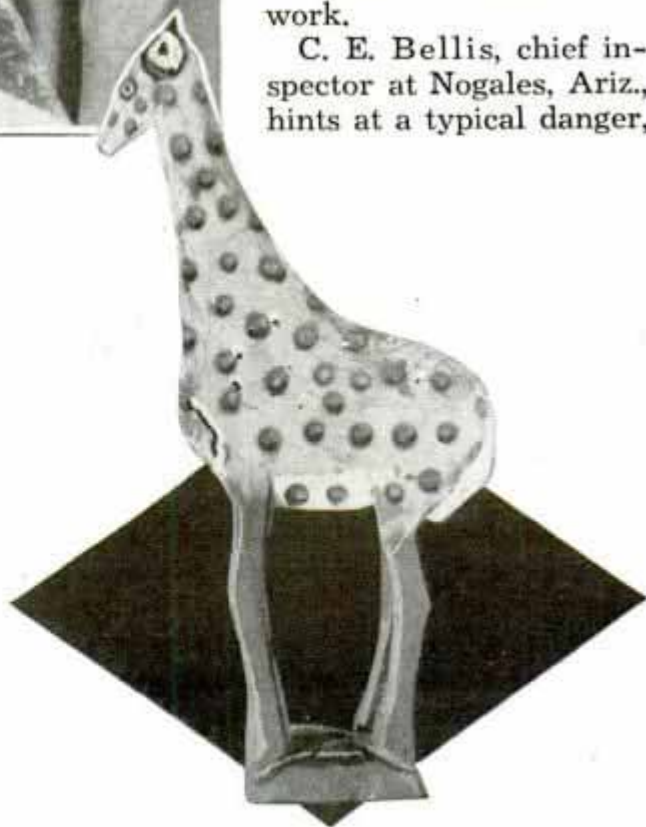
C. E. Bellis, chief inspector at Nogales, Ariz., hints at a typical danger,

DR. HAROLD COMPERE, of the California University college of agriculture, expert on insect parasites, asserts flatly that "almost all of the serious depredators in the United States have been introduced from foreign lands."

"Insistent craftiness," are the words used by department of agriculture officials in a recent report on the amazing scope of their work against the smugglers, to describe a type of smuggler the inspectors have to outwit—and they are not at all certain, with their limited forces, that they are always successful.

The mildest thing quarantine inspectors say about deliberate insect and plant disease introduction, is that it is attempted and often accomplished by "cranks," of the same type often accused of incendiarism in the oil fields and our national forests.

Attempted commercial introduction of



Above, Inspecting Airplane Baggage for Forbidden Fruit; Below, Imported Toy with Holes Indicating It Was Victim of Wood Borer

BUG SMUGGLERS



in a report to the department of agriculture. He says:

"On inspection of the Pullmans which crossed from Mexico on January 30, restricted plants were found concealed in the Mexico City-Los Angeles car. Twenty-one specimens were found in five packages, concealed in the following manner: two in a dark recess above the switchboard compartment in the vestibule which necessitated standing on the doorknob and using a flashlight; two on a high ledge in the ladies' dressing room; and another behind the ceiling ventilator in the toilet.

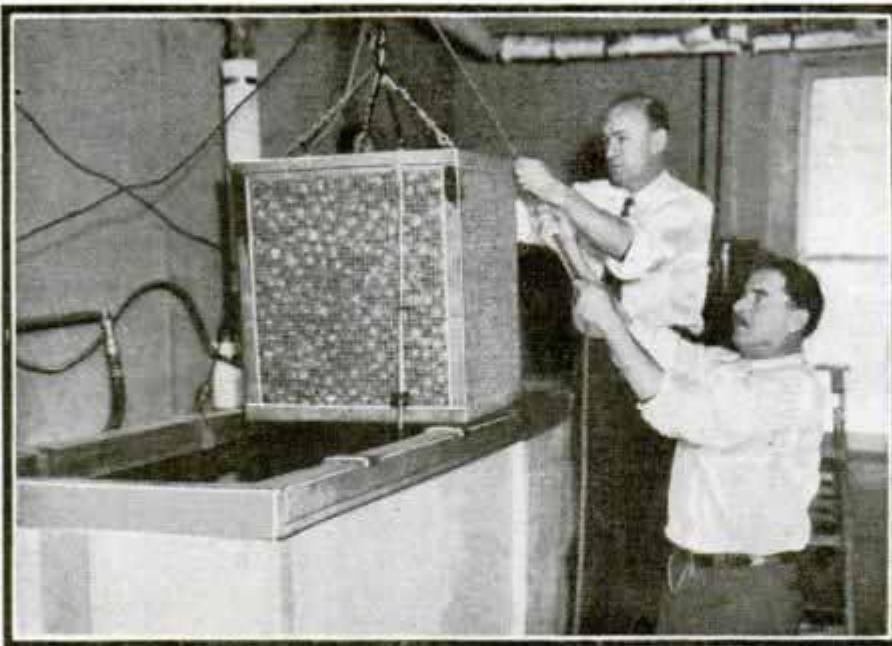
All but four passengers had detrained on the Mexican side of the line. These re-



Top, Examining Shipment of Roots from Abroad; Above, Imported Doughnuts and Pretzels Containing Infested Rice Straw and Cotton; Left, Borer Found on Imported Date Palm Plant

maining four all denied ownership of the material."

A. C. Fleury, chief quarantine officer of California, reports an incident that probably was an innocent one, but which reveals a threat nevertheless to the California and Louisiana rice-growing industries.

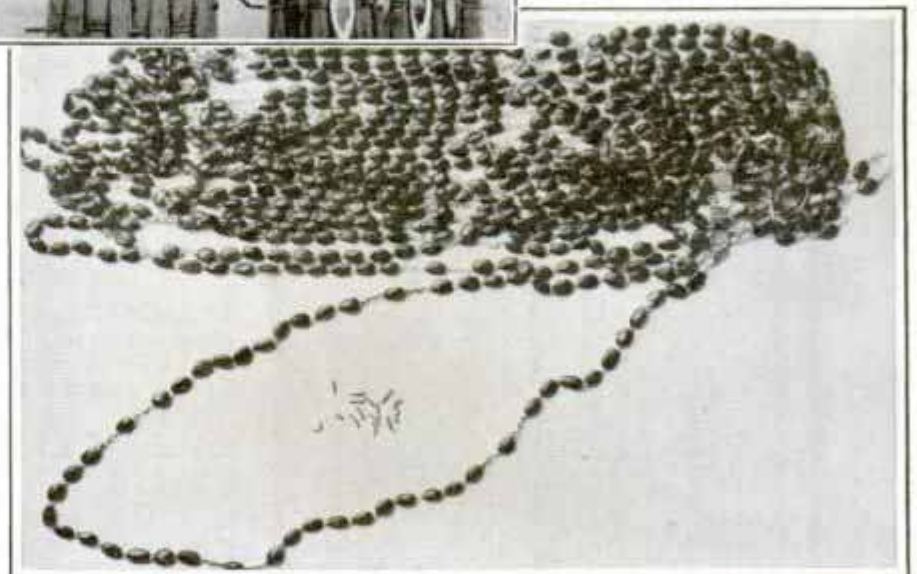
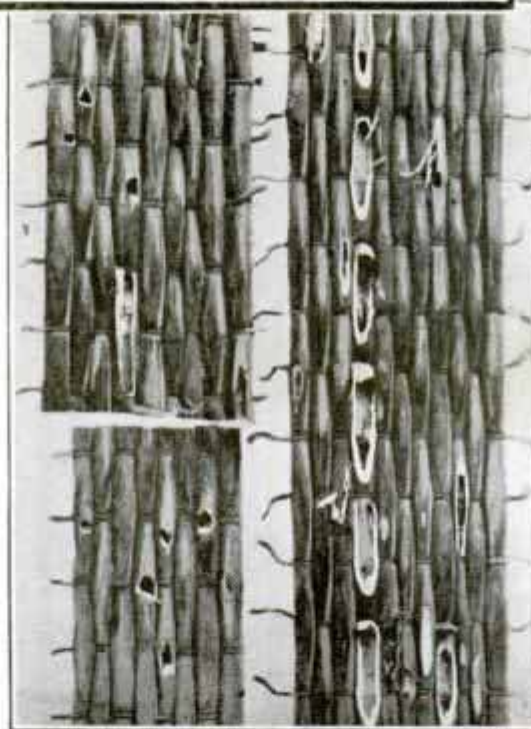


Insect Death Chamber; They Are Immersed in Hot Water

He says: "Four interceptions of the rice borer in rice straw packing around earthenware carried as cargo on Japanese freighters have been made in the past few weeks."

Since there are few foreign nations, except those contiguous to us, which care much whether the agriculture of the United States flourishes or not, we have to depend on our own inspection efficiency.

Of the apparently criminal type of smuggler, here is an instance. The S. S. "Columbia" arrived at New York with passengers from Caribbean ports. Inspector C. G. Latham, who was assigned to the vessel, was summoned to inspect some sour limes and avocados found in the baggage of one of the passengers, and during the examination he saw a shiny individual soap container accidentally



Center, Part of Imported Basket Infested with Boring Beetle; Bottom, Beads Made of Seeds Which Contained Dangerous Insects; the Vigilance of an Inspector Detected the Pests

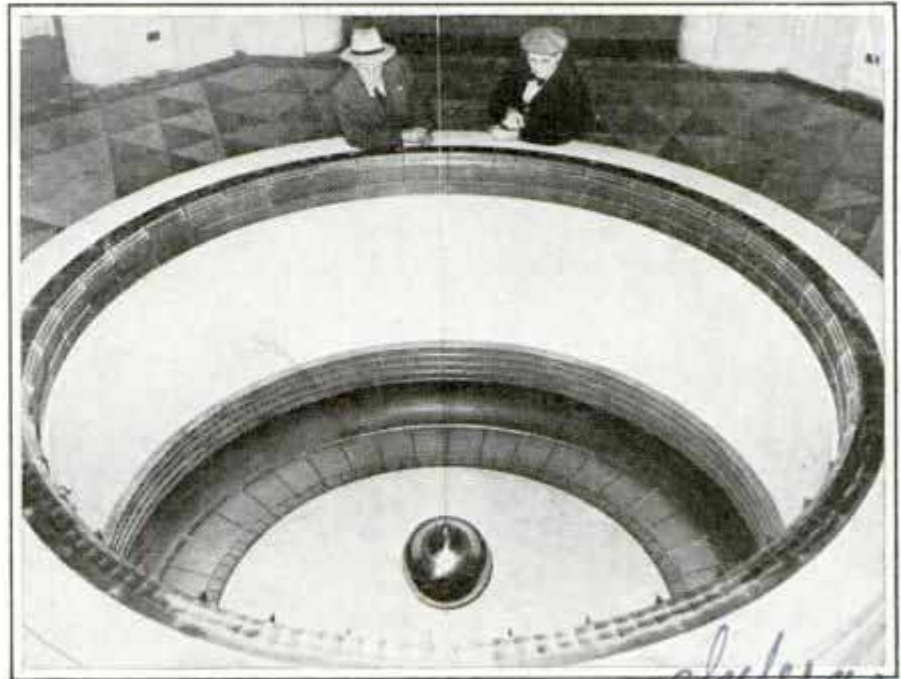
come open. The soap was carefully wrapped in newspaper and was of such a peculiar shape that a closer examination was made. The "soap" proved to be a mango, and rigid examination of the baggage revealed two more specimens of the same fruit. They were infested with fruit fly larvæ.

Federal and state inspectors do not hope to keep out noxious insects and plant diseases forever. They do hope to delay the entry and to create a condition that will restrict that entry to as few points as possible, so that, immediately the new insect is discovered operating on our food supply, we can get it in check and delay its progress as long as possible. Once in, it is fought all along the line. However, before it gets in, entomologists go where it is known to exist and study methods for combating it with poison and insect parasites.

Swinging Pendulum Shows Rotation of Earth

on Mt. Hollywood.

One of the pieces of apparatus in the Griffith observatory in California is a Foucault pendulum, the swinging of which demonstrates the rotation of the earth. This big pendulum actually was evolved from experiments originally conducted by Galileo. A verger in the cathedral at Pisa filled a lamp and left it swinging from the roof. Galileo, then eighteen, saw the lamp swaying back and forth as did hundreds of others. But Galileo got from the swinging lamp the idea of applying the swinging movement to measurements of time and devoted fifty years to completing his pendulum theory which has been of inestimable value in



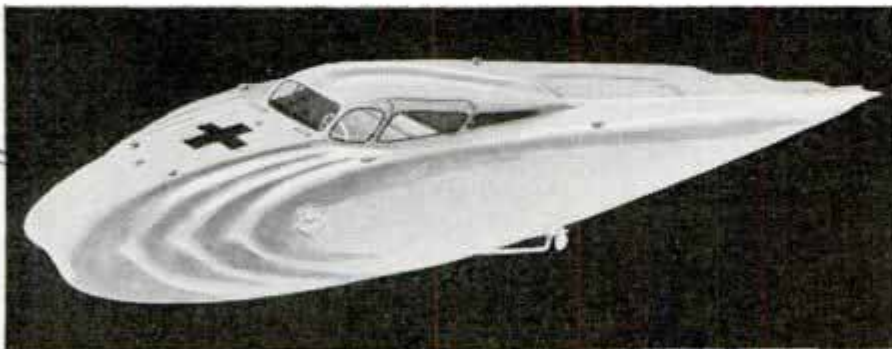
Large Pendulum in Griffith Observatory, the Swinging of Which Is Used to Demonstrate the Rotation of the Earth

measuring time and in astronomical calculations through the years since he announced the result of his experiments.

Ambulance Boat Like a Plane Is Fast and Non-Sinkable

Said to be non-sinkable, a new ambulance boat has been constructed for the Portland, Ore., police patrolling the harbor. Embracing principles of the airplane, the craft's cruising speed is rated at forty miles per hour and its top speed above fifty-five. The boat is designed to skim the water at full speed. When motionless, its draft is less than twelve inches. A siphon system that is effective when the boat

V-8 motor provides the power through an intermediate and high-gear transmission, one of the first installations of an intermediate gear in boats. This gear, in addition to providing quick acceleration, is for use at slower speed to facilitate maneuvering. High gear is for use only at higher speeds. The hull consists of a series of air-foil sections or "wing-stub ends," so designed as to afford the greatest amount of lift above and below the sections, an arrangement by which the craft is partially supported in air while traveling at top speed. The boat is twenty-four feet long and six feet in height with a beam of eight feet. It has accommodations for driver, doctor and two persons on stretchers. A special rack holds the stretchers when not in use. Respi-



© Pacific Feature Service
Design of Speedy Craft That Will Be Used in Harbor Ambulance Work; Note Air-Foil Sections of Hull

is in operation keeps the craft dry in any weather. A marine adaptation of the Ford

ratory and first-aid equipment and oxygen tanks are carried for emergency work.

or ch. w. Victor W. Grode,

See April 1933 573

857

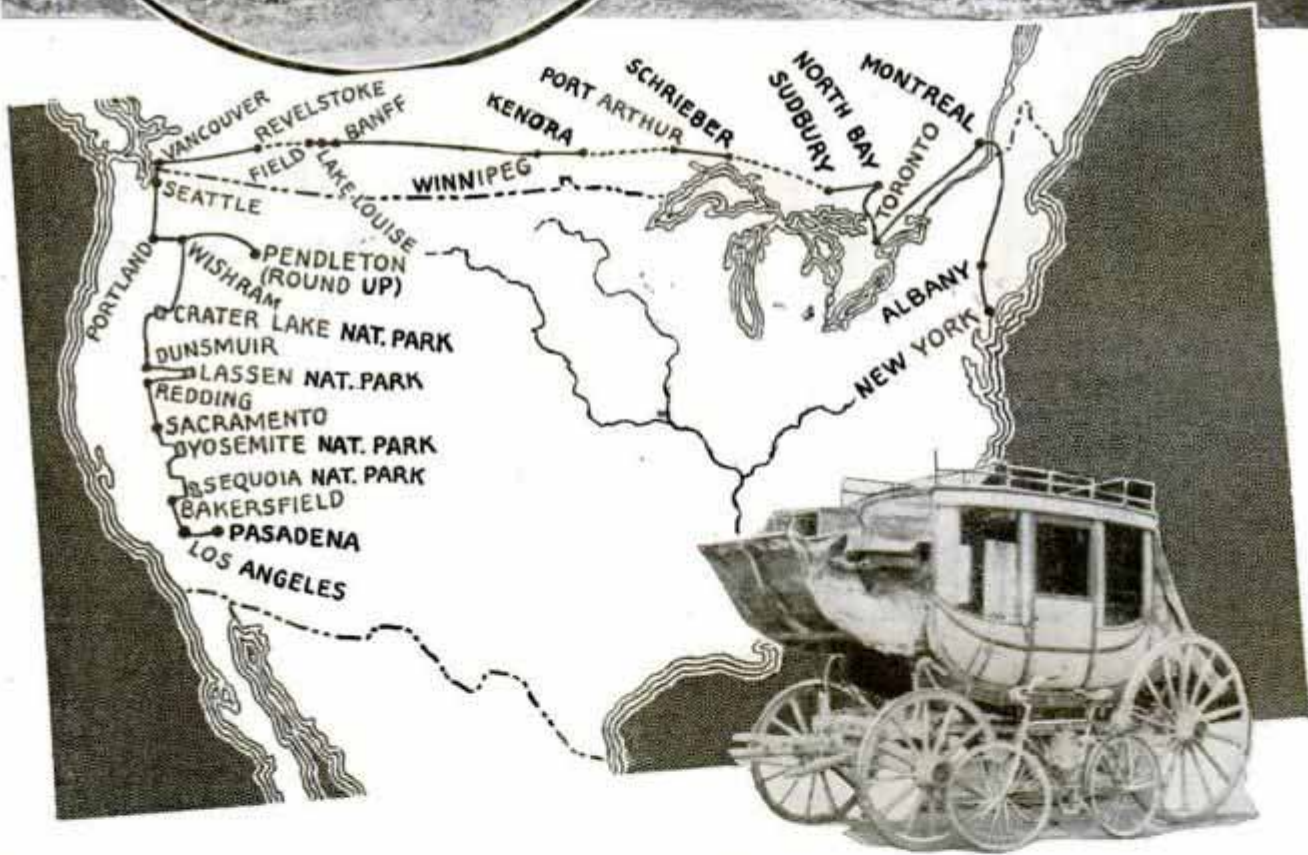
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Substantive

D 1568

Bike Camping Trip from Pacific to Atlantic

% Explorers Club, 10 W. 72nd St. New York



Top, Left, Preparing Meal in the Rain; Right, Along the Road; Bottom, Route of the Journey; Right, the Bike Beside Old Stage Coach

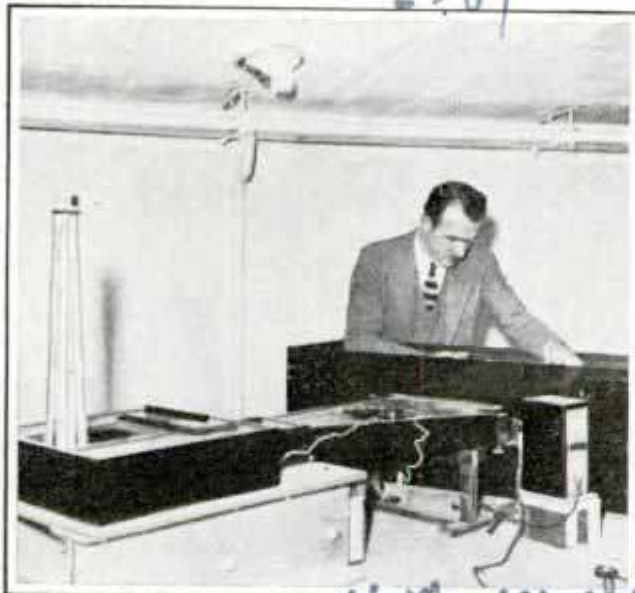
Touring America on a bicycle has been accomplished recently by Lewis R. Freeman, author and explorer. He assembled a camping outfit, including cooking utensils, tent, blankets, camera, binoculars and typewriter, lashed it on his bicycle and started north from Los Angeles. Right to Vancouver he pedaled, with side rides to

Sequoia, General Grant, Yosemite, Lassen, Crater Lake and Rainier National parks, and the Pendleton round-up. From the foot of the Canadian Rockies, hard gravel road was used to Revelstoke, where a train was taken to cross a range. Riding was continuous from Field to Banff, Calgary, and across to Winnipeg. The train



was taken across the Lake-of-the-Woods wilderness beyond Kenora, but from Fort William there was pavement nearly to Nipigon. The train was used from Schrieber to Sudbury, but from there an excellent road carried him to Toronto, and finally over pavement to Peterboro, Montreal, and down along Champlain and the Hudson to New York. The distance was more than 3,500 miles. One of the best day's rides was 120 miles. The highest altitude reached was 8,500 feet on Mt. Lassen highway loop. The bicycle was a stock model weighing thirty-five pounds. The rider weighed 235 pounds and the luggage fifty pounds. Not one cent was expended for repairs. For bedding, Freeman carried a light blanket and a waterproof poncho. A balloon fabric slicker doubled as bed-spread and shield against wind and rain when in the saddle. Complete changes of clothing were carried. For riding, an ankle-high pair of moccasins were used, with a light pair of white buckskins which were used as a "spare."

TILT OF EARTH IS MEASURED AS THE TIDES CHANGE



Apparatus Which Records the Tilt of the Earth with Each Change of the Tides

Tilt of the earth with each high tide is measured by a seismograph at Harvard university. The instrument records the tilt twice every twenty-four hours and keeps a photographic record. This record is preserved on a drum equipped with photographic paper and filed for future reference to aid in research work.

SIX-OUNCE PUPPY GETS DINNER FROM MEDICINE DROPPER

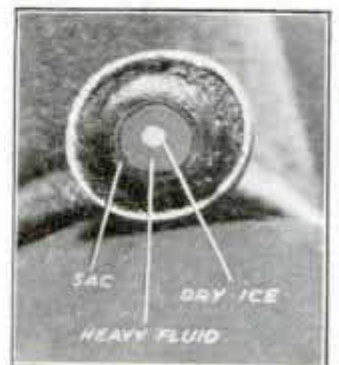


Six-Ounce Boston Bull Puppy Resting in Cup as It Gets Its Dinner from Medicine Dropper

Just large enough to stretch its neck over the rim of a teacup, a Boston bull puppy owned by a California man has taken its dinner since birth from a medicine dropper. The puppy, tipping the scales at six ounces when a month old, was the smallest of six normal brothers and sisters. Hand feeding saved its life.

"DRY ICE" INSIDE GOLF BALL CAUSES EXPANSION

Longer and more accurate shots are claimed for a golf ball containing a core of Dry Ice such as is used to preserve ice cream. The Dry Ice center is obtained by dropping a pellet of the substance into a heavy liquid center enclosed by a rubber sac. Around this are wrapped thousands of yards of stretched rubber band and the tough hard rubber cover is applied. The Dry Ice attempts to return to gaseous form and expands, thus "pumping up" the center. This uniform expansion increases the tension of the winding and tends to produce better centering, it is claimed.



Seismograph taken Crawford Inc, Esregor

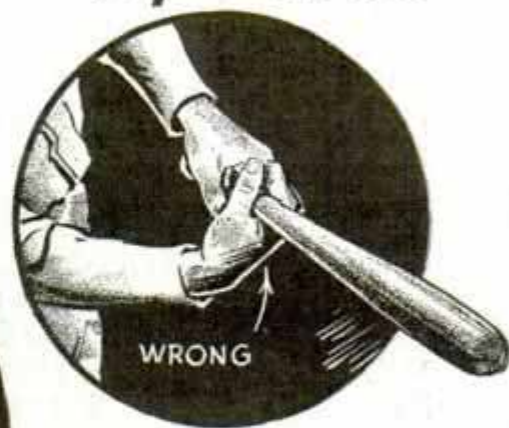
A.W. Robinson Hospital Emergency

Dayton, Ohio

Chas. Harold M. Jackson
1928 Southwest 13th St
Miami, Florida

D1588

INSIDE STUFF of the



By **MAX CAREY**
Former Big League Manager

SPECTATORS at a baseball game don't care how a player bats the ball as long as he lines out a base hit. They applaud him whether he makes the hit correctly or incorrectly.

But unfortunately games cannot be won consistently unless the plays are faultless. And the plays cannot be faultless unless each is performed by the application of certain methods. There are a few exceptions, of course, among the "natural" mighty men of baseball who have their peculiarities, but for the average person there are definite rules to be followed.

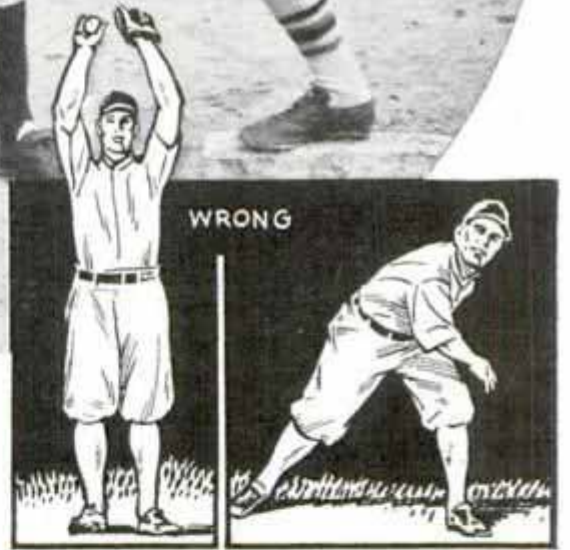
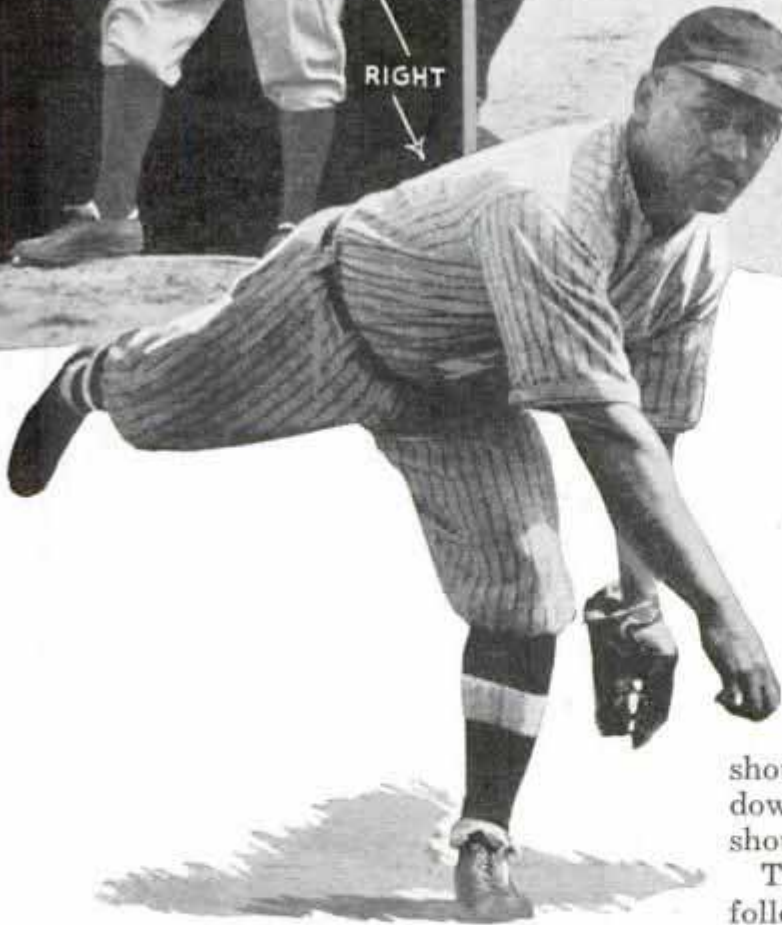
Consider for instance, the correct hand grasp on the bat. The upper hand, or pow-

Right and Wrong Way to Hold Bat and Run Bases; Man at Left Is Running Correctly

er hand, is placed on the handle of the bat and rests in the groove formed by the thumb and forefinger. The handle rests across the middle of the palm so the power of the swing will find the forearm and wrist straight. This puts the maximum weight of the body into the swing. The result of a direct hit will be a line drive.

A correct stance at the plate requires

BIG LEAGUERS

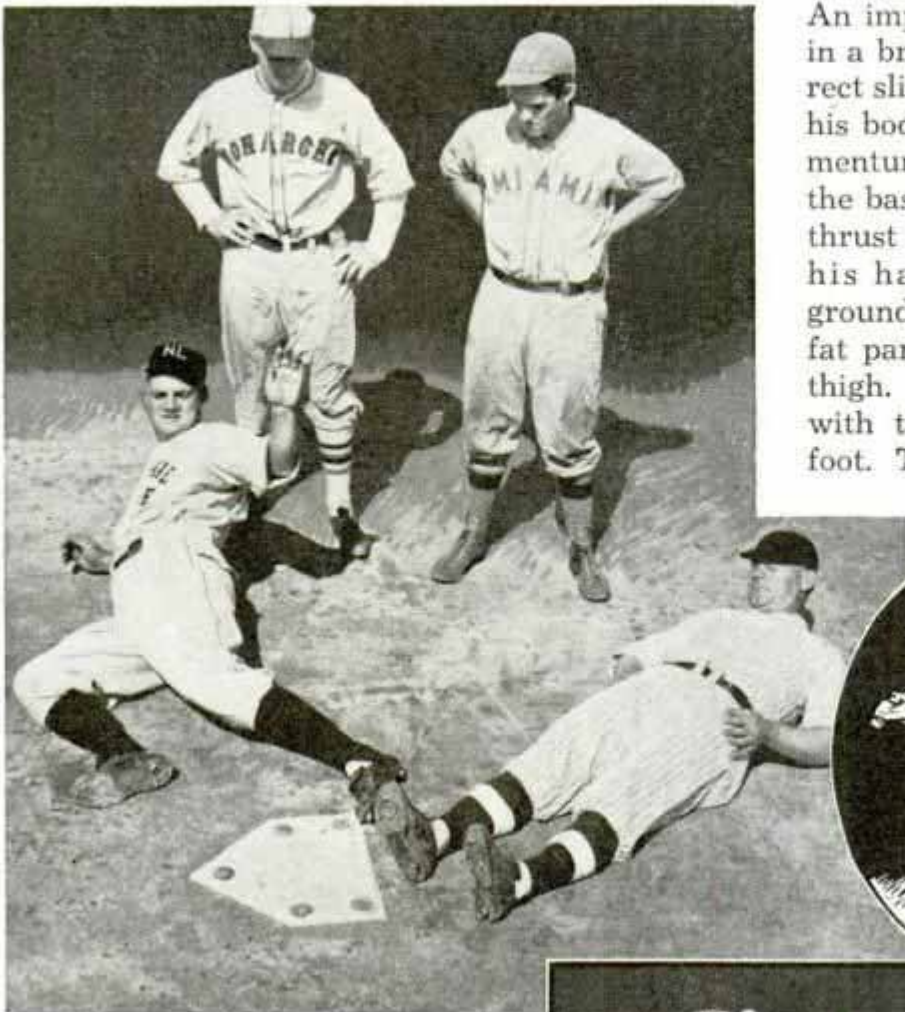


Right and Wrong Way of Starting and Delivering a Pitch; Above, Correct Stance for Delivery

that the batter be entirely at ease and relaxed. The feet must be squarely on the ground to insure balance. The side of the body should be toward the pitcher, the belt

line level, the body erect, not militaristic, but upright and restful. The head should be turned to look in the pitcher's direction. The shoulders should be level with only a slight pressing downward of the front point of the right shoulder as the bat is cocked to swing.

There is also a right and wrong way to follow through in batting. The right way is to step into the ball and swing the bat with a snap which resembles the cracking of a whip. Pivot the weight of the body from the rear leg to the front leg as the bat meets the ball. The muscles are re-



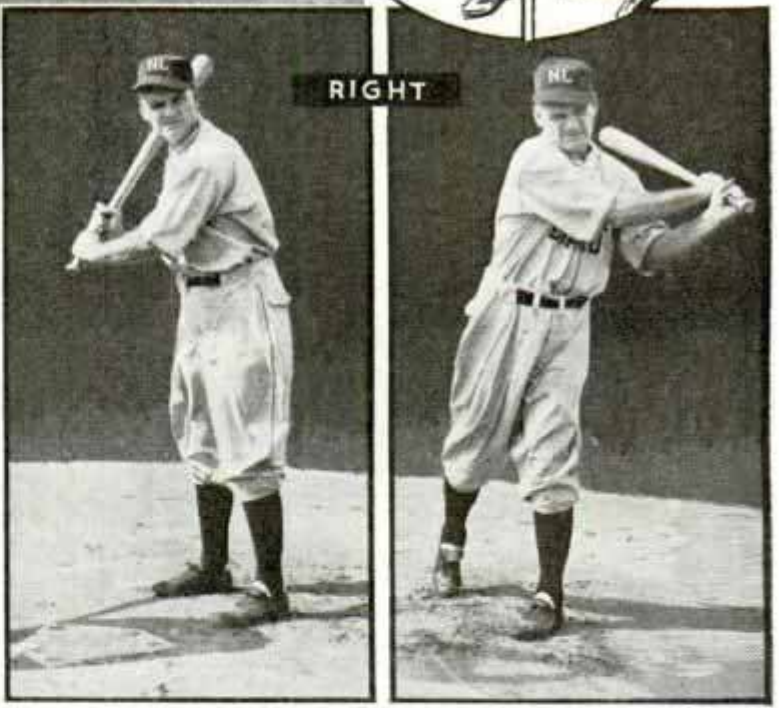
An improper slide also can result in a broken foot or leg. In a correct slide the player should throw his body out of line with the momentum directly he slides into the base. His shoulders should be thrust either to left or right, with his hands up away from the ground. The slide is made on the fat part of the lower leg, side or thigh. The base should be tagged with the top or "instep" of one foot. The other foot, missing the



laxed during this pivoting but they contract the moment of impact. The power behind the swing allows the bat to follow through naturally. The incorrect method involves a faulty step with the weight remaining on the rear leg. Here is loss of power. The bat swings up causing fly balls. There is lack of coordination and smooth swinging. This type of batter is an easy prey for pitchers.

The man who knows base running circles first base and advances toward second by swerving out. This brings him on the straightest and shortest distance between the bases and he gains additional speed in rounding first. When a player runs on a straight line into first base and then attempts to round first for second base, his momentum pulls him away from the shortest distance between first and second. He must almost stop at first to continue to second.

An improper slide often times costs a team the victory when the game is close.



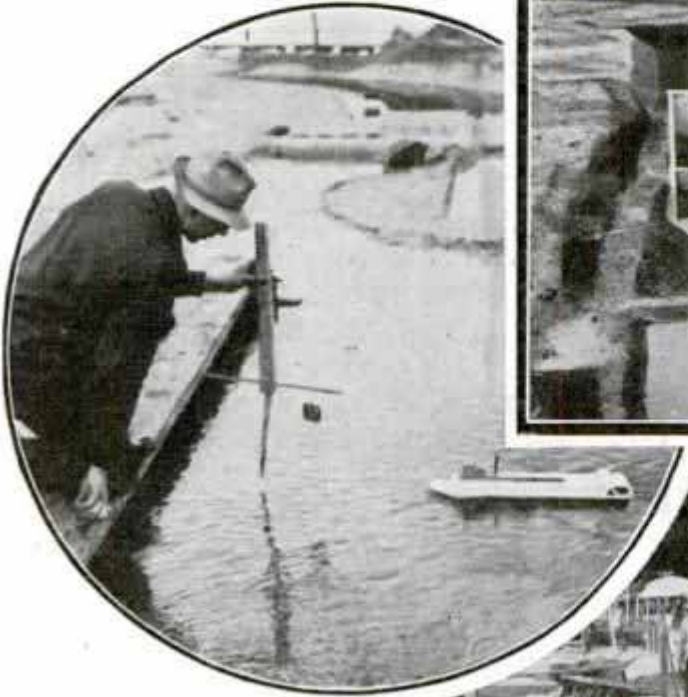
Above, Man at Left Is Sliding Correctly; Below, Right and Wrong Way to Stand at Plate and Follow Through

base, should be slid on its side. The spikes should never be toward the base as they are apt to catch the base and turn or break the ankle and the slider should never dive straight into the base.

A pitcher should maintain a balance of

(Continued to page 131A)

D/609 *Mr. Perry W. Young*
2636 2nd & Market
Model of Bonneville Dam Aids Study of River
Portland Oregon



see Jan. 1935 - 38

Three Views of Experiments Conducted with Large Model of Bonneville Dam and River; the Model Enables Engineers to Study River Currents That Probably Will Be Created by Construction; Daily Measurements Are Made in Testing the Model under All Conditions



near Portland Oregon.

Probably the largest and most complete model of a river section ever constructed is being studied by engineers working out plans for the huge Bonneville dam on the Columbia river. The model is 325 feet long, representing a five-mile stretch of the river and showing every rock, ledge, islet and major obstruction. Daily readings and measurements of the midget river are made with two objectives. First is the removal of obstructions in the river bed, which will result in reducing unnecessary back-water effect and still produce the same water levels at the dam. Second, the engineers are seeking data that will help in constructing the cofferdams in the main channel. For this work, a thorough knowledge of the river currents is necessary. Another model shows three bays of the eighteen to be built in the spillway of the dam. Water for the tests is taken from the Willamette river and pumped into a res-

ervoir above the models. The work is under direction of the United States Engineers' office, with Col. T. M. Robins, division engineer, Maj. C. F. Williams, district engineer and C. I. Grimms, chief civilian engineer of the Bonneville project.

240

AUTOMATIC WINDOW CATCH LOCKS AT ANY HEIGHT

Equipped with a rubber tip that prevents slipping, an automatic catch holds a

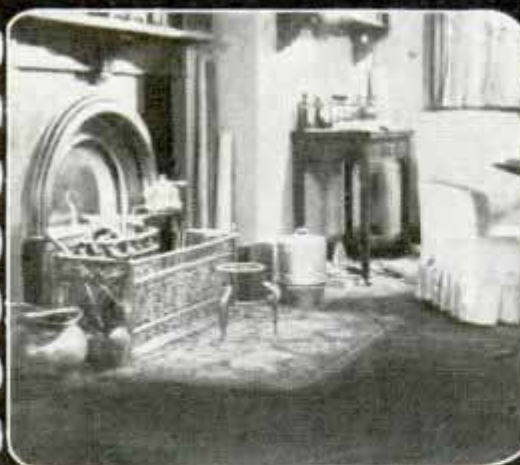


window at any height. Thus, the window may be locked up or down permitting air to enter but keeping out marauders. The device also prevents rattling of windows.

Automatic Window

D 1183
10555 Holman Co
Los Angeles, Calif

Latest STUNTS of the

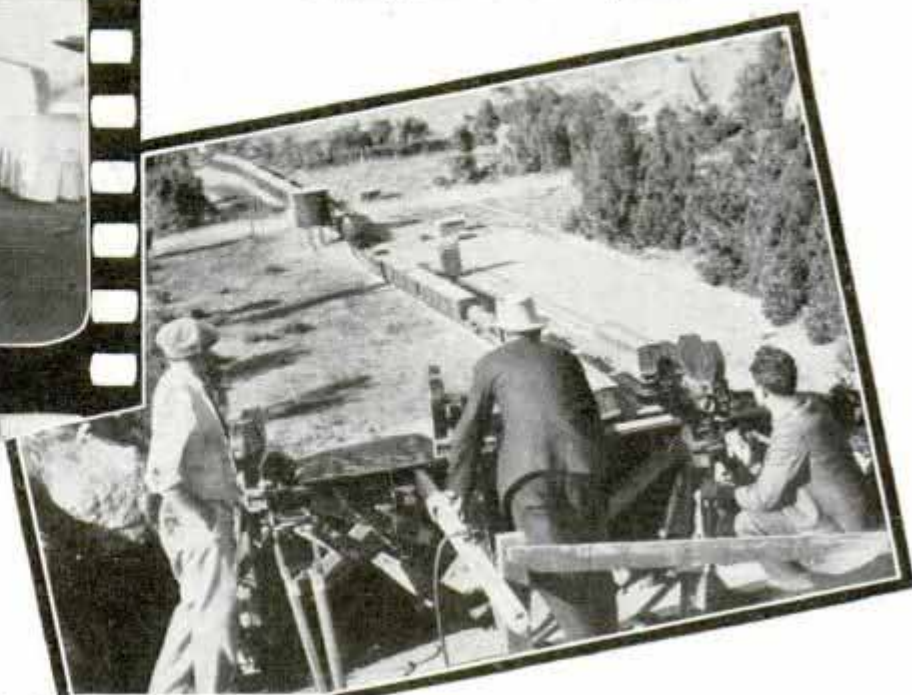


MODERN magicians perform tricks on the movie screen for your entertainment that match the most fantastic myths. Before your eyes an actor changes to a stone statue while another dissolves into the air. Absurd impossibilities occur as a matter of course and on the screen, seeing is no longer believing.

Rival trick men and photographers are still puzzling over how John P. Fulton and Frank Williams screened the "Invisible Man," a story in which a young chemist discovers a drug that makes him completely invisible. On the screen the man's head actually disappears as he removes the bandages in which he wrapped himself. His clothes appear to move around the room entirely unsupported. A hat placed on his head seems to hang in the air. When he removes his clothes and dashes from the house, his flight can be traced only by the footprints that appear in the snow.

The way in which an actor was given substance and invisibility at the same time was accomplished by using new film emulsions sensitive only to certain colors. First the actor, in front of a pale blue background, with his head and hands covered with blue masks of the same shade, was

Below, Using Miniature Devised by Don Jahrans in Filming a Railroad Siding Scene



Dummy Head of John P. Fulton's Invisible Man and Same Character Disrobing; Below, Background Scene over Which Film Is to Be Printed

MOVIE Magicians

Close-Up of Model Boat and Mechanical Crew, and the Craft as It Appeared on the Water

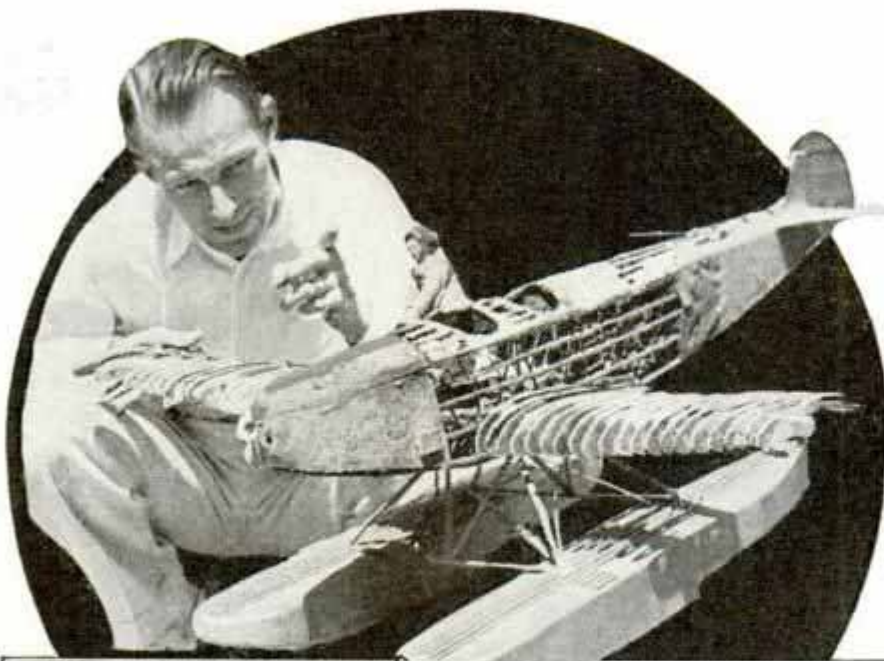


Even in Miniature, This Train Wreck Appears Realistic Although Only Model Cars and Engine Are Used

photographed with a camera that exposed a bi-pack containing two strips of panchromatic film, one of which registered the blues as whites and the other as blacks. One of these films was used to mask or matte off parts of another film containing the background and the other actors and then this first composite film was printed over the other from the bi-pack, trans-

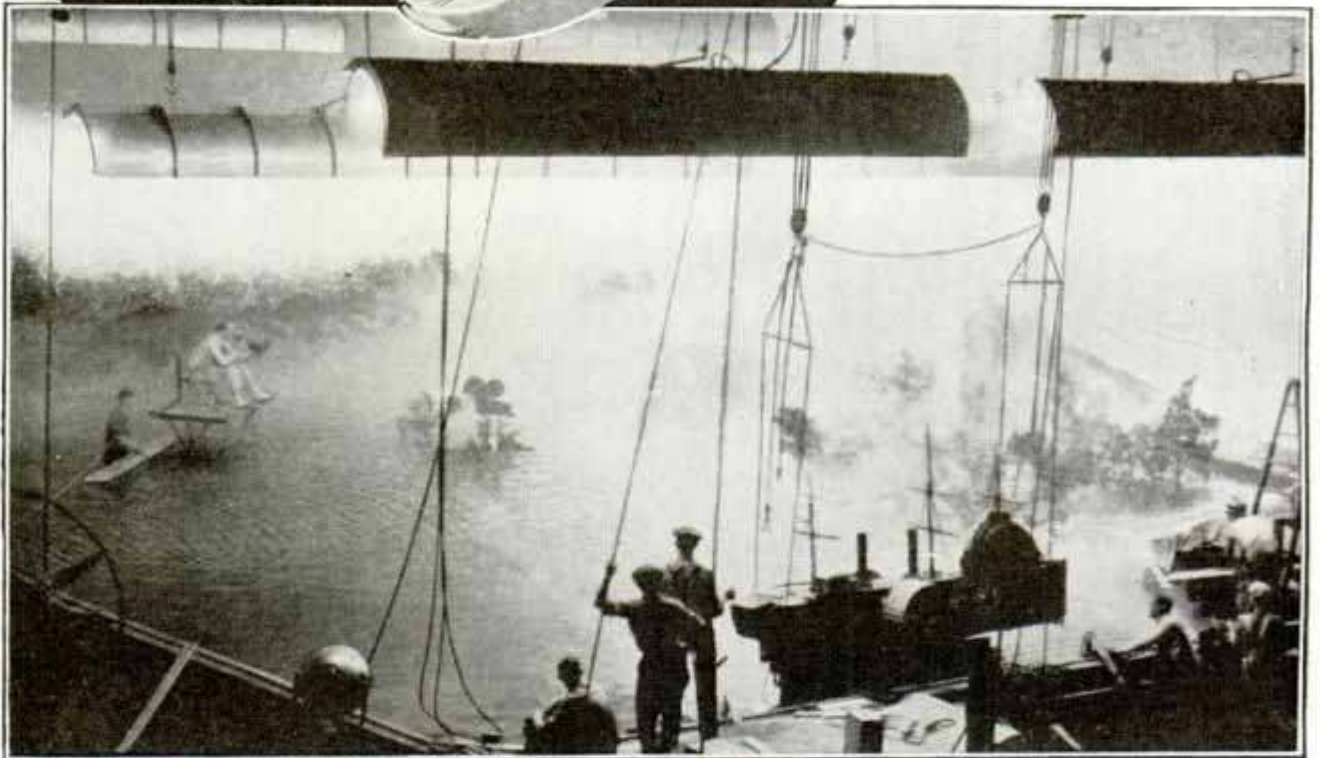
ferring only the actor's clothes to the finished film and eliminating his head and hands.

"The most difficult part was directing the actor," says Mr. Fulton. "In some shots he had to work blind behind the wrappings, with air supplied by concealed tubes as in a diving suit. Inside his helmet and bandages, it was sometimes impossible for



forms dropped away, giving us perfect footprints that mysteriously appeared in the snow.

"The final shots of the picture were interesting—and also difficult. The invisible man is shown lying in a hospital bed with the effects of the drug slowly wearing off. On the screen, looking straight down at the bed, we can see at first only the depression made in the pillow by the invisible head and the shape of



Miniature Plane after It Had Crashed and Burned; It Was Manipulated with Wires During the Crash; Below, Fog on a Model Water Set Used in the Movies

him to receive instructions. When I used a large megaphone and shouted he could just hear a faint murmur. Once, when the air supply failed, he fainted in the middle of a scene.

"We made the invisible man run across the ground by digging a trench and covering it with a board in which footprints had been cut. The wooden footprints, supported on pegs attached to a rope in the trench, were placed back in the openings in the board and the board was then covered with snow material. By pulling on the rope attached to the pegs the wooden

the sheets over the unseen form. Slowly a suggestion of bone structure appears—then a full skeleton—then slowly traces of flesh—then skin—and finally we see the man himself.

"This was done directly by the camera. The pillow, indentation and all, was made of plaster, and the sheets of papier mache. A long, slow lap-dissolve revealed the skeleton, a real one, by the way; another lap-dissolve replaced the skeleton with a roughly sculptured dummy that suggested the contours of the real actor, and a further series of such dissolves, each time

D/183

using a slightly more finished dummy, brought us to the actor himself."

The trick of slowly changing an actor into a stone statue is done by filming him through two color wheel filters, one red and the other green. The start is shot through the red filter on film that registers the actor and his clothes in normal shades, then the green filter slowly replaces the red and as it does so the color values change until the actor resembles gleaming white stone. Of course, the color of everything else on the set would be changed at the same time, so the actor is filmed by himself against a black background and this film is then printed over another that contains the desired background and the other actors. The Williams' traveling matte process, which combines the desired parts of two separate films, is also used to film such difficult effects as a tiger jumping on an elephant's back.

Miniature sets and full-size backgrounds that consist of motion pictures projected on a screen behind the actors, two standbys of the special effects departments, are now combined in many different ways. Photographing a miniature and then "blowing it up" to full size on a background screen is the latest combination. Instead of building an old fashioned train to full size, the miniature builders construct a scale model. Then a motion picture of the train is made and is thrown on a screen while live actors scurry to and fro in front of it.

Willis H. O'Brien, a specialist in combining projected backgrounds and miniature sets, has developed the art so that actors appear to move around freely in sets that would really come up only to their knees. Of course, the finished picture shows everything in the right proportion. If O'Brien wishes to show explorers at the walls of a ruined city he first constructs a miniature of the city's wall, leaving a hole at the place the actors are to appear. Then a film is made of the actors as they perform against a background having the same tint as the miniature. This film is projected on a small screen behind the miniature city and is visible to the camera through the hole in the wall. By carefully gauging distances and lighting values the finished picture seems perfectly natural.

(Continued to page 124A)

E 28

HOUSE ON WHEELS IS HOME OF COLLEGE STUDENT



Traveling Home in Which College Student Lives; the Wood Is Painted to Resemble Brick

One student at the University of Utah has solved his housing problem by building a home on wheels in which he lives and travels between his own home at Paris, Idaho, and the school at Salt Lake City. The house is twelve feet long, six and one-half feet wide and contains a stove, a bunk for two, a folding table, collapsible chairs, medicine cabinet, clothes closet, hat and book racks, typewriter stand, wash basin and other conveniences. It is built of wood, painted outside to resemble brick and well insulated. On the road it is towed as a trailer behind the student's automobile.

Albert J. Jensen,
J. Washburn.

E 59

HANDY THREE-IN-ONE SCALE WEIGHS ACCURATELY

Giving accurate weights by three systems, avoirdupois, apothecaries and metric,



a new scale is handy for the home, school and travel. The dial chart is calibrated into the three systems. The scale can be adjusted by set screws so the pointer may be set at zero to balance scoop or container.

It is three inches wide, six and one-half inches long and seven and three-eighths inches high.

Wanson Scale Co.

Message in Snow Aids Hunt for Missing Plane



Note "G E 1000" Outlined in Snow in Upper Part of Photo; Also the Arrow Pointing in Direction of Disabled Plane; the "Writing" Was Done with Snowshoes

Huge letters and figures, "feathered" into the snow by men on snowshoes, formed a message that helped rescuers in their search for a plane that was forced down in the mountains of New York state. The message, which could be seen easily from the air, was intended to direct searching parties aloft and on the ground. An arrow indicated the location of the lost plane. State troopers at Gray, N. Y. "wrote" the message for the searchers.

ACCURACY OF WATCH TESTED 99.9% IN FEW SECONDS

Developed to check the gain or loss of time in a few seconds, a watch tester records the difference on ruled paper. This permits the operator to make adjustments



Testing Watch on Latest Machine; Dots on Cylinder at Left Show Whether It Is Accurate

HEAVY TREAD ON "SNOW" TIRE GIVES BETTER TRACTION



Designed especially for winter use, a new tire is equipped with a heavy tread that gives better traction in snow and on ice. Developed by Firestone Tire and Rubber company, the scientific

design provides easy steering, firm grip in snow and smooth riding on pavement.

and recheck the watch quickly. Vibrations from the watch balance wheel are transmitted to the machine and registered as dots on a drum. If the dots are irregular, the watch should be adjusted.

848
1400 d
Main B.

Firestone Tire & Rubber

27

Roadway with Four Decks for City Traffic

Offered as a means of solving metropolitan traffic problems, a four-deck roadway has been designed. The multiple-deck arrangement is said to accomplish four times the transportation in a given amount of street space as existing systems. The top deck provides landing space for airplanes, the two middle decks contain rapid transit tracks and the bottom deck is for pedestrians. One feature is that traffic may continue at top speed in winter, the runways being inclosed and heated. In addition, power and telephone lines are in safe, dry housings, eliminating poles.

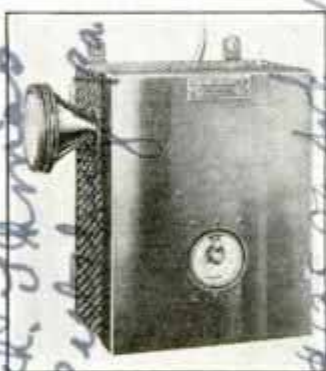


Sketch of Four-Deck Roadway as It Might Appear in City Street; Note Ramps Leading from Sidewalk to the Pedestrian Level

D/628

CARBON-MONOXIDE GAS ALARM

When the amount of carbon monoxide in the air reaches the danger point, a new alarm rings an electric gong. The alarm operates from a standard electric circuit. A small fan pulls air samples into the device constantly. If the concentration of carbon monoxide reaches .02 per cent, a point at which a few hours exposure would produce symptoms of poisoning, the alarm rings.



ELECTRIC WIRING CONNECTOR USED WITHOUT SOLDERING

Providing a positive and permanent contact, a new solderless connector for electric wiring replaces the conventional solder lug. It can be used for either solid or

stranded conductors. It consists of a copper cup with inclosing sides and raised lip at the wire entrance, a specially designed hexagon nut and a stud. The nut, which can be turned with either a screwdriver or wrench, presents a smoothly rounded surface to the conductor. The nut crowds the wire strands into the recess of the cup and compresses them to form a tight bond. The design eliminates loosening by vibration. Since the connector fits into the same place as a solder lug, it can be used on standard switches without exceeding electrical clearances.



Mine Safety Appliances Co. Inc. 132 Wallis Ave. Electr. Mech.

8-43

Electr. Mech.

Square D Company



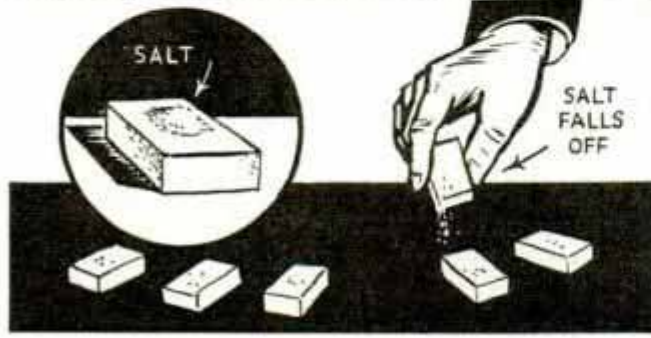
DINNER TABLE TRICKS

By HARRY BLACKSTONE



DINNER-TABLE magic is a diversion rather than a mystery. The cigaret is an excellent item to open proceedings. The demonstrator extends a pack to a friend. Before the recipient can reach for one, the performer makes passes with his fingers while he holds the pack in his other hand. Immediately a cigaret arises of its own accord.

This trick is made easy by the Cellophane wrapping around the pack. The performer uses a half-filled pack. He previously removes one cigaret and inserts it between the outside of the pack and the encircling Cellophane. When he takes the pack from his pocket, he keeps the outside cigaret from view. He holds the pack in his left hand, fingers in front, thumb



Left, Lumps of Sugar Treated with Salt in Order to Distinguish Any Lump Handled; Right, How Cigarette Inserted between Wrapper and "Cellophane" Is Made to Rise



in back. While the right hand makes its passes, the left thumb pushes through the Cellophane and forces the cigaret upward. To all appearances, the cigaret comes out of the pack itself.

With four or five lumps of sugar, the magician presents a real perplexity. He places the lumps on the table, then turns his back and gives instructions.

"Move them about," he suggests. "Then pick up any lump, clench it in your fist and hold it to your forehead. Now, replace the lump with the others."

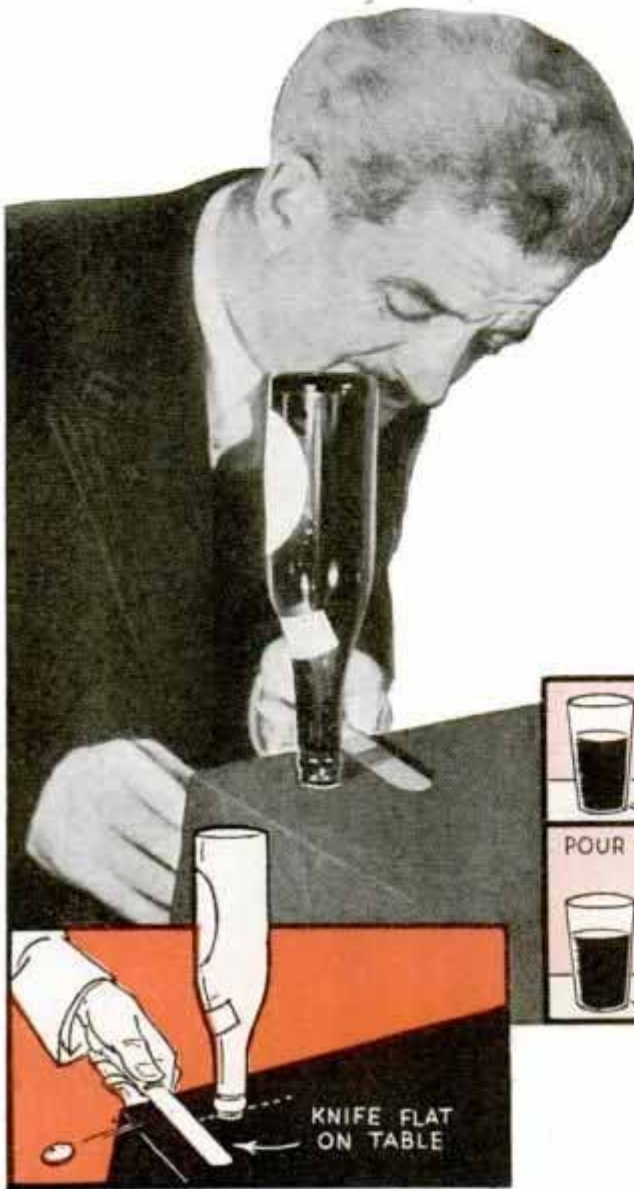
Turning about, the performer touches each lump in turn. He lifts one and announces it is the selected lump. Before he presents this trick, he arranges the lumps in special fashion. He pours some salt into the napkin in his lap and while toying with the lumps, he drops a pinch of salt on each. Since both salt and sugar are white, no one notes the salt. When a spectator lifts a lump, the salt falls from it, unnoticed. After the lump is replaced on the table, the magician can pick it out at first glance. The whiteness of the tablecloth obscures any spilled salt.

Excellent tricks for the dinner table are those which spectators try to duplicate, only to be outdone by the performer. Here is one such trick with a cigaret and a plate.

The performer sets a cigaret in the center of a plate. After a few experiments, he manages to make the cigaret stand upright. Others try to do the same stunt. Some one suddenly succeeds. The laugh is on the magician. Then he calmly raises his plate from the table, moves it about and replaces it, keeping the cigaret upright all the while. His imitator tries to do the same but fails. The magician has prepared his cigaret by pushing a large-headed



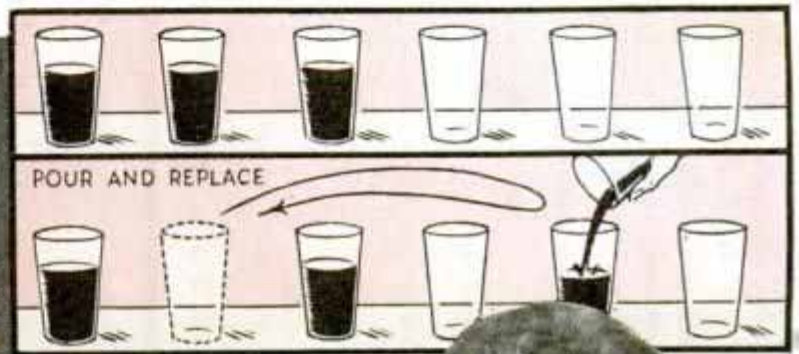
Top, the Coin and Water Trick and Making a Cigaret Stand on a Plate; Below, Note the Concealed Thumb



glass of the empty group; then replaces the original glass back between two full ones. Every odd glass is full; every even one is empty.

The next trick is one that some people will not believe possible even after they have seen it. First, a quarter is placed on the table. Next, an empty ginger ale bottle is inverted and carefully set upon the coin. The bottle seems ready to fall at the slightest jar.

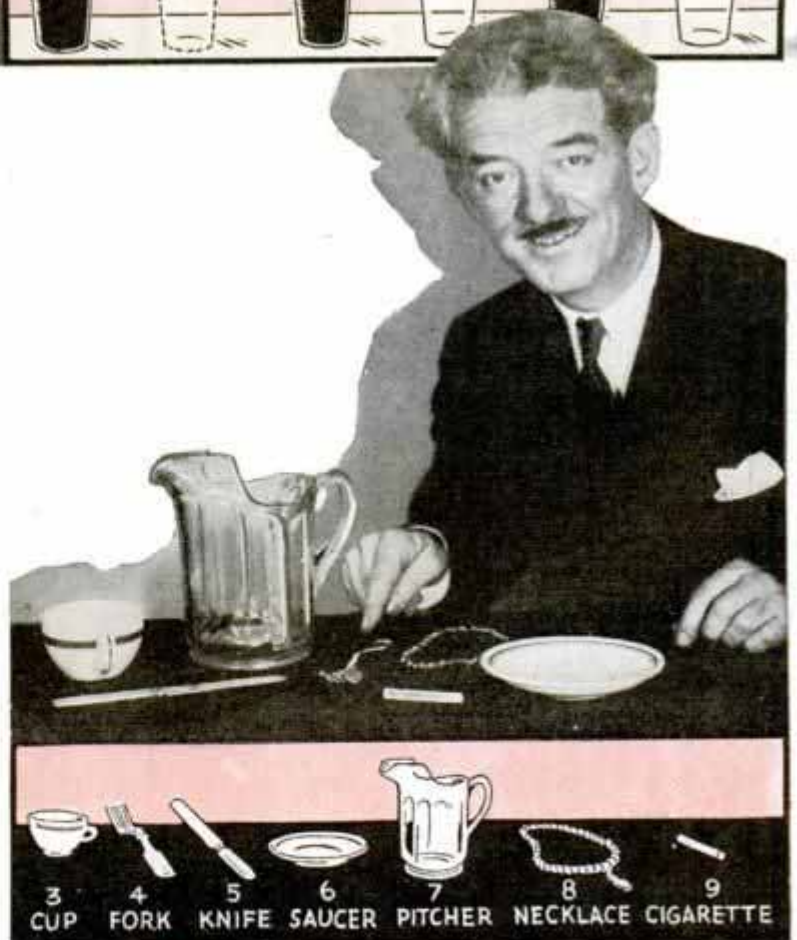
The magician takes a table knife, holds the blade flat against the table and delivers a side stroke with considerable force, cutting the coin from under the bottle. The bottle still stands upside down upon the table.



tack into one end. A cigaret thus arranged will balance with ease.

Here is one that always pleases. Six glasses are placed in a row; three tumblers are filled; three are empty. The full glasses are at one end of the line; the empties at the other. The trick is to move only one glass, yet finish with the glasses alternating full and empty, no two of the same sort being side by side. The spectators study the problem. Some declare that it can be done in two moves. A single move, however, sounds impossible, especially when the magician stipulates that he will touch but one glass.

When all have given up, the magician picks up the center glass of the three full ones. He pours the water from it into the center



Above, Using a Knife to Flip a Coin from under an Inverted Bottle, and the Solution of the Water Glass Trick; Below, the "Props" for the Mind-Reading Stunt

The trick works on a tablecloth as well as a wooden surface, provided the cloth is large enough not to scuff when the stroke is made. All that the magician must remember is to keep the blade flat, strike cleanly and carry through. The bottle will scarcely waver as it drops into place.

When a trick does not seem too miraculous, the onlookers can frequently be kept from spotting some very simple ruse. The balancing of a dinner plate is proof of this. Done in a laborious fashion, as though very difficult, the trick will catch the wisest watchers.

The magician tries to balance a dinner plate by setting it upright on the back of his left hand. He is careful to catch the plate each time it topples. Finally he holds his hand palm upward and sets the plate on edge, trying from that position. The hand is held quite flat, allowing no purchase; nevertheless, the balance is gained at last. The performer must be careful to have all the spectators in front of him. The attempt to balance the plate on the back of the hand is merely a preliminary step, to give excuse for turning the hand palm upward.

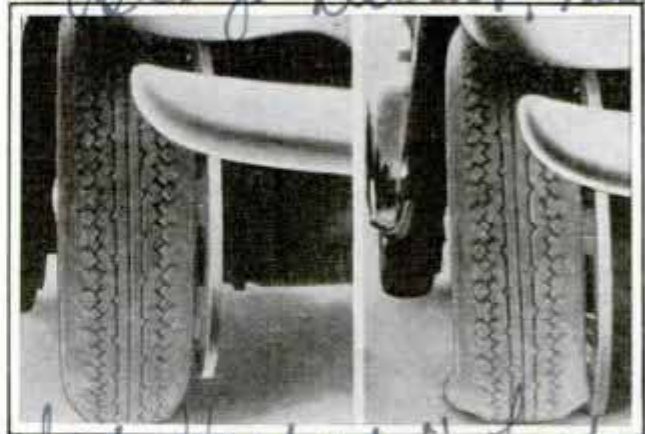
The observers watch the plate, forgetting about the balancer's left thumb. The plate rests on edge just below the fingers; the fingers are pointed toward the spectators. Up comes the thumb out of sight behind the plate. The magician allows the plate to tilt slightly backward. The thumb serves as a rest and the plate appears to be balanced. To conclude the trick, the performer tilts the left hand slightly forward. As the plate begins to topple, he grabs it with his right hand. The left hand draws away and the right passes the plate for examination.

The trick of picking out the coin is excellent for the dinner table, because it requires a variety of items, all of which are available. The magician begins with a saucer and glass of water. He pours some water in the saucer, then drops a coin into the water. He then declares he will remove the coin openly without dampening his thumb or fingers. Yet he promises not to lift the saucer, and adds that the water will still remain in it at the finish.

He tears a corner from a sheet of paper,

(Continued to page 118A)

**PERMANENT TIRE GUARD ENDS
DANGER FROM BLOWOUTS**



Left, Guard with Tire Deflated; Right, Guard Supporting Wheel and Deflated Tire

Permanently attached to the wheel, a tire guard ends the danger of wrecks after blowouts. It is a hubless, spokeless inner wheel of smaller circumference than the wheel with tire fully inflated, but large enough to support the wheel when the tire is deflated. If necessary, the motorist can drive for miles on the guards without damage to wheel, tire or tube. When a blowout occurs at high speed, the guard takes the drop created by the deflation and keeps the car on the road.

**CANNIBALISM OF HENS STOPPED
BY ANTI-PICKING GUARDS**

Protection of the flock from the tendency of chickens to pick each other at certain times is provided by two devices, the first of which is attached through the chicken's nostrils. When the hen puts her head down to eat, the device raises, being properly balanced. But when she raises



her head to pick at another chicken, the guard falls over the beak and prevents picking. The second device prevents the chicken from seeing when she looks up. In order to do damage

to other birds, the chicken must look up. If she wants to eat, she looks down and the device is no obstacle.

Poultry Tribune

Radio Cars with High Masts Do Patrol Work



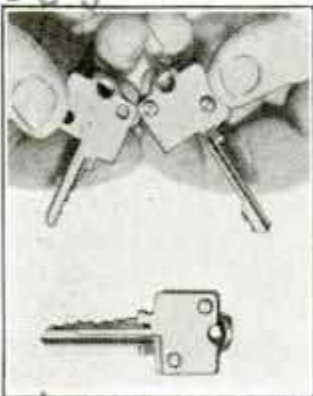
Acme

Radio Cars Equipped with High Aerial Masts Which Were Used to Maintain Communication between Various Military Units Policing the Saar During the Recent Plebiscite

Radio cars with lofty aerial masts are used for military patrol work in Europe. A fleet of such cars, each manned by a driver and radio man aided in policing the

Saar during the plebiscite there, making possible continuous communication between the various military units engaged in the work.

Split Keys in Two Sections Prevent Thefts from Safes



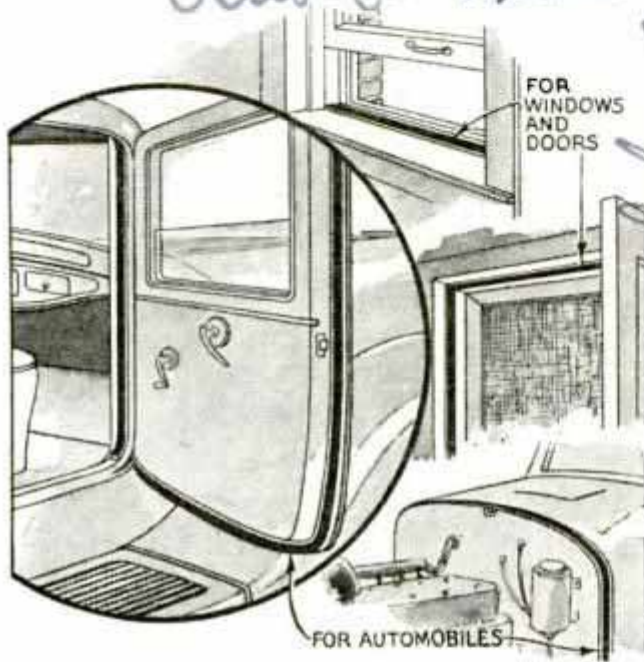
In order to divide the responsibility of the custodians of money and other valuables, a split key for cylinder locks has been developed. When the two sections of the key are joined, they form a master key for the lock on the safe or strong box. The master key is simple in construction. A single long control section can be paired

with any of several shorter main sections, each of the latter being different. The main section is kept by the cashier or other attendant in immediate charge of the money and the control section is retained by the proprietor of the business or the person who collects the money. The keys are virtually non-duplicative since they have a special grooving which does not appear on the blanks sold to locksmiths, requiring the owner to obtain a duplicate from the factory. A collector need carry only one control key in making the rounds of several stores or stations, each establishment having its own main section.

Revanee Safe Co. Revanee, Ill.

ADHESIVE-BACK RUBBER SHIM FOR HOME OR GARAGE

Many uses in the home or garage can be found for a rubber shim available in strips of ten or fifty feet. The strips have an adhesive on one side covered with a cloth backing. Attachment to wood, glass or metal is easy, the cloth simply being pulled off and the adhesive side pressed firmly on any clean surface. The material is invaluable for insulating purposes, for

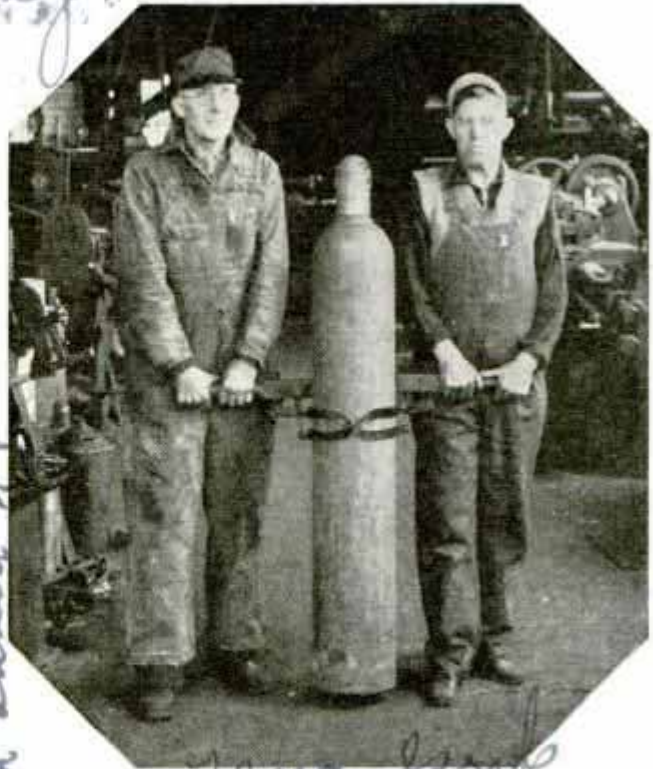


Several Uses of Rubber Shim; It Is Easy to Apply in Auto and in the Home

weather-stripping and for preventing rattles. Three-eighths of an inch wide, the strips may be obtained in three thicknesses.

TWO-MAN CARRIER SIMPLIFIES HANDLING OF GAS TANKS

Tanks used to hold oxygen, acetylene and other forms of gas can be handled easily by two men with the aid of a simple carrying device operating on the cantilever principle. It consists of two wooden handles connected by metal loops. The bands enclose a circular opening and to place the carrier in position the handles are lowered to enlarge the opening and the bands are slipped over the top of the tank. The handles then are raised to a horizontal position. This causes the bands to tighten and the butt ends of the handles are brought against the tank, making it impossible for the tank to slip. The carrier

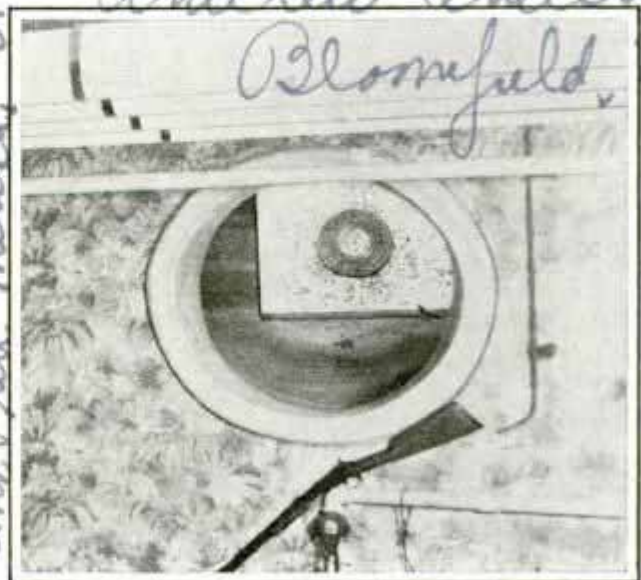


Two-Man Carrier Which Makes It an Easy Matter to Transport Tanks of Oxygen or Carbonic Gas

is provided in three sizes and a model with hooks is used with traveling cranes.

SHOOTING RANGE IN BASEMENT EXTENDS UNDERGROUND

When a New Jersey man remodeled his basement, he installed a shooting range in the lounging room. To make it safer than the usual basement range, he extended a hole through the basement wall for twenty feet and placed the target at the far end. When not in use, the aperture is covered with a plaque decorated like the walls.



Safe Shooting Range Installed in Hole in Basement

Van Cleef, 220 S. Woodlawn Ave
7-8-36 Chicago

Auto. St. Show

Emb. Fred mensh 31 Cassare Ave Pompton Lakes, N.J.

Jona Joff

E. 65

Andrew Anderson, Bloomfield, N.J.

A. H. Moore Co. Broad Ald

8.14.

2500 Eastwood Ave

Evanston, Ill.

Behind *the* Scenes in a



excite the lion or get him rebellious in the wrestling stunt. The lion's patience and power of attention are short. He has less intelligence than the most stupid dog. He cares nothing for the man's approval. He does automatically what he has been taught. If a tame lion is allowed to mix with ordinary beasts he quickly becomes just a lion.

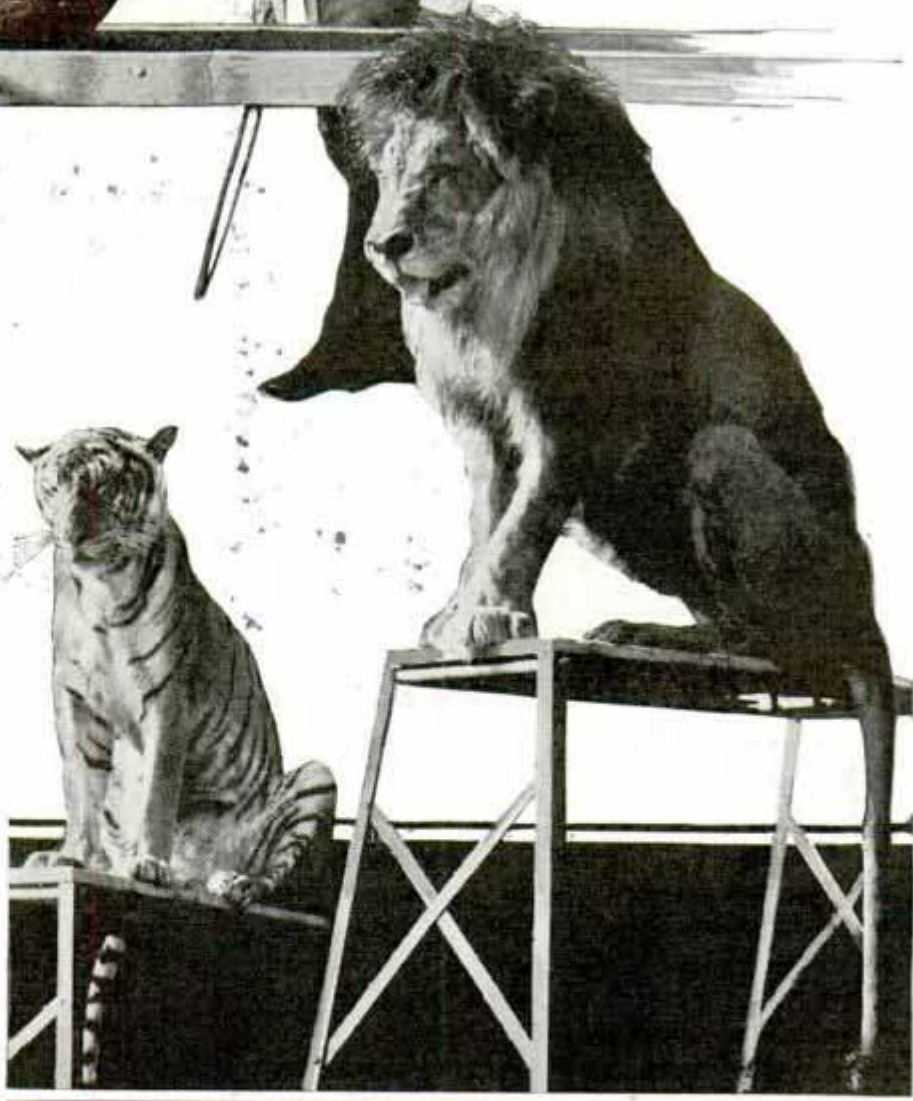
The spectacular lion and tiger shows are the "big

TRAINERS know only two kinds of lions—those you can put your hands on and those you can't.

There are two kinds of cat acts. In the small "trick acts" you see a huge, black-maned monarch of the veldt allow the trainer to sit on him or open his jaws and let the man put his head between them.

This lion was reared as a pet from the time it was a fluffy kitten. As a small cub it had a doll's head put in its mouth. If it closed its teeth the baby lion was tapped on the nose with a buggy whip. Every day it held in its mouth dummy heads, bigger as the lion grew.

You will notice that the trainer keeps his head in the jaws only a few seconds. He is careful not to



Allen King, Trainer, Teaching a Tiger to Roll a Ball and, Below, an Old Troupier Sitting Unconcernedly on His Perch Waiting for the Signal to Return to His Cage

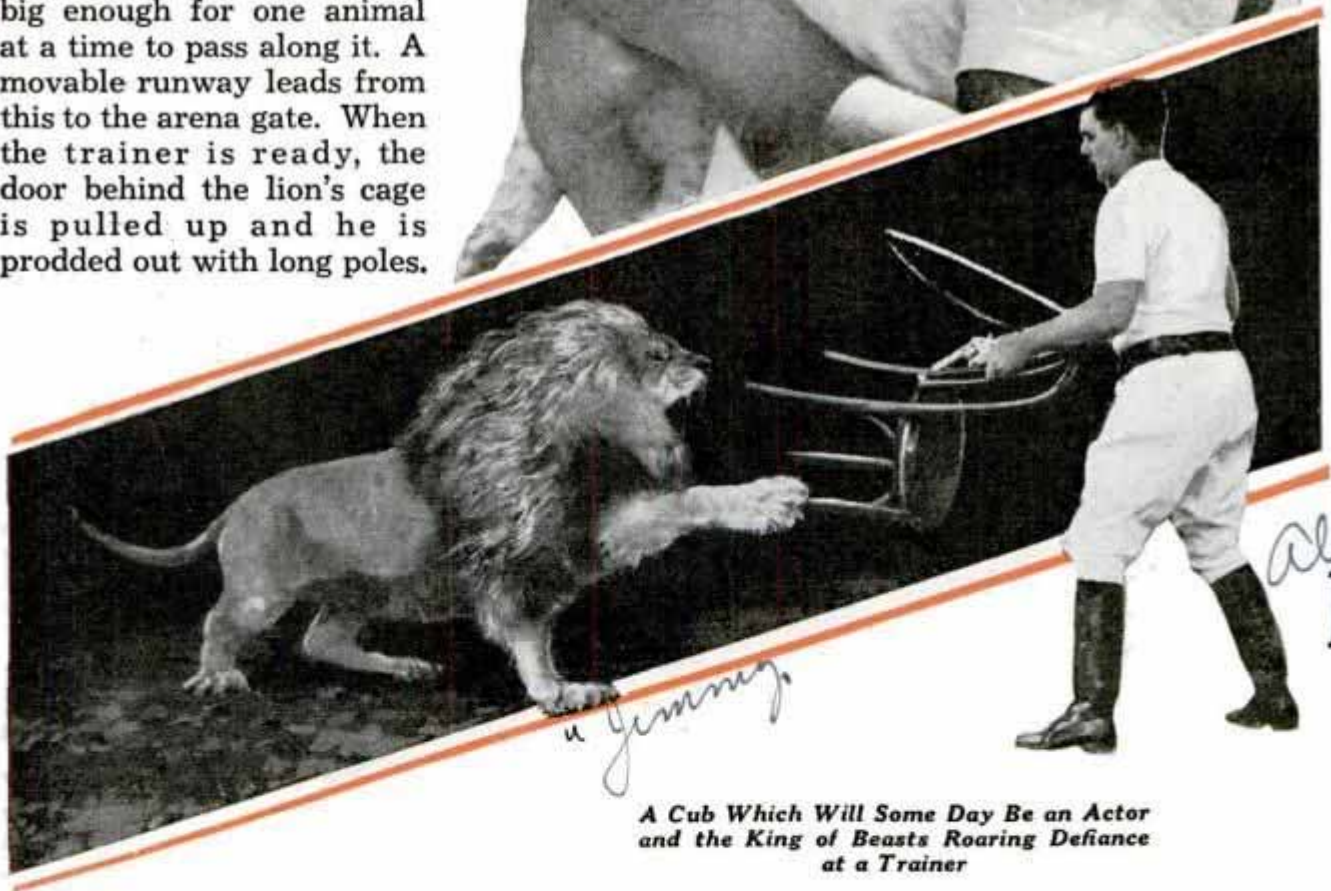
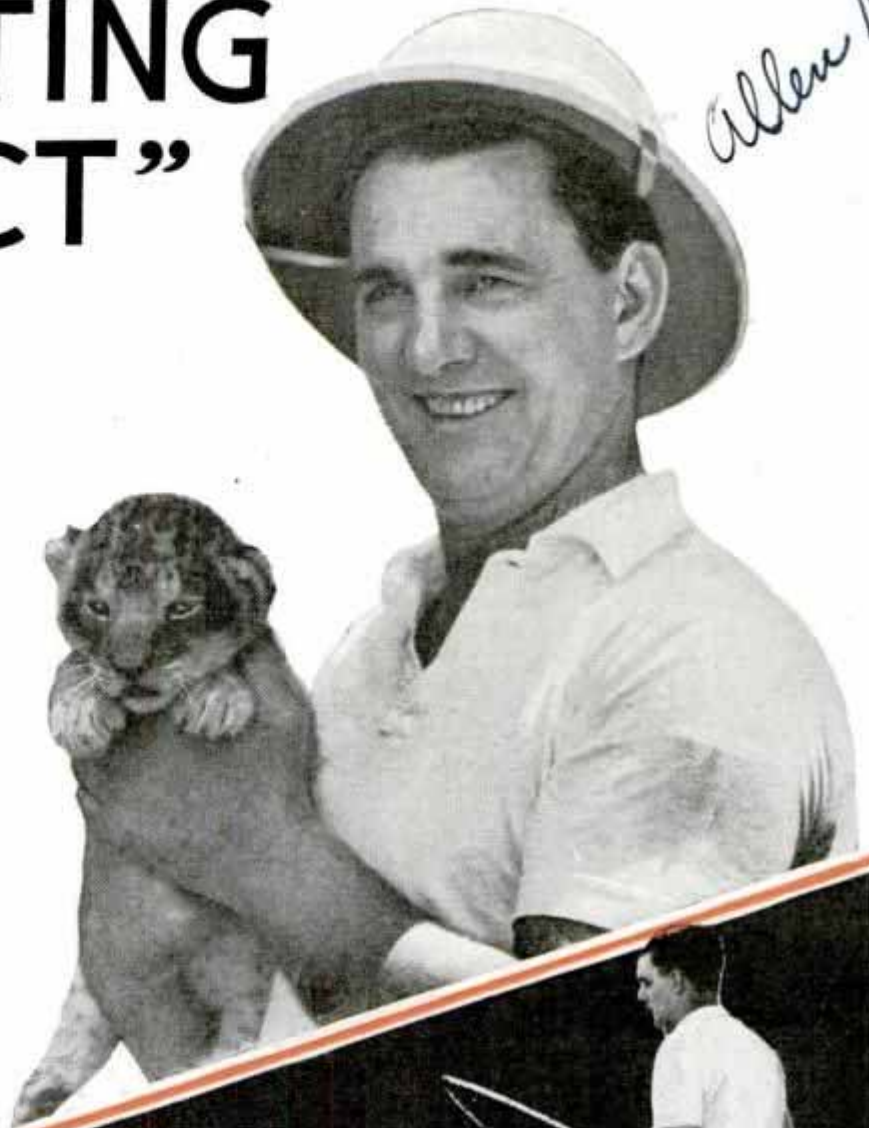
8-1-4

Allen King

"FIGHTING ACT"

fighting acts" which have twenty to thirty beasts in the arena at once. For these acts lions and tigers are trained when two and one-half to four years old. Savagery rather than education is emphasized. For the big acts, animals that have been captured full-grown are preferred to those reared on breeding farms. Let us watch a training session.

Behind the row of cages is a wooden-barred tunnel big enough for one animal at a time to pass along it. A movable runway leads from this to the arena gate. When the trainer is ready, the door behind the lion's cage is pulled up and he is prodded out with long poles.



u Jimmy

Allen King

A Cub Which Will Some Day Be an Actor and the King of Beasts Roaring Defiance at a Trainer

A minute later the trainer is alone with a wild lion.

The arena is a steel-barred circle, thirty to forty feet in diameter. It has several double-door emergency exits. The same arenas are used in winter quarters and in

the shows. Training and rehearsing go on all the time. Around the arena at various heights are small platforms clamped to the bars. The object is to force the lion or tiger to get up on one of these perches and sit there until ordered down. Most of

Allen King



Forcing a Tiger to Change Perches and the Trainer and One of His Lions at a Moment When an Armistice Had Been Declared

the animals never learn anything else. That is the limit of their mental capacity.

For weapons the trainer has a long-lashed whip, a long, heavy pole and a revolver loaded with blanks—never bullets. A wounded lion would never stop until he killed or was killed. The man also holds a common wooden chair with his left hand. In preparation for its schooling the lion has had a heavy trace chain fastened around its neck in its cage by catching the animal with loops of rope. There is a loud banging of clubs on the runway and yells of "Get going!" The beast leaps out on the tan-bark, two feet of the chain whipping its fore legs, and glares around the arena, paying no attention to the man.

It immediately begins to gallop around the circle, looking for a way out. The

trainer follows, shouting and cracking his whip, trying to get the animal's attention. To the animals, the arena is a detestable, unnatural place. Sometimes a lion, in a rage to get out, will scramble up to the top, hang a moment, then fall like a sack.

Around the outside of the bars are half a dozen cage men with iron hooks and coils of three-quarter inch rope. The trainer keeps after the lion. When he annoys it too much it turns on him in a snarling rush.



The man backs away and protects himself by shoving the legs of the chair in the beast's face. The animal vents its anger by chewing a chair leg and giving it a few cuffs with its mighty paws. The fundamental, stupid good-nature of the lion tribe is shown here. All the animal wants is for that incomprehensible, two-legged creature to stop bothering him.

The lion won't go on the perch. The trainer checks him a second close to the bars. One of the men outside hooks the chain through. Two men drag the lion close to the bars. Another snaps a rope on the chain. The end of the rope is passed over a cross bar eight feet above a perch. As soon as the hook is off the lion makes great leaps out into the arena. The rope jerks him to a stop in midair and he falls on his side like a lassoed steer. Then two men on the rope drag him back to the perch. To ease the choking of the chain he crawls up on the little platform and sits, dazed, tongue hanging out and ribs pumping. The trainer rewards him by kind words and stroking, at eight feet distance, with the end of the pole.

A lion may be seat-broken at one lesson. It may take a year. In a busy session the trainer may take on one animal after another until half a dozen novices are roped on the perches. For training specially promising animals to do specialties, like balancing on a ball, or jumping from place to place, the chain is used in the same way. Tigers are slightly more intelligent and give up much easier than lions. They may often be seat-broken without the chain.

The trainer works an animal only a few minutes at a time. Wild beasts can stand nothing like the steady grind of a domestic animal, mentally or physically. Capt. W. K. Bernardi, a trainer, says that if a lion escaped and ran sixty yards at its top speed it would be completely bushed.

Obviously animals so trained are more than half wild. In the performance the trainer will come near and tease them on their perches so they will show their savagery by snarls and cutting at him, but he keeps his distance. When he is putting an animal through an act he stands well out of reach. The reason they don't leave their places to attack is that it is not the nature

(Continued to page 130A)

810.

SCREW CAP EASILY TIGHTENED WITH SMALL HAND TOOL

1.954, 422



Wooden Handle with Composition Band in Hole in End Used for Tightening Screw Caps

Tightening screw caps on bottles is made easy with a wooden handle containing a composition band which is inserted into a hole drilled in one end. To tighten a cap the handle is pressed on the top and turned to the right. To loosen, the process is reversed. The band does not slip on the cap or damage it and it can be operated faster than the fingers alone can do the work.

PENCIL WRITES THREE COLORS



Serving the purpose of three pencils, an automatic pencil made of pyralin writes three colors. A flick of a thumb button changes from one color lead to another. Three separate leads are contained in the normal size barrel. Each lead is supported to the writing point.

Warren Knight Co.

*Wm. D. MacIntyre 52 Cedrus Ave
Boston
Suggested Norma Pencil*

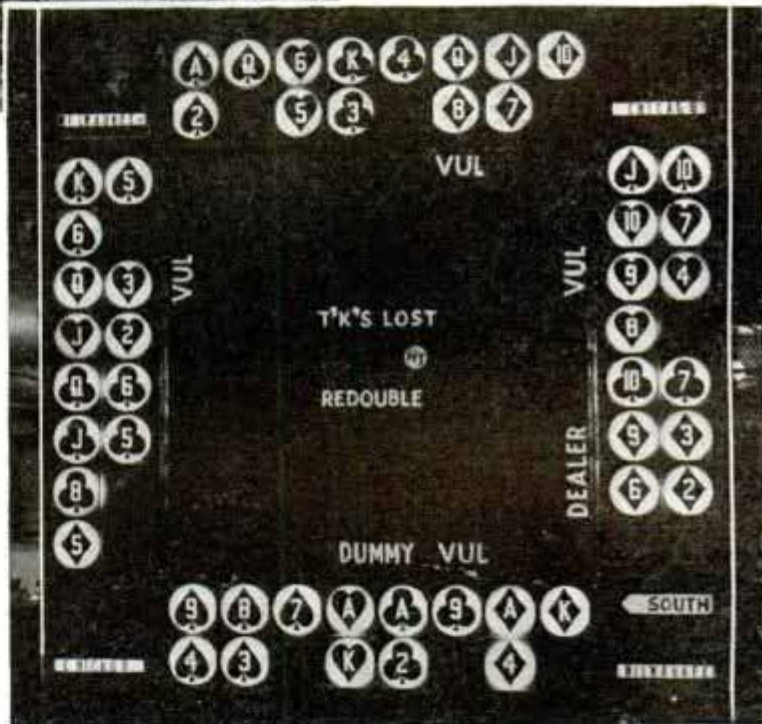
Crowds See Bridge Game on Electric Board



Electric Board Which Enables Crowd to Watch Play and Bridge Tournament, and the Man Who Operates It

More than 500 bridge enthusiasts were able to watch the bidding and play in an inter-city contract bridge contest between Chicago and Milwaukee teams with the aid of a big electric board on which the cards held by each player were shown. This enabled spectators to follow the bidding and play just as though they were standing behind the contestants. An announcer stood behind the players and through a telephone informed the operator of the

board, known as a tele-bridge, of the progress of the game. By manipulating a series of switches the operator flashed on the board each bid and each card played. Besides indicating cards held by each player and the cards each played, the board also showed tricks lost, redoubles and who was vulnerable at any moment during the tournament.



Rectangle Head Tri-Square Speeds Work of Mechanics



Designed with a rectangular head, a new tri-square can be used for inside and outside squaring without adjustment. An angle measuring arrangement is one feature, consisting of a movable arm and quadrant attachment to the head. Pressure on a slide bolt projects the arm to give the forty-five degree angle instantaneously. Angles from zero to forty-

five degrees are obtained by manipulation of the slide bolt. Quadrant faces marked for various classes of mechanics and carpenters are available. Other features include instantaneous forty-five degree miter, rule, level, plumb and scriber which screws into the head when it is not being used.

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

The electric board...
 The man who operates it...
 The bridge game...
 The cards held by each player...
 The bidding and play...
 The spectators...
 The announcer...
 The telephone...
 The operator...

R. Powell Co. 306 N. 11th St. Berkeley, Calif.

FLYING OFFICE SAVES TIME OF BUSY EXECUTIVES

Equipped with fine furnishings and decorated in the ultra-modern manner, the latest airplane resembles a skyscraper office, so far as the interior is concerned. It has a lounge seating eleven persons, a conference room for four, a galley, lavatory and pilot's quarters. The floor is covered with brown carpet, the ceiling with tan fabric and the paneling between windows with green finish, to match the green curtains. Metal accessories and trim are gun metal. Individual reading lights are set in the ventilating duct, while three central ceiling lights supply general illumination. The "flying office," a Douglas transport, has two-way telephone and built-in radio in the lounge. It was styled for Cities Service company.



Interior of Plane Equipped for Business Use; This Is the Lounge with Built-In Phone and Radio

TOY TRAIN DELIVERS FARMER'S MAIL

One western farmer claims he operates the world's smallest "mail train." His house



Depositing Mail in Box Pulled by Toy Engine

is some distance from the road where mail is delivered. The farmer laid a tiny track from his house to the road, obtained a toy locomotive and fitted his mail box as a "mail car." About time for the carrier to

arrive, the train is started from the house. A lever alongside the track stops the engine when it reaches the highway. The mail man deposits the letters, turns a switch and the train chugs back to the house. It is operated with small batteries.

SPEEDOMETER FOR THE "BIKE" ALSO SHOWS MILEAGE

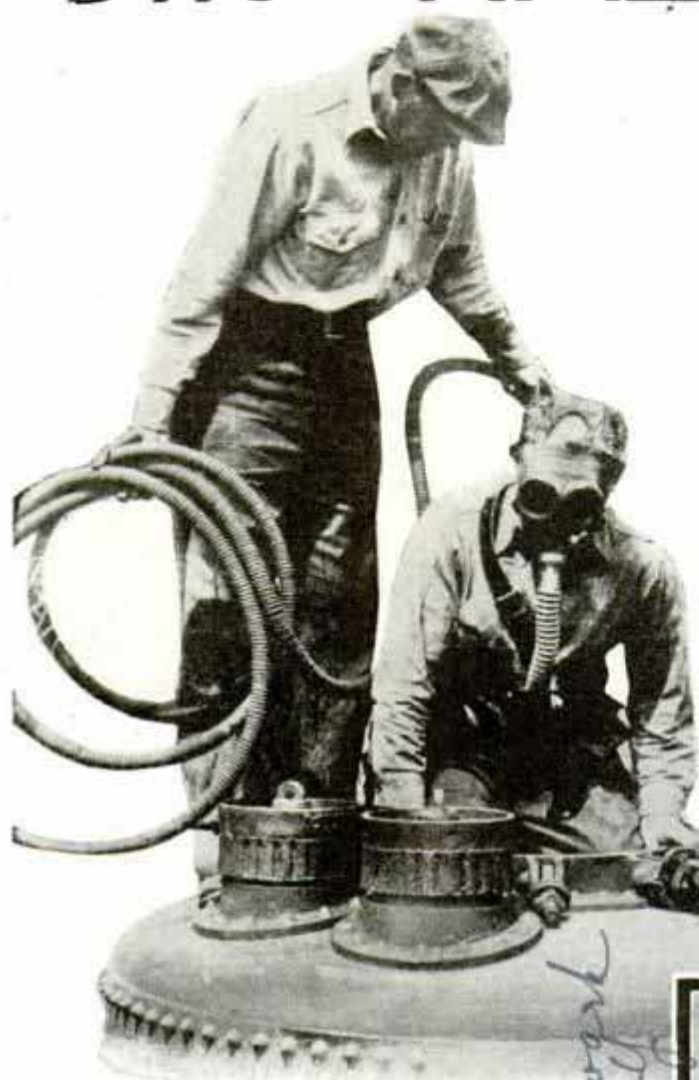
Both speed and mileage are indicated on an accessory designed by Stewart-Warner for the bicycle.

Three and one-half inches in diameter, the speedometer head has an aluminum-finish case. The face is black with white figures that show speeds up to fifty miles per hour and mileage up to 9999.9. Only a few minutes are required for installation. The speedometer works from the front axle.



Comp. Carlton Wash. Stewart-Warner Corp. 1821...
 501 Madison Ave. New York
 E 49
 Memphis
 4.95

The HAZARDS of



waves. So no man may number the colors; their number is infinity. In practical terms we recognize seven colors of the spectrum; red, orange, yellow, green, blue, indigo, and violet, and consider all others graduations of these. The painter recognizes only three colors, and calls these primary, for he has learned to blend them into any shade he desires save black and white, which he calls shadow and light, and not color.

But the dyestuff maker, by accurate mathematical computation, recognizes 4,000,000 colors, and each of these, he knows, is a precise chemical formula. Thousands have already been discovered and day by day the number is increasing.

In hundreds of dyestuff plants chemists labor to produce new colors and more permanent coloring materials. Their work is extremely dangerous, for from a group of 250 "intermedi-

By **WALTER E. STEWART**

WHEN W. H. Perkin, a young English chemist, attempted to make some quinine in 1856 and accidentally created the first synthetic dyestuff, aniline purple, he began an era of danger to experimenters only equaled by the development of gunpowder.

It was another English scientist who discovered the composite nature of sunlight and started the train of discovery which revealed that all non-luminous and non-fluorescent substances are dependent for their color upon the light which strikes them. A red carnation appears brilliant red in red light, and yellow in yellow light, but in green or blue light it appears black.

Colors of light are merely various frequencies of light waves, just as musical notes are various frequencies of sound



Fighting Fire Started While Making Dyestuffs and Inspecting a Pressure Mixing Chamber Used in the Manufacture of Dyes

D1575

CREATING

NEW COLORS



ates" they may derive a possible 4,000,000 or so different chemical dyes whose properties are largely unknown until discovered by experiment.

Only a few weeks ago a chemist in a laboratory near Kearny, N. J., started a reaction in a glass distillation unit. Cautiously he pushed a small bunsen burner under the glass chamber. Immediately the reaction began to accelerate, and he had just enough time to throw up his hands to protect his face before a violent detonation shattered the apparatus.

Dyes range in price from one dollar to over fifty dollars a pound, and it is not unusual for a new shade to result in a business for a small plant amounting to more than \$100,000 in a single month.

Beginning with the distillation of the coal tar and continuing to the final grinding of the dry dyestuff, every step of the process is potentially dangerous. About a year ago, near Newark, N. J., the ordinary process of recovering benzene from coal tar was proceeding when a new workman carelessly lighted a match. With a roar heard for miles a huge steel tank sailed skyward killing four persons.

A few months later at another plant in



Elle Paul Style Service

Changing Colors in the Show Windows Are the Result of the Work of Thousands of Research Chemists; the Dress Derives Its Color from a Coal Mine and the Test Tube of a Chemist



is derived from the picric acid used in gunpowder. The explosion demolished the entire end of a large building and it was only by great good fortune that the workers escaped. Accidents with this material had been so frequent that the mill was rebuilt in a bombproof shelter which was equipped with remote controls so that no one need be inside while the machinery was running.

And so the story of the creation of each new color is one of adventure and danger and high reward.

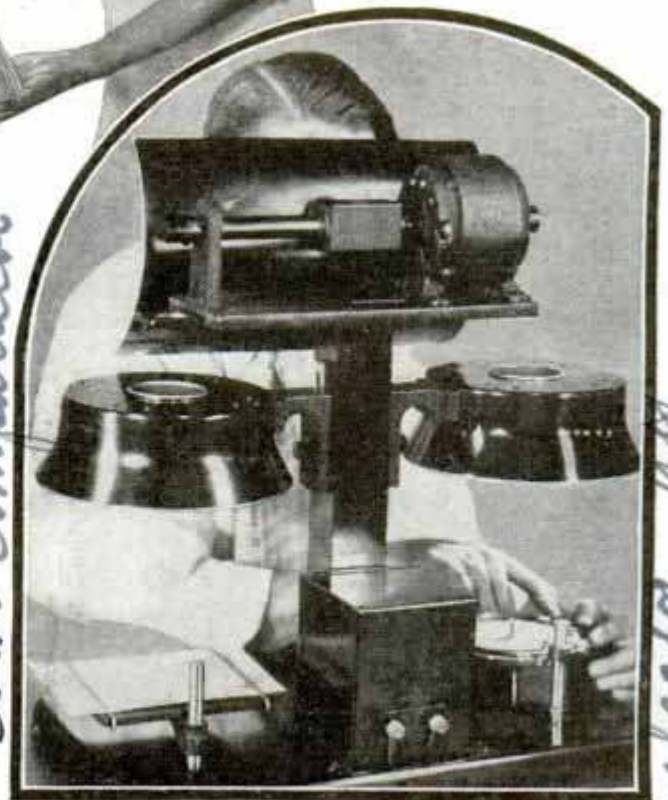
the same vicinity one of the intermediates, benzidine, was being made by adding powdered zinc to a compound of sodium hydroxide and nitro-benzene. The mixture was in a large, lead-lined, steel tank. A workman added the powdered zinc a little too fast, and when the reaction started the whole mass flashed over almost instantaneously. The resultant blast burst the heavy pressure head of the tank and sent it crashing through the heavily timbered roof.

Phosgene and chlorine, both deadly gases used in chemical warfare, are used extensively in the creation of intermediates. The chlorine is fairly well controlled, but workers around the tanks where phosgene is used always wear gas masks. A few weeks ago a foreman, checking one of the phosgenation processes, came upon a worker slumped on the floor. Only quick work in getting him out and the immediate application of an oxygen respirator saved his life. Investigation showed that the man had been knocked out by gas leaking into his mask through a tiny hole.

Many colors are themselves explosive when subjected to excessive heat. Less than a year ago a small micro-mill used for grinding and mixing the dry colors became overheated, due to friction, and exploded a batch of acid anthracine brown which was in process. This color



Above, New Fabrics Demand Hundreds of New Dye Combinations as They Are Introduced; Left, a Skein of Artificial Silk Ready for Dyeing



Above, an Optical Machine Which Classifies the New Colors as They Are Developed

Color Comparator
Bohler & Co.
Bausch & Lomb
optical 637 St Paul

Adam Adamick

near Ellsworth, Wash

**SEA SHELL ARTIST
TURNS HOBBY
INTO MONEY**

£-39

From a hobby of fashioning novelties out of sea shells is growing a business. A Pacific coast artist finds a demand for articles made from crab, lobster, clam, mussel, sea snail and periwinkle shells. The starfish is prepared by cleaning it thoroughly, incorporating it into a novelty and then giving the finished product a coating of shellac and varnish to give it permanency.



emb. 89 Paterson
740-11 St. Clair
north Seattle Wash

Triton Cove Resort

Artist With Some Samples of the Novelties Which He Has Made by Using Shells; Note Treatment of Starfish

**MIRROR HELPS TO FIND FLAWS
IN RAILWAY CARS**



£30

ms. 4/11/35

Car Inspector Using Mirror to Examine Arch Bar

Broken arch bars on freight cars have cost the railroads millions of dollars in damage to equipment and right of way. One of the latest methods of inspecting the arch bars at terminals is by using a specially constructed hand mirror that reflects the underside of the bars.

**NEST IDENTIFIES EGG-LAYERS
FROM NON-LAYING HENS**

£-21

Hens that lay are identified automatically from non-layers by an all-metal nest. The



Metal Nest Identifies Laying Hens; Drawing Shows How Egg Reaches Storage Basket

Forster Mfg Co 1852 Alcatraz Ave

Em. J. M. Karcher 4475 W. Paine Blvd

St. Louis Mo

U.S. Major ...
Technical Advisor to

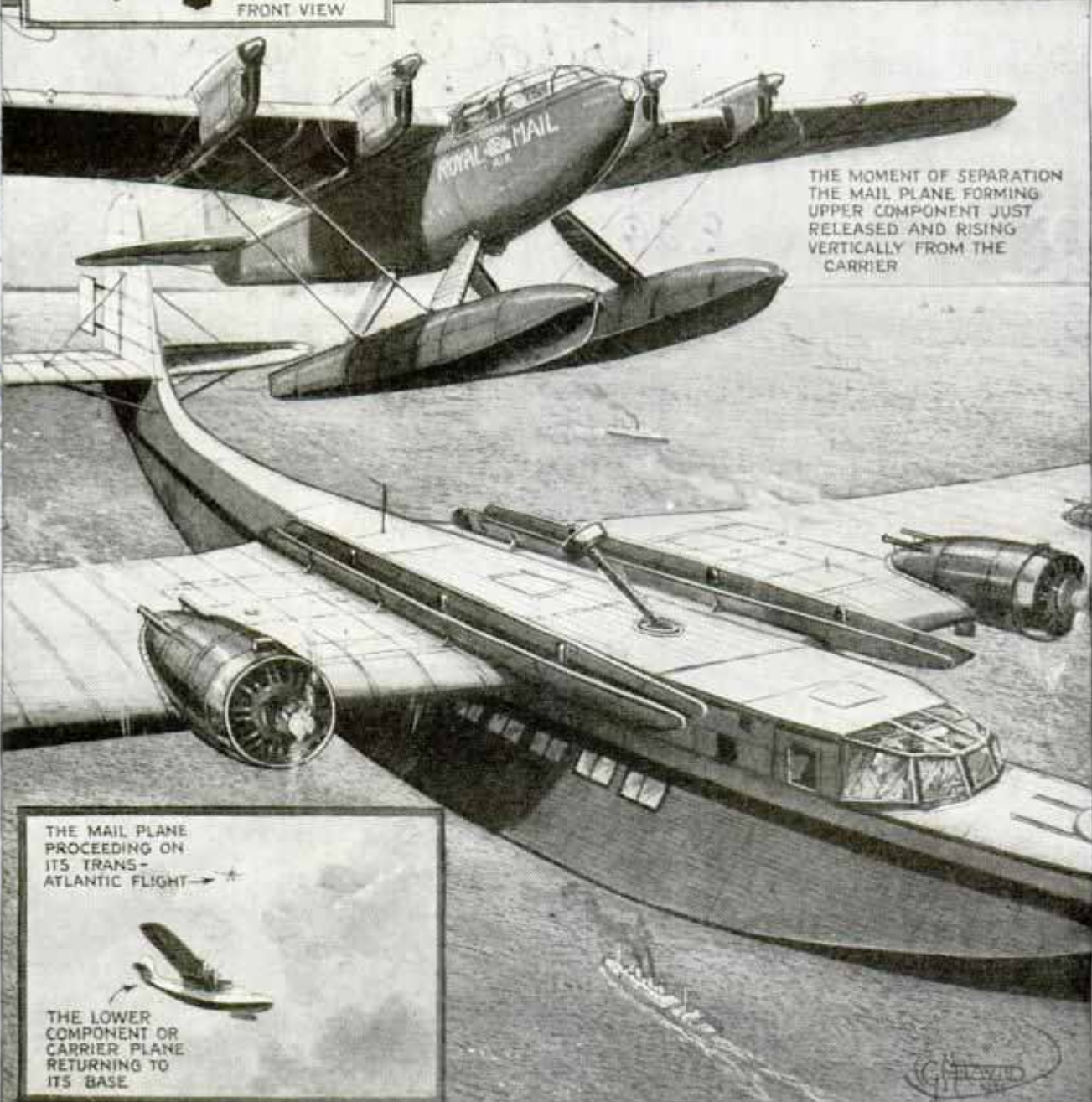
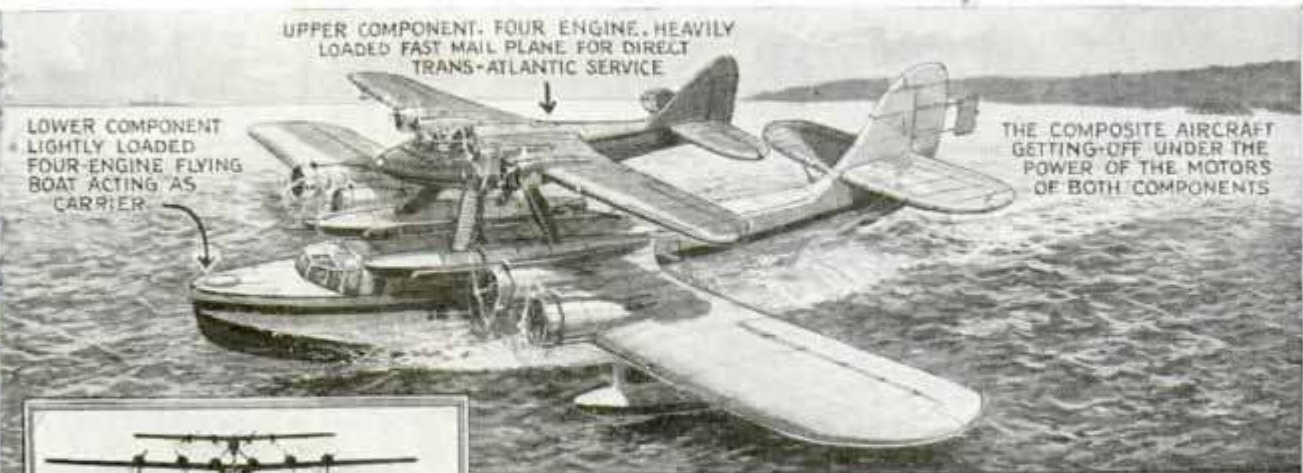
POPULAR MECHANICS

Imperial Airways, England

Flying Boat Launches Sea Mail Plane in Air

Being built by Short Bros. Ltd. Rochester Kent England

Copyright 1934 by the McGraw-Hill Companies



British Designer's Combination Flying Boat and Mail Plane, Each with Four Engines; Top, Mail Ship Attached to Flying Boat at Takeoff; Bottom, Launching Mail Plane in Air to Fly from England to Canada While Carrier Flies Back to Base; Mail Plane Has Floats; Composite Craft Is Being Constructured

Atos Boat Outboards Ltd. 618 London Road, Isleworth, Middlesex, Eng

RUSTPROOF STEEL BOAT RIBS DECREASE WEIGHT *8.73*

Replacing the usual timber ribs, rustless chrome-steel bars are used in a British made motor boat that is said to be about sixty per cent lighter than conventional craft of the same size. With an outboard motor, the boat attains a speed of twenty-five knots. The planks of the boat are laid lengthwise from stem to stern, with the steel bars passing edgewise through each plank. At the gunwales, the bars are fastened with nuts to press the planks tightly together. The bars are spaced three to ten inches apart to prevent changes in the shape of the hull. Painting or cleaning the interior of the craft is easy because it is smooth from keel to gunwale. The makers claim this method produces a boat that is much stronger and much easier to keep watertight.



Apparatus for Keeping Time at Ringside; It Counts Accurately in Case of Knockdowns

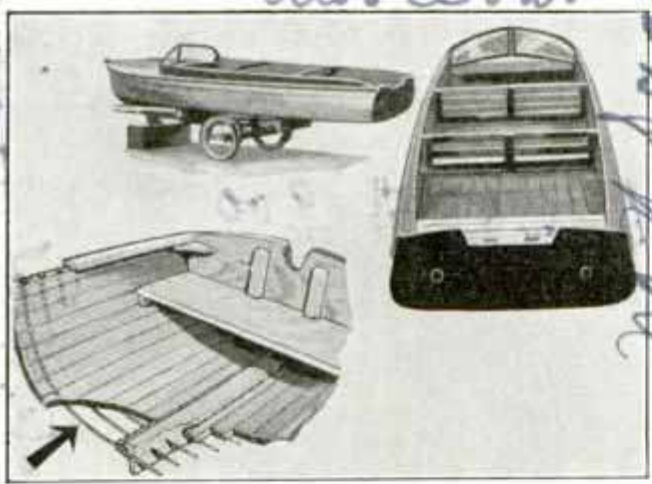
ping at ten and signifying a knockout. It is intended to eliminate the "long count" of past boxing bouts.

GAS IN BOTTLE WHIPS CREAM AT TOUCH OF BUTTON *8.137*

Cream can be whipped by touching the button of a gas container developed by Charles A. Getz of the University of Illinois. The whipping process is one of physical chemistry. The cream is placed in a special container made of steel, tin dipped, with an air-tight top, containing an air valve. All oxygen is forced out and nitrous oxide gas is injected into the container. The housewife is provided with a release trigger which she attaches to the "bottle." When she presses the button on top of the trigger, the gas forces out the cream in aerated or whipped form.



Three Views of Gas Bottle in Which Cream Is Whipped Almost Instantaneously

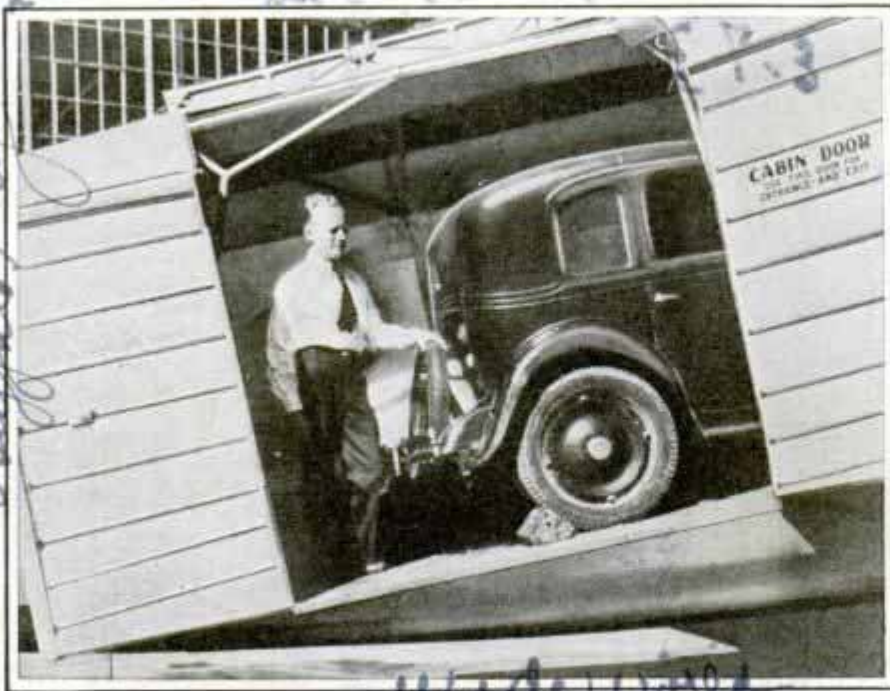


Illustrating New Boat Construction in Which Steel Ribs Replace Wood

ELECTRIC BOXING BOUT TIMER IS AID TO REFEREE *8.129*

More accurate timekeeping at boxing bouts is possible with an electric device recently installed at a Louisiana arena. After the referee gives his instructions to the fighters, the electric clock tolls off the seconds with flashes from a red-light bulb. During the rest period, the timer shows a green light for ten seconds before the fight is to be resumed, giving the handlers time to leave the ring. In the event of a knock-down, the device sounds a gong and the red light, held high above the timekeeper's head, begins tolling off the seconds, stop-

Charles A. Getz, Urbana, Ill.



Showing Automobile Loaded in Giant Cargo Plane; Note How Fully Assembled Car Is Easily Fitted into the Compartment

CARGO PLANE CARRIES AUTO IN ASSEMBLED FORM

Automobiles in assembled form can be transported by a giant cargo plane capable of a speed of 117 miles per hour. The automobile is loaded into the cabin of the ship, a Condor. The plane also can serve as an ambulance, a troop transport or carrier of general freight, cafeteria equipment, spare engines, gasoline and other supplies. Special fittings facilitate the loading of bulky or heavy objects.

GEAR LAPPING MORE ACCURATE WITH AUTOMATIC MACHINE

Making possible the lapping of heat-treated gears to an entirely new degree of tolerances, an automatic machine has been developed to turn out smoother, quieter and more efficient spur, helical and herringbone gears. A new method called "inclined axis" is employed by the machine. By inclining the axes of the lapping members



to the work piece, the machine produces frictional or abrasive action along the normal pitch line of the gear tooth by rotary

Auto Engineering Co

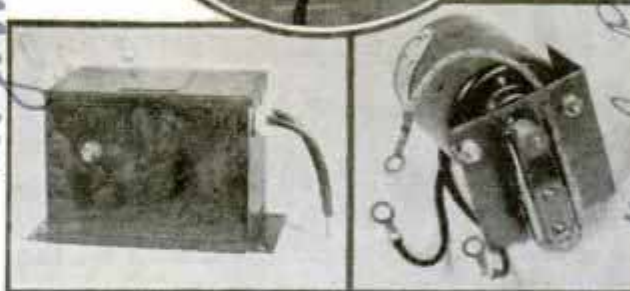
motion only without increasing the sliding movement between other contacting portions of the gear teeth. The result is more thorough lapping action throughout the gear tooth surface. The machine also has the advantage of lapping one or more gears on a cluster simultaneously without adding to operation costs.

NEON AUTO LIGHTS ARE OPERATED ON SIX-VOLT BATTERY

Neon signs on automobiles, trucks, airplanes and other places where the only current is from

storage batteries have been made possible by an inexpensive transformer unit. Direct current from a six-volt battery is converted by the unit into alternating current of 10,000 volts, sufficient to operate more than twenty feet of neon tubing. Con-

\$16.50 \$19.00



Two Views of Simple Equipment for Putting Neon Lights on Truck

sumption is only about five amperes, less than used by the average car radio. The transformer weighs only nine and one-half pounds. A special model can be used with lighting plants with thirty-volt batteries.

115 28 La Salle

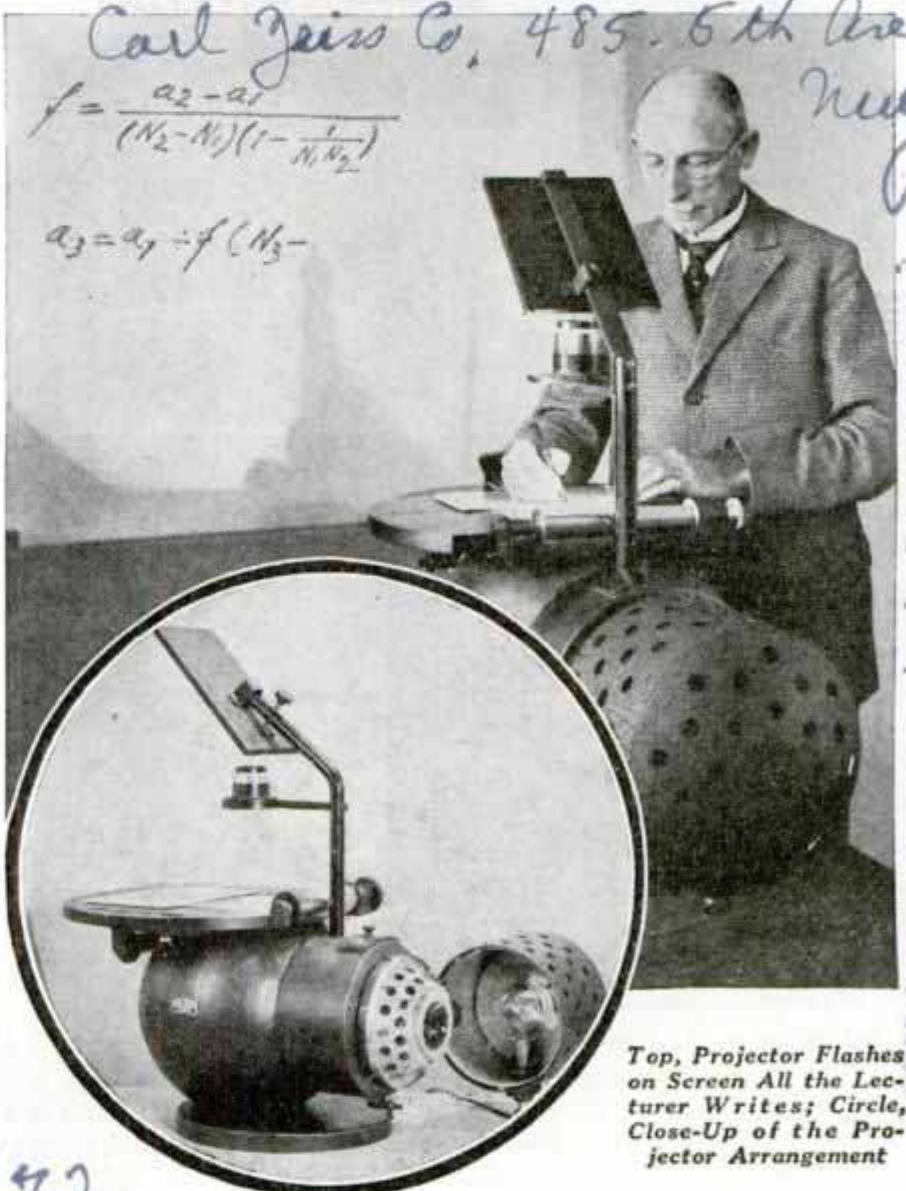
Curtiss Aeroplane and Motor Corp
Vulcan Buffalo, N.Y.

Industrial Products
Merrill
Merrill

Handwritten: D1606 Carl Zeiss Co, 37-41 Marlimer St. W. London, Eng.

Diagrams Flash on Screen as Lecturer Writes

Diagrams or formulas may be flashed on a screen as the lecturer writes by a projector developed in Germany. The lecturer writes or draws horizontally on a sheet of Cellophane lying above a horizontal glass plate. Illuminated from below, this plate causes whatever is written to be projected, on an enlarged scale, on a screen. The Cellophane is arranged in the form of a strip on rollers so that it may be pushed forward as the writing space is filled. The speaker writes in normal position and faces the audience. A 500-watt lamp projects the writing, its beam passing through a water chamber which absorbs the heat rays. The projected writing does not strain the eyes. The arrangement is intended to replace blackboard work, which forces the lecturer to turn his back on his hearers.



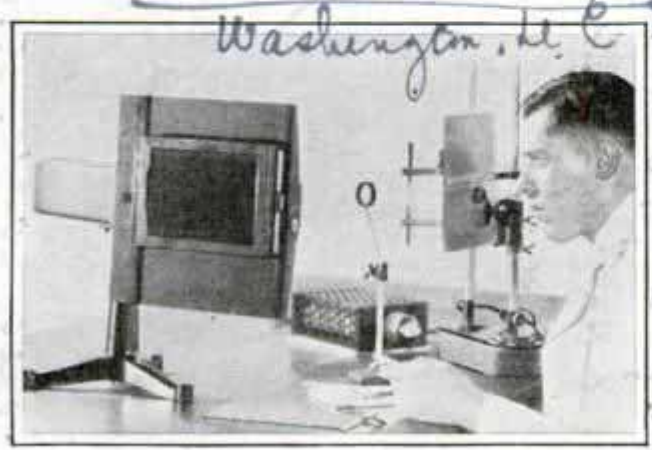
Top, Projector Flashes on Screen All the Lecturer Writes; Circle, Close-Up of the Projector Arrangement

Handwritten: E-72

Fingerprint Blurs Cleared by Matching Enlarged Images

Blurred fingerprints can be cleared up by a device recently pressed into service by the U. S. department of justice in the

war on crime. The device is plugged into an electric connection, lighting up a small screen. On this screen is projected the enlarged image of two separate sets of fingerprints. If they are identical, from the same fingers of the same hand, the lines flow together so that only one fingerprint stands out in detail. Thus may be proved the connection of a suspect with a crime, provided his fingerprints already are on file. Recently a fight occurred between department of justice agents and a band of outlaws. One of the government men was killed and the slayer escaped, leaving no trace but a pair of badly blurred fingerprints. The "unblurring" device helped to establish his identity and he was arrested.

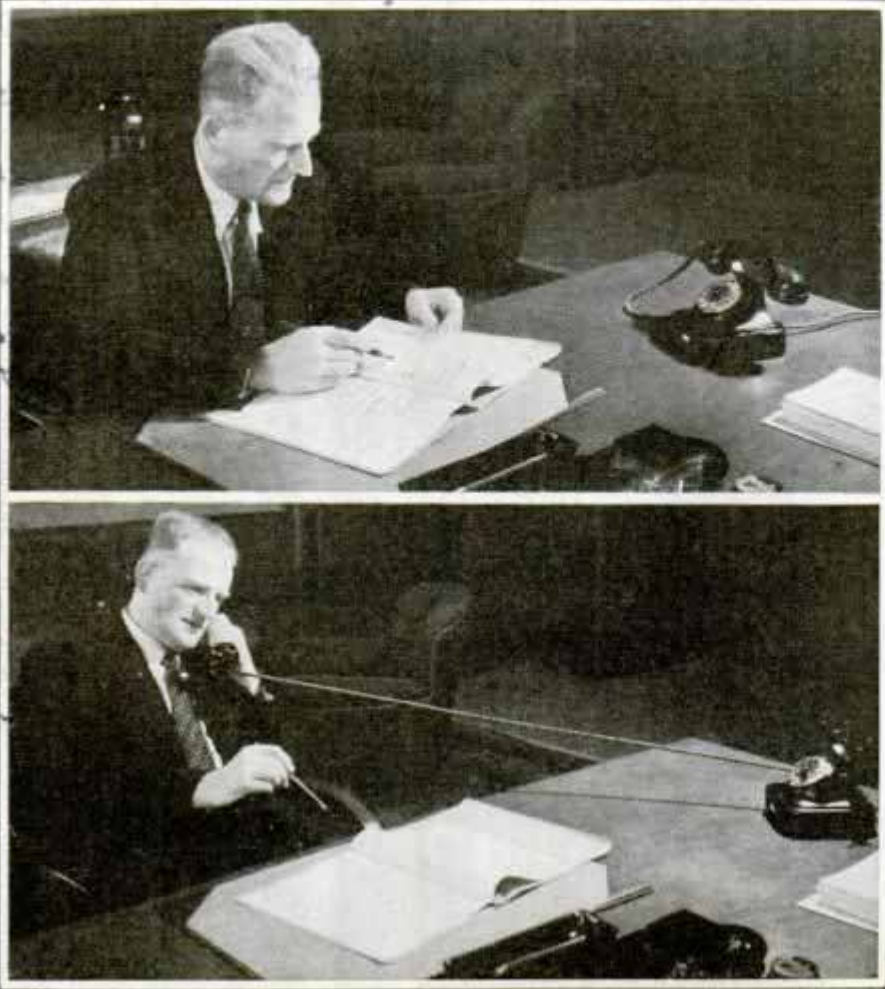


Latest Equipment for Comparing Fingerprints to Clear Up Blurred Lines

Handwritten: Washington, D.C.

Work a gentleman

D1644



Phone Cord of Braided Elastic Which Is Out of the Way When Not in Use Although It Stretches under Tension When Receiver Is Lifted

PHONE CORD WHICH STRETCHES WILL NOT TANGLE

Germany has produced a telephone cord which stretches, thereby eliminating the bother of disentangling the cord leading from the instrument to the receiver. The double cord to the hand set is of braided elastic rubber. This allows the cords to be stretched to about four times their length when not under tension. The wires the cords enclose are pulled together when not in use and extend with the rubberized covering when the hand set is pulled.

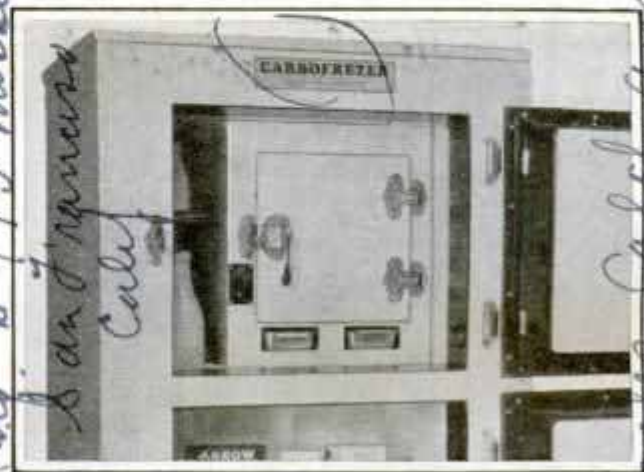
ELECTRIC "SEAS" ABOVE EARTH

More than sixty miles above the earth oceans of electricity affect the magnetic compasses and radio reception. Radio waves are reflected by the bottom of this layer, making long-distance reception possible. Currents up to 160,000 amperes make up this sea of electricity, the effect of which on compasses is demonstrated at the Carnegie Institution at Washington, D. C.

"DRY ICE" CONTROL FOR ANY SIZE REFRIGERATOR

Control of Dry Ice temperatures inside closed spaces is achieved in a system developed for efficient refrigeration in the home, trucks and railroad freight cars. Dry Ice is solid carbon dioxide gas which has a temperature of 112 degrees below zero. When it "thaws," it turns back into dry, invisible gas. The device for controlling its temperature is a welded metal chamber having a series of tubes surrounding the inner chamber. The block of Dry Ice is placed inside the chamber and the door sealed. As the ice turns to gas, it is recirculated around the solid block. The colder gases remain near the bottom and as they absorb heat from the ice box, truck body, ice-

cream cabinet or grocer's showcase, rise to the top, similar in action to the automobile radiator. Finally, when the gases reach the temperature indicated by a control dial they escape through a valve. Fifteen pounds of Dry Ice will keep a small ice box cold for a week in summer. A unit weighing less than 200 pounds and loaded with Dry Ice will refrigerate a five-ton truck for two days.



Control Unit for "Dry Ice" Keeps Ice Box Temperature at Point Indicated on Dial

Siemens & Halske, Berlin, Siemensstadt, Germany

any developed for Commerce

any of various

D1589

day 6973 museum

San Francisco Calif

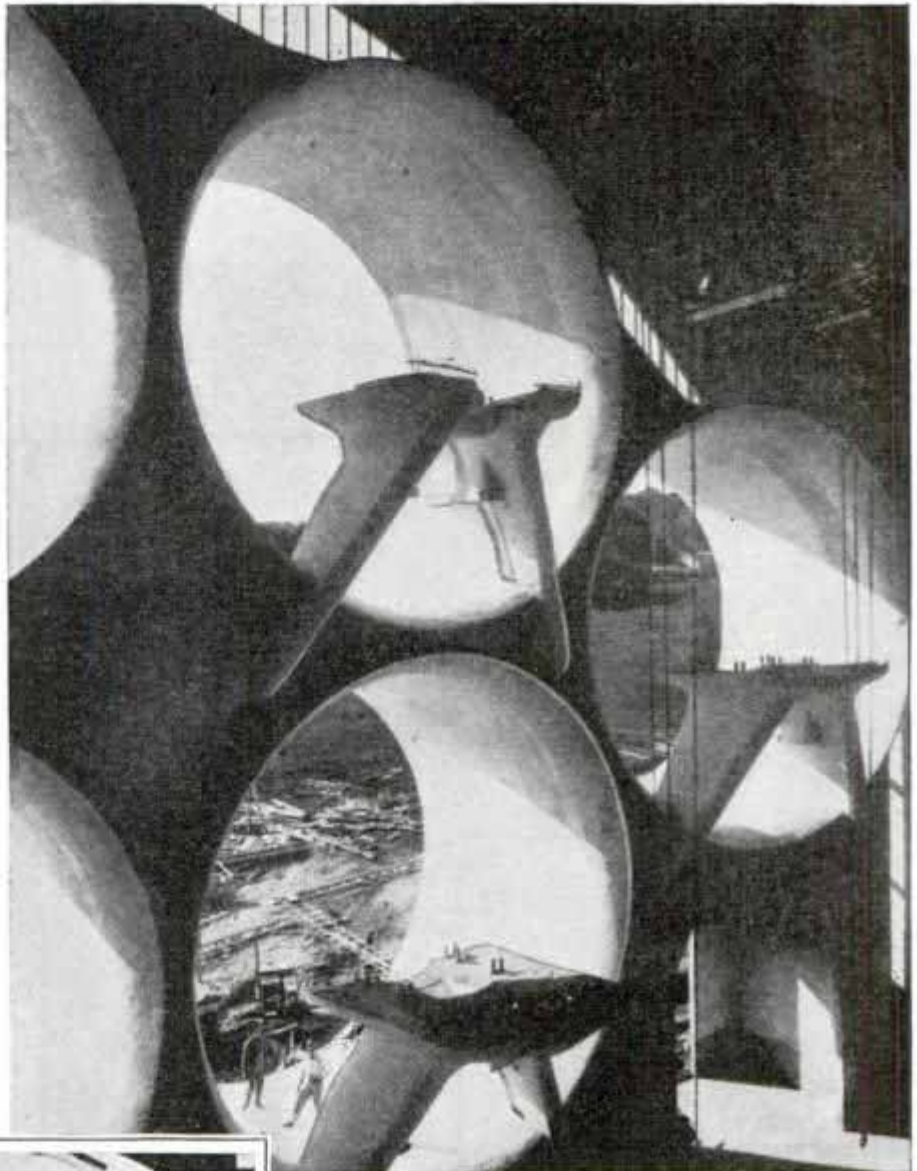
Angelo. Calif. and Stan

Science Service

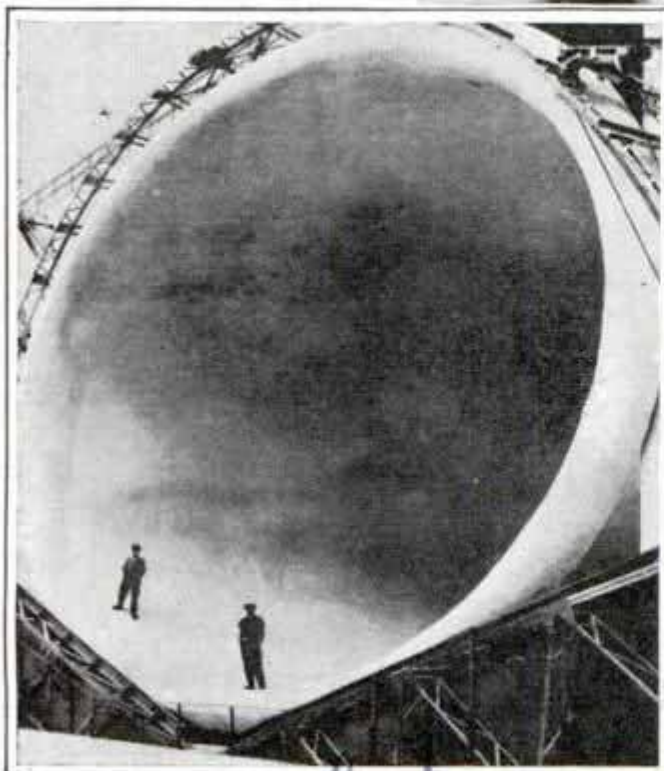
Holbrook Merrill

Huge Wind Tunnel to Test Full-Size Planes

Full-size airplanes will be given aerodynamic tests in a giant wind tunnel now being constructed near Paris. This tunnel is so large that actual flying conditions in the air can be approximated during the tests. From one angle the tunnel looks like a big Swiss cheese, the holes being the aspiration tubes with the supports for the motors and propellers. With the aid of this tunnel, plane designs constructed to full scale can be tested thoroughly without taking the ships off the ground. The equipment can also be used for testing boats, automobiles and other forms of transportation to which streamlining is being applied.



Right, Aspiration Tubes with Supports for Motors and Propellers in Giant Wind Tunnel for Testing Full-Size Planes; Below, a Part of the Tunnel; Compare Size with the Two Men



TASTE AND SMELL BY RADIO HINTED FOR THE FUTURE

Pointing out that we already hear and eventually will see by radio, Dr. Alfred N. Goldsmith, consulting engineer of the RCA Manufacturing company, suggests that in the remote future radio may appeal to man's other sense, such as taste, smell and touch. "Telegustatory Broadcasting," as he calls it, may make it possible to "taste" a fine brand of coffee by radio. The transmission of smells perhaps would be easier, he thinks, since the "telolfactory" receiver would need only to spray into the air a duplicate of the odor transmitted. Too, there is the very remote possibility of transmitting three-dimensional replicas of objects which might be touched.

Chub

Camden, N.J.

94

D1594. Cont. *Le... 40.103rd... new!*

Around the WORLD

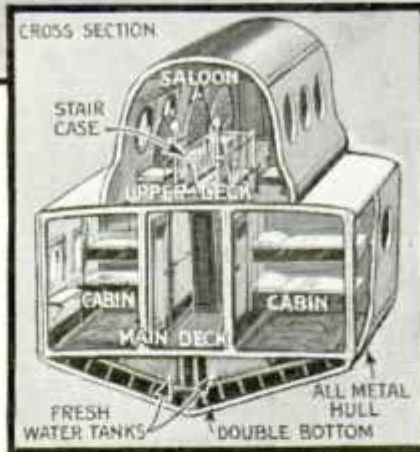
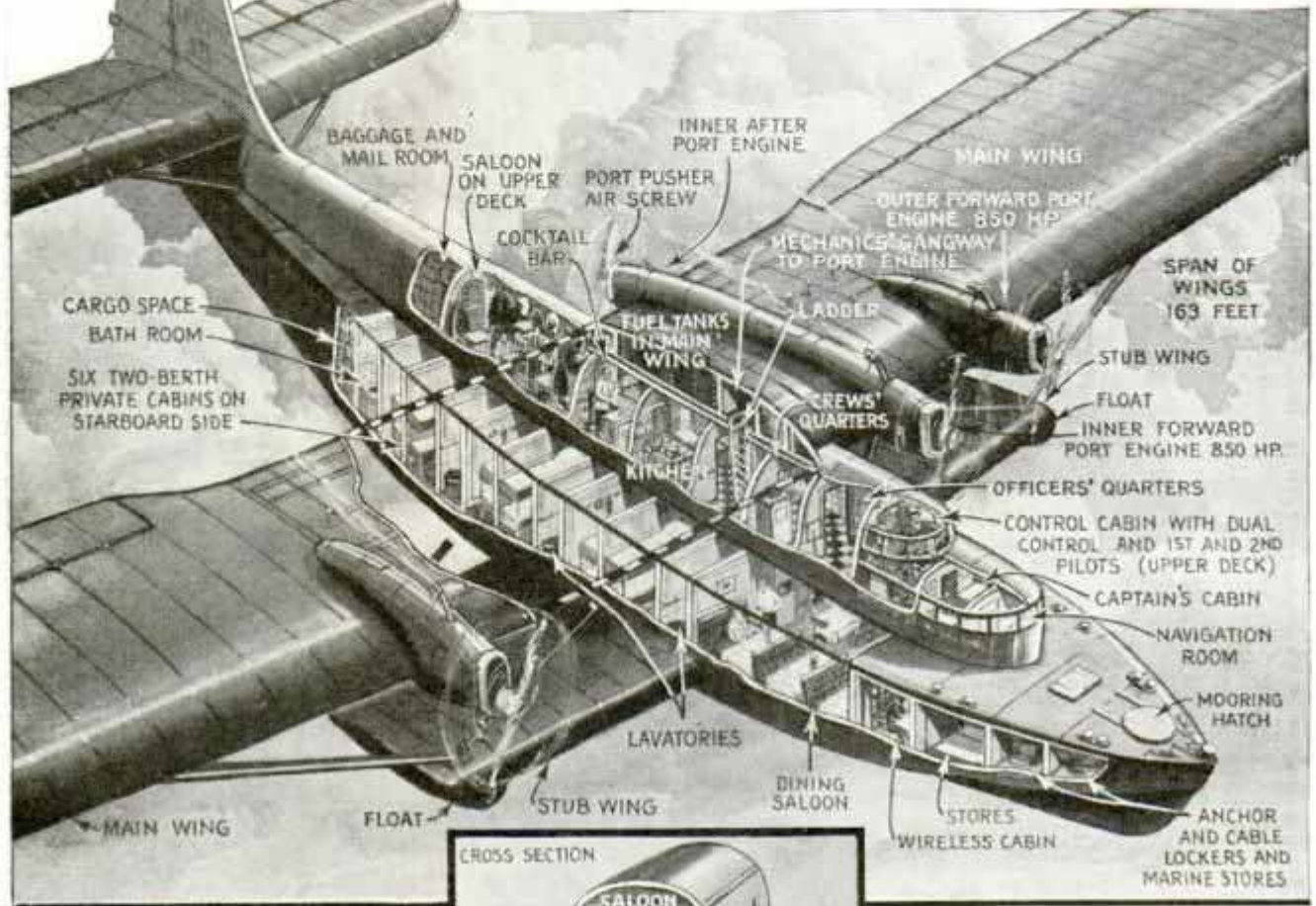


Diagram and Cross Section of Double-Deck French Flying Boat Intended for Transatlantic Service; When Fully Loaded, It Will Weigh Thirty-Seven Tons

GIANT flying whales and aerial greyhounds, built by men, are about to conquer the oceanic spaces and set new records for travel.

A ten-day tour around the world will be the immediate result of present plans to span the oceans with high-speed, multi-motored flying boats. A great boom in inter-continental communication is in prospect soon after the half-dozen or more transports pass their preliminary tests.

Five nations, the United States, England, France, Germany and Russia, have launched, or are about to launch, air transports of greater size and tonnage than any now on the world's airways. Igor Sikorsky is preparing to build a 100-passenger transatlantic clipper, while Glenn Martin has already launched the first of three Pacific clippers. Simultaneously, the French

are rushing construction on an eighty-passenger flying boat, destined for the South Atlantic run.

Under the direction of Dr. Hugo Eckener, Germany is completing the aerial greyhound LZ-129, which will have dimensions equal to some of the largest ships and comfortable accommodations for fifty passengers. The British Imperial Airways is extending

its regular service beyond India and will probably establish an eastern terminus at the Singapore naval base. Also, the company has received bids on two flying boats designed for the north Atlantic run. And Russia is now testing an eight-motored 7,000-horsepower giant capable of 240 miles per hour.

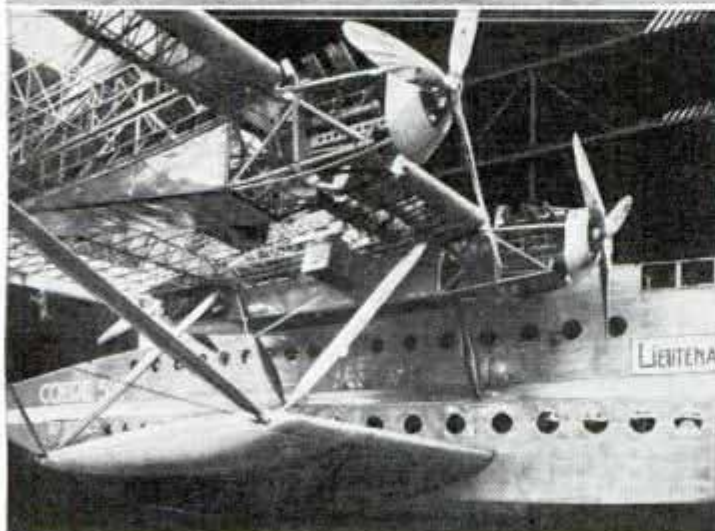
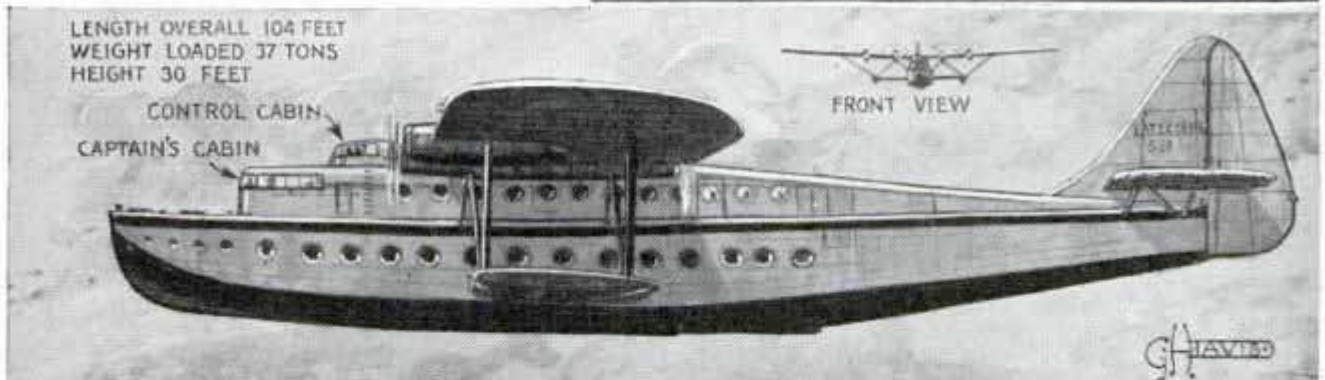
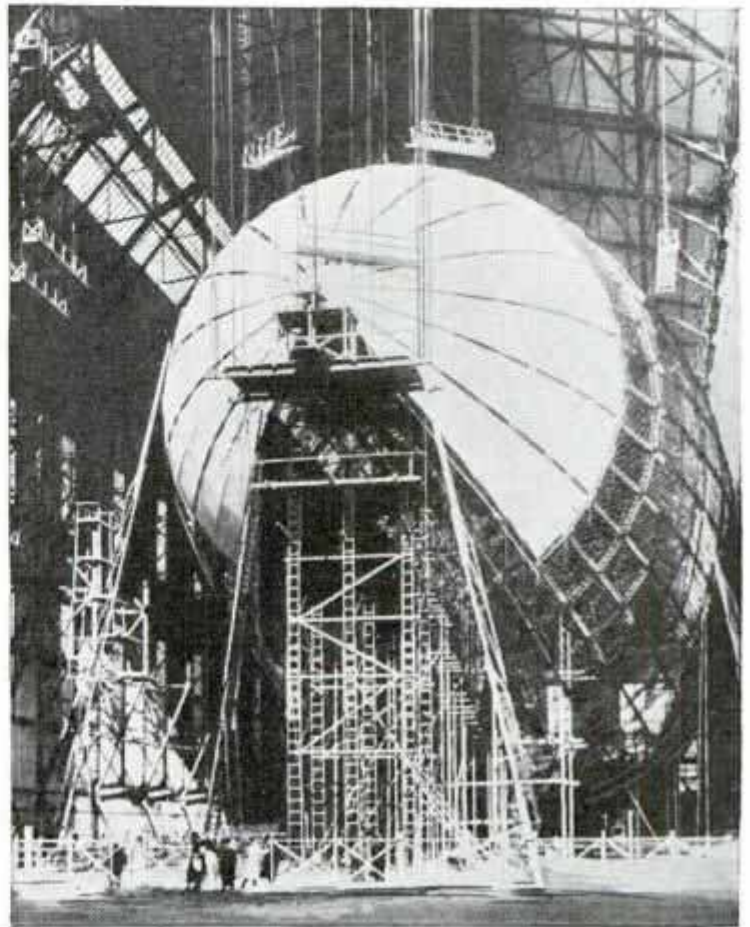
These air leviathans will change the picture of world travel beyond all recognition. Although it is now possible to buy a

D1594

in TEN DAYS ?

single ticket to carry you around the world via aircraft and steamers, the necessary time is fifty-seven days. Save for the Pacific leg, all the travel is by air. If you start from Seattle, you fly south to Pernambuco, Brazil, and transfer to the "Graf Zeppelin," which carries you to Seville, Spain; thence by plane, or plane and boat to Singapore, and across the Pacific by steamer. The actual time in transit is thirty-eight days, of which fifteen are spent in the air.

The next few months will witness a sensational reduction of the minimum time for a tour around the globe. The leg across the Pacific will be covered in a Pacific clipper and the south Atlantic leg will be optional when the new dirigible, LZ-129, starts a north Atlantic service. The new French flying boat service in the south Atlantic will cut

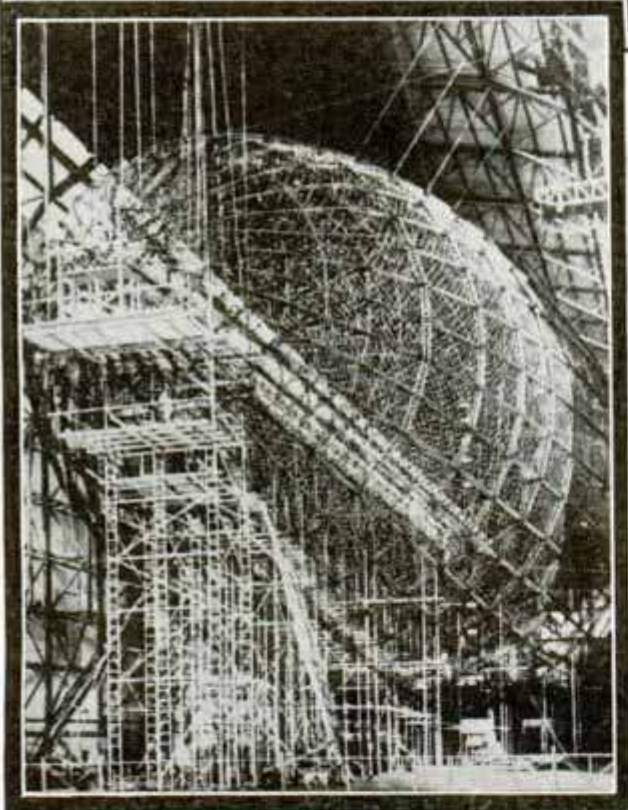


French Flying Boat under Construction and as It Will Appear When Finished; Top, This German Dirigible Will Carry a Pay Load of 60,000 Pounds

the time of the "Graf Zeppelin" in half and offer more frequent schedules. The United States navy has already granted Dr. Eckener permission to moor the LZ-129 at the Miami and Lakehurst naval stations. Tentative schedules indicate that after July, you will be able to travel from San Francisco to London in slightly more than forty-eight hours.

Commander Charles E. Rosendahl,

01574



Clipper Ship for Pan-American Airways' Service, and German Airship under Construction

the navy's lighter-than-air expert, says the development of aviation makes this possible. A passenger will cross the country in an overnight trip and arrive in time to catch the transatlantic dirigible by noon. Commander Rosendahl says that mail can be assembled hours after the dirigible has started and transferred at sea from airplanes which attach themselves to the air giant with "hook-on" appliances such as are used on the dirigible "Macon."

As to the safety and dependability of transoceanic dirigible service, Commander

Rosendahl points out that no attempt to cross the ocean by an airship has ever come to grief. Pan-American Airways plans to span the Pacific with a \$2,000,000 fleet of six mammoth clippers, the first of which has already gone into experimental service. With the use of the clippers, the post office is contemplating a six-day mail service between Shanghai and New York. In other words, it will be possible to travel between Shanghai and London, via Pan American, T.W.A., and the LZ-129 on a seven-day schedule.

Imperial Airways or the Dutch Air Lines will be the connecting link between London and the orient. It seems likely that the London-Shanghai stage of the journey will be completed within three days, making possible a ten-day tour of the globe, if connections can be made without delays. This is less than one-fifth the time required at present and one-eighth the time which Jules Verne predicted.

The LZ-129 will give passengers the same comforts now offered on ocean steamers. Her length is to be 815 feet, her beam 137 feet, and her volume more than 7,000,000 cubic feet. The helium within her metal frame will have a lifting capacity of 418,000 pounds, and her pay load will be 60,000 pounds. She will carry her passengers within the ship itself, instead of in a gondola. Features include twenty-five staterooms, fifty berths, a dining salon, lounge, reading and writing room, smoker, bar and promenade.

The four Diesel engines will generate

D1594

292

4,400 horsepower giving a cruising speed of eighty-four miles per hour. Her fuel tanks will hold sixty tons of crude oil, enough to carry her at least one-third of the way around the globe without refueling. To maintain a safe ballast she will have storage tanks to conserve all the waste of the kitchen and passengers to help counterbalance the loss of weight through fuel consumption. The designers have also produced an apparatus for extracting water vapor from the air at the rate of about 150 gallons per hour. Thus, in case of serious ballast loss, it will be possible with this apparatus to increase the stabilizing load of the ship.

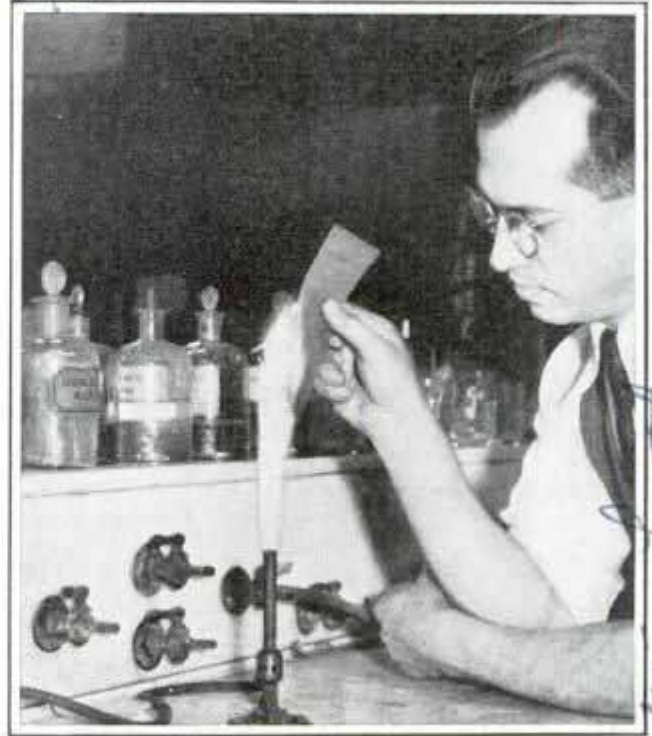
Glenn Martin has plans for a cantilever monoplane flying boat capable of carrying 10,000 pounds of pay load. With a range of 5,000 miles and a cruising speed of 180 miles per hour, it may make possible what Martin claims will be "an economically sound year-round service for mail, passengers and express."

"I predict," he said, "that by 1938 you will take off from New York at four p.m., have dinner aboard your plane, go to bed, and see the shore line of Europe by breakfast. You will set foot in Paris by noon."

The inventor said his super-clipper will be powered by only four engines, with a combined rating of 7,000 horsepower. This means 1,750 horsepower per engine, an unheard-of thing these days, but we have Glenn Martin's word that "such engines are well on the way experimentally."

France expects to begin operating its new flying boat on the south Atlantic run next summer. It has six water-cooled Hispano-Suiza engines rated at 850 horsepower each, and they are streamlined into the wing. Sikorsky's second record-breaking S-42 will leave shortly for experimental service in the Pacific coast area, in preparation for regular service from California to Hawaii. Supplementary service will be established from Hawaii to the Philippines and China.

British Imperial Airways are also preparing to enter the transatlantic service with flying boats. They have received bids on two larger than any they now have in service, and one of these will probably be used in the New York-Bermuda service which Imperial Airways will operate jointly with Pan-American Airways.



© Underwood and Underwood
Testing Sample of Awning Canvas Which Has Been Treated to Make It Fire Resistant

CANVAS MADE FIRE RESISTANT FOR USE IN AWNINGS

Canvas for awnings can be made fire resistant by a method developed by a government scientist. The treatment makes the fabric withstand repeated wetting and drying without serious deterioration.

COMPACT WEATHER INDICATOR FORECASTS CHANGES

Changes in the weather are indicated several hours in advance by a compact instrument which



includes several recordings on an upright column and a circular base. There is a barometer for measuring atmospheric pressure, a thermometer to give air temperature, a hygrometer for measuring air moisture and an indicator to show

wind direction. With the aid of these readings it is possible to make deductions concerning the coming weather.

Dr. Metzger leatherman
Washington, D.C.
Stullard, Germany

Es. Luft 22 New

"Pit" Crews Flash Signals to Outboard Racers

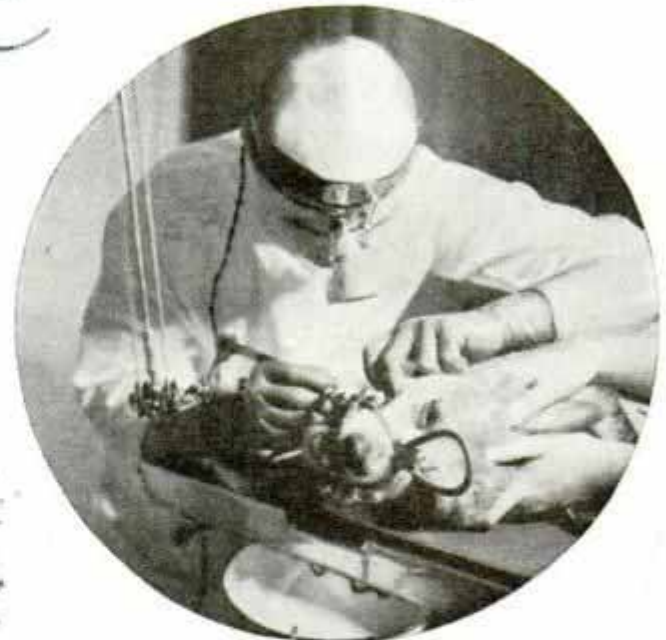


Signaling Outboard Boat Race Crew from Shore by Means of Placard Similar to Those Used in Communicating with Auto Race Drivers

Borrowing a trick from modern automobile racing, California outboard speedboat race drivers are catching their signals on the fly from assistants working in the "pits" ashore. The number of laps made, their position with relation to competitors, average speed and other information all are flashed to them by code characters printed on plywood boards and held aloft as they pass. The races are somewhat like automobile races in that refilling of fuel tanks and repairs are often required and this necessitates some method of communication between the drivers and mechanics and the "ground" crews.

Latest Dental Aids Are Used in Treating Dogs' Teeth

Visitors to the Humane Society's clinic in New York will find one suite of offices devoted entirely to dentistry for animals, and particularly for dogs. Here are all modern appliances and devices for dental treatment. There is also a spacious waiting room, the consulting room where dogs are brought first to have their condition determined. Next is the completely equipped operating room. But instead of the usual dentist's chair, there is a hydraulic operating table lately introduced. This has been modified and improved to suit the dog dentist's particular needs, for dog patients must lie down while being treated. In the laboratory are various curious devices necessary for the manufacture of artificial aids for broken teeth, missing teeth, etc. There are rows upon rows of artificial teeth which replace broken ones in the animal's mouth. It seems that dogs break their teeth frequently and their suffering in that case is considerable. When the dog gets false teeth, a plaster cast is made of his gums, upon which new teeth are fitted.



Dog Patient under Dental Treatment in Clinic Equipped with Finest Equipment

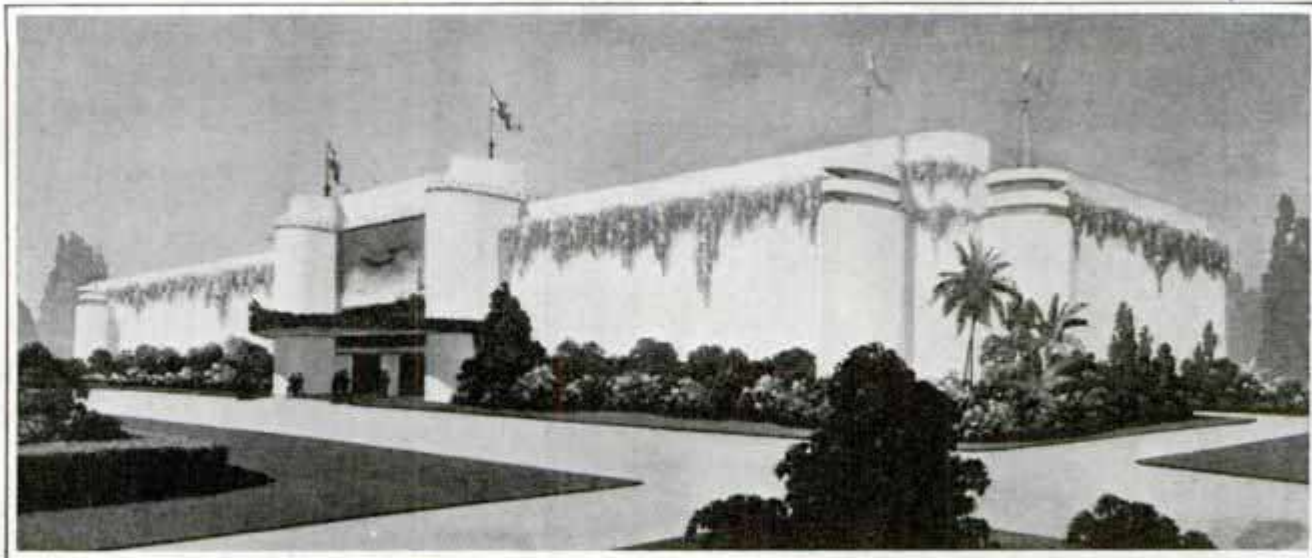
Sometimes people bring their dogs to have their teeth cleaned. Incidentally, it takes more than an hour to clean a dog's teeth because he has more than a human. Dr. William H. Dohm is in charge of the office.

Different from automobile racing - signals are flashed to drivers on the fly from assistants working in the "pits" ashore.

DL658
 737 E 5th St
 Long Beach Calif

270
 Contr. Carlos M. Washell
 1555 Homewood Street
 Altadena, Calif.

Living Flowers Decorate Exposition Buildings



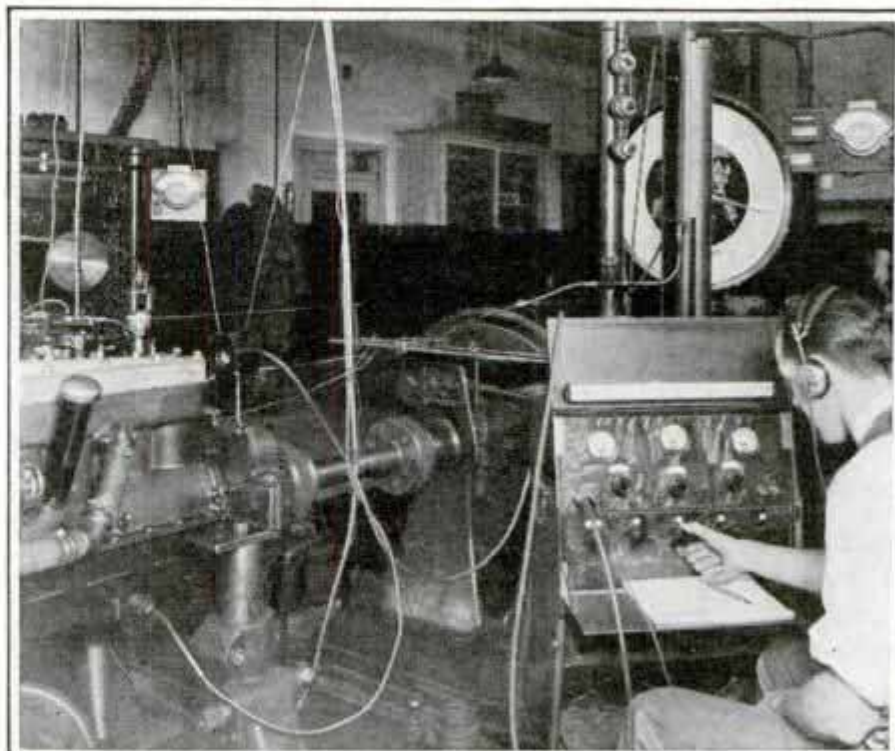
Architect's Rendering of One of Buildings for California Pacific International Exposition, Showing How Living Flowers and Vines Are Used for Ornamental Purposes

As a substitute for sculpture or other ornamental structural features, a California architect has designed a group of buildings to be decorated with living plants in bloom. From a roof-line ledge surrounding each structure, there are hanging borders of blossoming vines, adding color and life to otherwise plain wall spaces. This form of ornamentation is being employed

for buildings erected for the California Pacific International Exposition, opening in May. For each structure a different color scheme in flowers is used. For instance, from one building hang lavender trailing lantana and on the ground at the base is a border of both yellow and orange lantana. Exteriors will be illuminated at night, leading to still further color combinations.

Microphone Placed in Engine Detects Hidden Noises E 33

Experts are determining the performance of automobile engines by sounds picked up by a microphone inserted directly into the cylinder head. The noises within an engine, frequently inaudible to the driver, are measured in terms of decibels, which are units of sound. Once these hidden noises are located by the microphone, their causes can be removed to give better performance, longer life, and quieter operation. The experiments with radio equipment are being conducted in the Bohn engineering laboratory.

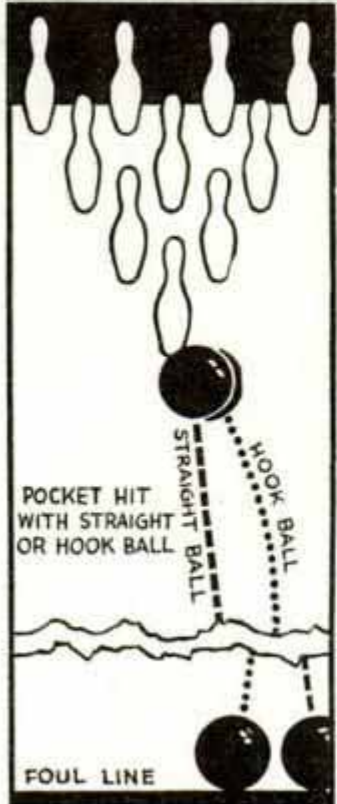
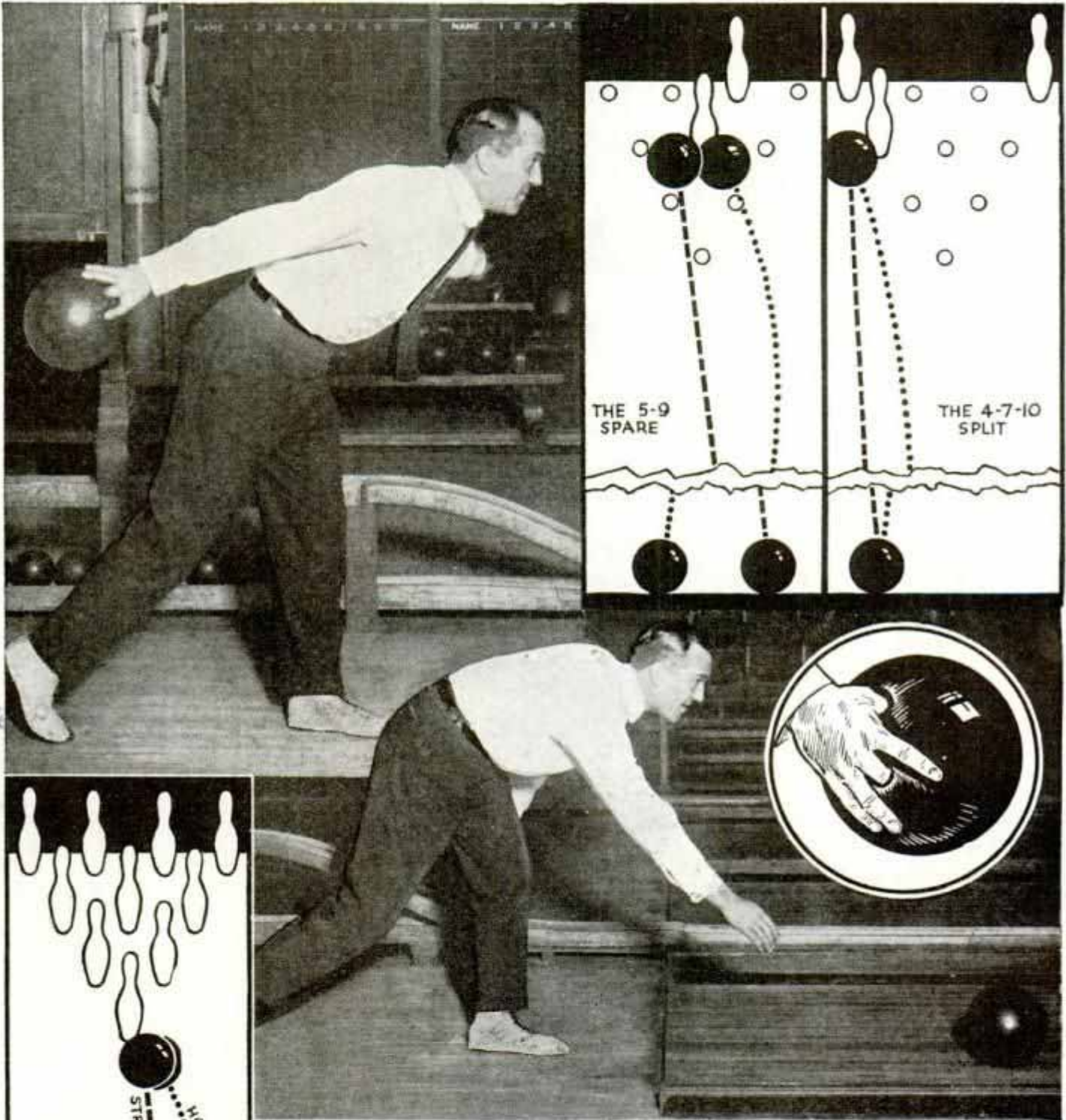


Listening to Interior Noises of Engine; Microphone Picks Up Sound from Cylinder and Carries It to Engineer's Headphones

Bohn Aluminum and Brass Castings

D7669

SECRETS of the



George S. Jarrett, Expert Bowler, Demonstrating the Approach, the Roll and Way to Hold Ball; Above, Right, Two Shots Which Are Difficult with Hook or Straight Ball; Left, Pocket Hit with Straight and with a Hook Ball

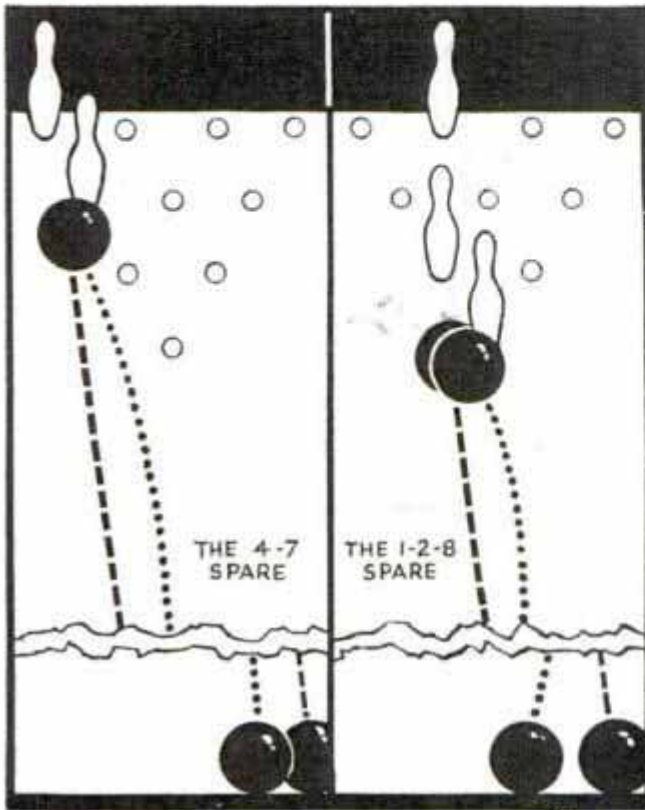
By **MORT LINDSEY**

THE only difference between the expert bowler and the dub is control. To roll strikes you must get the ball in the pocket, between the one and three pins, and to make spares you must hit the standing pins just right.

The biggest mistake of most beginners is

D166 Cont. Robert W. ...
1115 - 19 H St NE
Washington DC

MASTER BOWLERS



The Author and Illustration of Two Simple Spare Shots with Straight or Hook Ball



in reaching for the crayon too soon. You can see them on any alley. They pick up a ball—almost any ball—send it down the alley and wait for a lucky roll. The smart beginner forgets about the score until he has learned control. To control the ball, you must have a ball that can be controlled. The holes must be so spaced that the hand need not be stretched unnaturally, and the thumb hold must fit snugly, yet must not hang when the ball is released.

When the proper ball has been selected, lay it aside and develop your footwork. Standing ten or twelve feet back of the foul line, hold your hands in front of you as if carrying the ball and walk slowly forward, three or four steps, swinging the right arm. End the stride on the left foot, with the right foot back, the right arm completing the swing and following through.

Now try it with the ball. Hold the weight in the palm of the left hand, testing the grip with the thumb and third finger of the right hand. Now practice striding to

the foul line and releasing the ball. Make no attempt to knock down pins, but just get the ball down the alley, concentrating on your stride and swing until they are in rhythm. Try to end the stride with a short slide of the left foot, as a sudden stop will cause you to pitch the ball instead of rolling it. Don't try to copy the style of any bowler, but develop footwork and a swing that are natural and enable you to maintain balance.

Next you want to hit the one-three pocket. Most good bowlers pick out a spot near the foul line from which their natural delivery will hit the pocket, and attempt to start the ball as near this spot as possible every time. The true spot bowler picks out a spot and keeps his eyes on it until after the ball has been delivered, when he raises his eyes to watch the pins. Billy Knox, long one of the country's leading

(Continued to page 138A)

No. 11076 of 11/11/1935

Batesville, Ind

shown at Furniture Mart



acme
Latest in Lounges Is This Sled Type, Complete Even to Runners; Book and Magazine Rack at Left Matches the Lounge

LOUNGE BUILT LIKE A SLEIGH IS LATEST IN FURNITURE

Constructed along the lines of a sleigh, the latest lounge is cushioned with a white cord mattress and pillow. It even has runners, curving upward to the head of the lounge, instead of conventional legs. A magazine rack, ornamented with deer, matches the lounge.

SPINNING DISKS SEEN AS SOURCE OF CHEAP ELECTRIC POWER

Electricity generated by huge disks spinning in a vacuum and "piped" long distances along vacuum surrounded rods, thus carrying cheap energy from water-power developments or coal and oil fields to centers of population, is a possibility suggested by Dr. Karl T. Compton, chairman of the science advisory board, in a research project recommended to President Roosevelt for federal financing. The 10,000,000-volt electrostatic generator built by the Massachusetts Institute of Technology is evidence of the practicability of such a power-producing system and the transmission system proposed is an airless pipe with a rod running through it. Instead of alternating current, the proposed generators would produce direct current at about 1,000,000 volts. The big disks would be surrounded by vacuum because of the necessity of preventing tremendous

Miss. Inst. of Technology Cambridge, Mass. 1935

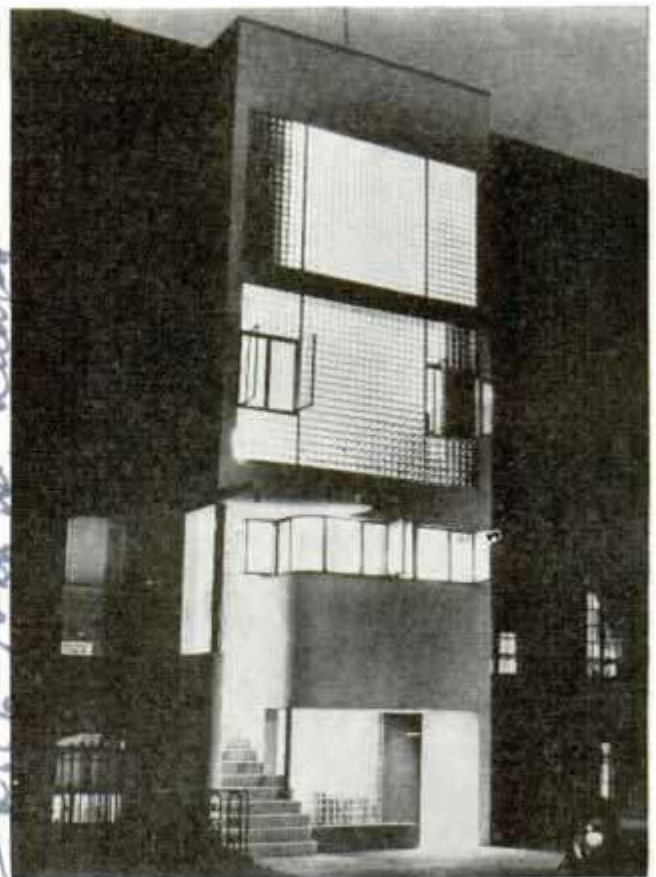
2113 48th St. Wash D.C.

Science Service

sparks which might wreck the equipment. If this power-production dream is realized, it will be like turning the clock back, in a sense, because the first electrical machines were of the electrostatic type, while modern generators and motors employ the electromagnetic instead of the electrostatic principle.

6-2
LATEST IN CITY HOME EMPHASIZED BY LIGHTS

Extensive use of glass is one feature of the construction methods employed in a town house completed recently in New York. An example of the modern trend, the structure lends itself to unusual treatment in lighting, the resulting brilliancy being impossible to produce in the conventional home. A photograph of the house, illuminated, offers a comparison of the old and new.



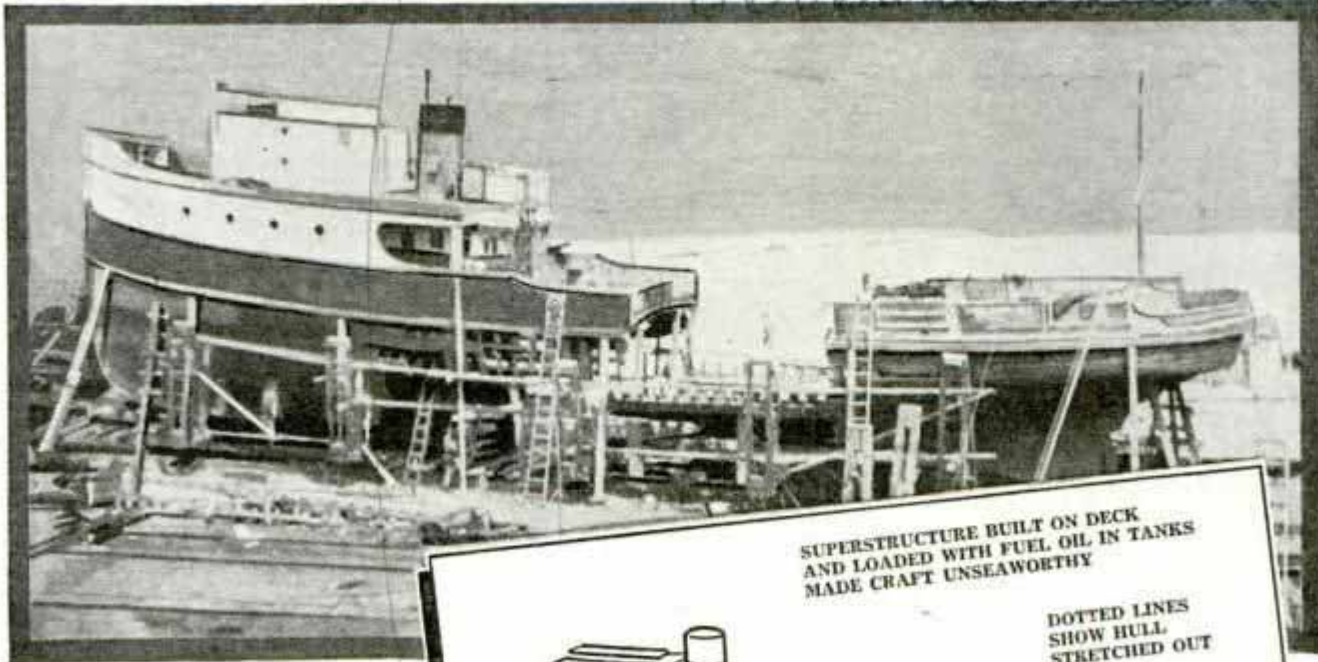
Night View of Town House Shows Effectiveness of New Methods of Illumination

Quiner. Wellman

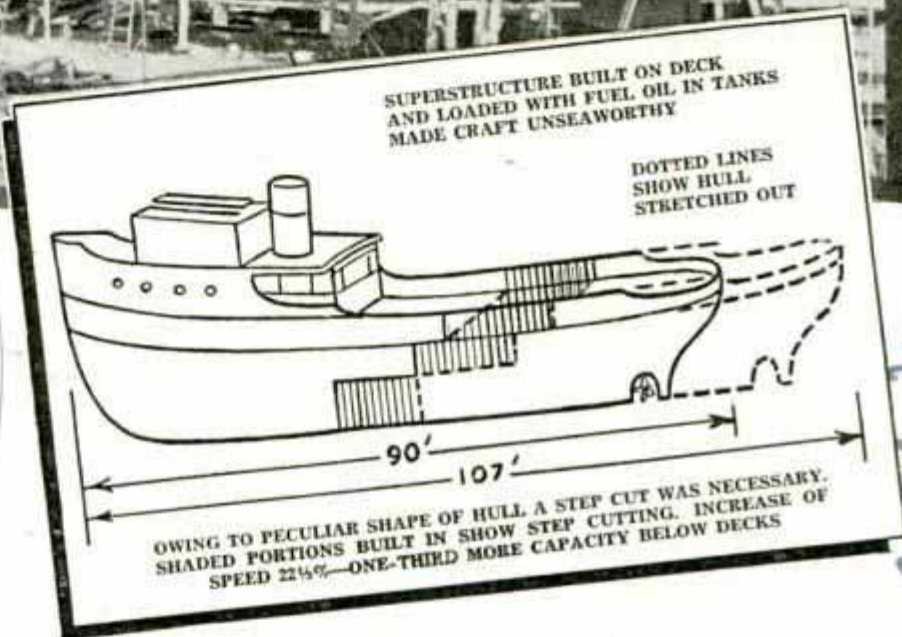
D1642

Harbor Boat Bldg Co. plans
Owner - John Rados,
Terminal Island Calif

Boat Is 'Stretched' to Increase Size and Speed



The "Rainbow" During "Stretching" Operations and Diagram Showing How It Was Cut in Two and Lengthened

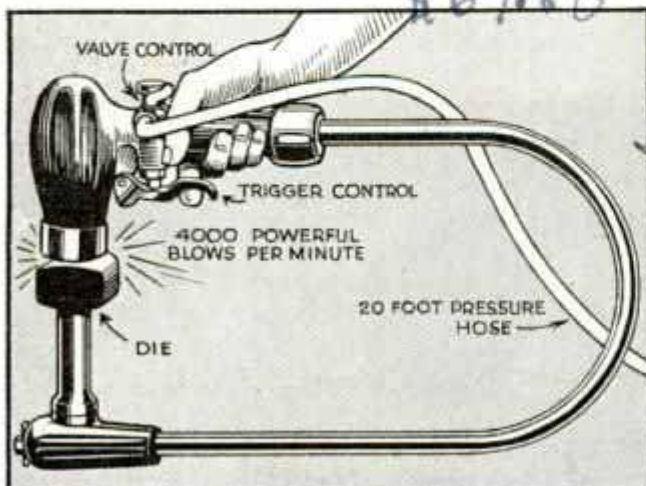


By "stretching" a ninety-foot fishing clipper, a California boat builder added seventeen feet to its length, increased its cargo space by one-third and added more than twenty per cent to its speed. The craft, the "Rainbow," capsized after a superstructure had been added to increase her cargo space. After being raised the craft was sawed in two and a new hull

section inserted in the step-like cut amidships. The boat, lengthened to 107 feet, thus was given more buoyancy and better balancing to counteract the added weight.

cmd. Max well O'Leid Island!
5 1/2' Escondido Blvd.
Los Angeles, Calif

Handy Air Pressure Hammer Smooths Out Car Fenders



Sketch Shows Controls on New Air Hammer

Dented fenders, hood, doors and other metal surfaces of the automobile can be smoothed out by a handy air pressure hammer that delivers 4,000 regulated strokes per minute. The strokes are powerful enough to smooth out heavy sheet metal or gentle enough to handle a metal tire cover. Two arms of the tool fit all the sweeps and curves of the modern auto. Eight assorted dies are furnished for all types of curved, angular and flat surfaces. The hammer is regulated by two controls, a trigger for starting and stopping and a valve governing the air pressure, both of which are hand-operated.

Wearer Mfg Co. Springfield, Ill.

New CONVENIENCES

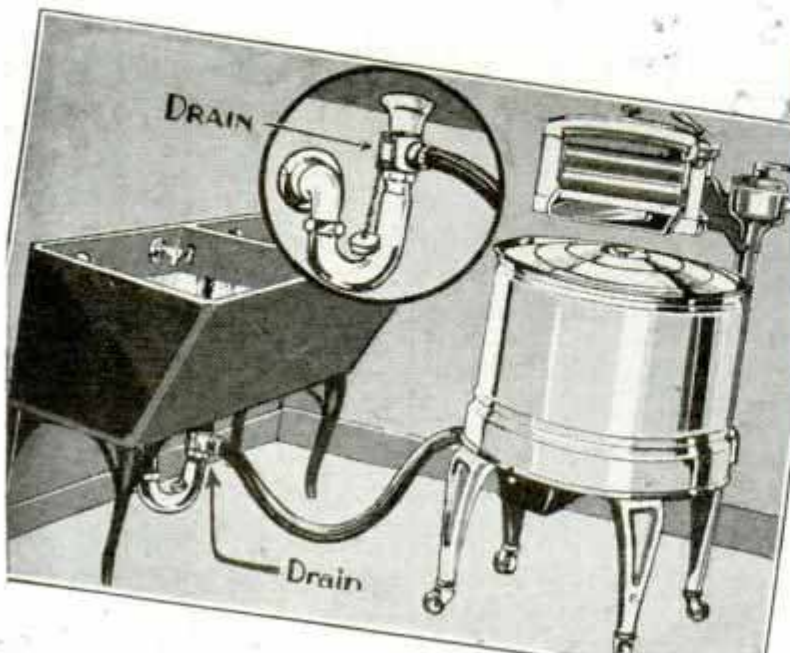


Left, Non-Tipping Plate for Children Holds Entire Dinner, Including Cup for Milk; Plate and Cup Are Made of Synthetic Plastic Material That Is Sanitary, Stainless and Non-Shatterable



Above, Electric Coffee Maker Percolates Beverage in Cup to Taste; Its Immersion Heater Makes Coffee in Four or Five Minutes

Right, Small Anti-Slip Pad for Rugs Is Attached by Moistening and Pressing with Hot Iron; then White Backing Is Peeled Off, Exposing Special Surface That Grips Floor; Bottom, Left, Washing Machine Drain Requires no Water Pressure to Operate; Made of Rustproof Metals, It Can Be Connected in Ten Minutes with Only a Screwdriver



Above, Bread Box That Aids in Slicing; Loaf Is Pushed Against Adjustable Flange on Door and Knife Is Passed Through Guide Slots for Slicing; Meat or Cheese Also Can Be Sliced on This Handy Device

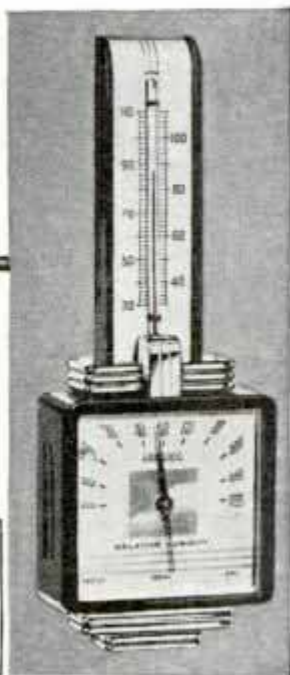
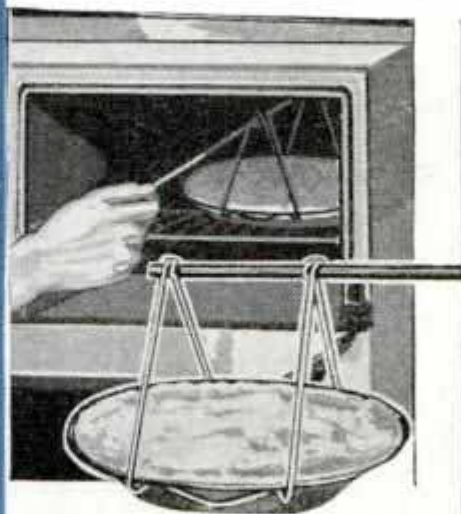
for YOUR HOME

Right, Portable Electric Range of Double-Steel Construction; It Can Be Moved to Convenient Socket for Cooking Entire Meal; Two Outside Burners and Oven Are Provided

Below, Thermometer Floats in the Bath and Registers Temperature of the Water; Parts Are Made of Non-Rusting Materials; Dial Is Porcelain Enamel, About Two Inches in Diameter; Thermometer Comes in Colors

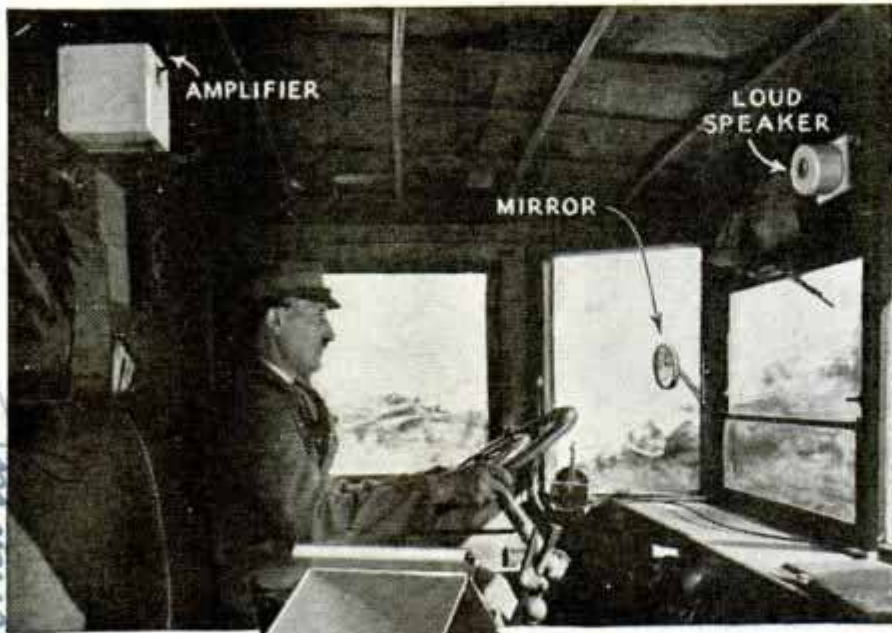


Below, Center, Hot Pan Lifter Prevents Burning Hand and Arm When Handling Utensils around the Stove; It Lifts Any Pan or Dish That Has Extended Lip or Edge; Right, Modern Version of the Thermometer Also Gives the Humidity Reading; It Has Black and Chrome Case



Above, Left, Floor Wax Applicator That Requires no Bending or Stooping; Can of Wax Is Attached to the Device; Wax Is Released in Even Film by Pulling Trigger Ring on Handle; After Using, Pad Can Be Removed and Washed

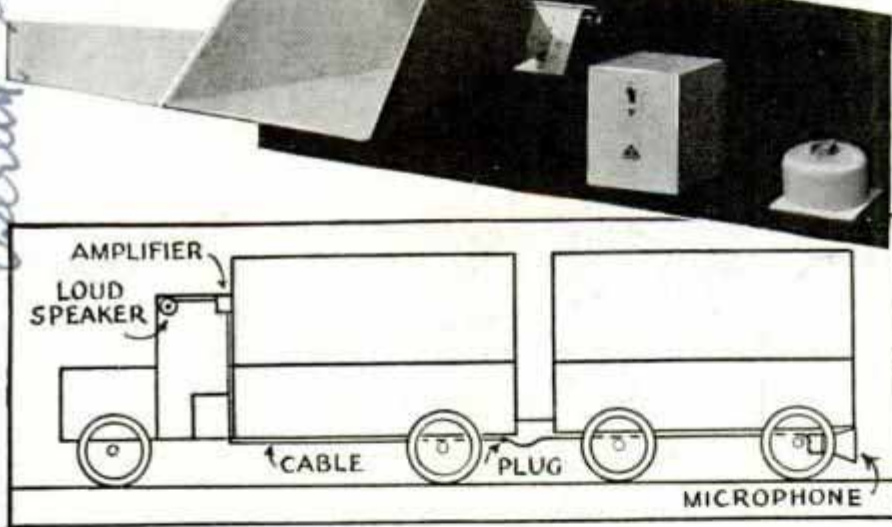
Auto Signal Amplifier Makes Passing Safer



an ordinary automobile siren 100 feet behind and carry it to the ears of the bus or truck driver. A signaling device with which the commercial driver may reply that he has heard the car driver's siren can be incorporated into the system.

**ACCIDENT SQUADS
FIX BLAME AND
AID VICTIMS**

Recently organized accident squads in Berlin not only render first aid on arriving at the scene of an automobile collision but also are equipped to fix responsibility for the accident. This they do by making photographs of the cars involved, taking careful measurements of the relative positions of the automobiles and obtaining the statements of witnesses while all details of an accident are fresh in their minds. The squads were organized in an effort to decrease the number of motor fatalities in the German capital.



*Equipment in Truck Cab Amplifies Sound of Siren on Car Following;
Bottom, Microphone Installation on Truck and Trailer*

Increased safety for both vehicles in passing on the road is claimed for a German-made device that amplifies the signal of the car behind and carries it to the cab of truck or motor bus ahead. Electrical current from the starting battery runs a small loud speaker located in the driver's cab. The speaker is connected to a microphone box at the rear of the truck or the rear of the trailer if a two-vehicle train is being operated. The special equipment is necessary only for the commercial vehicles, since the amplifier system will pick up the signal from



Accident Squad Taking Measurements at Scene of a Collision

Messrs Siemens & Halske, Siemensstadt
 Berlin, Germany
 No U.S. agent.

D 1643

Berlin

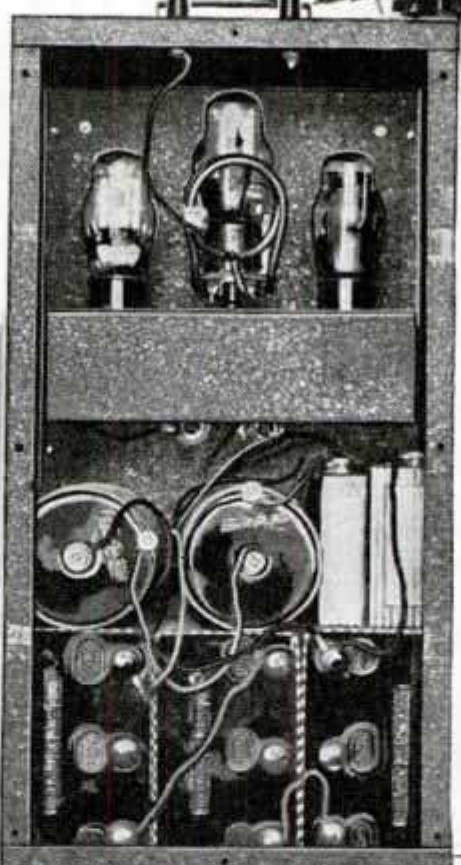
Paul



Portable Five-Meter Transceivers

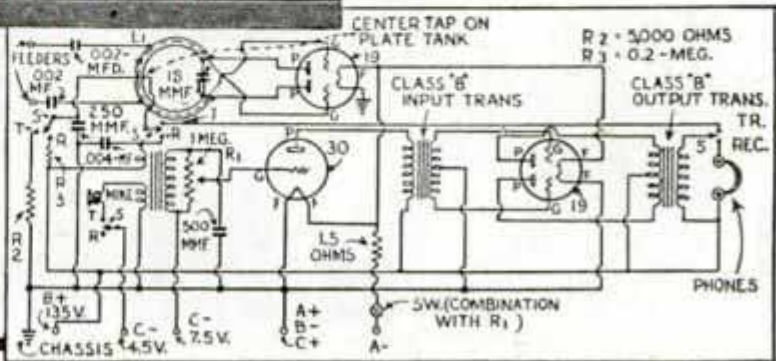
PERHAPS the most interesting piece of amateur radio apparatus is the portable 5-meter transceiver. It gets its name from the fact that it is a combination transmitter and receiver using the same tubes and accessories for both purposes.

Recent improvements in transceiver design have increased their range and portability; the new models are very compact and it is even possible to operate them in moving cars. The portable transceiver illus-



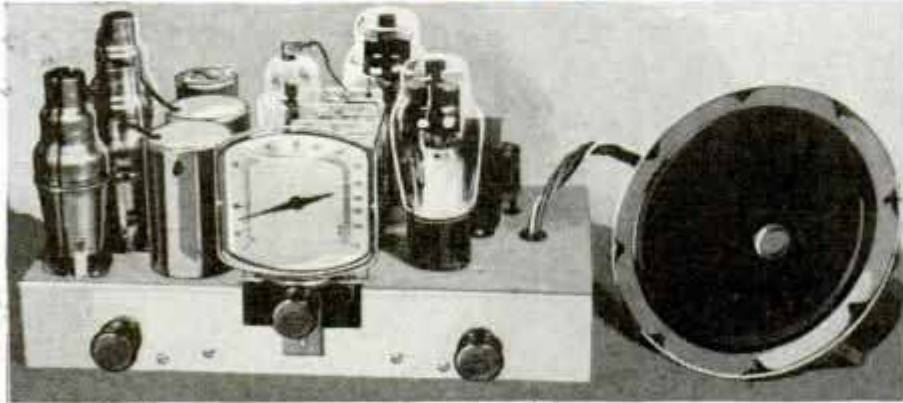
trated, is available in kit form for home assembly. One type-30 and two type-19 tubes are used in a highly efficient circuit. Two binding posts are provided on the top of the case for the antenna or feeder connections. Excellent results, however, were obtained with the 4-ft. length of aluminum tubing mounted on one of these stand-off insulators. Dry batteries are used for the power supply, one set withstood two months experimental service.

D4691
Wholesale Radio Service Co.





FARM SET

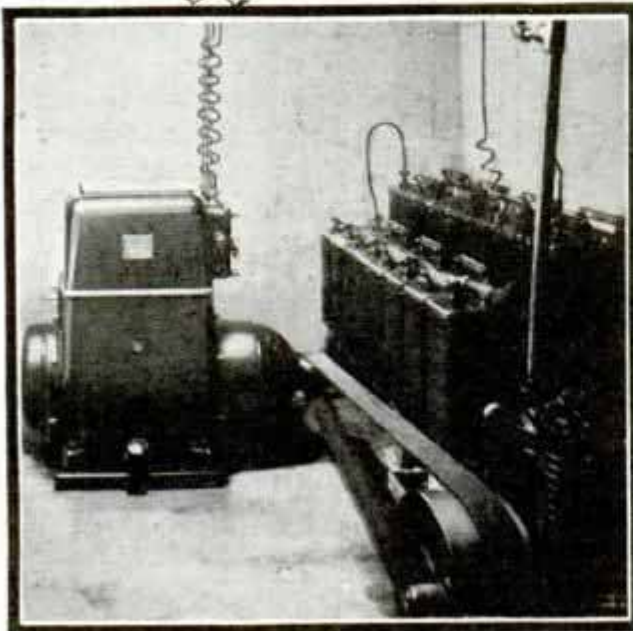
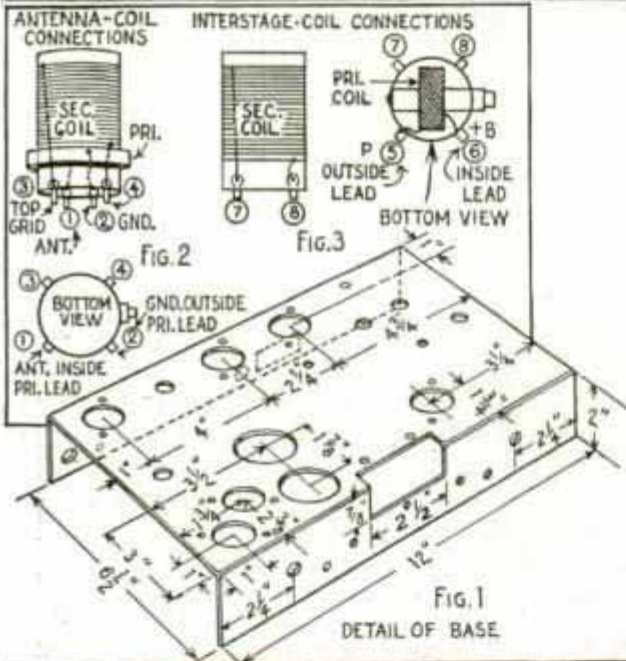


NO B-eliminator or batteries are required for this 6-tube broadcast receiver which operates directly from any 32-volt lighting plant. There are about 300,000 farm-lighting plants of this description now in use and many of the owners are depending on small batteries, or expensive converters, to operate their radio sets. All parts necessary to assemble the receiver are

available, and the construction details have been simplified so that anyone who can use a soldering iron will have no difficulty in building it.

The set has excellent volume, tone and range in spite of the fact that only 32 volts of power are required. In fact the performance equals that of many receivers employing the same number of tubes on standard power sources. Some of the outstanding features are: automatic volume control, superheterodyne circuit with tuned r.f. stage, tone control, high-gain r.f. coils, push-pull audio and a new type aeroplane dial. The secret of the unusual efficiency of this set is due to the type-48 output tubes and a specially designed super-sensitive dynamic speaker. An ordinary dynamic or magnetic speaker cannot be used. The entire cost of the parts, including the metal chassis and speaker, is less than \$15.00. Tubes are not included in the estimated cost of the construction parts. The completed receiver may be installed in practically any type of cabinet if there is sufficient room for the 6½-in. dynamic speaker. During tests, the set was used without a cabinet, the speaker being mounted behind a wooden baffle, 24 in. square and 1 in. thick.

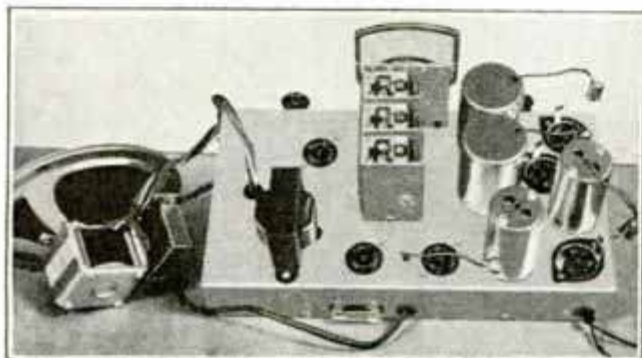
Fig. 1 shows the dimensions of the sheet-metal base for those who wish to make their own. The holes for the wafer-type tube sockets are 1⅛ in. in diameter; the two larger holes, for the antenna and in-



WORKS *on* 32 Volts D.C.

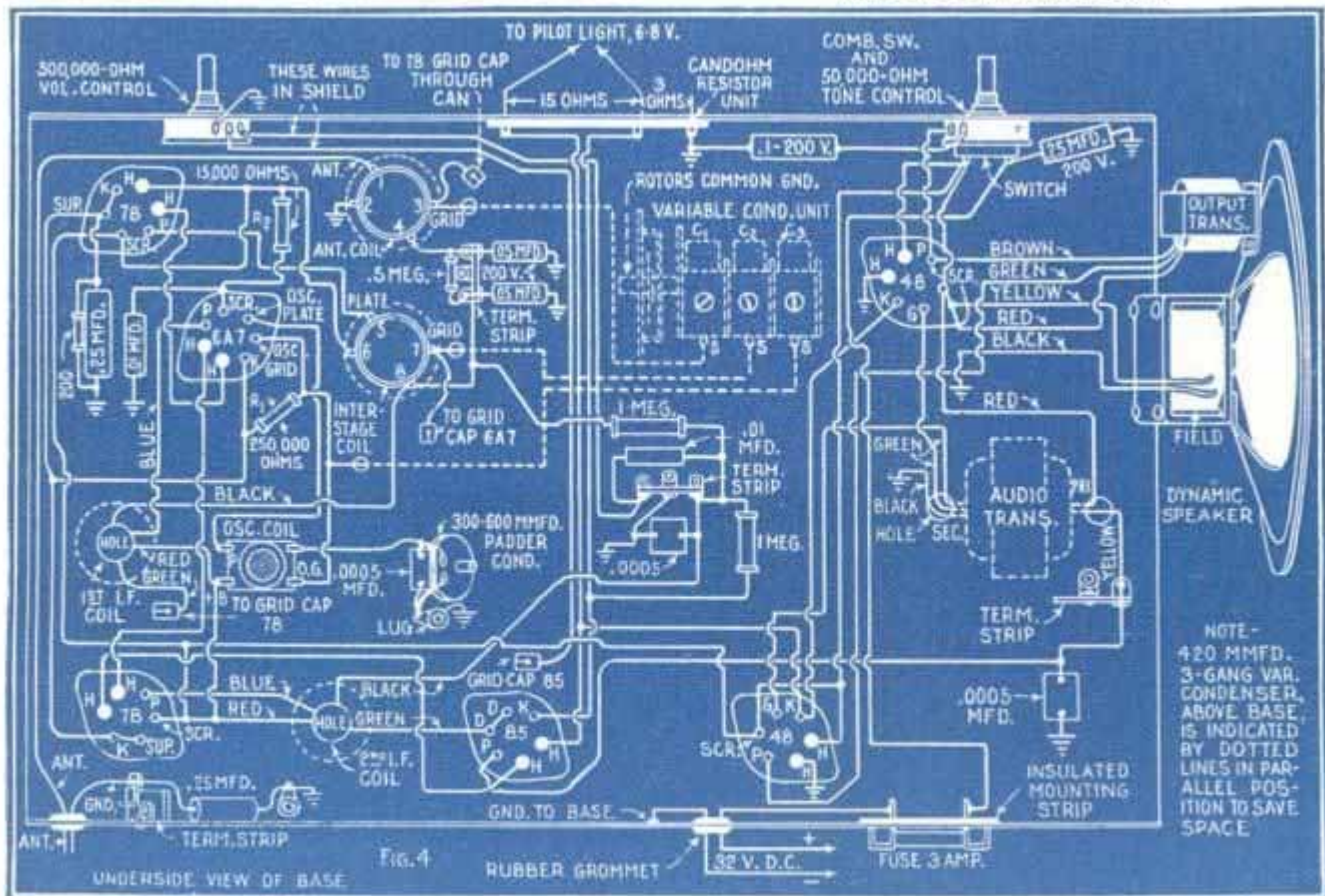
terstage coils, are $1\frac{3}{8}$ in. in diameter. The connections for these coils may be easily traced by referring to Figs. 2 and 3. A simplified wiring diagram is given in Fig. 4 and the schematic in Fig. 5.

It will seem odd when examining the diagrams, that positive B is also connected to the heaters of the tubes, however this is absolutely correct. No tube has more than 32 volts on the plate; series



wiring provides the necessary voltage drop for all tube heaters except for the type-48 tubes which operate on the full 32 volts. Ordinary hook-up wire is used for the circuit and a 4-in. length of flexible metal shielding should enclose the leads running to the volume control. This shield must

(Continued to page 116A)



All-Wave Super Built with Standard Parts



Above, Front Panel View of All-Wave Super in Operation; Below, Rear View of Completed Chassis

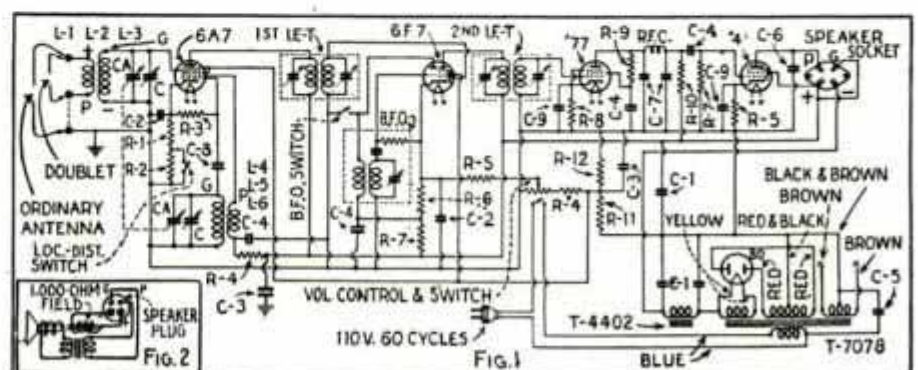
THIS junior model band-spread all-wave a.c. superheterodyne receiver is the result of collective cooperation on the part of a number of the leading engineers in radio, each man a specialist in some particular radio part manufacturer's staff. Any radio experimenter, or student, can build this set in one evening on the kitchen table with a screwdriver, pliers and soldering iron.

The finished design consists of a set of plans, diagrams and a parts list. Although this is not a kit set, the designers have provided a foundation unit which consists of a drilled front and sub-panel available for \$2.25; all the remaining parts may be obtained from radio supply concerns. The experimenter with limited funds can start with the foundation

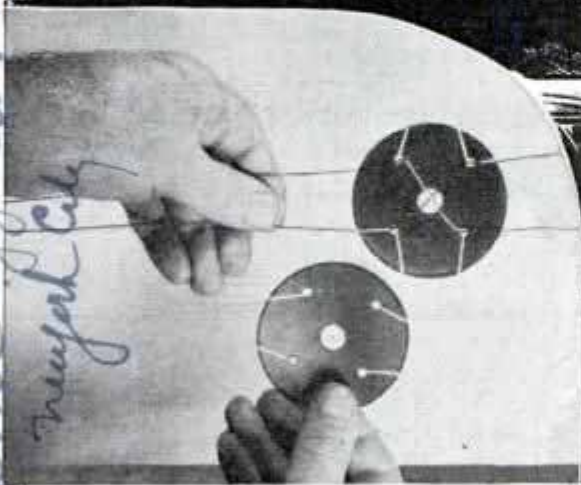
unit and purchase a few parts at a time, thus buying a complete radio receiver on the installment plan, which he assembles at leisure. This slower method often results in better workmanship and a clearer understanding and appreciation of the finished job. World-wide reception is the reward of the careful home constructor; special features not found in sets designed for the general public are built into this all-wave, all-electric receiver.

A complete itemized parts list including further necessary information, together with the names and addresses of the various manufacturers, can be obtained from Popular Mechanics radio department upon application without charge. Practically no technical knowledge is necessary to assemble the set as each step is carefully illustrated. The 5-tube superheterodyne circuit is continuously band-spread and employs a type-6A7 tube as a combination oscillator and mixer. A 6F7 pentode-triode tube works as an intermediate-frequency amplifier on a frequency of 370 k.c. The triode part of the 6F7 tube is connected as a beat-frequency oscillator, with a control switch on the front panel, as indicated by the letters B.F.O. in Fig. 1. This enables the operator to locate weak foreign stations quickly. When the switch is turned on, a whistle will be heard whenever a carrier wave is crossed while tuning. Any such carrier may be tuned easily to exact resonance, after which the beat-frequency oscillator can be switched off. A type-77 pentode detector tube is resistance-coupled to a

(Continued to page 118A)



HINTS for RADIO EXPERIMENTERS



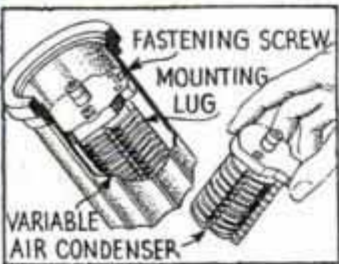
Doublet Transposition Insulators from Old Phonograph Records, Cut and Slotted on Scroll Saw



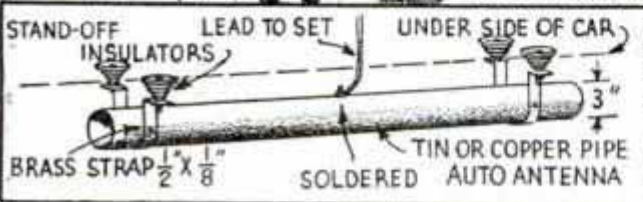
Left, Through-the-Panel Insulators for Single-Hole Mounting, Jack Types Have Soldering Lug



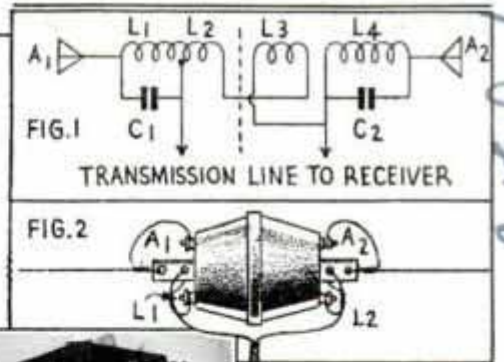
Left, Low-Loss Coil Form Has Threaded Shelf Inside for Mounting Variable Trimmer Condenser to Tune Coil to Fixed Frequency



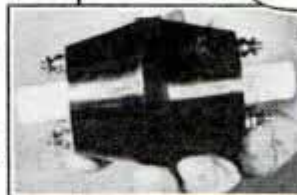
Below, Strip of Copper Screen under Fabric Tire Cover on Spare Tire, Makes Good Auto Antenna; Shield Lead to Set



Clip for Adjusting Rod-Type 5-Meter Antenna; the Usual 40 Inches Varies More or Less for Exact Frequency



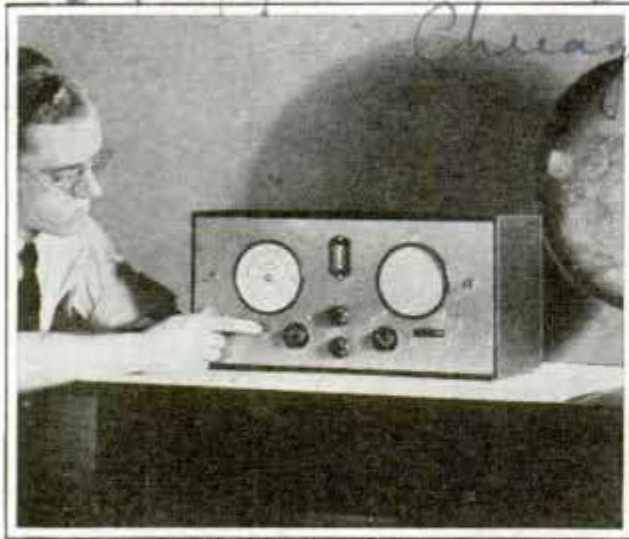
Duplex All-Wave Doublet Antenna Coupler Claimed to Be Efficient from 5 to 600 Meters; Figs. 1 and 2, Show Coil and Fixed Condenser Arrangement Housed in Bakelite Case Shown in Photo



Capacity-Type Auto Antenna Made from Copper Drain Pipe, or Similar Material, May Be Easily Mounted on Stand-Off Insulators under Car

As in my book my Ca 724 41 33rd

E. F. Johnson Co. 227 Fulton St. Wash D.C.



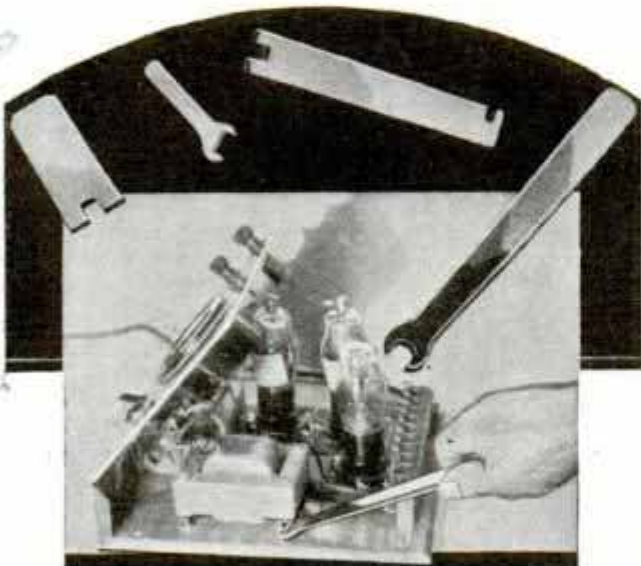
Front Panel View of Compact A.C. Short-Wave Receiver Which Employs Regenerative T.R.F. Circuit

Short-Wave Set Is Self Contained

Complete in one unit, this inexpensive regenerative receiver includes a dynamic speaker and a.c. power supply. It tunes from 13 to 200 meters and is housed in a neat metal cabinet. Tested in Popular Mechanics radio laboratory, the following features were noted: good sensitivity and selectivity with exceptionally low background noise on foreign stations. No plug-in coils are required and band-spread tuning is provided.

Homemade Wrenches for Special Uses

When small nuts are employed in out of the way places for mounting transformers and other parts, the experimenter often finds that it is difficult to reach them with ordinary wrenches or pliers. Wrenches of



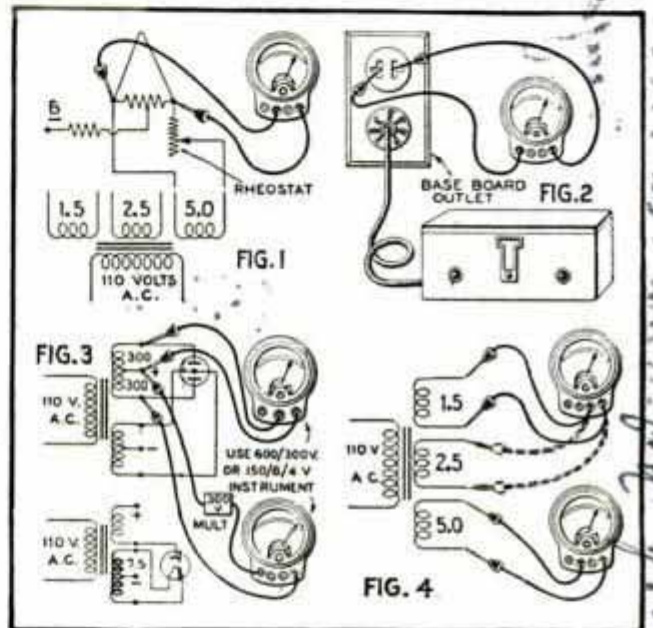
Special Purpose Wrenches Made from Scrap Metal; Handy for Tightening Nuts in Awkward Locations

suitable size and shape may be quickly made from scrap metal. A hole, equaling the diameter of the nut, is drilled near the end of the strip and two straight cuts with a hacksaw complete the tool.

D466/

Portable A.C. Voltmeter Simplifies Set Checking

One of the handiest devices available for testing a.c. operated receivers is a small portable a.c. voltmeter of the multi-range variety. These meters are provided with pin tipped 30-in. flexible cables for plug-



Multi-Range A.C. Voltmeter Checks Both Input Line and Output Voltages

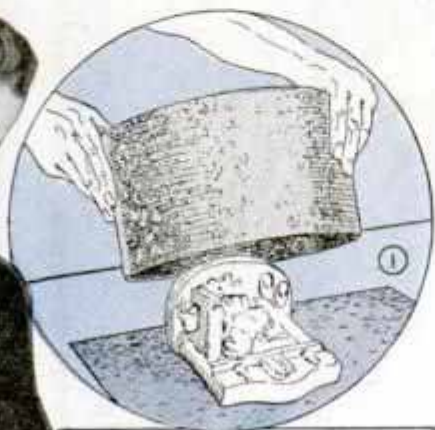
ging into connection jacks on the instrument. Fig. 1 shows the method for adjusting a filament-voltage rheostat for correct tube operation. Line voltage, subject to fluctuation, is checked as indicated in Fig. 2. Radio amateurs and service men measure plate winding output voltages in the manner shown in Fig. 3. Critical filament winding output voltages are accurately measured by merely shifting the test leads as illustrated in Fig. 4. Designed in dual and triple ranges, these voltmeters afford an accurate check of input line voltage and the same instrument can be used for measuring ordinary secondary outputs.

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; when material lists are not included in the articles, these are available without charge on receipt of postage.

Western Electrical

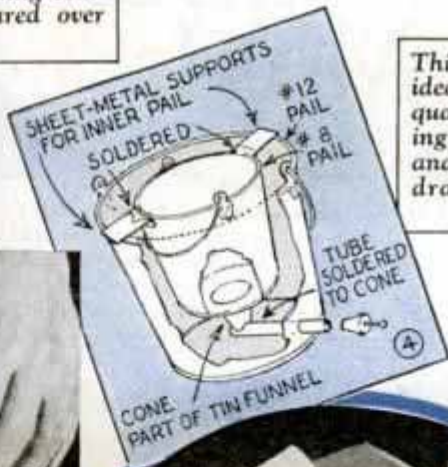
6/19 of rebringsmen are new... 6/19 of rebringsmen are new...

Nicholson & Co. 79 Sudbury Boston Mass



The model is placed on a sheet of tin and a tin retaining wall holds the melted molding compound, which is poured over the model

The next step is to melt the gelatin. It is melted in a double boiler, with water in the lower part. It is important to melt the gelatin slowly to avoid the formation of bubbles. Stirring occasionally while the gelatin is melting, will help. If you are doing a lot of this work, a large double boiler can be made from two pails as in Fig. 4. The inside and smaller pail has a cone, a tube soldered around a hole in the bottom, the tube passing horizontally through the side



This "double-boiler" idea keeps a large quantity of the molding compound liquid and allows it to be drawn off without air bubbles

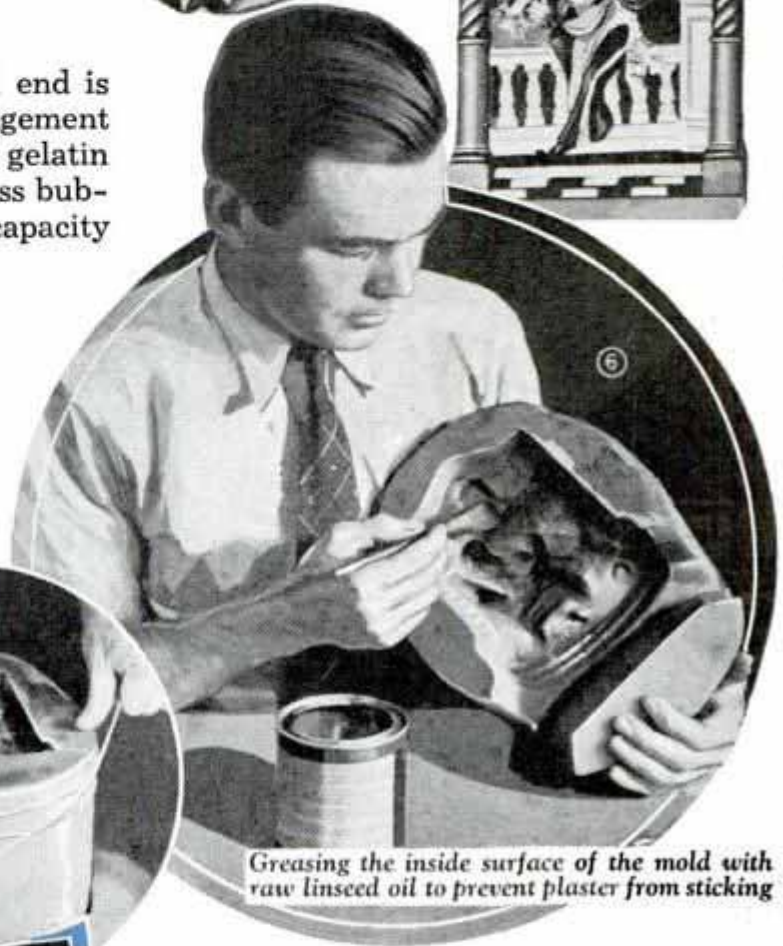


Above, after the molding compound has cooled to a stiff, jellylike consistency, the sheet-metal wall is removed. Right, when removing an intricate model from a mold, it is sometimes necessary to cut the mold with a knife, at points where the cut will meet the corners of the model



of the outer pail, where the open end is plugged with a stopper. This arrangement allows you to draw the melted gelatin from the bottom where there are less bubbles than at the surface. The large capacity of this double boiler makes it possible to fill a number of forms at one time. It is important to avoid the formation of air pockets when pouring the gelatin and for this reason it must be poured slowly.

After the gelatin has been poured to fill the form, it is al-



Greasing the inside surface of the mold with raw linseed oil to prevent plaster from sticking

Right, a split mold must be held together firmly with cord before the plaster is poured. Below, well-mixed plaster is slowly poured into the mold



The surplus plaster projecting beyond the surface of the mold is scraped off flush



lowed to cool, preferably overnight, in which state it will have a stiff, jelly-like consistency. The cord which holds the side of the form together is cut and the strip is pulled away as in Fig. 3. Removing the model from the bottom is next. Often simple models can be removed without the need of cutting the form, but in the case illustrated, it was necessary to cut the side of the mold at two points, Fig. 5. When doing this, make the cut at a corner of the model so that it will be less noticeable than if it were made over a flat surface.

The mold can be used for molding just as it is, in a room where the temperature is not higher than 50° Fahr. If you do the molding where the temperature is higher than this, the inside surface of the mold must be given two coats of slow drying



The molding compound can also be used to make flexible cuts of lettering and pictures

varnish, the first being allowed to dry thoroughly before applying the second. Then, when the second coat is dry, and you are ready for molding, the inside is greased with raw linseed oil as in Fig. 6, after which the mold is tied together with cord as in Fig. 7. For mixing the molding plaster (No. 1 grade molding plaster, at hardware stores), use a bowl of suitable size to hold the entire mixture, the proportions of which are, $\frac{3}{4}$ cupful of cold water to each cup of plaster. The mixture should be thick and creamy, but thin enough so that it will level itself when poured. After filling the mold level with the top, as in Fig. 8, the excess plaster is scraped off the flat, open side with a strip of tin as indicated in Fig. 9.

Now allow the plaster to set until it hardens, which will require from 20 to 45 min., depending on the amount and thickness of the mixture. Then remove the casting from mold which will be an easy matter as the latter is flexible. It can be re-greased, and used over and over again for molding as many castings as you desire. The finished castings can be left plain, coated with clear varnish, or they may be attractively painted and then given a coat of good varnish.

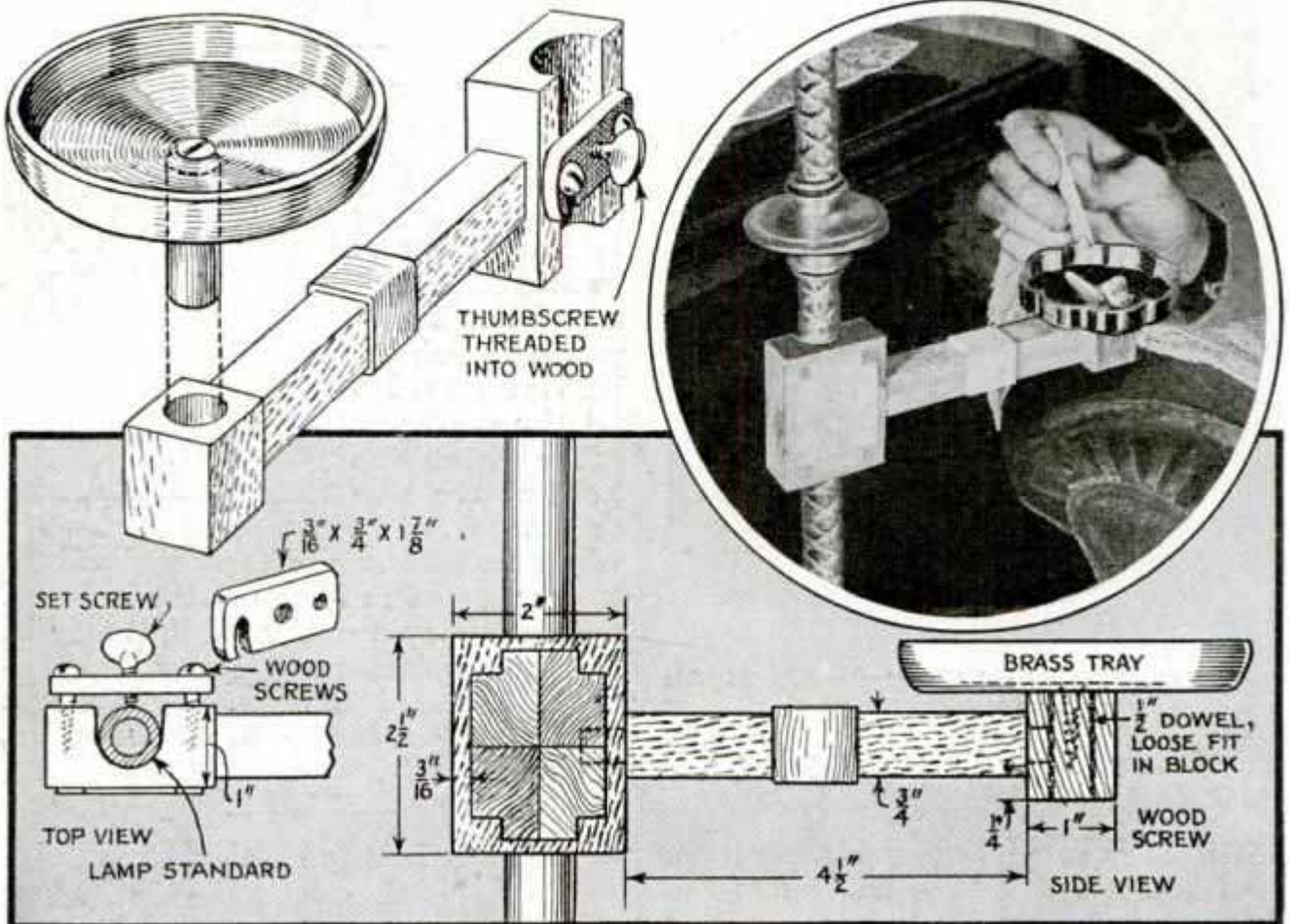
Another use to which the gelatin lends itself is the making of flexible stamps for printing lettering and pictures. To make the stamps place two strips of heavy cardboard or thin wood, about $\frac{1}{8}$ in. thick, on a square piece of sheet metal, after which some plaster is poured between them and smoothed down to a uniform thickness with a strip of tin as in Fig. 10. With a stylus, cut in the lettering or pictures, and then pour on some melted gelatin. When this is dry it is peeled off the plaster and glued to a block of wood.

Insulated Wire Used as Model Parts

On an architect's model of a gasoline filling station, which required measuring pumps to complete the assembly, the problem of making realistic hose for the pumps was solved by using red rubber-covered radio wire. This wire is available in many diameters and can be had in several colors, which makes it adaptable to model locomotives and other model jobs. It has the added advantage of being flexible so that it can be bent to permanent, natural curves as required.

Suggested A. Sengger & Co. 159 W. Kinzie Chicago

Small Ash Tray Clamped to Reading Lamp



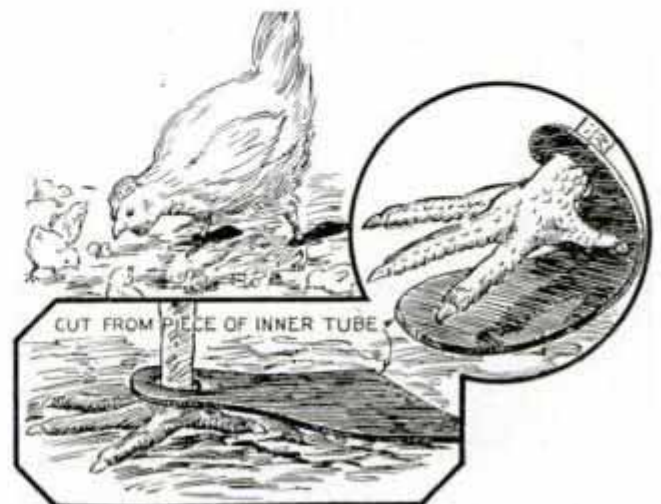
Clamped to the standard of a floor lamp by means of a decorative, wood arm, an ash tray is always at hand when reading in your favorite chair. Besides being adjustable in height, the tray can be moved from one lamp to another one. The arm and clamp may be made inexpensively from some rare wood, or you can use common wood and cover it with fancy veneer.

In this case, the arm is mahogany banded in the center with satinwood veneer. The clamp is also mahogany, and is overlaid with a design cut from satinwood. The arm is doweled to the clamp and to a wood block, which is drilled vertically for a dowel. The latter is a loose fit in the block, and is attached to the bottom of the ash tray with a wood screw.

Hobbles Prevent Chickens from Scratching in Flower Bed

When a hen must be turned loose in the yard with her brood of chicks, a piece of inner tube, cut to the shape shown, and slipped over her leg will help prevent her from scratching in flower beds. A hole of a size to fit loosely over the leg is cut in one end of the rubber. If the hen attempts to scratch, the rubber folds under her foot and has a tendency to discourage her from further scratching.

☞ A water stain should not be used on soft woods; it is better to use an oil stain or a penetrating spirit stain.



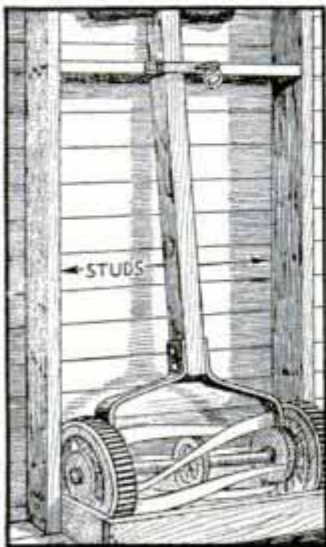


Clamped to a Mixing Bowl, This Device Adds Liquids to Mixtures a Drop at a Time

Homemade Device for Dropping Liquids into Mixtures

Riveted to a spring clamp, a small tin funnel, provided with a petcock in the spout, makes a simple device for adding oils to salad dressings or other mixtures where small amounts of liquids must be added, a drop at a time. The clamp is a piece of spring steel, which is bent at the lower end as shown to grip the edge of a mixing bowl.

Locker between Studs in Garage Holds Lawnmower



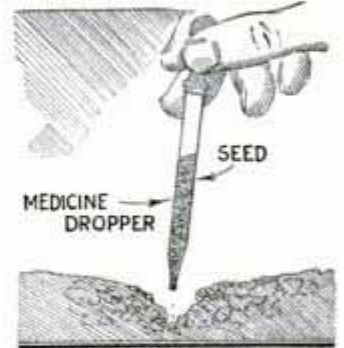
while another piece of the same material is

Built between two studs in your garage, this locker provides a good storage place for a lawnmower so that it will not be taken away if the garage doors are left open. A frame of 2 by 4-in. stock between the studs at the bottom extends out sufficiently to accommodate the mower,

nailed between the studs and notched to take the handle which is held in place with a hasp and padlock.

Sowing Tiny Seeds with Ordinary Medicine Dropper

Small seeds that are difficult to sow by hand may be planted easily with a medicine dropper. The rubber bulb is removed to fill the dropper, after which it is held above the shallow furrow in which the seeds are to be planted and the bulb squeezed to force out the seeds. If the seeds are unusually small, it may be necessary to decrease the size of the opening in the end of the dropper by heating it over an open flame.—A. S. Wurz, Jr., Rockyford, Alta., Can.



Models Lettered with a Stencil

Model makers who have difficulty in lettering their models will find that a stencil made of painters' adhesive or masking tape simplifies the work. It is best to cut

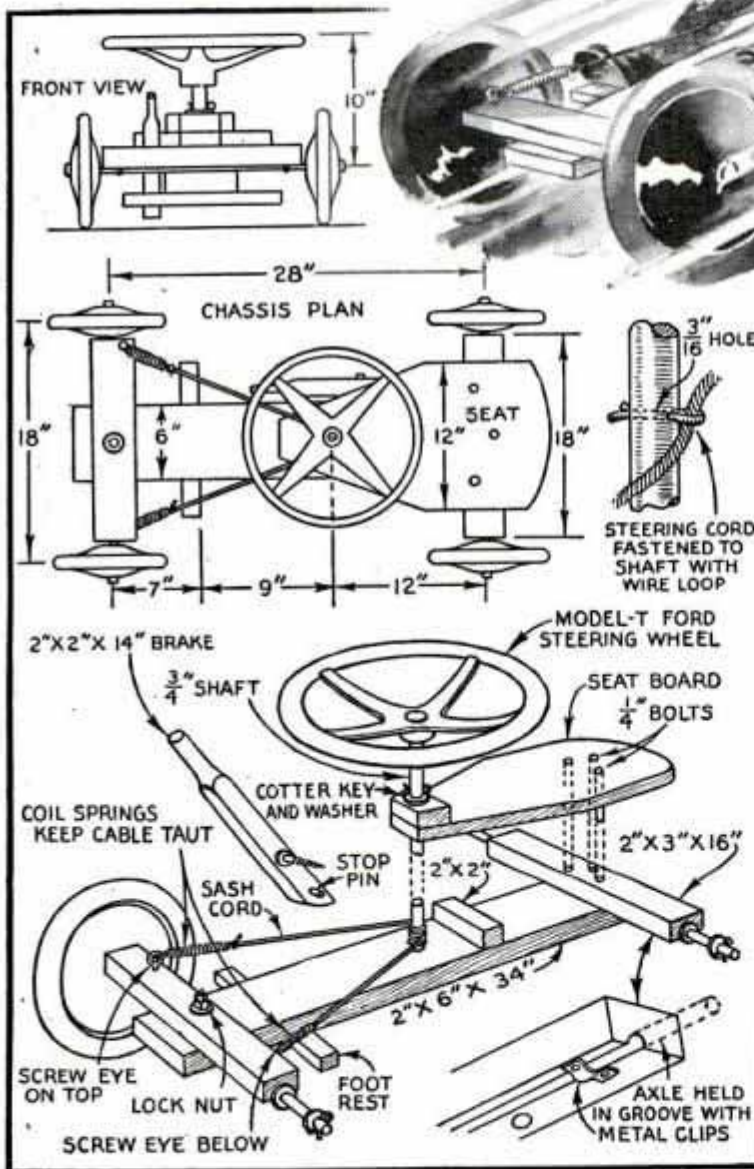


Stencil Made of Masking Tape Aids in Painting Letters or Figures on Models

the stencil on a piece of celluloid, as this permits getting a clean-cut job. The tape sticks tightly to the model so that there is no tendency of the stencil slipping, or of the paint working under the edges.

Speedy Coaster Has an Auto Steering Wheel

Here is a speedy little sidewalk coaster that can be put together in a couple of hours and if you have a set of rubber-tired wagon wheels and axles, the only extra equipment needed is a model-T Ford steering wheel and section of shaft or pipe. The steering cable is a length of sash cord wound directly around the steering post or shaft, and is fastened with a wire loop as shown. A coil spring keeps the cable taut and also acts as a shock absorber when hitting obstructions. The short wheel-base permits sharp turns and



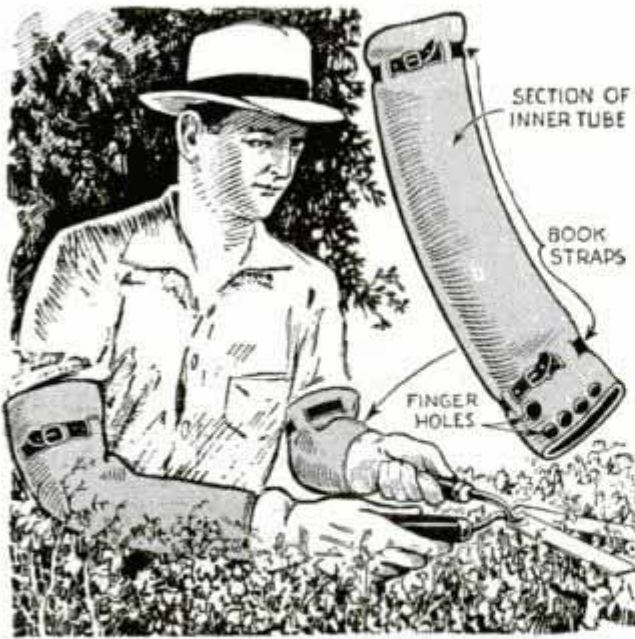
on the tires. It is pivoted to the right side of the main frame with a lag screw. A stop pin on the inside near the lower end, prevents the handle from falling too far forward when not in use.

Nicked Propeller Causes Outboard Motor to Race

Mystifying performance of an outboard motor, which reaches a normal speed, then without warning suddenly races with a slight decrease in the speed of the boat, is often caused by a damaged propeller. This is usually the result of nicking the leading edges of the blades on rocks, which narrows the effective area in such a manner that water follows the blades and assumes a circular or churning motion instead of being driven back toward the rear. This condition causes a partial vacuum to be formed in the area immediately surrounding the propeller, which allows the motor to speed up. About the only remedy is a new propeller.

the low center of gravity prevents capsizing. The brake acts directly on the sidewalk making it positive and avoiding wear

surrounding the propeller, which allows the motor to speed up. About the only remedy is a new propeller.



Sections of Inner Tube Slipped over the Arms to Protect Them When Pruning Thorny Bushes

Arm Guards for Pruning Hedge

When pruning a hedge or thorny bushes, slip a couple sections of old inner tube over your arms to prevent them from being scratched. Finger holes are made in one end of each section, after which they are fastened to the arms with straps, book straps being suitable for this purpose. A pair of gauntlets should be worn to protect the hands.

Old Razor Blades Rid Garden of Moles

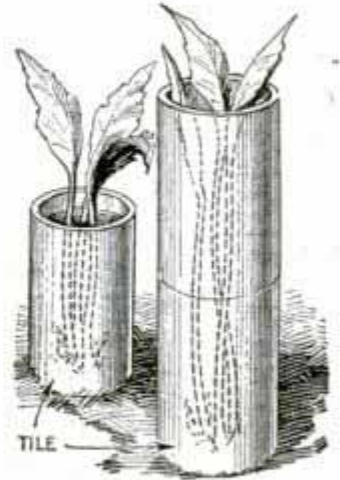
After trying several methods of trapping moles in my garden without much success, I tried inserting old razor blades in their runways, and found that they soon left. I merely pressed down the surface of the runways at intervals, and inserted the blades about 2 in. under the ground with the sides of the blades parallel to the runways.



When a mole comes along and finds the runway blocked, he starts digging and cuts his nose on the blades. A few experiences of this kind, soon induce him to seek another feeding ground. —A. L. Flude, Pacific Grove, Calif.

Tile Placed over Rhubarb Plants Makes Stalks Grow Long and Tender

To grow long, tender stalks of rhubarb, one gardener suggests placing a drain tile over each plant as soon as it forms a few leaves. Then, when the plant grows sufficiently to bring the leaves above the tile, it is filled with rich loam and a second tile is placed on top of the first one. No dirt need be added to the second tile.



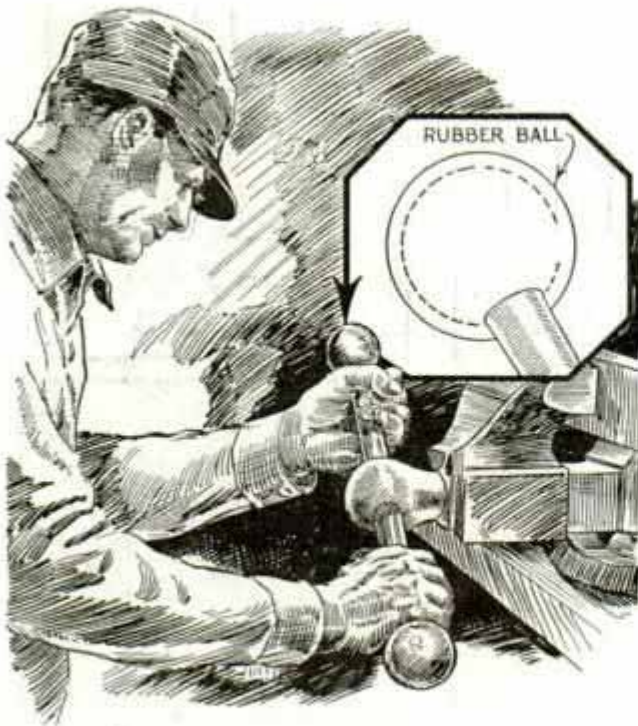
Piece of Garden Hose Used as Stop on Keyhole Saw

Slipped over the blade of a keyhole saw, a piece of garden hose was used by one home owner to limit the stroke of the saw when cutting through a floor to install wires, to avoid any possibility of sawing



Piece of Garden Hose Slipped over Blade of Keyhole Saw Serves as Stop to Limit Stroke

through the ceiling below. The hose also serves as a grip when it is necessary to hold the saw with both hands when cutting through a knot.



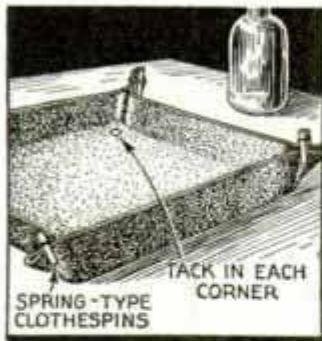
Hollow Rubber Balls Slipped over Ends of Vise Handle to Prevent Pinching Workmen's Hands

Rubber Balls Cushion Vise Handle

To avoid pinching the hands on a vise handle, slip a hollow rubber ball over each end as shown, to serve as a cushion. Holes are cut in the balls so that they can be stretched over the enlarged ends of the handle, a coat of shellac first being applied so that the balls will not slip off.—A. H. Waychoff, Tempe, Ariz.

Improvised Rubber Tray for Acids

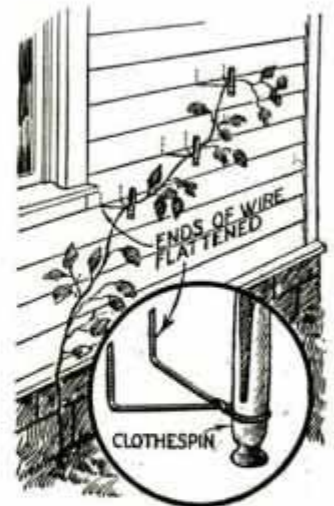
If occasional use of acids in experimental work finds you without a rubber container in which to mix them, one can be improvised quickly from a square piece of inner-tube rubber. This is folded at the corners to form a tray, each corner being fastened with a spring-type clothespin. Tacks, driven through the bottom near each corner, hold the tray in place on a table.



☐ A high room will seem lower if a molding is placed around the walls 16 to 24 in. below the ceiling.

Simple Brackets Hold Vines on Side of Building

To avoid driving nails into the side of a building when attaching strings or trellises to support vines, one home owner used brackets as shown. The brackets are made from lengths of stiff wire, which are bent around clothespins, the ends of the wire being bent up at right angles to slip under the siding boards of the building. By training the vines through the slots of the clothespins, they are held securely in place at a sufficient distance from the building to allow air to circulate around them.



Inexpensive Crack Filler

Cracks in floors, knot and rat holes or old cuts made for wires and pipes may be permanently repaired with a filler made by mixing plaster of paris, 1 lb., precipitated chalk, 6¼ lbs., and yellow dextrine, 1 lb. Before using, enough water is added to the quantity needed to make a stiff dough. This is pressed into the cracks and troweled smooth. If a coarser grade of material is needed, fine sand may be substituted for the chalk.

Paper Clips Lengthen Rubber Bands to Reach around Packages

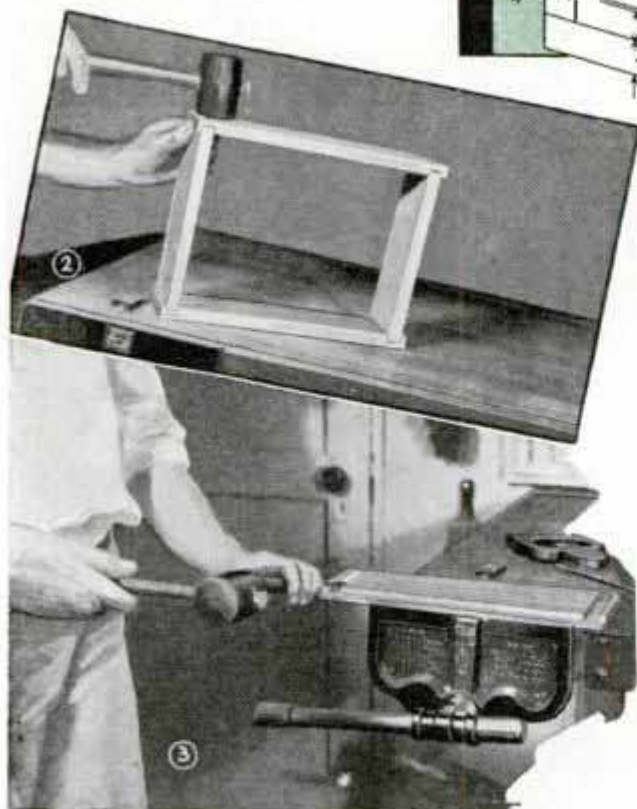
In an emergency, paper clips will be found handy for connecting small rubber bands together, so that they will reach around a large package. This method, besides providing a double strand of rubber around the package, is much better than looping the bands together, as the small knots formed in this way often tend to cut the rubber.



Built-in KITCHEN

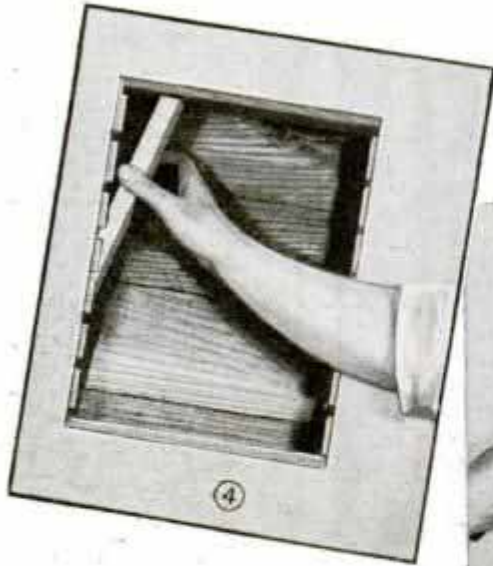
SOAP CASE

BUILT into the wall above the kitchen sink, this little case provides a place where soap, cleaning powder and other dish-washing accessories may be stored. The frame of the case should be made first so that the opening in the wall may be cut to fit it. Fig. 1 gives the dimensions. At each end of the sides, a dado is cut, Fig. 3, to house the top and bottom. Also, $\frac{1}{4}$ -in. rabbets are cut in the four pieces to house the back. The assembled case is shown in Fig. 2.

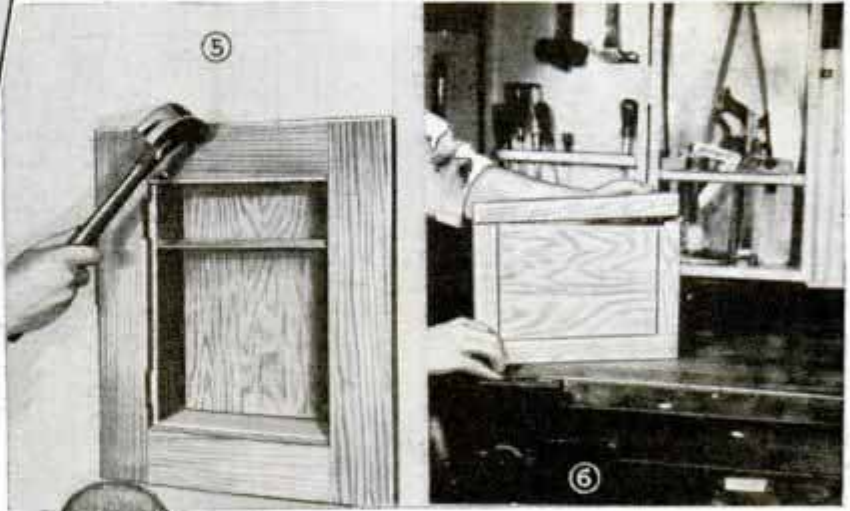


The $\frac{1}{4}$ -in. plywood backing is nailed into the rabbets to make a dust-proof joint. The casing is framed up and fastened together with long nails so that the faces will stay true even if the wall is not perfectly level. An opening for the door is made $\frac{3}{4}$ in. greater each way than the inside dimensions of the case to form a jamb.

The next step is to cut an opening in the wall between two studs for the case. To get the right location, rap on the wall. A hollow sound is produced everywhere except over a stud. Before making the cut, it is a good idea to check from the floor above, and in the basement below to be sure that there are no pipes or other obstructions in the wall. Most sinks have short risers or stubs on the pipes just above the faucets to prevent pounding; so



it will be best to space the bottom of the case at least 6 in. above the sink back. Obviously these directions apply only to a frame building. After laying out the opening on the wall, drill a small hole at one corner and carefully cut out the lath and plaster with a keyhole saw. Short pieces of material the width of the studs, should be slipped into the opening and forced into place at each side to support the lath, as shown in Fig. 4. Nails are then driven through the plaster



edges flush with the face of the plaster as shown in Fig. 7. After cutting the recesses for the hinges, the casing may be installed. Drive casing nails into both the case and wall, and set the heads for puttying as shown in Fig. 5. The door construction is simple. A groove to house the panel is plowed into all of the pieces, after which a tenon is formed on the rails, and stiles are mortised out to the size of the groove. This method of construction is shown in Fig. 6.

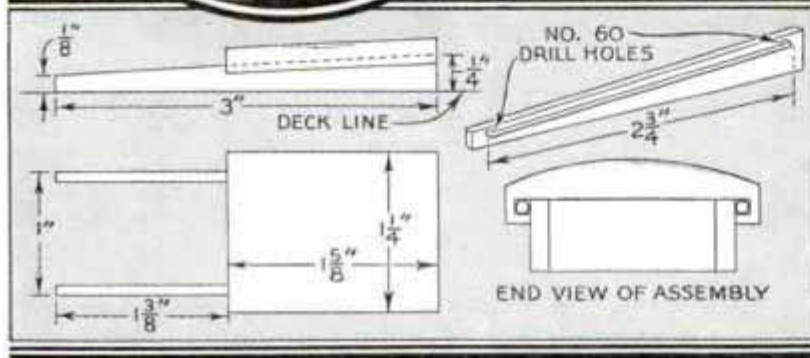
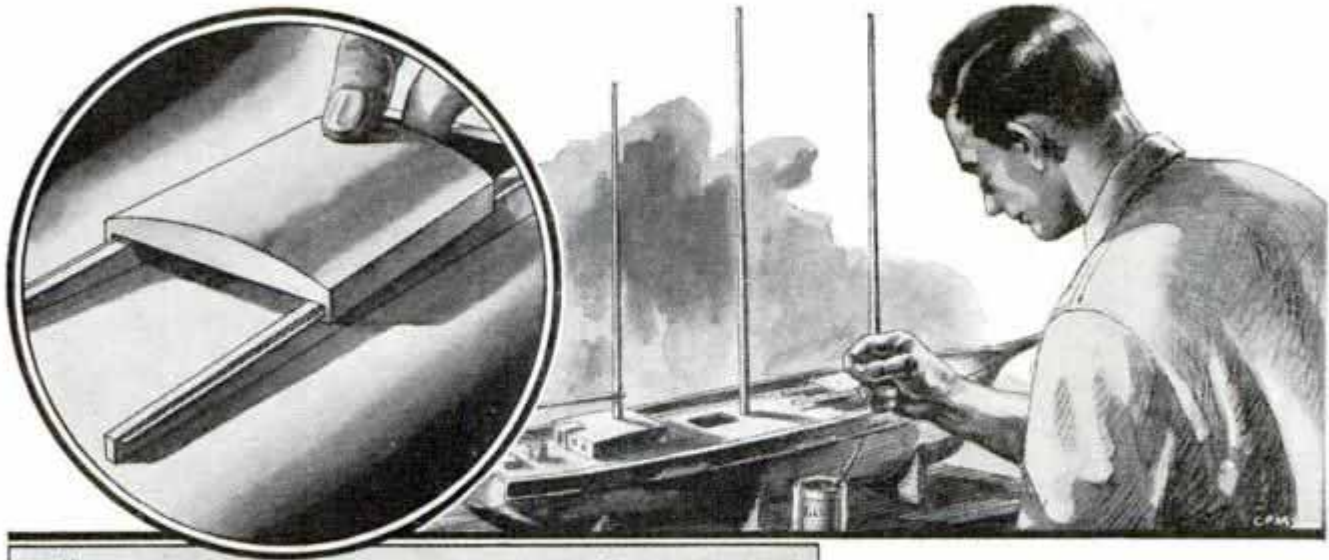
Feathers in Pillows Are Cleaned with a Vacuum Sweeper

Using a vacuum sweeper, one woman cleans the feathers in her pillows as shown in the lower detail. The feathers are spread out on a sheet laid on the floor, after which a window screen is placed over them. The sweeper is run back and forth over the screen, and draws the dust out of the feathers. After they have been cleaned thoroughly, the screen is carefully removed, the pillow case substituted for the bag on the sweeper, and the feathers picked up. Besides removing all dust from the feathers, this method assures that they will be fluffy when blown into the case.



☞ When fruit juice is spilled on table linen, sprinkle the spot at once with salt to prevent a permanent stain.

Sliding Hatch Covers Improve Ship Models



ing spaced 1 in. apart. This leaves $\frac{1}{8}$ in. on each side of the cover for grooves to take guide rods on each side of the slides. The rods were made from wire paper clips, which are straightened out and cut to length, a short portion at each end being bent at right angles to fit into tiny holes drilled in the hatch

Sliding hatch covers add considerably to the realistic appearance of ship models, although their construction is, of course, more complicated than that of stationary hatch covers. But, with the following method, the job is easy: In this case the cover was made $1\frac{1}{4}$ in. wide, the slides be-

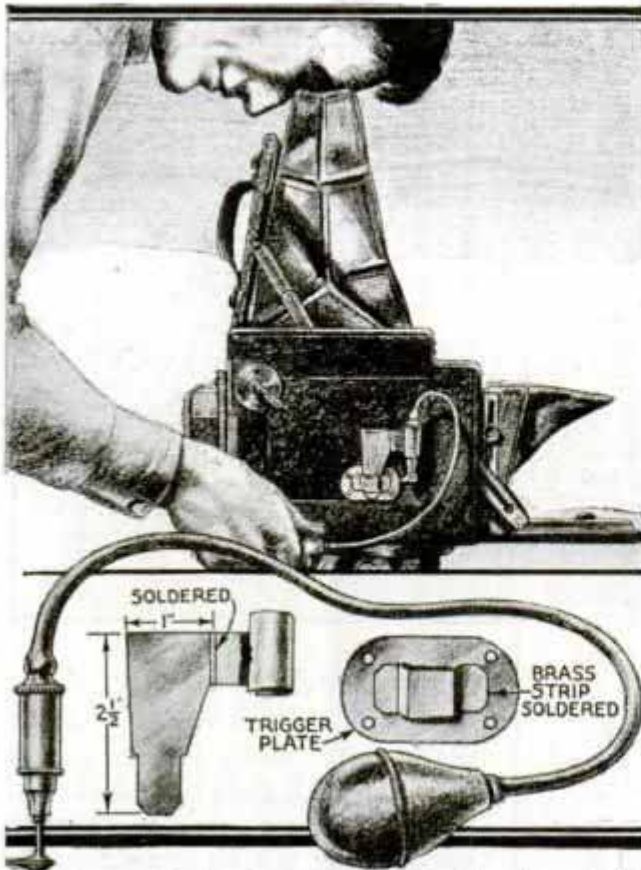
slides. A drop of glue in each hole holds the rods in place. The next step is to glue sides to the cover, after which thin strips about $\frac{1}{2}$ in. thick are glued to the lower edge of each side to form the grooves for the guide rods. If the cover slides too easily, the rods can be sprung slightly.

Wire Rings or Loops on Clothesline Hold Prop in Place

Your clothesline prop will not slip and allow the washing to trail on the ground if wire rings or loops are attached at intervals along the line as shown. These should be permanently attached to the line and spaced about 10 ft. apart. The upper end of the prop may be tapered to fit into the rings or a hole may be drilled into the end to receive a headless spike or a length of small iron rod, which is then inserted into the rings.—G. E. Hendrickson, Argyle, Wisconsin.



☞ To prevent pictures from slipping so that they hang unevenly, hang them face to the wall, and then twist them around, making a cross in the wire.

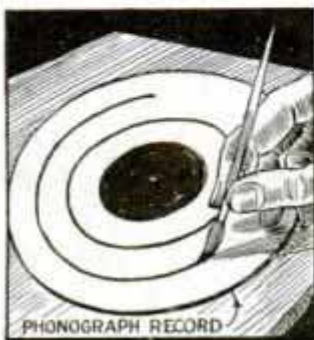


Shutter on Graflex Camera Operated by Detachable Bulb Release Held in Place with Brass Bracket

Bulb-Operated Shutter Release for Graflex Camera

Desiring a bulb-operated release for the shutter of my graflex camera, I attached one with a bracket as shown. The bracket is made from two pieces of brass soldered together. One end is bent around the end of the release, while the other end is trimmed to slip into a U-shaped brass strip soldered over the trigger plate on the camera. In this way, the assembly is readily attached or removed, and, when not in use, can be carried in the pocket where it is handy to get at when needed.—George Gilbert, Hollywood, Calif.

Old Phonograph Records Utilized as Rifle Targets



Old phonograph records are being used by amateur riflemen at Rocky Ford, Colo., for targets on their practice range. The center portion of the record is left black to form

a bull's-eye, and the recording part is painted white with a black ring halfway to the edge for the 3 and 4-in. rings. Contrary to expectations, the records will withstand many shots, the bullets leaving clean holes that may be covered with paper stickers to make them invisible.

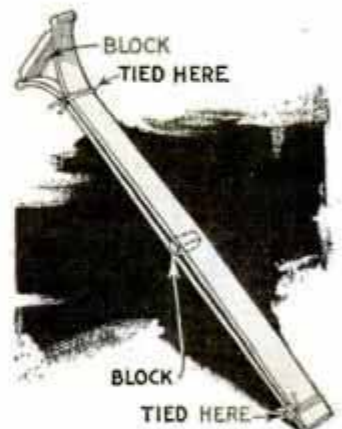
Wire Loop Supports Flowers

Instead of using unsightly wooden stakes and barrel hoops to support flower bushes, one gardener recommends the support shown. This is merely a length of heavy wire bent at right angles near the ends, which are then inserted into the coil springs of two spring-type clothespins. In use, the wire is placed around the flower bush, after which the clothespins are clamped to a 1/4-in. rod pointed at one end and driven into the ground. To add to the attractiveness of the support, a bird cut from sheet metal may be soldered to the end of the rod, and painted a bright color.



How to Store Skis to Prevent Them from Warping

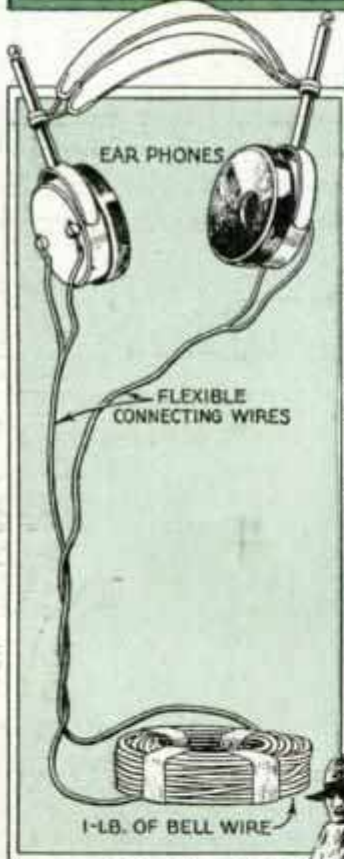
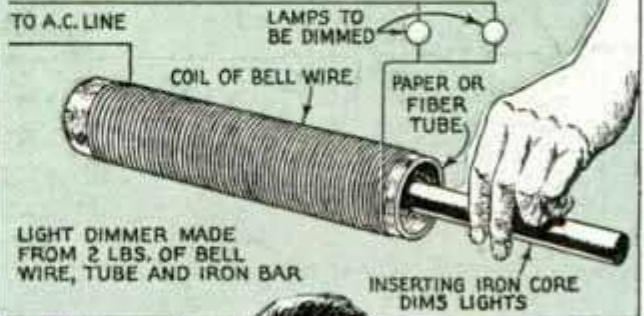
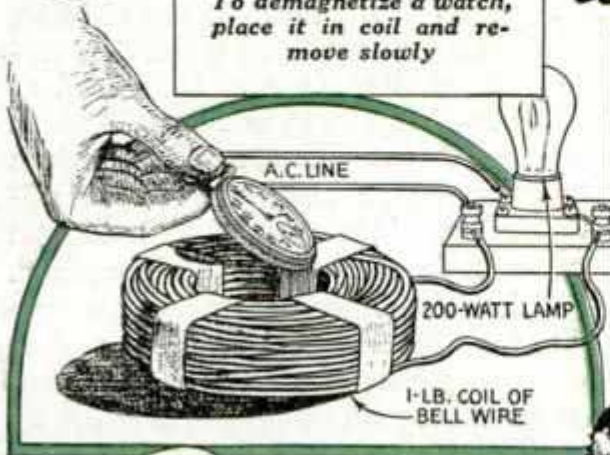
To assure that your skis will hold their shape when stored during the summer months, one man recommends tying them together with wood blocks between them as shown. A small notch is cut on the under side of each ski at the front end to take the beveled ends of a short block, a small block 1 in. square being placed between the skis midway from the ends, after which they are tied together with strong cord.



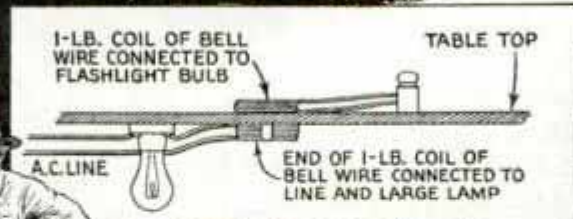
Electrical EXPERIMENTS

With Bell Wire & Iron

To demagnetize a watch, place it in coil and remove slowly



Flashlight bulb lighted without direct connection to current supply, the current in lamp circuit being produced by induction



A buzzing sound in the ear phones locates buried electrical wires

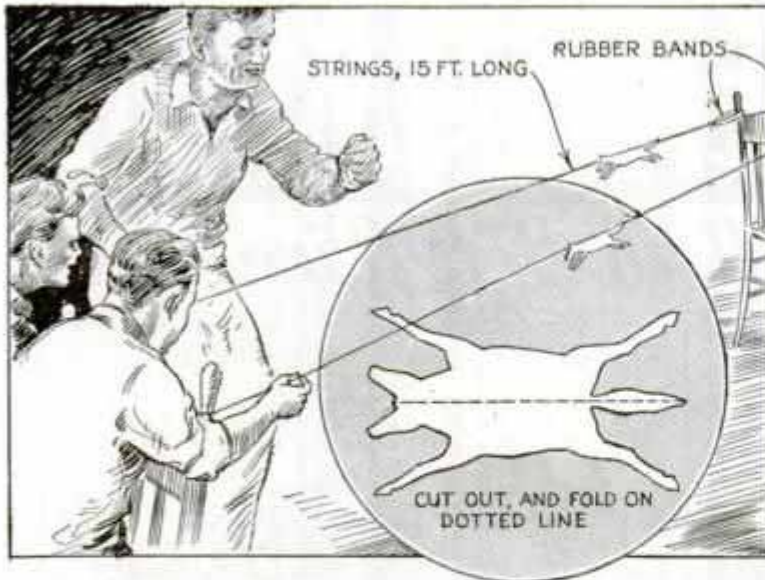


TO STORAGE BATTERY

HORSESHOE MAGNET



Recharging a magnet from storage battery. Magnet is tapped with a hammer while current is flowing through the coil



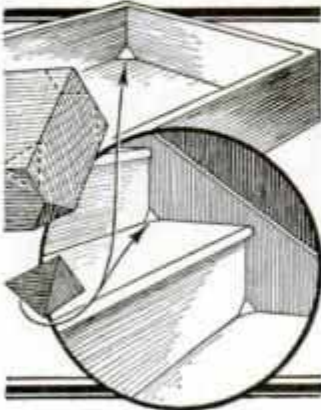
Cardboard Horses Racing over Strings in This Game Will Test Your Skill as a Jockey

Cardboard Horses Race on Strings Stretched between Chairs

Children and adults will find this race-horse game as interesting to play as it is simple to assemble. Two or more strings, provided with rubber bands at one end, are stretched horizontally between a couple of chairs. The horses, cut from a folded piece of cardboard, are placed over the strings near the rubber bands. Each jockey then races his horse by pulling the string toward him and then letting it snap back, thus leaving the horse advanced along the track.

Blocks Prevent Dust Gathering in Corners of Stairs

If small triangular wood blocks are glued into the corners of drawers and stair steps, cleaning is made easy as dirt cannot collect in the corners where it is difficult to remove. As many blocks as you need are readily obtained by sawing off the corners from pieces of scrap wood.



☛ Rings that are sometimes left on clothes after they have been cleaned with gasoline will often disappear when steamed over a teakettle.

Cements to Repair Metal Objects

Metal objects may be repaired by using one of the following tested preparations: Marine glue is one of the most effective cements for metal and can be made by mixing shellac with rubber cement. If the latter is not at hand, it may be made by dissolving virgin rubber, (not vulcanized or scrap) 1 part, in benzene, 10 parts. For most purposes, asphaltum may be used in place of or in addition to the shellac. This cement will keep well if tightly corked. If it becomes too thick, benzene may be added as a thinner. Another excellent metal cement that

is also useful for filling cracks is made by adding whiting to water glass until a viscous putty-like paste is formed. It dries very hard and will not deteriorate. When used as a filling material, this cement should be made very thick. It may be colored with almost any dry pigment, and if thickened with whiting, the cement may be used for modeling.

Homemade Spotting Brush

For removing spots and stains from woolens and similar fabrics, a brush may



Brush Made from Rolled Haircloth Removes Spots and Stains from Woolen Fabrics

be made from a scrap of haircloth, which is obtainable from any tailor shop. A strip of the cloth about 3 by 18 in. is rolled compactly, after which the free end is stitched down with heavy thread. Before using, one end of the brush is moistened with water and then rubbed over a cake of soap.

"VANJA"

By GEORGE BARON

PART II—Keel, Deck, Deck Fittings, Sails and Rigging

IN the last issue the construction of "Vanja's" hull was described up to the point where all the planking was completed and the molds removed. Before going further, make a cradle to hold the hull. This done, you are ready to make up the wooden pattern for the lead keel.

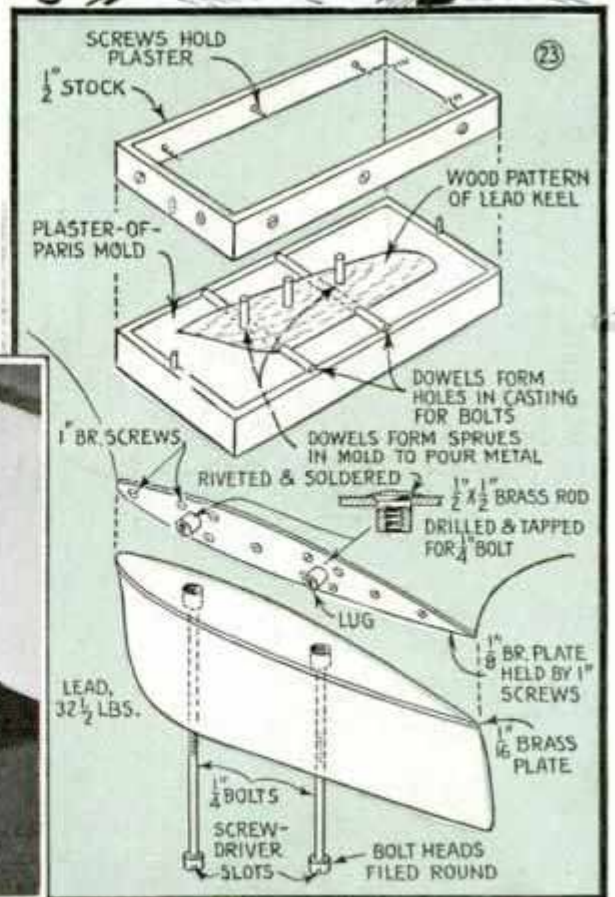
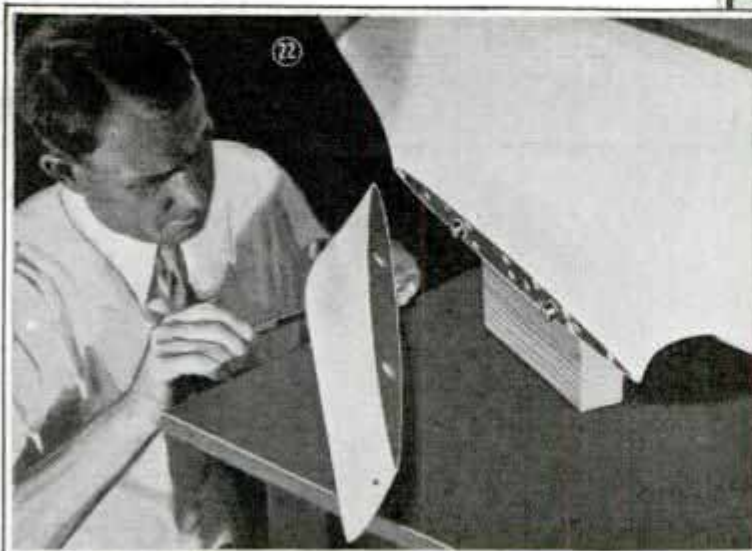
Making the Pattern for the Lead Keel

Glue up any number of pieces to the required size. Plane up the top, mark a center line and shape out to fit the hull. Make templates for each station from the body plan. Shape out the profile of the pattern, and mark the center line around the other side. Fasten it upside down onto a board which is marked with a center line and station lines, and cut to shape, using the templates. Plane $\frac{1}{8}$ in. off the bottom of the keel, fasten the pattern in place and finish to final contour.

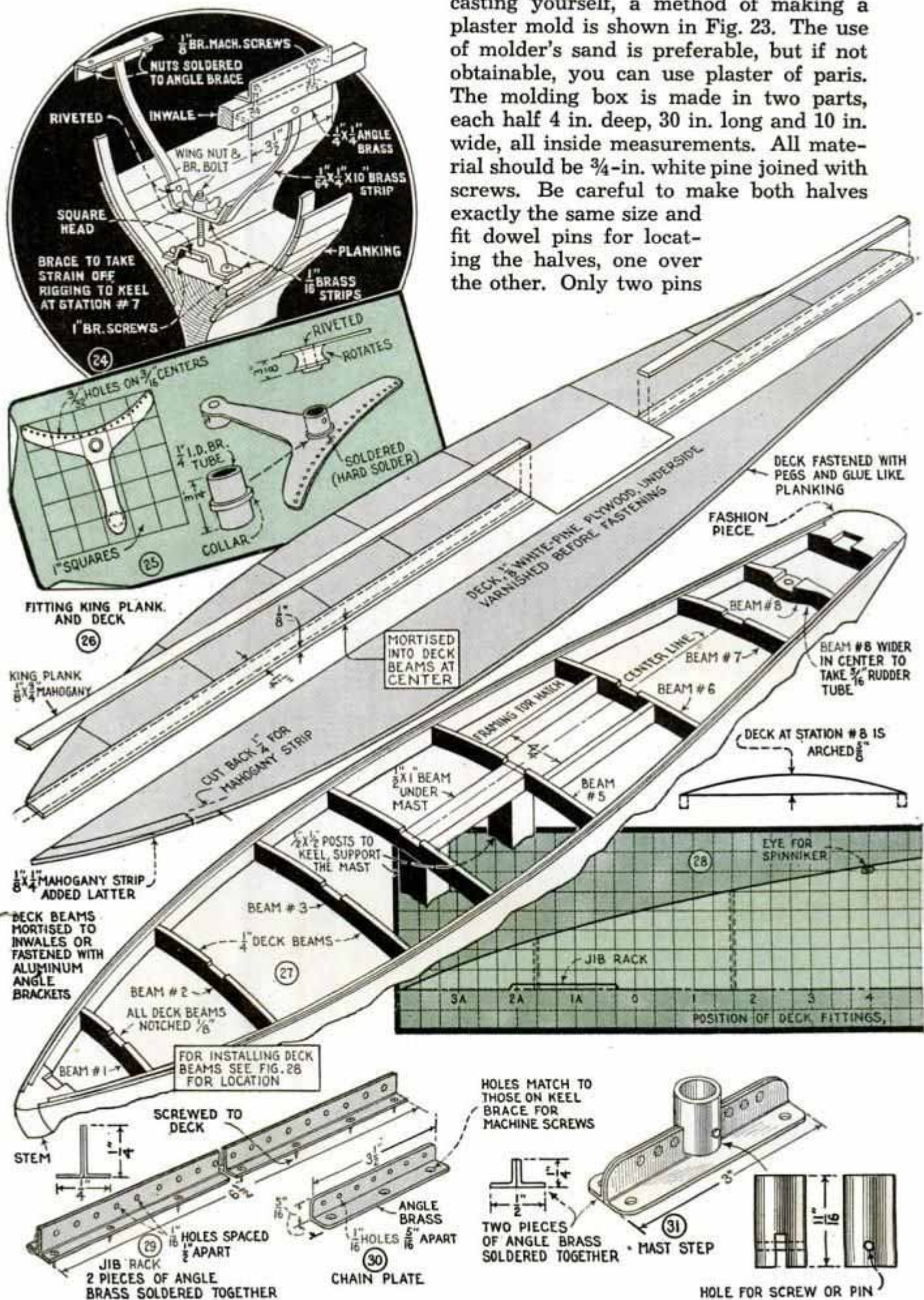
Casting the Lead Keel

You can save considerable time by having the lead casting made in a foundry. This work will be done at a very nominal charge. However, if you wish to make the

Champion Class-A Model Racing Yacht

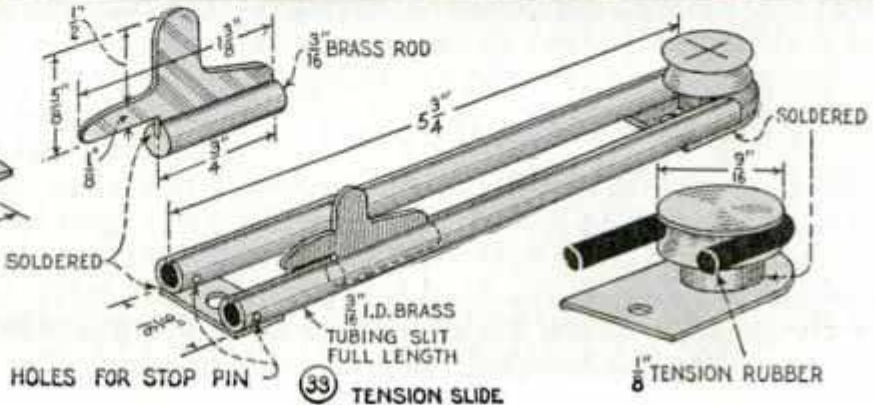
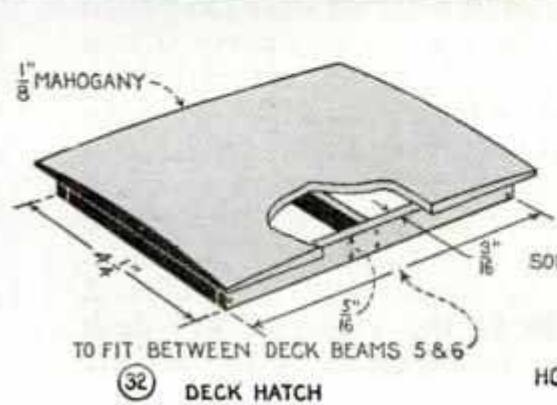
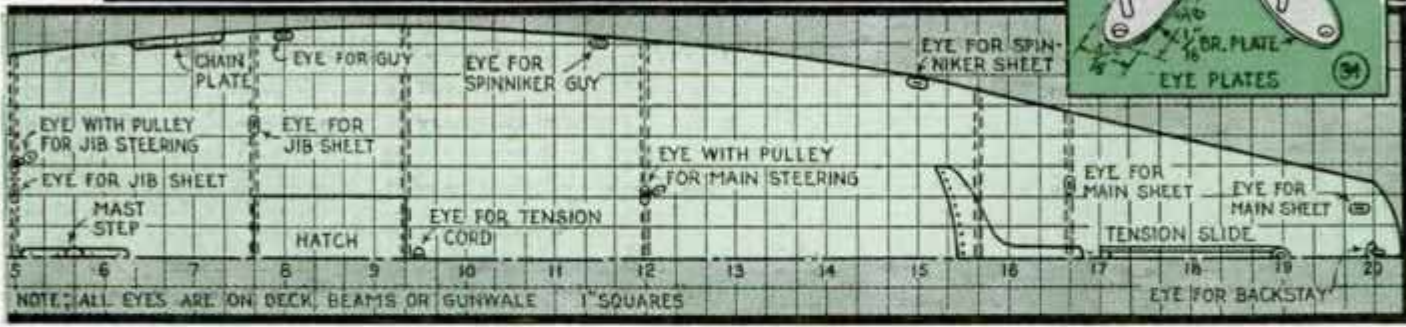
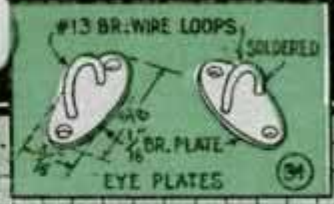
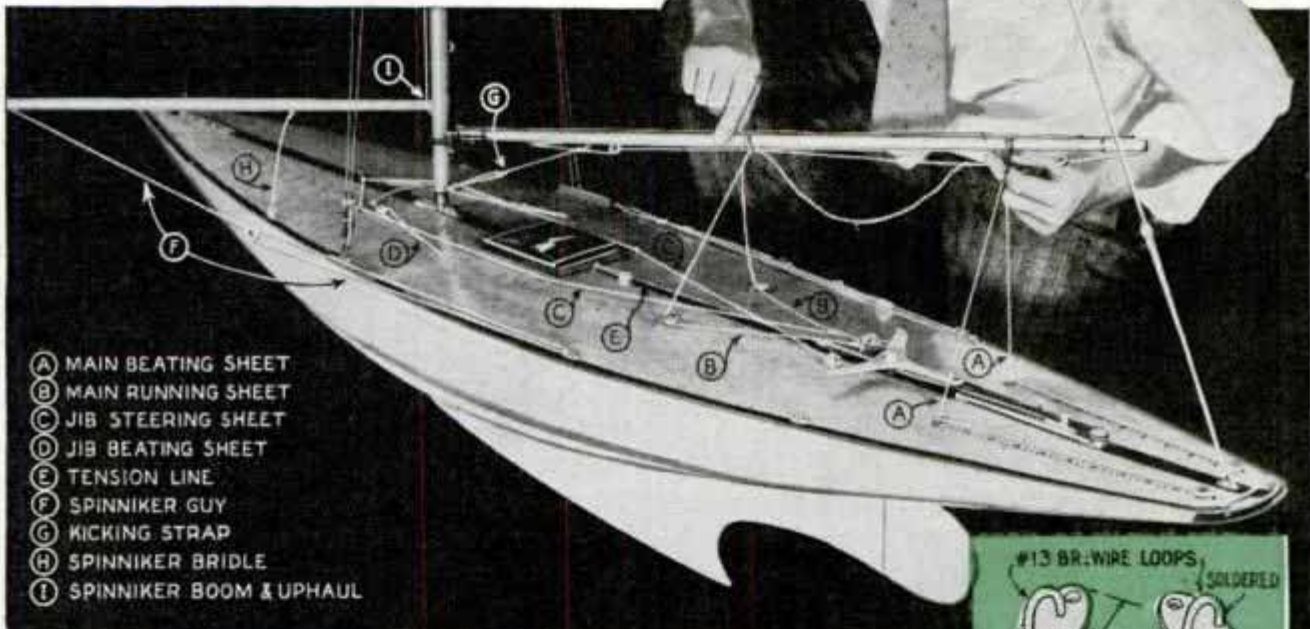


casting yourself, a method of making a plaster mold is shown in Fig. 23. The use of molder's sand is preferable, but if not obtainable, you can use plaster of paris. The molding box is made in two parts, each half 4 in. deep, 30 in. long and 10 in. wide, all inside measurements. All material should be 3/4-in. white pine joined with screws. Be careful to make both halves exactly the same size and fit dowel pins for locating the halves, one over the other. Only two pins



are shown in Fig. 23, but it is better to space four more, two on each side of the lower half of the box. Fig. 23 shows the pattern in place supported on two $\frac{3}{8}$ -in. dowels which fit in grooves cut in the sides of the box. These dowels are loose in the pattern and are left in the mold to form holes through the lead keel for bolts. The three vertical dowels, one for pouring and two for vents, should project beyond the top edge of the upper box. With this done, fill the lower half of the box very nearly full of plaster, grease the pattern to prevent it from sticking, and bed the pattern in the soft plaster filling in at the sides if necessary. Strike off the excess plaster flush with the top of the box and allow to

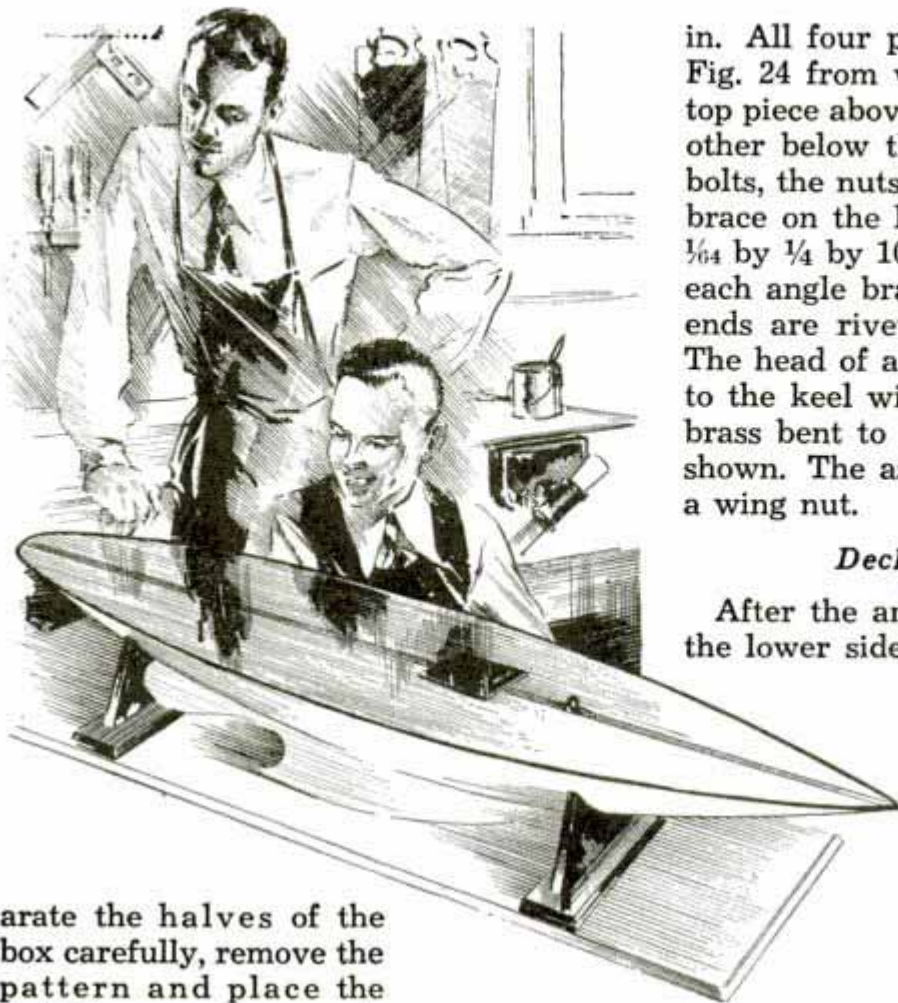
dry. Then lay a piece of waxed paper over the plaster, cutting the center away to fit closely over the pattern. Set the top half of the box in place and pack with the plaster, striking the top off flush with a straightedge. After the plaster has stiffened, prick a number of holes in the top half of the mold with a piece of wire. Sep-



32 DECK HATCH

33 TENSION SLIDE

1/8 TENSION RUBBER



arate the halves of the box carefully, remove the pattern and place the mold in a warm room to dry. It is essential that the mold be thoroughly dry before pouring the hot lead as any moisture present when the lead is poured will turn to steam. The steam is not only likely to damage the casting, but it is dangerous. You will need about 40 lbs. of lead, which should be melted at one time in a suitable container over a gas burner. When the casting is finished, a $\frac{1}{8}$ -in. brass plate is screwed to the keel, and a $\frac{1}{16}$ -in. brass plate is soldered to the lead. The former is fitted with drilled and tapped bosses which fit into countersunk holes in the lead. Bolts through the latter screw up snugly into the bosses and hold the lead in place as in Fig. 23. The keel bolts are $\frac{1}{4}$ in. iron with the square heads rounded and slotted so that the bolts may be tightened with a screwdriver as in Fig. 22.

Chain Plates and Rigging Brace

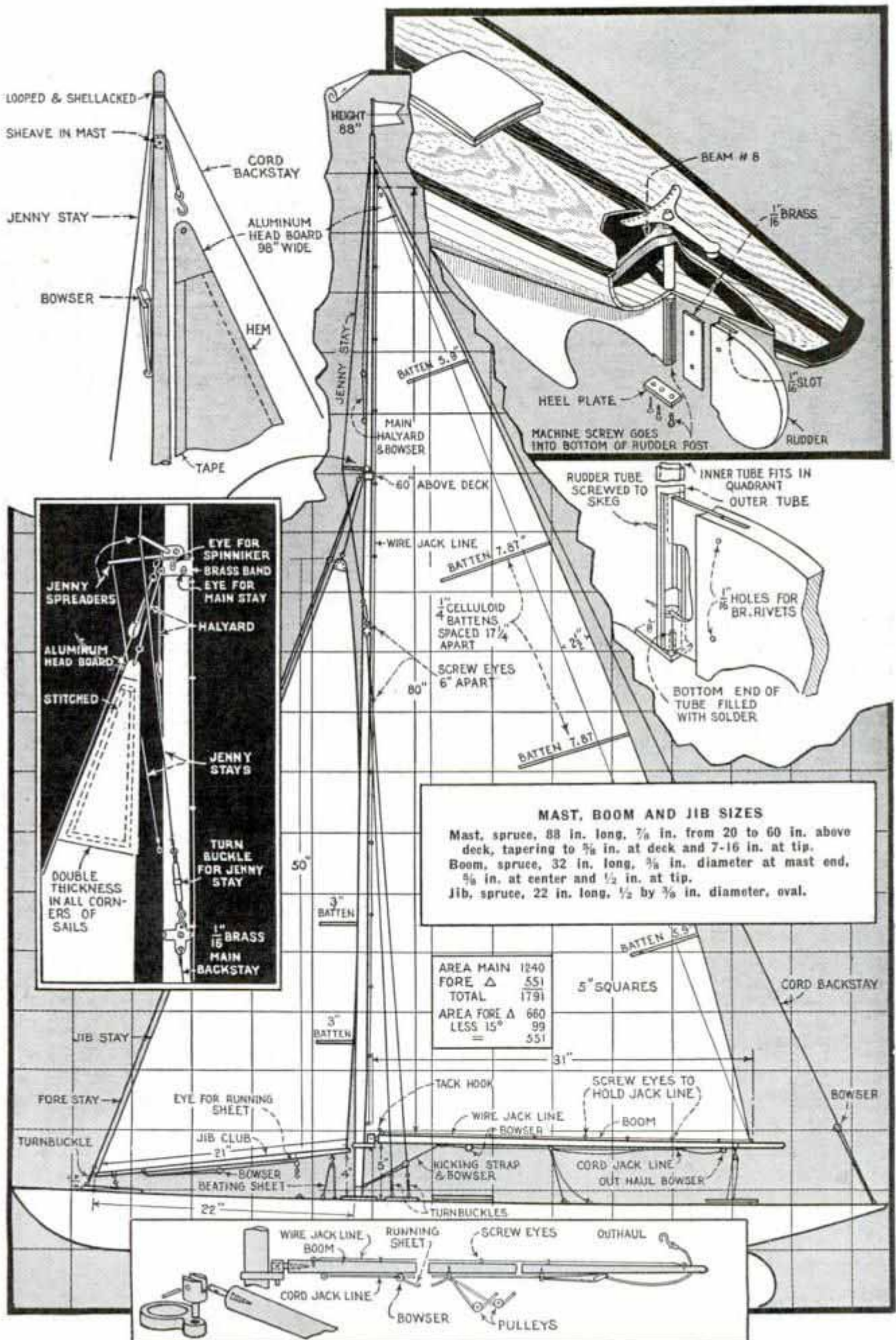
Next, you make and fit the chain plates holding the rigging and the brace which takes the strain down to the keel. For the chain plates, Fig. 30, you need four pieces of $\frac{1}{16}$ -in. angle brass, each $3\frac{1}{2}$ in. long. The two pieces for the chain plates, which are on the deck, are filed down to $\frac{5}{16}$ by $\frac{5}{16}$

in. All four pieces are then drilled as in Fig. 24 from which you will see that the top piece above the inwale is bolted to another below the inwale with $\frac{1}{8}$ -in. brass bolts, the nuts being soldered to the angle brace on the lower side of the inwale. A $\frac{1}{64}$ by $\frac{1}{4}$ by 10-in. brass strip is riveted to each angle brace as shown and the lower ends are riveted to a $\frac{1}{16}$ -in. brass strip. The head of a $\frac{1}{4}$ -in. bolt is then fastened to the keel with a similar piece of $\frac{1}{16}$ -in. brass bent to allow room for the head as shown. The assembly is drawn tight with a wing nut.

Deck Beams and Deck

After the angles have been fastened to the lower side of the inwales with $\frac{3}{8}$ -in. screws, remove the chain plates which later are fitted on the deck. Deck beams can now be put in place, located as in Figs. 27 and 28. The beams should arch to the center of the deck, the camber being $\frac{5}{8}$ in. at the center. Make the longer beams

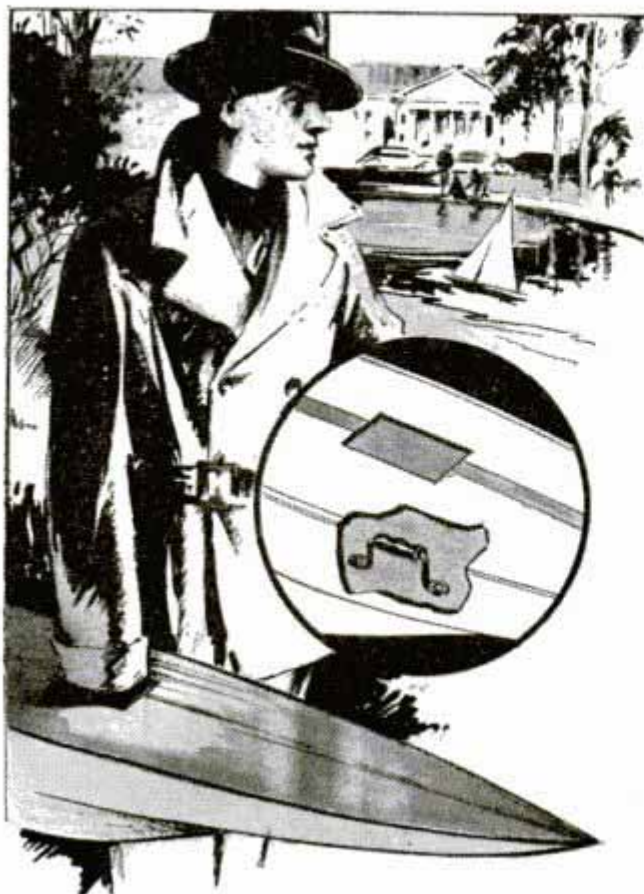
first out of $\frac{1}{4}$ -in. stock. Fasten deck beams to the inwales either by mortising or by means of small aluminum angle brackets. The two beams under the mast are joined by a longitudinal beam 1 in. wide and $\frac{1}{2}$ in. thick, and are further strengthened by two $\frac{1}{2}$ by $\frac{1}{2}$ -in. posts extending down to the keel as in Fig. 27. Beams No. 5 and 6 are joined by two lengthwise beams, $2\frac{1}{8}$ in. from the center line, which form a frame for the hatch, Figs. 27 and 32. Pieces of $\frac{1}{8}$ -in. mahogany, projecting $\frac{1}{4}$ in. above the deck are fastened to the frame to form the hatch coaming. Note that the No. 8 beam forms a support for the rudder post and is widened at the center to give greater strength. Run a batten over the beams and see that it takes an easy curve. Dress down any high places. Then mortise the deck beams $\frac{1}{8}$ in. deep and $1\frac{1}{4}$ in. wide at the center of the deck line and set in two pieces of wood from stem to hatch and from hatch to stern. See Fig. 26. On these lay the king plank of $\frac{1}{8}$ by $\frac{3}{4}$ -in. mahogany. Before adding the deck, bevel the gunwale to the curve of the deck beams. Also screw a handle to the keel directly under the main hatch for lifting



MAST, BOOM AND JIB SIZES

Mast, spruce, 88 in. long, 7/8 in. from 20 to 60 in. above deck, tapering to 3/8 in. at deck and 7-16 in. at tip.
 Boom, spruce, 32 in. long, 3/8 in. diameter at mast end, 1/2 in. at center and 1/2 in. at tip.
 Jib, spruce, 22 in. long, 1/2 by 3/8 in. diameter, oval.

AREA MAIN	1240
FORE Δ	551
TOTAL	1791
AREA FORE Δ	660
LESS 15°	99
=	551



the model out of the water and carrying it conveniently. A heavy drawer or garage-door handle will do very well. The deck is made in two halves of $\frac{1}{8}$ -in., three-ply white pine. Before putting on the deck, apply two coats of spar varnish to the underside. Fit the halves to the curve of the hull, then gauge a line on the curved edges $\frac{1}{4}$ in. inward from the edge and cut down to this line. Fasten the decks on with pegs and glue and be careful to mark the position of the beams for the fittings. Finish off with a strip of $\frac{1}{8}$ by $\frac{1}{4}$ -in. mahogany around the edges of the deck. Give the deck three coats of spar varnish, sanding each coat lightly with No. 6-0 wet-or-dry paper, and finish the hull with enamel.

Quadrant, Jib Rack and Mast Step

Rigging details and the fittings are shown in the drawings. The eye plates, Fig. 34, can be made from strip brass, $\frac{1}{16}$ by $\frac{5}{8}$ in. Draw parallel lines to mark the screw holes and eye holes and mark the width and length for each plate. Drill all holes to fit No. 2 round-head brass screws, eye holes to fit No. 13-gauge brass wire. Countersink the eye holes on the reverse side of the plates and rivet and solder in the U-shaped eyes cut from No. 13-gauge brass wire. Fittings are fastened to the

deck with No. 2 brass screws, $\frac{1}{2}$ in. long. Fig. 25 shows the construction of the quadrant and the manner of attaching it to the rudder post. The quadrant collar should be turned out of solid brass leaving a shoulder to fit against the quadrant. Center-drill the collar to a close fit over the rudder post. To center the rudder, clamp two strips of wood to the skeg and the rudder, center the quadrant and drill the hole for the key pin through both the collar and the rudder post. Any minor adjustment can then be made by moving the forward end of the tension slide, Fig. 33. The construction of the jib rack and the mast step is similar and is shown in Figs. 29 and 31.

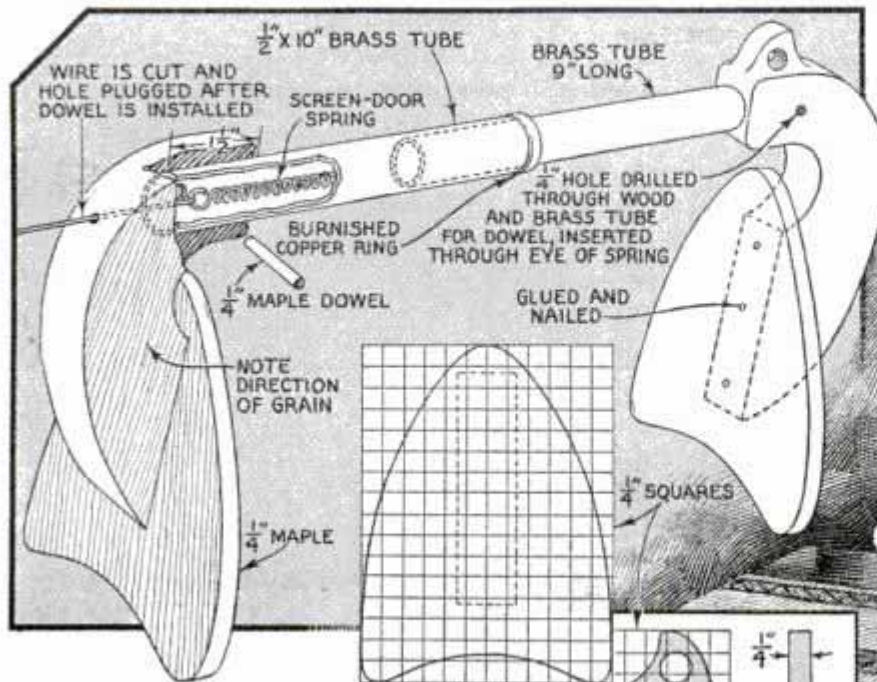
Mast, Booms and Sails

The mast is made of clear selected spruce. Dimensions are given in the rigging detail. Sails are made of light sail cloth, pre-shrunk. The luff, the edge near the mast, of the mainsail, is cut slightly hollow, the curve running into the sail about $\frac{1}{4}$ in. at the height of the third batten, then back to the straight line. The foot can be made slightly full, a curve about $\frac{1}{4}$ in. one-third its width from the mast. Tape the luff and the foot with linen tape, folding it over the edge of the sail.

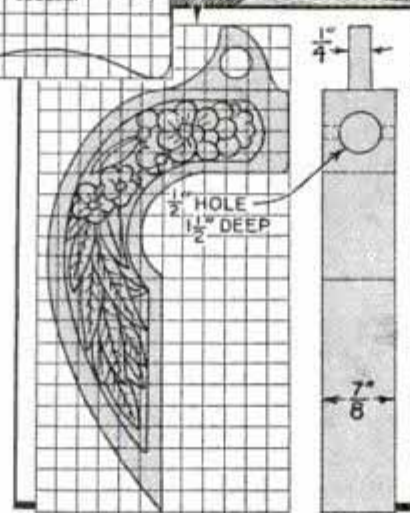
Batten pockets are made of sail cloth to take celluloid battens $\frac{1}{4}$ in. wide. Angle pieces sewed on the corners and cross-stitched, keep the sail from pulling out of shape. The leech, or aft side of the sails, should be hemmed as narrow as possible. Tape the jib the same as the main sail, the luff to be straight, and the foot about $\frac{1}{4}$ in. round. Head boards of $\frac{1}{16}$ -in. aluminum are sewed to the top of both sails. Hooks are sewed to the luff and foot of the mainsail to attach it to spars by means of the wire jack lines. Also sew hooks on the luff of the jib.

Turnbuckles, goosenecks and stays can be purchased cheaply enough to be well worth the saving in time and trouble they take to make. Stainless steel wire is used for all stays and jack lines; linen lines for the running lines and backstay sheets. The mast can be moved forward or aft to trim the sails to the boat but after being measured for class racing, only $\frac{1}{2}$ in. either way is allowed. Raking the mast aft will make the boat point higher into the wind.

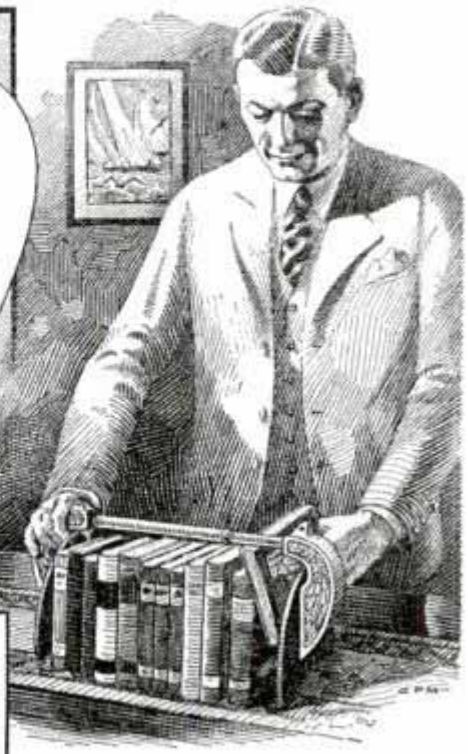
Unusual Pair of Book Ends That Telescope



With carved panels in a wild-rose or cherry-blossom motif, and a burnished brass tube across the top, these telescoping book ends make an unusually attractive table piece. The dimensions given will permit the book ends to be extended from 10 to 18 in. It is a good idea to drill the holes in the ends of the brackets for the brass tubes before cutting them to shape, as the square stock will be easier to handle. The spring inside of the

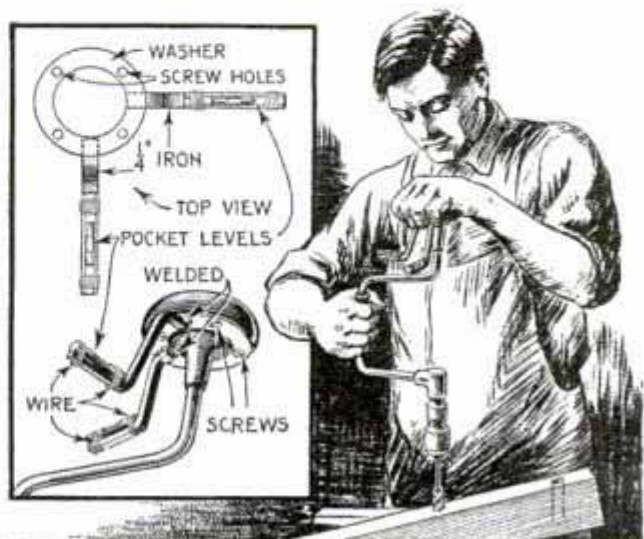


tubes is held by dowels inserted into holes drilled through the brackets and tubing. To install the spring, fasten one end in place, put the telescoping tubes together, and, with a cord or soft wire previously attached to the other eye of the spring, draw it through the tube in line with the hole in the bracket and insert the second dowel. The wire is then cut off close to the bracket.



Attachment on Brace Helps in Drilling Holes Vertically

Two small pocket levels attached to a drill-bit brace with iron brackets as indicated, will be found helpful in drilling holes vertically through work. The brackets are welded to a large metal washer, which has first been drilled for screws to attach it to the underside of the brace handle. After the assembly has been screwed to the brace, the levels are fastened to the brackets with fine wire as shown. Besides being an aid in drilling holes vertically, the levels also help when drilling them at a slight angle. If the position of the level bubble is marked on the glass, duplicate holes are drilled accurately.





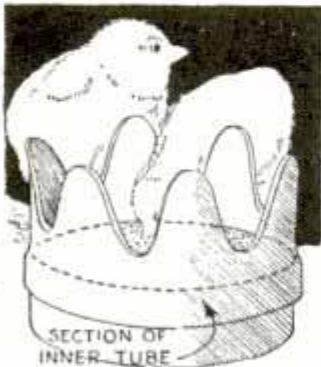
End of Steel Pipe Heated and Flattened to Make Lightweight Crowbar

Crowbar Made from Steel Pipe

I have found that an efficient crowbar can be made from a length of iron or steel pipe by heating one end to a white heat and then flattening it on an anvil. This welds the end of the pipe together, after which it is bent to shape and then filed or ground to a chisel point. A crowbar of this type has an advantage over the usual solid-iron type in that it is fairly light, yet very strong.—James E. Noble, Toronto, Ont., Can.

Baby Chicks' Feed Pans Improved from Can Lids

Instead of using wire guards to cover pans of feed and water for baby chicks,

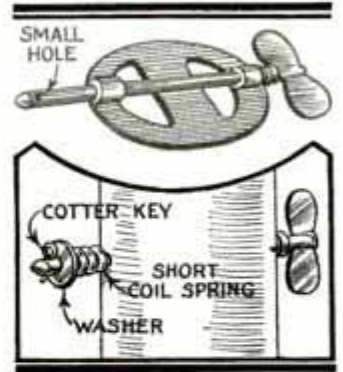


one poultryman employs can lids around which he stretches wide rubber bands cut from an old inner tube. Each piece is serrated along the upper edge as shown. With this method, the contents of the improvised pans are readily accessible to the chicks, and there is no possibility of them getting their heads caught in the rubber guards.—G. E. Hendrickson, Argyle, Wis.

Instead of using wire guards to cover pans of feed and water for baby chicks,

Loose Stovepipe Damper Repaired with Small Coil Spring

When a damper in a stove or furnace pipe loosens so that it will not stay open, slip a short coil spring over the pointed end as shown, and then provide a washer and cotter key to keep it in place. The spring provides sufficient friction so that the damper will stay in any position without being jarred loose.



Soap for Dry-Cleaning Solutions

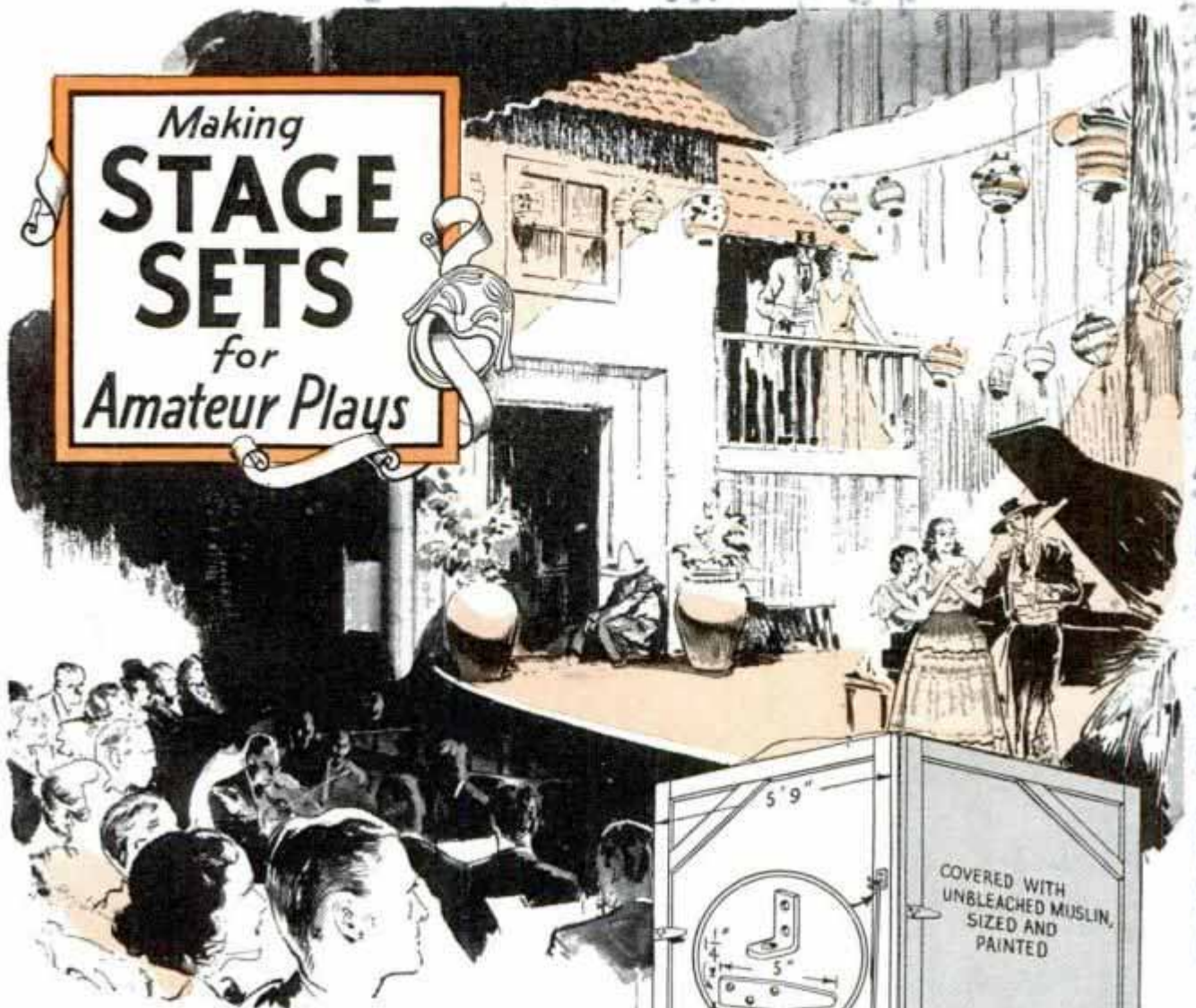
An excellent soap that is soluble in naphtha and can be used to add to the effectiveness of dry-cleaning solutions consists of oleic acid (red oil), 10.7 lbs., butyl cellosolve, 2.7 lbs., and dry cleaners' naphtha, 2½ lbs. This mixture is inflammable and should be heated carefully to a temperature of 140° Fahr. over a water bath. In another container, potassium hydroxide, .85 lbs., is dissolved in water, 1.35 lbs., after which triethanolamine, 1.97 lbs., is stirred into the solution. This is then heated to about 140° Fahr., and stirred vigorously into the first solution. The stirring should be continued leisurely for a half hour, or until a fairly clear solution is obtained. The amount of soap to add to a cleaning solution depends on the use for which the cleaner is intended, and may be determined by experiment.

Spring Handle Holds Small Paint Cans

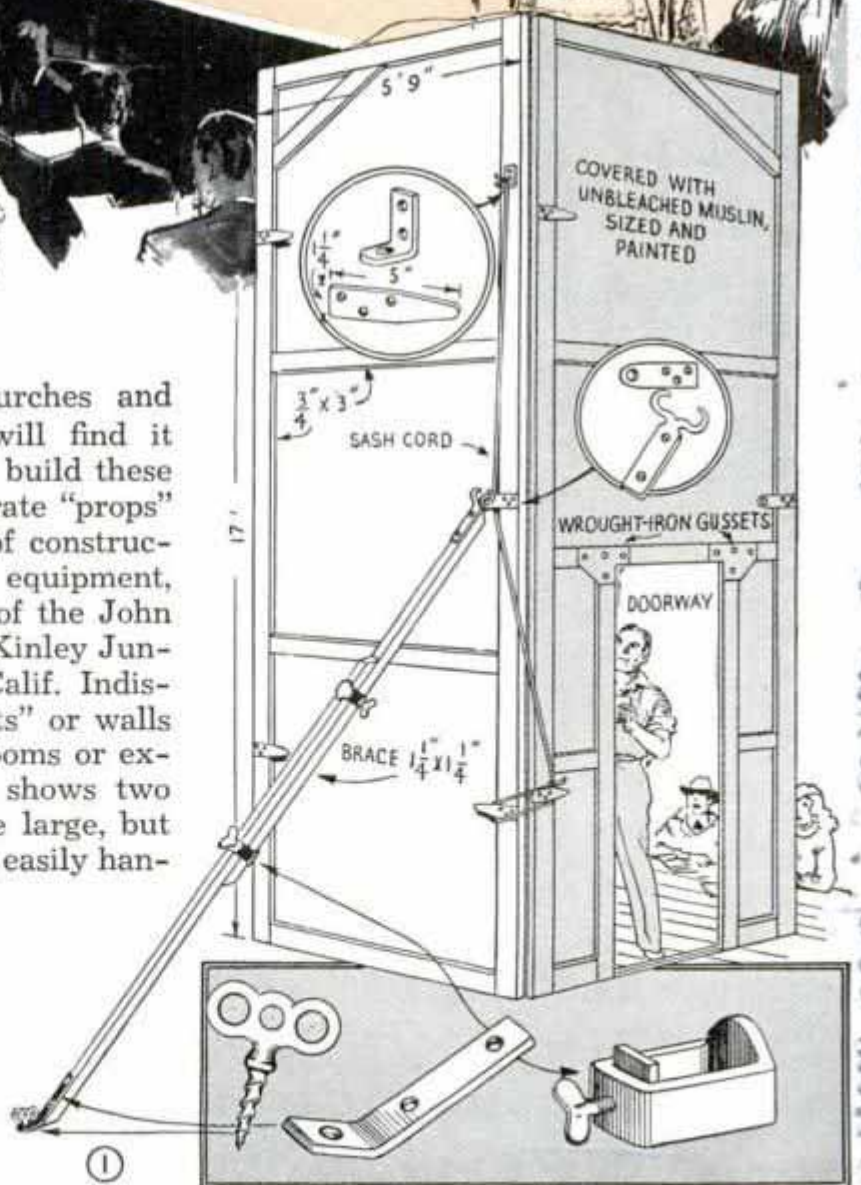
When doing odd jobs of painting around the home, this paint-can handle, made from spring brass or steel, will prevent getting paint on your hands. A split ring over the handle makes it adjustable.



Making STAGE SETS for Amateur Plays

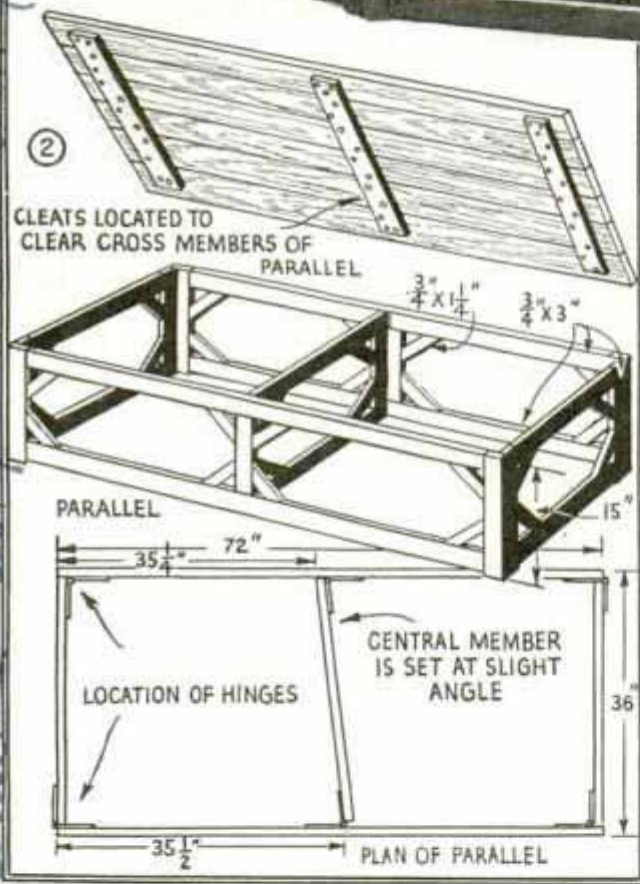
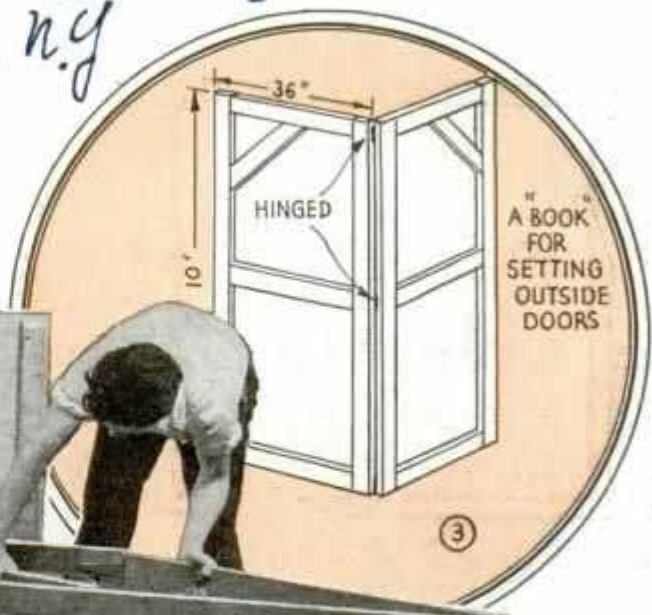
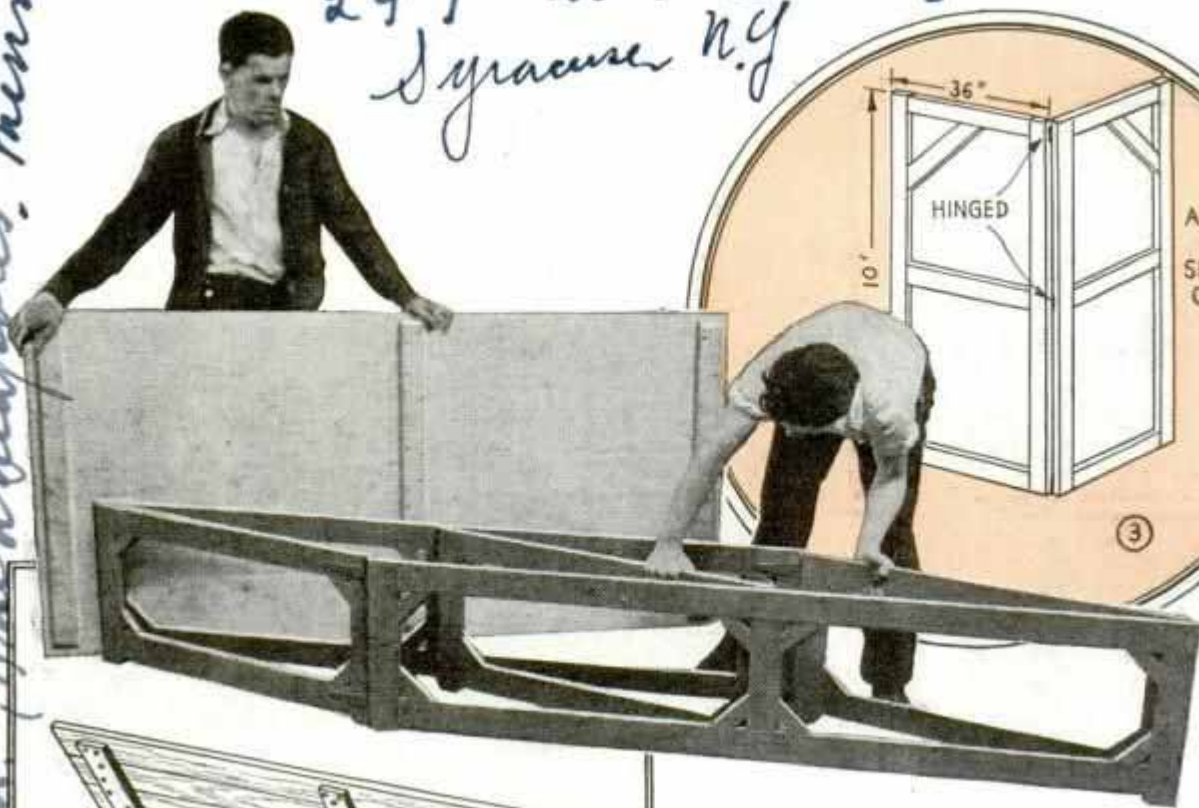


MEMBERS of schools, churches and neighborhood theaters will find it economical and instructive to build these stage sets when not too elaborate "props" are required. The simplicity of construction is well illustrated in the equipment, which was made by students of the John Muir Technical school and McKinley Junior High School of Pasadena, Calif. Indispensable to all stages are "flats" or walls for various settings, such as rooms or exteriors of a building. Fig. 1 shows two typical flats set up. These are large, but light in weight so that they are easily handled by one person. The framework is braced at one upper corner only, and is covered with unbleached muslin, which is glued and tacked to the wood. It is then sized, which stretches the cloth tightly, and painted as required. The flats are fastened



J. U. Clancy, author
247 N. Salina,
Syracuse N.Y.

James H. Chignior Corp. 1455 W. Austin Chicago
James City Scene Co. 289 N. 4th St. Minneapolis, Minn.

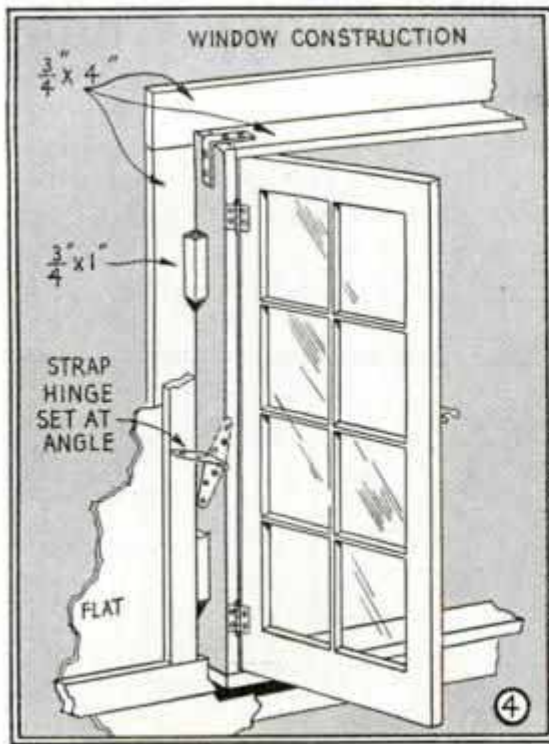


a sandbag to hold it to the floor, is shown in Fig. 8. This brace has an advantage over the standard type in that no screw is used to mar the stage floor. It is adaptable to the small flats as well as the large ones.

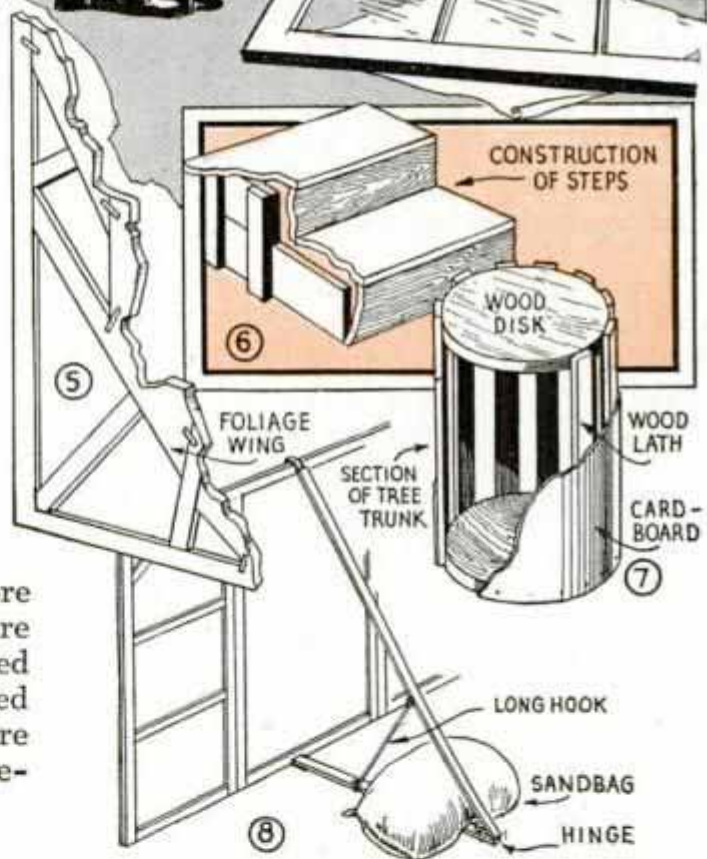
In addition to flats, the stage setting will require "books," Fig. 3. These are essentially two small flats hinged together and used outside of doorways so that the audience cannot see the bare stage beyond the scenery. Foliage wings, shown in Fig. 5, also have their place in outdoor settings. Windows and doors are so constructed that they can be assembled in place in a few seconds. Details of the windows are shown in Fig. 4. Sash and frame are built in a unit and set in the window opening in the flat. They are held in position by two strap hinges, which are set at an angle on the sides of the frame. When the free end of the hinge is pushed down, it tightens up on the side of the flat. To remove the window, the stage hand has but to raise the two hinge straps and lift out the entire sash and frame in a unit. The doors are installed in a similar manner.

together by means of a sash cord, which is run over brackets screwed to the side members of the framework. A standard adjustable brace supports each flat, a hook on the upper end being inserted into one of the brackets. A floor screw holds the lower end of the brace to the stage floor. It will be found less expensive to purchase all of the hardware items, which are standard equipment, than to attempt to make them. A convenient brace, which utilizes

Platforms of various heights are important items of stage equipment and consist of what is known as "parallels" and "lids," Fig. 2. In other words, they are merely a board platform supported by a parallelogram framework, which folds flat. There is, however, quite a trick in making the



parallel. The central cross frame must be installed at a slight angle, otherwise it will not fold up easily, and the hinges must be put on exactly as shown in the drawing. The parallels may be made in several heights as the individual case demands. The cleats on the lids, of course, must be located so as to clear the cross members of the parallels. Construction of steps is shown in Fig. 6. A series of these placed around a platform make a very effective rostrum or pulpit stand, and are removed quickly when changing a scene. Tree trunks, when something more definite than foliage wings is needed, are made up of a series of sections constructed as shown in Fig. 7. Wood strips are nailed to circular wood ends, after which they are covered with cardboard and painted to resemble tree bark.



How to Make Wax Crayons

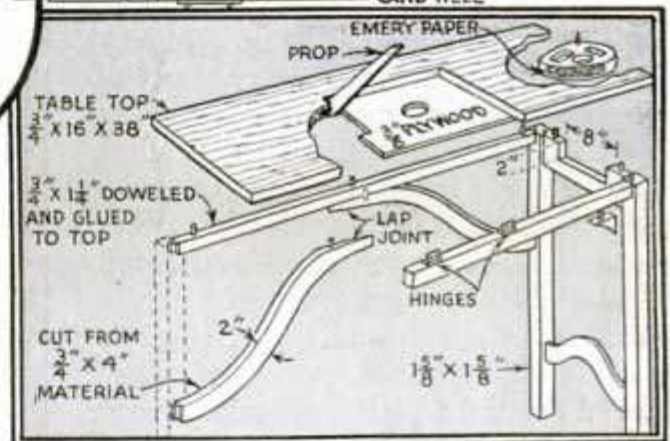
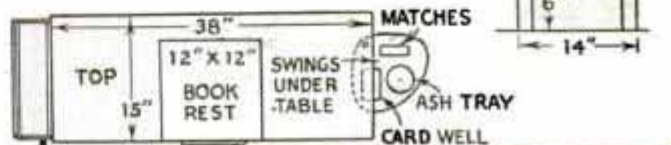
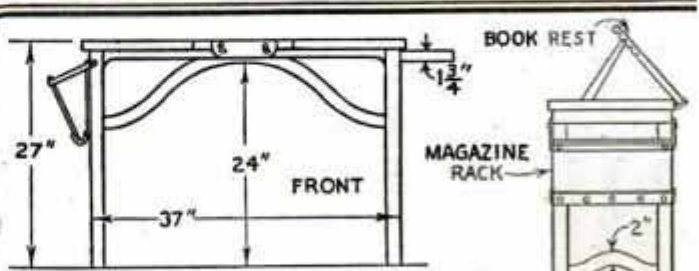
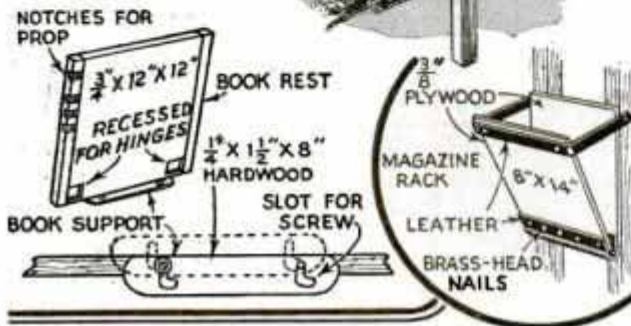
A good grade of wax marking crayons may be made in any desired color by melting together tallow, 90 parts, rosin, $2\frac{1}{2}$ parts and rosin soap, 1 part. While the mixture is molten, the coloring pigment should be stirred in. Almost any dry color may be used, such as prussian blue, red iron oxide or chrome yellow. The colored mixture is then poured into molds, which may be short glass tubes. Wax drawing

crayons may be cast from a composition made by melting together hard castile soap, 8 parts, beeswax crude, 6 parts, and crude spermaceti wax, $2\frac{3}{4}$ parts. While hot, carbon black, $1\frac{1}{2}$ parts, burnt umber, $\frac{1}{2}$ part and prussian blue, $\frac{1}{2}$ part, all by weight, are added and worked into the waxes until an even consistency is produced. The finished material is then poured into hot molds and cooled quickly by plunging into cold water.

A Reading Stand that Straddles Your Chair



making the curved braces for the rear legs, band-saw them from $\frac{3}{4}$ by 4-in. stock, making a tenon on one end, and cutting the other end at an angle for a lap joint. Use dowels and glue where indicated. Plywood is satisfactory for the magazine rack,



Straddling your favorite arm chair, this light table adds to the comfort enjoyed when reading, writing or playing solitaire, and it also has an ash tray within easy reach. An adjustable rest holds a book at any desired angle, and, when not in use, folds in a recess, flush with the table top. The recess is formed by sawing out a portion of the top and screwing a piece of plywood underneath, a hole being drilled in the plywood to permit insertion of the finger to raise the rest. Although not shown in the drawing, the plywood is screwed to wood strips on the underside of the table top to provide space for a $\frac{1}{2}$ -in. prop to fold under the book rest. The pivoted end, of course, must be rounded, and the prop must be shorter than the height of the rest. At the left end of the table is a magazine rack, and at the other end is a swinging shelf containing a card well, ash tray and a match box. The table top consists of two 8-in. boards glued together, sawed and trimmed to size. The legs are made in pairs, with cross members mortised and glued, the top cross member at the right end having a section cut away to receive the swinging shelf. In

which is supported by leather straps so that it will close up.

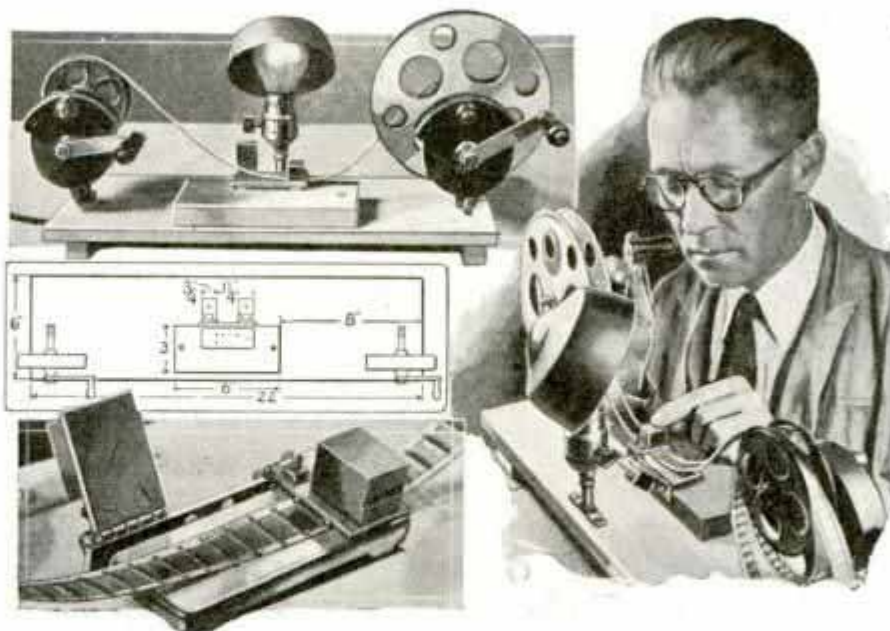
Tin Strip Opens Paste Boxes

Flat tin boxes containing paste or salve, unless provided with a patent clamp, are sometimes difficult to open. If a strip of tin is bent as shown, and then inserted in one side of the can before replacing the cover, the projecting end of the strip will, when pushed to one side, serve to lift the cover instantly.



Splicer and Rewinder for Movie Film

Two small bench-grinder heads, which are mounted on a wood base, are the essential parts of this simple home-movie splicer and rewriter. The splicer is one that comes with regular cementing kits and is mounted in the center of the base, the only addition being two hinged weights to hold down the ends of the film. These are small blocks of lead screwed to brass hinges, which are in turn screwed to the splicer. A small electric lamp mounted on the base to project above the splicer, illuminates the work when making a splice. To prevent tipping, small lead or iron bars, with felt glued on the lower sides, are screwed to the underside of the base. Painting the latter white facilitates locating the right place to make a splice.



Combining a Rewinder and Splicer for Home-Movie Film, This Homemade Apparatus Has Features That Make It Exceptionally Suitable

water, 7½ gal., and again stir until evenly mixed. For use, the concentrated solution is diluted with water in the proportions of 1 part of water to 15 or 20 parts of the solution. The diluted solution has a refreshing odor of pine.

Guard on Jig Saw Protects Fingers

To prevent the fingers from being cut on a jig saw, a finger guard, formed by cutting off the looped end of a wire paper clip, can be attached to the saw guide with liquid solder. The surfaces of the clip and guide should be roughened with a file before applying the solder.



Efficient Disinfectant and Deodorizer

An inexpensive preparation having disinfecting and deodorizing properties may be made by mixing to an even consistency red oil, (oleic acid) 6 lbs., triethanolamine, 3 lb., and pine oil, 30 lbs. To this soapy mixture, slowly stir in water, 5 gal., after which 60 lbs. more of the pine oil is added while continuing to stir. When this is evenly mixed into a milky solution, add

Diffusing Light of Photoflood Lamps

Home photographers will find that the appearance of their work can often be improved greatly if the photoflood or photoflash lamps are equipped with reflectors, and a good diffusing material to soften and spread out the light. The new Cellophane cloth, which can be obtained at most department stores, has been found an ideal material for this purpose. The cloth is made in a basket weave, and while not transparent, it is very translucent, so that the exposure need not be changed from that used when the light is not diffused. The Cellophane is easily attached to the lamps with spring paper clips.



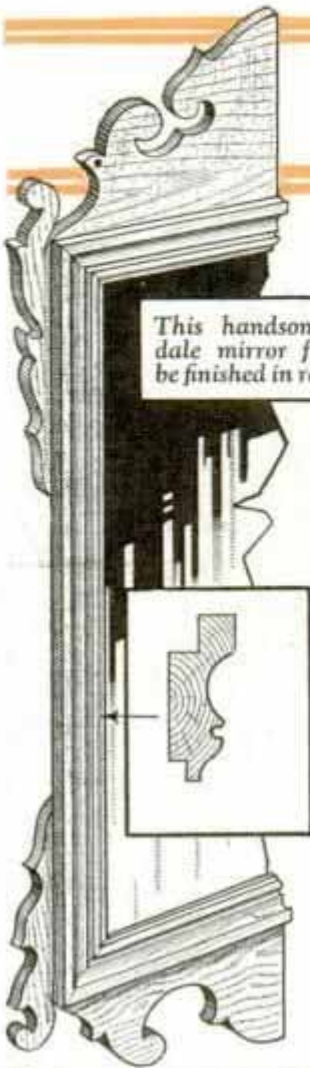
Iodine stains can usually be removed by soaking the fabric in milk and occasionally rubbing the spot.

Advance Solvents & Chemicals Corp. 28th and 5th Ave. N.Y.C.
 Chicago Sales Corp. 40 W. 40th St. N.Y.C.
 Jno. Brandt & Bros. 110 W. 40th St. N.Y.C.

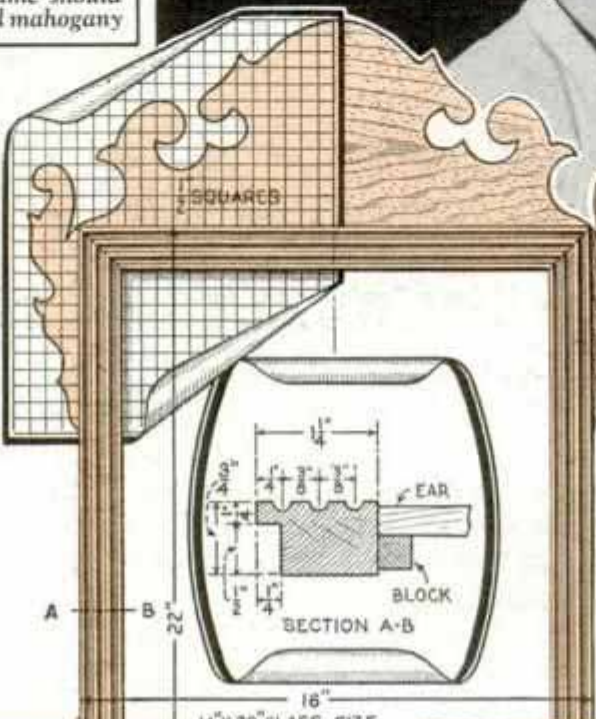
Esig's Products Old

2nd DD

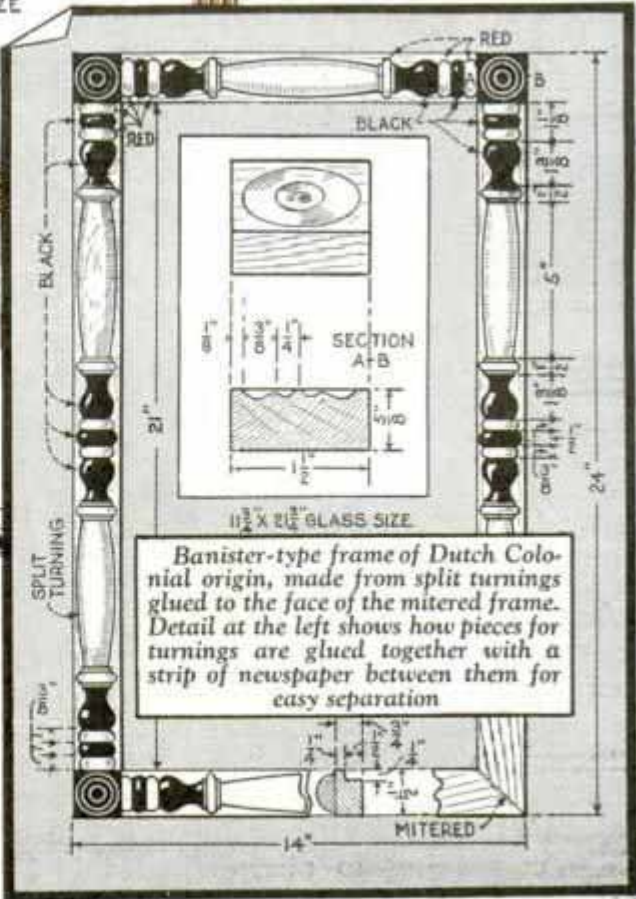
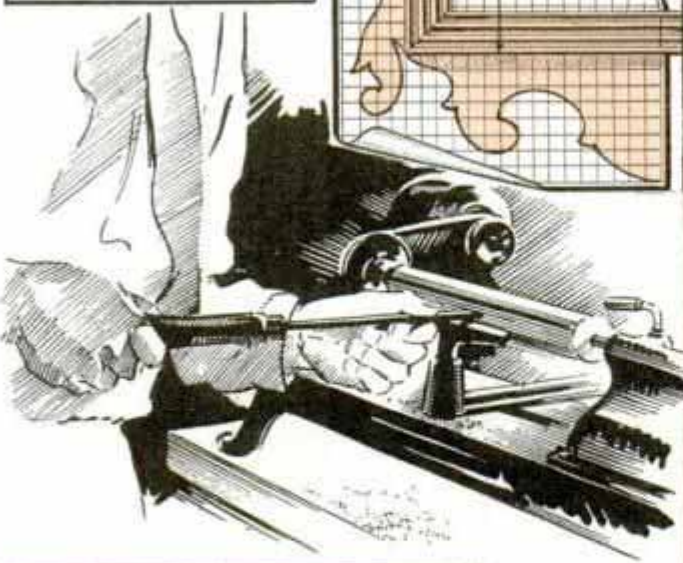
Colonial



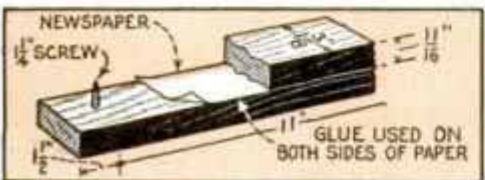
This handsome Chippendale mirror frame should be finished in red mahogany



The scrolled head and ears are cut from plywood and are fastened to the frame by means of glued blocks as shown in the circular detail

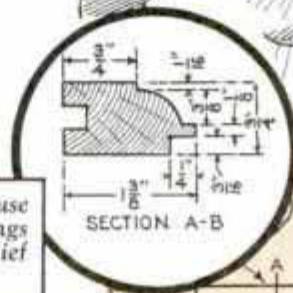
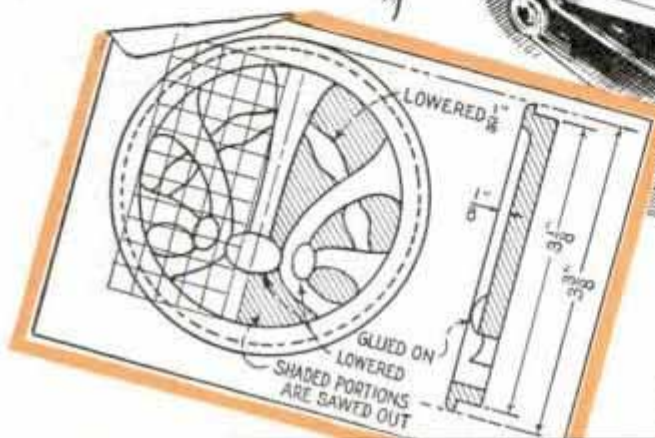
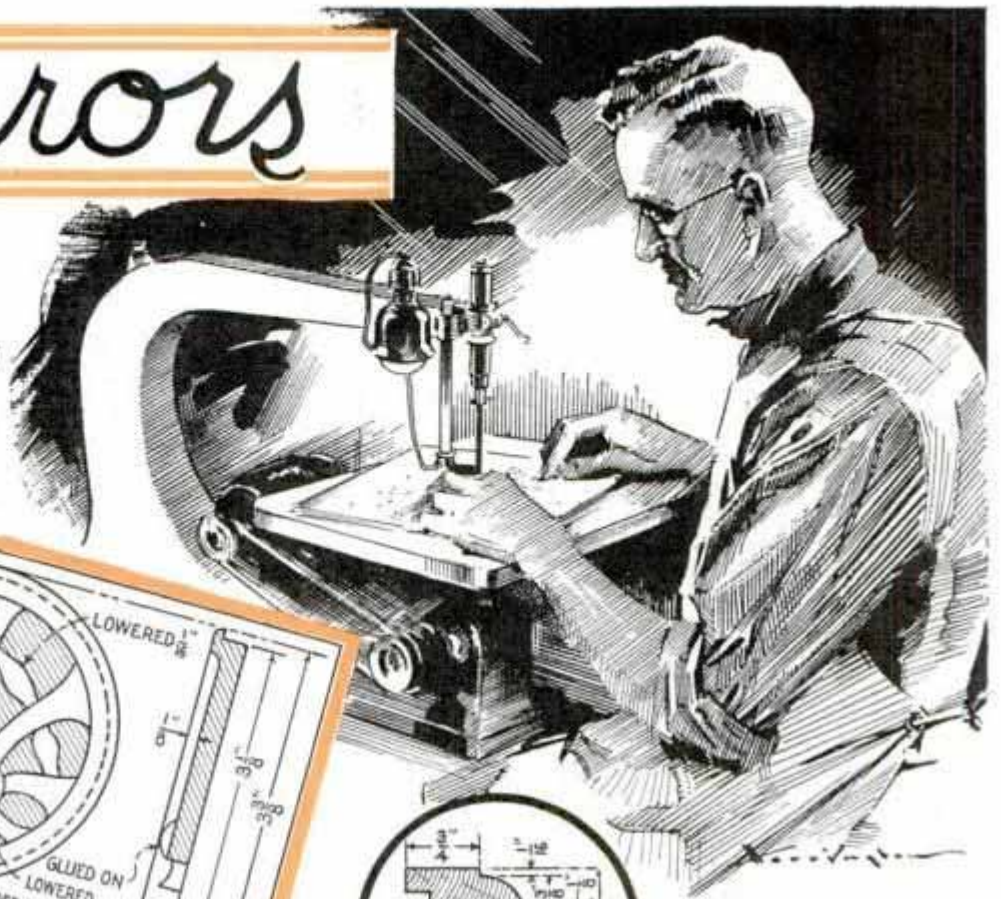


Banister-type frame of Dutch Colonial origin, made from split turnings glued to the face of the mitered frame. Detail at the left shows how pieces for turnings are glued together with a strip of newspaper for easy separation

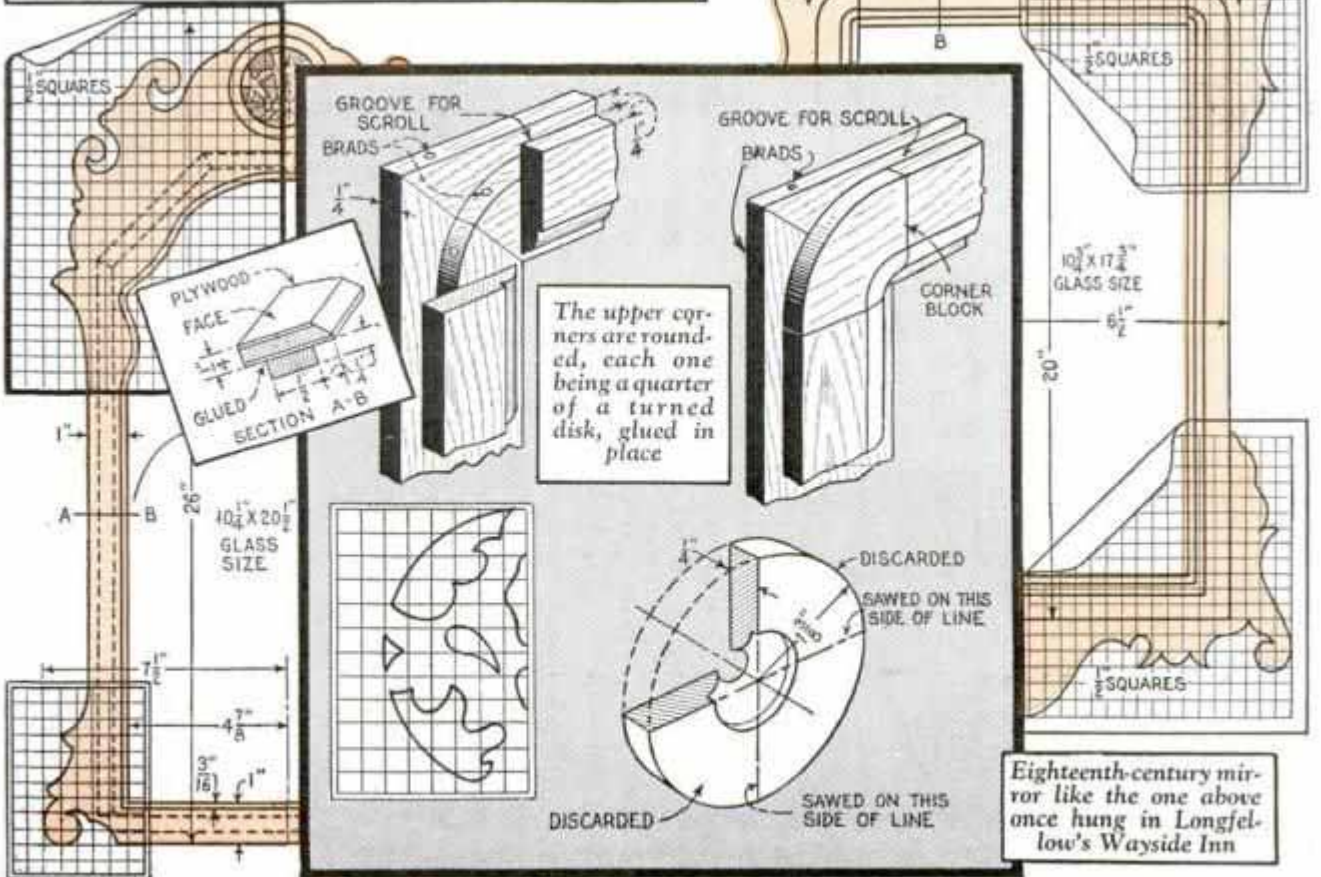


Mirrors

By R. O. BUCK
Lane Technical High School
Chicago

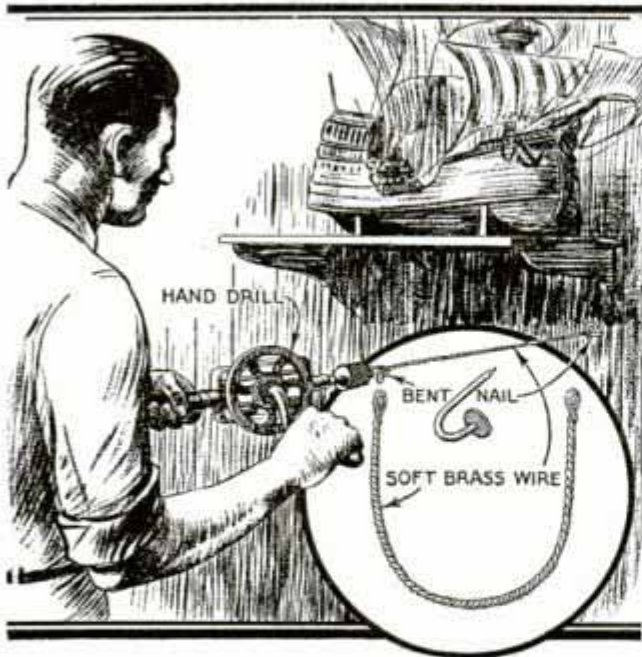


Queen-Anne style frame has cleats glued to back to house the glass. The medallion is turned on a lathe and the openings sawed out, after which it is glued over a circular hole. Relief carving helps to accentuate the design



The upper corners are rounded, each one being a quarter of a turned disk, glued in place

Eighteenth-century mirror like the one above once hung in Longfellow's Wayside Inn



Ship-Model Anchor Cables Made of Brass Wire Drape More Naturally Than When Cord Is Used

Realistic Anchor Cables for Ship Models Made of Wire

Models of ancient sailing ships, which often require cable instead of chain, will drape more naturally if made of soft brass wire, which is better than cord. To make the cable, use wire of a size equal to one strand of the finished cable and twist several strands together. This is best done with a hand drill as shown, fastening the wire strands to the drill chuck and to a screw eye or bent nail. A coat of black or dark brown paint completes the cables.

False Bottom in Baking Pan Prevents Cake from Sticking



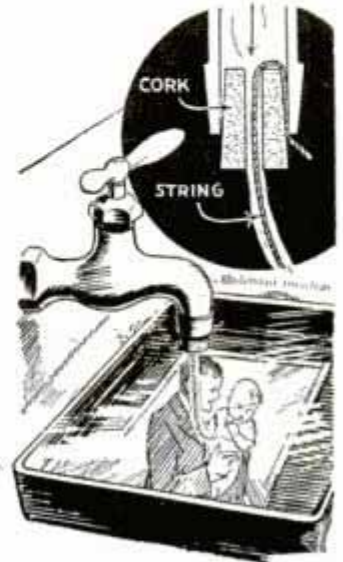
One woman who has experienced difficulty by having cakes stick to the bottom of deep baking pans, solved the problem by placing an aluminum disk on the bottom of the pan. The disk fits inside the pan, and is greased before pouring the cake batter. When the

cake is baked, it is turned upside down and the pan lifted off, after which the disk,

or false bottom, is removed from the cake by running a table knife under it, taking care not to damage the cake.

Preventing Splash When Washing Photo Prints under Faucet

Instead of letting water from a faucet splash on photo prints to wash them, it is better to put a string and a cork in the faucet as shown. In this way, the water follows the string, and not only can it be "led" to some extent, but splattering is prevented. The small compact stream of water also serves to keep the water in the washing pan in constant circulation.



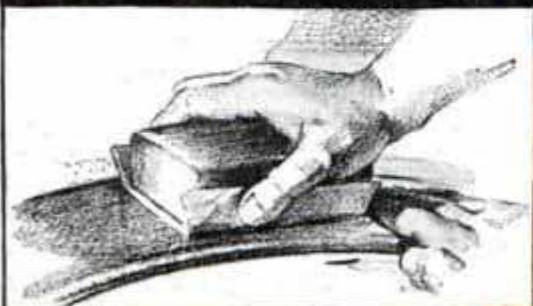
Buffers of Sash Cord Protect Canvas Covering on Canoe

Kayaks and lightweight canoes built of canvas stretched over a light framework with widely separated slats, can be made durable by putting sash-cord buffers on the outside directly over each horizontal slat. A number of such protecting cords on the bottom will prevent holes from being worn through the canvas when dragging the boat over a dock or beach.

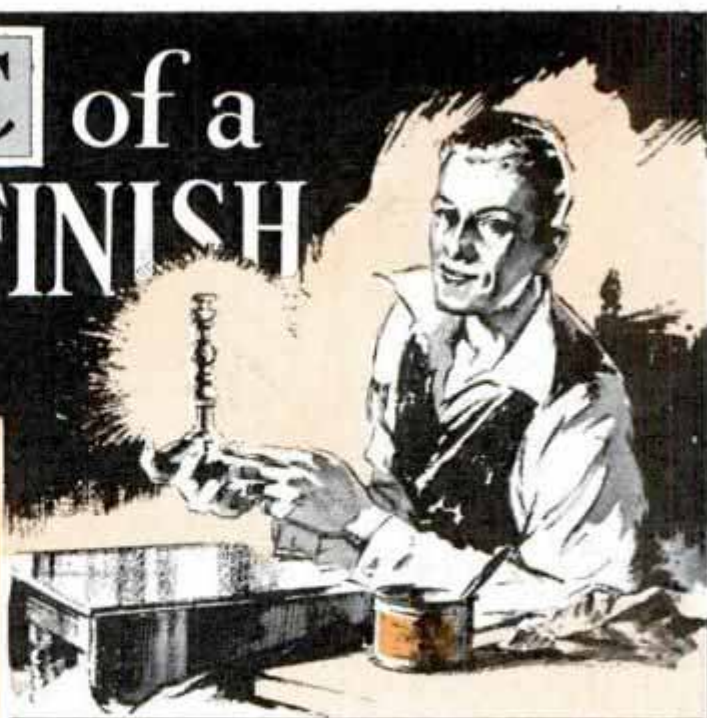


Sash Cord Attached to Sides and Bottom of Canoe Protects Canvas Covering against Wear

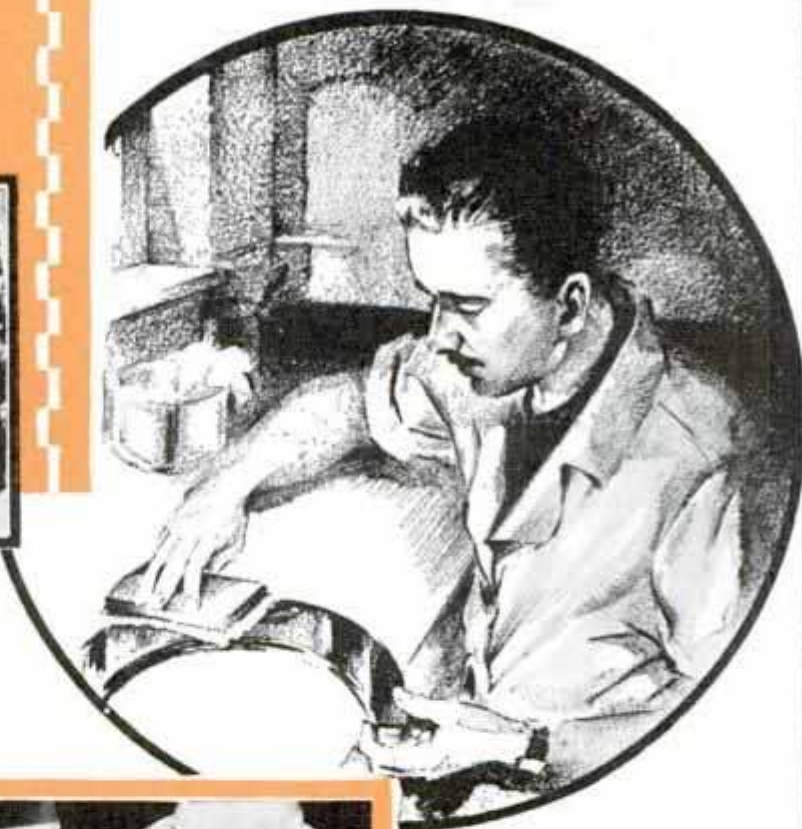
The **A B C** of a FINE WAX FINISH



One of the best ways of obtaining a rich, satiny wax finish is to first give the work a thorough sanding with No. 00 sandpaper, and follow this with No. 4-0, always rubbing in the same direction as the grain of the wood



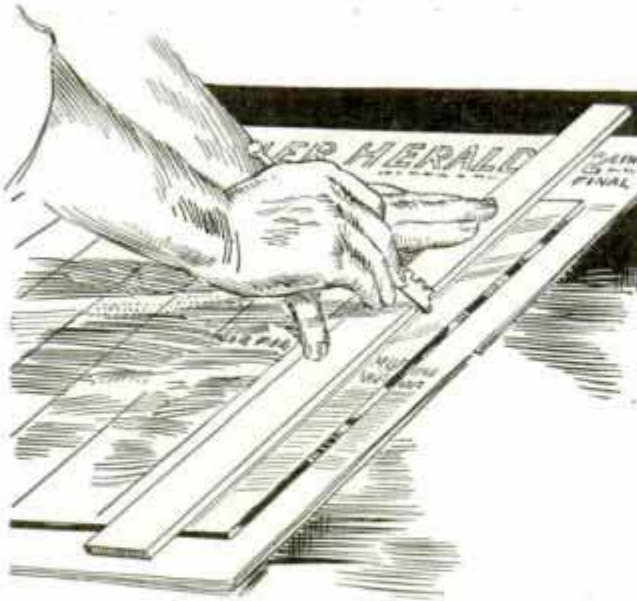
Second. The filler, which has been colored with a stain, is applied across the grain with a brush, and then allowed to stand 15 min., after which the surplus is wiped off with a cloth



On the right is shown a sample of the finished work, which, in this case, is a wooden bag handle. This particular job is of gumwood, or Southern California eucalyptus. Wax finish is applicable to practically any wood, which may be stained in mahogany, natural wood, weathered oak, cherry or other tones of your choice



Third. After the stained work has stood for 24 hrs., use a good grade of wax, which, like the filler, is applied across the grain, allowed to stand from 3 to 24 hrs., and wiped off. The work is then polished, a shoe brush being effective for this purpose



Heading and Column Lines of Newspaper Used as Guide Lines in Cutting Window Panes so That Edges Are True

Column Lines on Newspaper Aid in Cutting Glass

To aid in cutting small panes of glass, lay it over a sheet of newspaper so that the top edge is parallel with the heading line. Then cut the glass in the regular way, holding a straightedge parallel with a column line. Repeat this procedure for each cut made in the glass, and the edges of the pane will be perfectly true.

Cold Tea Fertilizes House Ferns

One woman who had unusual success in growing potted ferns, declares that the only attention given the plants is to pour cold tea over them every few days. The tea is not measured, but may be that which is left over from a meal.

BEAUTIFY YOUR GARDEN NOW



by building trellises, arbors and arched gateways. Or, perhaps you want a substantial, wooden lawn chair. And, there is nothing like an ornamental wood fence to improve the appearance of your backyard. Also, decorative window shutters are an appropriate addition to a home surrounded by a well landscaped garden. Popular Mechanics' collection of blueprints will give you many practical ideas along these lines.

Popular Mechanics 400 Blueprints

include plans for boats, models, toys, furniture, woodworking projects, as well as home-made machines for the workshop and various kinds of metal work and craft work.

Price of blueprints is 25 cents each or 6 for \$1.00. Address Blueprint Department, Popular Mechanics Magazine, 200 East Ontario Street, Chicago, Ill.

SN 636—RIDGE ROOF ARBOR AND GATE: Easily made of standard wood stock.

SN 637—CIRCULAR ARBOR AND GATE: Another beautiful style that is popular.

SN 639—FIVE LATTICE DESIGNS: Trellis types that are adaptable to any garden.

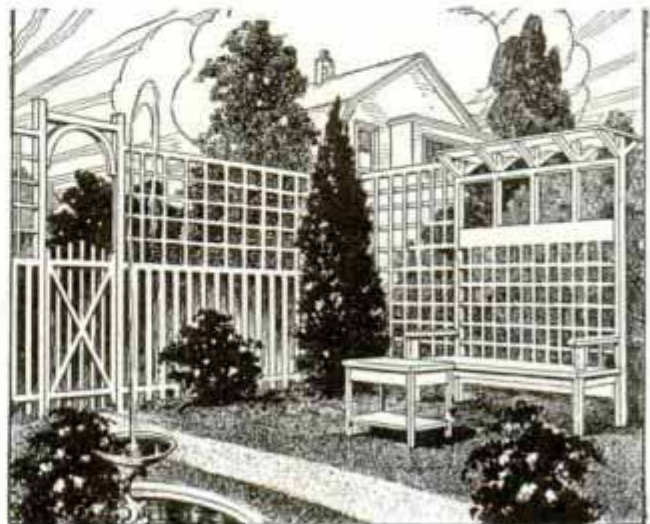
SN 715—ARBOR AND TRELLIS: A highly decorative garden unit that is easily cut and assembled.

SN 640—FIVE ORNAMENTAL WOOD FENCES: Artistic designs that can be made any length desired.

SN 635—HOW TO MAKE WINDOW SHUTTERS: Besides detailed construction hints, print includes 12 clever cutout designs.

SN 631—CONCRETE BIRD BATH: A 28-in. circular bowl mounted on a pedestal.

SN 529—LAWN CHAIR: A useful addition to your garden; plain-sawed southern style.



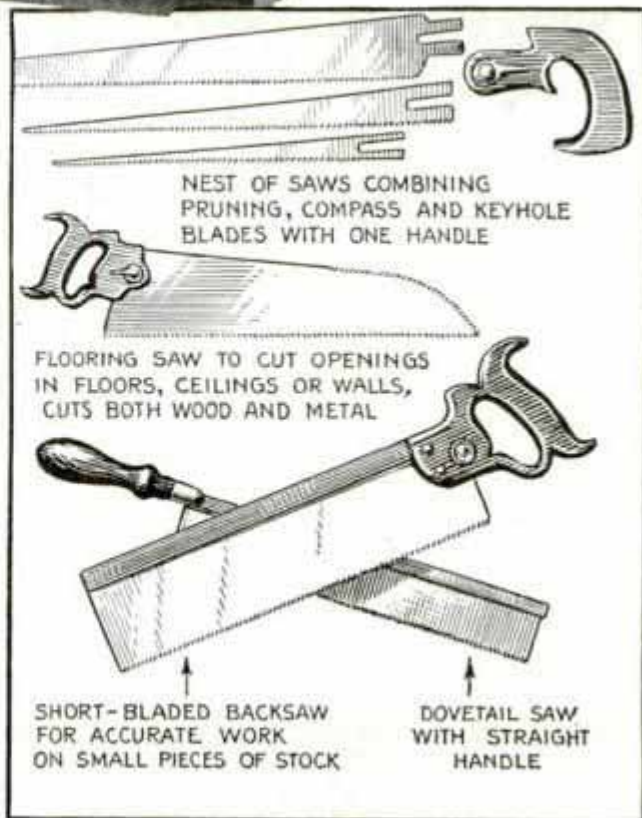


Using Your HANDSAWS



By W. CLYDE LAMMEY

CLEAN, accurate work with your handsaw is largely a matter of proper handling and selection of the tool best adapted to the work at hand. As an example, a saw with teeth filed for cross-cutting should not be used for ripping cuts lengthwise of the grain. It is essential that the teeth be filed and set for the purpose for which the saw is intended. Also, the manner in which the saw is held and started into the work determines, to a certain extent, how much or how little you are able to accomplish with it. When using either a rip or a crosscut saw, the work of moving the blade through the wood is not done with arm action alone, but by an easy swing of both body and arm. This coordination of movement is the secret of fast, accurate work. Your eye should always be in line with the blade when starting the cut, for only in this way can the angle of the blade with the work be gauged accurately. Start the saw by steadying it with the thumb, which is rested against the side of the blade. Light, short strokes will start the teeth cutting. Properly starting the blade will avoid the necessity of twisting it to hold the gauge





COORDINATION OF MOVEMENT BETWEEN ARM-AND-BODY ACTION IS THE SECRET OF FAST, ACCURATE WORK ON THIN STOCK

FOR CROSSCUTTING, THE SAW SHOULD BE HELD AT AN ANGLE, ABOUT 60° WITH WORK

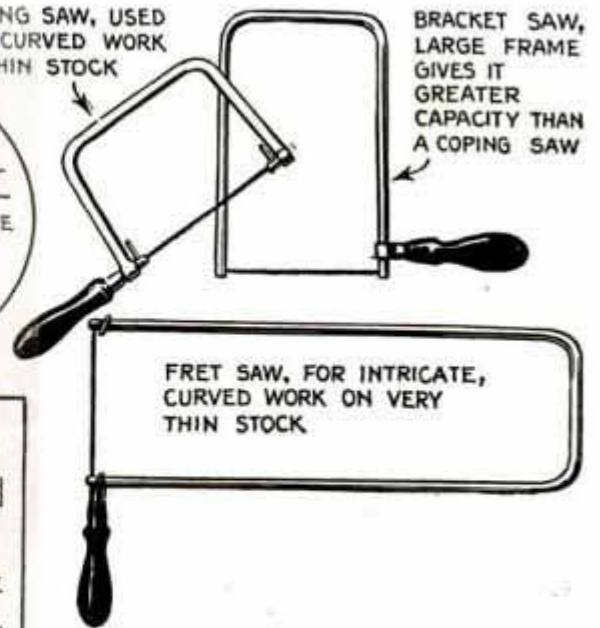
WHEN CROSSCUTTING OR RIPPING STOCK LESS THAN 3/4" THICK, AN ANGLE OF ABOUT 40° IS PREFERABLE

THE BLADE SHOULD CUT IN THE WASTE OUTSIDE OF THE PENCILED LINE



STARTING A CUT WITH THE THUMB PLACED AGAINST THE BLADE TO STEADY IT

COPING SAW, USED FOR CURVED WORK ON THIN STOCK



BRACKET SAW, LARGE FRAME GIVES IT GREATER CAPACITY THAN A COPING SAW

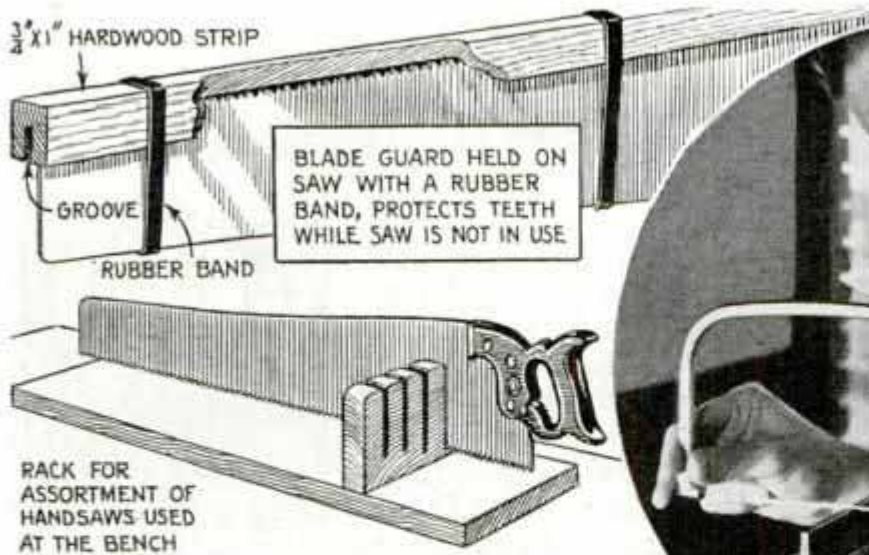
FRET SAW, FOR INTRICATE, CURVED WORK ON VERY THIN STOCK

line. This is especially necessary if you are using a saw with a very light set.

Your work should always be laid out so that the saw teeth cut outside the penciled gauge lines with the teeth on one side just cutting the edge of the line. To produce smooth work with a minimum of effort, it is essential that the saw be held at the proper angle with the wood. Ordinarily, this angle should be approximately 60° with the work. However, if you are crosscutting or ripping soft wood less than 3/4 in. thick, the saw will cut much smoother when held at an angle of 40°. The greater the number of teeth in contact with the wood, the less the necessary angle with the vertical, assuming that the work is in a horizontal position. On any special saw-

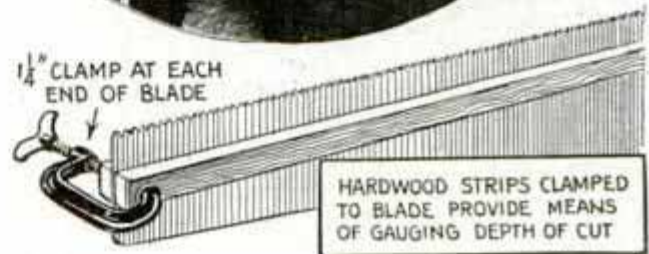
ing job, a few trial strokes will determine the angle at which the saw runs the best. Accurate line work with the handsaw cannot be done unless the work is supported at the proper height on a solid bench or table. Small, short pieces of stock are best handled in a bench hook, using a short backsaw. Sometimes it is handier to hold the work in a bench vise, especially when sawing down shoulder and cheek cuts of tenons.

The pressure applied to a saw blade should be governed by the type of saw, the kind of work, and the position in which the sawing is done. If you are cutting light stock in a bench hook, the weight of the backsaw is sufficient. As the saw moves forward, the direction of the movement, and the manner of holding the tool adds a certain amount of pressure aside from the weight of the saw. If the blade is properly sharpened it will require very little pressure of the hand to make it cut fast and smooth in any kind of wood. The strokes should always be straight and uniform. Rocking the blade and increasing the pressure just before reaching the end of the downward stroke will cause inaccurate work. The trick in making a true cut across the grain in hard or soft wood is using either a fine-tooth panel or backsaw, and holding the blade at an angle of about 30° with the horizontal. In this position, a greater length of the blade is kept in the wood, and aids materially in making an accurate



cut. The hand pressure should be just sufficient to keep the saw from chattering. Essentially, the same thing applies to compass and keyhole saws. These tools are used for cutting curves, and differ only in the width of the blades and the number of teeth to the inch. Due to the curved cut, these saws must be run with the blade very nearly at right angles to the work, and the pressure must be very light. When cutting circles of short radius, it is possible to use only the forward half of the blade with a correspondingly shorter stroke to prevent binding. Compass and keyhole saws may be purchased separately or as a "nest of saws." For cutting out sections of floors, ceilings or partitions, a flooring saw is generally used. With this tool you use the curved edge of the blade to start the cut on the line. Then the blade is turned over and the straight side used to finish to a corner, after which the procedure is repeated. The dovetail saw is used only for very fine, light work and is furnished with a straight handle, and a curved or offset handle for working on flat surfaces. Fitted with a depth gauge made from two strips clamped to the blade, the dovetail saw and the short backsaw can be used in making accurate depth cuts. Scrollwork, requiring short-radius curves on thin stock, can be cut easily with any one of several types of hand scroll saws. Bracket and coping saws differ only in the size of the frame opening, and, with the proper blades, may be used for cutting wood or sheet metal. The fret-saw frame is made especially for the very fine blades used in intricate work on thin plywood.

The important thing in using a miter



box is a straight, uniform stroke of the long backsaw, which is used in this device. A miter-box saw is not designed for fast cutting, hence it should not be crowded in an effort to speed up the work. If the blade is properly filed and set no hand pressure is necessary. If you use hand-saws exclusively at a bench, a few minutes time spent in making the bench rack shown, will save time in the frequent filing necessary to keep saws in condition if they are dropped carelessly on the bench top each time they are used. When saws are carried about in a portable tool box, a grooved blade guard will protect the teeth from damage. If saws must be stored for some time coat the blades with furniture wax to prevent rust.

Blackboard Eraser Used as Dry Window Cleaner

When cleaning windows with ordinary commercial preparations, which leave a dry abrasive powder on the glass, one may finish the task much easier and more effectively if the powder is removed with a blackboard eraser. The eraser wipes evenly and is easy to get into corners.



Embossed Book Covers Offer Varied Designs, Which May Be Utilized in Shading Mimeograph Stencils

Book Covers Utilized in Shading Mimeograph Stencils

Appearance of decorative mimeographed work is greatly improved by stippling or shading white spaces of line drawings, borders and open lettering on the stencil. Effects simulating engraving, half-tones, crosshatching, etc., may be had by placing the stencil over an embossed book cover and rubbing the surface of the portion to be shaded with a shading stylus or blunt-pointed lead pencil. Close inspection will show many variations in book covers, which can be copied on the stencil to obtain attractive shading effects.

Neat Trays from Tin Cans to Hold Small Parts

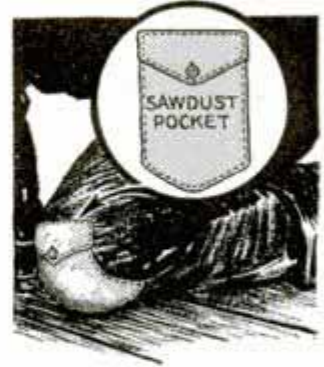


down the sides and turn over the edges as shown in the lower detail.

If only half of the tops are cut away when opening tin cans, they can be easily made into trays for small parts. Take the empty can, cut out half of the bottom and slit the side. Then bend

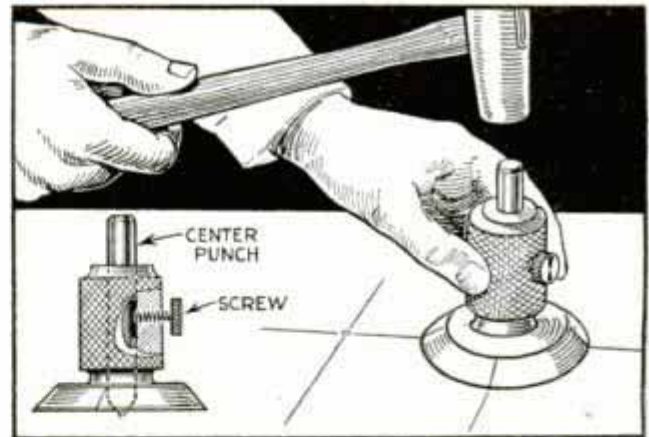
Sawdust Pockets Serve as Knee Pads for Carpenters

Filled with sawdust, a couple of pockets, made of denim and sewed to the knee portions of overalls, were used by a carpenter when working in a kneeling position on roofs and floors. Flaps, buttoned to the sides of the pockets, prevent the sawdust from spilling out.



Tool for Center-Punching Work

Turned from a piece of cold-rolled steel, this tool is used by a machinist to aid in getting a center-punch mark at the exact intersection of two lines scribed 90° apart on the work. After the tool has been finished, four guide lines are marked exactly 90° apart on the beveled portion, and a hole is drilled lengthwise through the center to take the punch. It is important that

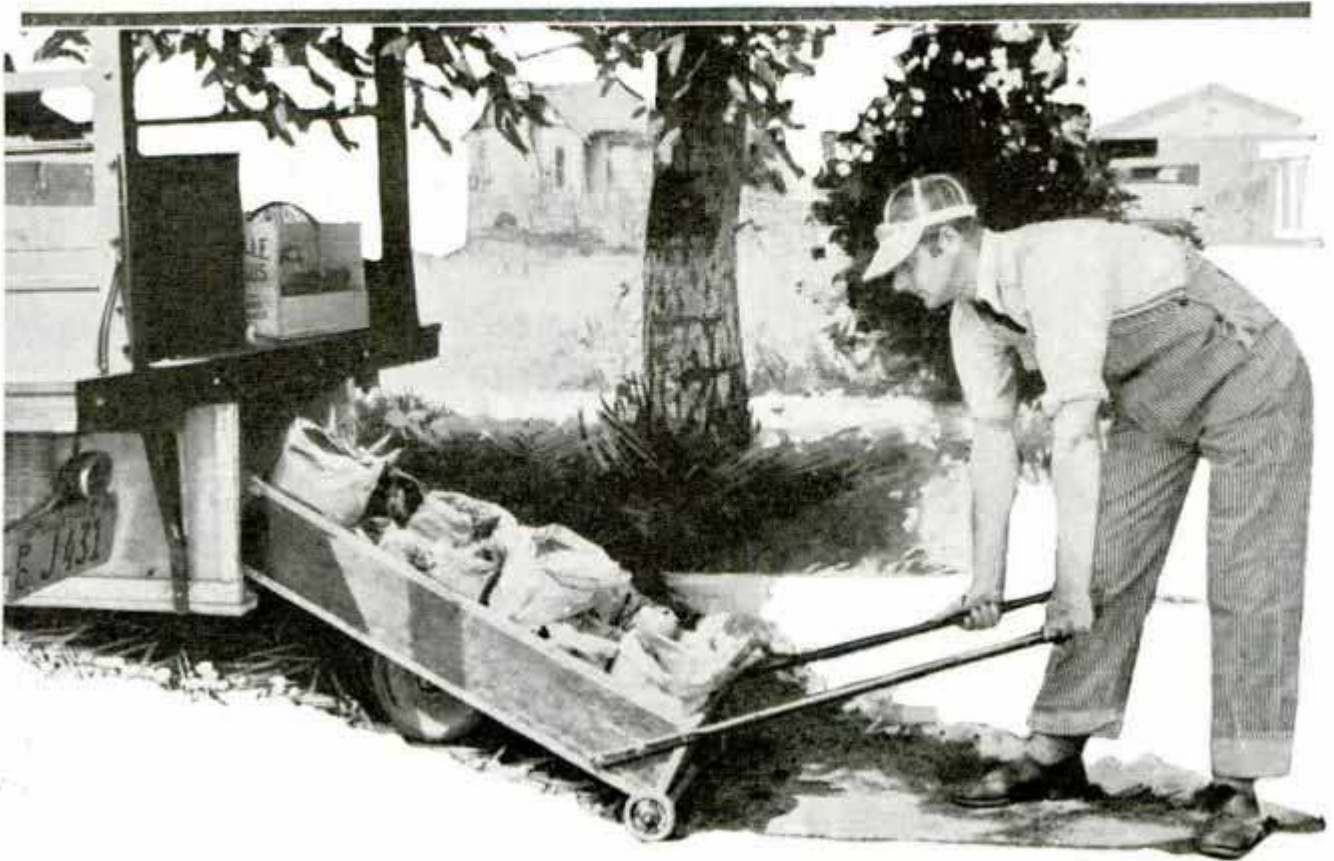


This Tool Is Handy to Accurately Center-Punch Work at the Intersection of Two Scribed Lines

the guide lines be scribed exactly central with the hole. This can be done accurately with the tool held between centers of an indexing head. The screw in the side of the tool is tightened to prevent the punch from dropping out when not in use. —Charles Kugler, Philadelphia, Pa.

☞ A little vaseline or cold cream rubbed on the hands before starting a paint job, will help make them easy to wash after the job has been finished.

Tender for Vegetable Truck Increases Sales



Realizing that housewives are more likely to buy fruits and vegetables if they can see them, one vendor constructed a small, rubber-tired pushcart, which he used as a tender to carry a display of his produce from the motor truck to the doors of his customers. The pushcart, when not in use, slides into a compartment built under the

body of the motor truck, and consists of a shallow box fitted with one large wheel, which is mounted on the underside slightly forward of the center, and two small ones at the rear end. A U-shaped handle, made from an iron rod and bolted to the cart at an angle, permits the latter to be pushed wheelbarrow-fashion.

Small Amounts of Plaster Mixed in Rubber Vacuum Cup

Plumbers and electricians will find a rubber vacuum cup a handy container in which to mix small amounts of plaster of paris for patching walls and ceilings. The cup can be bent or even turned inside out to crack loose the dried plaster after a job has been finished. They are convenient to handle and will make a useful addition to your tool kit.

❏ Instead of discarding sand points, used in driven wells, after they have become corroded, farmers will find that they can be cleaned with a stiff wire brush and kerosene, and used again. The points may be cleaned several times before they have to be discarded, depending, of course, on the amount of corrosion.





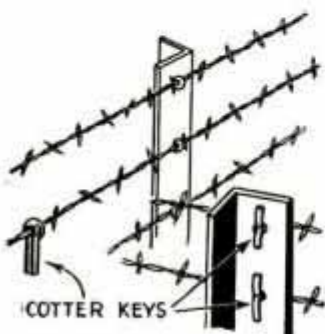
Set on a Frame Fitted with Casters, Fire Barrels Are Readily Pushed to Any Part of a Building

Fire Barrels Fitted with Casters

In one large warehouse, the fire barrels are mounted on hardwood frames fitted with heavy trunk casters so that in case of fire, the workmen can quickly push the barrels to any part of the building. It has been found that this method enables the men to get a volume of water to the fire much quicker than when the water has to be carried in buckets. Four casters on a rectangular frame give better support than three casters on a triangular frame.

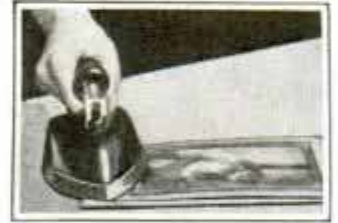
Cotter Keys Hold Fence Wire on Steel Posts

For fastening fencing to angle-iron posts, it has been found that cotter keys are much better than short tie wires, which



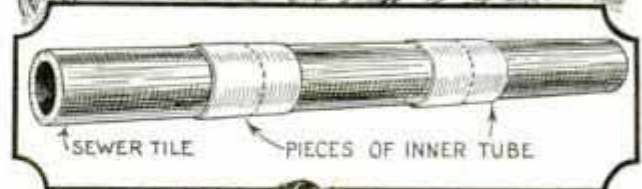
are often used for this purpose. The keys are spread and slipped over the fence wires, after which they are inserted into the holes in the posts. The keys are then clinched tightly as shown.

I have found that dry mounting tissue is better and more economical for fastening photos in folders than glue or cement, as it does not dry out and allow the photos to loosen. To use the tissue, lay a strip under the photo where you would ordinarily use cement. Then place a piece of blotting paper over the photo and press it with a hot iron to melt the tissue.—T. Perpoli, Chicago.



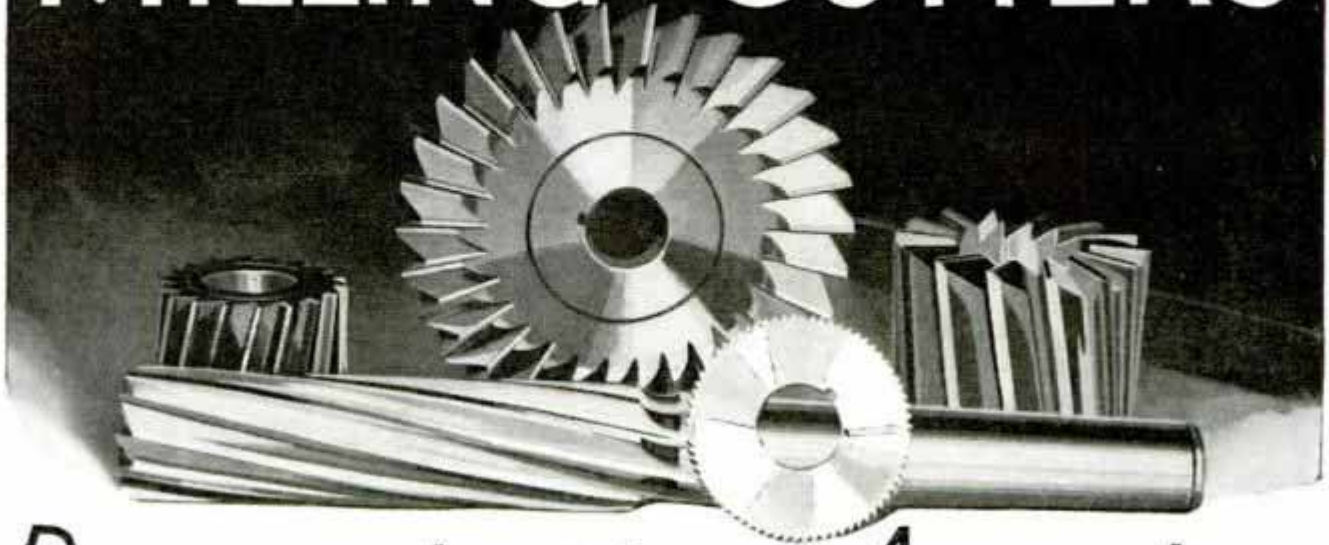
Tile in Temporary Sewer Joined with Old Inner Tubes

On a job of altering a building where a temporary sewer was needed, the contractor, instead of laying the sewer tile in cement, joined them with 12-in. sections of old inner tubes. The sewer, which was laid in a shallow trench, was in use about 30 days and was still in good condition when it was removed. The cost of laying and removing the sewer was only a fraction of what it would have been if the tile had been laid in cement, and it was much easier to take up.



Time and Labor Saved in Laying Temporary Sewer by Joining the Tile with Sections of Inner Tubes

MILLING CUTTERS

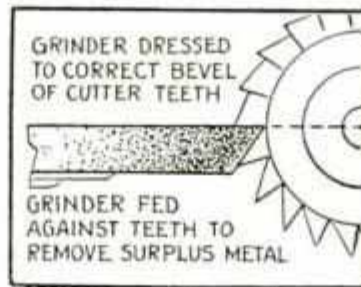


Reground without Annealing

by Fred B. Jacobs

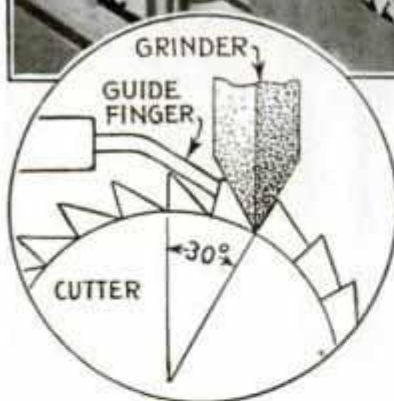
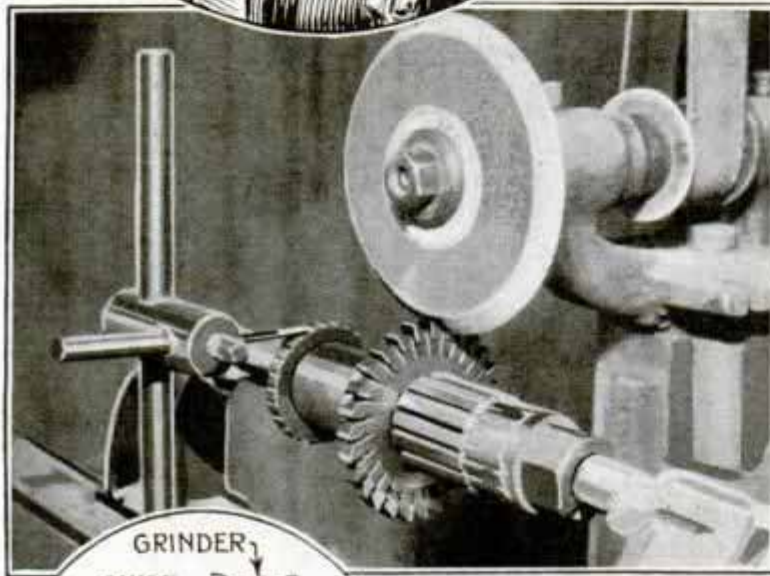
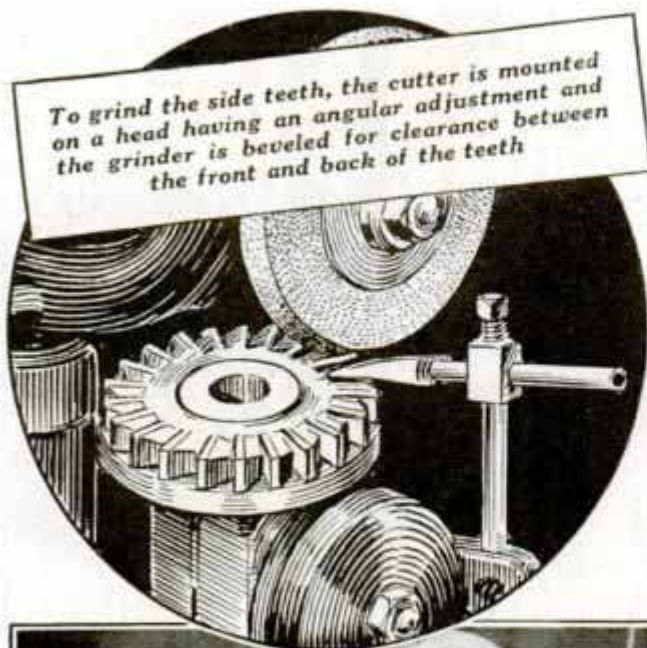
WHILE milling cutters, of carbon steel, were reground by first annealing them and then recutting the teeth, the use of high-speed steel cutters has made it advisable to regrind them without annealing, as this process often ruins the cutters. The following grinding process, which is used successfully in many large manufacturing plants, reflects the best practice, and can be carried out by any machinist who understands the operation of cutter-grinding machines. The principle of regrinding the teeth is shown in the detail at the right, a grinding wheel being trued to the correct bevel and fed down into the teeth, one by one, to remove the superfluous metal between them.

The first step is to grind a clearance on the sides of the cutter between the teeth and the center boss with a surface grinding machine, which is fitted with a magnetic chuck and a rotary table, the wheel head being fed back and forth by hand with the turnstile handles. The cutter is



Grinding the necessary clearance on the cutter sides between the teeth and the center boss. This is done readily on a rotary-table surface grinder, which is fitted with a magnetic chuck

located accurately by slipping it over a pin in the chuck center. In this operation, enough metal is removed to give a clearance ranging from $\frac{1}{16}$ to $\frac{3}{16}$ in., depending on the size of the cutter. The side teeth are then cut on an ordinary grinder, as in the upper circular detail, the cutter being located on a head that has an angular adjustment so that it may be set to get the correct angle. The wheel face is beveled



For grinding peripheral teeth, the cutter is held between collars on an arbor and correct spacing is obtained by using a guide finger. Detail at the left shows a setup for regrinding the teeth of spiral cutters

slightly to give the clearance angle between the front and the back of the teeth, the latter resting against a guide finger, which is flexible so that the teeth are readily located, one after another, and held conveniently in the grinding position.

In cutting the peripheral teeth, as shown in the photograph, the cutter is held between collars on an arbor provided for this purpose, the correct spacing between the teeth being obtained by using a guide finger with a slightly hooked end which drops into slots in a collar provided for

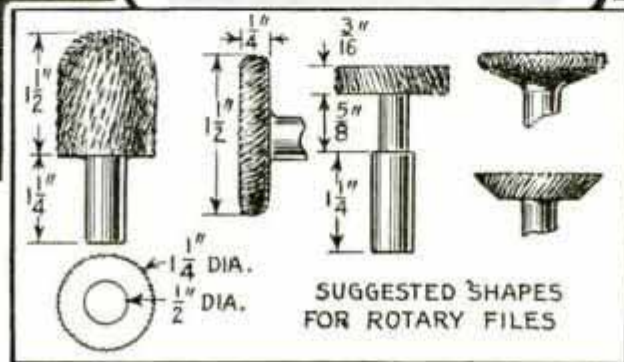
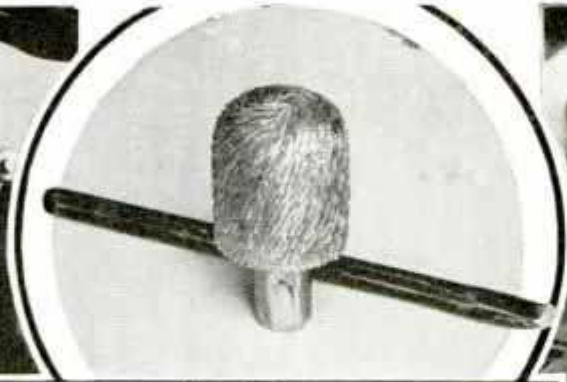
this purpose. See the lower, circular detail. It is necessary, of course, to provide a number of collars with different spacings to accommodate various cutters. On first thought, it would appear difficult to recut the teeth of spiral cutters, but the operation is comparatively simple if the cutter is set up correctly. The guide finger, in this case, is not flexible, and is brought to bear against the front of the tooth. The grinding wheel must have a double-angle face of about 30° at the back, while the angle at the front must be great enough to finish out the tooth correctly, and will vary with different teeth. Success or failure depends, in a great measure, on the

grinding wheels, which should be medium grade, 46 grit, $\frac{3}{4}$ in. thick, and from 6 to 8 in. in diameter, although the grade may vary, depending on the rigidity of the machine and other local conditions. However, by experimenting with wheels of various grades, those can be selected that give best results. The surface speed of the wheel may vary anywhere from 4,000 to 5,000 ft. per min. Moderately light cuts must be taken to avoid burning the work, but in grinding high-speed steel, a comparatively deep cut can be taken without burning. The wheels must be trued in a manner to keep them open so that they will cut freely. This can be done with a star-wheel dresser or a mechanical dresser incorporating an abrasive wheel, which is held at an angle against the grinder. The cutters are ground dry in every instance. It might seem that water or other coolant would help keep

down the heat, but experience has taught that dry grinding of high-speed steel is practical.

¶ Enamel letters that are used in putting the name of a firm on glass are usually cemented in place with a mixture of oil and white lead, which can be softened with ordinary paint remover so that the letters may be gently pried loose. It is generally necessary to leave the paint remover on the letters for an hour or so before they can be removed.

Homemade Rotary Files for Carving Wood



Small rotary files of various shapes are exceptionally handy for roughing out irregular shaped pieces of wood and can be made in your own shop if you have a lathe fitted for metal working. If not, you can have the files turned to shape in a machine shop at small cost. After the metal has been turned, the teeth are cut with a sharp cold chisel, and the files hardened. Exact dimensions are of little importance, except

on the shank, which should fit your drill-press routing attachment. When cutting the teeth, clamp the work tightly between two hardwood blocks, with a third block underneath to prevent the blank from being driven downward. Then grind a $\frac{1}{4}$ -in. cold chisel to a sharp, rounding edge, and, inclining it in the direction of rotation of the file, cut a series of teeth leading obliquely toward the rounded end. Make the teeth swirl in toward the center of the end. —E. M. Love, San Gabriel, Calif.

Your Initials Burned on Shipping Crates with Blowtorch

When poultry and produce crates are returned to the shippers, identification among the various dealers is sometimes difficult because the tags are often lost, or painted names are destroyed. To eliminate this trouble, one poultryman uses a sheet-metal stencil and burns his initials on the crates with a blowtorch. The stencil is mounted on a wire handle, and the lettering is outlined with punched perforations.

Renewing Workbench Tops

When the top of a workbench becomes worn, it can be renewed with a covering of quarter-sawn hardwood flooring boards. The boards should be drawn tightly together and toenailed down, after which the surface is treated with linseed oil and then given several coats of cup grease rubbed on and allowed to dry.



Owners' Initials Burned on Shipping Crates with Blowtorch and a Sheet-Metal Stencil



Tracing Paper Fastened over Drawing with Rubber Cement Instead of Thumb Tacks

Tracing Paper Held over Drawing with Rubber Cement

When it is necessary to fasten tracing paper over a drawing, try using a little rubber cement at each corner of the paper instead of thumb tacks to hold it down. This will hold the paper securely and will not mar the drawing as the cement can be removed by rubbing it with art gum.

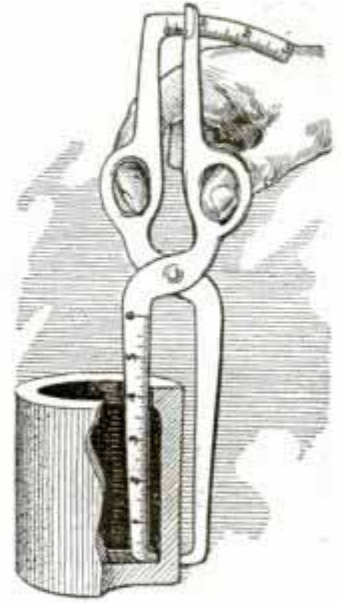
Removable Racks Hold Bicycles

Instead of building racks in various places about the factory grounds to accommodate employees' and messengers' bicycles, the manager of the factory made individual holders for the bicycles from lengths of $\frac{1}{2}$ -in. steel rod. These were bent to a U-shape, as shown, and the ends were pointed so that they could be driven into the ground easily, permitting the racks to be moved to different locations on the grounds as necessary. Use a padlock to fasten the bicycle to the rack.



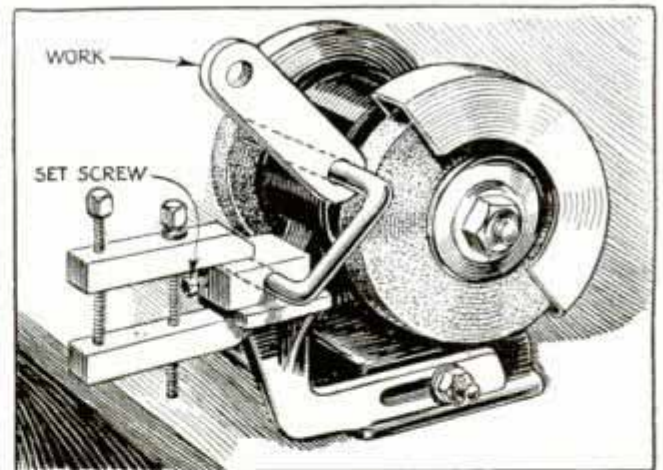
Combination Caliper for Inspecting Cored Castings

Here is a combination caliper that one machinist finds a time saver in inspecting cored castings. It is used to check the thickness of the walls and the depth of the casting in one operation. One jaw has a scale for measuring the depth of the casting, while one of the handles, which is made longer than the other one, is bent at right angles, and has a scale for measuring thickness of the walls.



Attachment for Grinding Radii on Steel Links

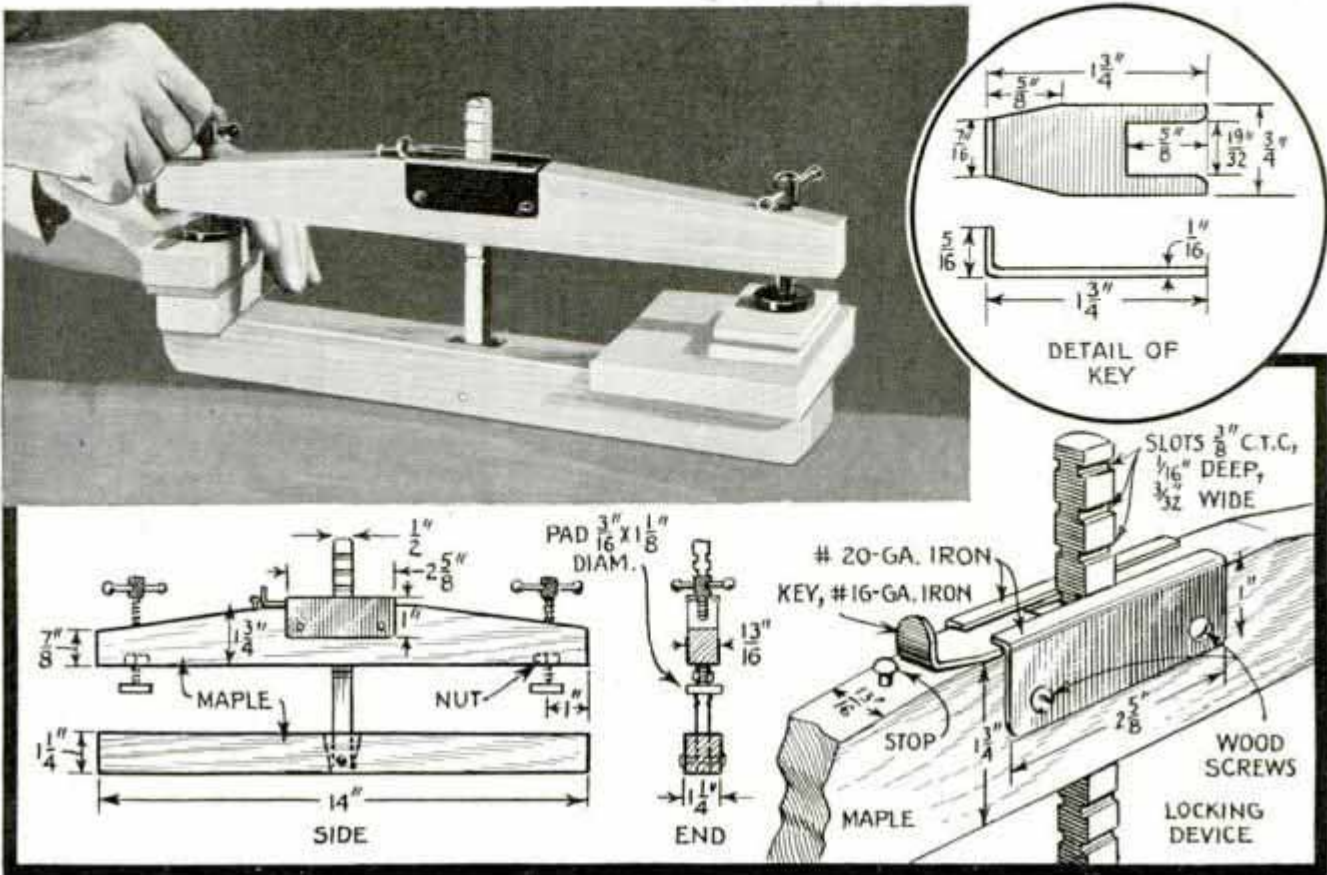
For grinding radii on the ends of steel links, mechanics in a small shop, where the equipment was limited, used the at-



Improvised Attachment, Which Clamps to Grinding Machine for Turning Radii on Ends of Steel Links

tachment shown, which is clamped to the grinder table. It is a steel block, drilled to take a U-shaped rod, and fitted with a set screw, which holds the rod. In use, the holder is adjusted so that the work, when slipped over the rod, will be ground down to the desired radius. If the rod is securely held in place by tightening the set screw, it is an easy matter to grind a large quantity of links to the same size.

Clamp Holds Two Gluing Jobs at One Time

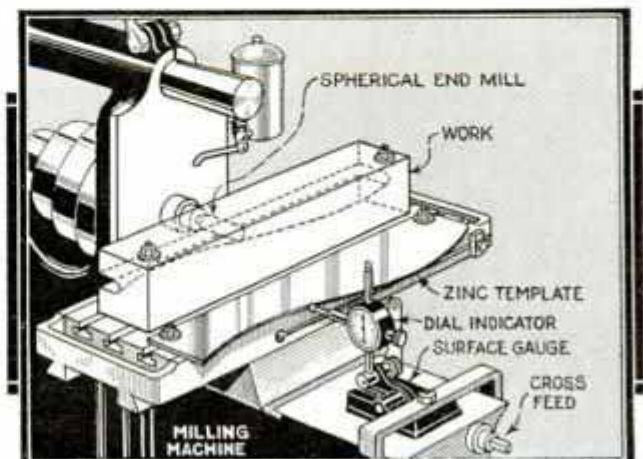


When several small gluing jobs must be done at one time, this pair of clamps will be found handy as two jobs of different thicknesses can be handled at one time. The jaws are fastened together with a square, hardwood piece, which is slotted on opposite sides and bolted loosely in a large mortise in the center of the lower jaw. A square hole in the upper jaw, through which the piece slips, is provided

with a locking device, shown in the upper and lower right-hand details, to engage the slots for spacing the jaws of the clamp. Screws near the ends of the upper jaw may be taken from broken vises or C-clamps, or they may be long bolts, screwed into nuts, which are mortised into the underside surface of the jaw. If bolts are used, they should be fitted with iron pads or disks, loosely riveted to the lower ends.

Template and Dial Indicator Aids in Irregular Milling

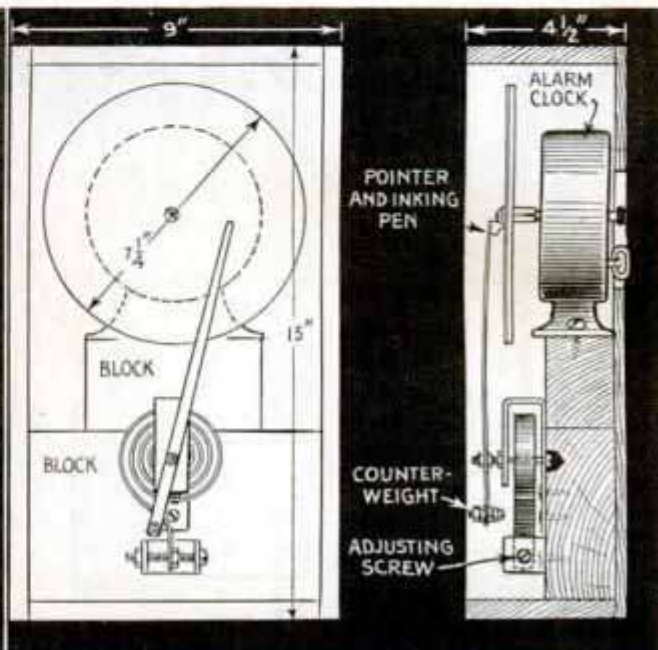
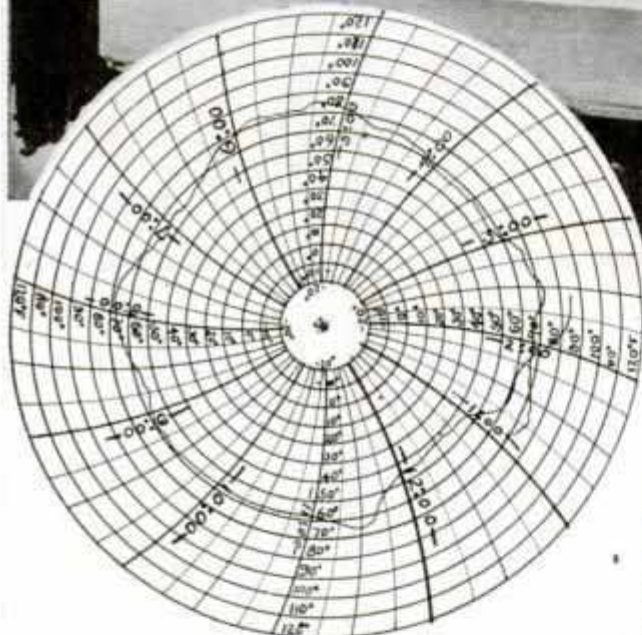
By using a template, cut to the desired shape of the finished work in connection with a dial indicator held on a surface gauge, irregular shapes can be milled accurately in a milling machine. The template is bolted in one of the T-slots in the machine table and the indicator is mounted as shown. With this set-up, a spherical end mill can be made to cut a groove in the work of the same contour as the template. The long automatic feed is engaged and the cross feed is controlled by hand so that the hand on the indicator remains stationary. If the work is done carefully, retouching with a file is unnecessary.



Irregular Work Cut in a Milling Machine by Using a Template and Dial Indicator

*Reader says they do not
 answer letter
 suggest also*

How you RECORDING



WITH this clock-driven recording thermometer, you can have a record of temperatures throughout the night, or, if you wish to check the effectiveness of your heating plant, or the insulation in your home, this simple instrument will not only do the watching, but it will write down the hourly results. The first thing required is a clock. Inexpensive alarm clocks are the simplest to work with, although any clockwork may be used with equally satisfactory results. After removing the glass from the clock face, the hands and dial are carefully taken off. On most clocks, the hour hand is attached to a piece of tubing slipped over the slender shaft to which the minute hand is attached. The rotating dial of the thermometer, to hold a paper chart

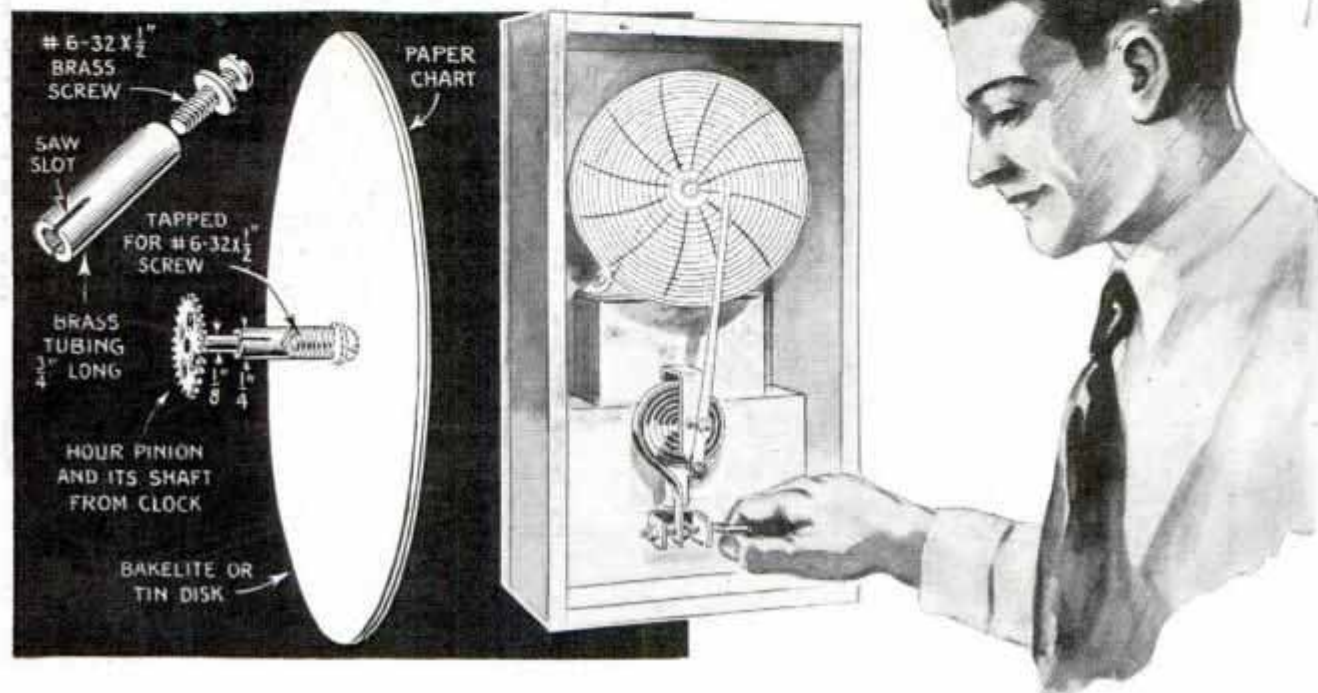
upon which the temperature is to be recorded, is attached to this tube in much the same manner as was the hour hand. This is shown in the left-hand detail on the next page. A piece of brass tubing, of such internal diameter that it can be pressed over the hour-hand hollow shaft, is cut to the length indicated and tapped at one end to take a brass machine screw, which holds the dial and the chart in place. The slot in the tube allows it to slip over the shaft readily and still bind tight enough to turn the dial without slipping. The dial is a disk of light sheet metal, such as aluminum, or better, bakelite. After the dial has been made, the next step is to build a case for the instrument and carefully locate the position at which the thermometer is to be mounted as shown above.

You are now ready to make the sensitive temperature unit, which is a strip of bi-metallic metal coiled into a spiral. This material is available at reasonable cost, and consists of two strips of metal, soldered together, one being nickel steel, which does not expand to any great extent when heated, and the other an alloy that is very sensitive to temperature changes.

5997 Mountain Ave Chicago
1/2 inch by 18 in. long.

W. M. Chace Valve Co
 4743 W. Lake Chicago
 or 1600 Broad Ave
 Allentown Pa
 by C.A. Crowley

can make a THERMOMETER



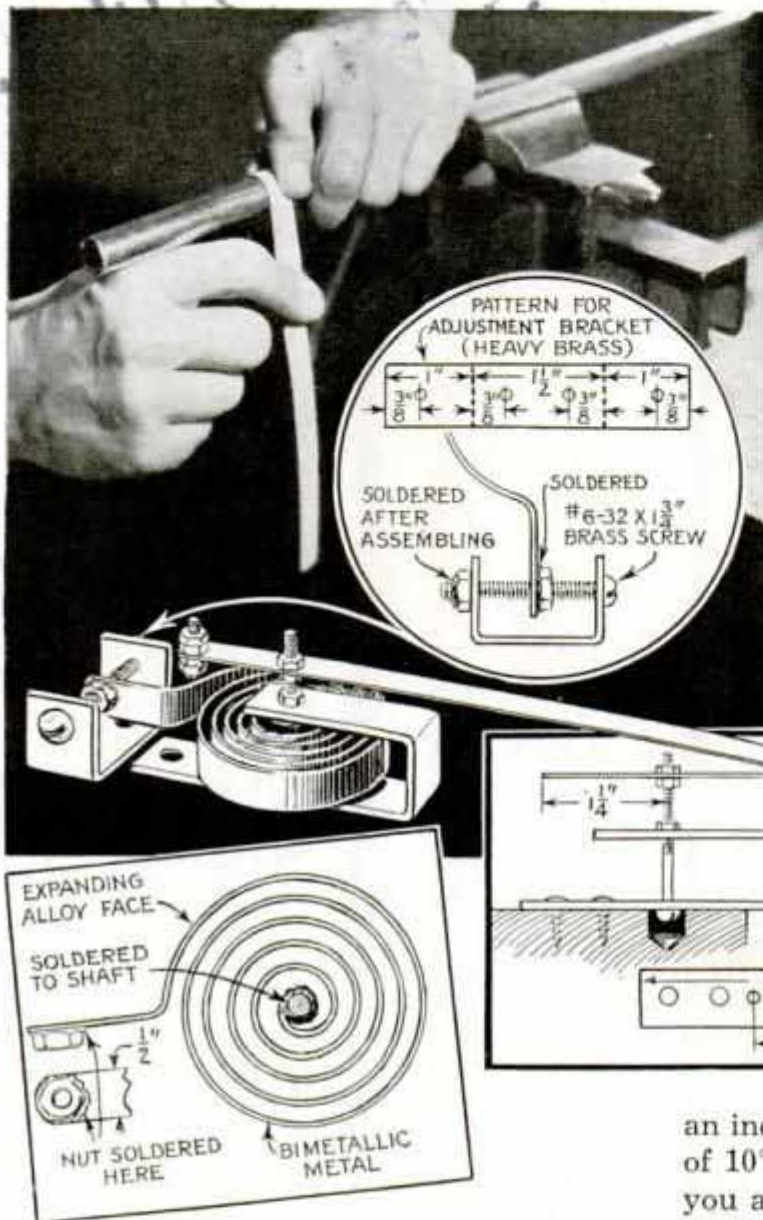
You will need a strip of this metal $\frac{1}{2}$ in. wide and about 18 in. long, as some experimenting and cutting down will be required to get the instrument to indicate accurately. The easiest way to make the spiral is to wind the strip of metal around a $\frac{1}{2}$ -in. iron rod. When released, the tight spiral will open up. When winding it, be sure that the expanding, alloy side of the strip is kept to the outside. If you are uncertain as to which is the expanding side, heat the strip cautiously over a flame and note the direction in which it curls, and then wind the spiral in the same direction. When this has been done, the ends should be bent as shown, after which the outside end should be drilled and soldered to a brass nut as shown in the lower left-hand detail on the last page.

The right-hand detail here shows a mounting bracket to hold the sensitive unit. The pivot screw is mounted in the bracket so that it turns freely. The sensitive unit is then soldered to the screw, after which the assembly is fastened to the mounting board in such a position that the end of the pivot screw is exactly $6\frac{1}{2}$ in. below the center of the dial and $\frac{1}{2}$ in. to

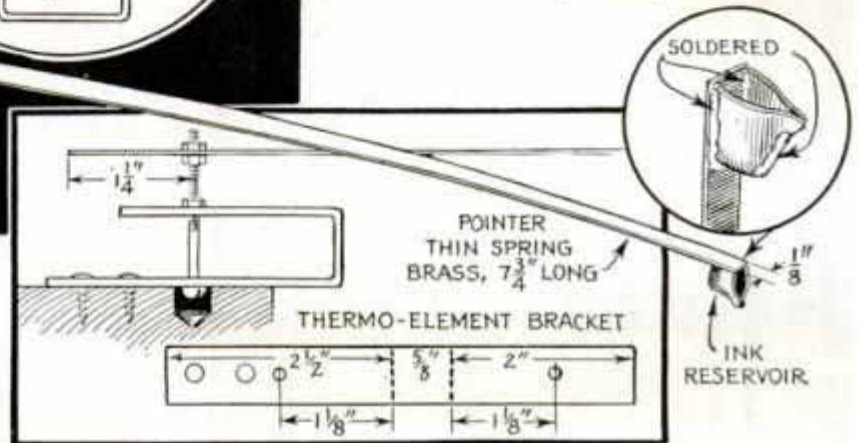
the right. The adjusting unit is next constructed as shown in the circular detail. The screw here is also left free to turn in the holes. The nut, which was soldered to the sensitive unit, is threaded onto the screw before pushing it through the other arm of the bracket. The holding nut may be put in place at this time, however, it should not be soldered until after all adjustments have been made.

The pointer is made next according to the details shown. It is $\frac{3}{8}$ in. wide at one end and tapered to $\frac{1}{8}$ in. The ink well is the only part which may prove troublesome. This also serves as a pen to write on the paper as the pointer moves it. The point of the well should be shaped as shown, but it should be free from burrs that might catch in the paper. The ink to be used may be ordinary red or green ink, 3 parts and glycerine, 1 part. The glycerine is to prevent evaporation. The pointer is mounted on the element shaft in such a position that its end is approximately in the center of the recording space, that is, halfway between the center of the dial and the right-hand edge.

After all of the parts have been made



do this, place the instrument out of doors if the temperature is low outside, or in an ice box with a good thermometer. After leaving it for about 30 min., quickly read the thermometer and mark the position of the pointer on the paper. The thermometer and the instrument are next put in a warm place and allowed to remain there for another 30 min. The temperature is again read, and the position of the pointer marked. With this information it is a simple matter to measure the distance moved by the pointer and figure out how many thirty-seconds of



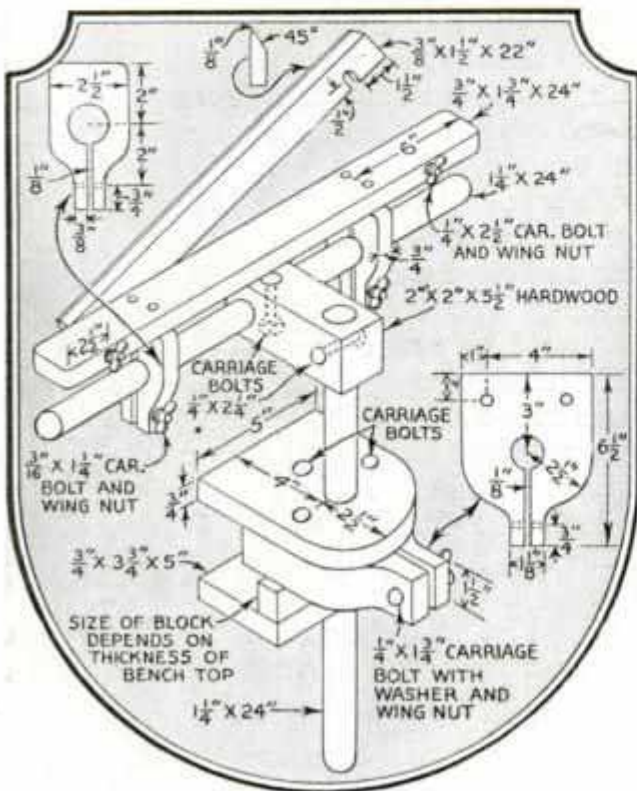
and tried out to make certain that they fit accurately, the sensitive element should be removed and placed in an oven and heated slowly to about 300° Fahr. When this temperature has been reached, the oven should be allowed to cool slowly without disturbing the element. This heating and cooling will need to be repeated three or four times before the unit is ready to use. Thermo elements of this type will not read accurately unless they are heat treated in this manner. After heat treating the unit, it may be installed into the case and given final adjustment. For this, a plain paper disk is placed on the dial, and the pen adjusted so that it will make an even line as the pointer moves slowly back and forth. Next, the paper disk should be calibrated, that is, it should be determined just how far the needle moves when the temperature increases 10°. To

an inch the pointer moves for each change of 10° in temperature. Having found this, you are ready to draw a chart for the instrument, shown on the first page. The spacing between the circles is the same as the distance the pointer moves for each 10° change in temperature. If this distance is too large, you may reduce it by cutting off part of the spiral.

When the chart has been drawn up carefully, you may have a printing plate made from it, and then have charts printed whenever they are needed. Each chart is good for 12 hours.

With a chart in place on the recorder, and the pointer held away from the paper so as to prevent ink splashes, turn the setting screw on the clock until the exact time to which the pen points on the chart is the same as indicated by your watch. Next read a good thermometer and turn the adjusting screw until the pointer of the recorder indicates the same temperature on the chart and your outfit is ready to make an accurate record.

Adjustable Maulstick Aids in Painting Models



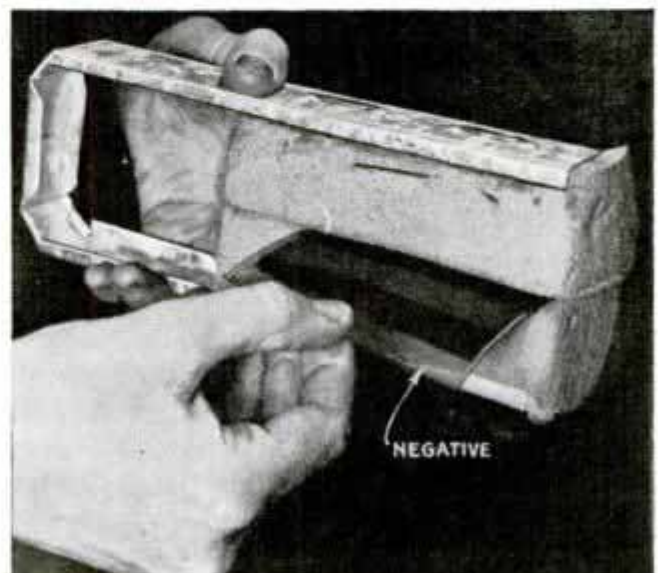
The difficulty of painting neat, straight stripes on models, owing to lack of firm support for the hand, is overcome with this adjustable maulstick. It not only assures a rigid hand rest at any convenient point, but also provides straight and curved edges as guides. Besides this, it will hold stencils for spraying details on a model. The base consists of an assembly of two wood blocks to clamp over the edge of a workbench top, and a wood clamp, or pinch clevis, the latter being used to ad-



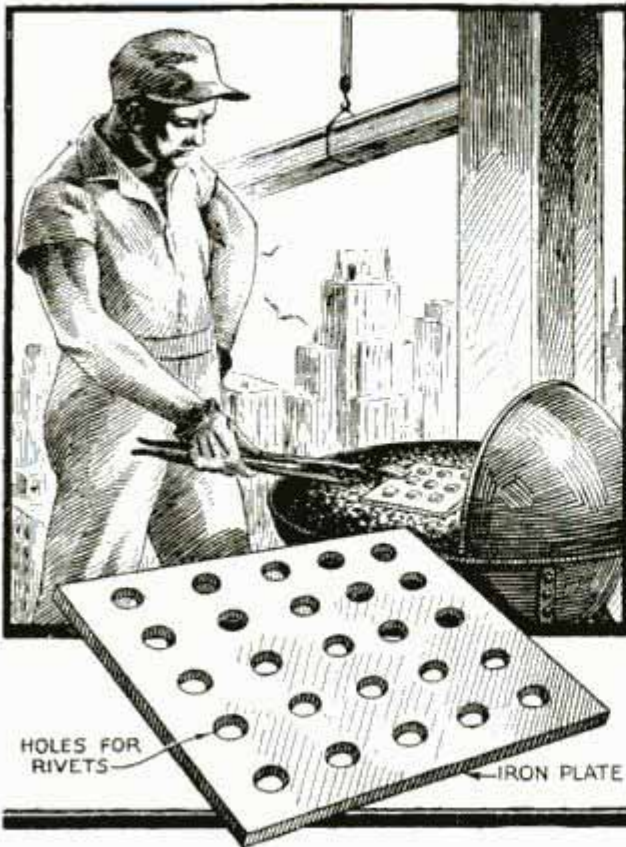
just a standard, which supports the upper assembly. A hardwood block bolted rigidly to the upper end of the standard carries a horizontal rod, to which is clamped a hand rest by means of two clevises similar to the one in the base. With this arrangement, the rest can be shifted crosswise or inclined for working on top of the model. To the ends of the rest, a straightedge is bolted, the holes in the end of which are cut out from the lower edge so that either end may be used as a pivot without removing the bolts from the rest. To use the maulstick, stand the model on the bench top or a box, and adjust the hand rest to a convenient height and distance from the surface to be painted.

Wet Photographic Negatives Dried with Rubber Sponges

To quickly dry wet negatives, one photographer draws them between two rubber sponges. These are held in a galvanized-iron handle bent to the shape shown. The edges of the handle are bent over to form shallow channels to fit the sponges, which are held in place by strong thread. This is passed through the sides of the sponges with a needle, and brought out through small holes, drilled in the top and bottom of the handle. The sponges should be moistened with water before using them.—W. Edward White, Plymouth, N. H.



☞ Glossy enamel will dry dull if enamel undercoater is mixed with the last coat.



Iron Rivets Heated without Burning the Heads by Holding Them in the Fire with Iron Plate

Iron Rivets Heated without Burning the Heads

One workman who heats iron rivets used in steel construction jobs, recommends holding them in the fire with a piece of $\frac{1}{4}$ -in. iron or steel plate in which a number of holes have been drilled. He claims this method allows them to be heated without any possibility of burning the heads, which do not come in direct contact with the fire.—Don Benn Owens, Jr., Dayton, Ohio.

Simple Device Levels Chalk Line

Provided with a swinging pointer, this simple device will be found handy for getting chalk lines level. It is cut from sheet aluminum and the pointer, which is weighted at the lower end, is loosely pivoted in place. If desired, a scale to show various angles may be used. When using the device, the line must be taut.



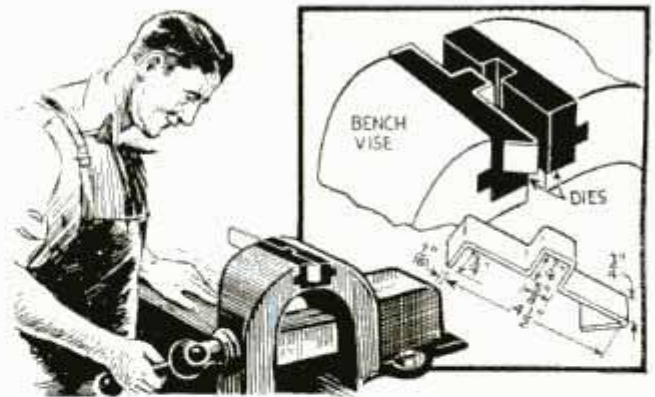
Printing Photos from Wet Negatives

One photographer, who often had rush jobs, saved much time by printing photos while the negatives were still wet. To do this, the negatives were developed in the regular way, after which they were removed from the bath and the water shaken off. A sheet of clear Cellophane was then applied to both sides of the negatives with a squeegee so that they could be handled to make the prints. With this method, the photographer claimed he was often able to deliver rush jobs one hour after the exposure was made.



Utilizing Bench Vise as a Punch Press

In a shop where there was no punch press available, I made a quantity of brass stampings in a heavy bench vise, the jaws of which were fitted with dies machined from cold-rolled steel. The dies were used to form the center portions of the stampings, the ends being formed with a few



Half-Hard Brass Stampings Made in Vise Fitted with Dies of Cold-Rolled Steel

blows of a rawhide hammer while the stampings were still in the vise.—Charles Kugler, Philadelphia, Pa.

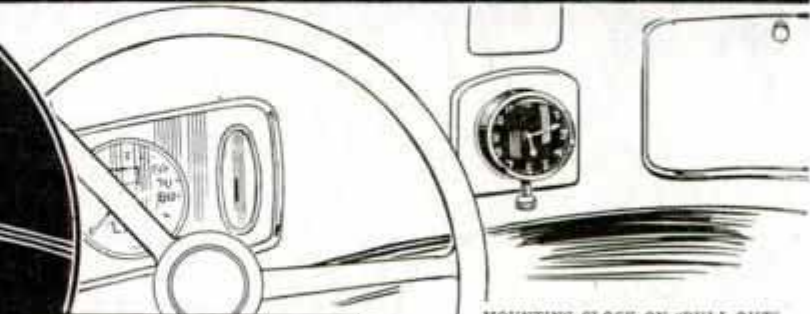
Marble and porcelain are easily cleaned by applying with a stiff brush an acid solution consisting of diatomaceous earth, 3 oz., sodium sulphate, $5\frac{1}{2}$ lbs., and sulphuric acid, 9 oz. The solution, which is corrosive, is washed off with water.

Suggestions for AUTO OWNERS

TO LUBRICATE DOOR LOCKS, FINELY POWDERED GRAPHITE IS BETTER THAN OIL, WHICH CONGEALS AND COLLECTS DIRT



INSECT-POWDER BELLOWS



MOUNTING CLOCK ON "PULL-OUT" ASH RECEIVER. LARGE HOLE IS CUT FIRST TO TAKE CLOCK; THEN SMALL SCREW HOLES ARE DRILLED



Repairing Cracked Fender on Old Cars

CUT A CARDBOARD PATTERN TO THE FENDER CURVATURE AT THE POINT WHERE IT IS CRACKED



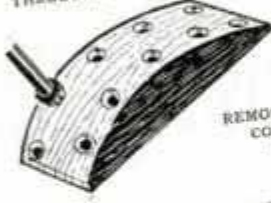
SAW A 2-IN. HARDWOOD BLOCK TO PATTERN CURVATURE FOR ATTACHMENT ON UNDERSIDE OF FENDER



CLAMP BLOCK AND DRILL HOLES FOR WOOD SCREWS THROUGH BOTH FENDER AND INTO BLOCK



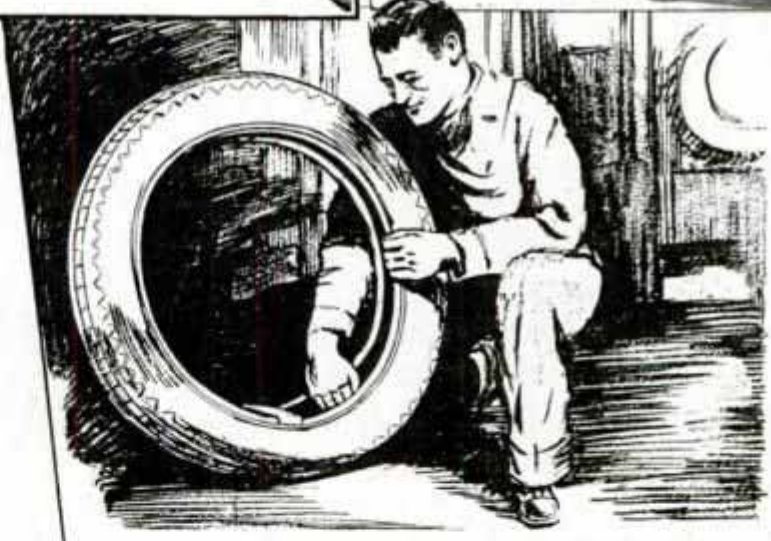
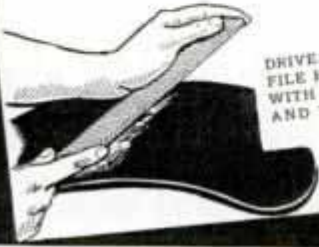
REMOVE THE BLOCK AND COUNTERSINK THE SCREW HOLES



REPLACE BLOCK AND DRIVE FENDER METAL INTO COUNTERSUNK HOLES WITH A TAPERED PUNCH



DRIVE SCREWS IN PLACE. FILE HEADS OFF FLUSH WITH FENDER SURFACE AND TOUCH UP WITH PAINT



WHEN THE SOURCE OF A PUNCTURE CANNOT BE READILY LOCATED, GO OVER THE INNER SURFACE OF THE CASING WITH A PIECE OF FINE SANDPAPER SO YOU CAN FEEL THE GRIT AS SOON AS IT CONTACTS THE INVISIBLE TROUBLE MAKER



NEAT, ROUND INNER-TUBE PATCHES CAN BE CUT WITH YOUR KNIFE BY FOLLOWING THE EDGE OF A COIN



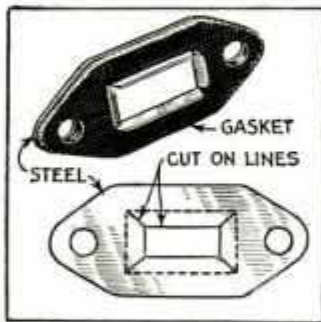
Wide Rubber Bands Stretched over Cylinder-Head Bolts Protect Hands When Working on Motor

Rubber Bands on Cylinder-Head Bolts Protect Hands

When working on an auto motor with the cylinder head removed, it is a good idea to cut wide rubber bands from an old inner tube and stretch them around the projecting studs as shown. This will help prevent cutting the hands on the threads if a wrench should slip while loosening or tightening a nut. Two or three bands will be sufficient for most motors.—Joe Gratz, Chicago.

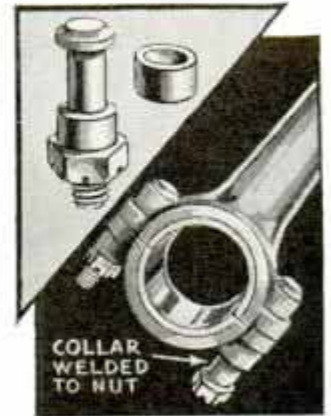
How to Prevent Exhaust-Manifold Gaskets Blowing Out

I have found that the tendency of some cars to blow out exhaust-manifold gaskets can be overcome by using a thin, sheet-steel gasket in connection with the regular gasket. The center hole in the steel gasket is made $\frac{3}{8}$ in. smaller than the regular one so that the edges of the hole can be flanged. The gaskets are installed with the steel one next to the motor, the flanges projecting outward so that they fit inside of the opening in the manifold when it is put in place.—James W. Clift, Columbus, Ohio.



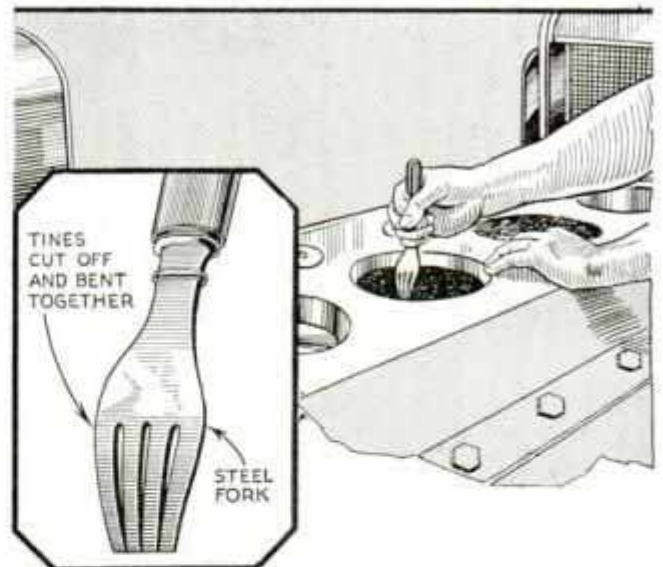
Speed Nuts to Adjust Bearings on Connecting Rods

To save time in screwing nuts on and off connecting-rod bolts, when adjusting the bearings, make up a couple of special nuts of the type shown. These are merely extra nuts to fit the bolts, and have short collars welded to them so that a bearing can be tightened without having to drive the nuts almost the entire length of the threaded portion of the bolts. After the bearing has been adjusted correctly, the special nuts are removed, and the regular ones screwed in place.



Efficient Carbon Scraper Made from Table Fork

An ordinary table fork will be found a handy tool for scraping carbon from a car motor. The tines of the fork are bent to-



Carbon Is Readily Scraped from Smooth and Irregular Surfaces Inside Car Motor with Table Fork

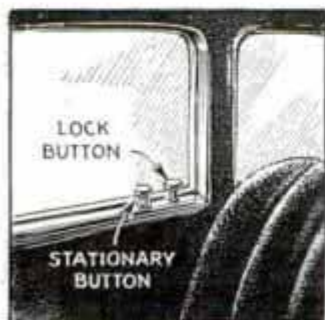
gether, after which the ends are filed to a chisel-like edge. The individual cutting edges of the tines will follow the most irregular surfaces, yet they will spring back in line for cleaning smooth surfaces.

Best woods for enamel finishes are birch, poplar, white pine, whitewood or gumwood.

Condenser Prevents Burning of Contacts in Headlight Switch

The burning of light-switch or cut-out contact points may be lessened considerably by bridging a suitable condenser across them. The size of condenser required will depend on the current flow across the contacts, but in general a .5-mfd. radio condenser is satisfactory.

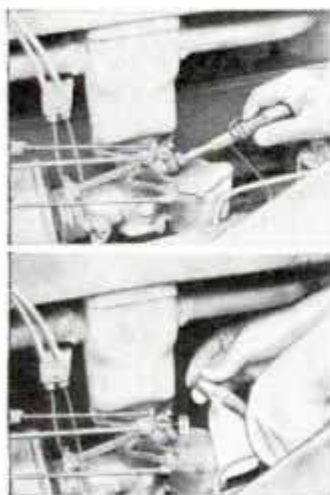
Guards for Lock Buttons on Car Doors



On cars that have small buttons projecting above the window ledges for locking the doors from inside, it will be found a good idea to mount an extra button in front of each lock as shown. These serve as guards to prevent the lock buttons from being bent.

Sand in Carburetor Causes Trouble

Some types of auxiliary air-valve carburetors, which employ an air dashpot control for slowing the action of the valve, are occasionally made inoperative by small particles of sand jamming the piston of the dashpot. The sand particle can be removed by anyone if care is taken to re-adjust the valve, which must be taken out for cleaning. Counting the number of turns as the valve is screwed out and then



turning it back exactly the same number of turns when re-assembling, will assure the proper adjustment after cleaning. The cylinder is best cleaned with a small piece of cloth, while the piston is cleaned by spilling a small amount of clean gasoline through the hole in which it seats. The excess gas is then blown out of the cup-shaped piston, and the spring and screw re-assembled.

On cars that have small buttons projecting above the window ledges for locking the doors from inside, it will be found a good idea to mount an extra button in front of each lock



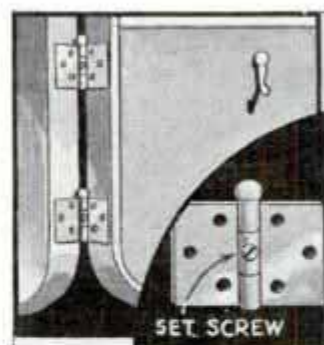
Motor-Knock Sounder Assists in Locating Knocks Made by Worn Bearings, Pistons, and Other Parts

Sounding Rod Locates Motor Knocks

A funnel soldered to the end of a metal rod makes an inexpensive but effective motor-knock sounder for locating loose bearings, piston slaps, and other operating defects. The rod is long enough to enable the funnel to be held against the ear while touching the other end to various spots about the motor.

Set Screw Locks Hinge Pin on Car Door

To prevent burglars from entering your car by removing the pins from the door hinges, drill a hole through the center portion of each hinge, and part way through the pin. Then tap the hole, and drive in a set screw as shown, first countersinking the hole so that the screw head will not interfere with opening or closing the door.



☐ If, after overhauling the rear-axle assembly of a car, a hum occurs when the motor is pulling, the ring gear and drive pinion mesh too tightly, but if the hum occurs when the car is coasting, the gears are meshing too loosely.



Ink on Printed Matter Quickly Dried by Passing It under Electric Heater

Printed Cards Quickly Dried with Electric Heater

While visiting a small printing shop, I noticed a workman taking cards from a press and placing them on an endless belt, which carried them slowly under an electric heater suspended above the belt. A workman at the other end of the belt was stacking the cards. The owner of the shop claimed that the heater dried the ink on the cards so that they could be stacked immediately, thus enabling him to get out rush jobs quickly that would ordinarily require several hours in waiting for the ink to dry.—Emil J. Novak, Omaha, Nebr.

□ An efficient hand soap for mechanics may be made by dissolving powdered soap chips in an equal amount of hot lard. Before cooling, the mixture should be poured into a shallow pan to harden.

The Next Issue

THE HOME CRAFTSMAN GOES TO SHEET METAL

Bric-a-brac shelves, flower-pot holders, shoe cabinets, vegetable bins, etc., made from sheet metal. Expert tells the tricks of forming, riveting, soldering, and making seams in metal. Also, spot welding simplifies joining.

PROFITS FROM YOUR BACKYARD GARDEN

Have you a small backyard plot you would like to use for raising vegetables? Story tells how to prepare the soil, and what to plant to get the best results.

PROJECTOR FOR THE WORKSHOP

Enlarge and project plans from magazines so that they can be traced. Quick method that eliminates the tedious job of laying out difficult drawings.

LOOK AT YOUR NEW HOME

Build a model of your proposed home to see what it looks like. A miniature offers you an opportunity to make changes before construction is started.

FURNITURE FOR BOYS

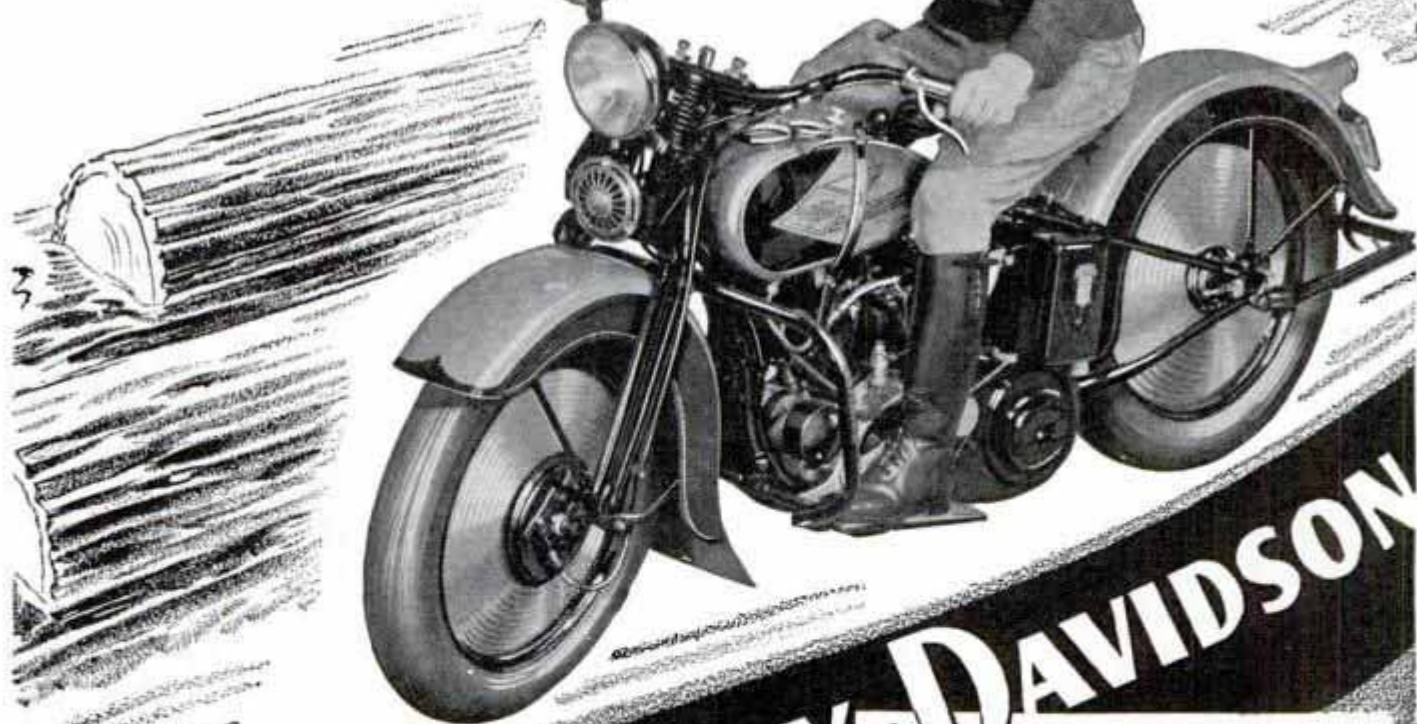
Drawing table, sea chest, and bookcase your boy will enjoy having in his room. Pieces are simple to make and have secret compartments to store treasures.

FUN ON THE SURF

Skim over the water with this graceful, slender kayak, which you can build easily. Completed boat is 17 ft. long and weighs approximately 40 pounds.

The **THRILL** OF THE *Spring Drive*

Swift streams, swollen by melted snows — tangles of smashing logs — yet those brawny, sure-footed riders of the northwoods enjoy every thrilling minute of the spring drive. But "riding the logs" isn't in it with the thrills of spring driving on a Harley-Davidson. A new 1935 Harley-Davidson will take you sweeping along — darting ahead of slower moving tangled traffic — out in the clear where the going is good. Don't sit back and merely wish you had a new 1935 Harley-Davidson. **RIDE ONE!** See your nearest dealer about the **FREE RIDE** he's offering. Ask him about his Easy Pay Plans—and send in the coupon.



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and up, under 16 years. Check age group.

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(Signed)

RAYMOND F. STEVENS
North American Bob-Sled Champion



"WHEN I WENT TO COLLEGE, I found that smoking a Camel when you are tired makes you feel fresher."

(Signed)

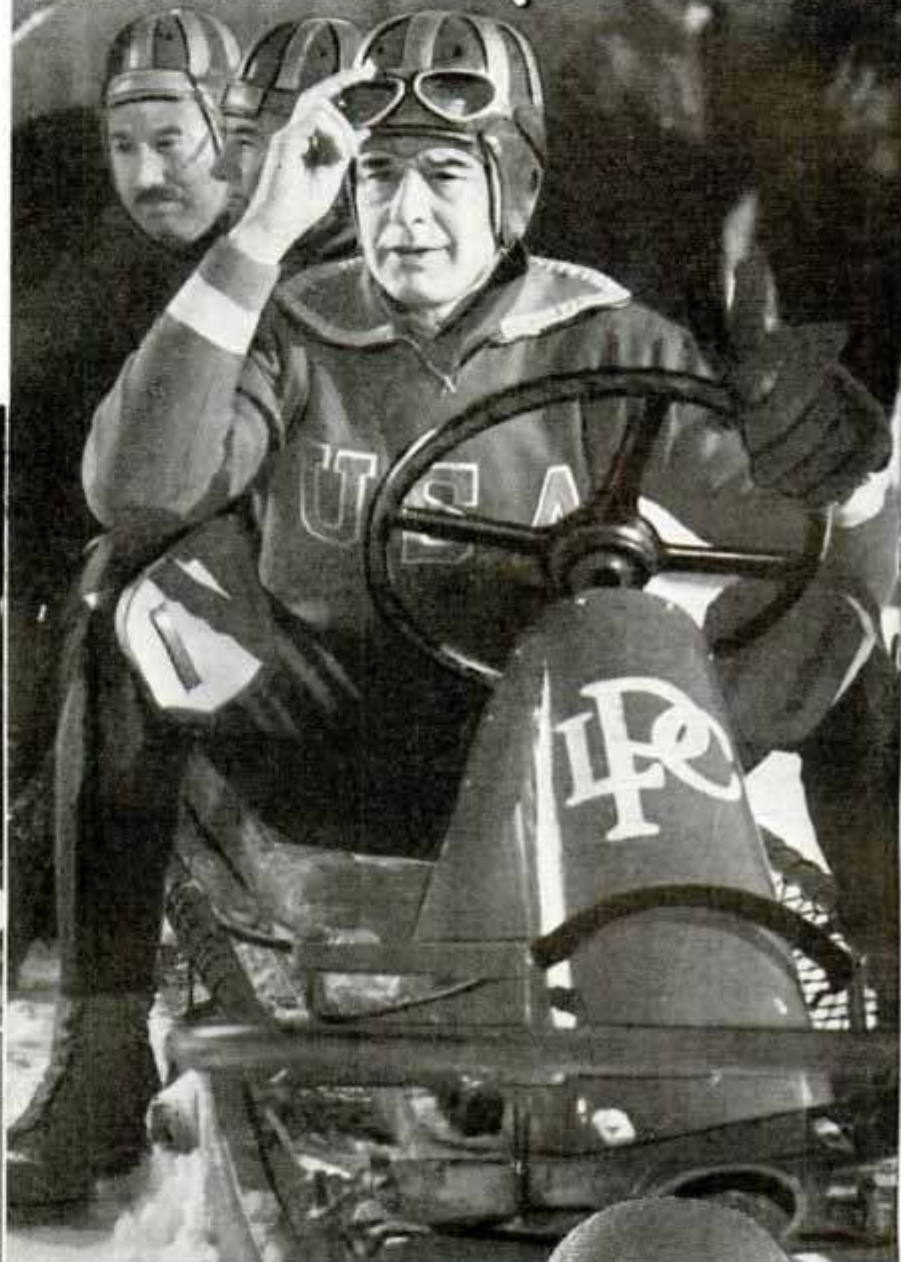
MARGUERITE OSMUN



"A FACTORY Superintendent has a strenuous job. But a Camel gives me new 'pep' when tired."

(Signed) **GEORGE WEBBER**

**TO BANISH
TIREDNESS QUICKLY...**



"SPEED SKATING takes an abundant supply of stamina and energy. Camels restore my 'pep' when I've used up my energy. And they taste so good, too. For sheer pleasure, there's nothing like a Camel."

(Signed) **JACK SHEA**



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WITH A CAMEL!




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TOBACCOS IN
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"Camels are made from finer,
MORE EXPENSIVE TOBACCOS -
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		9:00 p.m. C.S.T.			8:00 p.m. C.S.T.
		8:00 p.m. M.S.T.			9:30 p.m. M.S.T.
		7:00 p.m. P.S.T.			8:30 p.m. P.S.T.

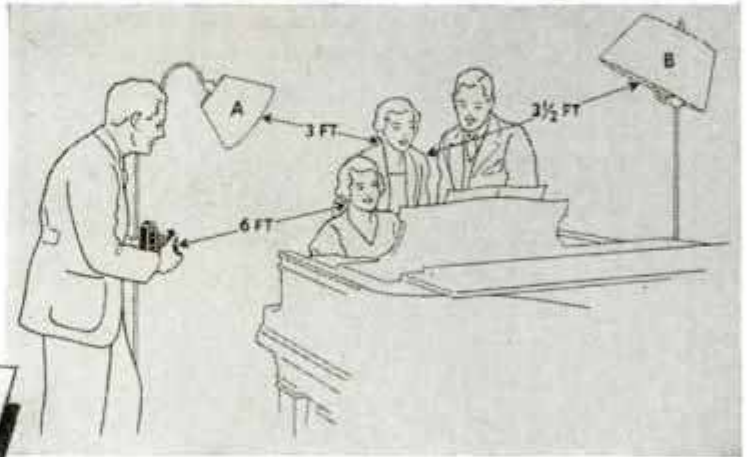


never get on your Nerves!

Make this snapshot at home *Tonight*

HERE'S ALL YOU HAVE TO DO

Use Kodak "SS" Film. Set your camera for 1/25 second—open the lens to *f.6.3*. Put 1 Mazda Photoflood bulb in lamp A—2 in lamp B. Distances as indicated. Sight the subject, click the shutter—and you've made the picture.



HOW many wonderful pictures you've missed because it was dark outside. Now you can get the many things that make evenings so enjoyable—you can take snapshots indoors, at NIGHT.

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Hold the camera in your hands as you would outdoors, set it for 1/25 second, open the lens to *f.6.3*. Sight the subject, click the shutter. You've made a snapshot. *Indoors . . . at NIGHT.*

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NEED FOR
SNAPSHOTS
AT NIGHT**



KODAK "SS"—the lightning-fast film, with the green lightning flashes on the familiar yellow box—the film that, indoors or out, in any light, improves picture quality.



MAZDA PHOTOFLOOD BULBS give brilliant light . . . last for about two hours, enough for many pictures. Cost but 25¢.



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Name _____
Address _____
City _____ State _____

ALL-WAVE SUPER BUILT WITH STANDARD PARTS

(Continued from page 584)

type-42 power output tube; the rectifier is a standard 80 tube in a built-in power-supply unit. There are no coils to wind and the I.F. transformers are pre-tuned so that an oscillator is not required to tune up the set after it is assembled. The tuning range is from 10 to 550 meters; six pair of plug-in coils are provided for the various bands. The circuit calls for a dynamic speaker with a 1,000-ohm field and a transformer to match its voice coil to the single type-42 output tube.

Fig. 2 shows the speaker-cable and plug connections. The selection of a speaker and a baffle or housing for it, largely determines the tone quality. The larger the speaker baffle, the more efficiently the deep tones will be reproduced. A tone control is not used as it merely reduces the intensity of the desirable higher frequencies that go to make high fidelity reproduction possible. However, experimenters who desire a tone control can install an extra volume control, in series with a .05 mfd. fixed condenser across the R-10 detector plate resistor and suppress the higher audio frequencies.

Standard 110 to 120-volt, 60-cycle a.c. is the only suitable source of power; the set draws less than 60 watts from the house-lighting system. A line filter condenser in the transformer primary prevents outside interference from the a.c. line entering the receiver through the power circuit. The antenna may be a plain wire 40 to 80 ft. long and from 10 to 40 ft. above the ground or metal roofing. It should consist of one continuous length of copper antenna wire well insulated with glass or porcelain insulators. A good connection to earth by means of a ground clamp on a cold-water pipe is necessary with an antenna of this description. In noisy locations it may be necessary to use an antenna of the doublet type. This system consists of two equal lengths of antenna pick-up wire connected to a twisted-pair transmission wire lead-in which goes directly to the antenna and ground posts of the receiver; in this case the ground lead may be omitted. Noise-eliminating antenna systems employing homemade impedance-matching transformers were described in detail in the February, 1935, issue.

DINNER TABLE TRICKS

(Continued from page 549)

crumples the paper, drops it in an empty glass and ignites the paper. Just as the paper is about to finish burning, he turns the glass upside down and plunges it into the saucer. The water is sucked up into the glass. There is the coin, high and dry. The magician takes the coin from the saucer, raises the glass and the water surges back into the saucer.

As a conclusion the performer can demonstrate his ability as a mind reader. To do this, he utilizes various objects which he places conspicuously upon the table, such as a pitcher, a saucer, knife, fork and cup. A person is chosen to act as the "subject." He thinks of any one object, then turns about and faces away from the table while the performer approaches to study the articles on display.

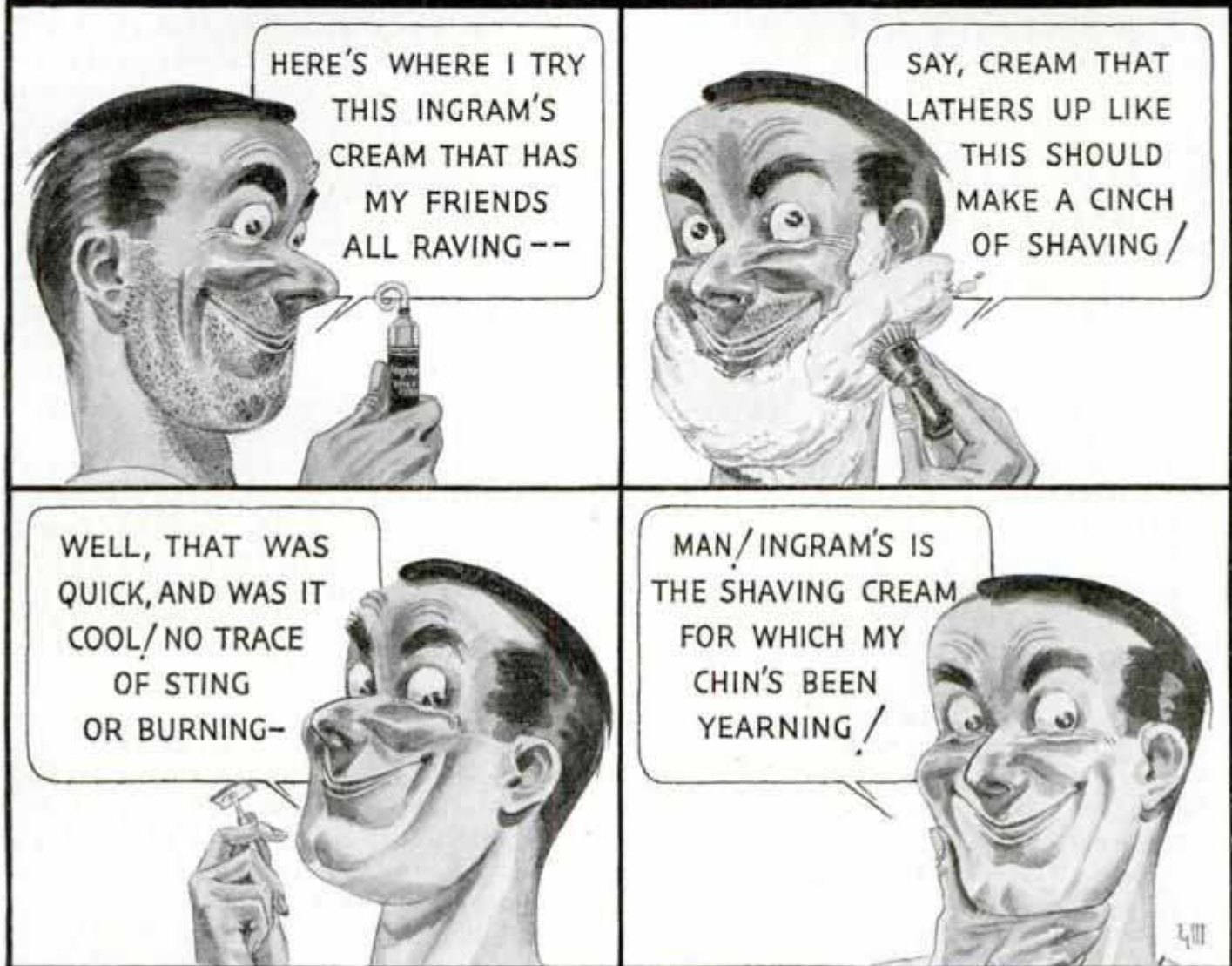
"I want you to think of your choice," states the performer. "Begin to spell the name of the object slowly to yourself, letter by letter. As you think of each letter, say 'Go,' and I shall touch an object. After you have spelled the final letter, say 'Stop.' The others will watch to see that I make no further move."

"With each 'Go,' the magician touches an object on the table. Just after he touches the pitcher, the subject says "Stop." Keeping his hand on the pitcher, the magician asks the name of the object on which the subject was concentrating. Without turning, the subject announces that the chosen articles was the pitcher.

There is no collusion between the performer and his subject. The trick works automatically, but only the demonstrator knows it. The secret lies in the proper choice of articles. Each item must be spelled with a different number of letters as cup, fork, knife.

The magician thinks of these objects in terms of letters: cup as three; fork as four; knife as five. In touching the articles as the subject spells mentally, the performer touches at random on the first two commands to "Go"; but on the third order he touches the cup. He touches the fork on the fourth order; the knife on the fifth, and so on. Though no one realizes it, he is spelling with the person who is thinking of the object. When the person suddenly says "stop," the magician is touching the object the speller selected.

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HERE'S a tip from a million happy shavers: If you want your shaves *cool* as well as *close*, use Ingram's.

Ingram's Shaving Cream softens whiskers until there's not a spark of spunk left in them. Just prey for your razor. No need to pray for your face.

It's cool while you're shaving; cool when you've finished. In this richer lather are three special ingredients that tone the skin and soothe it. No after-sting; no smarting; no call for lotion.

Ingram's SHAVING CREAM



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I'm burning with curiosity. Let me try 10 cool Ingram's shaves free!

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BONANZAS THE FORTY-NINERS OVERLOOKED

(Continued from page 505)

Geological experts say much of the west's underground wealth remains untouched.

"Take Tonopah as an example," said Letson Balliet, mining engineer and geologist. "From an area of less than 600 acres of ground, just one mine, the famous Mizpah, has produced approximately \$250,000,000. Yet not long ago a miner shipped from his lease in the Mizpah a fifty-ton car of gold and silver ore from which he received smelter returns of \$10,000. Another leaser has just uncovered two rich stringers in a section of the mine from which samples ran \$500 a ton."

Walter W. Bradley, state mineralogist of California, recently estimated California has \$600,000,000 in virgin gold easily reached; \$900,000,000 available to quartz or hard-rock miners able to follow veins 7,000 feet or more; and a total maximum amount of \$2,233,393,500 in gold recoverable in a period ending in 1950.

"Don't forget that old Mother Nature has been helping us for the past fifty years," suggests a veteran miner. "Tailings in some old mine dumps were worth a few dollars a ton to begin with. Wind and the rain have washed tons of dirt out of the heap, leaving the gold behind. Many old dumps have grown a lot richer this way."

The stamping ground of many Washington prospectors underwent a complete rejuvenation last winter. Mad torrents gouged out new channels, doing in a few days what hundreds of prospectors could not have accomplished in years. Miles of virgin ground in Idaho also have been exposed by floods.

Millions in placer wealth today rest deep beneath the burden washed down from decomposing hills. Hidden ledges never touched by the prospector's pick have lately been exposed by floods that ripped off the surface covering. Western deserts are believed to be full of deposits of gold-bearing sediments washed down from rich lodes in the surrounding mountains, and since covered by desert sands.

Sometimes strangers' eyes are keener than those of men who have lived in the country for years. Thousands of prospectors had tramped over property in the Silver City district of Nevada before a Reno

(Continued to page 122A)

TACKLE TIPS FOR THE FISHERMAN

(Continued from page 527)

822
ing a thin protecting film of oil. This attention for the tackle box is especially important if it has been near salt water. Does the box need a new coat of paint? There are some excellent rubber and aluminum paints that combine real protection with a new face for your favorite box.

While the box is drying, and all the contents are spread out on the table, is a fine time to examine plugs and spoons. Look for broken or rusted hooks. Nothing is more exasperating than losing a fish because of a rusty hook that parted during the struggle. Some of the favorite plugs will need to be touched up with a little paint, and this gives you a chance to originate your own color schemes.

Make a note of the essentials you always carry in your tackle box and may want to replace. How about the mosquito dope, and the first-aid kit, and a good knife? And that gaff, or landing net may need to be straightened and cleaned of rust. Wipe it off as you do the steel rods and the tackle box, with an oily rag.

The cork butts on your rods may be dirty and will look like new after you've gone over them with a fine sandpaper. Be careful not to sandpaper any metal trimmings but clean off the dirt and you'll be rewarded with a fresh, workmanlike appearance well worth the trouble.

And now we come to that collection of flies! Remember that the pleasant breath of spring is the time for hungry moths.

When I put flies away for the winter, I get powdered naphthaline and some glass jars that have screw tops. Put in a little of the moth chaser and turn the top tight. With this done they should go through the winter without damage. But now is a good time to look through the drawers and on the closet shelf to be sure none are lying around.

Now that you have checked your flies, and they all are safely bottled, and your tackle has been brought to top condition again, I suggest you leave that one bright red fly in that battered felt hat—the one everybody wants you to throw away—just as a gaudy, cheery reminder that the fishing season will soon be here. Any day now you'll be sallying forth with the assurance that this time that big fellow won't get away!



You can see,
I'm a
FRESHMAN.

You can SEE
that
WE'RE FRESH
TOO!



**LOOK FOR THE
"DATE-LINE!"**

Batteries are apt to "go dead" on dealers' shelves. The "Date-Line" on all Eveready Flashlight Batteries is your sure guarantee of the FRESHNESS which makes them long-lived and dependable...National Carbon Company, Inc., New York, N. Y.



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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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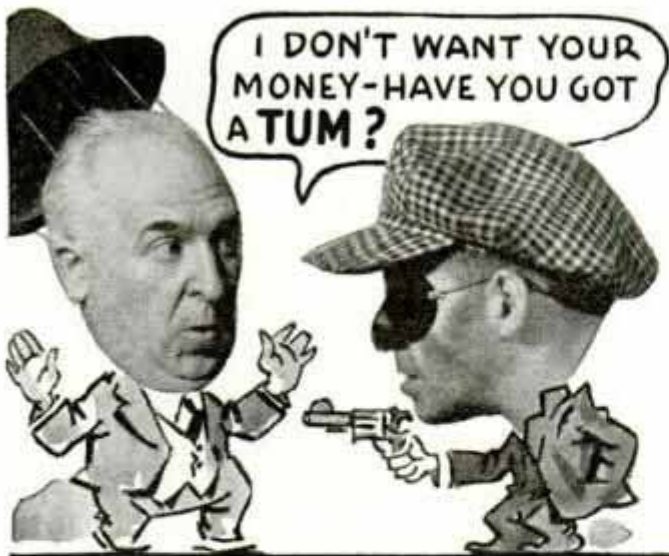
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IT'S liable to happen any time—that dreaded attack of acid indigestion. That's why most sufferers keep TUMS handy for an emergency. No need to be held up by fear of heartburn, sour stomach, or that nauseating gassy fullness, when your favorite foods appear on the dinner table. Millions now know that TUMS do not contain soda or any water-soluble alkali—to over-alkalize the stomach or harm the kidneys. When TUMS correct the acid condition any excess passes off inert and unabsorbed. 10c a roll at any drug store. The 3-roll package containing handy metal pocket carrier, only 25c.

Free

1935 Calendar-Thermometer, beautifully designed in colors and gold. Also samples TUMS and NR. Send stamp for postage and packing to A. H. LEWIS CO., Dept. 21-DJJ, St. Louis, Mo.



For a laxative, use the safe, dependable Vegetable Laxative NR (Nature's Remedy). Only 25 cents. **NR**



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HOLDEMS

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No Glue
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You can easily fix loose rungs and legs on chairs and tables with HOLDEMS—small metal pronged inserts that firmly grip both rung and socket. Merely remove rung, insert HOLDEM, and drive rung back. Also for mop, mallet or other handles, and any dowels. Patented. 25 cents a box of 30, assorted sizes.

AT HARDWARE STORES—or 25cts. by mail to
A & F Products, Mfrs., 3 West 37th St., N. Y.

BONANZAS THE FORTY-NINERS OVERLOOKED

(Continued from page 120A)

man recently took a sample of the unpromising looking rock and discovered an eighteen-inch vein of rich ore.

Pure chance is just as much a factor as ever. Tom Farley, small-scale miner, dug down only a foot into ground that had been panned on the surface by many prospectors, and found small streaks of gold running as high as \$1,000 a ton. Farley set up a small mill, and is now working in a shaft which has been worked and abandoned time and again.

A certain Nevada mine had been worked for years and finally, on the advice of mining engineers, was abandoned. Not long ago, a young man took a lease and started following a little streak in an old stope. He followed it a short distance, when it widened out and developed into a bonanza ore shoot, making its owner wealthy.

As one old-timer put it, "Since we have thirty-five-dollar gold, the stuff that was just country rock before, now is ore." If a man has a little capital, he can get other men to help him dig for about five dollars a shift. Materials are cheaper than in boom days. Railroad freight on supplies is only about half what it used to be. Coal, crude oil, and timber are cheaper than before; yet gold brings almost twice as much.

Many are reprospecting the old dumps in search of the gold that slipped through crude milling machinery of earlier days. From the mill dumps of the old Comstock Lode of Nevada, material has long been washing down into surrounding gullies, and now and then a miner will find a pocket of amalgam containing mercury and gold, lost half a century ago from the mills. Many who are placering small deposits are making only a dollar or less per day. But there are dozens of more experienced prospectors who have already gone back into the old diggings and found new wealth.

Then there are genuine lost mines whose lone owners never came back. Along the border on the Mexican side are some of the greatest lost mines in the world. These mines were operated by rich Spaniards, who kept them as family possessions and mined only as they needed cash. When these families were overthrown, the secret of the mines was lost. Prospectors have been looking for them ever since.

ALL ABOUT THE NEW



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OUTBOARD MOTORS**

NEW aero-type metallurgy and construction throughout! World's smallest all-purpose, full power twin! 30 big advanced features. Write for new illustrated Handy Chart describing this and 5 other great models in the 1935 quality Sea-Horse line... FREE!

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SAVE PRINTING COSTS



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THE STAMP OF A THOUSAND USES

Write your copy once on the stencil paper, insert in the automatic-inking COPY-STAMP, and print instantly as many copies as wanted.

Saves not only money but the vital element of time.

Five sizes: \$5.00 and up.

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FREE METLMACH
THE MODERN MACH.

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Very fast utility model

Only Boats With Full Length Spray Rails

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STUNTS OF MOVIE MAGICIANS

(Continued from page 543)

Another of O'Brien's inventions enables a studio to film fires, explosions, and gunfire by a method of double exposure that eliminates the necessity of burning up a set or firing a gun on the stage. When a stunt flyer crashed his plane in front of the camera and crawled away from the wreck, a timing device inside the plane was to set it afire a few seconds after the pilot left. The timer was broken and failed to work. Instead of making an expensive re-take, the cameraman placed the undeveloped film back in the camera and exposed it again, this time filming a motion picture of a fire that had been specially filmed against a dark background. The double exposure showed the airplane in flames exactly as had been planned.

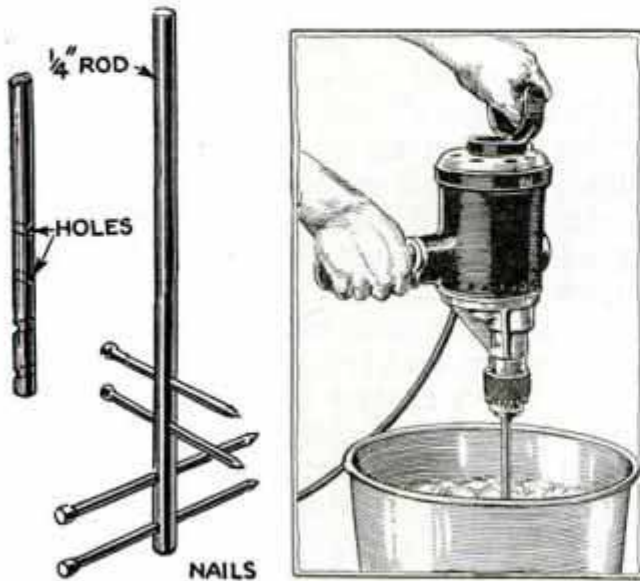
Most shipwrecks and airplane crashes that you see on the screen are done with models. A collision at sea is made easy by mounting the miniature ships on underwater tracks so they may be pulled together by wires. Breakaway bows enable cameramen to photograph realistic disasters and a stricken ship is made to sink slowly beneath the waves by pulling a wire threaded through a pulley at the bottom of the tank. All miniature water action is shot at high speed so when the film is run at regular speed, ripples on the water look like slow swells and the ship swings smoothly instead of bobbing up and down.

The motion picture background is now so common that nearly every picture exhibited contains this special effect. You may be sure, whenever you see a close-up of the inside of a taxicab, with scenery moving by outside the window, that the cab was filmed while standing still with the scenery projected on a screen outside the window. For one thing, it would be nearly impossible to record the sounds of conversation inside a taxicab moving through city traffic.

A Hollywood invention is "fourth dimensional" sound by which voices in the theater actually come from the parts of the screen the speakers occupy. A speech seems distant or close, or from left or right, according to where the speaker stands. This is accomplished by the use of several separate sound tracks on the film, each connected to an individual loud speaker properly placed behind the screen.

Electric Drill Used for Mixing Glue

For mixing large quantities of waterproof glue, an electric hand drill has been found useful. The stirring device, which is gripped in the chuck of the drill, con-

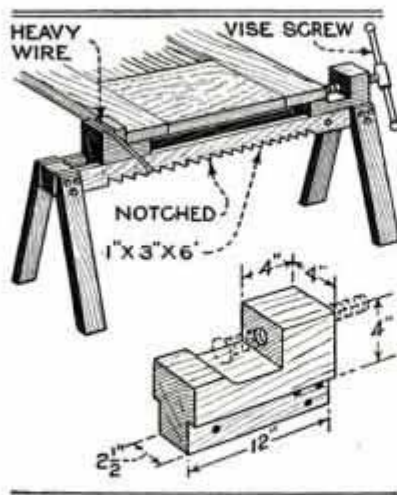


Large Quantities of Glue Can Be Quickly Mixed with the Aid of an Electric Hand Drill

sists of a short piece of $\frac{1}{4}$ -in. iron rod or steel. Two sets of slanting holes are drilled through the rod near one end to take four small finishing nails, which are driven halfway through.

Improved Gluing Clamp

A gluing clamp that is similar to a saw-horse in appearance and combines the advantages of both, has been found very useful for woodworkers. It consists of two rails notched on the underside, and supported by two legs at each end. A vise screw is securely fastened at one end and a heavy block of wood, which serves as a movable jaw, fits the rails as shown.



A groove is cut across the top and a heavy rod, bent to a rectangular shape, and with the ends securely twisted or welded together, is used to lock the block on the rails at any desired point.

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WITH THE SHORT WAVES

(Continued from page 511)

tained within a case five inches by seven and one-half by three inches. There is a larger case with a special shoulder harness that contains a complete modulation and oscillator system with four batteries providing a higher voltage than the average home lighting circuit.

The set has an effective range of ten miles. The sending apparatus is used with a chin strap microphone which leaves the speaker's head free to turn and both hands unemployed. Signals are picked up on a short wave receiver, located near the scene of operation, and transferred to telephone wires which convey them to the broadcasting studio. Usually a thirty-foot antenna is suspended between two poles and carried about following the speaker.

The automobile "mobile transmitter" is another recent development. The car may broadcast at a speed of nearly seventy miles per hour. It has a broadcast-quality range of 100 miles when stationary and at least fifty miles when in motion. It has microphone leads ranging from fifty to 1,000 feet in length. The "mikes" are of the portable type and can be carried close to the scene of action. The transmitter can also be removed to an airplane or ship. An antenna may also be used on the roof of a truck or attached to a suitable support.

When several announcers stationed over a large territory took part in a single broadcast in the early days they had their watches set and compared with one another to assure split second accuracy. Then a schedule was prepared as to who should talk and when. But one announcer frequently repeated parts of another's talk because he had no way of hearing what another had said. To overcome this difficulty, a "cue channel" was devised which might be considered a short wave "party line," over which all the announcers, no matter where they may be, can keep in touch with one another without the audience hearing the orders and questions.

Just as the scientists and research workers improvised their rebroadcasting equipment almost overnight as the new science achieved tremendous popularity, so have the announcers and field engineers improved their technique and learned how to cope with unexpected situations so you may hear the world's news as it occurs.

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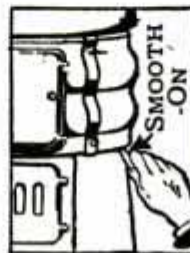
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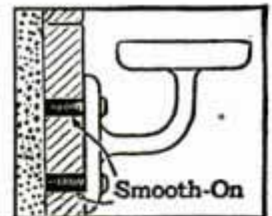


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JOYS OF THE OPEN ROAD

(Continued from Coloroto Section)

many white-tailed deer, at Bryce are many mule-foot deer and Zion also has mule-foot deer, elk and mountain sheep. At Crater lake there are deer and bears. In Glacier park deer, goats and mountain sheep roam by the hundreds and thousands. Grand Teton is noted for its moose and black bears, wolverines and deer are in Sequoia. McKinley park in Alaska has the famous Dall sheep and caribou. The parks are also a rendezvous for all kinds of migratory waterfowl which may stay unmolested by the hand of man.

Those who wish to travel in the parks may find all manner of accommodations at their disposal. This means you can spend your vacation in the parks at most any price you wish to pay—the only other expenses being transportation and a small entrance fee at some of the parks. Policing, sanitation and good water are provided. You can sleep in your own tent, cook your own food over your own campfire or avail yourself of nearby lodges, a cabin or a high class hotel. You can even rent camping equipment, such as stoves, blankets, pillows. You can roam through the parks at will in your own car or you can take a bus or travel horseback.

Rangers, hand-picked for courtesy and thoughtfulness, will guide and protect you and naturalists will explain everything of interest. Museums display exhibits peculiar to the particular park you are visiting. Everything is yours for a good time, swimming, horseback riding, golfing, tennis, hiking, fishing.

In addition to our natural parks historical objects are being preserved by the park service for the benefit of coming Americans. National monuments now are under the park service. This means that such places as Jamestown, Va., first settlement in America; Yorktown, where Cornwallis surrendered; Wakefield, the birthplace of Washington, and Monticello, the home of Jefferson, are to be preserved. Mount Vernon is already provided for.

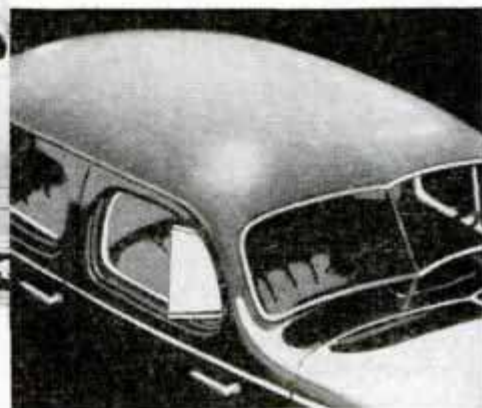
Our largest national park is Yellowstone, containing 3,437 square miles; the smallest, Platt national park, Oklahoma, containing one and one-third square miles. Hot Springs, Arkansas, runs it a close race, it being slightly under one and one-half square miles in area.



The turret of the modern battleship, arched and crowned for strength, is the highest development of the principles utilized by Fisher in the new solid steel "Turret Top" for closed cars

AT LAST
the safety of solid STEEL
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 Sensational new
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This is the way the new Fisher "Turret Top" looks—a single seamless sheet of tough drawn steel, steel reinforced with steel like a battleship turret

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AS THE largest makers of automobile bodies in the world, we have been working for years to perfect a *safety roof* of solid steel for closed cars.

No one until now ever succeeded in this and it was no simple task. It meant not only the drawing and forming of tough metal in unprecedentedly large sheets, but the designing even of the huge special presses to handle the steel.

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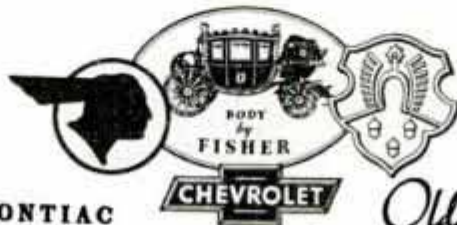
the laboratory, testing on the open road, consultation with car owners and exhaustive experiments at the great General Motors Proving Ground.

And the traditional eye-satisfying beauty of Body by Fisher is actually enhanced by the smooth, flowing, uninterrupted line of this modern roof.

There are many other worthwhile improvements in Body by Fisher for 1935 too—such things as full streamlining, more luggage room, windstream V-type windshield, wider seats, more headroom, bigger doors—

And, of course, time-tested and owner-approved Fisher No Draft Ventilation—more highly perfected, more efficient, more expertly engineered than ever this year.

But the biggest improvement of all is the new Fisher solid steel "Turret Top"—now featured on the 1935 Chevrolets (Master De Luxe Series), Pontiacs and Oldsmobiles—and found, like Body by Fisher, *only* on General Motors cars.



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BEHIND THE SCENES IN A "FIGHTING ACT"

(Continued from page 555)

of lions and tigers to attack except to kill for food. The animal considered most dangerous to trainers is the black leopard, for the reason that the smaller animal fears man and is therefore a package of quenchless hate.

On the other hand the lion's magnanimity is not kindness. Making friends with a lion, says Bernardi, after thirty years experience, is pure romantic nonsense. The closest you can get to that is the total, blank indifference of an animal that knows neither fear nor hate.

If you ever are around when a lion escapes the thing to do is to keep quiet in the most open space and he probably will not give you a thought. He is looking for a dark place to get out of sight.

What to do if a lion gets you down? Capt. Bernardi says try to get up again. If you are on your feet and get away he probably won't follow. If you are down under him he may take an angry or experimental bite. A lion which has chewed a man is a lion spoiled. He must be shot or sold to a zoo.

The usual beginning of a trainer is the husky boy who joins the circus to be near the animals. There he becomes helper, whip-boy, cage hand, head keeper, assistant trainer. His chance to get on the bill usually comes when the trainer has been hurt. Then the assistant must show his mettle by going in to save him and get him out.

Breeding farms have oversupplied the market for lions. Jungle beasts require from one to two years seasoning to cage life before they can be shipped on steamers or they will die en route. Tigers also are plentiful. A good performing lion or tiger is worth up to \$1,200.

Food of performing animals averages sixteen pounds of fresh raw meat per day with six quarts of fresh milk and two dozen eggs on Sunday and a quart of cod-liver oil during the week. Seventeen to twenty years is the life span of a lion. According to Capt. Bernardi the show business is the happiest existence a lion can have. In the arenas they get abundant exercise in a few minutes. The other ninety per cent of the time they lie and loaf—the lion's idea of the life of Reilly.

INSIDE STUFF OF BIG LEAGUERS

(Continued from page 538) *D1588*

body before, during and at the finish of the wind-up. This is obtained by first placing the feet squarely upon the ground with body erect and in contact with the mound rubber. At the peak of the wind-up the ball still is hidden from the eyes of the batter.

When there is a runner on first base the pitcher's feet are placed squarely on the ground. His rear foot is braced against the rubber, front foot forward directly towards the batter with the toe pointed diagonally towards the plate. His body is erect and his shoulders level. His body is turned slightly so that the left shoulder points half way between home base and first base. The pitcher can now turn his head toward first and back again without committing a balk. The glove hand covers the hand with the ball, hiding the grasp, so he is prepared to throw to first or pitch to the plate.

Correct pitching form involves the proper balance and position of the leg kick so that the pitcher will get the maximum power behind his throw. At the peak of the leg kick, the pitcher drops his throwing arm at full length and twists the body, pivoting upon the right leg and raising his left leg upward in front and around slightly to present his back partly to the batter. At the same time he keeps his front shoulder low enough to insure clear vision on the plate.

Besides the proper stance before and during the pitch, an important fundamental is the "follow through." At the end of the throw the feet should end squarely with the plate, apart at a comfortable distance to insure a perfect balance. The eyes and head face the batter. The pitcher in this position is prepared to stop line drives, field bunted balls to the left and right, or dash to first base where he will be in a position to cover this bag when a ball is hit to his left and fielded by the first baseman.

There are right and wrong ways of playing baseball. Ninety-nine out of a hundred men who play contrary to the rules and who reach the major leagues, do not remain for a very long period. The player who applies himself step by step has the real opportunity. This type of player who reaches the major leagues has a chance of remaining in them for a good many years.

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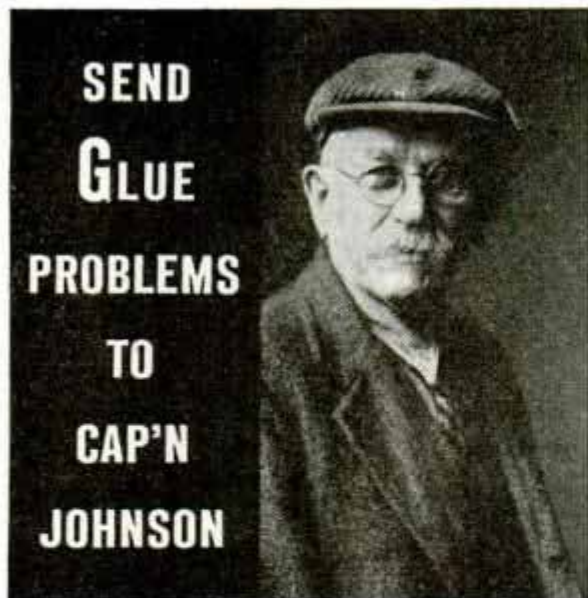
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THE LENGTHENING SPAN OF LIFE

(Continued from page 484)

germs of tuberculosis, made innocuous by chemical treatment. Skin tests have been developed which show very promptly whether or not a child is susceptible to tuberculosis or has the disease.

The X-ray has been improved to include the use of a new type of paper film so that large numbers of children may be X-rayed very cheaply, the condition of their lungs found out, and suitable preventive measures used early to cut down the incidence of this disease.

When the list of causes of death is studied, it is found that many of the greatest hazards to mankind in our modern life have developed with the introduction of new chemicals used in industry and in the home, and from the development of new machines, including the motor car. The six leading causes of death are heart disease, diseases of the kidneys, pneumonia, cancer, hardening of the arteries, high blood pressure and diabetes. Previous to 1900, the motor car did not appear among the causes of death. Today motor-car accidents are tenth on the list of causes of death.

New hazards to life, however, are the chemical substances already mentioned, such as carbon-monoxide gas, benzene, the aniline derivatives of various kinds, lead and arsenic. Great attention has been attracted in recent years to the fact that a chemical substance containing the benzene ring—a chemical arrangement of six carbon molecules—when taken into the body of a person who is sensitive, produces a sudden drop in the white blood cells which protect the body against infection. Among the drugs which contain the benzene ring are pyramidon, a remedy used to relieve pain, also associated with various sleep producing drugs, and also the drug called dinitrophenol, used in weight reduction.

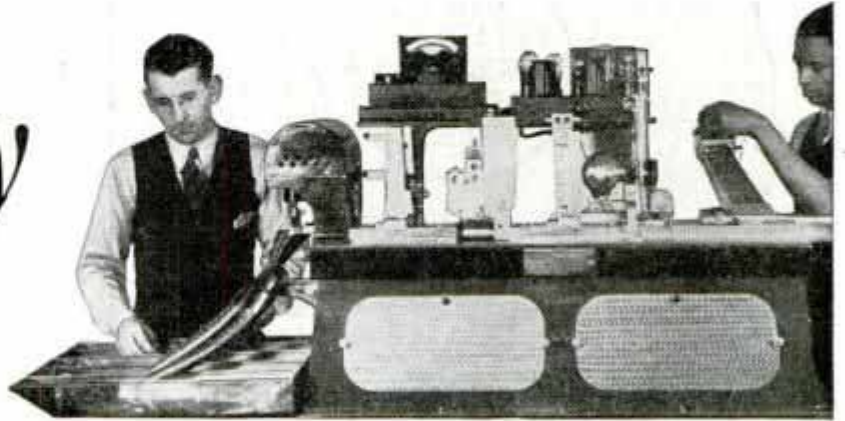
Because of the increasing number of deaths from carbon monoxide and from mercury poisoning, chemists and physicians have combined in studies to control these two conditions. New methods in treatment of mercury poisoning have been developed which may yield eventual success. Great interest has been manifested also in the use of methylene blue as a specific antidote against poisoning with car-

(Continued to page 136A)

SCIENCE INSURES

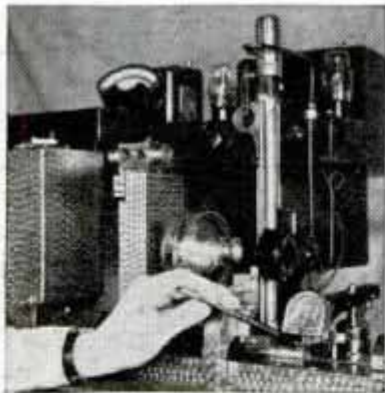
Ford Accuracy

PISTON PINS MAY BE LITTLE THINGS—BUT LOOK HOW THEY'RE INSPECTED



MODERN SCIENCE plays an important part in these ingenious automatic machines built by the Ford Motor Company to inspect piston pins.

The machine checks every piston pin for smoothness, hardness, straightness, roundness and diameter. One machine can check over 1500 pins an hour and those not up to the high Ford standard are automatically rejected.



First, the pins are forced through a unit that wipes the surface clean. Then they slide under a needle on a pick-up head. Microscopic varia-

tions in surface finish set up vibrations which are amplified by a two-stage radio amplifier, and unless the pin is absolutely smooth the machine rejects it.

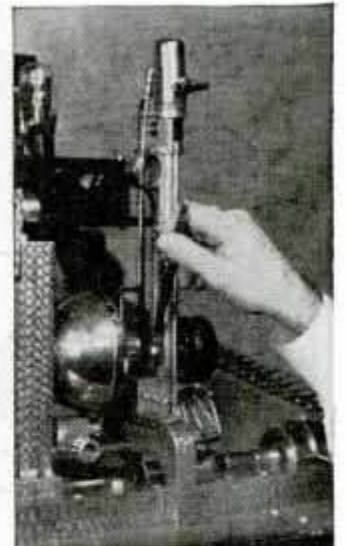
Next an automatic scleroscope checks the hardness. A light beam passes through an opening at the correct scale reading onto a photo-electric cell. The scleroscope hammer is released, strikes the pin, and rebounds to indicate hardness. If the pin has the right hardness the hammer rebounds and intercepts the light beam for a sufficient interval. This sets the mechanism to okeh the pin. If pin is not hard enough the hammer does not rebound high enough to intercept the beam; if the pin is too

hard the hammer goes past the opening. In both cases the mechanism rejects the pin.

The next two units of this machine inspect for straightness and roundness. A variation of only one ten-thousandth of an inch—1/30th the thickness of the average human hair—throws the pin out. That's accuracy for you!

The last unit measures the diameter and sorts the pins according to size. Pins distributed in the three center trays have passed inspection and are graded in size by one ten-thousandth of an inch. The tray on one end receives all over-size pins. The other end tray receives all undersize pins—these are scrapped.

When such machines are used for the inspection of parts there can be no compromise with accuracy. This is just one example of the painstaking efforts of the Ford Motor Company to make sure that Ford parts are right. It is one reason why it is possible to maintain such high standards of quality in Ford cars and yet sell them at such low prices. It is also a reason why Genuine Ford Parts are the best parts you can use in your Ford car or truck.



FORD MOTOR COMPANY, DEARBORN, MICHIGAN

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THE LENGTHENING SPAN OF LIFE

(Continued from page 134A)

bon monoxide and with cyanides.

Progress also has been made in the fight on infantile paralysis. Maurice Brodie of New York and John A. Kolmer of Philadelphia have developed vaccines by macerating spinal cords of monkeys infected with the disease and invalidating the toxin in the cord by the use of antiseptic substances. There seems to be some reason to believe that these will be of value in immunizing children, and perhaps also in the early treatment of cases of this disease.

Research on cancer continues throughout the world, concerned principally with the nature of the cancer cells. Investigators have found out that cancer cells use sugar to maintain their growth. They have found that there is a tendency to inherit cancer when there is inbreeding in cancer types. Electrical engineers have developed X-ray apparatus more powerful than ever produced heretofore. Such X-ray apparatus is exceedingly useful in the treatment of cancers that cannot be reached in other ways. Radium is also increasingly utilized in bombs of high potency which permit shortening of the period of treatment as well as more successful treatment.

The development of new anesthetics, of new devices for cutting electrically which control hemorrhage, and of new antiseptic substances which inhibit infection, and finally, the development of technic have led to marvels in the field of surgery. There is now hardly an organ in the human body which the surgeon cannot approach successfully. As a result, one-half of the cerebrum or forepart of the brain of a human being has been successfully removed in many cases, thus saving the lives of people with cancer of the brain. In several instances one lung has been removed and life thereby saved. The heart was once considered unapproachable, but many surgeons today have performed operations which involve stitching of the heart, cutting away of portions of the sac which surrounds it, and similar procedures.

Much of our modern medical advance depends on the development of new machinery and new apparatus which aids the senses of the physician. Machines have been developed to aid in anesthetization and which give comfort and safety. New

(Continued to page 142A)

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Secrets of Master Bowlers Revealed by Expert

(Continued from page 575)

bowlers, claims he can start his ball every time from a spot the size of a silver dollar. The idea is to roll naturally, changing the spot rather than the delivery to make corrections.

The straight ball is the easiest to deliver and control, but unless the first ball hits the pocket accurately it is apt to carry the pins straight back without scattering them. The hook ball has a larger pocket to work in, and the spinning action of the ball throws the pins sideways, where they have a better chance to sweep the rest of the pins for a strike. Developing a good hook requires much practice, but is well worth the effort. The hook is achieved by a turning movement of the wrist and forearm from right to left just as the ball is released. The ball will roll down the alley with a fair amount of speed, and at a certain point will curve to the left.

Control is the ability to hit the one-three pocket with the first ball. Strikes, however, will not always result, and it is in picking off the remaining pins for spares that the accuracy developed by practicing trick shots will count. A good test for con-

trol is to remove all pins except the two and three. The three pin should be kept on its spot, while the two is moved three inches to the left. This will give the ball one and two-thirds inches clearance. When you can roll between these two pins four times out of five you have developed real control.

Now set up all the pins except the five, eight and nine, and attempt to pick them all off, one at a time. If you fail to get your pin, or get more than one, start over again. If you think those two shots are a bit too hard for you, try lining up the back row seven, eight, nine and ten and picking the pins off one at a time, starting over again when you miss or take two. The big trick here, of course, is to take the ten pin. It should be left until the last, unless you want to make the trick harder, for in attempting to keep out of the gutter you will tend to shave it too thin and take the nine with it. Getting the ten will be easier with a straight ball, for with a hook you must take advantage of the full width of the alley, and even then the ball must almost roll in the gutter before it breaks in order to score a hit.

"Eyes" of Automobile Are Corrected by Robot Optician

Automobile lamps can be tested and adjusted with scientific accuracy at a range of only eighteen inches, instead of the usual twenty-five feet, by employing a recently developed device which checks both the patterns of the light beams and their intensity, the latter being measured by a photronic output meter and registered as lumens. The car to be tested is placed on four flat steel plates to assure correct level. The lamp beams strike twin "aiming heads" eighteen inches distant, each head carrying three specially ground lenses which collect the light from a given area of lamp and focus it in various patterns on a target card. The latter is provided with cross lines indicating the desired shape and location of the beam patterns. The "aiming heads" can be raised or lowered to change the level of the lamp beam in steps of one inch at twenty-five feet. With the head adjusted at the required level, the car lamps then are aimed to bring their beams into proper relation with

the target cross lines behind the lenses. Differences in battery voltages and candlepower rating are compensated for by a calibrated variable resistance control. All information revealed by the tester is recorded on an analysis chart for the convenience of the customer.

Bigger Than the Great Pyramid

Grand Coulee dam, the federal project on the Columbia river, will be the largest single structure ever built by man, according to present plans. Containing three million, six hundred thousand cubic yards of concrete, it will rank first, the Great Pyramid of Egypt second and Boulder dam third. If the dam is increased in size, as suggested, its nine million cubic yards of concrete would be three times the size of the largest pyramid. These figures were given by Francis Donaldson, chief engineer for the Mason-Walsh-Atkinson-Kier company which holds the contract for the first unit of the dam.

2/106

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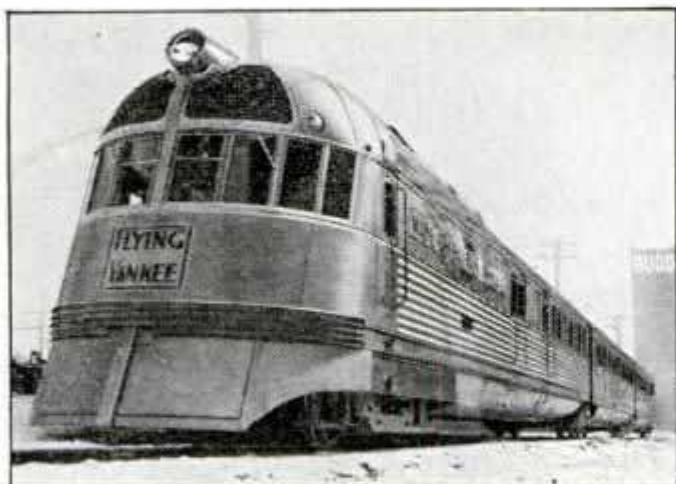
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Mason-Walsh-Atkinson-Kier Co

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Francis Donaldson
Chief Engineer

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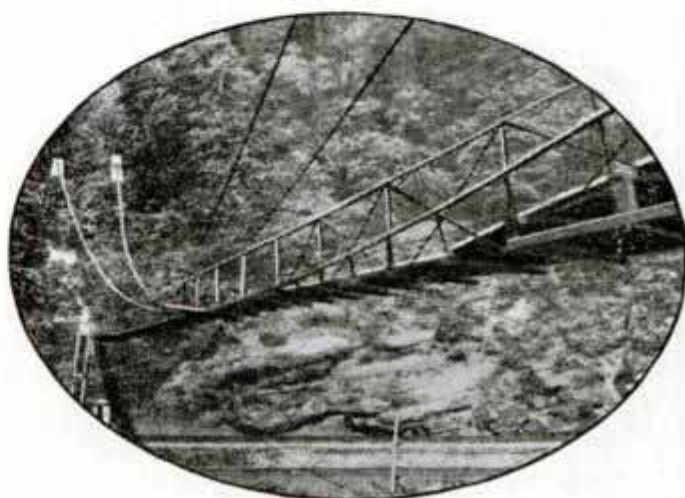
The man who sells Veedol Motor Oil is not only thoroughly schooled in the quality of the product, but also in the proper grade to use for each car. The text book for this "grade" school is the Veedol Lubrication Guide developed by the Tide Water Sales Engineering Department in conjunction with each motor manufacturer. Tide Water is the only major oil company that offers its own guide to the dealer.



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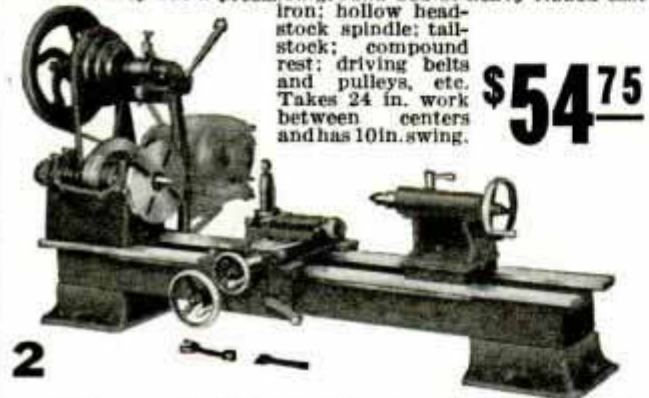
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Here's a lathe that meets every need economically. As your shop grows, you can add to it UNIT by UNIT until you have a fully equipped, back-gear, screw-cutting lathe, capable of every kind of lathe work—as fine a tool as a man could wish for. This first step has a precision-ground bed of heavy ribbed cast iron; hollow head-stock spindle; tail-stock; compound rest; driving belts and pulleys, etc. Takes 24 in. work between centers and has 10 in. swing.



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2
By adding countershaft assembly you get greatly increased power and wider speed selection. (\$49.25) Ideal for all small metal jobs and work on radio, armatures, valves, pistons, etc. The next step (\$54.75) substitutes different Compound Rest and adds the Carriage and Rack. This gives longitudinal feed entire length of bed without changing the Rest.



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3
... Final additions build up, UNIT by UNIT, to this complete back-gear, screw cutting lathe. Cuts 4 to 72 threads per inch; automatic reversible feeds; 16 speeds from 28 to 2,072 R.P.M.

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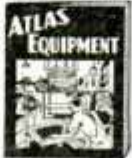
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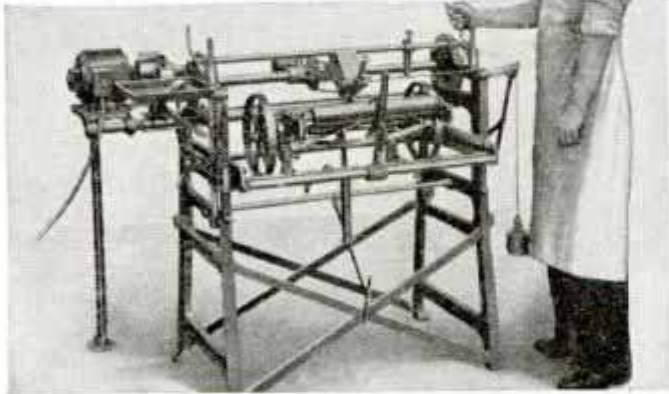
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**WORLD WIDE
ANTENNA
SYSTEM**

THE LENGTHENING SPAN OF LIFE

(Continued from page 136A)

devices for raising the temperature of the body artificially have been applied, particularly for the treatment of infections and softening of the brain. All sorts of new ways of supplying heat to the human body have been used in the treatment of rheumatic disorders.

Particularly significant was the development of the artificial lung or respirator, used to keep patients alive when their breathing muscles have become paralyzed, as occurs in infantile paralysis or when a person has been poisoned by carbon monoxide and similar poisons. An interesting device just announced maintains alternate air pressure on the limbs of the human body, said to be useful in inflammation of the blood vessels in the legs. Innumerable small devices to aid in studying the changes that go on in the body, in hearing the sounds of the heart and lungs, and in measuring the functions of the various portions of the body have been developed to aid the physician in his work.

As 1935 advances, major interest attaches itself to the new plans for economic security, including old-age pensions, unemployment insurance, sickness insurance, maternal welfare, child welfare and increased appropriations for public health.

Few people realize that medical science, through its advancement, has created new problems. When life expectancy of human beings was thirty-five years, there was no problem concerning the aged. Today the life expectancy approximates sixty years, and the care of the aged is a serious matter. The insane, the feeble-minded and the hereditary blind and the deafened were permitted to die. The workers of the population were not concerned with that problem. Today conditions of overcrowding in institutions have brought about the question of means to prevent the perpetuation of defects and to control population.

New habits of diet, and of rest, new ways of living as the development of the apartment house to take the place of the home of an earlier day, also change the nature of disease and of its care. Today American medical science is recognized as superior to that of most other nations in the world. American initiative and American opportunity if unhindered, promise still greater achievements for the future.

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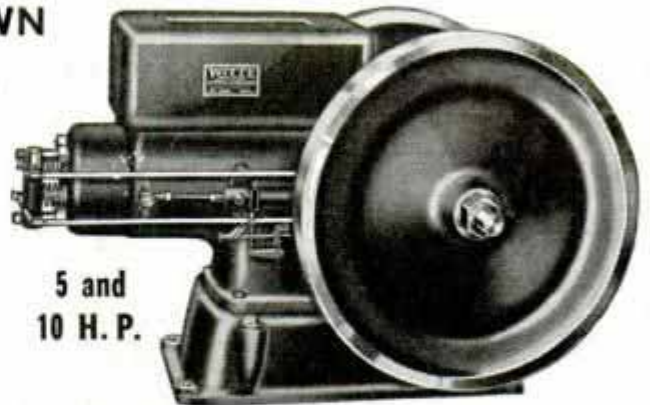
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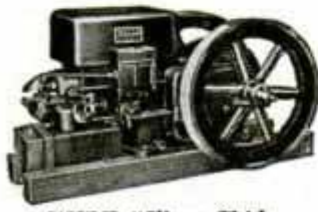
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There are very sensible reasons why oil should be completely changed at regular intervals. Oil at work in your motor is contaminated with many things: dirt and dust, fuel residues, water, and minute metal particles.

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Have YOUR OWN Monogrammed Cigarettes.
Put tobacco and blank of papers on machine. TURN THE CRANK—PRESTO—CIGARETTES. Easy—simple. All metal construction. Guaranteed. No cloth ribbons; no special tube or gummed papers required. ASK FOR FREE ILLUSTRATED FOLDER.
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Stringing Tennis Rackets PAYS ...
\$1.75 profit on \$3.00 restringing. Easy work—we teach you how. Tennis players need new strings in their rackets two or three times a year ... every restringing means profit for you. Just see how easy it is to get in this business. Cost practically nothing to start. Get started without delay.

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Makers of TOMGUT "COURT-TESTED" Tennis Strings & Restringing Equip.

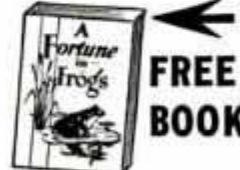
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When you decide to build one of the radios or radio devices described each month in Popular Mechanics Magazine, be sure you use quality approved parts for best results. You'll save money by buying from the World's Largest Radio Mail Order House because of our lowest Wholesale Prices. Below are but 2 of the scores of kits which we can immediately supply. Ask us for **FREE** Parts List and Prices on any radio device that has appeared or will appear in Popular Mechanics Magazine.



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SPECIAL OFFER! GUARANTEED UNDERWOOD

Yours for **10¢ a Day**
No Money Down



Sent on **10 DAY FREE TRIAL**

\$100.00 MODEL ONLY \$39.90

Positively the greatest bargain ever offered. A genuine full-sized office model Underwood No. 5 for only \$39.90 (cash) or on easy terms. Has up-to-date improvements including standard 4-row keyboard, backspace, automatic ribbon reverse, shiftlock key, 2-color ribbon, etc. The perfect all purpose typewriter. Completely rebuilt and FULLY GUARANTEED. Lowest Terms—10¢ a Day.

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 Send Underwood No. 5 (F. O. B., Chicago) at once for 10-day trial. If I am not perfectly satisfied I can return it express collect. If I keep it I will pay \$3.00 a month until I have paid \$44.90 (term price) in full.
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WITH HATS AND CAPS

Sensationally new line of personality styled Hats and Caps—latest exclusive designs—superior qualities—large selection—choice of seven spring colors—three price ranges. Caps tailored to measure and rain-proofed by secret Taylor process. Twelve luxurious fabrics in four smart styles.



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Unique sales outfit sent free just for sending name. Fits in pocket. Designed to make quick, easy sales. Simply show and write up profitable orders. No experience needed. All customers' orders sent postpaid.

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FREE HAT AND CAP OFFER

You don't invest a red cent. Everything free. We even give hats and caps to sincere salesmen. Send head size with name right now. A penny postcard will do.

ONLY \$6.95 Metal Cutting Lathe A PRECISION TOOL

Less Chuck \$3.50 extra for 4 Jawed, 3 in. Chuck



Complete with compound slide rest, 4 jawed, 3" chuck and 4" face plate. Accurately turned and machined. Ideal for machine, or home workshop.

\$6.95 without chuck, \$10.45 with chuck. Send \$2.00 deposit, balance C.O.D. Shpg. wt. 30 lbs. Money back guarantee. Same lathe furnished with 26-in. bed, \$1.00 extra.

Hollow spindle, large oversized bronze bearings. Centers standard Morse tapers. 2 1/2-in. bed, 5-in. swing, 13-in. between centers. A genuine quality tool.

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COOKS A MEAL FOR 1c



AGENTS

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 Clark sold 93 in 30 days. O'Toole sold 194 in a month. Write quick for REAL money making offer.

Slips into Any Old Stove, Range or Furnace; Beats Coal or Wood; No Dirt or Ashes; HALF THE COST.

United Factories, D-751 Exchange Bldg., Kansas City, Mo., have brought out an amazing oil burner which experts and 15,000 users say beats any ever gotten out. Burns cheap oil a new way, without generating or clogging up; gives intense heat at HALF COST by turn of valve. One free to one person in each locality who will demonstrate and act as agent. Write quick, be first to learn how to end drudgery of coal and wood and make big money, spare or full time—mail 1c postcard today.

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Into a trunk, under the bed or anywhere. Lots of fun fooling teacher, policeman or friends.

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a little instrument, fits in the mouth out of sight, used with above for Bird Calls etc. Anyone can use it.

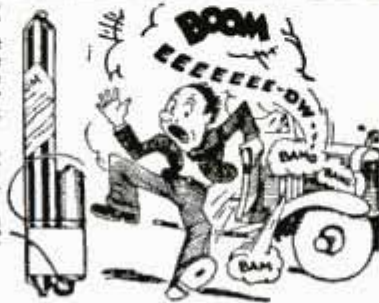
Never fails. A 64-page Book on Ventriloquism and the Ventrilo. All for 10c Postpaid. **JOHNSON SMITH & CO. Dept. 848 RACINE, WIS.**



AUTO SCARE BOMB

The Auto Bomb is attached to the motor of your car, fastening one wire to the spark plug terminal and the other wire to any part of the motor to serve as a ground. The instant your "victim" steps on the starter, there is a shrill whistle, followed by a loud bang. The driver thinks his car has exploded. Can be attached in a few seconds. Does not harm the car. Gives you more protection than an insurance policy—catches the thief in the act.

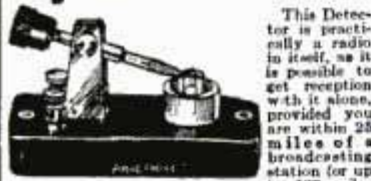
PRICE 15c Each, 3 for 40c. Shipped by Express, not prepaid.



AUTO SKUNK BOMB

Works same as above. Attached to motor of car. When driver presses foot on starter the contact sets off the Skunk Bomb. A dense cloud of smoke envelops front of car; upon raising hood a violent odor greets the driver. PRICE 20c Each, 3 for 50c. Shipped Express only.

Crystal Radio



Complete with Crystal 25c. This Detector is practically a radio in itself, so it is possible to get reception with it alone, provided you are within 25 miles of a broadcasting station (or up to 100 miles under very favorable conditions). All you need is an aerial and an ear phone and you are all set. It is completely assembled and wired, all ready for use. It has two posts, making connection much easier, also making it possible to make changes quickly. Everything complete, including the stand, crystal cup, arm with catwhisker and necessary screws, an ultra sensitive crystal of the finest grade, two terminals for wire connections mounted on handsome base—**EVERYTHING COMPLETE FOR ONLY 25 CENTS POSTPAID.** Every set tested and reception positively guaranteed.

Put PHOTOS on Silk, Cloth, Wood, Paper, Linen, etc. 25c THIS EASY QUICK WAY



It is now easy to print your snapshots and other photos on any cloth or other fabric surface—cushions, pillows, handkerchiefs, scarfs, ties, bowties, underwear, paper, wood, linen, etc. The photos are washable. Will not fade or rub off—long lasting. Easy to do. Just follow a few simple directions. One bottle is good for about 50 prints in RICH TONES. Thoroughly practical.

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A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, the lead in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. Price 10c, 3 for 25c, ppd.



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PEA-MATIC REPEATER-12 SHOT



25c Post-paid.

Here it is, boys. You can have an immense amount of fun with this new pistol. It shoots 12 to 15 ordinary peas without reloading. All you need do is to load the gun with peas, pull the trigger and keep on firing until the barrel is empty. Then reload and fire again. It is absolutely harmless and safe. Nothing to explode. These pistols sell like hot cakes, so get yours AT ONCE. Be the first boy in your town to own one of these automatic repeating pistols and be the envy of all the other kids in the neighborhood. **PRICE ONLY 25 CENTS** Holder for Peamatic 25c.

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LEARN TO DANCE THE LATEST STEPS.

Be popular this season. Really good dancers are always admired—always popular guests. Partners welcome them eagerly. With the aid of this book you can learn the newest, smartest steps without a teacher and become a dancer who is sought after. After following the instructions in this new book you won't need to make excuses when the dance music starts. Besides you'll get lots more fun out of parties and dances. If you want to become a perfect dancer, learn to dance at home this new, easy way.

WHAT THE BOOK TELLS: How to develop poise and control, how to improve your dance steps, the art of holding, how to walk to music, how to lead, how to do the latest Fox Trot Steps, Natural and Reverse Turns, the Reverse Wave and Change of Direction Steps, the Quick-step, swaying to music, how to Waltz, Backward Changes, how to do the Continental, the famous Kiss dance, the Manhattan Dance, the College Rhumba, the Carlo, etc., etc. Numerous illustrations are given, in fact everything is made so plain and simple that if you follow the instructions given, you'll be dancing before you know it.

PRICE 25 CENTS POSTPAID.

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REVOLVER STYLE



25c 50c \$1.00

Three new models now out. 25c, 50c and \$1.00. Well made and effective. Modelled on pattern of latest type of Revolver. Appearance alone enough to scare a burglar. Takes 22 Cal. Blank Cartridges obtainable everywhere. Great protection against burglars, tramps, dogs. Have it lying around without the danger attached to other revolvers. Fine for 4th of July. New Year's, for stage work, starting pistol, etc. **SMALL SIZE 4 in. long 25c. MEDIUM SIZE 5 in. long 50c. LARGE SIZE 6 in. long \$1.00. BLANK CARTRIDGES 50c per 100. HOLSTER (Cowboy type) 50c. Shipped by Express only not prepaid. Big novelty catalog 10c. JOHNSON SMITH & CO., Dept. 848, Racine, Wis.**



They Said I Couldn't Do It. But Here It Is
my 1935 OFFER
WEAR A WATCH OR DIAMOND

30 Days FREE!
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My sole aim during the year 1935 is to place as many watches and diamonds as I can in the hands of men and women throughout the world **no matter what the sacrifice!** I have cut prices to **Rock Bottom**, and in addition I am allowing you to **Make Your Own Terms.** I know that if I can distribute 5000 of these standard dependable watches and beautiful genuine diamonds through this unusual offer, that every watch and diamond will be a salesman to sell another watch or diamond. I am making this startling and unheard of offer to those who will tell their friends of this remarkable value if they find the

watches and diamonds to be all, and more, I claim them to be.

Alonzo S. Thomas, President Santa Fe Watch Co.
THINK OF IT! You can buy nationally advertised watches and diamonds—

Hamilton, Illinois, Elgin and Bulova Watches. Beautiful genuine perfectly mounted **Diamond Rings at Direct-to-You, rock bottom prices!**

You can wear one of these watches or diamonds **Thirty Days FREE**, and then you can **Make Your Own Terms.** Have you ever heard of a more astonishing jewelry offer, and from one of the country's **Largest Jewelry Firms** which has sold **High Quality watches**

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ACT AT ONCE

Here's all you have to do to cash in on this remarkable sales drive. Clip the coupon below and mail it. I will send you one of my beautiful watch and diamond catalogs **FREE.** You select the watch or diamond you want, and then write me personally, and you and I, just bet ween us, will fix terms to suit you. **DON'T DELAY—SEND NOW** When these Watches and Diamonds are gone I will with draw this offer.



Santa Fe Watch Co.
 46 Thomas Building Topeka, Kansas
 We Buy Old Gold and Sterling Silver

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 Please send me the catalog I have checked.
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More Than **100,000**
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"If NOT MORE THAN SATISFACTORY, your money returned immediately."

These Simplex Ball Bearing Jacks are miniatures of the larger Simplex Jacks that the good Hardware Dealer stocks.



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RADIOS GIVEN

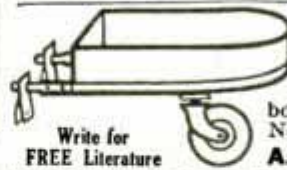
Your choice of five brand new 1935 Nationally advertised Radios given to you absolutely without cost—just for a few hours pleasant visiting among your friends and neighbors. Beautiful console and table models for **long and short wave** reception, 6 tube "Super-het," guaranteed foreign reception, and even a special radio for your car! Any one of these radios positively can be yours without a penny's cost. **Not a contest!** Write for color-illustrated circular and **Free** details of this amazing **New** plan today. **ALBERT GOULD, President, Dept. 40, 75 E. Wacker Drive, Chicago.**



NEW! SENSATIONAL SELLER

AGENTS WANTED to introduce No. d73 deal consisting of 10 blue steel safety razor blades, 1 tube of shaving cream, 1 styptic pencil and 1 Goodrich hone, all quality merchandise. It's the outstanding seller of the day. At 49¢ it's a sell out. **FREE**, wholesale catalog. Send for a copy.

SAMPLE DEAL 25c
 Doz. 21c ea. deal, Gr. 19c ea. deal
 Spors Co., 2-35 Main St., Le Center, Minn.



TRAILER COMPLETE \$39.50

Ready for road, wt. 175 lbs.; load 1/2 ton. Fit any car. Attaches to bumper bolts. 4" pneumatic tire. Body 52x42x9". No side sway. Detach one minute.

Write for **FREE Literature**
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BUILD THIS Ocean Cargo Steamer

Popular scale model of old time tramp steamer from shipbuilder's plans. Only one of many models covered in our 32-page catalog of blueprints, construction sets and fittings. Send 15¢ for this catalog today. **A. J. Fisher, 1002-1 Etowah Ave., Royal Oak, Mich.**

FLEX-O-SEAL The New *Miracle* Product for all reasonable permanent repairs for any Water Circulating System. Seals cracked Water Jackets in Automobiles. Guaranteed to do satisfying work. 8 oz. can 75¢.
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DOUBLE YOUR PROFITS with Modern Service Equipment!

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Brings business right to your door—profits pay for it. Beltless, space saving, always ready. Liberal trial to prove it.



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Earns \$50 to \$100 monthly profit, puts your shop above competition. Cuts electric bills in half. Investigate now.



ARC WELDING Easy Monthly Terms

Profits \$300 to \$400 monthly with ease, using new Simplified Welder. No special experience required. Electric, belted, gas engine drive—30-Day Trial.



20 MINUTE CAR WASHING \$70 MONTHLY

Big profits washing cars. Saves two-thirds time, does better job. Savings pay for it. Tear out and mail this ad, checking items of interest to **HOBERT BROS. Box M-45 Troy, Ohio**

30 Days Use to Prove it... No Investment Terms WRITE TODAY

New INVENTION

**3 TO 7 MILES MORE
PER GALLON**

**MOTORIST SAVES
\$180.00 a YEAR**



Saves up to Thirty Per Cent On Gas.
Provides Faster Pick-Up—More Power—
Greater Mileage and Smoother Running.

GET FREE INFORMATION

VACU-MATIC
the Carburetor Control
that "BREATHES"

AT LAST! Automotive engineers have smashed down the barriers to perfected combustion! The new VACU-MATIC solves the secret of greater power! With almost magical action, this amazing invention instantly puts new life and pep in any motor. It adds mileage to every gallon of gasoline . . . produces split-second pick-up, sensitive accelerator response, greater speed and smoother running

New—Automatic—Nothing Like It!

The self-starter—four wheel brakes—knee action—streamlining . . . and now VACU-MATIC! The greatest motor improvement of recent years! With it, engineers have achieved a practical means of balancing air and gasoline automatically for all speeds. Vacu-matic is *entirely different!* It is AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles—no carburetor adjustments necessary. Just put it on and forget it! Sharply cuts fuel wastes, saves dollars in gas costs, reduces carbon and gives your engine new pep, greater power and longer life.

Fits All Cars

VACU-MATIC is constructed of six parts, assembled and welded into one unit, correctly adjusted and sealed at the factory. Nothing to regulate. Any motorist can attach VACU-MATIC in ten minutes. Once in, its only reminder is the surge of instant power and speed it gives to the motor and the savings it affords your pocketbook.

Agents and Salesmen

If you are interested in earning unusual profits, check coupon. Exclusive territories are now being granted.

The VACU-MATIC Co.,

Wauwatosa, Wis.

SAVES GAS!

CHRYSLER

Have tried the Vacu-matic and it sure is fine. Better pick-up with a 30% gas saving.—John C. Martin, Pa.

PLYMOUTH

I am amazed at Vacu-matic performance. It's giving me 5 more miles per gallon.—Walter Zielinski, Ill.

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With Vacu-matic I have increased my mileage from 10.1 to 14.2 miles per gallon. I figure I save over \$75.00 a year in gasoline. R. K. Radtke, Wis.

ALL WELL PLEASED

Enclosed find order for 12 more. Everyone I have sold is giving from 4 to 6 more miles per gallon. I have 3 more orders for V8 Ford. Every body is well pleased.—J. O. Carll, Texas.

NASH

On my Advanced 6 Nash gained 17½% in mileage. The car will idle down to 3 miles an hour and then take gas without a complaint.—J. Showalter, Mo.

V-8 FORD

I installed both Vacu-matics and they work excellent. On my own V8 Ford I notice wonderful performance in pickup, get-away and gas saving.—Burt Burnett, Mich.

SAVES \$180 A YEAR

On my Plymouth 6 I obtained an average of 22 miles per gallon, an increase of 7 miles. This means a saving of \$15 a month or \$180 a year. F. S. Peck, Calif.

BUICK

Everything you claim about Vacu-matic is true. I now get 20 miles to the gallon. Before I was only averaging 15½ miles.—C. Constantino, Fla.

CHEVROLET

Please send me a Vacu-matic for a Model A. The mileage on my 1933 Chevrolet jumped from 18 to 22 miles per gal. with Vacu-matic.—Paul P. Haas, Mass.

MODEL A FORD

Have been using the Vacu-matic for a month. I used to get 20 to 22 miles per gal. Now I get 30 to 33 miles. It is amazing the difference it makes.—James W. Barr, Canada.

DODGE

Just completed 2310 miles on 92 gallons in my 1933 Dodge 6. This figures 25 miles while before I averaged only 20 miles per gal. on trips.—Al Fruzynna, Calif.

OLDSMOBILE

I am well pleased with Vacu-matic on our Oldsmobile. A test proved it to give 18 miles per gal. Before we considered 13 good.—Arthur Williams, N. Y.

Above are just a few of the many unsolicited letters received from Vacu-matic users.

Guaranteed Gas Savings

The VACU-MATIC proves itself on every car. It is guaranteed to give worth-while gas savings, quicker pick-up, and more power or it costs you nothing. "On a test I gained an average of 4 miles on a gallon," writes Alex Wertz. "Vacu-matic is the best I have ever tried." Clarence Rutzin—"I have tried the Vacu-matic on several tests and find that I get between 5 and 6 miles per gallon increase, have more mileage, have greater pickup."

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Learn about this remarkable device that so greatly affects the entire performance of your motor. Learn why your car is costing you extra money to operate without VACU-MATIC. See why your VACU-MATIC equipped car will leap away from traffic without sputter or hesitation. Discover a new driving thrill and enjoy the savings. Get the facts! Write today!

FREE OFFER COUPON

THE VACU-MATIC COMPANY
7617-82 W. State St., Wauwatosa, Wis.
Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

Name.....

Address.....

City..... State.....

Check here if interested in selling proposition.

The New South Bend
9-in. x 3-ft.
"WORKSHOP"
PRECISION LATHE

A High Quality
Back Geared, Screw Cutting
Metal Working Lathe

USED BY THOUSANDS OF

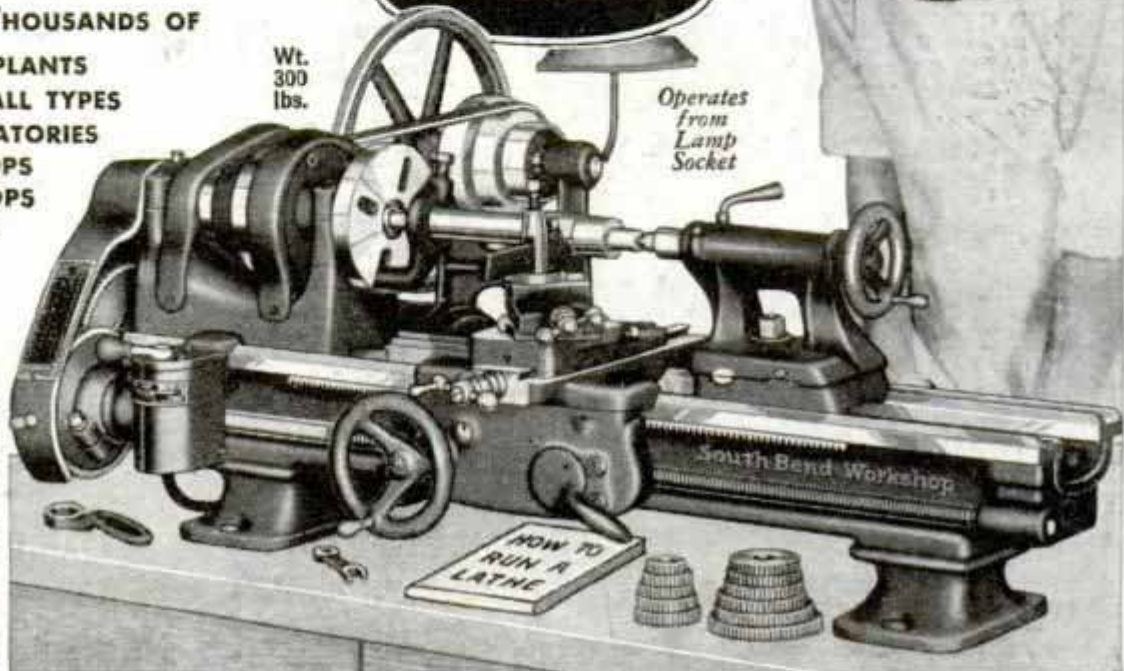
- MANUFACTURING PLANTS
- MACHINE SHOPS, ALL TYPES
- U. S. GOV'T. LABORATORIES
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THE "Workshop" is the ideal lathe for making and servicing mechanical devices of every description. It is recommended for all classes of accurate machine work; wood turning; radio, auto and electrical repair; also for model, tool and instrument work, etc.

THIS lathe turns, faces, bores, cuts screw threads, does chucking work and performs all general machining operations on cast iron, steel, other metals, woods—all kinds, hard rubber, fibre, bakelite and all other similar compositions.

FEATURES: The "Workshop" Lathe is a rigid, powerful, accurate modern lathe. It is constructed entirely of cast iron and steel and all gears are machine-cut and tested. Has six spindle speeds; cuts screw threads 4 to 40 per inch; has automatic longitudinal feed to carriage; 3/4" hole through spindle; graduated compound rest; micrometer collars on feed screws; reverse for threads and feeds; and three V-ways and one flat-way on lathe bed. Will reduce the diameter of a steel shaft 1/4" in one cut.

\$75⁰⁰ less motor drive
ON EASY TERMS
\$6⁵⁰ A MONTH
10 Months to Pay



9 1/2" swing x 3' bed "Workshop" Bench Lathe Complete with Horizontal Motor Drive 1/4 h. p. reversing motor and reversing switch. Takes work 18" between centers **\$94⁰⁰**
\$24.00 Down, Balance \$7.00 a Month—10 Months to Pay.

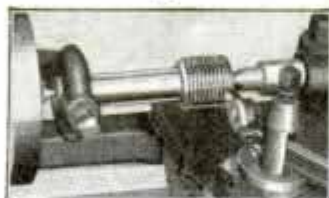
THE "WORKSHOP" is the greatest value we have ever offered. It is accurately built and recommended for the finest precision work. May also be had in 3 1/2', 4' and 4 1/2' bed lengths, countershaft and motor drive types.

30-DAY TRIAL. Send in your order and down payment today and try this genuine South Bend Lathe for 30 days in your own shop. Lathe will be shipped immediately. Satisfaction guaranteed or your money back.

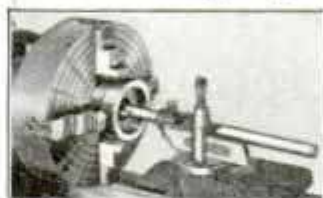
BULLETIN NO. 5-W fully describes and prices the 9" "Workshop" Lathe and all its accessories and attachments. Mailed, post paid to any address—use coupon.



Turning Down a Steel Bar.



Cutting a Screw Thread.



Boring Work, in a Chuck.



Turning a Wood Spindle.

MAIL COUPON FOR BULLETIN No. 5-W FREE

SOUTH BEND LATHE WORKS 4-35
604 E. Madison St., South Bend, Ind., U.S.A.

Please send me free quotation and illustration on the following lathe:

Swing.....Length of Bed.....
 Countershaft Drive Motor Drive

My work is.....
 9-inch "Workshop" Lathe Bulletin No. 5-W (free)
 How to Run a Lathe (160 Pages) (25c)

Name.....
Address.....
City.....State.....

South Bend Lathes are built in other sizes 9" to 18" swing with Countershaft Drive and Motor Drive. Prices of a few popular sizes are listed at right. Catalog No. 94 shows all sizes. Mailed free post-paid to any address in the world.

Popular Size Standard Change Gear Lathes	Mtr. Dr. Wt.Lbs. Crated	COUNTERSHAFT DR.			MOTOR DRIVE		
		Cash Price	Down Mnth. Pay't	Dr. Mnth. Pay't	Cash Price	Down Mnth. Pay't	Dr. Mnth. Pay't
16" x 6' Lathe	2195	\$480	\$100	\$29	\$622	\$125	\$34
16" x 8' Lathe	2355	520	108	31	662	135	37
13" x 5' Lathe	1440	352	75	25	485	100	29
13" x 6' Lathe	1490	367	75	25	500	100	29
11" x 4' Lathe	905	309	60	20	393	80	26
9" x 3' Lathe	461	225	45	16	244	50	17

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