

TELEVISION SOON SAYS DEFOREST

POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

MARCH
25 CENTS
30¢ IN CANADA

SEE PAGE 362





Luckies



They Taste Better

Copyright 1966
The American Tobacco Company

Engineers Tell Why NEW PLYMOUTH IS THE WORLD'S SAFEST LOW-PRICED CAR

First Car ever built on High-Speed Safety Principle



THE MEN who answered America's traffic problem... Chief Engineer Fred Zeder (center) and his colleagues, Carl Breer and O.R. Skelton...builders of the first High-Speed Safety Car!



Today's congested highways demand this New Kind of Car

ALL DRIVERS hit it up faster than they used to. And there are almost twice as many of them on the road today as there were 10 years ago.

That gave Plymouth engineers their cue. America needed a different kind of automobile than had yet been built... a new "high-speed safety car."



Engine is moved forward, as first introduced by famous "Airflow" cars.

So they started with the engine of the new Plymouth. They gave it greater power... for faster get-away and instantaneous response.

Yet, by improving the cooling system and the ignition timing, they actually cut gas and oil consumption 12% to 20%.

When you drive this car, everything will have a different "feel." The clutch works easier. Syncro-Silent Transmission simplifies gear shifting.

But probably the biggest change you'll notice will be in the ride. Bouncing and jouncing have been overcome by the new

Today, Plymouth is the only low-priced car with Hydraulic Brakes!

Plymouth's "Floating Ride!"

New weight distribution... new Mola Steel front springs and a sway eliminator... make you glide over the rough spots.

Any Dodge, De Soto or Chrysler dealer will gladly demonstrate the new Plymouth.

PLYMOUTH NOW ONLY \$565 *World's Safest Low-priced Car*
AND UP F.O.B. FACTORY, DETROIT!

PAT O'BRIEN

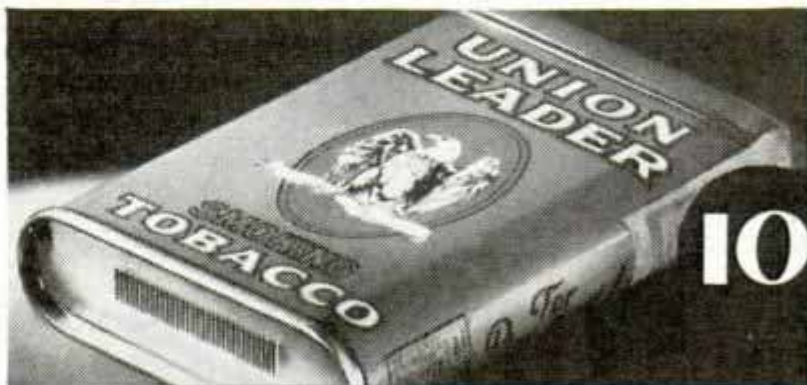
Ex-football star. Made Hollywood debut in 1929. Now featured in "Devil Dogs of the Air," a Warner Bros.' picture. A Union Leader smoker since 1930.

"Believe me
here's the best
thing a
dime
is good for"

WHO says the best things always cost most? That rule doesn't work when it comes to tobacco. Because one thin dime buys a tin of Union Leader, and if any fancy mixture can top this *old*, mellow Kentucky Burley for aroma, flavor, and downright pipe-pleasure, I've never found it, and I've smoked some pretty snooty brands! (Great for cigarettes, too.)



UNION LEADER



THE GREAT AMERICAN SMOKE

Popular Mechanics Magazine

H. H. WINDSOR, Founder

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

March, 1935

Vol. 63, No. 3

Special Features

Miracles in Television	322
<i>Breaking Them Up</i> Topsy-Turvy Drivers	322
Coloroto Section	
Speeding Up the Iron Horse	339
Comfort and Safety in New Cars	344
The Master of Movie Thrills	348
Around the World by Air	354
True Prophecies about Inventions	362
Hobbies of Hollywood Stars	372
Who Pays the Tax?—You Do	378
Making Cartoon Characters Act	386
Secrets of Lost Mines	392
Men Against the River	402
Eyes of the Air	408
Metals More Costly Than Jewels	414

(Continued on next page)

How about Exploring America?

IN certain favored places in America, nature outdid herself in producing spectacular effects, some of which rank among the scenic wonders of the world. These locations, each with its own unique features, have been set aside as national parks. Today these parks, comprising more than 8,500,000 acres, have become the playground of a nation. Why not let nature entertain you next summer by planning a vacation in one of these wonderlands? Costs are surprisingly low. An article in the April issue describes the various parks and eight pages of pictures in color depict some of the wonders awaiting you.

Next Month

WHAT is your favorite sport? If it's baseball, Max Carey, former big league manager, has an article next month on training rookies. If it's fishing, Bob Becker has a story filled with tackle tips. Or if it's bowling, Mort Lindsey, trick bowler, gives you the low-down on rolling strikes.

Boss of the Big Cats

IF you have seen a man in a cage working a score of lions and tigers, you may have reflected that, after all, the animals are trained to their parts. But who trained them? This same man spent tedious weeks with each member of his troupe. And there was more excitement in the rehearsals than in the finished performance you witnessed. An article next month takes you behind the scenes with a trainer who works a "fighting act." The story will revise a few of your beliefs about the big cats.

News Reel of the Air

YOUR radio brings you events today from distant corners of the earth as they transpire—a royal wedding in England, an aviator soaring into the stratosphere, the voice of a polar explorer. You hear the news from remote places as it occurs because science has harnessed together the short and the long waves. An article next month explains how it was done.

Why MOTORISTS WISE SIMONIZ



MAKES DULL CARS LOOK NEW AGAIN



PROTECTS THE FINISH IN ALL WEATHER



MAKES THE FINISH LAST LONGER

Be sure to insist on Simoniz and the new improved Simoniz Kleener for your car. They will quickly make the finish sparkle like new again and keep it beautiful for years.



(Contents—Continued)

the new way to use and use

- Airplanes—ship hoists to deck without stopping... 343
- Apiary—bees killed by poison spread by planes... 384
- Art—three-dimension effect is the latest... 407
- Automobiles, Accessories
 - electric heater for motor aids starting... 395
 - license plate locked with metal strip... 400
 - reflectors in license plates visible at night... 384
 - self-cleaning oil filter... 417
- Automobiles, Driving
 - crash fence to test safety... 342
 - "sandpaper" road decreases skidding... 380
- Automobiles, Repairing—gasket kit for home or garage... 411
- Automobiles, Trailer—with wheel is streamlined... 368
- Aviation
 - "blinders" aid pilots to fly by instruments... 361
 - life preserver inflated instantly... 385
 - safety kit on parachute... 412
 - seaplane models proved in tank... 382
 - wind tunnel tests plans designs... 383
- Balloon—altitude limit set at twenty miles... 420
- Battery—home-type charger for... 361
- Bicycle—trailer carries camping equipment... 411
- Blind—"talking book" in phonograph records... 384
- Bottle—breaker "digests" empty... 401
- Bridge—two-deck tunnel joins spans of... 337
- Capitol—"face lifting" to center dome... 375
- Cement—dome formed by gun... 376
- Cloth—made waterproof by using Bakelite... 391
- Clothesline—run by electric motor... 359
- Coal Dust—used as motor fuel... 376
- Communication—trans-Pacific radiophone scrambles calendar... 369
- Concrete—wire tie for form speeds building... 401
- Crime—latest weapons used by U. S... 377
- Die Making—machine adjusted for variety of work... 400
- Door—stop set in floor keeps out intruders... 368
- Electrical Apparatus—voltage tester used with sight meter... 380
- Embroidery—leaf base results in new beauty... 391
- Erosion—plants brought from Russia to stop... 398
- Explosions—sewer, may be caused by exhaust gas... 368
- Fishing—lure taken apart to change coloring... 413
- Floodlight—with own plant in portable outfit... 361
- Football—camera catches dropkick... 406
- Fruit—juices preserved by silver process... 377
- Garage
 - spinner tests auto wheels without road runs... 406
 - universal lift for towing autos... 353
- Glassware—film prevented by dishwashing compound... 347
- Globe—shows daily changes in earth's magnetism... 405
- Household Devices... 418, 419
- Inhaler—with pocket clip... 413
- Ink Bottle—with top well is always "full"... 397
- Insects—wasps may end black widow spider menace... 416
- Landscaping—model of Washington helps plan changes... 381
- Lighting—of modern churches beautifies interior... 398
- Lightning
 - apparatus operates on house current... 371
 - rods of platinum and gold on monument... 352
- Microscope—lighting improved by filter lamp... 401
- Mine—government to attack fifty-year old fire... 370
- Model
 - mill made of tiny cut stones... 375
 - motor drives plane at high speed... 417
 - railroad, develops into business... 341
 - river boat propelled by motor... 380
- Motion Picture
 - film reel of spring steel holds its shape... 343
 - model of London built in making... 347
- Motorcycle—in lion's cage latest circus thrill... 352
- Music—choir trained by sound film... 390
- Nail—self-locking, barb resists withdrawal... 391
- Photo-Electric Cell
 - guides postage stamp perforator... 390
 - takes energy from sunlight to drive motor... 371

4900

Chemical Formulae In This One Indispensable Book



In this one big book you have at your fingertips practical commercial formulae for making thousands of useful products for your own use and for profitable manufacture. Brand new, encyclopedic in scope, arranged for quick reference, it is exactly the book that every commercial chemist, large or small, has long wanted. 600 Meaty Pages of formulae including many patented, scarce and little known processes, many published for the first time. *Collected by over 60 outstanding industrial chemists and technicians—every formula proved successful by actual test and experience.*

Covers Hundreds of Industries Thousands of Products

You will find, in The Chemical Formulary, methods for making or using:

- | | | | |
|--------------------|------------------|-------------------|-------------------|
| Abrasives | Disinfectants | Hair Tonics | Patent Leather |
| Adhesives | Dyes | Incense | Photographic |
| Air Conditioning | Electrotyping | Inks | Specialties |
| Alloys | Etching | Insulation | Polish, Auto |
| Anti-rusts | Compounds | Jams and Jellies | Porcelain |
| Aromatics | Explosives | Kalsomine | Preservatives |
| Asphalt | Fertilizer | Lacquers | Printing |
| Bronze Lacquers | Fireproofing | Latex Paint | Refrigerants |
| Candles | Fireworks | Leather Polishes | Rubber, Synthetic |
| Candy Glaze | Fluxes | Liniment | Safety Glass |
| Carbonizing | Fly Killer | Liquors | Shaving Cream |
| Catalysts | Food Specialties | Lubricants | Soaps |
| Celluloid | Gems, Artificial | Matches | Solvents |
| Cement | Glass Polish | Metallic Printing | Stencils |
| Cream, Cold | Glues | Matrix, Rubber | Tooth Paste |
| Coffee Substitutes | Gold, Plating | Mirrors | Waterproofing |
| Colors for Oils | Grease | Nickel Plating | Zinc Etching |
| Decolorizing | Lubricating | Oil Sun-Tan | Zinc Plating |
| Preparations | Hair Setting | Ointments | and thousands |
| Dental Cement | Liquids | Paints | more |
| Depilatories | | | |

ONE FORMULA ALONE MAY BE WORTH HUNDREDS OF DOLLARS TO YOU

Every formula in this book is of practical, commercial value. The volume is not merely a collection of "household stunts" or experiments for the amateur, but a mine of money-making ideas for everyone concerned with commercial chemistry. In addition, you will find it a quick-reference book for a vast amount of information that you need in your daily work. Send for your copy today.

EXAMINE IT FREE *Send No Money Mail This Coupon*

D. VAN NOSTRAND CO.,
250 Fourth Ave., New York

Send me on approval The Chemical Formulary. Within 5 days after I receive it, I can return it to you and owe nothing. If I keep it I will send you \$2.00 as first payment and I will pay \$2.00 monthly thereafter for 2 months—\$6.00 in all. (5% discount for cash. Same return privilege.) (P.M. 3-35.)

Name.....
Address.....
City.....State.....
Reference.....
Address.....

THIS COMPLETE, SIMPLE, PRACTICAL COURSE FOR SELF-INSTRUCTION WILL QUICKLY GIVE YOU A Complete Mastery of MATHEMATICS



Prepare now to advance yourself to an important job by *Mathematics Training*. Mathematics is the foundation of all mechanical and scientific work, and of all business or industry based on science. Without this essential knowledge even the most capable man is left behind while others forge ahead to better jobs, bigger contracts, more money. You need mathematics to solve technical problems and to improve, speed up and check on your work and the work of others.



Now you can learn mathematics by an easy, inexpensive and time-saving method. A very simple and extremely interesting course in book form has been prepared for you by an expert who has devoted a lifetime to teaching practical men the fundamentals of this important subject.

MATHEMATICS FOR SELF-STUDY

By J. E. Thompson, B.S., A.M.,
Dept. of Mathematics,
Pratt Institute

A Complete Course and Reference Library in 5 Volumes
Arithmetic
Algebra
Geometry
Trigonometry
Calculus
1598 Pages Illustrated

These books start right from the beginning with a review of arithmetic that gives you all special short-cuts and trick methods that save countless hours of your time. Then they go right into higher mathematics and show you how simple it is when an expert explains it for you. In no time at all you will be tackling with ease the most difficult questions on this subject.

An Expert's Simplified Methods

Mr. Thompson, the author of these books, has had many years' experience in mathematical training. He presents each practical method and problem in the clearest, simplest way. He gets right down to the kind of information that you need in your daily work.

Send No Money—Mail This Coupon for FREE EXAMINATION

D. Van Nostrand Co., Inc.
250 Fourth Ave., New York

Send me MATHEMATICS FOR SELF-STUDY in 5 volumes. Within 10 days I will either return the books or send you \$2.95 as first payment and \$2.00 per month for 3 months—total \$8.95 (5% discount for cash).

Name..... **This One**
Address.....
City and S.....
Reference.....
Address..... **HBZK-8LZ-46S8**

DON'T FORGET TO ADD PYROIL TO BOTH GAS AND OIL



Your service station attendant knows the importance of adding Pyroil to each filling of gasoline, oil and grease—**winter and summer**. When severe cold handicaps your motor, Pyroil effects easy starting—conserves battery power. And when temperatures fluctuate radically, in turn thinning and "freezing" regular lubricants, Pyroil keeps damaging wear from occurring on bearings, gears, pistons, cylinders and all other vital frictional parts.

Pyroil induces unrealized comfort and convenience to winter driving. It increases power. It adds mileage. There is no finer method of protecting and increasing operation efficiency for any car—new or old—than Pyroil.

Insist on Pyroil being added to your gas, oil and grease, regularly. It saves far more than its cost. Mail coupon for further interesting facts. Manufactured and Guaranteed by Pyroil Company, W. V. Kidder, Pres., 53 Pyroil Bldg., LaCrosse, Wis., U. S. A.

Pyroil has been tested by Popular Mechanics and is used by Popular Mechanics' presses and publishing equipment.

DISTRIBUTORS—SALESMEN

Check square in coupon below and mail for facts of one of the greatest sales and distribution Opportunities of today, for you. It will pay you to do this—at once.

PYROIL COMPANY
53 Pyroil Bldg., LaCrosse, Wis.



Please send me at no obligation, further interesting Pyroil facts.

Please send Distributorship Opportunity facts.

Name.....

Address.....

City.....

County.....

State.....



Grease, Pyroil, is protected by U. S., Canadian and foreign patents issued to W. V. Kidder, its inventor. Identified by lithographed, factory-sealed cans bearing signature below. Not sold under any other name.

W. V. Kidder

Simply ADD TO GAS OIL AND GREASE

(Contents—Continued)

Photography
border mask is printed with negative.....377
outfit makes microphotos as easily as snapshots.381
Police—accuracy in night shooting improved by light beam413
Pump, Electric—prevents flooding basement.....360
Radio—practical suggestions425
Radio, Apparatus
how to chat over a light beam.....422
ribbon microphone is directional426
Radio, Broadcasting—crystal microphone and carbon plate tubes424
Radio, Receiver
light column aids in tuning426
sixteen-tube set covers five wave bands426
Railroad
brakes set by track magnet342
German engine shaped like bullet338
locomotive is streamlined342
track walker aided by mirrors359
twin locomotive and coaches run on monorail..400
wrench on wheels tightens nuts353
Saw—portable, attachment converts to new uses...398
Scissors—sharpener uses both file and stone.....397
Service Stations
revolving, saves time of motorists405
weather-warning indicator used by417
Ships
cone impellers eliminate steering gear399
wooden burned to salvage metal396
Soldering Torch—kit works on gas from tanks...397
Sound—waves from big guns travel in arc.....385
Telephone—without battery has many uses.....338
Television—film, with mirrored lenses421
Tennis—robot used in practice420
Transportation—three-wheel car used in Japan...360
Tree—insulated by bark, resistant to fire.....369
Water—pocket-size purifier uses batteries395

Sunlight motor 371

AMATEUR MECHANICS

Bathtubs—old, method of modernizing.....438
Battery—brass spring facilitates connecting wires.430
Bit—rubber pad improves brace432
Bootjack—an efficient456
Bottle—inner tube provides grip on large456
Boxes, Cardboard—method of closing430
Cabinet—door used as lemon squeezer.....455
Cellophane
a glue for.....457
used as banjo head432
Chalk—helps when filing soft metals461
Clothes Reel—made from barrel hoop450
Coaster Wagon—push bar controls461
Coins—small, mailing safely430
Containers—for salt and coffee, improving.....455
Dipper—combined with funnel has many uses...430
Door—combined bumper and stop438
Eave Spout—wire prevents birds from roosting...456
Electrical Apparatus—reducing amperage capacity of small fuses438
Flag—coat hook serves as bracket436
Floors—refinishing varnished451
Flowers
hairpins hold in wide mouth vase430
your living room garden434
Furnace—sheet-metal fins attached to smoke pipe warm basement456
Furniture
latest in folding screens458
night table assembled without mortising.....449
Glass—cut with phonograph needle432
Glue—nursing bottle as spreader448
Guns—mixture, homemade, for cleaning.....462
Ice Scooter—you travel fast with this437
Kitchen—winter, a novel431
Model—belt and pulley arrangement for planes...450
Model Making—tubular rivets serve as bearings...432

(Continued to page 8A)

Accountancy Home-Study

made interesting and practical thru problem method

YOU know as well as we do that Accountancy fits many men for positions that pay three and five and ten thousand dollars a year—gives many other men unusual opportunity to start a profitable growing business of their own.

You probably realize also that—because of the new state and federal legislation—the accounting profession faces now and for the next few years the greatest opportunity it has ever had.

The only question is—just how practical is it for you to train yourself adequately in Accountancy through home study?

And the answer lies in the LaSalle Problem Method.

For this modern plan of training not only makes Accountancy study at home thoroughly practical but makes it interesting as well.

And here's how:

You Learn by Doing

Suppose it were your privilege every day to sit in conference with the auditor of your company or the head of a successful accounting firm. Suppose every day he were to lay before you in systematic order the various problems he is compelled to solve, and were to explain to you the principles by which he solves them. Suppose that one by one you were to work those problems out—returning to him every day for counsel and assistance—

Granted that privilege, surely your advancement would be faster by far than that of the man who is compelled to pick up his knowledge by study of theory alone.

Under the LaSalle Problem Method you pursue, to all intents and purposes, that identical plan. You advance by solving problems.

Only—instead of having at your command the counsel of a single individual—one accountant—you have back of you the organized experience of the largest

business training institution in the world, the authoritative findings of scores of able accounting specialists, the actual procedure of the most successful accountants.

Thus—instead of fumbling and blundering—you are coached in the solving of the very problems you must face in the higher accounting positions or in an accounting practice of your own. Step by step, you work them out for yourself—until, at the end of your training, you have the kind of ability and experience for which business is willing and glad to pay real money—just as it was glad to pay these men.*

Five Men Who Tested and Proved It for You

For instance, there was the man who started Accountancy training with us in 1916. After a short period of study, he took a position as bookkeeper for a year, and then became accountant for a leading automobile manufacturer—with two bookkeepers under him. Today he is auditor of one of the foremost banks in his state and his salary is 325 percent larger than when he started training.

He writes, "My training is the best investment I've ever made, showing a cash value running into five figures."

And the young clerk, earning \$75 a month eleven years ago and now getting many times that as general auditor for an outstanding, nation-wide organization. Within six months after he began our training, he was earning \$125 a

month and within four years, he was earning \$250.

Do you wonder that he writes, "While LaSalle ads once seemed like fairy tales to me, now I know from personal experience that they are true."

Or let us tell you about two men—one a stenographer and the other a retail clerk—neither of whom knew more than the simplest elements of bookkeeping. One is now the comptroller and the other the assistant comptroller of a large company.

"LaSalle training in Higher Accountancy," write both, "was the important factor in our rapid climb."

And if you are thinking about the C. P. A. degree and a public accounting business of your own, read about the pharmacist who was earning \$30 a week eleven years ago when a LaSalle registrar secured his enrollment for Accountancy training. Eight months later he left the drug store to take a bookkeeping job at \$20 a week—less money but larger opportunity. Three years later he passed the C.P.A. examination and a year later yet he was earning \$5,000 a year. Now he has his own highly successful public accounting firm for which he says, "My LaSalle training has been largely responsible."

One-Tenth of All C. P. A.'s Are LaSalle Trained

If you want still more proof, remember that 1,200 C. P. A.'s—approximately one-tenth of all those in the United States who have ever passed the difficult examination for this coveted degree—are LaSalle trained.

And knowing these facts, ask yourself if there can be any further question about the practicability of this training for you—ask rather if the real question is not about the size of your own ambition and the quality of your determination.

For Accountancy is no magic wand for the lazy or the fearful or the quitter—it offers success only to the alert adult who has the courage to face the facts and the will to carry on till the job is done.

If you are that individual, the coupon below, filled out and mailed, will bring you free the information that can open up to you the future of which you have dreamed—ability and income and success.

Is it not worth getting that information?



Send for
This Book

*Names and addresses given on request.

Silver Anniversary
1908-1933

LaSalle Extension University

25 years of service to
over 800,000 members

LaSALLE EXTENSION UNIVERSITY, Dept. 364-HR, Chicago, Ill.
Please send me, free of all cost or obligation, your 64-page, illustrated book, "Accountancy, the Profession That Pays," telling about the profession of accountancy and your training for success in that field.

Name.....
Address..... City.....
Position..... Age.....

When writing to advertisers please mention Popular Mechanics





"He's the best paid man here because he is the best informed"

"HE HAS an amazing amount of information at his finger-tips, on all kinds of subjects. Many of them relate directly to this business. Everybody consults him. He is indispensable to us.

"Each day he devotes a fixed amount of his time at home, studying the Encyclopaedia Britannica. 'I wouldn't trade that set of books for all the other business books in the world,' he said."

You will say the same thing! You can own these books for a small initial payment and balance on easy terms. Send the coupon today.

ENCYCLOPAEDIA BRITANNICA, INC.
3301 Arthington St., Chicago, Ill.
Box 68a-3

Gentlemen: Without obligation, please furnish me full information on latest edition of the Encyclopaedia Britannica.

Name _____

Address _____

City _____ State _____

(Contents—Continued)

Nail Set—repairing worn end	456
Photography	
chain is substituted for tripod	429
improving your camera ground glass	450
print straightener for home use	439
saving photoflood bulbs used in an enlarger	457
Radio—aerial posts held with shelf brackets	448
Refrigerator—rubber band helps prevent sticking of ice-cube trays	455
Roofing—roll, cut with ice pick	438
Rubber Bands—substitute for trouser hangers	448
Salt Shaker—rubber band keeps cap from sticking	436
Sandpaper—in edge of bench top furnishes work	457
Saw—circular, scale on miter gauge aids in cutting	462
Seesaw—operated by one child	433
Sewing Machine—needle cleaned with emery paper	448
Ship Model—speed clamp holds rigging	449
Shoe—preventing heel catching in trouser cuffs	438
Spectacles—rubber tubing protects ears	461
Steak Maul—utilizes hack-saw blades	436
Stove—kitchen, helpful ideas around a	439
Telephone—flashlight illuminates dial	461
Towel Hanger—made from spring wire	432
Toys—tubular rivets serve as bearings	432
Tray—serving trays, two simple	427
Vaporizer—homemade, uses an electric bulb	448
Window	
concealed board holds draperies	433
frosting glass with paint	436
Wire Solder—patterns simplify bending stiff wire	436
Yacht—"Vanja," model Class A racing	440

SHOP NOTES

Adhesive— <u>that sticks celluloid to metal or wood</u>	480
Artists— <u>two useful ideas for</u>	473
Automobiles, Accessories	
<u>attachment lubricates speedometer cable</u>	479
<u>deflector for exhaust pipe</u>	479
Automobiles, Repairing	
eliminating knock in cam shaft on Model-A	
<u>Fords</u>	477
<u>generator troubles, avoiding</u>	475
<u>installing cylinder head gaskets</u>	478
<u>screw eyes as terminals on spark-plug cable</u>	478
shifting gear on flywheel prevents starter locking	477
<u>tool holds piston to install new rings</u>	479
<u>tools carried on radiator tie rod</u>	478
Automobiles, Tires	
<u>altered valve-stem cap deflates</u>	477
<u>drop-center rims cause punctures</u>	478
Automobiles, Trucks— <u>garden hose protects back of truck cab</u>	478
Bottles— <u>compound for cleaning</u>	467
Buckets— <u>skid-chain links used as bails on improvised</u>	466
Draftsmen— <u>two useful ideas for</u>	473
Electrical Apparatus	
adapting large growler to armatures of small motors	466
<u>tool for changing bulbs in high ceilings</u>	467
Garage	
<u>tool belt quickly removed or attached</u>	477
<u>transmission stand made of pipe</u>	479
Grease Cup— <u>used as dispenser of prussian blue</u>	478
Lath— <u>tool aids in sawing strips</u>	474
Measuring Tools— <u>correct use key to good workmanship</u>	468
Mimeograph— <u>guide aids in tracing arcs on stencils</u>	466
Model Making— <u>improvement in crankshafts</u>	467
Pencils— <u>colored, how to make write on glass</u>	473
Poultry	
<u>brooder, electric underheat</u>	463
remodeling buildings for uses as brooder houses	466
Rivets— <u>auto valve used to cut</u>	480
Safety Guards— <u>tubing in floor, supports</u>	474
Vegetables— <u>underground heating system for</u>	474
Wingnut— <u>an improvised</u>	474

"WHICH ONE

TWO DOLLAR WAIT.
 AUTOMOBILE Apply Hartman Co., Doan & Barber with can, good w. nison st. Lof. 1700.

en... with... opportunity to...
 must qu... character...
 stability...
 and be...
 of... Philadelphia

NA...
 Over Chicago...
 for r...
 mber...
 altera...
 bury...
 Prop...
 found...
 Inq...
 Expe...
 ward...
 metrist...
 town...
 a high...
 red, Pr...
 or...
 silk ribb...
 0-room av

MALE HELP WANTED

CANVASSERS...
 CHEV...
 CIGAR...
 COOK...
 DRIVER-Salesman to...
 No phone calls...
 also be...
 please; only...
 salary



MALE HELP WAN...
 YOUNG MAN to travel and to...
 calculation work, big commis...
 and transportation expense paid...
 son Hotel Lormondict No about...
 YOUNG MAN, over 20, neat...
 high school education, for pers...
 (thou... retail...)

MALE HELP WAN

MALE HELP WANTED

SALESMEN

GETS THE JOB?"

● **THEY'RE ALIKE IN EVERYTHING — EXCEPT JUST ONE THING!**

They're all intelligent men. All loyal and ambitious. Willing and anxious to work. But one factor—and one factor alone—makes one of these applicants the logical man for the job!

HE HAS TRAINING! He's ready to step in and go to work. He invests a capital stock of

spare-time training in his employer's business.

Like him, today thousands of I. C. S. trained men are getting the "breaks" in this important business of landing jobs. They are turning spare time into ready cash. They're equipping themselves for the jobs at hand and bigger jobs.

Mastering an I. C. S. course is not easy—it takes work and determination, but if you really have a fighting heart, this coupon is the first shot in a winning battle!

INTERNATIONAL CORRESPONDENCE SCHOOLS

"The Universal University"

BOX 5558-H, SCRANTON, PENNA.

Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject before which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

- | | | | | |
|---|--|--|---|--|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Reading Shop Blueprints | <input type="checkbox"/> Automobile Mechanic | <input type="checkbox"/> Air Brakes | <input type="checkbox"/> R. R. Signalman |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Telegraph Engineer | <input type="checkbox"/> Plumbing | <input type="checkbox"/> Highway Engineering | <input type="checkbox"/> Chemistry |
| <input type="checkbox"/> Building Estimating | <input type="checkbox"/> Telephone Work | <input type="checkbox"/> Heating | <input type="checkbox"/> Pharmacy | <input type="checkbox"/> Coal Mining Engineer |
| <input type="checkbox"/> Wood Millworking | <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Ventilation | <input type="checkbox"/> Navigation | <input type="checkbox"/> Air Conditioning |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Sheet Metal Worker | <input type="checkbox"/> Boilermaker | <input type="checkbox"/> Textile Overseer or Supt. |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Machinist | <input type="checkbox"/> Steam Engineer | <input type="checkbox"/> Cotton Manufacturing | <input type="checkbox"/> Woolen Manufacturing |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Toolmaker | <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Woolen Manufacturing | <input type="checkbox"/> Agriculture |
| <input type="checkbox"/> Development and Protection of New Products | <input type="checkbox"/> Patternmaker | <input type="checkbox"/> Steam Electric Engineer | <input type="checkbox"/> Fruit Growing | <input type="checkbox"/> Poultry Farming |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> Heat Treatment of Metals | <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Radio | <input type="checkbox"/> Marine Engineer |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Bridge Engineer | <input type="checkbox"/> Refrigeration | | |
| <input type="checkbox"/> Welding, Electric and Gas | <input type="checkbox"/> Bridge and Building Foreman | <input type="checkbox"/> R. R. Locomotives | | |
| | <input type="checkbox"/> Gas Engines | <input type="checkbox"/> R. R. Section Foreman | | |
| | <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> R. R. Bridge and Building Foreman | | |
| | <input type="checkbox"/> Aviation Engines | | | |

BUSINESS TRAINING COURSES

- | | | | |
|--|---|---|--|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> C. P. Accountant | <input type="checkbox"/> Service Station Salesmanship | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Office Management | <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> First Year College | <input type="checkbox"/> Grade School Subjects |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Secretarial Work | <input type="checkbox"/> Business Correspondence | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Spanish | <input type="checkbox"/> Lettering Show Cards | <input type="checkbox"/> College Preparatory |
| <input type="checkbox"/> Accountancy | <input type="checkbox"/> French | <input type="checkbox"/> Stenography and Typing | <input type="checkbox"/> Illustrating |
| <input type="checkbox"/> Cost Accountant | <input type="checkbox"/> Salesmanship | <input type="checkbox"/> Civil Service | <input type="checkbox"/> Cartooning |
| | <input type="checkbox"/> Advertising | <input type="checkbox"/> Mail Carrier | |

Name.....Age.....Address.....

City.....State.....Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

When writing to advertisers please mention Popular Mechanics



draw me!

COMPETE FOR AN *Art* SCHOLARSHIP

Copy this girl and send us your drawing—perhaps you'll win a COMPLETE FEDERAL COURSE FREE! This contest is for amateurs, so if you like to draw do not hesitate to enter.

Prizes for Five Best Drawings—FIVE COMPLETE ART COURSES FREE, with drawing outfit. (Value of each course, \$190.00.)

FREE! Each contestant whose drawing shows sufficient merit will receive a grading and advice as to whether he or she has, in our estimation, artistic talent worth developing.

Nowadays design and color play an important part in the sale of almost everything. Therefore the artist, who designs merchandise or illustrates advertising has become a real factor in modern industry. Machines can never displace him. Many Federal students, both men and girls who are now commercial designers or illustrators capable of earning from \$1000 to \$5000 yearly have been trained by the Federal Course. Here's a splendid opportunity to test your talent. Read the rules and send your drawing to the address below.

RULES FOR CONTESTANTS

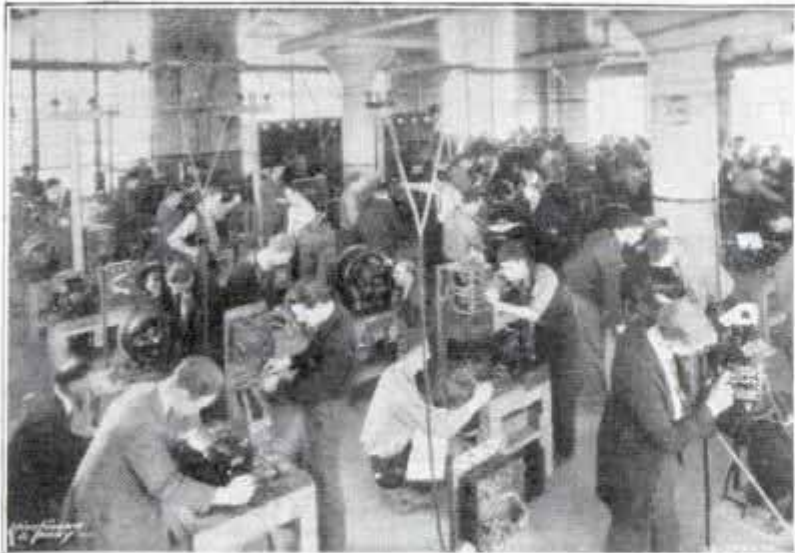
This contest open only to amateurs, 16 years old or more. Professional commercial artists and Federal students are not eligible.

1. Make drawing of girl 5 inches wide, on paper 6½ inches square. Draw only the girl, not the lettering.
2. Use only pencil or pen.
3. No drawings will be returned.
4. Write your name, address, age and occupation on back of drawing.
5. All drawings must be received in Minneapolis by Feb. 25th, 1935. Prizes will be awarded for drawings best in proportion and neatness by Federal Schools Faculty.

◀ FEDERAL SCHOOLS ▶ INC ▶

Dept. 3135 Federal Schools Bldg., Minneapolis, Minn.

When writing to advertisers please mention Popular Mechanics



STUDENTS BUSY AT WORK IN GREAT COYNE SHOPS

Learn ELECTRICITY

Pay For Your Training After You Graduate

Yes sir! I mean just what I say. There are no strings to this offer. I'll train you in 90 days, right here in the Great Coyne Shops—NOT BY CORRESPONDENCE—but by real electrical work on real electrical machinery. And you won't have to start paying your tuition until two months after you graduate, and even then you'll have over a year to complete your payments.

This Is the Greatest Offer Ever Made by Any School

THERE are absolutely no conditions attached to this offer. I MEAN EXACTLY WHAT I SAY. You get the full and complete training of the world's oldest and largest Practical Electrical School—AND YOU DON'T START PAYING YOUR TUITION UNTIL 2 MONTHS AFTER YOU GRADUATE! How can I do it? Because I really run no risk. The type of fellow who is ambitious enough to make a little effort to get ahead, is honest. IF YOU ARE AMBITIOUS ENOUGH TO SEND IN THE COUPON TO THIS AD, and then SPEND JUST THREE MONTHS IN LEARNING ELECTRICITY, I'LL TRUST YOU for the TUITION.

Learn By Doing In 90 Days

Lack of experience—age or advanced education bars no one. I don't care if you don't know an armature from an air brake—I don't expect you to! It makes no difference! Don't let lack of money stop you. Most of the men at Coyne have no more money than you have. That's why I have worked out my offers.

MANY EARN While LEARNING

If you need part-time work to help pay your living expenses and will tell me your problems I may be able to help you as I have thousands of others. Then, in 12 brief weeks, in the great roaring shops of Coyne, I train you as you never dreamed you could be trained . . . on one of the greatest outlays of electrical apparatus ever assembled . . . real dynamos, engines, power plants, auto. switchboards, transmitting stations . . . everything from doorbells to farm power and lighting . . . full-sized . . . in full operation every day!

TRAINING By Actual Work

No dull books, no baffling charts, no classes, you get individual training . . . all real actual work with only the theory you will need. Building real batteries . . . winding real arma-



Prepare for Jobs Like These
Here are a few of hundreds of positions in the electrical field. Our free employment bureau gives you a lifetime employment service.
ARMATURE EXPERT
SUBSTATION OPERATOR
AUTO ELECTRICIAN
INVENTOR
MAINTENANCE ENGINEER
SERVICE STATION OWNER
RADIO EXPERT

tures, operating real motors, dynamos and generators, wiring houses, etc. That's a glimpse of how we help to make you a master electrician, and fit you to qualify for jobs leading to the biggest pay.

Jobs-Pay-Future

"Two weeks after graduation I received a splendid job. The main consideration given my application was that I was a Coyne Trained man," reports Harold Soucy of Illinois. "I wish to thank your Employment Manager for securing this position for me," writes Albert Yagon, "he sent me out to this Company the first day and I was employed there immediately." And I could go on quoting from hundreds of letters of successful Coyne Trained Men. What they have done, you should be able to do!

Electric Refrigeration

Right now I'm including my big new Electric Refrigeration course at no extra cost.

GET THE FACTS

Coyne is your one greatest chance to get into electricity. Every obstacle is removed. This school is 36 years old—Coyne training is tested—proven beyond all doubt—endorsed by many large electrical concerns. You can find out everything absolutely free. Simply mail the coupon and let me send you the big, free Coyne book of 150 photographs . . . facts . . . jobs . . . salaries . . . opportunities. Tells you how many earn expenses while training and how we assist our graduates in the field. This does not obligate you. So act at once. Just mail coupon.

Get This
FREE
Book



Now In Our New Home

This is our new fire-proof modern home wherein is installed thousands of dollars' worth of Electrical equipment of all kinds. Every comfort and convenience has been arranged to make you happy and contented during your training.



COYNE H. C. LEWIS, PRESIDENT FOUNDED 1899
ELECTRICAL SCHOOL
500 S. Paulina St., Dept. 35-72, Chicago

H. C. LEWIS, President
Coyne Electrical School, Dept. 35-72
500 S. Paulina St., Chicago, Ill.

Dear Mr. Lewis:— Without obligation send me your big free catalog and all details of Free Employment Service and your new Electric Refrigeration course, also tell me all about your "Pay After Graduation Offer."

Name

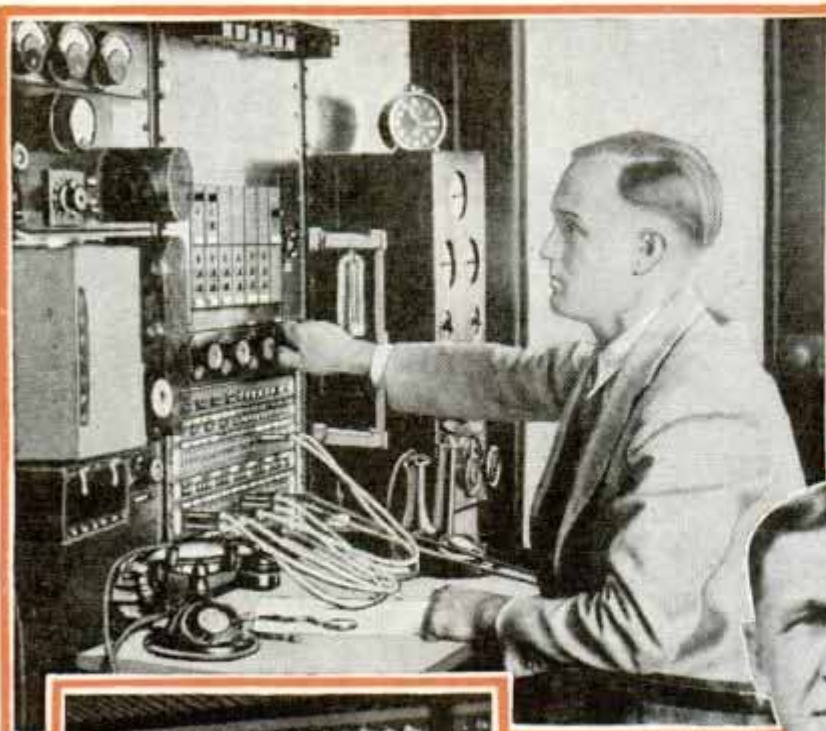
Address

City..... State.....

BE A

MANY

I'll train you



If you are dissatisfied with your present job—if you are struggling along in a rut with little or no prospect of anything better than a skinny pay envelope—**Clip and Mail the Coupon NOW!** Get my big 64-page **FREE BOOK** on the opportunities in Radio. Read how quickly you can learn at home in your spare time to be a Radio Expert—what good jobs my graduates have been getting—real jobs with real futures.

Real Opportunities Ahead in Radio for Trained Men

It's hard to find a field with more opportunities awaiting the trained man. Why in 1933—one of the worst depression years—the Radio industry sold \$213,000,000 worth of sets and parts! Radio set sales **INCREASED 45%**—tube sales **INCREASED 25%**! Over 300,000 people worked in the industry!

It's a gigantic business, even in the worst business years. And look what's ahead! Millions of sets are going out of date annually. 18,000,000 sets are now in operation on which over \$200,000,000 are spent **EACH YEAR** for repairs, servicing, new tubes, etc. Broadcasting stations pay their employees (exclusive of artists) approximately \$23,000,000 a year. Advertisers pay 600 great Broadcasting Stations over \$75,000,000 a year for Radio time and talent. A few hundred jobs that paid \$40, \$60, \$75 a week 20 years ago have grown to thousands. These figures are so big that they're hard to grasp. Yet they're all **TRUE!** Here's a new industry that has grown to be a commercial giant! No wonder great business leaders predict a brilliant future for the great and growing Radio industry.



Broadcasting Stations

Employ managers, engineers, operators, installation and maintenance men for jobs paying up to \$5,000 a year.

Loud Speaker Apparatus

Installation and service work is another growing, money-making field for trained Radio men.

J. E. SMITH President National Radio Institute

The man who has directed the Home Study Training of more men for the Radio industry than any other man in America.



Set Servicing

Spare time set servicing pays many N. R. I. men \$5, \$10, \$15 a week extra. Full time men make as much as \$40, \$60, \$75 a week.

Sample Lesson FREE

Take advantage of this offer. Mail the coupon *Right Now*, and I'll send you **FREE** a Sample Lesson that only my students have received in the past. This fascinating book, "A Bird's-Eye View of Radio," is just packed and jammed with information about this growing industry. The reason I am willing to send it to you is to **PROVE** that my Course is simple, easy to understand, and enjoyable to study. I want to **SHOW YOU** that I can train you, just as I have **ALREADY** trained thousands of men. Many of them with not even a grammar school education, and no Radio or technical experience, have become Radio experts, and now earn two or three times their former pay. Mail the coupon **NOW**.

Some Other Jobs N.R.I. Trains Men For

- Radio Service Business of my own
- Spare time Radio Service work
- Retail Sales of Radio Sets and Equipment
- Service Expert for Retail Stores
- Broadcasting Station Operator
- Aircraft Radio Operator
- Ship Radio Operator
- Loud Speaker Systems, Installation and Service
- Auto-Radio Installation and Service
- Television Station Operator
- Commercial Radio Station Operator

You Get PRACTICAL EXPERIENCE with RADIO EQUIPMENT I GIVE YOU



I'll show you how to use my special Radio Equipment for conducting experiments and building circuits used in such well-known sets as Westinghouse, General Electric, Philco, R. C. A., Victor, Majestic and others. You work out with your own hands many of the things you read in our lesson books. This 50-

50 method of training makes learning at home easy, interesting, fascinating,

intensely practical. You learn how sets work, why they work and how to make them work.



When writing to advertisers please mention Popular Mechanics

RADIO EXPERT

MAKE \$40 \$60 \$75 A WEEK

at home • Mail coupon for FREE PROOF

Get Into This Field With a Future

There's opportunity for you in Radio. Its future is certain. Television, short wave, police Radio, automobile Radio, loud speaker systems, aviation Radio, marine Radio—in every branch developments and improvements are taking place. Here is a real future for additional thousands of trained men who really know Radio. Get the Training that opens the road to good pay and success! Send me the Coupon NOW—and get full particulars on how easy and interesting I make learning at home. Read the letters from graduates who are today earning real money in this fascinating industry.

Learn At Home In Your Spare Time To Be a Radio Expert

Hold your job. There is no need for you to leave home. I will train you quickly and inexpensively in your spare time. You don't have to be a high school or college graduate. My Course is written in a clear, interesting style that most anyone can grasp. I give you practical experience under my 50-50 method of Training—one-half from Lesson Books and one-half from practical experience with equipment I give you. This unique and unequalled method has been called one of the greatest developments in home study Radio training.

Many Make \$5, \$10, \$15 a Week Extra in Spare Time While Learning

My big 64-page book gives proof that many make \$5, \$10, \$15 a week extra servicing sets in their spare time soon after enrolling. I give you plans and ideas that have made good spare time money—\$200 to \$1,000 a



year—for hundreds of fellows. My Course is famous as "the one that pays for itself."

Money Back If Not Satisfied

I am so sure that N. R. I. can train you at home satisfactorily that I will agree in writing to refund every penny of your tuition if you are not satisfied with my Lesson and Instruction Service upon completing your Course. You'll get a copy of this agreement with my Book.

64-Page Book of Information Free

Get your copy TODAY. It's free to any ambitious fellow over 15 years old. It tells you about Radio's spare time and full time job opportunities; it tells you about my Course; what others who have taken it are doing and making. Find out what Radio OFFERS YOU—without the slightest obligation. MAIL THE COUPON in an envelope, or paste it on a penny postcard NOW.

**J. E. SMITH, President
NATIONAL RADIO INSTITUTE
Dept. 5CP, Washington, D. C.**



Clears \$4,500 In 18 Months

"Before taking your Radio Course I was making \$18 a week. I came here three years ago. In about 18 months I made about \$4,500 in Radio. I cannot say too much for the wonderful help I have received from N. R. I."—**NOEL W. RAY**, 619 Broad St., Gadsden, Alabama.



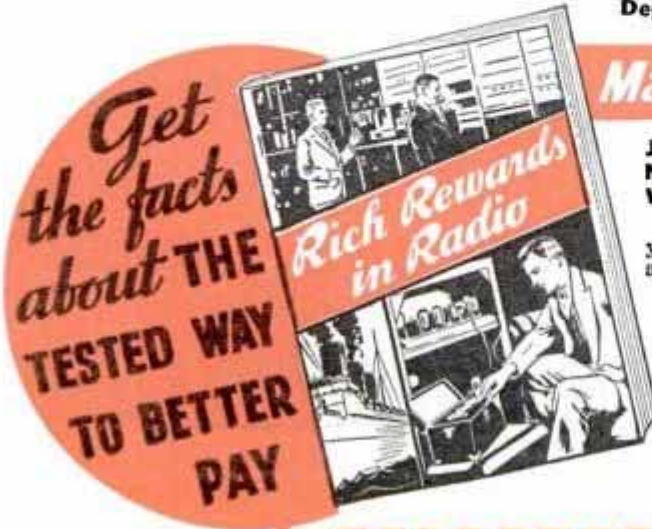
Spare Time Work Pays \$18 A Week

"I do only spare time Radio work and average \$18 a week. People who in good times would buy a new Radio, now have the old one fixed."—**STEPHEN J. DRAPCHATY**, 407 Wunderlich Avenue, Barberton, Ohio.



Now Owns Own Business

"If I had not taken your Course I would be digging ditches instead of running my own business. One week I made \$75 on repairing alone, and this doesn't count sales. If a fellow wants to get into Radio, N. R. I. is the starting point."—**R. S. LEWIS**, Modern Radio Service, Pittsfield, Ohio.



Mail Now for FREE 64 Page Book

**J. E. SMITH, President
National Radio Institute, Dept. 5CP
Washington, D. C.**

Dear Mr. Smith: Without obligation send me the Sample Lesson and your free book about spare time and full time Radio opportunities, and how I can train for them at home in spare time.

(Please print plainly)

R

NAME.....AGE.....

ADDRESS.....

CITY.....STATE.....

For MORE PAY learn **DRAFTING** FROM AN ENGINEER

Learn by mail at home

Prosperity is coming. Be prepared for a bigger, better job. Get the training NOW.



These **TOOLS** and Other **EQUIPMENT** Given When You Start



Write

for my valuable book, "Success in Draftsmanship"—free. See coupon below.

I'LL TRAIN a number of selected students as practical Draftsmen. Yes, I furnish you all tools and a drawing table. And I'll teach you in a very short time by mail in your spare time until you actually have a desirable draftsman's position so that you are fully satisfied with your easy work and better pay.

Trained men needed now; jobs pay \$50 a week or more; be prepared!

"I will train you by mail at your home."

Engineer Dobe
Est. since 1900

Keep the job you have now while training. I'll tell you how to start earning extra money a few weeks after beginning my training. Get started now. Send coupon.

Jobs Open NOW!

in these and many other great industries.

Automobile industry is experiencing a wonderful improvement.
Motor Bus building is becoming a leading world industry.

Aviation is expanding to enormous proportions.

Steel Construction is upward bound.

Electricity is getting a bigger market every day.

Machinery building faces revival. No machinery can be built without plans drawn by a draftsman.

Building of stores, homes, factories, office buildings. No structure can be erected without plans by a draftsman.

START NOW and get the training. Be ready. Send the coupon NOW.

FREE BOOK COUPON

ENGINEER DOBE, Div. 33-73, Libertyville, Ill.

Send me your free book "Successful Draftsmanship" and please explain how you will assist me to a good position as a draftsman.

Name..... Age.....

Address.....

HOME-STUDY BUSINESS TRAINING

Your opportunity can never be bigger than your preparation. Prepare now and reap the rewards in earlier and larger success. Free 64-Page Books Tell How. Write now for book you want, or mail coupon with your name and address in margin today.

- Higher Accountancy
- Mod. Salesmanship
- Traffic Management
- Law: Degree of LL.B.
- Commercial Law
- Industrial Mgm't
- Banking and Finance
- Stenotypy
- Rail. Station Mgm't
- Paper Salesmanship
- Business Mgm't
- Business Corres.
- Credit and Collection Correspondence
- Modern Foremanship
- Personnel Mgm't
- Expert Bookkeeping
- C: P. A. Coaching
- Business English
- Effective Speaking

LA SALLE EXTENSION UNIVERSITY
Dept. 364-R Chicago

SAVE 1/4 to 1/2 on TEXT and REFERENCE BOOKS

TEACHERS:
FREE desk copy with order of ten or more.

Write for Price List on any book desired. 500 pages of printed price lists.

New Books also cheaper. For Text or LIBRARY purposes good used books serve as well as new. Save depreciation. One million volumes in stock. Every text book used.

College Book Co.
[Established 1902]
Dept. P M Columbus, Ohio

WE ALSO BUY BOOKS

ELECTRICAL ENGINEERING

A BROAD, basic, intensive course for men of limited time, complete in one school year. Approved by educators, endorsed by industry. Modern buildings. 41 years' successful experience. Catalog on request.



BLISS ELECTRICAL SCHOOL
133 Takoma Ave., Washington, D. C.

Be a DENTICIAN



Learn at home to make Crowns, Plates, Bridgework, etc., for Dentists. Easy, practical way to learn mechanical dentistry at home in spare time. Full equipment of tools and materials included with course FREE. Low tuition. Easy terms. Write for FREE BOOK about this money-making profession that is not affected by "machine age."

McCARRIE SCHOOL OF MECHANICAL DENTISTRY
207 N. Broad St., Dept. 608, Philadelphia, Pa.

How To Secure A Government Position

Why worry about strikes, layoffs, hard times? Train now for a Government job. Many examinations expected! Increased salaries, steady work, travel, good pay. Let me help you become a Railway Postal Clerk, Post Office Clerk, City Mail Carrier, Rural Carrier—or help you get into any other Government job you want. I was a Secretary Examiner of Civil Service Commission for 8 years. Have helped thousands.

Now FREE My 32-page book tells about the jobs open—and how I help to qualify you to get one. Send the coupon for your copy TODAY.

A. R. Patterson, Civil Service Expert
PATTERSON SCHOOL, 83 Case Bldg., Rochester, N. Y.
Please send me without obligation, your free book "How to Secure a Government Position."

Name.....
Address.....



"I'll PROVE in Only 7 Days that I Can Make YOU a New Man!"

No other Physical Instructor in the World has ever DARED make such an Offer

By CHARLES ATLAS

Holder of the Title:

"The World's Most Perfectly Developed Man"

Won in open competition in the only National and International contests held during the past 15 years.

I HAVE proved to thousands that my system of building powerful, big-muscled men begins to show real results in only 7 days—and I can prove it to you.

You don't have to take my word for it. You don't have to take the word of my hundreds of pupils who have added inches to their chests, biceps, neck, thighs and calves in only a few days. No sir! You can prove for yourself—in just one week—by the change you see and feel in your own body—that you can actually become a husky, healthy NEW MAN—a real "Atlas Champion."

All I want to know is: Where do you want big, powerful muscles? How many pounds of firm flesh do you want distributed over your body to fill you out? Where do you lack vitality, pep, and robust health? Where do you want to take off flabby, surplus fat?

Just tell me, give me a week, and I'll show you that I can make a New Man of you, give you bodily power and drive, and put you in that magnificent physical condition which wins you the envy and respect of any man and the admiration of every woman.

My own system of *Dynamic-Tension* does it. That's the way I built myself from a 97-pound weakling to "The World's Most Perfectly Developed Man." And now you can have a big, balanced muscular development like mine in the same easy way.

No "Apparatus" Needed!

You begin to FEEL and SEE the difference in your physical condition at once, without using any tricky

weights or pulleys, any pills, "rays," or unnatural dieting. My *Dynamic-Tension* is a natural method of developing you inside and out. It not only makes you an "Atlas Champion," but goes after such conditions as constipation, pimples, skin blotches, and any other conditions that keep you from really enjoying life and its good times—and it starts getting rid of them at once.

Let Me Tell You How

Gamble a stamp today by mailing the coupon for a free copy of my new illustrated book, "*Everlasting Health and Strength*." It tells you all about my special *Dynamic-Tension* method. It shows you, from actual photos, how I have developed my pupils to the same perfectly balanced proportions of my own physique, by my own secret methods. What my system did for me, and these hundreds of others, it can do for you too. Don't keep on being only one-half of the man you can be! Find out what I can do for you.

Send for FREE BOOK

Charles Atlas —
As He Is Today

CHARLES ATLAS, Dept. 83,
115 East 23rd Street,
New York, N. Y.

I want the proof that your system of *Dynamic-Tension* will make a New Man of me—give me a healthy, husky body and big muscle development. Send me your free book, "*Everlasting Health and Strength*."

Name.....

(Please print or write plainly)

Address.....

City..... State.....

© 1935. C. A. Ltd.

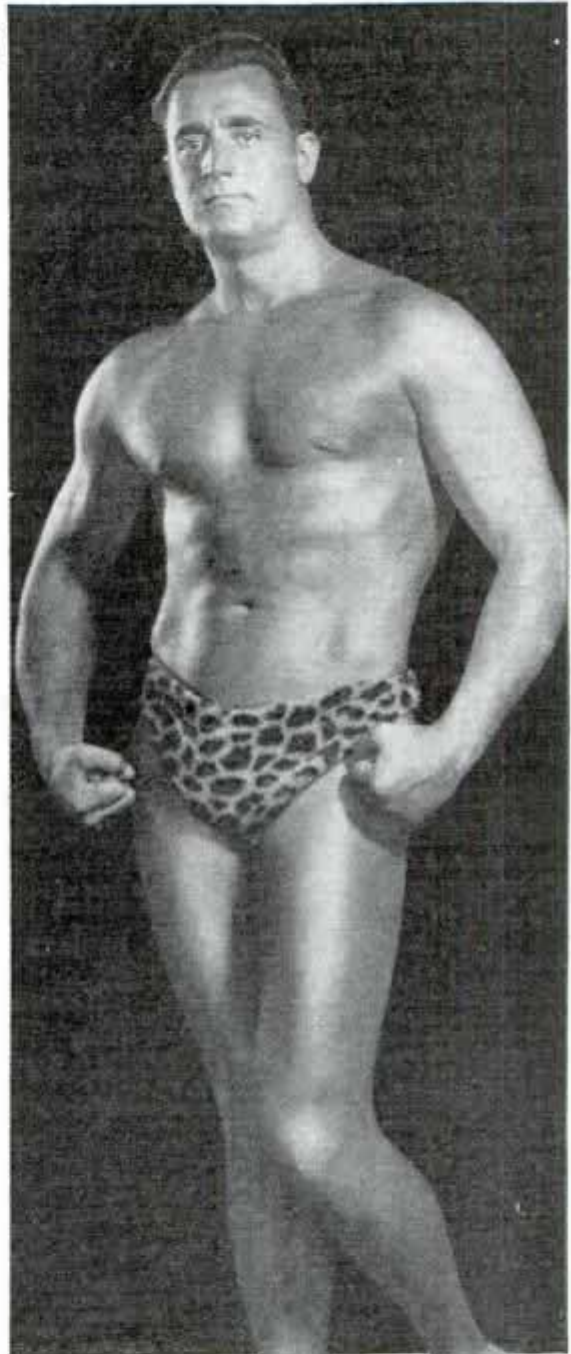


Photo by Joel Feder.



● *He's young; a few years ago his friends and associates predicted a great future for him. But something happened. The world got ahead of him. He didn't realize it until the business procession was almost out of sight. He is not alone in his predicament.*

THINGS are happening today, men. Faster than they ever happened before. Old standards are passing. Success has a new order of requirements.

Yesterday a man was merely required to do his job well.

Today he must do that same job well—but he must also know the fundamentals of all other jobs associated with his work. *Specialization relates to business—not to the jobs in that business.*

What does this mean to you? Just this: The men who succeed hereafter are going to be exclusively those who combine study with their labors. They must capitalize their spare time.

Not only study of a particular job but other subjects directly or indirectly related to that job and the promotions which should grow from it.

Realization of this fact is causing thousands of successful men, in many lines of endeavor, to enroll with the International Correspondence Schools at Scranton for home-study courses. The value of these courses is established. The individual who applies himself can get inestimable benefit from them. He can head himself toward promotion and more money—that's a great benefit these days! *And arrangements can be made for him to pay as he studies.* Mail the coupon today!

INTERNATIONAL CORRESPONDENCE SCHOOLS

"The Universal University" Box 5559-H, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject before which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|---|--|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Aviation Engines |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Automobile Mechanic |
| <input type="checkbox"/> Building Estimating | <input type="checkbox"/> Plumbing <input type="checkbox"/> Heating |
| <input type="checkbox"/> Wood Millworking | <input type="checkbox"/> Air Conditioning |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Sheet Metal Worker |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Steam Engineer |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Steam Electric Engineer |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> Civil Engineer |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Surveying and Mapping |
| <input type="checkbox"/> Welding, Electric and Gas | <input type="checkbox"/> Refrigeration |
| <input type="checkbox"/> Reading Shop Blueprints | <input type="checkbox"/> R. R. Locomotives <input type="checkbox"/> Air Brakes |
| <input type="checkbox"/> Telegraph Engineer | <input type="checkbox"/> R. R. Section Foreman |
| <input type="checkbox"/> Telephone Work | <input type="checkbox"/> R. R. Bridge and Building Foreman |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> R. R. Signalman |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Highway Engineering |
| <input type="checkbox"/> Machinist <input type="checkbox"/> Toolmaker | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Development and Protection of New Products | <input type="checkbox"/> Coal Mining Engineer |
| <input type="checkbox"/> Patternmaker | <input type="checkbox"/> Navigation <input type="checkbox"/> Boilermaker |
| <input type="checkbox"/> Heat Treatment of Metals | <input type="checkbox"/> Textile Overseer or Supt. |
| <input type="checkbox"/> Bridge Engineer | <input type="checkbox"/> Cotton Manufacturing |
| <input type="checkbox"/> Bridge and Building Foreman | <input type="checkbox"/> Woolen Manufacturing |
| <input type="checkbox"/> Gas Engines | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> Poultry Farming <input type="checkbox"/> Radio |
| | <input type="checkbox"/> Marine Engineer |

BUSINESS TRAINING COURSES

- | | |
|---|--|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Business Correspondence |
| <input type="checkbox"/> Office Management | <input type="checkbox"/> Lettering Show Cards <input type="checkbox"/> Signs |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Civil Service <input type="checkbox"/> Mail Carrier |
| <input type="checkbox"/> Accountancy and C.P.A. Coaching <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Secretarial Work | <input type="checkbox"/> Grade School Subjects |
| <input type="checkbox"/> Cost Accountant | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Salesmanship <input type="checkbox"/> Advertising | <input type="checkbox"/> College Preparatory |
| <input type="checkbox"/> Service Station Salesmanship | <input type="checkbox"/> First Year College |
| <input type="checkbox"/> Wallpaper Decorating | <input type="checkbox"/> Illustrating <input type="checkbox"/> Spanish |
| <input type="checkbox"/> Salesmanship | <input type="checkbox"/> Cartooning <input type="checkbox"/> French |
| | <input type="checkbox"/> Lumber Dealer |

Name.....Age.....
 Address.....
 City.....State.....
 Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

When writing please mention Popular Mechanics



Learn to Draw at Home

New Method Makes It Amazingly Simple

Trained artists earn from \$50 to over \$250 a week. Tremendous demand right now for good Art work. Magazines, newspapers, advertisers, printing houses, etc...all buy Art work. Become an artist through wonderful new easy method of personalized instruction—right at home in spare time. Learn Illustrating, Designing and Cartooning. Actual fun learning this way. Learn to draw and earn big money!

Send for FREE BOOK

Just printed—a new book which describes the latest developments and wonderful opportunities in Commercial Art, gives full details on this new easy method of learning to draw. Tells all about our students—their successes—what they say—actual reproductions of their work—and how many earned big money even while learning! Write for this Free Book and details of big Commercial Artist's Outfit GIVEN to all new students. Mail postcard or letter now.

Studio 123

WASHINGTON SCHOOL OF ART

1115—15th St., N. W.,

Washington, D. C.



TRI-STATE COLLEGE

B. S. Degree in 2 years. World famous for technical 2-year courses in Civil, Electrical, Mechanical, Chemical, Radio, Aeronautical Engineering; Business Administration and Accounting. Equivalent in technical hours to 4-year course. Those who lack

high school may make up work. Low tuition. Low living costs. Located in picturesque hill and lake region. Students from every state and many foreign countries. 51st year. Enter Sept., Jan., March and June. Write for catalog.

435 COLLEGE AVE.,

ANGOLA, IND.

LEARN WATCHMAKING AND ENGRAVING



BY OUR PROFIT-SHARING PLAN OUR GRADUATES SUCCEED

One of our Iowa students started in a very small way—now doing over \$30,000 a year. Another in Wisconsin, over \$10,000 the first year. Day or night classes. Call or write for FREE BOOK. Chicago School of Watchmaking, Dept. 2501, 155 N. Clark St., CHICAGO.

Learn ADVERTISING at Home

Greater opportunities now in advertising. Learn easily and quickly in spare time. Practical work. No text books. Old established school. Low tuition—Easy terms. Send for free booklet of interesting information.

Page-Davis School of Advertising Dept. 1353, 3601 Mich. Ave., Chicago

GOV'T. JOBS

SALARY TO START \$105 to \$175 MONTHLY MEN WOMEN Age Range 18 to 50

- () Ry. Mail Clerk
- () P. O. Laborer
- () R. F. D. Carrier
- () Special Agent
- () Customs Inspector
- () City Mail Carrier
- () P. O. Clerk
- () Matron
- () Immig't Inspector
- () Typist

- () POSTMASTER
- () Seamstress
- () Auditor
- () Stenographer
- () U.S. Border Patrol
- () Telephone Opr.
- () Watchman
- () Meat Inspector
- () Statistical Clerk
- () File Clerk

GOVERNMENT INSTRUCTION BUREAU, Dept. 111, St. Louis, Mo. Send me FREE particulars "How to Qualify for Government Positions" marked "X". Salaries, locations, opportunities, etc. ALL SENT FREE.

Name.....
 Address.....

Be a



RADIO EXPERT

But Get Your Training Now, from

REAL RADIO ENGINEERS!

Learn Radio from these men! Just see who they are! All top-notchers in their profession—selected by the great Radio concerns they work for to supervise and direct your Training. Learn Radio the way the Radio Industry wants you to learn it—the Shop way—the practical way—the real money-making way.

Only the Radio & Television Institute can offer you this chance to get your Training from real Radio Engineers working right in the heart of the Radio Industry.



HERE THEY ARE:

- Kendall Clough, Chief Engineer, Clough-Brazzale Company,
- E. E. Gramer, Chief Engineer, Standard Transformer Corporation,
- Karl E. Hassel, Chief Engineer, Zenith Radio Corporation,
- H. C. Tittle, Chief Radio Engineer, General Household Utilities (Granov),
- F. D. Whitten, Service Manager, Chicago Branch, Philco Radio & Television Corp., all of Chicago,
- Dr. C. M. Blackburn, Radio Engineer, P. R. Malbury & Company, Manufacturers of Radio Apparatus.



Dear Mr. Smith: Due to my R-T-I Training I was made manager of the Radio Department of a city department store, working up over the other four service men who had been there for some time.

Howard N. Lentz
123 W. Alexander St.
Buchanan, Mich.

MANY R-T-I TRAINED MEN
Earn \$50 to \$75 a week

Don't waste time on a small-pay, no-future job when hundreds of men are drawing down \$50 to \$75 every Saturday as R-T-I Trained Experts. Get ready for a real job. Get into Radio now. My big FREE book tells you how you can learn at home to fill good-pay full-time or part-time Radio jobs.

Good-Pay Opportunities, Everywhere

Broadcasting Stations, Factories, Dealers and Distributors and others all use "trained" men, and pay up to \$5000 a year. Air Craft and Short Wave Radio, Photo Cells, Public Address Systems and Sound Pictures have created thousands of good-pay jobs. This is a big year for Radio. New developments in receivers alone, demand up-to-date trained technical men. Get the facts in my free book.

Learn At Home, In Spare Time

Hold your job. Keep down expenses. My famous method of home training—endorsed by more than 50 leading Radio manufacturers—gives you

simplified, practical training along workshop lines. In a few short months many R-T-I Trained men step out of poor-pay, no-future jobs into big-future Radio work paying \$50 to \$75 a week and up.

Many Make \$5 to \$20 A Week Extra In Spare Time, While Learning

C. E. Head, Alexandria, La., wrote: "Made \$14.25 in spare time eleven days after enrolling." L. M. Christensen, Deweyville, Utah, wrote: "Got my first spare-time job two weeks after enrolling. Have already made \$250 doing spare-time Radio work."

4 Big Working Outfits Included, No Extra Charge

These outfits developed by Engineers directing R-T-I Training to make your Training Real Shop Training for the home. Can be used in your service work. Money Back If Not Satisfied

To learn Radio my way you don't have to be a College man, or even a High School graduate. My Training is practical shop training for the home. It is the Training endorsed by 50 leading radio manufacturers.

50 Great Radio Concerns
ENDORSE and RECOMMEND
R-T-I TRAINING
Mail Coupon

SEE WHO THEY ARE! READ WHAT THEY SAY ABOUT R-T-I TRAINING. FIND OUT WHY THEY ENDORSE AND RECOMMEND THIS SCHOOL.



Dear Mr. Smith: My knowledge of Radio, gained through R-T-I Training, has won me the position of assistant to Chief Engineer of Radio Station WHO. The pay is very good and every day I make use of what I learned in your lessons.

D. A. Whitney
Des Moines, Iowa

MAIL COUPON FOR MY FREE BOOK

See who these big Radio firms are and why they endorse R-T-I Training and recommend it to you. See the hundreds of pictures, the proofs, the enthusiastic letters of R-T-I men. Act today. Mail the coupon now.



RAY D. SMITH, President
RADIO & TELEVISION INSTITUTE
CHICAGO

RAY D. SMITH, President,
Radio & Television Institute (R-T-I)
2130 Lawrence Ave., Dept. 13,
Chicago, Ill.

Dear Mr. Smith: Without obligating me, send me your book that explains your Engineer-Directed and Industry-Endorsed method of training men quickly and inexpensively at home in their spare time to be Radio Experts.

Name

Address..... Age.....

City.....State.....



High School Course in 2 Years

Business—To be valuable in any Business capacity, you must be able to write clear, accurate letters and reports—make business calculations—understand geography, economics, etc. Most firms require all applicants to be High School graduates.

Industry—Advancement in Engineering or Manufacturing depends on your knowledge of High School mathematics, physics, chemistry, mechanical drawing, etc. Your employment application shows definitely for what job you're fitted.

College Entrance and the Professions

—Colleges, Universities, Engineering and Professional Schools require entering students to have a High School education, because College work begins where High School leaves off.



Business

College and Professions

Industry

You Can Complete Your High School Education at Home—in 2 Years or Less

Our course meets all requirements for Business, Industry, the Professions, and College Entrance. Standard High School texts supplied, supplemented by our own time-saving study instructions. Diploma awarded. Full credit given for High School subjects already completed. Send for Free Bulletin TODAY. No obligation.

American School, Dept. H-345, Drexel Avenue at 58th Street, Chicago, Illinois

QUALIFY for GOOD JOBS DIESEL and AUTO TRAINING

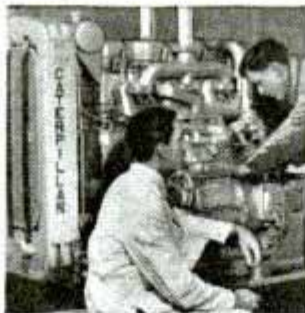
Trained men needed. Demand for Auto-Diesel experts to operate and service trucks, tractors, trains, boats, airplanes, power shovels, etc., grows every month. To qualify for good jobs, you must first become trained. This can be done in few months at National. Qualifies you as Auto Mechanic, Auto Electrician, Battery Expert, Carburetor Expert, Diesel Mechanic, Diesel Service Man, Fuel Injection Expert, Trouble Shooter, etc.

OLDEST, LARGEST TRADE SCHOOL IN WEST

Est. 1905. 30,000 graduates. Finest equipment—late model autos and Diesel engines to work on. Expert instructors.

EARN ROOM AND BOARD

We assist students to obtain part-time job during training. We allow coach railroad fare from any part of U. S. to Los Angeles. Send Coupon For Free Auto-Diesel Book.



BE A RAILWAY TRAFFIC INSPECTOR

A Real, Well-Paid Job for an Ambitious Man
TRAINED MEN—19 to 50—are wanted in the Railway and Bus Passenger Traffic Inspection Field. You can quickly qualify by our short, home-study course and on completion, we will help place you in a position at up to \$140 per month, plus expenses, to start, or find tuition. Rapid advancement with experience. Free Booklet describes our 10-yr. record. **STANDARD BUSINESS TRAINING INSTITUTE**, Div. 203, Buffalo, N.Y.

RADIO ENGINEERING

RCA Institutes offers an intensive course of high standard embracing all phases of Radio. Practical training with modern equipment at New York and Chicago schools. Also specialized courses and Home Study Courses under "No obligation" plan.



Illustrated Catalog on request.
RCA INSTITUTES, Inc. Dept. PC-35

75 Varick Street, New York, N. Y.
 1154 Merchandise Mart, Chicago

Recognized Standard in Radio Instruction Since 1909

Learn Public Speaking

At home—in spare time—20 minutes a day. Overcome "stage-fright" gain self-confidence, increase your salary, through ability to sway others by effective speech. Write now for free booklet, *How to Work Wonders With Words*.
NORTH AMERICAN INSTITUTE, Dept. 1353
 3601 Michigan Avenue, Chicago, Illinois

NATIONAL AUTOMOTIVE SCHOOL Los Angeles

Dept. 3-PMA, 4006 South Figueroa St.
 Send Free Auto-Diesel Book and Special offer.

Name.....
 Address.....
 City..... State.....

Play the Hawaiian Guitar like the Hawaiians!

FAMOUS NATIVE HAWAIIAN INSTRUCTORS teach you to play this fascinating instrument. ONLY 4 MOTIONS—No previous musical knowledge needed. OUR 52 EASY LESSONS teach you the enchanting music you hear over the radio.

GIVEN—when you enroll—a sweet toned HAWAIIAN GUITAR, complete playing outfit and carrying case.

WRITE AT ONCE for attractive offer and easy terms.

FIRST HAWAIIAN CONSERVATORY OF MUSIC, Inc.
 9th Floor, Woolworth Bldg. Dept. 250 New York, N. Y.
 Approved by New York State Board of Regents

Improves Handwriting In 3 Hours

Marvelous invention. Corrects poor writing in few days. Amazing results guaranteed. No failures. Positive proof and complete outline mailed FREE. Write quickly.
OZMENT INSTRUCTION BUREAU, Dept. 34, St. Louis, Mo.

M O L L E R

Learn Beauty Culture or Barbering
 Earn while learning, day, night classes. Write for free Booklet "B". Moller College, 139 East 23rd St., New York

New Ideas now Salable Before Patenting

Have you a sound, practical invention, patented or unpatented, for sale? If so, write
Chartered Institute of American Inventors
 597B Barrister Building Washington, D. C.
 "World's Largest Organization of Inventors"

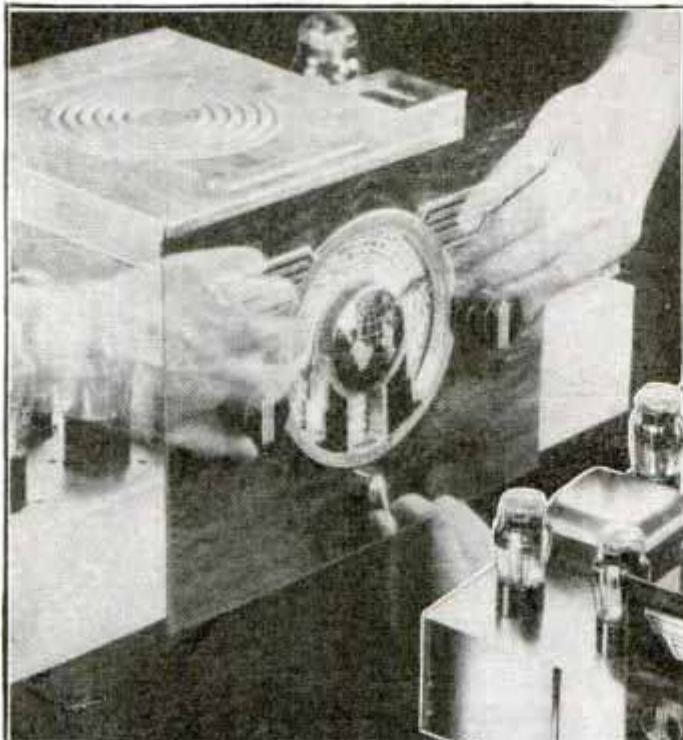
Invisible Hands Magically Assure WORLD-WIDE

HIGH FIDELITY RECEPTION

with This Amazing New

MIDWEST

16-TUBE ALL-WAVE Radio!
(ALL FIVE WAVE BANDS)



30 DAYS FREE TRIAL

SAVE UP TO 50%

Direct from Midwest Laboratories!

THE almost magical performance of this 16-tube all wave radio is startlingly human! As domestic and foreign stations are brought in, many automatic adjustments are constantly being made inside the set. It might be said that a number of "Invisible Hands" enable you to bring in and hold any station you desire from the whole world of broadcast...regardless of fading and interfering conditions. Before you buy any radio, write for the new

FREE Midwest "Fifteenth Anniversary" catalog and see how you can save from $\frac{1}{4}$ to $\frac{1}{2}$ by buying direct from Midwest Laboratories. Learn why Midwest outperforms sets costing up to \$200.00 and more. Now save 30% to 50%. Never before so much radio for so little money! Midwest gives you triple protection with: **One-Year Guarantee, Foreign Reception Guarantee, Money-Back Guarantee.**

ONLY RADIO COVERING
9 TO 2,400 METERS.
12,000 MILE TUNING RANGE
—
WORLD'S GREATEST
RADIO VALUE
\$49.50 with New
Deluxe Auditorium-Type
SPEAKER
(4 LBS. WEIGHT)

TERMS as low as **\$5.00** DOWN



NEW STYLE CONSOLES

The Midwest 36-page catalog pictures a complete line of beautiful, artistic deluxe consoles and chassis in four colors. Write for new FREE catalog today!

Midwest long-range radios are priced as **\$27.50** low as...

Thrills to Greetings of Foreign Stations
Safford, Arizona—It's a real thrill to hear a voice from a far off land say: "This is the voice of the Pacific, VK2ME, in Sydney, Australia," or, "We take you now to Westminster Abbey,"...etc. Franklin H. John, P. O. Box 244.



MIDWEST AUTO RADIO
Add to motoring enjoyment with Midwest All-Electric Auto Radios. Advanced features assure amazing reception, glorious tone. Installed in 15 minutes with screw driver and pliers. Priced as low as \$29.95. Write for FREE literature or mail coupon...TODAY!



40 ADVANCED FEATURES

Exclusive "Invisible Hands" features include: Automatic Volume Control Action, Automatic Tone Control, New type of Airplane Dial, which has these outstanding advantages: Station Group Locator, Simplified Tuning Guide Lights, Automatic Select-O-Band Indicator, Illuminated Printer Indicator, Centralized Tuning. Only Midwest covers a tuning range of 9 to 2400 meters (33 megacycles to 125 KC)—enabling you to easily and successfully tune in even low-powered foreign stations up to 12,000 miles away. All 5 Wave Bands enable you to enjoy today's finest High Fidelity American programs. In addition, you get Canadian, police, amateur, airplane broadcasts...commercial and ship signals...and delight in exciting world-wide broadcasts from England, France, Germany, Spain, Italy, Russia, Australia, etc. Send today for money-saving facts!

SENSATIONAL HIGH FIDELITY RECEPTION

This bigger, better, more powerful, clearer-toned, super-selective, 16-tube "Invisible Hands" radio gives you absolute realism—assures you of life-like, crystal-clear tone, unlike anything you have ever experienced before. You will hear one more octave—overtone—that cannot be brought in with ordinary radios. Now, hear every instrument, every voice, every shade and inflection of speech.

DEAL DIRECT WITH LABORATORIES

Increasing costs are sure to result in higher radio prices soon. Buy before the big advance...NOW...while you can take advantage of Midwest's sensational values. No middlemen's profits to pay! You can order your Midwest High Fidelity radio from the new Midwest catalog with as much certainty of satisfaction as if you were to select it in our great radio laboratories. You save 30% to 50% when you buy this popular way...you get 30 days FREE trial...as little as \$5.00 down puts a Midwest radio in your home. Foreign Reception, One-Year and Money-Back GUARANTEES protect you! Write for FREE catalog NOW...TODAY!

SAVE UP TO 50%

Hears His Native Country
Acushnet, Mass.—I tuned in CTIAA, Lisbon, Portugal, my birthplace...clear as a local. Heard news, music and songs of my country. This alone is worth more than low price I paid for my Midwest. Also tuned in GSB, England, 12RO, Rome...DJA, Germany and many other foreign stations. Anibal N. Ferreira.



MAIL COUPON TODAY! FOR FREE 30-DAY TRIAL OFFER and 36-PAGE FOUR-COLOR FREE CATALOG

MIDWEST RADIO CORP., Dept. 32-A, Cincinnati, Ohio.

Without obligation on my part, send me your new FREE catalog and complete details of your liberal 30-day FREE trial offer. This is NOT an order.

User-Agents Make Easy Extra Money Check Here for Details

Name.....
Address.....
Town..... State.....
 Check here, if interested in Midwest World-Wide Battery Radio.
 Check here, if interested in a Midwest Auto Radio.

MIDWEST RADIO CORP.

DEPT. 32-A — CINCINNATI, OHIO, U. S. A.

Established 1920 Cable Address Miraco. . . . All Codes



Follow this Man

Secret Service Operator 38 is on the job

FOLLOW him through all the excitement of his chase of the counterfeit gang. See how a crafty operator works. Telltale finger prints on the lamp stand in the murdered girl's room! The detective's cigarette case is handled by the unsuspecting gangster, and a great mystery is solved. Better than fiction. It's true, every word of it. No obligation. Just send the coupon and get—

FREE!

The Confidential Reports No. 38 Made to His Chief

And the best part of it all is this—it may open your eyes to the great opportunity for YOU as a well paid Finger Print Expert. This is a young, *fast-growing* profession. This school has taken men and trained them for high official positions. This is the kind of work you would like. Days full of excitement. A regular monthly salary. Rewards.

Can you meet this test?

Are you of average intelligence? Are you ambitious? Would you give 30 minutes a day of your spare time preparing yourself for this profession? Answer "yes" and I'll show you how it is possible for you to attain all this. Send the coupon and I'll also send the Free Reports.

INSTITUTE OF APPLIED SCIENCE
1920 Sunnyside Ave., Dept. 13-53 Chicago, Illinois

Institute of Applied Science

1920 Sunnyside Ave., Dept. 13-53 Chicago, Illinois

Gentlemen:—Without any obligation whatever, send me the Reports of Operator No. 38, also your illustrated Free Book on Finger Prints and your low prices and Easy Terms Offer. Literature will NOT be sent to boys under 17 years of age.

Name _____

Address _____

Age _____

When writing please mention Popular Mechanics

Law!

LEARN AT HOME

Are you adult, alert, ambitious, willing to study? Investigate LAW! We guide you step by step—furnish all texts, including 14-volume Law Library. Training prepared by leading law professors and given by members of bar. Degree of LL. B. conferred. Low cost, easy terms. Send NOW for Free, 64-page "Law Training for Leadership."

LaSalle Extension University. Dept. 364-L, Chicago

THE ORIGINAL HOME STUDY COURSE IN
Practical RADIO ENGINEERING

The quickest way to enter Radio, Recognized by leading authorities. Write for complete details of residence and home-study courses. Easy terms. Dept. P-3, 14th & Park Rd., Wash., D. C. On Request

Free 44 PAGE BOOKLET

CAPITOL RADIO ENGINEERING INSTITUTE

You Can Regain Perfect Speech, if you

STAMMER

Send today for beautifully illustrated book entitled "DON'T STAMMER," which describes the Bogue Unit Method for the scientific correction of stammering and stuttering. Method successfully used at Bogue Institute for 33 years—since 1901. Endorsed by physicians. Full information concerning correction of stammering sent free. No obligation. Benjamin N. Bogue, Dept. 152, Circle Tower, Indianapolis, Indiana.

LEARN WATCH REPAIRING



AT HOME You can learn by our modern and original system of instruction every part of the Watch Repairing Trade at home as good or better than at a shop. You can earn money while earning and secure a well paying position or start in business after completing our course of instruction. Good watch repairers are always in demand and earn very good salaries. For particulars apply to the

Wisconsin School of Watch Repairing
524 E. Mason St., MILWAUKEE, WIS.



Learn to Write

Begin Today. Write for my Free Book, "How to Become a Good Penman." It contains specimens and tells how others learned to write in spare time. Your name elegantly written on a card if you enclose stamp for postage. Write today. **F. W. TAMBLIN,** 418 Ridge Bldg., Kansas City, Mo.

Learn to Dance

You can learn all the modern dances—the latest Tango steps, the new Fox Trots, dreamy Waltzes, smart Collegiate Steps, and popular Society Steps at home, easily and quickly. New chart method makes dancing as simple as A-B-C. No music or partner required. Don't be a wallflower. Learn to dance. Complete course—256 pages, 54 illustrations, sent on 5 Days' Free Trial. Equals \$20.00 course. Send no money. Pay postman only \$1.00, plus postage upon arrival. Money back if not delighted. Catalog Free.



Franklin Pub. Co., 800 No. Clark St., Dept. 9470, Chicago



Minstrels

Unique First Parts for complete show with special songs and choruses. Make-up. Catalog Free.

T. S. Denison & Co., 623 S. Wabash, Dept. 19 Chicago



Learn PHOTOGRAPHY at Home

Make money taking pictures. Photographs in big demand. Commercial Photography also pays big money. Learn quickly at home in spare time. No experience necessary. Write today for new free book, *Opportunities in Modern Photography*. American School of Photography, Dept. 1353, 3601 Michigan Ave., Chicago.

LEARN TO PLAY THE PIANO ACCORDION

IN 5 WEEKS.

CLARKE FORTNER'S FIRST 5 LESSONS \$1




Make big money! Be the life of the party. Play the Cellini Piano-Accordion—a sensational hit with boys, girls, professionals. Easy, quick to learn; combines organ and complete piano in one. Easy to carry around. Send \$1.00 today for Clarke Fortner's Portfolio of First Five Lessons, and name of your dealer nearest you where you can practice free of charge. You don't have to know how to read music. Charts show which keys to press. We guarantee you can play after learning these 5 lessons. Five complete pieces of music included. Get started now. Send \$1.00 today for this regular \$5.00 value. Money refunded if not satisfied.

Regular \$5 Value

Cellini Piano Accordion Division
CHICAGO MUSICAL INSTRUMENT COMPANY
 Box 103, 309 So. Wabash Ave., Chicago, Ill.

BE A CARTOONIST



AT HOME IN YOUR SPARE TIME under supervision of NORMAN MARSH, creator of the famous comic strip "DAN DUNN, SECRET OPERATIVE 48," appearing in the big newspapers. Success—fame—real money may be yours when you learn the easy simple methods and secrets which make the MARSH cartoons so successful. Send name for free details of this personal course. Act Today!

MARSH CARTOON SCHOOL
 Chicago Daily News Bldg., Dept. C-1, Chicago, Ill.

ARMOUR INSTITUTE OF TECHNOLOGY

A COLLEGE OF ENGINEERING AND ARCHITECTURE

41st Year. Fully accredited by North Central Assn. 4 yr. courses in mechanical, electrical, civil, chemical, fire protection engineering, science and architecture, leading to B.S. Degree. All student activities—athletics, good living accommodations. Day and evening classes. Bulletin sent on request.

ARMOUR INSTITUTE OF TECHNOLOGY
 3306 FEDERAL STREET CHICAGO, ILLINOIS

Amazing New Automatic Oil Burner

SAVE 25% in Fuel Cost



Get Free Book, Special Offer!

LACO'S great new 1935 Automatic oil burner now yours for **WORLD'S LOWEST PRICE!** Saves you \$50 to \$60! Reduces fuel costs 25%! Gets more heat from cheapest oil. Quiet. Safest known. Only 1 moving part. Easy to install. Built and guaranteed by one of largest Mfgs. Approved by Underwriter's Lab. Over 15,000 in use prove it's America's finest!

Write! Send for Low Price. No-Risk, Trial-Offer plan. See how easily you can own this fine oil burner. Send NOW!

Laco Oil Burner Co., 135 Union Ave., Griswold, Ia.

Special offer to DEALERS

I'll ship you a sample burner, on approval, subject to examination, no obligation. Write on letter-head for my plan.
 L. A. COCKLIN, Pres.

MAKE YOUR OWN MOTORS



Model T Ford Generator makes 1/4 H. P. Motor, reversible and variable speed up to 7000 R. P. M. Dodge 12 V Generator makes 3/4 H. P. Motor. Other Generators can be used. Operates on 110 volts DC or AC or 32 volt current. Complete, illustrated and tested plans so simple a boy can use. Be sure to mention kind of Generator and current. You can sell your motors at a nice profit. Send only \$2 for plans. We guarantee plans to work or refund your money.

RAND CO., Dept. 100, 2004 Grand Ave., Kansas City, Mo.

MAKE MONEY AT HOME!


Learn easy Koehne Method of coloring photos and miniatures in oil. New! No art talent needed. Big demand. Send for free booklet. **Make Money At Home.**

NATIONAL ART SCHOOL
 3601 Michigan Ave., Dept. 1353, Chicago

WHY NOT

spend spring, summer, fall, gathering butterflies—insects? Profit. Please use. I buy hundreds of kinds for collections. Some \$1 to \$7 each. Simple outdoor work with my instructions, pictures, price-list. First, before sending butterflies, send 10c (not stamps) for Illustrated Prospectus, terms.

MR. SINCLAIR, DEALER IN INSECTS
 Dept. 6, Box 1424 San Diego, Calif.



THOUSANDS

have already gotten this

JOB INSURANCE!



YEARS ago the International Correspondence Schools introduced job insurance to the ambitious men of America. And training—the knowledge and ability to handle your present job so efficiently that your security is established and your pay envelope enlarged—is still the best job insurance! Take out job insurance for yourself right away—mail the coupon.

INTERNATIONAL CORRESPONDENCE SCHOOLS

"The Universal University" Box 5561-H, Scranton, Penna.
 Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject before which I have marked X:

- #### TECHNICAL AND INDUSTRIAL COURSES
- | | |
|---|--|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Aviation Engines |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Automobile Mechanic |
| <input type="checkbox"/> Building Estimating | <input type="checkbox"/> Plumbing <input type="checkbox"/> Heating |
| <input type="checkbox"/> Wood Millworking | <input type="checkbox"/> Air Conditioning |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Sheet Metal Worker |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Steam Engineer |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Steam Electric Engineer |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> Civil Engineer |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Surveying and Mapping |
| <input type="checkbox"/> Welding, Electric and Gas | <input type="checkbox"/> Refrigeration |
| <input type="checkbox"/> Reading Shop Blueprints | <input type="checkbox"/> R. R. Locomotives <input type="checkbox"/> Air Brakes |
| <input type="checkbox"/> Telegraph Engineer | <input type="checkbox"/> R. R. Section Foreman |
| <input type="checkbox"/> Telephone Work | <input type="checkbox"/> R. R. Bridge and Building Foreman |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> R. R. Signalman |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Highway Engineering |
| <input type="checkbox"/> Machinist <input type="checkbox"/> Toolmaker | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Development and Protection of New Products | <input type="checkbox"/> Coal Mining Engineer |
| <input type="checkbox"/> Patternmaker | <input type="checkbox"/> Navigation <input type="checkbox"/> Boilermaker |
| <input type="checkbox"/> Heat Treatment of Metals | <input type="checkbox"/> Textile Overseer or Supt. |
| <input type="checkbox"/> Bridge Engineer | <input type="checkbox"/> Cotton Manufacturing |
| <input type="checkbox"/> Bridge and Building Foreman | <input type="checkbox"/> Woolen Manufacturing |
| <input type="checkbox"/> Gas Engines | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> Poultry Farming <input type="checkbox"/> Radio |
| | <input type="checkbox"/> Marine Engineer |

- #### BUSINESS TRAINING COURSES
- | | |
|--|--|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Business Correspondence |
| <input type="checkbox"/> Office Management | <input type="checkbox"/> Lettering Show Cards <input type="checkbox"/> Signs |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Civil Service <input type="checkbox"/> Mail Carrier |
| <input type="checkbox"/> Accountancy and C.P.A. | <input type="checkbox"/> Railway Mail Clerk |
| Coaching <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Grade School Subjects |
| <input type="checkbox"/> Secretarial Work | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Cost Accountant | <input type="checkbox"/> College Preparatory |
| <input type="checkbox"/> Salesmanship <input type="checkbox"/> Advertising | <input type="checkbox"/> First Year College |
| <input type="checkbox"/> Service Station Salesmanship | <input type="checkbox"/> Illustrating <input type="checkbox"/> Spanish |
| <input type="checkbox"/> Wallpaper Decorating | <input type="checkbox"/> Cartooning <input type="checkbox"/> French |
| Salesmanship | <input type="checkbox"/> Lumber Dealer |

Name.....Age.....
 Address.....
 City.....State.....
 Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

Get
Valuable

PATENT

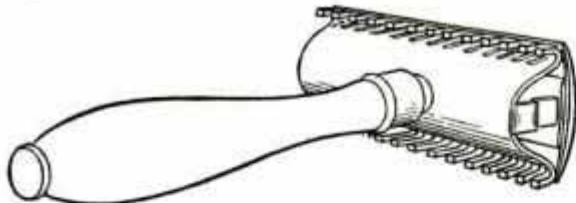
INVENTORS Write for

INTERESTING INVENTIONS



An Early Revolver

its originator, was known as the boy inventor. While still a lad he ran away to sea and whittled the first model of a repeating fire-arm out of wood during his leisure moments on ship-board. Colt was persevering. Three years later, in 1839, he had made improvements to produce the second revolver shown here. It was used in the Mexican War. By 1852, Colt had the largest fire-arms factory in the world. Colt died a very wealthy man.



This is an early Gillette Safety Razor and the beginning of one of our greatest modern commercial enterprises. Millions of safety razors have since been sold all over the world and millions of dollars of profit have been made. For centuries men shaved with the old straight edge razor. Then came Gillette with his happy idea.

Many Little Ideas Have Big Commercial Possibilities

Look around in any direction today and see the inventor's handiwork. Many of the most successful inventions have been the small things found in ten-cent stores, drug stores, hardware stores and the like. Many inventions have come from men who did not consider themselves inventors at all. If you have an idea which in your judgment will make money, save money, save time, save labor or give pleasure—then see about protecting your rights to it. It costs you nothing to learn the facts. The Patent Laws were made to protect the poor man and the rich man alike. But you must know how to take advantage of them.

"RECEIVED your book, 'Patent Protection,'" writes an inventor, "and I am only sorry that I did not have the information contained therein some thirty years ago. I have been unfortunate enough through my ignorance to lose out in at least three major instances where understanding would have helped immeasurably."

Another inventor says: "In going through your book, one of your mechanical movements gave me an idea that I am sure I will be able to use in my invention."

We cite these statements from inventors simply to emphasize one point: Ignorance is dangerous, where Patent matters are concerned. The easiest way for an inventor to lose his rights, his possible profits, is to do nothing simply because he doesn't know **WHAT TO DO**.

That is why inventors by the hundred have welcomed the book shown on the opposite page. It tells them **WHAT TO DO**. Its facts may be the means of saving money, saving time, and most important, saving later disappointment.

Can You Answer These Questions?

How do the Patent Laws protect an inventor? What is the first simple step to take to establish a claim to an invention? What kind of a sketch or drawing is needed? When is a model needed? What can an inventor do to secure financial assistance? Why is a Patent necessary? What can be Patented? What can a competent Patent Attorney do for you? What will it cost? What is the preliminary search and why is it important?

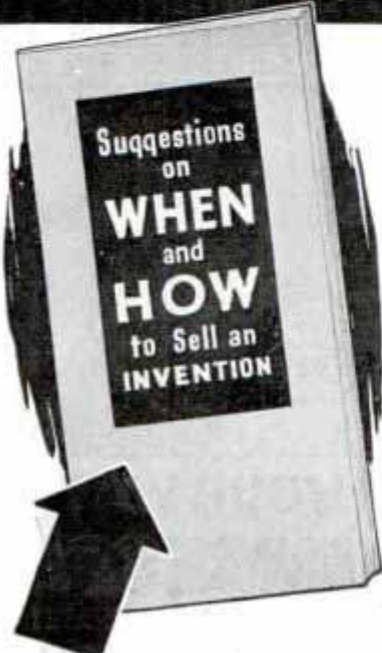
These and other suggestions are answered in our 48-page book of facts, "Patent Protection." In it, we have put the practical, usable information which from thirty-six years' experience we know the average man requires. Among other things it shows interesting inventions, **115 mechanical movements**, views of the U. S. Patent Office, and much more. **It is yours for the asking.** We gladly send it with our compliments to serious, interested men.

HOW WE HELP INVENTORS

For thirty-six years—more than a third of a century—it has been our business to help inventors; to assist them in securing **ALL THE PROTECTION TO WHICH THEY ARE ENTITLED**. We have represented not a few inventors, or a few hundred, but **THOUSANDS** of them in their dealings with the U. S. Patent Office. We answer questions—thousands of them a year. We study each device to bring out its best Patentable possibilities; we often dissuade inventors who might have gone ahead with inventions which could not possibly have been protected. By methods of efficiency, carefully developed over a long period, we endeavor to keep expense at a minimum. We arrange deferred payments where they are needed.

FACTS • FREE

these BOOKS **THIS COUPON TO RUSH**



VICTOR J. EVANS & Co.
REGISTERED PATENT ATTORNEYS
Patent and Trademark Practice Exclusively
Main Office: 500-c Victor Building, Washington, D. C.

Other Offices: 1640-N Conway Bldg., Chicago; 1007-N Woolworth Bldg., New York; 514-N Empire Bldg., Pittsburgh; 1010-N Hobart Bldg., San Francisco; 736-N Seacurly Bldg., Los Angeles.
Kindly send me a FREE copy of your book, "Patent Protection" and your special booklet of "Suggestions on When and How to Sell an Invention." (Note: You can also secure the books by writing any of the branch offices listed above.)

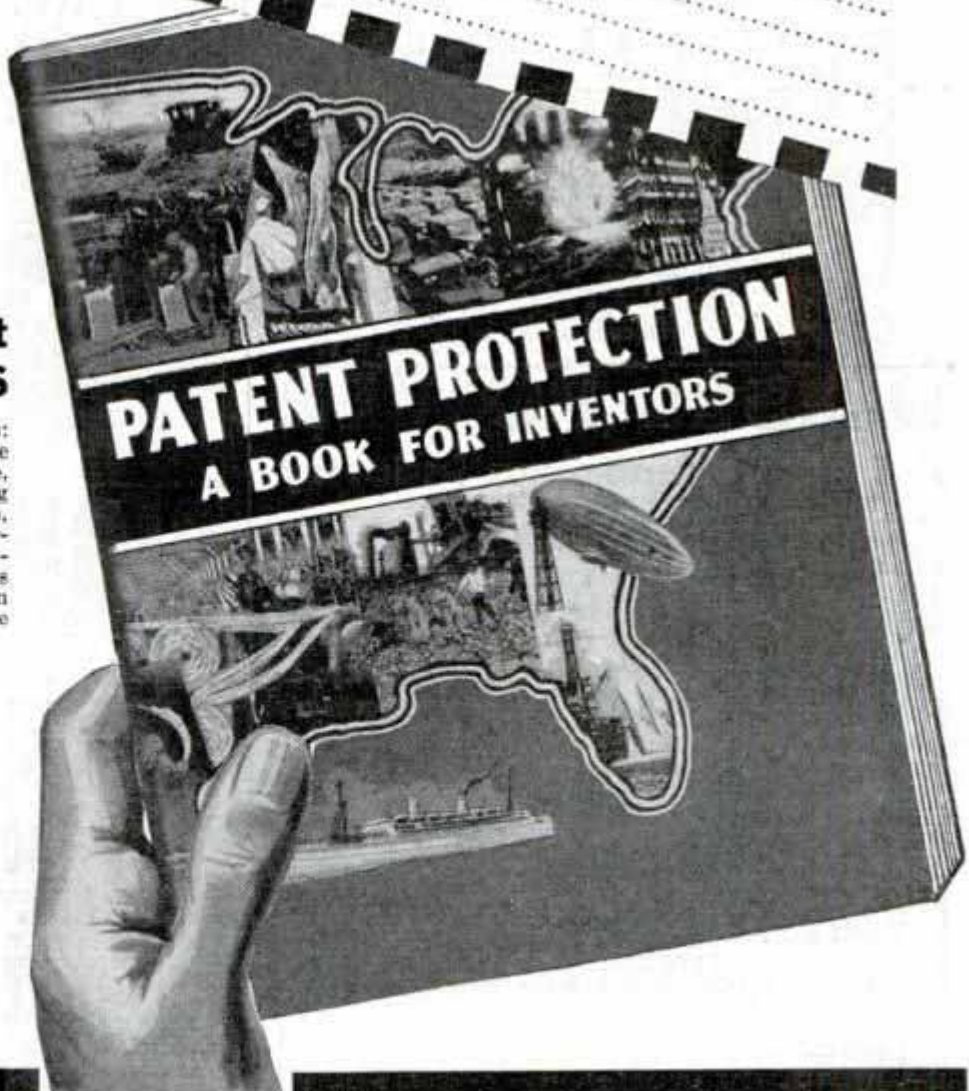
Name.....
Street and No.....
City or Town.....
State.....

This is a
NEW
Book About
SELLING INVENTIONS

There are two sides to every inventive success: There is the inventive side, which deals with the invention itself. There is the commercial side, which is the way the inventor sets about getting his invention on the market. A good invention, poorly handled, can prove a failure commercially. An ordinary invention, properly handled, can be made a money-maker. In this NEW booklet we give you "Suggestions on When and How to Sell an Invention." We give you practical hints and advice on the commercial side of inventing. Write us a card, letter or use the handy coupon. Look before you leap. **KNOW THE FACTS.** They cost you nothing. They may be worth much.

STRICTEST SECRECY

With these two booklets, we will also send you a FREE copy of our "Evidence of Invention" form, on which you can sketch and describe your invention and establish a date of disclosure. Such a dated disclosure may later prove important to you. We send full instructions. Any letters, sketches, drawings or models you send us are held in **STRICTEST SECRECY.** You can write us frankly. But first, get the facts. Sign and send the coupon now. **Get that much done today.**



You're a Step AHEAD in AVIATION When You Train at LINCOLN



Lincoln-trained pilots and mechanics enjoy the advantage of knowing that the aviation industry quickly recognizes their ability. Lincoln has sent so many well-trained men into aviation that Lincoln-trained men are preferred today. Our recent employment report shows many LINCOLN graduates who have found good jobs with prominent concerns in the aviation industry.

Learn to Fly All Types of Planes
High wing and low wing monoplanes, biplanes, cabin planes and others are used to assure you complete experience. We train you for Government License as Transport, Limited Commercial, Private or Amateur Pilot. Only modern, high class training planes with Dept. of Commerce approval are used. Highest type pilot instructors. Both flight and ground training under Government Supervision. Thoroughly equipped ground and mechanics school with high class experienced instructors qualify you as a Master Airplane and Engine Mechanic.

Lincoln is in Constant Touch with the Aviation Industry with a view to placing our graduates in trusted positions. Government Approved School!

Good Pay Jobs—The Government's great aviation development program, for which 10 million dollars was recently appropriated, promises a future in which thousands of new openings will be available for properly trained men. Let LINCOLN training have you ready to fill one of these good jobs!

WRITE today for further information about how YOU can prepare for a successful aviation career. State age.

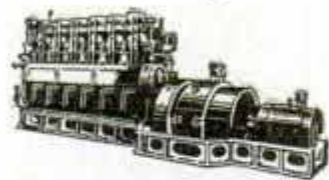
Lincoln Airplane & Flying School
202E Aircraft Bldg., Lincoln, Nebr.

Write and Speak MASTERLY ENGLISH



Learn correct English with Sherwin Cody's new invention. No rules to memorize. Like a fascinating game. Spare-time study. 15 minutes each day, quickly gives you command of English. Send for free book "How You Can Master Good English in 15 Minutes a Day." Write today. **SHERWIN CODY SCHOOL OF ENGLISH**
53 Seaside Bldg. Rochester, N. Y.

DIESEL POWER
A Coming American Industry



THE internal-combustion engine represents man's supreme triumph of machine power. Diesel engineers are in

great demand. Many are acquiring necessary knowledge through spare-time study of this modern I. C. S. Course on Diesel engines. Free booklet!

INTERNATIONAL CORRESPONDENCE SCHOOLS
BOX 5563-H, SCRANTON, PENNA.
Please send information on course checked.
 DIESEL POWER
 Mechanical Engineering Automobile Course
 Aviation Engines Air Conditioning
Name _____ Age _____
Address _____

FREE LESSON Home Art Craft

GOOD MONEY FOR SPARE TIME
A new easy way. Art novelties in big demand. Get free lesson and quickly learn to decorate Gifts, Bridge Prizes, Toys, etc. No experience necessary. Anyone can succeed with simple "3-step" method and you earn as you learn. Everything furnished including supply of Novelties for you to decorate and Home-crafters Outfit.



NO CANVASSING
We show you how to get stores to dispose of all your decorated giftwares at big profit for you. We will even open up your OWN STORE, furnishing all stock and fixtures, when you qualify. No risk in sending for Free Lesson; nothing to pay now or ever. Openings in every locality. Write quick.

FIRESIDE INDUSTRIES
Dept. 66-C, ADRIAN, MICH.

STICK 'EM UP!

Regardless of strength or size defend yourself and friends against any foul attack, from bullies or by gun, knife or club. Subdue with ease persons much stronger than yourself. A complete course on approved American Police Jiu-Jitsu by internationally known police instructor. 151 illustrations with detailed instructions pocket size. 13 knockout blows without using fists. Send One Dollar Full Price, or will send C. O. D.
S. J. JORGENSEN
787 Maritime Building Seattle, Washington

CARTOON YOUR WAY TO SUCCESS!

DON'T COPY—LEARN TO ORIGINATE!
RAYE BURNS will teach you HOW to CREATE ORIGINAL CARTOONS at home that you can SELL! Course contains 26 lessons and over 600 illustrations. All for Only... **\$2.85**
Send name and address for free details.
RAYE BURNS SCHOOL, Dept. M-X, BOX 2194, Cleveland, Ohio

VOICE
100% Improvement Guaranteed
We build, strengthen the vocal organs—not with singing lessons—but by fundamentally sound and scientifically correct silent exercises... and absolutely guarantee to improve any shrill or speaking voice at least 100%... Write for wonderful, new book—sent free, but enclose 3c for part postage. Learn WHY you can now have the voice you want. No literature sent to anyone under 17 years unless signed by parent.
PERFECT VOICE INSTITUTE, Studio 93-53
308 No. Michigan Ave., Chicago

BIG MONEY in RADIO, ELECTRICITY
Learn for only—\$1 Per Mo.
Write for free book, easy payment plan, on America's best home-study courses that prepare you quickly, in spare time for big money job in fastest-growing industry! Radio, Public Address, Photo Electric, Electronics, Electrical-Engineering! Most complete, understandable. FREE laboratory apparatus. We help you earn as you learn. Send for full facts, TODAY!
LINCOLN ENGINEERING SCHOOL, 855-E S. 37th STREET, LINCOLN, NEBRASKA

DENISON'S PLAYS Musical Comedies, Operettas, Vaudeville Acts, Minstrels, Comedy Songs, Make-up Goods.
Catalog Free
T. S. Denison & Co. 623 S. Wabash, Dept. 9, Chicago

MODERN BOOKKEEPING in 12 Easy Lessons
by an expert. Learn easily by mail, to open, keep and close books. \$25 pays entire course in small easy payments.
THE FRAZEE METHOD, 46A Wayne Place, NUTLEY, N. J.

INDIANA TECH DEGREE IN TWO YEARS
B. S. Degree in Electrical, Civil, Chemical; Radio; Mechanical or Aeronautical Engineering in two years. Located in Electrical Hub of West. Earn Board. Low tuition. Enter Mar., June, Sept. Catalog.
INDIANA TECHNICAL COLLEGE, 229 E. Washington St., Fort Wayne, Indiana

When writing please mention Popular Mechanics

SKINNY? ADD 5 TO 15 LBS. QUICK—THIS NEW EASY WAY!

NOW there's no need to be "skinny" and lose your chances of making friends. This new easy treatment is giving thousands solid, good-looking flesh—in just a few weeks!

As you know, doctors for years have prescribed yeast to build up health. But now with this new yeast discovery in pleasant tablet form, you can get far greater tonic results than with ordinary yeast—regain health, and also put on pounds of firm attractive flesh—and in a far shorter time.

Not only are thousands quickly gaining husky, handsome pounds, but also clear healthy skin, glorious new pep.

Concentrated 7 times

This amazing new product, Ironized Yeast, is made from specially cultured *brewers' ale yeast* imported from Europe—the richest yeast known—which by a new process is concentrated 7 times—made 7 times more powerful.

But that is not all! This marvelous, health-building yeast is then *ironized* with 3 special kinds of strengthening iron.

Day after day, as you take these little Ironized Yeast tablets, watch flat chest develop, skinny limbs round out attractively. Skin clears, new health comes—you're a new person.

Results guaranteed

No matter how skinny and weak you may be, this marvelous new Ironized Yeast should build you up in a few short weeks as it has thousands. If you are not delighted with the results of the very first package, your money back instantly.

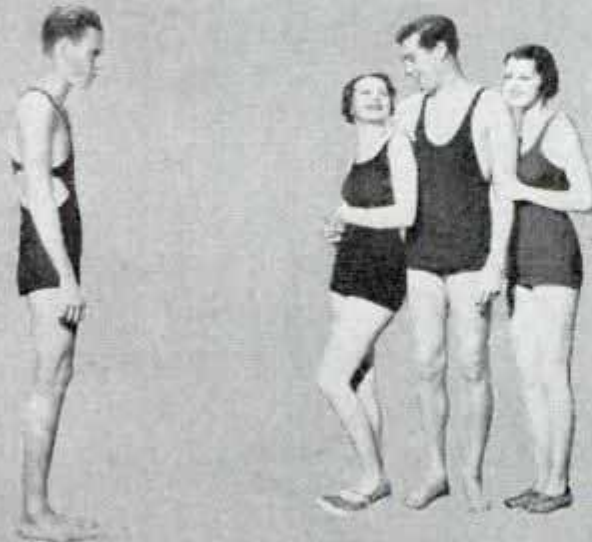
Special FREE offer!

To start you building up your health *right away*, we make this absolutely FREE offer. Purchase a package of Ironized Yeast at once, cut out the seal on the box and mail it to us with a clipping of this paragraph. We will send you a fascinating new book on health, "New Facts About Your Body," by a well-known authority. Remember, results are guaranteed with very first package—or money refunded. At all druggists. Ironized Yeast Co., Inc., Dept. 533, Atlanta, Ga.



Posed by professional models

NO MORE POOR "SKINNY" FELLOW



When writing to advertisers please mention Popular Mechanics

MECHANICAL ENGINEERING

—A Field with a Future



This course has meant advancement to hundreds of ambitious men, mechanics, draftsmen, blacksmiths, foundrymen, patternmakers, apprentices, and mechanical engineers — men who wanted to get ahead and to earn more money. You will find, as they have found, that enrolling for an I. C. S. Course is an investment in a Bigger Future. Use the coupon!

ELECTRICAL ENGINEERING

—A Great Industry with a Great Future



The new course in Electrical Engineering covers this fascinating field thoroughly. If you are just starting or are partly on the way to a real paying position in this industry, this new course brings the broader knowledge necessary for advancement. The coupon brings complete information.

DIESEL POWER

A Coming American Industry



The internal-combustion engine represents man's supreme triumph of machine power. Diesel engines are in great demand. Many are acquiring necessary knowledge through spare-time study of this modern I. C. S. Course on Diesel engines. Free booklet!

AUTOMOBILE EXPERTS

are always in demand



The rapid progress in manufacture and service of the modern automobile brings new opportunities to thousands of ambitious and forward-looking men. There's always a demand for trained men. The new I. C. S. Automobile Course will make you a trained man! The time to act is now. Use the coupon.

INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 5560-H, SCRANTON, PENNA.

Without obligation, send me full information on subject checked below:

- MECHANICAL ENGINEERING
- ELECTRICAL ENGINEERING
- DIESEL POWER
- AUTOMOBILE COURSE
- Architecture
- Concrete Construction
- Reading Shop Blueprints
- Civil Engineering
- Diesel Engines
- Gas Engine Operating
- Refrigeration
- Chemistry
- Highway Engineering
- Poultry Farming
- Drafting
- Accounting
- Good English
- Salesmanship
- Advertising
- Show Card Lettering
- Civil Service
- High School Subjects
- Air Conditioning
- Inventing and Patenting
- Aviation Engines

Name _____

Address _____

When writing please mention Popular Mechanics

Increase Your Earning Power

Apply time and labor-saving kinks to your work. Your efficiency will soon be recognized and you will be in line for advancement.

If you do machine shop work of any kind, sheet-metal work, painting, carpentry, auto repairing, farming, concrete work, plumbing, electrical work, welding, building-glass work, general repairing, tool-making, poultry raising, masonry or home repair work, get this

LIBRARY OF 2500 TIME AND LABOR SAVING IDEAS FOR SHOPMEN AND HANDYMEN

JUST PUBLISHED

SHOP NOTES for 1935

332 Articles
721 Illustrations
224 Pages
Price 50c
See partial list of contents below



Including the new 1935 issue illustrated above, there are seven volumes in the Shop Notes Library of 2500 easily understood short cuts to every-day jobs. Here are just a few of the subjects taken from the latest issue.

- | | | |
|---------------------------------|---|---|
| Auto Electrical Troubles, Tests | Glass, Working with | Scroll Saw, Special Uses |
| Auto Knocks, Locating | Hack Saw, Using | Soldering with Electric Arc |
| Band Saw, Tuning Up | Heat Treating of Iron, Steel, Brass, Copper, Aluminum | Streamline Bodies, Wire Mesh and Fabric for Boat and Auto |
| Belt Sander, Portable | Jointer, Keeping in Shape | Taps and Dies |
| Boathouse Piling, Concrete | Knee Action Wheels, Servicing | Tool Chest, Portable |
| Cold Chisels, Using | Lathe, Labor Saving Ideas for | Window Attraction, Novel Store |
| Dancing Auto Wheels, Curing | Lathe Kinks, Simple | Window Displays, Mechanical, that Draw Trade |
| Drill Press, Homemade | Metal Spinning | Wood Chisels, Tricks of Using |
| Drill-Press Problems, Solving | Metal Turning Suggestions | Wood Joints with Hand Tools |
| Electric Appliances, Repairing | Neon Sign, Flashing | Work Benches you can Build |
| Electrical Motors, Rewinding | Paint Spray Gun | Workshop, Motorize Your |
| Electricians, Short Cuts for | Reed Baskets, Weaving | |
| Forge Made from Cream Separator | Roadside Salesman | |
| | Sander From Auto Parts | |
| | Sand, Uses in Workshop | |
| | Saw Table, Adjustable | |

Each volume contains approximately 350 articles and 500 illustrations and has 192 or more pages. This unrivaled library of shop helps may be secured for a limited time only. After the present supply of books is exhausted the offer must be withdrawn.

*** Send No Money ***

POPULAR MECHANICS PRESS, 200 E. Ontario St., Room 335, Chicago, Ill.

Send me, as per your offer, the following books. I will pay postman price and small amount of postage. My money will be refunded if I am not satisfied. (Check what you want.)

- 1935 Shop Notes and Lathe Handbook, both for 98c.
- Shop Notes Library (7 vols.) 53.00.

Name.....

Street and No.....

City..... State.....

* C. O. D. applies to U. S. and possessions only. If you reside elsewhere, remittance must accompany order.

AUTO-MECHANICS & WELDERS

Auto Mechanics Welding Auto Mechanics and Welders are in big demand. Complete courses in arc and acetylene welding. Pay while you learn. Enroll now at special low rates. Write today.

MICHIGAN TRADE SCHOOL
3758 Woodward Ave., Detroit, Mich.

Write for **FREE CIRCULAR**

at last **CARTOONING** MADE EASY

NEW, ORIGINAL, COMPLETE COURSE, especially prepared by one of today's cleverest newspaper and magazine Cartoonists. Full of punch and interest, 50 fascinating lessons; hundreds of step-by-step Cartoons. **EX-TREMELY EASY.** Learn quickly right from the start, either for fun and spare money or to become a professional Cartoonist! Money Back Guarantee. Or, send for Free details. Don't delay.

Complete COURSE only \$2.75

AMERICAN SCHOOL OF CARTOONING
Dept. 13 614 West Austin Ave. Chicago, Ill.

FREE TRIAL LESSON in Free-DRAFTING

Get ready now for new money-making opportunities in Drafting. Clean, well-paid work. Send post card for FREE TRIAL LESSON in Drafting. Shows how easy to learn at home by C.T.C. method. We furnish all tools. Write today. **CHICAGO TECHNICAL COLLEGE**
C206 Tech Bldg., 118 E. 26th St., Chicago, Ill.

This May Be Your BIG OPPORTUNITY

Become an expert PHOTOGRAPHER. Growing demand for trained men and women. Wonderful money-making opportunities. Lifetime career. Learn quickly. **COMMERCIAL, NEWS, PORTRAIT or MOTION PICTURE PHOTOGRAPHY.** Personal attendance or Home Study courses. 25th year. Free Booklet.

NEW YORK INSTITUTE OF PHOTOGRAPHY
10 West 33 St., (Dept. 49) New York City

LEARN MECHANICAL DENTISTRY

Special Tool Offer — NOW

Don't waste the best years of your life. Learn this money-making business in a few months in Day or Evening sessions and become independent. Big demand. School is highly endorsed. Estab. 1920. Practical training. Individual instruction. Easy terms. Write TODAY for FREE Catalog P.

NEW YORK SCHOOL OF MECHANICAL DENTISTRY, 125 W. 31 St., NEW YORK

MAKE GLAZED GARDEN POTTERY

Beautiful, colored, glazed concrete pottery made without molds. No experience needed. Use only sand and cement. 2,500 different designs birdbaths, vases, jars, etc. Big profits. Send 10c for Booklet, color plate, etc.

NATIONAL POTTERIES CO., 424 Second Ave., So., Room 21 Minneapolis, Minn.

MAN IN EACH TOWN To Plate auto parts

reflectors, mirrors, etc., by new method; no capital or experience required. Outfits furnished. Free particulars. Write Today!

GUNMETAL CO., Ave. M, Decatur, Ill.

MAIL FOR FREE INFORMATION

BEDFORD YMCA TRADE SCHOOL

1115 Bedford Ave., Dept. PM-22 Brooklyn, New York City, N. Y.

- Auto Mechanic
- Talking Pictures
- Aviation Mechanic
- Welding
- Aeronautical Engineering
- Refrigeration
- Machine Shop
- Oil Burner
- Commercial Art
- Air Conditioning
- Sign Painting
- Electrical
- Window Display
- Radio and Television Mechanic
- Architectural-Mechanical Drafting

Name

Address

Get on AVIATION'S PAYROLL!



PREPARE QUICKLY AT HOME In Spare Time for a GOOD PAY Aviation Job

You don't need to give up your present job—don't need to leave home to get your training in Aviation. I've made it downright easy for you. I've put my own fifteen years of experience—backed by over 400,000 miles of flying—five years of instruction in the Navy—all into my quick, simple, thorough, home-study course. My up-to-date course gives you the ground work you need to get and keep a real job in this fascinating, fast-growing industry.

No Experience Needed Gives Credit to Training

You don't even need a high school education—don't have to know anything about planes or engines to learn the ground work of Aviation with my practical course. Everything is clearly explained—illustrated by countless pictures, drawings and charts. Many of my graduates, who didn't know a thing about Aviation when they enrolled for my training, are holding down fine jobs right now—in the air and on the ground. **Over forty different kinds of jobs to choose from now**—and Aviation is growing fast. Get the facts about my practical Course, free Employment Service, and Money-Back Agreement NOW!

"At present I am employed with one of the largest builders of aircraft on Long Island, and I can truthfully say that it was the knowledge I received through Walter Hinton's complete course in Aviation that I secured this position."—Carl Schneider, 4215 Graham Avenue, Astoria, New York.

There's No Time to Lose—Get My FREE Book NOW!

Don't wait and let the other fellows get ahead of you. Think about your own future. Let me prepare you for a good job paying \$30.00 a week or more. Get the FACTS. Mail the handy coupon below today—right now. I'll send you my big new FREE Book — packed with interesting facts about your opportunities in Aviation. **ACT NOW.**



Training Gives Quick Results

"I received a call from the manager of a nearby airplane factory, who understood I was taking your Course and asked if I would accept a position as chief mechanic and in his absence, act as manager."—Edward F. Dick, 2203 Tuscarawas St., West Canton, Ohio.

Rush to Washington!

WALTER HINTON, Pres. Aviation Institute of U. S. A., Inc. 1115 Connecticut Avenue, N. W. Washington, D. C.

901-C

Send me without obligation a FREE copy of your book, "Wings of Opportunity." I want to know about the opportunities for me in Commercial Aviation and your method of training men at home in spare time.

Name

Address

City

Age

State

NEW ELECTRIC LIBRARY

\$ 1.50 A VOLUME



WHAT ELECTRICIAN WANTS TO KNOW!

is easily found in AUDEL'S NEW ELECTRIC LIBRARY. Electricity made simple as ABC. Up-to-date, trade dope for the expert and ALL electrical workers. Questions, answers, diagrams, calculations, underwriter's code; design, construction, operation and maintenance of modern electrical machines and appliances FULLY COVERED.

All available at small cost, easy terms. BOOK-A-MONTH service puts this NEW information in your hands for 6c a day. You can start your subscription with any volume. Write TODAY for electric Folder and FREE TRIAL offer.

THEO. AUDEL & CO., 65 W. 23rd St., New York City

Mail Vol. I, Electric Library on 7 days' free trial. If O. K. I will remit \$1.50, otherwise I will return it. I also request you to mail one book each month on same terms. No obligation unless I am satisfied.

Name.....
 Address.....
 Occupation..... PM



AUTO

BOOKS SENT FREE



on approval. Just mail the coupon and we'll send you a set of these remarkable auto books, just off the press. Whether you are a mechanic or helper, expert or apprentice, auto owner or driver, if you're interested in knowing all about automobile mechanics, then take advantage of this FREE OFFER.

DON'T SEND A PENNY!
 A better job—in the gigantic auto industry. BIGGER PAY—a chance to go into business for yourself and get a share of the huge profits are waiting for any man who even half tries to improve himself. Learn Auto Engineering with these wonder books a new way—without studying or memorizing. Simply use the JIFFY INDEX to look up the answer to any auto problem. Built by eleven of America's greatest automobile engineers, and written in simple language so you can understand it. Very newest cars, all covered.

[FREE! Privilege of consulting Automobile Engineers of American Technical Society for one year without cost if you mail coupon immediately.]

AMERICAN TECHNICAL SOCIETY
 Drexel Avenue & 58th Street
 Dept. A319, Chicago, Ill.

CAN YOU FIX IT?

These wonder books tell step by step HOW to take out "play" in differential—to kill the shimmy in steering—to set TIMING—how to put your finger instantly on engine trouble and then the quick expert way to FIX it. Newest improvements fully covered. Equal to a complete trade course at less than a fourth the cost.

6 Big Volumes 1935 Edition

2500 pages, 2000 illustrations, wiring diagrams, etc., including Aviation Motors. Diesel engines, etc. De Luxe edition, gold-stamped flexible binding.

AMERICAN TECHNICAL SOCIETY,
 Drexel Ave. & 58th St., Dept. A319, Chicago, Ill.

I would like to see the new 6-volume edition of your AUTO BOOKS. I will pay the few cents delivery charges only, but if I choose to, I may return them express collect. If after 10 days you prefer to keep them, I will send you \$2 and pay the balance at the rate of only \$3 a month, until \$24.8 is paid. Please include free consulting membership as per your offer above. Send brand new 1935 edition.

Name.....
 Address.....
 Employer's Name.....
 Employer's Address.....

When writing please mention Popular Mechanics

So Very Easy

... AND TO THINK YOU'VE HAD IT ONLY A WEEK ...

● Popularity! Step right into it with a P-A Sax! Play beautiful tunes first week. No failures. Learn quickly. Join a dance band in 90 days. Only P-A assures such rapid progress. Easiest blowing, fingering; most beautiful tone. See your P-A Dealer, or write direct for beautiful literature. No obligation. Easy terms. You can do it. Write today.

1166
PAN-AMERICAN
 303 P-A Bldg. Elkhart, Indiana

Moderate Price

62 ART LESSONS

Only **\$1.95** POST PAID

Become Talented Artist With Big Income. This thorough home-study Course teaches Commercial Art, Cartooning, Lettering—atomy, perspective, adv. layout, short cuts, tricks of profession, etc. By Alexander Murray, famous Art School instructor. Natural ability not necessary. Over 815 clear, concise instruction plates assure easy, rapid development. 125 sheets of drawing paper included FREE. Complete Course (no more to pay) only \$1.95 postpaid—or send no money, pay postman plus postage. Money back if not delighted after inspecting. Turn your spare time of today into BIG MONEY tomorrow.

EDUCATIONAL SUPPLY CO., Dept. 101-C, Racine, Wis.

QUICK WAY to make money in

TRAIN WITH RADIO

Modern receivers are demanding men with modern training for service work. New training method and service equipment offer starts you earning almost at once. Up to \$3 an hour easy in a short time. Write today for FREE book of details.

Radio Training Association of America
 Dept. PM-53, 4513 Ravenswood Ave., Chicago

GLADIOLUS

3 Souvenir (Yellow), 3 Orange Queen (Orange), 3 Virginia (Red), 3 Purest of All (White), 3 Herada (Lavender), 3 Osalin (Pink). 18 Bulbs as Above

15c TWO LOTS FOR 25c
 90 MIXED FOR 50c—POSTPAID

REGAL BULB CO. DEPT. 311, WESTPORT, CONN.

\$25 A WEEK FOR YOU

and work 12 hours a week. Great plan (illustrated) to breed PR Royal squabs. Ask for new free Library 4, send 3-ct. stamp for mailing. Get details, learn what, why, how, where, 1935 facts.

Plymouth Rock Squab Co., 633 H. St., Melrose, Mass.

52 BREEDS WONDERFUL POULTRY BOOK

BERRY'S Hand Selected BABY CHICKS and TURKEY POULTS, also Started Chicks and Mature Fowls; 52 Breeds, all Iowa Inspected; Pullorum Tested, Also Super-X Hybrid Pullets or Cockerels. NEW COLOR BOOK FREE. Lowest prices and Golden Rule service.

BERRY'S HATCHERY, Bx 29, Clarinda, Iowa

RAISE RABBITS FOR US

WE PAY YOU UP TO \$5.00 EACH. ALSO PUT YOU IN TOUCH WITH MARKETS EVERYWHERE. Large illustrated book and catalog, also copy of the AMERICAN RABBIT FARMER and monthly market bulletin showing names of buyers in various parts of America who continuously buy all rabbits offered them. All for 10 cents. Address

OUTDOOR ENTERPRISE CO., 101 Main Street, NEW CITY, N.Y.

POULTRY PAPER 12 BIG ISSUES 25c

Paste or pin this ad on a letter with your name and address and mail it to us with 25c. (stamps or coin) for the next 12 issues. American Poultry Journal

532 So. Clark Street Chicago, Illinois

EARN BIG MONEY AT HOME!

FREE BOOK

Raise mushrooms in your basement, cellar, garage, idle places. We buy crop. Experience unnecessary. FREE Book.

MUSHROOM GROWERS OF AMERICA, DE-433 N. Clark St., CHICAGO, ILL.

Why waste time on old fashioned methods

when you can learn to play at home without a teacher?

DONT let the thought of long years of tiresome practice and an expensive teacher scare you away from learning to play! For you can easily *teach yourself*—right in your own home.

It's so easy! Just look at that sketch. The note in the first space is *always* f. The note in the second space is *always* a. The way to know the notes that come in these four spaces is simply remember that they spell *face*.

You don't have to know one note from another in order to begin. The lessons come to you by mail. Then the U. S. School way explains everything *as you go along*—both in print and picture—so that almost before you know it, you are playing *real tunes* and *melodies* right from the notes. No wonder over 600,000 men and women have learned to play this easy way!

Those who can entertain with music at parties—who can snap up things with peppy numbers—are always sought after, always sure of a good time! Start now and surprise your friends.



ment by note—in less than half the time and at a fraction of the cost of old, slow methods—the U. S. School way. No obligation. Clip and mail the coupon NOW. U. S. School of Music, 73 Brunswick Bldg., New York City, N. Y.

U. S. SCHOOL OF MUSIC,
73 Brunswick Bldg., New York City

Send me your amazing free book, "How You Can Master Music In Your Own Home," with inspiring message by Dr. Frank Crane, also Free Demonstration Lesson. This does not put me under any obligation.

Name.....

Address.....

Instrument..... Have you Instrument?.....

LEARN BY NOTE

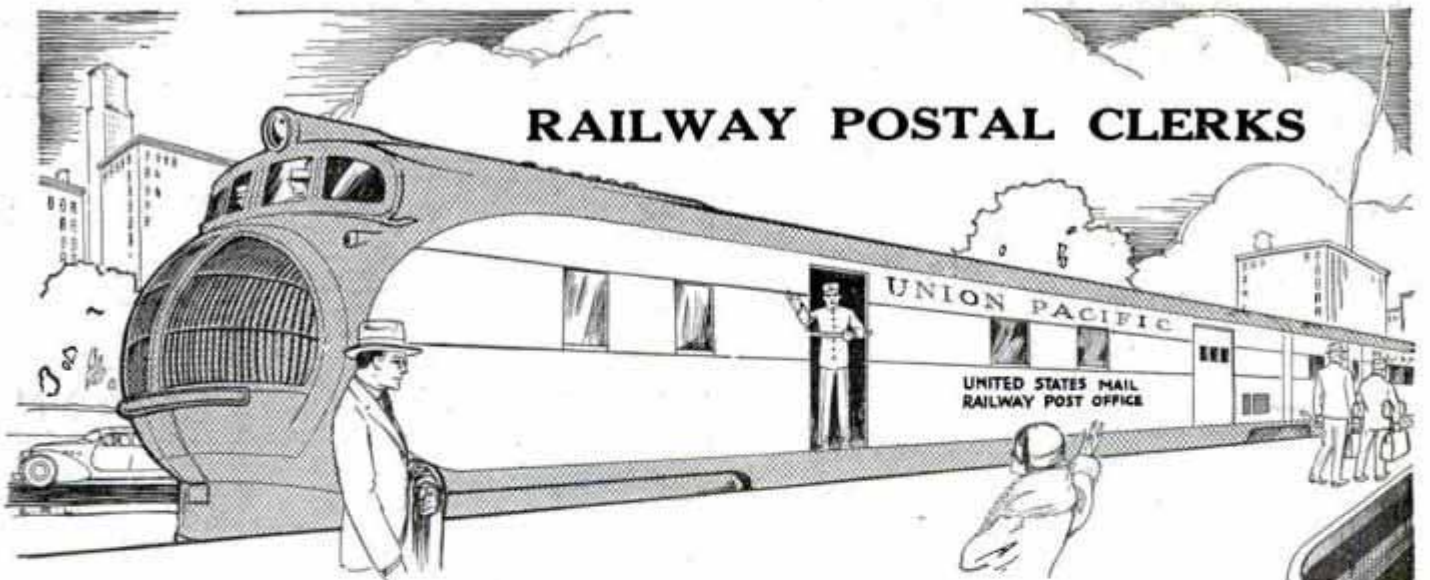
- Piano Violin
- Guitar Saxophone
- Organ Ukulele
- Tenor Banjo
- Hawaiian Guitar
- Piano Accordion
- or any other Instrument

Free Book and Demonstration Lesson

"How You Can Master Music in Your Own Home" is an interesting little book that is yours for the asking. With this free book we will send you a demonstration lesson that proves how quickly and easily you can learn to play your favorite instru-

WANT A STEADY JOB?

RAILWAY POSTAL CLERKS



MANY OTHER U. S. GOVERNMENT POSITIONS STEADY WORK

MEN—BOYS 18 TO 50

Short Hours Pleasant Work
Rapid Advancement, Permanent Employment

MANY SPRING EXAMINATIONS EXPECTED

MAIL COUPON TODAY. TOMORROW YOU MAY FORGET

FRANKLIN INSTITUTE, Dept. N184, Rochester, N. Y.

Rush to me entirely free of charge (1) a full description of the position checked below; (2) Free Copy of 32-page book, "How to Get a U. S. Government Job"; (3) A list of U. S. Government Jobs; (4) Tell me how to get a Government Job.

- Railway Postal Clerk.....(Start \$1900 year
- Post Office Clerk.....(Start 1700 year
- City Mail Carrier.....(Start 1700 year
- Office Clerk—File Clerk.....(Start 1260 year
- Inspector of Customs.....(Start 2100 year
- Immigrant Inspector.....(Start 2100 year
- Liquor Gauger-Storekeeper.....(Start 2000 year

Name.....

Address.....

Use This Coupon Before You Mislaid It

When writing to advertisers please mention Popular Mechanics



There's Quicker, Bigger MONEY for YOU—in POULTRY

Earn \$2,000 to \$5,000 a Year or Have a Business of Your Own!

Whether you want a job at good pay or a highly profitable business of your own—the Poultry Industry offers you more than any other. There's a shortage of poultry meat and eggs—a shortage of trained poultrymen. I'll train you quickly at home—to fill a good job in Poultry—and our FREE Students' Employment Dept. will help you get one!

Spare Time or Full Time YOU Can Cash-in BIG
No matter where you live—city, town or country—what you do now, my proved methods will assure your success right from the start. I'll help you make from \$2,000 to \$5,000 a year and UP! And, if you choose to start your own business, I'll show you how to make your tiny investment multiply itself automatically. What I've done for thousands of others—I can do for you.

FREE Book Shows the Way to Big Pay and BIG Profits

Mail coupon below TODAY—for my BIG NEW FREE Book, "How to Raise Poultry for Profit." My forty years of experience are yours. The Poultry Industry needs YOU. You need my book. Get it—and get in line for the BIG Money that's waiting for you in POULTRY.



Mail NOW for FREE Book

NATIONAL POULTRY INSTITUTE, Dept. 33, Adams Center, N. Y., Att'n: Harry N. Lamon, Pres.
Dear Mr. Lamon: Send me your FREE Book, "How to Raise Poultry for Profit." I want to know more about my opportunity to make \$2,000 to \$5,000 a year, spare or full time.

Name.....

Address.....

A better job - A future in RADIO WITH COYNE TRAINING!

Don't overlook your big chance in the field of RADIO, that young giant among the world's great industries, offering steady employment, good pay, and unlimited opportunities for Coyne-trained men.

Learn in 10 Weeks By Actual Shop Training

The remarkable Coyne training plan makes it amazingly easy for you to master Radio in its many branches and qualify as a real Radio Expert in 10 weeks. You "learn by doing" actual shop work on the finest Radio, Sound and Television equipment, with the personal guidance and individual help of expert instructors — not a correspondence course.

I WILL FINANCE YOUR TRAINING



Don't let lack of ready cash hold you back. Come to Coyne and get your training NOW—the course takes only 10 weeks—but you don't start paying me until FIVE MONTHS after you start school or 2 1/2 MONTHS after regular training period. Mail coupon today for complete details and my Big Free Illustrated Book on the unique Coyne Method of training... photographs of the great Coyne Shops... success stories of Coyne graduates... how many earn while learning... life-time employment service, etc.

H. C. Lewis

SEND NOW FOR FULL DETAILS!

MR. H. C. LEWIS, President COYNE RADIO & ELECTRICAL SCHOOL 500 S. Paulina St., Dept. 35-3H, Chicago, Ill.

Send at once your Big Free Illustrated Catalog of your school and methods of training, also full details of your offer.

Name.....

Address.....

City..... State.....

YOU CAN PUT YOURSELF in his PLACE

In your search for happiness, remember this: *Life is what you make it.* If you want your life to be richer, fuller, more interesting, by all means learn to play music. Musicians are the first to be invited to parties—have loads of fun playing in school and fraternal bands—earn big money playing dances, radio engagements, etc. . . BUNDY Instruments offer amazing playing ease, real professional quality, at surprisingly moderate cost. Easy lessons—convenient terms—free trial. Write today for big FREE book. Write Dept. 1.

Selmer Elkhart, Ind.

New DIESEL Engines!

DON'T WAIT! Diesel Power is the big, new field for greater opportunities and bigger pay. GET OUT OF THE RUT! BE AN EXPERT DIESEL ENGINEER and advance with this great new industry that is sweeping the world.

LEARN DIESELS in our big, nationally recommended DIESEL Schools and Shops. The original, exclusive DIESEL Schools of the United States and Canada . . . established many years and always ahead in training and equipment. More engines . . . more successful graduates . . . more Big Pay Jobs.

Book K Explains All Practical School Courses—Day and Night.
Book H Explains Home-Study Combination Course.

Send for your FREE copy of "Diesel News," containing up-to-the-minute information about the amazing opportunities everywhere for trained DIESEL men.

HEMPHILL DIESEL ENGINEERING SCHOOLS, INC.

2127 San Fernando Road, Los Angeles, Calif.

1253 Diversey Parkway, Chicago, Ill.

507 Westlake N., Seattle, Wash. 1365 Granville St., Vancouver, B. C.

Nation-wide Employment Service is Free to all Hemphill Graduates

PHOTO-ENGRAVING LEARN IT AT HOME



We Furnish all equipment and materials including large photo-engraving camera complete with lamps, lens and screen. When you have finished the course you can establish a good paying independent business with the equipment furnished or work for others at a big salary. Photo-Engraving offers greater opportunities today than any other industry. Every picture in this issue of Popular Mechanics was engraved by the process we teach you. Earn good money while learning. Write today for our new illustrated catalog which was engraved on equipment such as we furnish. You will not be obligated in any way by writing.

A copper plate to print above picture size 8 by 10 inches sells for \$15.37.

Aurora School of Photo-Engraving, Dept. 135, Aurora, Mo

Be a Draftsman Make BIG PAY

Only 15 minutes a day with these WONDER BOOKS will prepare you for a good drafting job in less than a year. Mechanical and architectural drafting from simple straight lines to important complex plans. *A step at a time!* Built especially for beginners, for men with only grammar schooling. Drafting room practice, PLUS ENGINEERING, made easy and clear. Includes complete course in blue-print reading.

Quick Way to Learn
Competent draftsmen are urgently needed right now in all building and manufacturing lines at \$20.00 to \$75.00 a week. That's just the beginning—FOR DRAFTSMEN HAVE THE BEST CHANCES FOR ADVANCEMENT. Pleasant, fascinating work, easy to learn and do. Learn quickly with these books. Complete set of drawing instruments if you send for these drafting books NOW.

American Technical Society, Drexel at 58th St., Dept. D319, Chicago, Ill.

Send for 10 days' free use New 5-volume set of drafting. I will pay the few cents delivery charges. If I wish, I may return the books in 10 days and owe you nothing, but if I decide to keep them, I will send \$2.00 after 10 days, then only \$3.00 a month until \$24.80, the special introductory price, is paid. Send latest edition and include drawing instruments.


Name.....

Address.....

Attach letter stating age, occupation, employer's name and address and that of at least one business man as a reference.

When writing please mention Popular Mechanics

LET THESE GREAT BOOKS HELP YOU TO



Start Your Climb!

"the Man who KNOWS is the Man who WINS"

Easy to train yourself! These books have helped thousands—

- AIR CONDITIONING**
Live Field; Great Future.....\$3.50
- AUTO ENCYCLOPEDIA**
Dyke's 16th Edition, Recent!.....\$6.00
- 110-V. GENERATORS**
Made From Old Auto Units.....\$1.00
- BIRD HOUSES**
Build to Sell; Easy Designs.....\$1.00
- BOAT BOOK**
Power, Sail, Rowing, Paddle Plans.....\$3.00
- BOY MECHANIC**
4000 Things to Make, 4 Vols.....\$7.00
- BUILT-IN FURNITURE**
Take Orders, Make Money!.....\$2.50
- CARPENTRY HANDBOOK**
336 Practical Short-Cuts.....\$1.50
- CONCRETE WORK**
173 Uses Described, Pictured.....\$1.00
- DOG TRAINING**
Home, Stage, Movies, Etc.....\$1.50
- ENGINEER-CUSTODIANS MANUAL**
Pay Raising Data for Building Superintendents and Others.....\$2.50
- FARMERS' BOOK**
861 Kinks for Field, Home.....\$1.00
- V-8 FORDS**
Also "A" and "B" Models, All New!.....\$2.50
- FROG INDUSTRY**
New! Raise and Sell Profits!.....\$2.00
- FURNITURE MAKING**
Tools, Materials, Designs.....\$2.50
- HOME PHYSICIAN**
Modern, Complete, Authentic.....\$2.50
- HOW TO DANCE**
Teach Yourself in Private!.....\$2.00
- LATHE WORK (Metal)**
Drilling, Threading.....\$1.00
- LOCOMOTIVE**
Folding Chart Shows all Parts.....\$1.00
- LOG CABINS**
Easy Plans; Build for Profit, Value!.....\$2.50
- MATHEMATICS**
Easy Guide for the Practical Man.....\$1.50
- MECHANICAL DRAWING**
Learn Drafting; Good Salaries.....\$1.00

- MONEY MAKING IDEAS**
1000 Spare Time.....\$1.00
- OCEAN LINER "EUROPA"**
Atlantic Speed Queen; Charted.....\$1.00
- PLUMBING**
500 Facts Every Home-owner Should Know.....\$1.50
- POULTRY**
Breeding, Management, Protect Your Profit!.....\$2.00
- PROSPECTORS' HANDBOOK**
How to Mine, Appraise, Equip.....\$3.00
- RADIO**
Amateurs' Handbook; Circuits, Repairs, Etc.....\$1.00
- RADIO SERVICING**
Profit by Knowing Costs, Kinks, Etc!.....\$1.75
- REFRIGERATION SERVICE**
Manual (All Makes).....\$5.00
- REWINDING ELECTRIC MOTORS**
Fractional Sizes, Value!.....\$2.50
- SHIP MODELS**
Entire Text, Famous "Sovereign" of 1637.....\$1.00
- SHOP NOTES LIBRARY**
7 Vol. 2500 Wonderful Shop Ideas.....\$3.00
- STAMP ALBUM**
Modern, 400 Pages.....\$1.00
- STEEL SQUARE**
How to Figure Angles of Rafters, Roofs, Etc.....\$1.00
- STORAGE BATTERIES**
New! How to Build, Repair, Charge.....\$2.50
- TOYS**
For Amusement or Profit, Saleable Designs.....\$1.50
- TRICKS YOU CAN DO**
200 Sure Fire.....\$1.00
- UPHOLSTERY**
Always a Big Market, Start Own Business.....\$1.60
- WELDING ENCYCLOPEDIA**
All Methods; Hard Jobs Made Easy.....\$5.00
- WIRING**
Approved Economy Methods for Homes, Buildings.....\$2.50
- WOOD TURNING**
Woods, Tools, Methods; Practical Teacher.....\$1.50
- WOODWORKING SHOP**
Motor-driven, 3 Big Volumes.....\$3.00
- WRIGHT ENGINE**
Chart of "Whirlwind"; All Parts.....\$1.00

LEARN AUTO MECHANICS in 8 weeks!

Earn \$35 to \$75 a week as an Auto Mechanic. Never in the history of the automotive business has there been such a demand for TRAINED men. 8 weeks training fits you for a job that's waiting for you or to open your own repair shop. Read what two McSweeney trained men have done. Hundreds of others can tell you facts equally interesting. Don't look for a job! TRAIN for it!

Farrell, Pa.
Dear Mac: Please forward me your catalog. I want it to add to my traveling souvenirs. I am working in a modern garage although I have been out of school only four weeks, thanks to McSweeney Training. My best regards to all. M. Klushauk

Rector, Ark.
Dear Mac: Just a few lines which might interest you. I left your school two years ago last May. Since I left I have not seen a day I could call "hard times." I have been working ever since I left and have averaged in my earnings \$173.00 a month, in spite of the hard times. Many thanks. Thos. J. Sharp

EIGHT WEEKS of Actual Shop Training

No books or lessons the McSweeney way. First you learn the "why" of everything you do; then under competent instructors, you DO the job. You work on real equipment and machines, with the real tools of the auto expert. In eight short weeks you are TRAINED to hold down a permanent BIG PAY job. Any man 16 to 50 can learn. Write today for New Low Tuition Offer.

AVIATION GROUND COURSE

Aviation is coming and coming fast! Prepare now for the wonderful opportunities of the future. Each plane needs many mechanics on the ground.

MONEY BACK GUARANTEE!

In eight weeks of intensive training; actual shop work with real tools on real equipment; you will be qualified to accept a Big Pay Job as an Auto Mechanic. If you are not satisfied with your qualifications, your tuition will be refunded.

FREE Write today for Big Free Book on AUTOS. Get the facts about jobs; and Low Tuition Offers. Mailing the coupon does NOT obligate you. It obligates ME to tell YOU how you can train for Big Money in eight short weeks. Address Dept. 10-15

McSWEENEY SCHOOLS AUTOMOBILE - AVIATION CLEVELAND, OHIO or KANSAS CITY, MO.

Write Our School Nearest You

Books sent C.O.D. anywhere in U.S.

Just check the books you want, write your name and address below, and mail the advertisement. It is your order blank. When postman hands you books, pay him the price and few cents postage. If outside the U. S. remit when ordering and include 10 cents per book extra for postage. We have many other books on these and 2,000 other subjects.

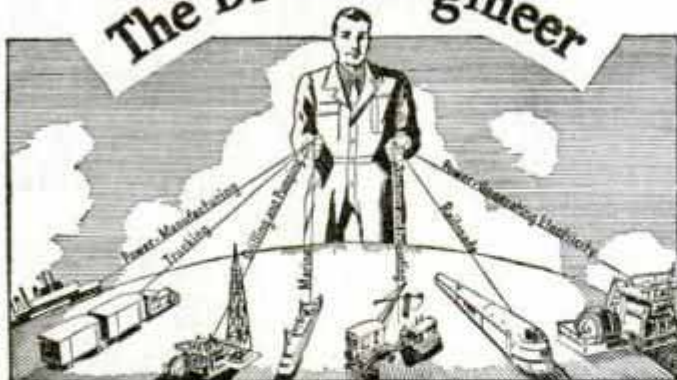
Name.....
City..... State.....
Address.....

Mail to Popular Mechanics Press, Room MAR 5—200 East Ontario St., Chicago, Ill.

McSweeney Auto and Aviation School, Dept. 10-15, Cleveland, Ohio or Kansas City, Mo.
Without cost or obligation, send me your Big FREE Book on Autos; also full information about your low tuition offer.
Name.....
Street.....
Town..... State..... Age.....

When writing please mention Popular Mechanics

The Diesel Engineer



Diesel Engineering offers you a chance to get into a field that is on the upgrade and continually expanding — one that will require more and more Diesel-trained men for the next 25 years, or as long as you need to work. A very important part of our service is that, when the student has completed his training, we help him search out an opening in the Diesel Engineering field where he can be sure of steady advancement, with an ever-increasing reward for his foresightedness in getting training. Write today for free Bulletin. No obligation.

American School, Department D-345, Drexel Avenue at 58th Street, Chicago

Controlling—Power and Transportation

Diesel engines — because of their high efficiency, dependability and economy of operation — are fast replacing steam and gasoline engines in power plants, motor trucks and busses, locomotives and ships, tractors, dredges, drills, pumps, etc. — opening up steady, well-paid jobs for Diesel-trained men.

You can get the necessary training at home on all the latest Diesel developments — two- and four-stroke cycles; solid- and air-injection fuel systems; low- and high-speed and heavy duty types; Diesel-electric generating systems, etc. Course includes all text material — with special diagrams making possible quick understanding of this new type of power.

You Can Now Make More Money

Let us show you how easy it is to make special, individually fitted foot supports. New System. Supports bring ten to twenty times their small cost. No capital or store needed. Highly profitable, respected occupation, full or part time. You can learn quickly in your own home. Send your name for full information free.

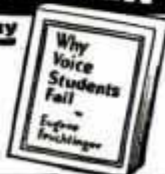
B. M. Metzdorf, American College, 50 W. Illinois St., Chicago

Why VOICE Students Fail

SENT FREE No Obligation to Buy

If you act quick! — we will send postpaid — for 30 days' free reading — new Voice Book disclosing startling VOICE FACTS that may save hundreds of dollars to every man or woman seeking a strong, rich voice for either singing or speaking. 30 days' free reading — then send \$1.00. Otherwise, return it — that's all!

PROF. E. FEUCHTINGER Studio 13-53
308 North Michigan Avenue - Chicago



RADIO ENGINEERING, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. Nine months' engineering course equivalent to three years' college radio work. School established 1874. All expenses low. Catalog free.
Dodge's Institute, Ada St., Valparaiso, Ind.



"BECOME A LIGHTNING TRICK CARTOONIST"

Send \$1.00 for Laugh Producing Program of 23 Trick Drawings with Instructions. Catalog of Chalk Talk Supplies Free.
BALDA ART SERVICE, Dept. 1, Oshkosh, Wis.

FULLY PATENTED AND PATS. APPLD. FOR IN ALL LEADING COUNTRIES

Astounding Invention

URNS JUNK AUTO TIRES INTO MONEY



ONE HANDY MACHINE KEEPS FOUR HELPERS BUSY

The Most Sensational Business Opportunity Since 1929

Gigantic National Market running into Millions. And you can now supply it with JUNK TIRES as your raw material. What a Business. What an unheard of profit. Schools, stores, clubs, factories, public buildings, homes, offices, grab this good looking, springy, long wearing FABRIX Mat. No limit to market. And the profits are so big that you can easily afford to hire helpers, hire salesmen, and still have a fabulous margin on every mat.

Here is a new business. The product is so unusual that it has opened up a new market. Don't confuse FABRIX with a "Door Mat." It has a hundred INDUSTRIAL uses in factories. Your sales for home use will be the least part of your business. Here is an opportunity for one man in each community. Under our license you can establish a local manufacturing plant. The investment required is reasonable.

COSTS NOTHING to get complete facts. Rush your name and address and we'll send complete description of simple machine that quickly slices

old tires into uniform strips; show you how patented method forms strips into springy, long-wearing FABRIX Mats; how you can turn a 5¢ tire into a \$2.00 mat; how you can start on a reasonable investment and build a business so big, so fast, that it will take your breath away. Capable men, responsible men, big men, are the ones we want in this enterprise. If you are that kind don't delay a minute. Write, air mail or wire today. All information is free.

FABRIX, INC., 325 West Huron St. Dept. 73 - Chicago, Ill.

MAIL COUPON for FREE FACTS

Responsible men dropping everything to enter this New Field.

FABRIX, Inc., Dept. 73
325 West Huron St., Chicago, Ill.
Send full information at once. No cost to me, no obligation.

Name.....
Address.....
City.....State.....

Classified Advertisements

WORLD'S BEST WANT AD MEDIUM

Advertisements in this section, 35 cents per word, each insertion, minimum 10 words, payable in advance
To be inserted under proper classification in April issue, copy should be in our office February 16th
Popular Mechanics Magazine, 200 East Ontario Street, Chicago, Illinois

**Our Records Prove That You
Can Fill Almost Any Want
Through a Small Classi-
fied Ad in This Section**

Popular Mechanics Magazine,
200 E. Ontario St.,
Chicago, Illinois

Gentlemen:—Please insert our ad in your next issue. We find that our advertising money, spent with you, is the "best investment." We had 109 replies from our November ad and replies are still coming in.

Sincerely,
MACY STAMP CO.

AUTOMOBILES

26x4" MINIATURE Auto wire wheels for Ford spindles, \$6.95 each. Karl Ort, 541 W. Poplar, York, Pa.

SPEED In Auto Racing. Brand new book gives all speed records; drawings, pictures, full description of record cars. Tells how you can build 125-135 m.p.h. stock car and speedway racers. Midgets, conversions, fully described. \$1.00 postpaid; \$1.12 C.O.D. Ray F. Kuns, Dept. B-6, Madisonville, Cincinnati, Ohio.

REFINISH Your own car. New instruction book treats all phases of painting and refinishing autos and trucks. Designed primarily for the man who wants to renew his own car, but covers also the business end of refinishing for the professional. Price only \$1.65 postpaid or sent C.O.D. by mail anywhere in U. S. Popular Mechanics Press, Room 803, 200 E. Ontario St., Chicago.

AUTO SUPPLIES AND EQUIPMENT

TRAILERS, 4'x6"—\$27.50, undercarriages \$15.50. Plans utility 50c, house \$1.00. Shamrock, 12321 Turner, Detroit, Mich.

CASH Income resilvering mirrors, replating metalware; making glass signs. Portable outfit. Sprinkle, Plater, 287, Marion, Ind.

BOOK of camp trailer plans containing fifteen modern designs ranging from 8 to 16 feet. Copy sent postpaid for \$1.00. Toelien Coach Company, Box 25, College Park Sta., Detroit, Mich.

JUMBO Wheels and tires, five complete, \$25.00. Most cars. Shamrock, 12321 Turner, Detroit, Mich.

L-J RACING Equipment Co. Parts made to specification. 2225 Fulton Rd., Cleveland, Ohio.

BARGAINS Used service station, garage equipment. Fesco, 3117 W. Roosevelt, Chicago.

USED Auto parts at half price for all cars. Century Parts Co., 1712 Lafayette Ave., St. Louis, Mo.

PROTECT Your motor! Temperature indicators repaired, guaranteed. \$1.50 C.O.D. Send all parts. A. Field, 1367 Castle Hill Ave., New York City.

PADS And bed seats for trailers, also camper's pads, any size, lowest prices. Hunters and Tourist Co., Box 276, Youngstown, O.

DEMONSTRATORS, Compressor, test bench, 8-hour battery charger—are welder. Guaranteed. Trial and terms. Ken's Equipment Exchange, Box M-351, Troy, Ohio.

BUILD Cabin trailer, low cost. Construction plans \$1.00. Tarr, Box 86, Boise, Idaho.

NICKEL Plating outfits, connect to your battery. No tanks used, thousands in use. \$3.00 prepaid. Gunmetal Co., Ave. J, Decatur, Ill.

MICROMETER, Measures accurately every thousandth between 1½", 5 inches. \$1.00 Agents. Schaap, Springfield Gardens, Long Island.

AUTOMATIC Choke. Make your own. Plans 25c. E. Moore, 805 E. Eckman St., South Bend, Ind.

BUILD Your own cabin trailer and save ¾ cost. Send 3c for literature. Brooks Boat Co., Inc., Box E220, Saginaw, Mich.

MOTORCYCLES, BICYCLES AND SUPPLIES

HENDERSON, Excelsior, Harley, Indian, used parts, alloy pistons, catalogue and wings pin 10c. Ballak, 100 N. 12th, St. Louis, Mo.

MOTORCYCLE Bargains, lowest prices, bargain sheet for stamp, motorcycle accessories, largest line in America, lowest prices. Largest motorcycle mailorder house in the United States. Rochester Harley Davidson Corporation, 129 West Main St., Rochester, N. Y.

USED Motorcycles. Harley-Davidson new and used parts, accessories. Bargains. Send 10c for bulletin. Western Motorcycle Co., 911 E. 15th, Kansas City, Mo.

We Repair bent, broken frames, forks. Scored cylinders, magnetos, generators. New and used motorcycle parts. J. B. Dahl, 2661 Archer Avenue, Chicago, Ill.

SEND 15c For illustrated used Motorcycle catalog. Large stock. Bargains. Indian parts. Accessories. Indian Motorcycle Sales, Kansas City, Mo.

ANY Motorcycle purchased from Knuth's will give real service and satisfaction. Send 6c for bulletin. Complete stock. All models and low prices. Knuth's, 2491 W. Fond du Lac Ave., Milwaukee, Wis.

MOTORCYCLES—Direct to you at rock-bottom wholesale prices. Rebuilt, roadtested and guaranteed Indians, Harley's, etc. Send 10c today for "Bargain Bulletin 43." Crandall Hicks Co., 789 Commonwealth Avenue, Boston, Mass.

DIME Secures sample Speedway Racing Magazine, catalog English motorcycles, crash helmets, speed books, supplies. Overhead speed heads for Fords. Clymer, 434 W. Pico, Los Angeles, Calif.

BOYS Motor bicycle \$45.00. Motorcycles \$40, new. Goodyear tires \$3.95. Engines for boys automobile, sleds, boats, aeroplanes \$25.00. Wheels \$1.00. Chains \$1.00. Parts at lowest prices. Bicycles \$11.50. Send 6c. Save dollars. Price-Cutter Deninger, Rochester, N. Y.

BOYS, Learn bicycle repairing. Send quarter for Correct Way to Lace Bicycle Wheel. Foreman's, 12201 N. Wis. St., Racine, Wis.

AVIATION

GET Into aviation. Air transport pilots get up to \$7,000 per year; mechanics, \$2,500. Learn at this government approved school. Write for complete information. State age. Lincoln Flying School, 2004 Aircraft Building, Lincoln, Nebr.

USED Airplanes, gliders, \$40 and up. Literature 10c. Continental Sales, Box 344U, Indianapolis, Ind.

300 AIRPLANES, \$45 up. Directory 20c. Aircraft Directory, Athens, Ohio.

300 hp. STROMBERG Carburetors \$3.95. Warm lined leather helmets \$1.95. Aldis telescope sights \$3.95. Curved rearview mirrors 95c. Wire wheels \$1.00. Wicker seats \$1.00. Bosch booster magnetos \$3.95. Airplane cloth 17c yd. Rubberized, 20c. Plywood \$1.95 sheet. Colored dopes \$1.00 gal. Air Transport Equipment, Garden City, N. Y.

PROPELLERS: Fords—\$7.45, Harley's—\$3.45, used—\$2.25. Aero Sales, Hart, Mich.

BIG Package of model airplane samples. Send dime for packing and postage. Aero Shop, 3050 Hurlbut Ave., Detroit, Mich.

BATTERIES, GENERATORS, ETC.

ELECTRIC Lights—Wind driven—You build them. Write Wind Motor Electric, Ridgway, Mont.

EDISON Storage batteries for power and lighting systems. Replace your old lead batteries with the Edison. Built like a battleship. Non-acid. Non-corrosive. Exceptionally long life. Liberal guarantees. Free illustrated literature. See Jay Battery Company, 82 Sterling Avenue, Yonkers, N. Y.

DIRECT Drive wind driven battery charger and light plant. Complete plans 35c. Paul Dickson, Beaconsfield, Iowa.

DODGE Generator easily changed to powerful arc welder. Ford, etc., to 110 or 32 volt motors, drills, etc. How to build pocket radio for 50c free. All complete with drawings \$1.00. Neal Brown, Richland Springs, Texas.

MAKE Automobile battery charger for dollar. Instructions 25c. Lonk, D-1613, Palestine, Ill.

ELECTRIFY Farm with windmill! Twelve pound wooden propeller driving rebuilt auto generator supplies 500 watts 32 volts. Inexpensive, practical, scientifically correct. Step by step instructions and blue prints to build \$3.00, particulars dime. 4714 No. 41 St., Omaha, Nebr. Wind Power.

BUILD New batteries from old, work at home. Daily cash demand. Thousands can be put into service. Send 25c for formula, instructions, mold catalog. Home Occupations, St. Paul, Minn.

TWENTY New practical changes for automobile generators. See our advertisement at bottom of page 121A. Auto Power, Inc.

PROFIT Rebuilding batteries. Make your own plates. Information 25c (encl). Gen. Batt. Serv., 78M Glenwood, Minneapolis, Minnesota.

EDISON Storage batteries for all types of lighting systems. Uses no acid. Odorless. Long life. Guaranteed. Generating plants, motor bargains. Free interesting literature. Hawley Smith Company, 22 Washington Ave., Danbury, Conn.

ELECTRICAL SUPPLIES—EQUIPMENT

ELECTRICAL Experimental apparatus—Super-special—\$17.75 kit—Bankrupt sale price \$2.79. Kit makes motors, arc furnace, defectophone, relays, electroplating, etc. Instructions furnished. Commercial apparatus, not toys. Kit contains twenty-five pieces. Stamp for catalog. Electrical Salvage Co., Box 524-AA, Lincoln, Nebr.

NICHROME Resistance wire problems solved. Easy-to-understand 17 pp. bulletin shows simplified methods of figuring size and length of wire for any job. Sent prepaid \$1.00. Technical Service Bureau, 6803 North Clark, Chicago.

INSULATION Wire, varnishes, supplies, etc. Send 3c stamp for bulletin. Autopower, 408-B Hoyne Ave., Chicago.

PHOTO-CELL Selenium, 3 grams with instructions 25c. Box 6, Barberton, Ohio.

MACHINE Costing \$21.50 changes icebox into automatic electric refrigerator. Build it yourself. 9x12 blue print of, "how it works" illustrated by drawings 10c. Onia A. Koistinen, Lake Norden, S. Dak.

NICHROME Resistance wire in all standard sizes 10 cents per foot, postpaid. Remittance must accompany order. Technical Service Bureau, 6803 North Clark, Chicago.

WELDING AND SOLDERING

ARC-WELDING Outfit \$1.25. Weld fenders, braze, solder. Lavrow, 4368-W. Warren, Detroit. Stamp appreciated.

WELDING And brazing oxy-acetylene equipment, new and rebuilt. Superior Oxy-Acetylene Company, Hamilton, Ohio.

DEMONSTRATORS. Electric arc welders. Money-saving prices. Used by the government. Trial and terms guaranteed. Hobart Welders, M-253, Troy, Ohio.

SPEED-E-ARC Electric welder. 75 ampere. Built from automobile generator. Complete instructions and improved blueprints \$2.00. C. Carlson, 2212 Grand Ave., Omaha, Nebraska.

MACHINERY, TOOLS AND SUPPLIES

WANTED — Woodworking, metalworking machines, fifty screw lathes—cash. T. Bates, Norwalk, Conn.

BARGAINS, Demonstrators, electric arc welders, guaranteed, 30 days trial and terms. Write Ken's Equipment, Box M-354, Troy, Ohio.

BIGGEST Bargains!—Bankrupt stocks, supplies. List 5c. Kostka, 2350-N South Crawford, Chicago.

ELECTRIC Drills—Brand new, husky, powerful, 1/4-inch, \$5.95. Description sent. Shaw, 31-A Winchester, Boston, Mass.

HAND Spring winders \$2.50. H. Myers, 111 Washington Street, Burlington, Iowa.

ENGINES, MOTORS AND DYNAMOS

GOVERNORS Control auto engines—stationary or portable power uses. New big discount. No cash down. Special foreign terms. Agents wanted. Candee-Smith Governor Co., 215 North Los Angeles St., Los Angeles.

300 BRAND New General Electric 1/4 h.p., 110 volt, 1750 speed, alternating current motors, price \$5.99. Six—\$5.60 each. Send 33 1/2%, balance C.O.D. Wilnot Auto Supply, 1970 Wilnot St., Chicago.

FINE Kva. 110 v. alternating generators \$89.50. Other sizes. Converters, motors. Queen City Electric, 1736 Grand Ave., Chicago.

ASSEMBLE Your own compressor outfit. Rotary pumps, gear type, direct drive for \$1.95. Haywood Company, 709 S. Kolmar, Chicago, Ill.

LIGHTING Plants. Four cylinder, four kilowatt, 110 volt. Direct current. \$250.00. Samara, 43 Old Slip, New York.

WINDING Data, 100 AC motors, various horsepower and voltage, \$1.00. Motor Data Co., 3002 Monroe, Kansas City, Mo.

\$17.75 FOR Our 35 pound 3 hp. engine. Circular 5c. Rasmussen Motor Company, Niles, Mich.

BOATS, OUTBOARD MOTORS, ETC.

BUILD Your own boat and save 1/2 cost. 38 designs. Send 10c for catalog. Brooks Boat Co., Inc., Box E-20, Saginaw, Mich.

OUTBOARD Parts—New or used—All makes—What do you need? Crandall-Hicks Company, 782 Commonwealth Avenue, Boston, Mass.

NAVY Surplus. Paragon reverse gears. Ideal for automobile conversion. Reasonable. Samara, 43 Old Slip, New York.

BUILD Your own boat. Our fabricated frames save you 1/3. Describe requirements and let us quote. Illustrated catalog 100 boats 10c. Bay City Boats, Inc., 1552 Adams, Bay City, Mich.

OUTBOARD Motor Mart. All makes, new and used outboard motors and parts. Bought, sold and exchanged. 315 Atlantic Ave., Boston, Mass.

BUILD Substantial 16 1/2 foot cedar canoe. Particulars, stamp. Arbec, 113, Bedford, O.

GUNS, FISHING TACKLE AND SPORTING GOODS

FLY And leader makers tools and materials. Complete line. List free. Paul H. Young, 8065-3 Grand River, Detroit, Mich.

GUNSMITHS' Secrets! Bluing, checkering, engraving, etc., 25c. International Agency, P-3, Cincinnati.

MAKE Sinkers for use or profit. Easy. Folder free. Reading Instrument Co., Box 78, Reading, Pa.

MINERALS—PRECIOUS STONES

SPECIAL Mineral offers for students, collectors, cutters, etc. Gem Shop, Korrs Block, Helena, Mont.

VAST Collection opals, cut, rough. Good assortment \$5.00. Lists free. Norman Seward, Melbourne, Australia.

ANTIQUES, RELICS, INDIAN GOODS

STONE Age Indian relics, Arkansas tribes. 10c for list and arrow. H. J. White, Huntsville, Ark.

INDIAN Relics, Beadwork, Coins, Curios, Catalogue and arrow, 6c. Vernon Lemley, Northbranch, Kans.

TAXIDERM Y

TAXIDERM Y Supplies—Quality artificial eyes, teeth, genuine Jonas head forms. Tools, materials, etc. Everything for the progressive taxidermist. Send for big illustrated catalogue—Free. Jonas Bros., 1049 Broadway, Denver, Colo.

LEARN Taxidermy. Five courses. Blue Beaver Taxidermy School, Lemont, Ill.

DOGS, BIRDS, POULTRY, PETS

52 BREEDS Chicks, baby turkeys, started chicks, hybrids, pullets, cockerels; Iowa inspected, nothing finer. Beautiful poultry book free. Berry's Hatchery, Route 23, Clarinda, Iowa.

POULTRY Tribune—Leading poultry magazine. Five years \$1.00; six months trial 10c in U. S. Poultry Tribune, Dept. C-93, Mount Morris, Ill.

COLLIES: Terhune strain; \$20-\$35. Sunny Grand Collie Farm, Station F, Milwaukee.

BEAUTIFUL—Pure bred—Finest blood lines. Dachshunde Kennels, Camarillo, Calif.

BEAUTIFUL Pure white police dogs. Ansonia Kennels, Mose, N. Dak.

ROOTS, HERBS, TREES AND SHRUBS

GINSENG Seed \$1.50 per 1000. W. N. Long, Florence, Ky.

AMERICA'S Biggest value! New "Herbalist Almanac" sent for only 10c postpaid. Includes hundreds tested herb medicine recipes, fishing dates, best times for planting and other valuable information. Beautifully illustrated in natural colors. Needed every home. Botanic, 145 West 112th St., Chicago.

FARMS AND FARM LANDS

NEW Opportunities, for renters and owners of high priced lands, in Washington, Oregon, Idaho, Montana, North Dakota and Minnesota where land prices and rents are correspondingly low. The Great Northern Railway serves an agricultural empire. Write for free books. E. C. Leedy, Dept. 957, Great Northern Railway, St. Paul, Minn.

\$5 DOWN, \$5 Monthly, 20 acres, Ozarks, \$100. Fishing, hunting, trapping. Hubbard, 216 Grossman Bldg., Kansas City, Kas.

INDEPENDENCE, Security assured, North Dakota, Minnesota, Montana, Idaho, Washington, Oregon farms. Bargain prices, easy terms. Descriptive literature, impartial advice. Mention state. J. W. Haw, 119 Northern Pacific Railway, St. Paul, Minn.

CANADIAN Tax sale lands for a dollar an acre and up; small monthly payments. Farms, timber, hunting and fishing camps, minerals. Limited number of properties. Write at once for free illustrated booklet. Tax Sale Service, Room 613, 72 Queen St., W., Toronto, Canada.

OREGON Catalog 25c. Details 250 farms, 165 pictures, maps, rainfall, climatic information. Kinney Company, Eugene, Oregon.

PROFITABLE OCCUPATIONS

IF Interested in raising frogs we guarantee to save you money. Send 10c for literature. American Frog Industries, Rayne, Ia.

SILVER Fox rabbits: Enormous profits. Proposition 10c. Hickory-Dell, Glenbeulah, Wisconsin.

RAISE Rabbits for us. We pay you up to \$5.00 each. Also put you in touch with markets everywhere. Large illustrated book and catalog; also copy of the American Rabbit Farmer and monthly market bulletin showing names of buyers in various parts of America who continuously buy all rabbits offered them. All for 10 cents. Address Outdoor Enterprise Co., Box 10, Holmes Park, Mo.

BOOKS AND PERIODICALS

STORAGE Battery handbook, complete authoritative course—200 pages—215 illustrations—\$3.00 postpaid. Refund in five days if unsatisfactory. Arndt, 1808 North Bronson, Hollywood, Calif.

WANT To get your every wish? Our marvelous book—"As a Man Thinketh"—shows the way. Postpaid \$1.00. John Mullowney, Nashville, Tenn.

BIG Mails. Magazines, catalogs, propositions, etc. Send 10 cents. Anderson Press, Box 3177, Miami, Fla.

BIG Mails magazine, propositions, catalogs, 10c. International Agency, P3, Cincinnati.

PICTURES AND POSTCARDS

INK Cartoon or yourself or friends \$1.00. Photo or snapshot returned. E. Sprague, Everson, Wash.

GAMES—ENTERTAINMENT

PLAYS, Operettas, musical comedies, complete minstrel first-parts with song programs, blackface skits, vaudeville acts, monologs, dialogues, recitations, juvenile plays and songs, musical readings, entertainments, make-up goods. Catalog free. T. S. Denison & Co., 623 So. Wabash, Dept. 11, Chicago.

MAGIC TRICKS, PUZZLES, JOKER NOVELTIES

PUZZLE—Used in leading universities as intelligence rater. Now you can rate yourself, your friends. New, unique, entertaining device. A challenge to your wits. Send 25c. Professor Green, 835 Riverside Drive, New York City.

MAGIC Catalogue 20c. Lynn, 105 Beach, Dept. 3, Jersey City, N. J.

VANISHING Half-Dollar trick. Complete apparatus and instructions. 50c. Box 133, Cloverdale, Ind.

LARGE Professional magic catalogue, 25c. Holden, 220 W. 42nd St., New York.

VENTRILOQUISM—Detailed instructions for voice throwing, with imitations and dialogues, only 10c. Franklin Publishing Company, 800 North Clark Street, Dept. 8000, Chicago.

JOKERS—3 World's greatest laughs. Newest novelties—35c. Persian Novelty, Alice Bldg., Norwich, Conn.

"125 CARD Tricks" 25c. Spelzer Service, 417 Altamont, Schenectady, N. Y.

FREE Magic catalog! South's largest line. Amaze—mystify your friends. Be popular. Earn money. Lyle Douglas, Station A-5, Dallas, Tex.

FREE! "Fun Magazine"—funniest thing out! Sample for 3c stamp. Fun, 2095 Jarvis, Chicago.

JOIN Magicians' fraternity! Free tricks! Monthly magazine, sample 10c. International Magicians, Mount Morris, Ill.

STAMP COLLECTING

SCARCE Egypt and Roumania airmails; also famous Belgium Piccard balloon commemorative and large packet British Colonies. All for 7c to approval applicants. Eureka Stamp Company, Box 602-P, Burbank, Calif.

30 DIFFERENT Angola, Cape Verde, Guinea, Portugal, Mozambique, St. Thomas—5c. Depraw, Ocean Park, Calif.

STAMP Dealers, your ad here will bring wonderful returns. Ask me for proof. F. W. Johnson, Manager, Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

ABSOLUTELY Free. 25 Japan. Approvals. 3c postage. Donovan Stampco, Milwaukee, Wis.

IMPERFORATE National Park, 2 diff. and 33 U. S., including early issues; high values; commemoratives; airmail; envelopes; special delivery; postage due; revenues cataloging over 85c. All for 7c to approval applicants. Illustrated pricelist free. Curhan Stamp Co., Dept. P, Gloucester, Mass.

166 U. S. Commemoratives, etc., 10c, 500—25c. Box 457, Newark, N. J.

AFRICA, Weird, mystic land, 50 different 10c with approvals. Ransom, 1333 Pontiac, Ann Arbor, Mich.

55 DIFFERENT United States commemoratives, Civil War revenues, airmails, etc. 15c with approvals; 120 different 50c; 200—\$1.00. Illinois Stampco, Rockford, Ill.

PENNY Approvals loaded with real bargains. Taylor, 6122 Woodlawn, Chicago.

100 DIFFERENT United States precancels and collecting instructions 10c to approval applicants. We buy precancels. Des Moines Stampco, Des Moines, Iowa.

FREE \$1.00 U. S. stamp with request for 52 page illustrated price-list of U. S. and foreign stamps. Also fine stamps on approval. Reference necessary. Packet \$10.00 value only \$1.25. New Hussman Stamp Co., 1122 Pine Str., St. Louis, Mo.

FREE—United States price list. Approvals against references. Huber, 505 Hennepin, Minneapolis, Minn.

BARGAINS 303 Varieties 25c. Catalogue \$10.00. To approval applicants. Timourou, R-589, Pasadena, Calif.

25 BRITISH Colonies, 3 Iceland, 5 Argentine, 8 China. All different 10c. Approvals. Nilsen, Poplar Hill, Alberta.

MT. EDITH Cavell. This beautiful \$1 Canada stamp with 20 different Canadian, only 20c to approval applicants. R. A. Lynch, Box 58, Peoria, Ill.

FREE! Big price list. Two U. S. \$5.00 stamps 10c. Vanvorhis, Hyndman, Pa.

FREE Dollar packet to one cent approval applicants. Harlan, 5307 S. Marshfield Ave., Chicago, Illinois.

120 DIFFERENT including United States commemoratives 5c with approvals. Tricity Stampco, Davenport, Iowa.

WORTHWHILE—1, 2 And 3 cent approvals on request. Mention approvals desired. Address to "Goldy," % Collectors Stamp Service, Box 118, Phoenix, Ariz.

BEST One cent approvals in America. F. Hand, 1117 So. 60th St., Philadelphia.

FREE!!! Russia Ethnographic set or ten pictorial stamps. Postage 3c. Roberts, 901F Fourth Baycity, Mich.

EXCHANGE Stamps, postcards by "Exchangers," 51 Passage Bureau, Paris, 126, France. Information free.

FREE 100 Different stamps to approval applicants sending 3c postage. Yale Stamp Co., 226 W. Longwood, Detroit, Mich.

PENNY Approvals. Sets and singles. Higher values. Write now. Krogh, 6711 Paschal Ave., Philadelphia, Pa.

SCARCE Panama triangle, octagon stamp, Confederate essay, and 50 others to approval applicants sending 5c postage. Phillips Stampco, D7, W. Springfield, Mass.

250 DIFFERENT Stamps 10c. 100 different U. S., 25c. Stamp House, Wenatchee, Washington.

FREE! Curious set Azerbaijan to approval applicants. Riedell, Greensburg, Penna.

STAMPS Sent on approval. 50% discount. Fred Herzberg, 197 Grantley Ave., Elmhurst, Illinois.

200 DIFFERENT 10c. Big 50% approvals. Covert Stamp, 39 State, Rochester, N. Y.

FREE! Costa Rica triangle, scarce Turkey octagon, packet gorgeous ship stamps, complete airmail set, watermark detector, interesting lists and coupons! Postage 3c. Approvals included. Midwest Stampco, Midwood Station, Brooklyn, N. Y.

THIRTY Large commemoratives only 10c to approval applicants. Ace Stamp Co., Erie Bldg., Cleveland, O.

THE World in a packet—105 different stamps from 105 different countries, including Abyssinia, Afghanistan, Brunel, Falkland, Zanzibar, and others from Africa, Asia, South America, West Indies, etc. Our pamphlet which tells "How to Make a Stamp Collection Properly," together with our large bargain list of albums, packets, sets, etc., all for only 20c. Queen City Stamp Co., Room 36, 604 Race St., Cincinnati, Ohio.

FREE! Beautiful collection of stamps from Africa, Asia, South and Central America, Europe, French, British and Portuguese Colonies including airmails, provisionals, commemoratives, etc. The entire lot free to approval applicants. Kindly send 20c for registered postage. We frank with rare tete-beche stamps. Frasek, Inc., Lucerne 3, Switzerland.

BRITISH Colonial approvals. References. Pioneer Stampco, 304 Covert, Brooklyn, N. Y.

SCARCE Hawaii!!! Bolivia triangle! Packet of unusual stamps containing old Hawaii, scarce Bolivia triangle, famous money stamp (printed on cardboard and also used as currency!); airmails from Mexico and Paraguay; map, ship, animal, commemorative, etc. No Europe. Only 10c to approval applicants. De Soto Stamp & Coin Co., 103 N. Clark St., Chicago, Ill.

AMAZING Value—35 different U. S. early commemoratives, air mail, etc., 10c to approval applicants. Stamp Shop, 809 Holland Bldg., St. Louis, Mo.

SCARCE Airmail and triangle. Beautiful Uruguay "flying horse" airmail and scarce Guatemala triangle (smallest in the world) are included in our big packet of 60 different stamps from Abouites, Grand Liban, Venezuela, British and French Colonies, etc. All for 5c to approval applicants. Big illustrated lists free with each order. Write today! Mystic Stamp Co., (Dept. 80), Camden, New York.

SUPER-WONDER Packet of 60 different stamps, containing scarce Bolivia triangle, stratosphere balloon, French, British Portuguese Colonies, Andorra, Inial, Monaco, Victoria, ship, beasts, etc. Only 6c to approval applicants. Potomac Stamp Co., Dept. 103, Washington, D. C.

FREE—15 Extra fine Newfoundland, Mexico, Canada, Salvador to those requesting approvals. 1000 superior unpicked United States 1891/1926 clean soaked \$1.00. 10 different foreign envelopes 25c. 2000 hinges 25c. Hart Stampco, 208 North First, St. Louis, Mo.

105 DIFFERENT, Hyderabad, Congo, Guinea etc., 3c to approval applicants. Extra—Airmail set free with above. Hunziker, Box 225-P, Minneapolis, Minn.

ASSASSINATED King Alexander!!! Portraits. Scarce mint Goyas. 10c. Approval applicants: 1000 (unpicked) American or worldwide beauties 25c. Rio Stampco, 3280 Rochambeau Ave., New York.

AIRMAILS—Brazil, Chile, Columbia, Ecuador, Mexico—all for 10c with double premium penny approvals. Progress Stamp Service, Franklin Park, Ill.

1000 FOREIGN Or U. S. mission mixture 20c to approval applicants. Goldenrod Company, Harrisburg, Ill.

THIS Ad worth 25c. If you send for our approvals and buy 50c worth or more—large selection of U. S. and foreign—reasonable prices. Morton Stamp Co., 1121 Olive, St. Louis, Mo.

110 DIFFERENT Stamps free to approval buyers. Postage 3 cents. Badger Stampco, Milwaukee, Wis.

ECUADOR 20 Different including commemoratives, airmail only 10 cts. to serious collectors desiring our dependable approvals. Dependable Stamps, 716 North Kilkea, Los Angeles, Calif.

FREE Outfit! Pocket wallet, hinges, watermark detector. Packet stamps from South America, Asia, Africa, etc. Postage 6c. Approvals. Maxwell Stampco, Piedmont, California.

200 DIFFERENT Stamps, triangle, airmail, etc., 10c. R. H. Carlton, 209 W. Fourth, Los Angeles, Calif.

FREE Gorgeous packet, including Spanish airmail set, triangle, ships, maps; only 3c postage to approval applicants. Imperial Stampco, Fontana, Calif.

1000 MIXED Foreign 25c with approvals. Johnson, 69 W. 102nd, New York.

FREE—Beautiful airmails from six countries, to approval applicants enclosing postage. Green & Co., Norwood, Ohio.

1000 ASSORTED U. S., 25c; 100 commemoratives, 25c; 125 revenues, 25c; 1000 foreign, 25c. Jewett, 1204 West Onondaga, Syracuse, N. Y.

UNUSUAL Approvals. 12 different Peru, to applicants. 3c postage. Ranson, 3307 Adams, Chicago.

MAMMOTH Mystery packet of rare stamps for only 10c to serious approval applicants, also valuable free premiums with every selection afterwards. Our stamps are better and our service is different. Fair-Play Stamp Service, 1215 Browning Blvd., Los Angeles, California.

20 VARIETIES Newfoundland 10c. Approvals. Marian, 1314 Somerset, Detroit, Michigan.

BEAUTIFUL Collection 50 unused Soviet Russia. Catalogued value \$2.64. 15c to serious approval applicants. Lincoln Stampco, 137 North Marion Street, Oak Park, Ill.

U. S.—55 Different (commemorative, airmail, etc.) with approvals 9c. Moseley, 4932 Forestpark, St. Louis, Mo.

FREE Set with bargain approvals. Brooks, 624 Cameron, Dallas, Texas.

UNITED States, British North America approvals. Reference please. Macy Stamp Co., 8114 Maryland, Chicago.

STAMPS: 100 Different catalogue over \$2.00 with catalogue 10c. Norman Shultz, Salt Lake, Utah.

TRIANGLE From Costa Rica, Venezuela airmail, many scarce stamps, blank album, perforation gauge, hinges, watermark detector, millimetrescale. Price 5c with approvals. Mohawk Stampco, Box 932, Mar Vista, California.

\$2.50 CONSULAR Service stamp, 5c with approvals. Chipless, 7080 Cabalan, Detroit.

53 ABYSSINIA, Ceylon, Zanzibar, etc., 13c with approvals. Edgard, 100 Maple, Windsor, Ontario.

1000 UNUSED Stamps 8c to approval applicants. Clifton J. English Co., Nashua, New Hampshire.

NEWFOUNDLAND, 15 Different 5c with approvals. Hudson Co., Plainfield, N. J.

ILLUSTRATED U. S. list, price 50c, large complete U. S. price list free. Stanley Gibbons, 38P Park Row, N. Y.

20 DIFFERENT Greece 10c. Fred Onken, 630 79th St., Brooklyn, N. Y.

MEMEL! We include a stamp, guaranteed genuine, from this distant and rare country, along with a complete Russian commemorative set; complete Hungarian "Postage Due" set; 3 classic stamps of the world, all over 50 years old; and a complete set of the most historic issue in existence, "The Bosnian Assassination, the Spark That Set the World Afire," all guaranteed genuine, for only 10c! Pearson Bros., 63 Nassau St., Dep't. 19, New York.

GREECE: 40 Different stamps of this interesting country, bargain at 10c to approval applicants. Anchor Stampco, Rutherford, New Jersey.

GRAF Zeppelin airmail triangle, pocket album, watermark detector, perforation gauge, packet Asia, Canada, Africa, South America, etc. 6c to approval applicants. Glendale Stamp Co., Glendale, Calif.

20 AFRICA 3c With penny approvals. Lejac, 902 1/2 South San Pedro, Los Angeles, California.

80 STAMPS—Ecuador, Nyassa, Persia, etc. 10 cents. Lufbery, 213 Pine, Middletown, Connecticut.

FREE Set to approval applicants. Bill Sadler, Vineland, N. J.

EXTRAORDINARY Sale! Limited time only! Number one Argentine, Iceland airmail triangle, Australian Lyrebird, Kooburra, etc., ten stamps cataloging over dollar, for 25c. Bargain Co., Box 39 P, Station H, New York.

MYSTERIOUS Jungle packet: Abyssinia, Azerbaijan, Congo, Tanganyika, Zanzibar, scarce triangle included. 5c. Approvals. Rosenberg, 344 West 12th Place, Chicago.

INDO-CHINA And Paraguay airmails, pocket album, watermark detector, perforation gauge, packet Asia, Africa, Canada, South America, etc. 5c to approval applicants. Penny Stamp Co., Glendale, Calif.

SCARCE Morocco airmail, Eritrea camel stamp, maps of stamp countries, watermark detector, hinges, perforation gauge, stamp album, many scarce stamps, 5c with approvals. Superior Stampco, Box 8276, Palms Station, Los Angeles, California.

LINDBERGH Spanish commemorative with 50 different 10c. Approvals. Burke, Marshfield, Vt.

FREE—\$2.00 United States stamp. Postage 3c. Coronado Stampco, Salina, Kans.

20 LIECHTENSTEIN .03c To approval applicants. Sodak Stamps, Sioux Falls, S. D.

GORGEOUS Packet 3c. Approval applicants only. Harvey Teeple, Decatur, Ind.

FREE!!! 22 Different Canada to approval applicants. Fort Dearborn Stamp Co., 5439 Aberdeen, Chicago.

SIXTY Attractive stamps from twelve different countries cataloging over \$1.50 to approval applicants furnishing reference, 25c. Town Stamp Shop, Towson, Md.

POSTAGE Paid. Try my approvals. Woodhams, 6137 Toltecway, Los Angeles, California.

50 DIFFERENT Stamps, 1000 hinges 10c. Approvals. Valley Stampco, Little Valley, New York.

FOREIGN Or United States mixture \$1.00 per pound (about 4000). Sample 1/4—25c. Approvals sent. Elmer's, 192A Washington St., Boston.

MAGNIFIER, Stock book, stamp album, hinges, watermark detector, perforation gauge, millimetrescale, packet scarce stamps. Price 5c with approvals. Atlas Stampco, Box 4023, Culver City, California.

EXCELLENT Foreign approvals. 50 different British Colonial stamps 6c to approval applicants. H. Wilcox, Box 142, Torrington, Connecticut.

LARGEST Bi-colored United States stamp ever issued! Roger Clark commemorative and 15 different from Canada, Mexico, Newfoundland, U. S., including \$1.00 postage, \$2.00 revenue, imperforate park. All for 8c to approval applicants. Clipper Stamp Co., Dept. 7, Gloucester, Mass.

\$1000 CATALOGUE Value in prizes offered in big free stamp contest. Can you solve the "Know Your Stamps" puzzle? Barrels of fun! Loads of prizes! No obligation! Write for your puzzle today. And we want to tell you about our three kinds of approvals, our bangup premiums, and our tremendous listing of tencent items. Closing February twenty-eighth. Amity Stamp Service, Amityville, N. Y.

FREE—Imperforate parks to serious collectors. Approvals. Chase Stampeo, Haverhill, Mass.

BRITISH Turkislands—Also Congo's, Montecarlo, Nigercoast, Uganda, Djibouti, Ecuadorian, Ivorycoast, Ubangi, countries collectors need. Free for 5c postage. Empire Stampshop, Dept. PM, Toronto, Canada.

WHOLESALE Monthly—Sample copy sent free. Empirestamp, Dept. MP, Toronto, Canada.

CANADA Treasure packet. Fifteen cents. Frontenac Stamp Company, Kingston, Ontario.

NET Approvals. 50% to 66% discount. Reference required. Charles DeJong, 366 Geneva Ave., Dorchester, Mass.

WEEKLY Stamp magazine, thirteen weeks, 10c. Stamp Journal, Kalamazoo, Mich.

PENNY Approvals, that satisfy. Neil Gronberg, Box 5441-P, Philadelphia, Pa.

FREE U. S. \$10.00 stamp number 4339. Old stamps are always best. We will send above \$10.00 stamp free to approval applicants who send 10c for our unexcelled 19th Century combination containing 15 genuine very old stamps, including a United States stamp over 50 years old. Globus Stamp Company, 268 - 4th Ave., Dept. 50, New York, New York.

SWITZERLAND Mixture. Finest on market. Packages 3,500 for \$1.00. Satisfaction guaranteed. Charles Rose, Maywood, Ill.

FIFTY Different U. S. 25c. Also approvals. Crystal, 242 W. 30, New York City.

UNITED States; British colonies. Liberal discounts. Box 95, Minneapolis, Minn.

FREE! U. S. 30c, 50c, \$1.00 postage dues (cataloging 45c); and 40 other beauties, for 3c postage! New Byrd stamp, for mail going to South Pole, 3c. Block four, 15c. Watermark detector, 2c. 15 different Confederate prints, 10c! United States price-list, free! Approvals with each order. Tatham Stampeo, (D125), Springfield, Mass.

ILLUSTRATED Album, spaces 4000 stamps; or 200 different mint to approval applicants 20c. Swan Stamps, 604 Swan, Dunkirk, N. Y.

WASHINGTON Stamp of Poland, Epirus, Zanzibar, triangle, \$2.00 United States, etc. In packet 58 different, 5c with approvals. Monumental, Arlington, Baltimore, Md.

GIANT Triangle and Zeppelin! World's largest triangle stamp from Spain and scarce Russian Zeppelin; also big packet of 53 different stamps, including Azerbaijan, Epirus, new Martinique, etc., and illustrated lists—all for 5c to approval applicants! World-Wide Stamp Co., Box 600, Camden, N. Y.

200 DIFFERENT Including 50 different British with Fiji, Newfoundland, Cyprus, Canadian commemoratives 10c, approvals included. Mantle Stamp Company, London, Canada.

WHOLESALE Catalog for dealers. Illustrated. Postage 5c. Frank Company, 4900 Chalgrove, Baltimore, Md.

CANADA \$1.00 "Mountain"—rare, and 30 other Canada only 30c. World specials—500 different 30c; 1000 different 85c; 2000 different \$2.50. Approvals with each order. Canadian catalog 10c. Victoria Stamp Company, London, 4, Canada.

MALDIV Islands, Brunei, Turks and Caicos Islands, Charkhari, \$5 United States, genuine Baden, and a U. S. imperforated "park" stamp—All these given to approval applicants enclosing 3c for postage! Viking Stamp Co., 1 Hanson Place, Brooklyn, N. Y.

UNITED States stamps—40 different with pricelist 10c. Seidenberg, Baroda, Mich.

50 OLD Stamps 1c. Album 3c. Bullard, 446 Tremont, Boston.

20 ARGENTINE, 25 Cuba, 15 Chile, 10c each. Price lists free. John Graf, 1874 Loring Place, New York.

GIANTIC Collection containing rare triangles, airmail, Abyssinia, Algeria, Andorra, Camerons, Kouang-Tcheou, only ten cents with approvals. Walker, 471 Witmer, Los Angeles, Calif.

500 FINE Mixed U. S. with scarce airmail cachet 25c. Approvals. Wright, 1154 Hamilton, Hagerstown, Md.

SEND \$1.00 For photo postcard from Little America to you. Also rare airmail covers circular. Katonah Stamp Co., Katonah, New York.

SOUTH American mixture—1,200 stamps. Over 100 varieties. Aeros, commemoratives. Package \$2.00. Satisfaction guaranteed. Charles Rose, Maywood, Ill.

RARE COINS

UNITED States. Large cent, 2c bronze, 3c nickel and bargain list, 25c. Thirteen dates large cents, \$1.00. George P. Coffin, Augusta, Maine.

OLD Money wanted. Will pay \$100.00 for 1894 dime, S. mint; \$50.00 for 1913 Liberty head nickel (not buffalo). I pay big premiums for rare coins. Send 4c for large coin folder. May mean much profit to you. B. Max Mehl, H Mehl Bldg., Fort Worth, Tex.

HIGHEST Prices paid for Indian head pennies. Send dime for list of those wanted. Coin Shoppe, Box 407-PM, Ottawa, Ill.

\$2000.00 FOR 1c. We pay the world's highest prices for old coins, encased postage stamps and paper money. Large cents up to \$2000.00 each, half cents \$250.00, 1909 cent \$10.00, Indian head cents \$50.00, half dimes \$150.00, 25c before 1873 \$300.00, 50c before 1879 \$750.00, silver dollars before 1874 \$2500.00, gold dollars \$1000.00, trade dollars \$250.00, 1822 \$5 gold \$5000.00, old paper money \$26.00, encased postage stamps \$12.00, certain foreign coin \$150.00, etc. Send dime for large illustrated list. Romano-coinshop, Dept. 424, Springfield, Mass.

FREE!—Foreign coin, banknote, and large illustrated coin catalogue,—4c postage. Souvenir California gold quarter size 26c; 3/4 size 53c; both 65c! Round or octagon, set of each \$1.30! Approvals with each order. Tatham Coinco, Springfield, Mass.

3 FOREIGN Coins and price list 10 cents. Stephens, 1702 Main St., Elkhart, Ind.

WE Buy 1907 Indian head cents. Full information one dime (coin). Mattick, Box 3450, Altoona, Pa.

WANTED. Old U. S. money. Walter F. Allgeyer, Box 192, Newark, N. J.

\$5.00 TO \$500.00 Each paid for old coins. Keep all old money. Send 10 cents for illustrated coin value book, 4x6. Guaranteed prices. Buying and selling. Coin Exchange, Box 5, Le Roy, N. Y.

FOUR Crisp notes, one foreign copper before 1800 with catalog 10c. Geo. Best, Cedar Rapids, Iowa.

RARE 1700 Java coin and bargain list only 10c. W. Webb, Box 1854, St. Petersburg, Fla.

11 DIFFERENT Coins, 3 bills and catalog, 25c. Creamer's, 1112 Somerset, Baltimore, Md.

12 DIFFERENT Coins 25c—California gold quarter and half 50c. Brooks, 624 Cameron, Dallas.

UNITED States white cent and bargain selling price list 10c. Arcy, Box 483, Muskegon, Okla.

CALIFORNIA Gold, quarter size, 27c; 3/4 size, 53c; eighty page selling list coins, 10c; buying list cents, Indian head, etc., 10c. Norman Shultz, Salt Lake, Utah.

SELL Us your old coins. Up to \$53.00 paid for Indian head pennies. To \$2.00 for Lincoln pennies. Certain nickels \$100. Other coins to \$2500. Send 10c for buying catalog. Coin Collectors Club, DD-700 East 63rd, Chicago.

20 ASSORTED Coins 25c. 100 coins \$1.00. Otto Oddehon, Williamstown, Kans.

15 DIFFERENT Coins, including two United States before 1865. 25c. Coin Exchange, Box 2554, Kansas City, Mo.

UP TO \$300 paid for dimes dated before 1895; Liberty head nickels \$200; pennies \$25. Send 15c complete catalog. National Coin Company (BB), Springfield, Mass.

CAMERAS—PHOTO SUPPLIES

CAMERAS And supplies. Big bargain book free. Offers tremendous savings on cameras, lenses and other photographic apparatus. Still and movie. All listed and illustrated in our new, big, complete bargain book for 1935. Also binoculars and weather instruments at equally sensational savings. Write for your copy of this free book today. Central Camera Co., Established 1899, Dept. PM-3J, 230 South Wabash Ave., Chicago.

PHOTOGRAPHERS Wanted with view cameras for newspaper features. Fine Arts Syndicate, Box 852, Chicago.

MAKE Money in photography. Learn quickly at home. Spare or full time. New plan. Nothing like it. Experience unnecessary. American School of Photography, Dept. 3432, 3601 Michigan Avenue, Chicago.

HAVE You a camera? Send ten cents for recent number of our big magazine, showing how to make better pictures and earn money. American Photography, 116 Camera House, Boston, 17, Mass.

INCOME From your camera instead of expense. Low cost home course teaches you to make photographs for magazines, newspapers, advertisers. Tremendous demand. Earn good money wherever you live. Free book. Universal Photographers, Dept. 104, 10 West 33rd St., New York.

GUN Cameras, unused. Lens, shutter, magazines, complete. Philip E. Myers, 3709 Albatross Street, San Diego, Calif.

PHOTOGRAPH Without films. Guaranteed instructions \$1.00. Sample 10c. Koch's Studio, Collbran, Colo.

PHOTO FINISHING

ROLLS Developed. Two beautiful double-weight professional enlargements and 8 guaranteed Never Fade Perfect Tone prints. 25c coin. Rays Photo Service, LaCrosse, Wisconsin.

FILMS Developed 1c. First order, get-acquainted offer. Any size, 6 or 8 exposure roll beautifully developed for only 1c with this ad. Geppert Studios, Suite 130, Des Moines, Iowa.

HAND Colored enlargement with each roll 25c. 40 reprints 50c. Colorgraph-8, Dunning Station, Chicago.

MINIATURE Camera owners—Film developed fine-grain 20c. 4"x5" prints 6c each. Advance Photo Service, 32 Lewis Place, St. Louis, Mo.

ADAMS Photo, 11-A Lincoln, Dorchester, Massachusetts. Friendship offer! 3 superb 5x7 enlargements, 20c!

FILMS Developed 5c per roll; prints 3c each. Ask for special bargain list. Roanoke Photo Finishing Company, 161 Bell Ave., Roanoke, Va.

20 REPRINTS 25c. Films developed, two prints each negative, 25c. Skrudland, 4118-8 Overhill, Chicago.

20 REPRINTS 25c, 100 Reprints \$1.00. Rolls developed and printed with 2 professional enlargements 25c. Photoshop, 1904-L South 3rd, Maywood, Ill.

ENLARGEMENTS 4x6, Five for 25c. 5x7 three for 25c. 8x10 three for 35c. Special hand colored easel mounted 4x6 enlargement 25c. Enlargers, 1652-8 North Western, Chicago.

YOUR Favorite kodak pictures enlarged, size 5x7, 10c. Three for quarter, coin. Send best negatives (film) today. Address Darmer Photo Lab., Enlarging Dept. 9, Des Moines, Iowa.

16 BEAUTIFUL Gloss prints and two enlargement coupons only 25c. Imperial Film Service, Unionville, Mo.

COLOR Enlargement with each film developed—a professional enlargement painted in oils and eight Gloss-tone prints. DeLuxé finish, guaranteed not to fade, 25c. Super quality. Speedy service. Satisfaction or money refunded. LaCrosse Film Company, LaCrosse, Wis.

FILMS Developed any size 25c coin including two enlargements. Century Photo Service, Box 829, La Crosse, Wis.

FILMS Developed 2 prints of each negative and two enlargement coupons 25c. Summers Studio, Unionville, Mo.

COLOR Photography here. Prints in vivid fadeless colors. Any ordinary roll developed and photochrome printed 35c coins. Reprints 4c. Photochrome Co., Columbia, Mo. Sole American producers.

PRINT Snapshots on handkerchiefs, note-paper, etc., sensitized with photoprint fluid. Dark room unnecessary. Washable, permanent, guaranteed. Send \$1.00 for fluid to print 200 pictures. Park Specialty, 219 Park Place, Brooklyn, N. Y.

TRIAL Roll developed and 8 prints 25c. Prints 3c each. Beautiful 10-inch enlargement 25c. Young Photo Service, 405 Bertha St., Albany, N. Y.

BEAUTIFUL 8x10 Enlargement 25c, on high grade professional paper, of your favorite picture or film. Janesville Film Service, Janesville, Wis.

KODAK Pictures enlarged, 5x7 10c, 3 for 25c. Send negative film. Stanley Studio, Des Moines, Iowa.

SEND 10c For: "Tricks and Technique of Developing, Printing and Enlarging." Eastern Scientific Co., Box 294, Plainfield, N. J.

MOTION PICTURES AND SOUND EQUIPMENT

16 MILLIMETER Art reels. Blackstone Exchange, 515 South Laflin St., Chicago.

MAKE 16mm Movies in foot including film and processing. Instructions \$1. W. Turan, E. Wareham, Mass.

100 FEET 35mm Film 27c. Lists 3c. Hoffman Film Service, 57 Broad, Albany, New York.

BASS. Cine headquarters, offers astounding value in new special 100 ft. Keystone 16 mm. camera, seven speeds including slow motion, interchangeable lens mount, fitted with F:3.5 Anastigmat lens at \$32.95. Or with 1" Wollensak F:1.5 Anastigmat in focusing mount at \$59.95. Money back guarantee. 100 ft. Dupont Mono film including reversing at \$2.95. 200 watt Keystone Special projector, motor driven, at \$23.75. 400 watt biplane Model A projector, new latest type, \$135.00 value, complete with case, \$99.50. Willo Cinemeter, regularly \$9.50 at \$5.15. Order direct from ad. Send for latest Bass Bargaining No. 214 of 16 mm. apparatus. Library service available in 21 states. Send for catalog. Bass Camera Company, 179 W. Madison St., Chicago, Ill.

8MM USERS: New economical film; new accessories; new ideas. Information free. Corpe, Box 177-A, El Monte, Calif.

FREE—16mm, 8mm Bargain lists. Films 35c up. Art sample 25c. Home Movies, Box 32, Easton, Penna.

8MM OR 16MM. Movie cameras and projectors. On easy terms. Elder, Dept. B-9, Chelsea, Mass.

35MM BARGAINS. Stamp for list. Harry Nelson, Lake View, Hempstead, N. Y.

EXCLUSIVE 16mm. Art productions, travelogues, cartoons, Mickey Mouse. Catalog 10c (coin). State type of movie desired. Home Movies, 22 E. Van Buren, Dept. 16M, Chicago.

WORLD'S Greatest "Passion Play" 16 MM. (new) 5 reels. Rent or purchase. Write Hemenway Film Co., 37 Church Street, Boston, Mass.

LEARN The motion picture theatre business. Big opportunities as business or profession. Catalog free. Theatre Institute, 325 Washington Street, Elmira, N. Y.

16mm FILM Subjects—20% to 80% saving. Low priced projectors, cameras. Film rental library. Big catalogue, two "end" titles sent for dime. Eastin Films, Dept. 33, Galesburg, Ill.

BARGAINS. Used theatre projectors, parts, soundheads, turntables, amplifiers, horns. Catalog mailed. S.O.S. Corp., 1600 Broadway, New York.

WESTERNS: 500 Ft. 75c. Jersey Films, 2075 Richland, Lakewood, Ohio.

1000 FEET 35mm 75c. Projectors. Features. Savarese, Woodliff Lake, N. J.

35-MM FILMS. Projectors. Stamp for lists. Box No. 6, Rosedale, Kans.

RADIOS—SUPPLIES—INSTRUCTION

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

"MILLION Point" supersensitive long distance tested crystals. Set instructions included. 50c postpaid. Radio Supply Company, Ltd., E 598, Edmonton, Alberta, Can.

MAKE Simple long-distance crystal radio. Crystal and instructions, 15c. 2 for 25c. Music Sales, Independence, Mo.

RADIO Experimenters and set builders. Parts and kits of parts for the Economy Three Tube, five and four tube Little Giant, auto radio and portable battery set described by Popular Mechanics. Lund Mfg. Co., Dept. PM, 1730 Foster Ave., Chicago.

DISTITE \$1.50 Pocket radio only 45c, postpaid. Agents proposition included. Music Sales, Independence, Mo.

WHOLESALE Catalog free. 1935 long-short wave radios. Bart, Knoxville, Tenn.

SHORT Wave transmitters, receivers, supplies. Wholesale literature 5c. Federal Telegraph, Box 344B, Indianapolis, Ind.

35c COMPLETE Pocket (crystal) radio kit. Educational Radiolabs, 4932 - 8th, Philadelphia.

NEW Long distance crystal receiver. Blueprint, 17 others 25c coin. Particulars free. Modern Radiolabs, 151-C Liberty, San Francisco.

RADIOS—Farm or auto. World's cheapest. Catalog free. Sample offer. J-20th Century Co., Kansas City, Mo.

FREE Electricity—6 volt wind generator for radio, lights, battery charging. Currier Mfg. Co., Minneapolis, Minn.

MUSIC AND MUSICAL INSTRUMENTS

REBUILT Band and orchestra instruments. Honestly rebuilt—fully guaranteed. Catalog of new instruments on request. Weymann Company, Dept. M-3, 13th and Arch Sts., Philadelphia.

SONGWRITING. Good money being made from songs through talking pictures, radio, phonograph, music publishers. "Hit" writers revise, arrange, compose music to your lyrics, lyrics to your music. We submit to studios and other markets. Free reading. Send for booklet. Universal Song Service, 671 Meyer Bldg., Hollywood, Calif.

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

SONG Writers. Send for our "Publishing Agreement." McKinley Music Printers, 1501 E. 55th St., Chicago.

SONG Poems wanted, free examination, 50-50 plan. Song Bureau, Salem, Ind.

PIANO By ear, no notes. Twenty compact lessons song writing included. \$1.00 bill. Home University, Box 545, Dallas, Texas.

GET This book: "Successful Songwriting"—Complete, only 35c postpaid. Winters, 31P - W. 46th St., New York City.

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

JAZZ Piano—10 lessons—beginners or advanced. Eddle, 1114 McGee, Kansas City, Missouri.

LATEST Song hits 30 cents each postpaid. Catalog free. Zerbe Distributing Co., 210 Olive, St. Louis, Mo.

"SONGWRITERS Professional Plan." Edward Madden, 1017 Danforth St., Syracuse, New York.

COMPOSERS. Verse or music. Brilliant opportunity. Write immediately. Burrell VanBuren, 1017 McClurg Bldg., Chicago.

NEW Deal. Write Sequoia Songwriters Service, Sherman Branch, Los Angeles, Calif.

SONGWRITERS! Poems—Melodies. Special offer. Studio PM, Guarantee Bldg., Hollywood, Calif.

WRITERS! Poems, music. Amazing offer. Hibbeler D1, 2157 North Avers, Chicago.

BUSINESS OPPORTUNITIES

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.

ANY Formula. Send \$1.00. Supply sources furnished. Established to give service. Technical Service Bureau, Inc., 6803 N. Clark, Chicago.

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

DISCARDED Auto oil and inner tubes useful various ways. Instructions 25c each. Charles, 12-AH, Norwood, Ohio.

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

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.

THAXLY Technically-Tested formulas. Practical processes. Chemical consultation. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

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 decoration, garden furniture, statuary, flexible molds, particulars and illustrations free. Chris Mahler, Elmont, N. Y.

SIGN Painting made easy with letter patterns. Samples free. Clark, Ellwood City, Pennsylvania.

FIRMS That sell wholesale. Names, addresses, 10c. International Agency, P-3, Cincinnati.

INVENTION And finance magazine; sample copy sent upon request. 5 Heckman Street, Department G, New York.

CASH Income-resilvering mirrors; replating metalware; making glass signs. Portable outfit. Sprinkle, Plater, 127, Marion, Ind.

MANUFACTURING Business (mail) \$250 handles. Emerson, 175 Fifth Avenue, New York.

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

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

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., 228 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. Elftro, 525 S. Dearborn, Chicago.

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

TWELVE New successful money-makers. J. Home, 3949 Metropolitan, Chicago.

VALUABLE Circulars on tested, money making plans. Free particulars. Write Advisor, 2432 N. McVicker Ave., Chicago.

WONDERFUL Opportunity for you in mail order business. We tell you how. Details 3c stamps. Nagle Enterprises, 1329 Olive, Indianapolis, Ind.

GREATER Earnings! Home, office. Particulars free. B-Hochman, 269 West First, Mount Vernon, N. Y.

"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.

FREE! Literature describing book "120 Ways to Make Money." Write, Boomer, 828 Pine St., Portsmouth, Va.

DOLLARS Daily! Start profitable, home! Mail order business. Duffy, Covington, Ky.

EARN Money. Big 60-page magazine full money-making plans, opportunities, ideas. \$1 year. Trial, 3 months, 15c. Ward Smith, Fergus Falls, Minn.

OPEN A key-making shop. Start a permanent profitable business with a small sum. No skill necessary. Write for particulars. Belser 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 Marey Avenue, Brooklyn, N. Y.

"PROSPERITY" For home workers. 52 page magazine. Sample 10c (silver). Size more, 4917 N. Kostner, Chicago.

GET Ready for prosperity! Many money-making plans; 100 formulas of standard products. Booklet—25c. National Book Agency, 4837 N. Albany, Chicago.

GET Lots of mail 25c. Your name listed in 10,000 directories. Rosoco, 4627 Glenshade, Cincinnati.

NEWEST. Different, successful, money-makers! Amazing book, dime. Standard, 3347 Wall Street, Chicago.

CANE Chairs. Build your own business. Dime tells how. Grover Pratt, Scottsville, New York.

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.

GREAT Opportunity. Get free plan. Mail order. Clean, legitimate. Particulars 6c stamps. National Services, Fairview, Birmingham, Ala.

BIG Profit hand engraving rubber printing plates. New, economical. Printers, advertisers buy on sight. Easy, quickly learned instructions, supply sources. 50c (silver). August Becker Corporation, Dept. PR3, 300 Graham Avenue, Brooklyn, N. Y.

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

FREE—Books, mail order business. Stamp appreciated. Dolson Herald, 36 Liberty Street, Brooklyn, New York.

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

LIQUID Marble—Anyone can make! Colorful, glazed! Molded, brushed, sprayed. Rubberlastic 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.

MOSAIC. Reproduce everything you see in colored marble. Make portraits of your friends. Bring in your home the works of Radio City. Mosaic Studio, 63 East 172 Street, New York.

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.

MANUFACTURING And selling business easily started. New type food line. Opportunities everywhere. Big profits. Circular free. Success Associates, Box 852, Syracuse, New York.

50 PAGES Home business ideas and valuable formulas—20c!!! T-S-G Box Ten, Wilkesburg, Pa.

NEW Enterprises. Guaranteed large returns. Instructions 25c. No expensive equipment required. "Modren," 4618 Howell St., Philadelphia, Pa.

INVENTORS! Authors! Swappers! Magazine full of new ideas and "Trade-Or-Sell" ads. 4 months 10c. Year 25c. Ads, 1c word. 50c inch. Carl Hansen, Brookings, S. Dak.

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

CAPITAL Seekers send 10c in stamps for informative 14-page booklet "Raising Business Capital." Schelzel, Stott Bldg., Detroit, Mich.

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

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

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

BARGAINS—Paint spray outfit, gasoline engine drive. Terms—trial. Helmick Paint Spray Exchange, M-352, Troy, Ohio.

WIN Thousands cash! Send 25c. World Contests Magazine, 3 months. B949A, Seattle.

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, Dept. 127, Toronto, Ont.

FORMULAS AND TRADE SECRETS

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

GUARANTEED Formulas. \$1.00. Expert analysis. Dept. F, Viking Laboratories, 11610 Superior Ave., Cleveland, O.

THAXLY Technically-Tested formulas. Practical processes. Chemical consultation. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

TWENTY Latest money-making formulas! 20c brings all! International Agency, P-3, Cincinnati.

AMAZING Auto anti-freeze formula 25c. Catalog. Allied Research, 2217 N. Kilbourn, Chicago.

ANY Formula 50c! Three \$1.00! Guaranteed!! T-S-G Publ., Box Ten-D, Wilkesburg, Pa.

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.

NEW Line! Medical formulas! List 10c. Continental, 3542-W Polk, Chicago.

PROVEN Formulas. Practical business plans. Big special offer! Barrett, 4243 Keystone, Chicago.

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

FORMULAS—Liquid leather and ten money makers. Twenty-five cents. Evans Institute, Montgomery, Ala.

PAINT And varnish remover. Trade secret. No scraping, just rub. Inexpensive, non-injurious. Formula 50c (silver). August Becker Corporation, Dept. PF3, 300 Graham Avenue, Brooklyn, N. Y.

700 SECRET Trade formulas, manufacturing processes and money-making plans. 30c postpaid. Lawrence Publishing Co., 143-E West 100th St., New York.

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

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

TOOTH Paste formula, guaranteed. Only 50c. Whites Laboratory, Fort Wayne, Ind.

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

ANY Formula 20c or money refunded. Westcott, Clyde, N. Y.

FORMULAS, Chemical analysis, business opportunities. Free catalogue. Hertstein, 222 Ransom, Grand Rapids, Mich.

12 INK Formulas 15c. Mitchell's, 10407 Lexington, Kansas City, Mo.

FAST Sellers. Fabric mending fluid. Liquid cold solder. Resilvering mirrors. Mineral water crystals. Liquid leather. Plastic wood. Formulas 25c each. Charles, 12-AG, Norwood, Ohio.

ANY Formula. Send \$1.00. Supply sources furnished. Established to give service. Technical Service Bureau, Inc., 6803 N. Clark, Chicago.

FORMULAS, Processes; all lines. Individual service by experienced chemist. Clore, Industrial Chemist, Crawfordsville, Ind.

FORMULAS, Plans, ideas. Literature free. Belfort, 4042 N. Keeler, Chicago.

SAVE Fuel. Seven guaranteed plans 25c. FSD Company, 900 Manhattan, Dayton, O.

525 PRACTICAL Formulas 25c. Money-making literature free. Peleshek's, Adell, Wisconsin.

AUTO Products—10 different tested formulas. \$10.00 value, \$1.00. Service Bureau, 6803 N. Clark, Chicago.

ANY Formula, recipe, process—15c; 8—\$1.00. Harsum, 175 Bryant, Malden, Mass.

1,000 FORMULAS. Recipes, manufacturing secrets, methods, etc., 25c. Start a business of your own. Franklin Publishing Company, 800 North Clark Street, Dept. 8200, Chicago.

CHEMISTRY

FASCINATING Chemistry magazine contains loads of experiments, news, problems, queries, jokes. 5 cent stamp brings sample. Chicago Press, Dept. 103, 158 Carroll Ave., Chicago.

CHEMISTS' Slide rule, solves equations, shows formulas, molecular weights, solubility of 391 compounds. In use from England to China. Postpaid anywhere, complete instructions, two dollars. MWC Company, 508 Andrus Bldg., Minneapolis, Minn.

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.

"SCIENCECRAFT" Magazine—50c year. Copy for stamp. Sciencecraft, P-5049 Bernard, Chicago.

MONEYMAKING OPPORTUNITIES

NO Competition in leveling butcher blocks for meat and fish markets, grocery, restaurant, hotels, institutions, etc. Make your own outfit. Can be carried on running board of auto. Send \$1 for blue print drawing. Zahara Products, 648 N. Morgan, Chicago.

CLEANING Preparations. 10 different formulas. \$10.00 value, \$1.00. Chemical Bureau, 6803 N. Clark, Chicago.

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

AMERICAN Homemaker Magazine. Sample copy, plans, offers, 10c. Mailmarts, P3, Cincinnati.

PROFITS In rewinding electric flatirons, toasters and other heating appliances. Easy-to-understand instructions enable you to become an expert. Sent complete for \$1.00. Technical Service Bureau, 6803 North Clark, Chicago.

SELECTED Opportunities. Opening. Write Ashley Big Food Market, 2019 Central, Wichita, Kans.

MAKE Miniature pottery novelties. Instructions 10c. Curtis, 3329 Lafayette St., Denver, Colo.

WRITING For profit, 10c. E. Pratt, 89 Leland Road, Rochester, N. Y.

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 autos like new without rubbing, polishing, waxing or painting. Wipes on with cloth. Lasts 8 to 12 months. Free sample. Karnu, Dept. G-108, Cincinnati, Ohio.

"WHEN You have tried everything else, let us show you how to make a living." Write Federal Pure Food Company, A-2946 Lake Street, Chicago.

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.

NEW. Patented, no selling, send name. Springfield Products Co., Dept. 8, Springfield, Ohio.

\$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. G-744, Cincinnati, O.

TWO In one combination cigarette lighter and mechanical pencil. Sample 75c. Havalite Products Co., Rochester, N. Y.

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

DOUBLE-EYED Self-threading needle packages, size 3/8. Blind people thread them. Invaluable for failing sight, necessary for good sight. Sample, particulars 10c. Agents wanted. Wm. Oglesby, Vandalia, Ill.

CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 21A.

900,000 ARTICLES Wholesale, Directory 1,500 jobbers \$1.00. 300—25c. Arts, B-1611-M, Denver.

QUALITY Flavors, attractive 4-bottle deal; two 4-oz., two 8-oz. Costs you 31¢c, distrib' manager's price. Sensational \$1 seller. Favorite, 2100 Kennedy Northeast, Minneapolis, Minn.

SELL Giant 75c tube brushless shaving cream. Costs you only 12¢c. Sample 20c. Armstrong Enterprises, 516 Fifth Ave., Suite 307, New York City.

NEW—Different pinless curtain stretcher. Curtains attached in 30 seconds. Low priced. 100% profit. Miniature sample furnished. Write Evans Co., Dept. MX-31, Cincinnati, Ohio.

AMERICA'S Greatest food bargains! Miraculous premium deals! Values that beat chain stores. Big profits. Mail postcard today. F. Kennedy Co., Kokomo, Ind.

THAXLY Technically-Tested formulas. Practical processes. Chemical consultation. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

EVERYBODY Needs food! I'll give you a wonderful chance to make \$9.50 a day supplying nationally known products on regular weekly route. Complete outfit furnished on trial. Albert Mills, 8960 Monmouth, Cincinnati, Ohio.

500% PROFIT Selling new "20-in-1" kitchen utensil. Retails 25c. Costs you \$1.00 a dozen. \$7.20 a gross. Sample 10c. New Method Co., PMM-5, Bradford, Pa.

STRANGE Ironing cord. Prevents scorching. Saves electricity. Abolishes kinks, snarls. Approved by Good Housekeeping. For telephones also. 140% profit. Samples furnished. Neverknot, Dept. 3-A, 4503 Ravenswood, Chicago.

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

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

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-3, New Method Bldg., Bradford, Pa.

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., 393 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, 200 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.

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

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. 15 B-1, Memphis, Tenn.

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

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

SELL Our attractive cigarette ash retainer. Latest winner. Big sales. Agents make big money. 40% discount on orders. Sample \$1.00. Sales Manager, 21 Belvidere South, Sherbrooke, Que., Canada.

AMAZING Zipper pinless clothesline. Instant demonstration. Sure sale every home. Free guarantee sales plan. Dunn Bros., Hempstead, N. Y.

NECKTIES, Pens, pearls, pencils, combs, razor blades, etc. All big sellers. Hell Premium Co., Dept. M, Gaylord, Minn.

25c PER Thousand. Tin foil window sign letters. Make them yourself. Dollar bill brings complete details of press, cutter, printer, formulas, sketches, plans, blue prints, trade secrets, etc. Make your own equipment. Make any size, style, color or design. Information worth fortune. Atlas Sign Works, 7941 Halsted, Chicago.

NEW Mechanical wallpaper cleaner. Revolution invention. Banishes cleaning drudgery. Homes, offices buy instantly. Hustlers coinage money. Outfit free. Kristee Mfg. Box 1433, Akron, Ohio.

CACTUS Candy, a goldmine for agents. Splendid sales. Unusual confection. Send \$2.5 for sample. Norust Sales, 390 Grand Ave., Rochester, N. Y.

COSTS 1c—Sells 25c. Make non-explosive cleaner from Benzene 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 Letcourt Bldg., Newark, N. J.

OVER 100,000 Articles wholesale. Large illustrated wholesale catalogs. Directory 10c. B-Wepco, 3705 University, Des Moines, Iowa.

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

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

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

PROFIT With new products. Make, sell, repeat. Guaranteed formulas, special prices, leads. Biggest catalog free. Gibson, Chemist, BD-4792 No. Racine, Chicago.

WANTED: Territory manager. Distribute amazing new teeth whitener. Address: Perlyte Co., 38B - 28th Ave., Venice, Calif.

AMAZING New automobile and furniture polish. Demonstrates instantly. Big profit. Sure repeat. Get territory now. Sample 25 cents. Cook Chemical, South Main, Reading, Massachusetts.

DISTRIBUTORS: Represent manufacturer. Sell Latex—self sealing bandage that breathes. Great demonstrator. Lowest prices. 400% profit. Good repeater. Exclusive territory. Neway, 24-H South Clinton, Chicago.

1000 BUSINESS Cards cost \$1.17. Sell \$1.75. 3214 Huron, Chicago.

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

HIGH-GRADE SALESMEN

SALESMEN, Representing national manufacturer selling tickets, checks to hotels, theaters, restaurants, clubs, buses. Liberal commission. Elliott Ticket Co., 12 Vestry Street, New York.

MAN—Handle regular store route. Place nationally advertised 5c-10c counter card mds. New aspirin deal—6 tablets 5c. 85 other fast sellers. 100% profit. No investment. Samples free. World's Products Co., Dept. 3810, Spencer, Ind.

SALESMEN: Acquainted with garages, filling stations, to handle local business. Write Colgra, 2629 N. Third St., Milwaukee, Wisconsin.

WANTED: County salesman with car, to demonstrate and service for large Ohio manufacturer. First-class job. 244 Fyr-Fyter Co., Dayton, O.

BIG Profits in advance—Exceptional opportunity for ambitious men to introduce our personalized belt and buckle. Over 550 emblems and designs, raised letters and colors. Actual samples supplied. Write for free sales plan. Hofmann "Hook-Fast" Specialties, Box 1425, Providence, R. I.

NEW, Special featured necessities for filling stations, garages, and all business places. Products they have to buy. Experience unnecessary. Reserved territory, great repeat orders. 100% profit. Write Harper Mfg. Co., S. Main, Fairfield, Iowa.

SELL Process engraved printing \$3.95 thousand, with free cut service. Worth \$7.00. Nothing like it! Commission \$1.00. Experience unnecessary. Outfit furnished free. United Engravers, P-8 So. Dearborn, Chicago.

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

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.

START A business of your own! Become a subscription representative for "Popular Mechanics." No capital required. Liberal commissions. Monthly bonus. Write for details. V. D. Angerman, Circulation Manager, 200 East Ontario Street, Room 235, Chicago.

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

BRAND New grab-bag deal. Going big everywhere—big profits—swift sales—fast repeats. No restrictions. All dealers buy. Act! K&S, 4373 Ravenswood, Chicago.

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

SALESMEN—Sell collection systems. 400% commission. Sayers Systems, 2801-123 Sheffield, Chicago.

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

SALESMEN Wanted—To sell brand new, patented, low-priced, non-competitive article, just being marketed. Salesmen sample 10c. Ideal Company, Racine, Wis.

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. Willens, Dept. AP, 2132 Gladys, Chicago.

NEW Marvelous electric light bulb gives strong concentrated white light. Consumes 36% less current. Stores, factories, institutions buy quantities on sight. Big profits. Exclusive opportunity for right party. Mastertite Corp., 110 East 23rd, New York.

LOW Cost portable water softener; sensational demonstrator; big profit. Softete, Kansas City, Kans.

SALESMEN-DISTRIBUTOR With car. Sell drug, hardware, garages, etc. New 10 cent item. Quick seller, sure repeater. Ideal for truck jobbers. Peerless Waterproof Cement Co., 2739 Dodder, St. Louis, Mo.

PENNY Each. Non-tarnishable window sign letters. Free samples. Atlas Sign Works, 7941 Halsted, 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., 739 Burkhardt, Dayton, Ohio.

SALES Demonstrators. U-Kan-Plate with pure silver. 1 oz. polish 20c, 8 oz. \$1. Justice, 904 Walnut, Philadelphia.

HERSHEYS, Baby Ruth, Oh Henry, candy deals—1c - 5c. Display and punch deals. More profit for dealers—unheard of candy profits for you. Casterline, 1918 Sunnyside, Chicago.

SELL Union label printing at half. Business stationery, cards, calendars, political printing, etc. 33½% commission advanced. Experience unnecessary. Free outfit. Consumers Press, N-82 W. Washington, Chicago.

RADIOS—World's cheapest. 55% commission. Catalog free. J-20th Century Co., Kansas City, Mo.

MAKE More money taking orders. Shirts, ties, underwear, dresses, hosiery, raincoats, coveralls, pants, uniforms. Outfit free! Nimrod Company, Department 65, 4922-28 Lincoln Avenue, Chicago.

MAKE Big money steady. High grade coveralls, shopcoats, pants, shirts, summer suits. Advertising on back. Fast sellers. Free outfit. Strong Mfg. Co., 901 West Jackson, Dept. N-2, Chicago.

SELL Punchboards direct to dealers from world's leading punchboard factory. Wholesale prices. Enormous profits. Big commissions. Sales kit free. Harlich Co., 1407 Jackson, Chicago.

HANDSOME Profit selling Neoprinting. This startling, new process reproduces without cuts, anything written, printed, drawn. Big illustrated sales catalog, samples, price lists, sales instructions. 25c (silver). August Becker Corporation, Dept. PN3, 300 Graham Avenue, Brooklyn, N. Y.

TRADE Stimulator (chinaware) for retail merchants. \$5.00 to \$50.00 commission each sale. References. Lancaster, BB-128 North Wells, Chicago.

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.

HELP WANTED

LOCAL Men wanted to show actual samples for big tailoring company. Make up to \$10.00 in a day. Wear suits free of extra charge. Big, valuable equipment, many actual samples sent free if you write quick. Send no money. Great Lakes Tailoring Co., Dept. Q-1417, 500 Throop, Chicago.

BIG Money growing mushrooms. Cellar, idle places. Supplies furnished. We buy. Free book. Mushroom Growers, DW-433, N. Clark, Chicago.

GO Into wholesale business without investment. Call on stores with biggest line self-selling counter displays: Aspirin, razor blades, handkerchiefs, breathlets, household cement, 79 different items. Up to 125% profit for you. Experience unnecessary. Write for catalog and plans. Procopax, Dept. 36-GD, 1956 S. Troy, Chicago.

CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 21A.

LOCAL Agents wanted to wear and demonstrate free suits to friends. No canvassing. Up to \$12 in a day easy. Experience unnecessary. Valuable demonstrating equipment, actual samples free. Progress Tailoring, Dept. Q-217, 500 Throop, Chicago.

SELL Hard worsted suits \$16.95. Make \$5 profit. Extra pants at cost. Finest workmanship. Over 30 hand operations. \$25,000 bond guarantees satisfaction. Customers repeat. Complete DeLuxe sample outfit free. Actual leads furnished. Bonus sample suit. Williams Bros., 832 Broadway, Dept. PM-3, New York City.

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

REAL Jobs open—Auto mechanical field, aviation. Earn \$35.00-\$75.00 weekly. 8 weeks' training qualifies you. Write for big opportunity book and special low tuition now. McSweeney Schools, Dept. 10-A-15, Cleveland, Ohio, or Kansas City, Mo.

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, Dept. 128, Toronto, Ont.

MEN Wanted—For coffee routes paying up to \$60 a week. I furnish everything you need. Albert Mills, 8954 Monmouth, Cincinnati, Ohio.

EXTRA Money growing mushrooms in cellars, outbuildings. Ready market. We assist you and give full instructions. Booklet free. Adanac Mushroom Company, Dept. 147, Toronto 8, Canada.

MAN Wanted—Old established manufacturer will finance responsible men with complete stock guaranteed food products, farm and household necessities. Very pleasant work. Excellent opportunity for good living and extra money to save every week. Pays better than most occupations. O. W. Jack sold \$308, B. M. Anderson \$330 in one week. No slack seasons or layoffs. Experience unnecessary. Write today for No-Investment Offer. McConnon & Company, Room 66CT, Winona, Minn.

AGENTS—Mosco corn and callous remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 54 Searle Bldg., Rochester, N. Y.

EARN Quick cash raising mushrooms in cellar, shed, attic. We buy crops. Guaranteed materials furnished. Easy, odorless method. Book free. United, 3818-AO Lincoln Ave., Chicago.

EDUCATIONAL AND INSTRUCTION

BIND Your own books, magazines, etc. Enjoy hobby, small cost. Do bookbinding for others, rebind for libraries, nice profit. We furnish all supplies and easy rules. Complete outfit \$9.37. Write for details. Kelsey Binders Supplies, G-101, Meriden, Conn.

SECRET Service. Valuable information free. International Secret Service Institute, PM-25, Hoboken, N. J.

STUDY Law at home. Four courses; degree; free catalog. Chicago School of Law, Reader Block Chicago.

HOLLYWOOD Sound-projection course. Learn at home. Reasonable. Box 187, La Crescenta, California.

LEARN Latest arithmetical developments. Difficult problems solved. Frederick A. Smith, 2416 Smalley Court, Chicago.

UNDERWOOD Portable typewriter free on completing Gregg Shorthand course; trial lesson—particulars 10c. National School, 150-P Norman Road, Newark, N. J.

THE Plot Builder—Endless source of plots. 50c. International Agency, P-3, Cincinnati.

BECOME An investigator. Free particulars. Write International Secret Service Institute, PM-35, Hoboken, N. J.

WORK For "Uncle Sam." Start \$105-\$175 month. Men-women. 18-50. Many spring examinations expected. List free. Qualify now. Franklin Institute, Dept. N3, Rochester, N. Y.

BECOME A successful investigator. Experience unnecessary. Work at home or travel. Write today for free publication and particulars. National System, 340-G Electric Building, Omaha, Nebr.

LEARN New trades in your spare time—Refrigeration, oil burners, air conditioning servicing. Herkimer Institute, 1819 Broadway, New York.

GET U. S. government job—start \$105-\$175 month. Men-women. age 18-53. Are you eligible for eligibility test? Get our free questionnaire—find out. No obligation whatever. Instruction Bureau, 101, St. Louis, Missouri.

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

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

HOME Study courses leading to degrees: Arts and sciences, philosophy, education, law, letters, theology, psychology, engineering, chemistry, business and commerce. Many others. McKinley-Roosevelt University, Chicago.

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

GET Into aviation. Air transport pilots get up to \$7,000 per year; mechanics, \$2,500. Learn at this government approved school. Write for complete information. State age. Lincoln Flying School, 2005 Aircraft Building, Lincoln, Nebr.

MEN Wanted—To learn Machinist trade Tool and Die making, Automatic screw machine. Get experience on actual work. Employment help. Start now. Days—evenings. Write for free book. Allied Screw Machine Co., 601 Lake St., Chicago.

RESORT Hotel positions. Instruction courses. Lee Institute, 22 Wesley, Somerville, Mass.

NEW Writers wanted. We train you to write for newspapers, magazines. Good writers well paid and in demand. No experience necessary. Write today. National Press, 3806 Beverly, Los Angeles, Calif.

LEARN Jiu-Jitsu from America's leading experts. Become a Jiu-Jitsu instructor in ninety days. Graduates of this institution afforded splendid social and financial benefits. Full information free from The American School of Jiu-Jitsu, Inc., 152 W. Twelfth St., Los Angeles, Calif.

LEARN Sign painting, the big paying trade. Circulars free. Matthews, 3627 Finney, St. Louis, Mo.

CARTOONING—COMMERCIAL ART

CARTOONING Instruction book. New, modern method. 30 lessons, 125 illustrations. 25c postpaid. Lawrence Publishing Co., 143-E West 100th St., New York.

NEW—Simplified instruction course "Turning Art Ability Into Cash" shows you how. \$1.00 postpaid. Particulars free. Paisley, 421 Kinloch Bldg., St. Louis, Mo.

LAUGH Producing program, \$1.00. Catalog free. Balda, The Cartoonist, Oshkosh, Wisconsin.

AMATEUR Cartoonists: Sell your work. Write Smith's Service, Wenatchee, Wash.

CARTOON Ideas wanted. 50-50. Freeburn Artist, Hicksville, Ohio. Stamp.

CARTOONING Course—30 lessons, 500 illustrations with drawing pens and pencils. \$1.00 postpaid, complete. Seovell Studios, Box 610-P, Hollywood, Calif.

ARTISTS' Advisory Bureau. Sales help. Information. Norman Feather, Parkville, Missouri.

ADVERTISING AGENCIES

LEARN Advertising quickly at home. New easy practical plan. No text books. Interesting booklet free. Page-Davis School of Advertising, 3601 Michigan, Dept. 3431, Chicago.

FREE—New Advertisers Rate Guide, 44 pages. Includes everything. Lowest rates. E. H. Brown Advertising Agency, 140 S. Dearborn, Chicago.

ADVERTISING Placed anywhere. Helpful, free service. Rate guide book free. Baker Advertising Agency, 189 W. Madison, Chicago.

FREE Money making book with yearly subscription any magazine publishers rate. Wolfe Agency, 2085 Valentine, New York City.

ADVERTISE Profitably: Free assistance with your ads; free newspaper and magazine rate-guide. Write Chicago Union Agency (Established 1900), Great Northern Bldg., Chicago.

INCH Display advertisement fifty magazines, year \$21.00. Wood's Popular Service, Atlantic City, N. J.

FOR ADVERTISERS

45 WORDS Neatly displayed in 40 mail order magazines \$1.50. Classified 3c word. Sample magazine 10c. Victor Advertising Service, Box 1234, Cleveland, Ohio.

ADVERTISE: 24 Words in 250 newspapers \$10. Lists free. Advertising Service Bureau, 4650 Drexel, Chicago.

ADVERTISE. 24 Words \$3.50. Circulation 211,000 guaranteed. Goodall Adv. Co., Box 1592, San Francisco.

25 WORDS 25 Magazines, 3 months \$1.50. One inch \$6.00. Plans. 38 Liberty Street, Brooklyn, New York.

BUSINESS SERVICE

DELAWARE Charters; fees small; free forms. Chas. G. Guyer, 901 Market St., Wilmington, Del.

ALL International legal matters. Lic. Victores Prieto, Mexican Attorney at Law, 213 Juarez Avenue, Juarez, Mexico.

INFORMATION Any subject \$1.00. American Business, 79 Madison Ave., New York.

VALUABLE Wholesale information, 1c per question. Free list for stamp. Goshar, 141 Rockview Terrace, Rochester, N. Y.

PRINTING, MULTIGRAPHING, MIMEOGRAPHING, GUMMED LABELS

1000 QUALITY Business cards \$2.50 postpaid. Nahabit, 116 Sylvian St., Central Falls, R. I.

ENVELOPES—6½, 24 lb. White, printed your copy, 1,000—\$2.40 postpaid (3rd zone). West, Box 501A, St. Louis, Mo.

1000 BUSINESS CARDS, card case, \$1.50. Miller, Printer, Ambler, Pa.

ENGRAVURE Printing. Lowest possible prices. Samples free. Sunko, Mohawk, N. Y.

GUMMED Labels—100 beautiful two-color—your 3-line copy, 25c. Draper's, Culver City, Calif.

GUMMED Labels—Your copy printed that satisfies. Wetzel, Valhalla, N. Y.

1000, 6½ ENVELOPES, Printed to order, \$2.80 postpaid. Donald Garrison, Cedar Falls, Iowa.

2000 BUSINESS Cards neatly printed \$1.50. Atlas Distributing Co., 1814 Bedford Ave., Pittsburgh, Pa.

500 LETTERHEADS, Envelopes, billheads \$1.75. Illustrations, Bradshaw, 3214 Huron, Chicago.

STATIONERY, Circulars, checks, loose-leaf, ruling, binding. Commercial Press, Batavia, Ohio.

BETTER Grade printing, reasonable priced. Free samples. Economic Press, Leonia, N. J.
5000 ELEGANT Colored envelope slips, \$3.90 prepaid. All printing low prices. Samples. Goodprint, Harrisonburg, Va.

500 LETTERHEADS, Envelopes, billheads, statements \$1.75. Bradshaw, 3214 Huron, Chicago.

PRINTING, All kinds, free estimates, low prices. Independent, Mexico, N. Y.

2000 (6%) ENVELOPES, \$4.85-1000, \$2.65. Abbott Press, Oswego, Kans.

250 LETTERHEADS, Bond paper 8 1/2 x 11, \$1.25. 250 envelopes, 6%, \$1.00. Postpaid. Schaffer Press, 687 Seneca Ave., Brooklyn, New York.

LETTERHEADS, Envelopes, circulars, \$2.50. Business cards \$1.50 1000. Superpress, 11610 Superior, Cleveland.

PRINTING OUTFITS AND SUPPLIES

USED Press bargains, type. List 3c. Exchange D12, 22 Orient, Meriden, Conn.

MIMEOGRAPHING Ink, \$1.25 lb.; stencils, \$1.25 doz. Unconditionally guaranteed. Mailmarts, P-3, Cincinnati.

HAND Press, type and complete printers' supplies. Advise equipment you need and we quote prices; or send stamp for catalog. P. Peiffer, 34-A, 6 Columbia St., Newark, New Jersey.

PRINTING Outfits—Presses, type supplies, type novelties. Send stamp for catalog. Model Press, York, Penna.

\$25.00, 5x8 PRESS, Monarchpress, 275 East Gunhill, New York City.

BARGAINS Used presses, type. Send stamp. Box 15, Cambridge, Mass.

MIMEOGRAPHING Ink, \$3.50 gal. (8 lbs.) delivered. Perfink, Vermillion, S. D.

PRINT Your own circulars, envelopes, with home made press costing less than \$1.00. Illustrated instructions 10c. Carl Edquist, Odessa, Minn.

PRINTING Presses, type, supplies. Lawrence, 1426 South St. Francis, Wichita, Kans.

PRINTING Presses, type and equipment. Lists 3c. Landis, Richland, Pa.

PRINT Your own cards, stationery, circulars, advertising, etc. Save money. Easy rules furnished. Print for others, big profits. Job presses, \$11.00 up. Write for catalog and full details. Kelsey Co., V-11, Meriden, Conn.

BUILD Your own press. Material costing less than \$1.00. Illustrated instructions 20c. Earle Nason, 19 High, Somerville, Mass.

TYPEWRITERS, DUPLICATORS, OFFICE DEVICES AND SUPPLIES

TYPEWRITER Bargains—Genuine late model Underwoods, Royals, Remingtons, L. C. Smiths refinished \$100 office models at 60% saving. Fully guaranteed—10 day trial—easy terms—10c a day. Free catalog. International Typewriter Exchange, Dept. A301, 231 West Monroe St., Chicago.

TYPEWRITER \$12. Multigraph, mimeograph, and other office machines. Write 818 Pruitt Bldg., 170 North LaSalle, Chicago.

NEW \$4.75 Automatic adding machine. Fully guaranteed. Bassett, 1458J Hollywood Avenue, Chicago.

INCREASE Business. "Execlograph" rotary stencil, clay and film duplicators \$3.85 to \$37.50. Prints anything. Typewritten, penned, drawn, traced. Colors. Folder free. Pittsburgh Typewriter Supply, Suite 518, Pittsburgh, Pa.

TYPEWRITERS \$5.99-\$24.99; Ribbons; duplicators \$15-\$50, 2000 copies \$1.99. Knight's, 1517 Olive, St. Louis, Mo.

RUBBER STAMPS AND OFFICE SUPPLIES

RUBBER Stamps, two lines twenty-five, three lines thirty-five cents. Sunset Stamp Works, Seattle, Wash.

2 LINES 25c, 3 lines 35c. Cushion mounted. Stamp Works, 814 Bradley, Peoria, Ill.

FOR BOYS

BASEBALL. Exciting game of skill. Batting home runs, pitching strike outs. Plan, instructions, rules, 25c. Charles Wood, Highland, N. Y.

PATENT ATTORNEYS

INVENTORS: Send immediately for your copies of our new free books, "Patent Protection" and "Suggestions on Selling an Invention." Sixty-eight pages of interesting facts. They tell how Patent Laws protect you; kind of sketch or model needed; simple steps to take without cost; how successful inventors have secured financial assistance; show interesting inventions; illustrate important mechanical movements. With book we also send free Evidence of Invention form to help establish date of disclosure. Prompt service, reasonable fees, special deferred payment plan. Strictest secrecy. Thirty-six years' experience. Highest references. Write us today. The facts in our books are worth money to the man with a good invention. Address: Victor J. Evans & Co., Registered Patent Attorneys, 400C, Victor Building, Washington, D. C.

TIME Counts in applying for patents. Don't risk delay in protecting your ideas. Write for new free book "Patent Guide for the Inventor" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. My success built upon strength of satisfactory service to inventors located in every state in the Union. Clarence A. O'Brien, Registered Patent Attorney, 58-R Adams Building, Washington, D. C.

PATENTS Procured; trade marks registered—preliminary advice furnished without charge. Booklet and form for disclosing idea free. Irving L. McCathran, 700A International Bldg., Washington, D. C.

L. F. RANDOLPH, 302-B Victor Building, Washington, D. C. Low cost. Book and information free.

PATENTS. Booklet free. Highest references. Best results. Promptness assured. Watson E. Coleman, Patent Lawyer, 724 Ninth St., Washington, D. C.

PATENTS. Instructions "How to Establish Your Rights" and form. "Evidence of Conception"—sent free! Lancaster, Allwine & Rommel, 411 Bowen Building, Washington, D. C.

ESTABLISHED 1864. Milo B. Stevens Company. Free booklet. Patents. Trade marks. Copyrights. Offices: Monadnock Block, Chicago; American Security Building, Washington, D. C.

INVENTORS—Send for free booklet "Patent-Sense." Information based on 54 years experience. Lacey & Lacey, Dept. 6A, 635 F St., Washington, D. C.

PATENTS—Proper service for manufacturers and individual inventors. Established 1895. Reasonable charges. Consult Chandler & Chandler, Patent Attorneys, 902 F. Street, Washington, D. C.

ECONOMY For inventors. Write for booklet. Thos. H. Johnston, 635 F St., N. W., Washington, D. C.

INVENTIONS May now be safely marketed before patenting. For information, write Chartered Institute, 554 Barrister Building, Washington, D. C.

MANUFACTURERS Will consider purchasing worthwhile unpatented inventions. List free. Write W. T. Greene, 967 Barrister Building, Washington, D. C.

"INVENTOR'S Guide," 100 mechanical movements, free; advises on patenting, selling inventions. Fk. Ledermann, 151 Nassau Street, New York.

PATENTS Secured, low rates. Samuel Goldstein, 275 East Gunhill, New York City.

A NEW Deal for inventors: Combined patent attorney and development engineer service. Simple case attorney's charge \$50.00. Search \$5.00; trade-marks complete \$25.00; copyrights \$6.00. Reg. 1909, 108 West 42nd St., New York City.

FOR INVENTORS

UNPATENTED Inventions wanted by nearly 1000 buyers listed in Inventors' Selling Guide—200-page book \$2 postpaid. Given ironclad methods protecting unpatented inventions, sales tips, swindles to avoid, many other topics. Free list of needed inventions, full details, on request. Donley Publishing Co., P-3, 509 Fifth Avenue, New York City.

OUR Manufacturer-clients now want better inventions, patented or unpatented, to meet present industrial conditions. Write Chartered Institute, 558 Barrister Building, Washington, D. C.

INVENTORS: "Making Inventions Pay," our 32-page illustrated book, mailed upon receipt of 3c postage. Crescent Tool Company, Dept. Z, Cincinnati, Ohio.

INVENTOR'S Universal Educator: contains 900 mechanical movements; 50 perpetual motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price \$1.00 postpaid in U. S. A. Address: Albert E. Dietrich, 602B Ouray Bldg., Washington, D. C.

PATENTS—Before too heavy an outlay of time or money is made on an invention, a search of the Patent Office records should be made to determine as nearly as possible whether or not the same idea has been patented before. The cost of this search is small, while the value of the facts it uncovers is often considerable. We offer inventors and manufacturers a thorough, prompt, confidential search service—plus experienced counsel and assistance in every phase of Patent and Trademark practice. Write for my free book containing valuable information relating to patent procedure. Clarence A. O'Brien, Registered Patent Attorney, 58-R Adams Building, Washington, D. C.

TO Inventors: We are in the market to purchase a good patent, preferably in the automobile accessory line. Will purchase outright or on royalty basis. Purchasing Agent, 241 Front St., New York, N. Y.

MANUFACTURERS Everywhere seek new inventions to improve their product. List of wanted inventions sent free on request. Use our legal form for recording proof of invention. Write W. T. Greene, 944 Barrister Building, Washington, D. C.

PATENTS. Low cost. Book and information free. L. F. Randolph, 302-C Victor Building, Washington, D. C.

SUCCESSFUL Engineer—Inventor can advise you. David E. Patterson, 3842 North 9th Street, Philadelphia.

COPY Of any patent sent for \$1.00. R. Burch, 904 F St., Washington, D. C.

SELL Your invention! Patented or unpatented. Deal directly with manufacturers, 1000 prospective buyers, 25c. Hammond, 1110 Hartford Building, Chicago.

INVENTORS: Send immediately for your copies of our new free books, "Patent Protection" and "Suggestions on Selling an Invention." Sixty-eight pages of interesting facts. They tell how Patent Laws protect you; kind of sketch or model needed; simple steps to take without cost; how successful inventors have secured financial assistance; show interesting inventions; illustrate important mechanical movements. With book we also send free Evidence of Invention form to help establish date of disclosure. Prompt service, reasonable fees, special deferred payment plan. Strictest secrecy. Thirty-six years' experience. Highest references. Write us today. The facts in our books are worth money to the man with a good invention. Address: Victor J. Evans & Co., Registered Patent Attorneys, 401C Victor Building, Washington, D. C.

INVENTIONS WANTED

LONG Established engineering-manufacturing concern, reputation high, open for two new products. Nation-wide selling facilities. Preferably products designed for handling fluids. Everlasting Valve Company, Jersey City, N. J.

WE Want inventions of household items merchandised through department and chain stores. Complete manufacturing and national distribution. Royalty basis. Working models necessary. Gustin Products, Penobscot Bldg., Detroit, Mich.

SMALL Inventions wanted. Stanley Hull, 7829 Euclid Avenue, Cleveland, Ohio.

INVENTIONS Wanted—Patented, unpatented. If you have an idea for sale, write Hartley's, Inc., Box 928-E, Bangor, Maine.

PATENTS FOR SALE

PATENTED Extension tong, flexible tube—reaches into inaccessible places. Address Box 507, Virginia, Minn.

USEFUL Loose fence wire and wire hoop tool. Write, 512 S. Arbor St., Bay City, Michigan.

JUST Patented, adjustable rubber heel. Will wear evenly all around thus doubling its life of wear. Peter Kellar, 3469 19 Street, San Francisco, Calif.

FOR Sale or royalty, novelty smoking stand. W. F. Williamson, Searcy, Ark.

SUGAR Bowl transfers sugar without removing spoon or top. United States and Canadian patent. Paul DeMartini, 75 Rice Way, San Francisco, Calif.

SALE Royalty basis—Safety rubber bathing device for children. H. E. Saxton, 150 North St., Bedford, Ohio.

MANUFACTURING

METAL Articles developed and manufactured. Model making. Reasonable price and first class workmanship. W. F. Meyer Company, Bedford, Indiana.

INVENTIONS Manufactured in any quantity at low cost. Stampings, dies, models, etc. Estimates and free catalog. Crescent Tool Co., Dept. X, Cincinnati, Ohio.

DIES For stamping; models and patterns made at low cost. J. J. O'Brien, Patent-Attorney Engineer, 106 West 42nd St., New York.

MANUFACTURING, Models, dies, stampings, brasswork, moulds for castings, vulcanizing. Circular free. Baums Metal Specialties, Kansas City, Mo.

MODELS AND MODEL SUPPLIES

BRASS Gears and model supplies. Send for catalog. The Pierce Model Works, Tinley Park, Ill.

THE Modelmaker. The magazine for those interested in building model railroads, boats, engines. Send 15 cents for copy. Modelmaker Corp., 98P East Main St., Bay Shore, New York.

MODELS—Your ideas developed into practical working models. 30 years' successful experience; thousands of satisfied customers. Confidential service guaranteed. Bank references. Send 3c postage for 32-page book—"Making Inventions Pay." Crescent Tool Company, Dept. Y, Cincinnati, Ohio.

SHIP Models—Build 18" Flying Cloud, Constitution or Galleon. All materials including full-sized plans only \$1.50 from Hancock, 323 Douglass Ave., Portsmouth, Virginia.

MODEL Makers—Brass, copper, fibre, steel and aluminum in all shapes. Also castings, gears, screws, fittings. Catalog 10c. Experimenters Supply House, Dept. P, Box 10, Station Y, New York.

MINIATURE Crankshafts and other parts made to your specifications. Jensen, 2462 Kendall, Detroit.

SHIP Model fittings. Dime for list. Wm. Crothers, 1639 Yewdell St., Philadelphia.

EVRAV'S Engine catalog (No. 34) or supply catalog (No. 35) postpaid 20c. Evray-meseo, 28 N. Clinton, Chicago.

MODEL And inventors supply catalog 15c. Howardo, 2417 No. Ashland Ave., Chicago.

MINIATURE Storage batteries (rechargeable). Sizes, weights and capacity for every requirement. 3c postage catalogue. Steere, Clawson, Mich.

MODEL Railroaders—A complete line of equipment and parts is shown in our new 40 page profusely illustrated catalogue. Send name, address and 25c today to Rollin L. Lobaugh, 1179 Howard St., San Francisco, Calif., for your copy.

PLANS, BLUEPRINTS, INSTRUCTIONS

MAKE Blueprints, Instructions \$1. Particulars stamp. Earl Dorris, Moorecroft, Wyo.

MODEL Of Wright "Whirlwind" 300 radial engine. Size 13x22 inches. Lithographed in colors. By means of an ingenious arrangement of flaps, this model can be practically disassembled and put together again. Shows and names every part. Of great value to aviation students, mechanics and air-minded men and boys. Durable. Sent prepaid upon receipt of price, \$1.00. Popular Mechanics Press, Room 805, 200 E. Ontario St., Chicago.

HOME CRAFTSMEN

LEATHERCRAFTSMEN—Write for free instructions and price list of leather, tools and beginners' kits. Send 5c for sample cards. Address Wilder & Company, Dept. F, 1638 Crosby St., Chicago, Ill.

TIME Switch—Make yours. Operate radio, thermostats, lights. Snap action, on, off. Clock adaptation. Blueprints, instructions, 40c. Constructoprints, Box 523, Dayton, O.

BEAUTIFUL Bird-house free to each scholar first showing this ad to his teacher, interesting the teacher in adopting our educational money-raising plan for schools, boys' clubs, etc. Particulars free. Birdbuilders, Box 36, Harrisonburg, Va.

HUMIDIFIER—Make your automatic level device, coal, gas, oil furnaces. Humidify for health, economy, comfort. Blueprints, instructions, 40c. Constructoprints, Box 523, Dayton, Ohio.

THINGS YOU CAN BUILD

BUILT-IN Furniture adds convenience, comfort and beauty to your home at very low cost. Any handy man can build a great variety of this space-saving furniture from the easily-followed instructions in our remarkable book, the only one on this subject. Delivered to your door C.O.D. Simply pay postman \$2.50 and postage. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

WATCHES, JEWELRY, PRECIOUS STONES

LEARN Watchmaking free. Experimental movement 50c. Catalog 5c. Stewart's, Sixth-Olive, St. Louis, Mo.

MEXICAN Orizaba rings (worn by movie stars). \$150 diamond replicas! 15c with ad. Orizabagen, 329 Broadway, Los Angeles, California. (2 for 25c.) Agents wanted. Easy money giving coupons away.

OLD GOLD WANTED

CASH For gold teeth, jewelry, watches. 100% full gold value paid day shipment received. Satisfaction absolutely guaranteed or articles cheerfully returned. Licensed by United States government. Information free. Chicago Gold Smelting & Refining Co., 357 Champlain Bldg., Chicago.

FOR THE HOME

WRINGER Rolls for washing machines. Key Shop, 308 Ridge Road, Springfield, O.

HEATING AND VENTILATING

DOUBLE Kitchen range oil burners, thousands used. Bennett Company, Islip, New York.

TOBACCO

BOX Cigars free with 10 lbs. mild choice smoking or Bulkweetened chewing \$1.75 postpaid. Sandy Smith, B419, Martin, Tenn.

30 FULL Size quality twists \$1.00. Mild and sweet or natural. 30 sacks smoking \$1.00, cigarette or pipe. 24 sweet plugs \$1.00. Economy Tobacco Co., Murray, Ky.

QUALITY Leaf tobacco. Try our package containing 6 marked kinds, \$1.00 prepaid. Price list on request. Farmers Exchange, Edgerton, Wis.

RAZORS AND BLADES

SPECIAL—50 Double edge blue blades \$1.00. Prepaid. Gallen Sales, 8 Hixon Street, Rochester, N. Y.

RAZOR Blades sharpened extra keen. 1c each. Petter Wetterquist, Rockford, Ill.

TATTOOING

TATTOOING Outfits, electric \$5.00, hand \$1.25. "Waters," 965 Put-nam, Detroit.

AMATEUR Tattooing outfits, free list. Removing facts, formulas, 15c. "C-T-S-H," 651A South State, Chicago.

SURVEYING INSTRUMENTS

BARGAINS In guaranteed factory rebuilt transits and levels. Largest selection in United States. Buy now. The prices will never be lower. Sale or rent. Cash or terms. Trade your old instrument. Write for new list M-93. Warren-Knight Co., 136 N. 12 Street, Philadelphia, Pa. Headquarters for repairs to any make instrument.

WANTED—MISCELLANEOUS

MAIL Us your discarded jewelry, gold crowns and bridges, watches, diamonds, silver, platinum. Money promptly mailed. Goods returned if offer refused. United States Smelting Works (The Old Reliable.) This is not a government institution. 39 So. State St., Dept. 71, Chicago.

CASH For used drawing sets, slide rules, microscopes, engineering instruments, scientific tools, stamp collections. Highest prices paid day shipment received. Satisfaction guaranteed or shipment cheerfully returned. Elman's, 2302F Van Buren, Chicago.

WANTED—Photographs and records. Used or unused. Wholesale. Send price list. Nearest, Box 15, Raanana, Palestine.

PERSONAL

YOUR Handwriting reveals many facts essential toward improving yourself. Send \$1.00 and specimen of your handwriting to Box 9, Station T, New York, New York for complete character analysis. Questions answered free with reading.

FORTUNES Await unlocated heirs. 2,000 (authentic) \$1.00. International Agency, P-3, Cincinnati.

GETTING Bald? I reveal hair treatment secrets. Kill dandruff. Send \$1.00 today. Tells how! Money back if no results. Hair & Scalp Specialist, 2262 Brooklyn Sta., Cleveland, Ohio.

FREE—Trial astrological reading revealing many interesting things about you. Send birthday with 3c stamp. Franklin Publishing Company, 800 North Clark Street, Dept. 8100, Chicago.

POPULARITY. Success, can be yours. Personality improvement information free. Flow, 6618B Quimby, Cleveland, Ohio.

MISCELLANEOUS

BRONZE Tablets, desk plates, wall plates, memorials, grave markers. Bronze, brass and aluminum casting. Wandkey Pattern & Foundry Co., Anderson, Ind.

BURGLARS Catch themselves. Fourteen points of entrance protects your home or business. Complete \$25.00. Plans \$1.00. Abbot Alarm Engineering, 808 Venice, Los Angeles, Calif.

YOUR Poem revised, two copies typewritten \$1.00. A. Nahabit, 116 Sylvian, Central Falls, R. I.

SWAPPER'S Friend, R4, Salline, Michigan. Interests swappers, collectors, sportsmen. 50c year, sample 10c.

CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 21A.

TATTOOING Outfits, supplies. 1935 illustrated list. "Waters," 965 Put-nam, Detroit.

JIGSAW Puzzles only source of supply. Large variety. Write for lists. Consolidated Trading Corporation, 11 Moore Street, New York.

PROF. Magnetic mineral rods with complete placer book, \$4 value for \$1.75. Many successes. Golden B. Ray Co., 444 Market, San Francisco.

MOUNTS For your insects; new on market. Rizzo, Coldspring, Ky.

CASH Income resilvering mirrors; replating metalware; making glass signs. Portable outfit. Sprinkle, Plater, 288, Marion, Ind.

BILLS Collected everywhere. Ace Collection Syndicate, 3637 Boulevard, Jersey City, New Jersey.

CUTS Anybody can make. Zinc etching process. Specimens, particulars, testimonials, for stamp. J. C. Day, Windfall, Ind.

HERR Fire alarm—Operate electric, doorbell. Sample 75c. Collinsville, Ill.

ENGRAVE Your name on tools with rubber stamp. Permanent, easy, ¼c per tool. Instructions 25c. Mannion, 6718 Olive, St. Louis, Mo.

NAVIGATION. Sun-moon-stars. Easily understood. Illustrated. Latest method. 50c. Candler Co., 1810 - 34th Ave., Seattle, Washington.

TRIANGLE Chart solves triangles by inspection, 15c. P. O. Box 764, Detroit, Mich.

SUNDIAL. Novel design. Place inside southerly window, adjustable. All you need is a picture frame. 35 cents. Draftsman Weisz, 420 West 121 Street, New York.

TREASURE Seekers—Learn scientific methods. Wyss, 104½ Frances, St. Joseph, Missouri.

AMATEUR Cartoonists can earn \$35.00 weekly, spare time, duplicating cartoon advertisements. 3-M Syndicate, Argyle, Wis.

TREASURES, Money located. Send stamped envelope. Box 447, Albany, Ga.

NEW Super-Six, self supporting, radio-frequency detector. Complete plans \$5.00. Clough, Grayling, Mich.

TREASURE Buried. Send for free literature, photographs. Fisher, Palmer Building, Hollywood.

MAKE It Yourself. Hundreds of practical and useful devices described in our big book. The plain instructions and illustrations show you how to make them. By making for your own use you save money. Through selling to others you can make a profit. 900 articles of great variety. 480 pages. 823 illustrations. Price \$3 postpaid or sent C.O.D. by mail anywhere in U.S. Popular Mechanics Press, Room 803, 200 E. Ontario St., Chicago.

Easy **NEW**
Improved CONNQUEROR

World's largest manufacturer announces sensational improvement in Band Instruments. New patented V-CABELL revolutionizes tone effects. Easier to play. You'll develop talent fast with these new Conns. Choice of world's greatest artists. See your dealer or write today for **FREE BOOK** and home trial, easy payment offer. Mention instrument. C. G. CONN, LTD. 331 CONN BUILDING ELKHART, INDIANA

WRITE FOR FREE BOOK



CONN
 BAND INSTRUMENTS

Advanced **BOOKKEEPING**
 BY MAIL

Those higher levels of expert and executive records which managers most rely on are taught our students. We show you how to get more money for your services and be a power where you are employed. If you already possess some knowledge of bookkeeping. Thorough grounding, long experience. Reasonable rates for mail instruction. Write. **KINMAN LETTER INSTITUTE, Box 1286, Spokane, Wash.**

DIVORCE EYE CRUTCHES!



Get RID of the Spectacle Handicap. The **NATURAL EYESIGHT SYSTEM** makes Victory over Glasses Possible.

You are the Judge—your eyes the Jury—when the **Natural Eyesight System** goes on trial in your home for four months on our **100% MONEY-BACK GUARANTEE.**

Full Information Mailed **FREE**
Natural Eyesight Institute Inc.
 Dept. 53-F Los Angeles, Calif.

Big Chance for ELECTRICAL ENGINEERS
NOW

Here's great news for anybody interested in Electricity. BRAND NEW edition of Applied Electricity brought right down to date with every NEW Electrical subject fully covered. 10 big volumes and all shipped **FREE** for examination.

Big Field — Big Demand — Big Pay

Men who understand electricity are urgently needed right now in thousands of industries. Autos, airplanes, machine shops — practically every industry depends on electricity and men who know this subject make big money. Pleasant, fascinating work, easy to learn and do; learn quickly with these books. Send coupon for a set for **FREE** examination and see for yourself.

10 Big Books Shipped FREE FOR EXAMINATION

American Technical Society, Drexel at 58th St., Dept. E-319, Chicago
 Send for 10 days' free use, BRAND NEW 10 volume set of Electrical Engineering. In return for mailing this coupon promptly, send free certificate of membership in the American Technical Society entitling me to full consulting privilege for one year. I will pay the few cents delivery charges on the books. If I wish I may return them in 10 days and owe you nothing, but if I keep them I will send \$2.00 after 10 days, then \$1.00 a month until the special price of only \$29.50 is paid.

Name.....

Address.....

City.....State.....
 Attach letter stating age, occupation and name and address of employer and at least one business man as reference.



NEW DEAL
 Government **JOBS**

Start \$1260 to \$2100 a Year
PICK YOUR JOB
MEN, BOYS—18 to 50

Travel—See Your Country

Railway Postal Clerks get \$1,900 the first year regular, being paid on the first and fifteenth of each month. (\$79.17 each pay day.) Their pay is quickly increased, the maximum being \$2,700 a year. (\$112.50 each pay day.)



Travel On
"Uncle Sam's"
Pay Roll

3 Days On—3 Days Off—Full Pay

Railway Postal Clerks on long runs usually work 3 days and have 3 days off duty or in the same proportion. During this off duty their pay continues just as though they were working. They travel on a pass when on business. When they grow old, they are retired with a pension.

City Mail Carriers, Post Office Clerks

Clerks and Carriers now commence at \$1,700 a year and automatically increase \$100 a year to \$2,100 and \$2,300.

Customs and Immigrant Inspector

Salary \$2,100 to \$3,300. Men 21 to 45. Work connected with examining immigrants and merchandise entering the country from foreign parts.

Spring examinations expected

Many Spring examinations are expected and those wishing positions should qualify at once.

Get Free List of Positions

Fill out the following coupon. Tear it off and mail it today—now, at once.

This investment may result in your getting a life big-paid Government job.

FRANKLIN INSTITUTE, Dept. N-174, Rochester, N. Y.

Rush to me entirely free of charge (1) a full description of the position checked below; (2) Free Copy of 32-page book, "How to Get a U. S. Government Job"; (3) A list of U. S. Government Jobs; (4) Send pointers on how to get a Government Job.

- Railway Postal Clerk.....(Start \$1900 year)
- Post Office Clerk.....(Start 1700 year)
- City Mail Carrier.....(Start 1700 year)
- Office Clerk—File Clerk.....(Start 1260 year)
- Inspector of Customs.....(Start 2100 year)
- Immigrant Inspector.....(Start 2100 year)
- Liquor Gauger.....(Start 2000 year)

Name.....

Address.....

Use This Coupon Before You Mislay It

When writing please mention Popular Mechanics

NEW BOOK *for*

PATENT GUIDE FOR THE INVENTOR

CLARENCE A. O'BRIEN
REGISTERED PATENT ATTORNEY
WASHINGTON, D.C.



FREE RECORD OF INVENTION

This FREE Record of Invention Blank enables you to make in convenient form a sketch of your idea and have it witnessed in a manner of value to you should the occasion for evidence arise.

INVENTIVE FIELDS

Is your invention something for the home, the farm, the factory, the store? Would you like to know whether anything like it has ever been invented? You'll find scores of examples of patents reproduced in my 48-page book. You'll get a good idea of whether you "have something" or not. Would you like to know how you may judge the marketability of your invention? This book gives you several important tests prepared by authorities. Read of the experiences of Bell, Edison, Westinghouse, and other outstanding, successful inventors who patented and thereby protected their inventions. This book not only tells you how to obtain patent, it explains the steps that must be taken afterwards to promote the success of your invention. It answers such questions as—What is an inventive improvement? What is the worth of an improvement? How should inventor arrange for manufacture? Has an unknown inventor a chance to make money? What are the qualifications of an inventor? What happens to the Patent Infringer? Can local attorney handle patent case? How did other inventors get started? What pitfalls should an inventor avoid? Can inventor learn whether his idea is worth patenting?

CLARENCE A. O'BRIEN

When writing to advertisers please mention Popular Mechanics

INVENTORS

COMPLETE INFORMATION ON HOW TO OBTAIN PATENT AND MARKET INVENTIONS

If you have ideas, if you have invented something, if you're interested in inventing something, you need this new 48-page book that gives the entire Story of Patents. It tells you for the first time about new phases of invention, how others succeeded, how the patent laws protect you, how to market your invention, where to obtain finances, how to form a company, partnership, or arrange for royalties from your invention's sale.

NEW INFORMATION This book gives you actual statements, suggestions, and ideas from famous authorities who know the inventive field thoroughly.

PRACTICAL BENEFITS You will find 6 complete pages illustrated with simple inventions that have succeeded in six different fields of industry. Over 100 illustrations are in this book. You will read the stories of ten (illustrated) of America's most famous inventors. You will find an experienced and thorough survey of market conditions affecting the inventor—showing the possibilities for commercial invention today. Entire chapters are devoted to the value of a patent in promoting the final success of your invention. The importance of quick action in applying for patent is stressed—facts revealing danger of delay are emphasized.

If you expect to realize profits from your invention you must protect it with a U. S. Patent. Otherwise you may find that all your time and labor have been lost, because it often happens that other inventors are working on the same idea. If you have an idea, an invention, or an ambition to invent—get the information on obtaining patent AT ONCE!

WHAT A PATENT DOES FOR YOU Without a U. S. Patent, you cannot expect to reap the profits that your invention may make possible. Send at once for this book. After you get that, you'll know exactly what to do to protect yourself.

Anything you write me or send me is strictly confidential between us. All letters and drawings are kept in strong, steel, fire-proof files, which are open only to myself or authorized members of my staff. I have secured patents for inventors located in every State in the Union. The practice of my organization is confined entirely to Patents, Trademarks and Copyrights. I have had years of experience in Patent Matters. When you place your idea in my hands, I am in position to proceed at once to secure protection

for you. My fees are reasonable, and if you desire, I can arrange convenient terms of payment.

Get This
FREE BOOK

IMMEDIATELY-MAIL COUPON TODAY!

This new 48-page book of facts is absolutely FREE! You need it NOW. Simply fill out the coupon, and mail. The field of invention changes constantly—here is the latest information on the most recent developments affecting inventive success. Within a very few days you will receive our Free Book, together with the Record of Invention Blank described here. Write NOW—

CLARENCE A. O'BRIEN,
704 Adams Bldg., Washington, D. C.

Registered Patent Attorney

Get
FREE COPY
Write Today

48
PAGES
Over 100
Illustrations



CLARENCE A. O'BRIEN

REGISTERED PATENT ATTORNEY

704 Adams Building

WASHINGTON, D. C.

CLARENCE A. O'BRIEN

REGISTERED PATENT ATTORNEY

704 Adams Building, Washington, D. C.

Please send me your FREE BOOK, "Patent Guide for the Inventor," and your "Record of Invention" form, without any cost or obligation on my part.

NAME.....

ADDRESS.....

(Important: Write or print name plainly)

PATENTS

Booklet Free Highest References
Promptness Assured Best Results

Send drawing or model.

ALL BUSINESS GIVEN PROMPT AND PROPER ATTENTION

Listed Patent Lawyer in the latest editions of the Rand-McNally Directory of Bankers and Bank-Recommended Attorneys, published by Rand-McNally & Co., Chicago, Ill.; The Baggott & Ryall Directory of Guaranteed Attorneys, published by Legal Directory Corporation, Boston, Mass.; Flugel's Law List, published by Legal Directory Publishing Co., St. Louis, Mo.; American Lawyers Annual, Cleveland, Ohio; Bankers Service Legal Directory, Bankers Service Co., Boston, Mass.; Eyre's Law List, 9 Park Place, New York City, and the Central Guarantee Co., Bankers and Lawyers Directories, Empire State Bldg., New York City.

WATSON E. COLEMAN,
REGISTERED PATENT LAWYER

Victor Building, 724 Ninth Street, N. W.
WASHINGTON, D.C.

INVENTORS PATENT YOUR IDEAS SEND FOR FREE BOOK

HOW TO OBTAIN A PATENT, written by a Former Member of the Examining Corps (1922-24) of the U. S. Patent Office. If you want to profit by your idea, you should take steps to apply for a U. S. Patent at once. Your first step is to get this Free Book. This interesting illustrated book contains valuable information you should have. It tells you fully how to obtain a patent on your idea in the quickest way. With this Free Book you will also receive a "Record of Invention" form on which you can easily record your idea. Personal and Confidential Service: Your case will be personally handled only by a Registered Patent Attorney who is also a Former Member of the Examining Corps of the U. S. Patent Office. All communications confidential.

MAIL COUPON TODAY for FREE PATENT BOOK and RECORD OF INVENTION Form.

MILLER & MILLER REGISTERED PATENT ATTORNEYS FORMERLY IN EXAMINING CORPS U. S. PATENT OFFICE

1638 Woolworth Bldg., Dept. 35A, New York City
MILLER BUILDING, Dept. 35A, WASHINGTON, D. C.

Please send me your Free Book, "How to Obtain a Patent," and your "Record of Invention" form.

NAME.....

ADDRESS.....



**CRIME
DETECTION
SECRET SERVICE
AND
FINGER
PRINTS**

**SECRET SERVICE BOOK
FREE**

For 30 Days Reading
No Money Down—Actual Crime Cases—
If You Act Quick!—We will send you this stirring
book on Crime Detection, Secret Service and Ident-
ification Work for 30 days free reading. Send no
money. If you decide to keep it, then send only
\$1.00. If not, return it. WRITE TODAY. Not
sent to boys under 17 years of age.

T. G. Cooke, Book Dept. 13-53 1920 Sunnyside Ave., Chicago

PATENTS—TRADE MARKS

All inventions submitted held confidential and given personal attention by members of the firm.
Form, "Evidence of Conception" and instructions,
"How to Establish Your Rights"—FREE!

LANCASTER, ALLWINE & ROMMEL
Patent Law Offices

412 Bowen Bldg. Washington, D. C.

Inventors! WE GIVE RESULTS!



PATENTS

Protect yourself by retaining a legal firm that has been in good standing before the Patent Office over sixty years. . . . Preliminary advice FREE . . . estimate of costs submitted. Write full particulars to Dept. S—635 F St. N. W., Washington, D. C.

ESTABLISHED 1869

Lacey and Lacey



GEARS

In Stock — Immediate Delivery

Gears, speed reducers; sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blue prints and inquiries.

Write for Catalog No. 10
CHICAGO GEAR WORKS
769-773 W. Jackson Blvd., CHICAGO, ILL.

No JOKE TO BE DEAF

—Every deaf person knows that—
Mr. Way made himself hear his watch tick after being deaf for twenty-five years, with his Artificial Ear Drums. He wore them day and night. They stopped his head noises. They are invisible and comfortable, no wires or batteries. Write for TRUE STORY. Also booklet on Deafness.



Artificial Ear Drum
THE WAY COMPANY
720 Hofmann Bldg. Detroit, Michigan

STOP Your Rupture Worries!

Why worry, suffer with that rupture? Learn about my perfected invention. It has automatic Air Cushions which bind and draw the broken parts together as you would a broken limb. No obnoxious springs or pads. No salves or plasters. Sent on trial to prove it. Beware of imitations. Never sold in stores. Write today for full information sent free in plain, sealed envelope.
H. C. BROOKS, 111-A State Street Marshall, Michigan

BUCHSTEIN'S FIBRE LIMB



is soothing to your stump—strong, cool, neat, light. Easy payments. Braces for all deformities. Agents wanted.
D. BUCHSTEIN CO.
610 3rd Ave., So., MINNEAPOLIS, MINN.

Send for Catalog Today

To PROTECT YOUR INVENTION Use this coupon, NOW

Delays are dangerous and may be very costly. My personal service assures prompt action, strict confidence, and a minimum of expense. I suggest that you send me a model or drawing, or sketch and description of your invention, and \$5.00. I will make a search and report

promptly as to its patentability and send you a copy of my 72-page booklet. Or, if you prefer to read my booklet first, mail the attached coupon at once. I will also send my "Record of Invention" form. (Over 37 years experience as a Registered Patent Attorney.)

L. F. Randolph, 302-D Victor Bldg. Washington, D.C..

Please send me at once, free of charge, your 72-page booklet and "Record of Invention" form.

Name.....

Address.....

A PERSONAL CONFIDENTIAL PATENT SERVICE.



Amazing! Sensational!

REFINISHES AUTOS Like NEW!

No Polishing. Waxing. Rubbing or Painting

KAR-NU Pays You UP TO \$7 IN AN HOUR

JUST WIPE IT ON WITH A CLOTH. LASTS 8 to 12 MONTHS GUARANTEED

2,028 Other Uses

Besides refinishing automobiles, KAR-NU has hundreds of other uses in the home, office, factory, store and shop. It refinishes typewriters, adding machines, cash registers, scales, desks, chairs, file cabinets, furniture, book cases, safes, etc.—in fact, anything made of metal or wood on which the original finish has become dull or discolored.

A new miracle discovery! A transparent magic-like fluid with which anyone can refinish any color automobile easy, quickly and economically without polishing, waxing, rubbing or painting. **JUST WIPE IT ON WITH A CLOTH!** Immediately dullness, discoloration, shabbiness and sun fade **DISAPPEAR. INSTANTLY.** As if by magic, the old paint is covered with a tough elastic coat which is absolutely transparent, self-leveling and self-polishing. KAR-NU actually fills the pores and rebuilds the old finish. Paint or Duco is rejuvenated, restoring the lustre, life, glow and beauty of the original factory finish. As KAR-NU dries it seals the pigment and protects the finish from further wear. Lasts eight to twelve months. **GUARANTEED.**

SALES GALORE! BIG PROFITS!

Enormous demand! Millions want it! W. L. Morgan, of Mass., earned \$10.61 in a single hour. Sell to individuals, fleet owners, garages, auto accessory stores, used car dealers, etc. No experience necessary. Send no money for sample and details. Get in on ground floor. Just mail coupon—NOW. Opportunity For Distributors in Foreign Countries

THE KAR-NU COMPANY

Dept. G-30, Oakley Station, Cincinnati, O.

MAIL COUPON TODAY!

NOT A WAX, POLISH OR PAINT

KAR-NU is entirely new and different—nothing in the world just like it. Now, no need to spend long, tedious, back-straining, muscle-tiring hours polishing, waxing and rubbing to produce a "mere shine" that is only fairly satisfactory—that lasts for only a short time, and that leaves the car looking worse than before when it wears off. KAR-NU is free from the labor and danger of so-called "cleaners" with acids and abrasives that remove some of the finish each time they are used. KAR-NU produces a result that is equal in beauty to a repaint or refinishing job which costs \$25.00 to \$75.00.



This Seal of Approval awarded by the Testing Laboratories of the Automobile Club of Illinois shows that KAR-NU is a product of merit and does all we claim for it.

FREE SAMPLE COUPON

KAR-NU CO., Dept. G-30, Oakley Station, Cincinnati, Ohio.

Rush FREE SAMPLE to prove your claims about KAR-NU, and Territory Offer.

Name

Address

Town..... State.....

ADVENTURE! REAL SEA LIFE!
 Special edition of "Life On a Deep Sea Tramp" just off press. Only 10c. Portrays present day life aboard these Rovers of the Seven Seas with Pen and Picture. Send a dime for your copy to OWENS, 1027 Stanyan St., San Francisco, Calif.

BUILD IT YOURSELF
JIM DANDY CABIN TRAILER
 Classy! Roomy! Easy to build at low cost! Plans and instructions only \$1.00—include all Diagrams, Sketches, Photos, Material List, etc. Big Value! Mail Dollar Bill to Jim Dandy, Box 125-A, Wausau, Wis.

SUPPRESSED KNOWLEDGE OF THE AGES
 Hidden, denied, but not lost, is the miraculous wisdom of the ancients. Their methods of mental power in achieving **SUCCESS and MASTERY IN LIFE** are available TO YOU. Write for a FREE copy of the "Wisdom of the Sages" and learn how to receive this rare knowledge. **MAKE YOUR LIFE ANEW.**
 SCRIBE C. S. J.
ROSICRUCIAN BROTHERHOOD
 SAN JOSE CALIFORNIA

***DOCTOR TELLS WHAT TO DO FOR COMMON HAIR AND SCALP TROUBLES**

Advises Use of Real Scalp Medicine

The physician who approved this advertisement says that you need a real scalp medicine—an antiseptic counter-irritant—if you are to avoid premature baldness due to poor circulation, dandruff and scaly accumulations that choke your scalp pores. So follow the doctor's advice—ask your druggist for an antiseptic counter-irritant—just say **JAPANESE OIL** and you'll be sure of getting the right thing. Then massage your scalp with it every night before retiring. Keep this up faithfully—and you'll marvel at the improvement in your hair and scalp. Delay doesn't help, so ask your druggist for Japanese Oil today. It costs but 60c a bottle; \$1.00 for Economy size.

FREE: "The Truth About the Hair," a valuable booklet full of information on how to have and to keep a good head of hair. Write National Remedy Co., 56 West 45th St., New York, Room 1102A.

***This advertisement was reviewed and approved by a registered physician.**

CHEMISTRY



Complete, practical home-study courses prepared by some of the best-known chemists in this country, including **ALLEN ROGERS, B.S., M.S., Ph.D.**—Head of Department of Industrial Chemistry, Pratt Institute; **L. M. TOLMAN, Ph.D.**—Formerly Chief Chemist, Wilson & Co. Now Vice-president, United Chemical and Organic Products Co.; **BRADLEY STOUGHTON, B.S.**—Head of the Department of Metallurgy, Lehigh University, and **OWEN L. SHINN, Ph.D.**—Professor of Applied Chemistry, University of Pennsylvania.

Mail Coupon for Free Booklet

INTERNATIONAL SCHOOL OF CHEMISTRY

Associated with the International Correspondence Schools Box 5564-H Scranton, Penna.

Without cost or obligation, please send me full details of your home-study course in

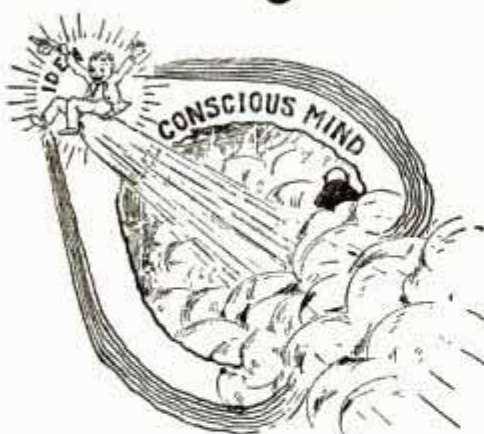
- Analytical Chemistry
- Industrial Chemistry
- Chemical Engineering
- Short Chemistry Course
- Pharmacy

Name.....

Address.....

When writing to advertisers please mention Popular Mechanics

Inventing now for the first time Taught!



Did You Know: There are 38 ways of locking a nut to a bolt?

Each is a variation of a basic idea—arrived at through correct idea development. Yet only those who follow such mental processes can quickly turn their ideas into profit. **Everyone** has ideas for inventions (you've had them—perhaps you have one or more right now)—but many are lost to their owners because they do not know how to proceed. Yet inventing is really simple. No college or technical education needed. All you need know is how to quickly and properly develop your ideas to practical use.

Learn How to Turn Your Ideas into Cash

Lev A. Trofimov, M.Sc., Development Engineer and internationally known inventor, now makes it easily possible for anyone to learn inventing. His complete Home Study Course, same as taught in Resident School, and widely approved by prominent educators and inventors, teaches you Inventive Practice concisely, thoroughly and by the generous use of practical problems. Every phase masterfully handled. Write name and address on margin and send ad today for complete literature at no cost or obligation.

TROFIMOV SCHOOL OF INVENTIVE PRACTICE, Inc.,
3859 Northampton Rd. CLEVELAND, OHIO



Know Electricity as Experts Know It—and Get an Expert's Pay!

Recovery has begun! The months ahead are charged with significance and expectation. What will you do to get the jump on the other fellow?
Thousands of men have used

The Croft Library of Practical Electricity

The Croft Library is a complete electrical educator. It is founded on practice—on 20 years of shirt-sleeve experience—on work as it is actually done. It is jammed from cover to cover with the kind of hard-headed facts you want. Written so that the beginner can easily understand it, yet so sound, so thorough, that it is the daily guide of 50,000 highly paid electrical workers and engineers. Croft tells you the things you need to know about motors, generators, armatures, commutators, transformers, circuits, switchboards, distribution systems—electrical machinery of every type—wiring for light and power—wiring of finished buildings—underwriters' and municipal requirements—illumination in its every phase—the most improved methods of lighting—lamps and lamp effects, etc.—how to do a complete job, from estimating it, to completion.

No money down—easy payments
Fill in and mail the coupon attached and we will send you the entire set of seven volumes for ten days' Free Examination. We take all the risk—you assume no obligation. If you decide to keep the books, send \$1.50 in ten days and the balance at the rate of \$2.00 a month. Send the coupon NOW and see the books for yourself.

FREE EXAMINATION COUPON

McGraw-Hill Book Co., 330 W. 42nd St., New York

Send me for ten days' free examination the Croft Library of Practical Electricity. If satisfactory I will send you \$1.50 in 10 days and \$2.00 monthly until the price of \$19.50 is paid. If not wanted, I will return the books postpaid. (To insure prompt shipment write plainly and fill in all lines.)

Name.....
Home Address.....
City and State.....
Position.....
Name of Company..... PM-3-35

The **NEW Tark**
ELECTRIC RAZOR

NEW—LATEST RAZOR

No. H315. Electric razor whisks off the beard like magic. It does not irritate the skin—but leaves it smooth and refreshed. The latest in razors—A Sensational Seller. Comes complete with cord and one blade; ready for use. Guaranteed against any mechanical or electrical imperfections. Suggested selling price \$1.50 to \$2.00.

SAMPLE 89c, DOZ. \$9.60 Plus Postage

FREE Wholesale catalog of 3000 Fast Sellers. Send for a COPY TODAY.

SPORS CO., 1-35 Main Street, LE CENTER, MINN.

SAVE 75%

Gas Convenience Hotter than Gas

Therm-O-Gas burns low-priced kerosene . . . delivers intense blue flame heat same as gas at **one-fourth** the cost. Starts instantly, and regulates like gas. No noise, soot or smell. Works outdoors as well as indoors.

All-Purpose—Therm-O-Gas boils 50 gallons, fires 2 H.P. steam boilers, distills water, heats tanks, boilers and vats. For boiling, cooking, heating, scalding, and melting tar, white metal, etc. Special burner for kitchen cook stoves.

Nothing to wear out. Trouble-proof. Guaranteed. Will last a lifetime. Explain use when writing for **Liberal 10-day Free Trial Offer.**

HARDWARE AND APPLIANCE DEALERS WANTED
HOME MFG. CO. Dept. 313, 18 E. Kinzie St. CHICAGO

Wrestling Book FREE

Wrestling taught at home, by mail, by greatest of all world's champions—Farmer Burns and Frank Gotch. Be a wonderful athlete. Handle bigger, stronger men with ease. Learn the secrets of experts, Jiu-Jitsu, Physical Culture. Have perfect health, fame, a perfect body admired by both sexes.

FREE 32 page illustrated prospectus, full of thrilling information, sent free. Tells how we teach expert wrestling at home. Send 3c to cover postage. Write now for your copy. State age.

FARMER BURNS SCHOOL
3373 Courtney Bldg., Omaha, Neb.

G. E. MOTORS

made by General Electric Co., originally intended for large manufacturer. Specifications: 1-30 H. P.—4800 R. P. M. Universal A. C. and D. C. 110 volts instant reverse. Size Diameter 3 inch, length 5 inch. Shipping wt. 3 lbs. Add 25c for packing and mailing. Original price \$12.00. Bargain price. Also, Marvel Transformer, 110 volt 50 to 133 cycle secondary voltage 6—8 volt, Special, 95c. Add 25c postage for each item.

\$2.45 Each

NATIONAL ELECTRIC TOOL CO.
560 W. Washington Dept. 323 Chicago, Ill.

AGENTS Make \$380 Monthly

selling 10 CARTER WINDOW WASHERS daily. Cleans, dries, polishes. No mess. Good Housekeeping approval. Restricted territory. Write today.

Carter Products Corp., 998 Front Ave., Cleveland, Ohio

Electroplating with Gold & Silver

and other plating information in Shop Notes for 1933. Illustrated. 50 cents, postpaid.

Popular Mechanics Press, 200 E. Ontario Street, Chicago

MAKE MONEY CASTING LEAD TOYS

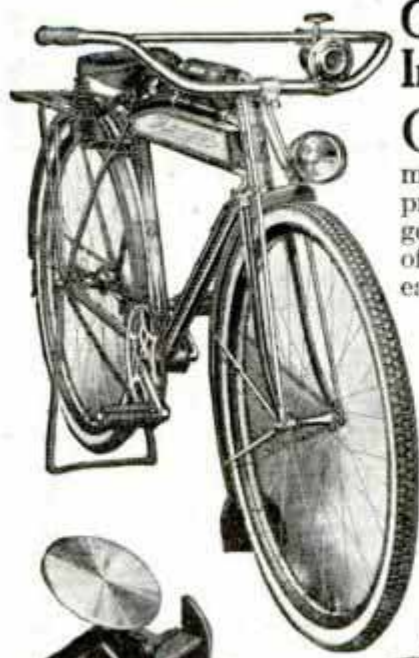
Get this complete outfit. Full equipment for casting. Molds for three different figures. Paints for coloring. Make all the toys you want. Earn handsome profits selling them. Ask dealer for JUNIOR CASTER, or send \$2.50 money order and outfit will be shipped (postpaid in U. S.). State choice of U. S. Soldiers, Wild West Cowboys, U. S. Machine Gunners. Large Illustrated Casting Book sent FREE on request.

Rapaport Bros., 703 W. Ohio St., Chicago
FREE—24 PAGE BOOK

GIVEN WITHOUT COST

Over 300 Dandy Big Prizes Including a Speedy Motorbike!

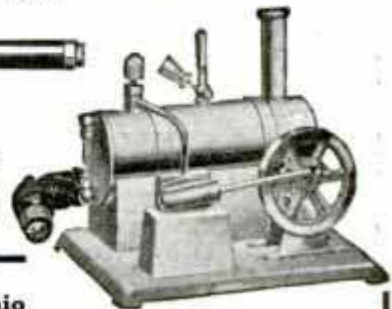
OH, BOY! Here's your opportunity to win over 300 big prizes *without cost!* Get this 1934 deluxe model motorbike, fully equipped. Win a printing press, open a shop of your own, and make money. Or get this radio microphone and go on the air! Heaps of fun. . . Besides these wonderful prizes, you can earn **CASH PROFITS**. It's easy! Just deliver 3 fine magazines to customers in your neighborhood. No experience necessary. Mail the coupon **NOW**—and we'll start you!



Mail the COUPON



You'll have lots of fun studying the moon, stars, birds, and wild life with this telescope. Ten power. Mail the coupon right away, and start winning it.



**Jim Thayer, Dept. 470
The Crowell Publishing Co., Springfield, Ohio**

Dear Jim: I want to earn **MONEY** and **PRIZES**. Start me at once, and send me a big Prize Book, showing over 300 prizes that I can win.

Name..... Address.....
City..... State..... Age.....

Learn to Draw

beautiful girls' heads and figures for pleasure and profit. Be an artist and make big money. Amazing **NEW** easy way quickly starts you. No experience necessary. **FIRST LESSON FREE**
Any ambitious person over fifteen can have the first lesson **FREE** by sending name and address and only ten cents to cover mailing cost. **TRY IT FREE**. No obligation.
**TOWERTOWN STUDIOS, Dept. 336
520 N. MICHIGAN AVENUE CHICAGO, ILL.**

CIVIL SERVICE

**VALUABLE INFORMATION FREE
COLUMBIAN CORRESPONDENCE COLLEGE
WASHINGTON, D. C.**

TEST the WEIL BELT

...at our Expense!

YOU will appear many inches slimmer at once and in 10 short days your waist line will be 3 inches smaller. Remember 3 inches of cumbersome fat gone or no cost! "I reduced my waist 3 inches" . . . writes Geo. Bailey. "Lost 50 lbs." writes W. T. Anderson . . . *Hundreds* of similar letters. **THE MESSAGE-LIKE ACTION DOES IT!**
You will be completely comfortable as its massage-like action gently but persistently eliminates fat with every move! Gives an erect, athletic carriage. Restores abdominal walls and stomach to proper position, aiding digestion and elimination without drugs, diets or exercises!
Simply write name and address on postcard and we will send you illustrated folder and full details of our **10 DAY FREE TRIAL OFFER!**
**THE WEIL COMPANY
563 Hill St., New Haven, Conn.**

**REDUCE YOUR WAIST
3 INCHES IN 10 DAYS
OR
... it won't cost you one cent!**

EXPERIENCED MEN Get the Big Radio Jobs!

**S. Q. NOEL
PRES. FIRST NATIONAL TELEVISION, INC.**

"Every qualified man I train puts in actual hours at my 1,000 Watt Commercial Radio Station! When you have completed my training course, you are a tested radio and television expert—ready to step into the **BIG PAY** class! You have had actual experience behind you in genuine radio broadcasting work which gives you preference in any radio job. The hours you spend in my ultra-modern, "Hi-Fidelity" commercial station **W9XBY** and my licensed television experiment station **W9XAL** mean dollars to you. Never before have you been offered so great an opportunity! Tune in on "Hi-Fidelity" station **W9XBY—1530 kilocycles.**

GET YOUR LICENSE WHILE LEARNING

A government operator's license is a passport to a real job with a future! My students qualify for their licenses and get certified service records while learning. **FREE** employment service for life on graduation. No previous experience needed. Write today and let me point the way to the highest-pay radio jobs!"



**S. Q. Noel, Pres. First National Television, Inc. (Training Division)
AA-3 Power and Light Bldg., Kansas City, Mo.**

Without obligation, send me postpaid **FREE** Illustrated Folder telling about new opportunities in radio and television. I am 17 years or older.

Name..... Age.....
Address.....

HOW TO BUILD, TEST, AND REPAIR RADIO SETS

3 Volumes,
5 1/2 x 8—1177
pages, 561
illustrations



Radio Construction Library

Including Television, Short-Wave Receivers and Auto Radios

This practical Library includes: **PRACTICAL RADIO**—The fundamental principles of radio, presented in an understandable manner. Illustrated with working diagrams. **PRACTICAL RADIO CONSTRUCTION AND REPAIR**—Methods of locating trouble and reception faults and making workmanlike repairs. Discusses modern Short-Wave Receivers and installation of automobile radios fully. **RADIO RECEIVING TUBES**—Principles underlying the operation of all vacuum tubes and their use in reception, remote control and precision measurements.

Helps you to understand modern type receiving sets—full of construction data and practical kinks for the experimenter.

FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 330 W. 42nd St., N. Y. C. Send me the RADIO CONSTRUCTION LIBRARY, charges prepaid, for 10 days' Free Examination. If satisfactory I will send \$1.50 in 10 days, and \$2.00 a month until \$7.50 has been paid. If not wanted I will return the books postpaid.

Name

Home Address

City and State

Position

Name of Company PM-3-35

STEP INTO THE SPOTLIGHT



Banish Boredom... Earn Extra Money START TO PLAY VERY FIRST DAY

Picture the joy of playing a snappy foxtrot, dreamy waltz or mellow old favorite on the Xylorimba. No reason why you shouldn't! Xylorimba is easiest of instruments to play and yet the most spectacular. In constant demand by orchestras, radio stations, at lodge meetings and parties. Marvelous opportunity to increase popularity, make big spare-time money. No bothersome practice or exercises. With Free easy lessons you actually Start to Play Very First Day.

BIG FREE BOOK tells all about Deagan line, liberal trial offer and easy payments. Send coupon today for your free copy.

J. C. Deagan, Inc., Dept. 8453, 1770 Berneau Ave., Chicago
Send me, without obligation, full details of Free Trial offer and easy-payment plan on the Deagan Xylorimba.

Name

Address

Better Pay—Better Opportunities

STUDY LAW ONE YEAR Same Law Attorneys Get
A new clear-cut, easy, proven method. Only
Win back those pay cuts! Law made easier than you have dreamed. Big opportunities, profession-ally and in business, await law-trained men and women. Successful graduates many states. No entrance requirements. Personal instruction. Moderate cost. Easy payments. Write today for Catalog 35 giving Bar requirements in all states, and other valuable information. Now is the time to enroll.

WEBSTER LAW SCHOOL, 420 Lexington Ave., New York, N. Y.

BE AN ARTIST

WE CAN TEACH YOU DRAWING in your own home during your spare time. Thirty-five years of successful teaching proves our ability. Artists receive large salaries.

Write today for Art Year Book
SCHOOL OF APPLIED ART
Dept. 135, 10 E. Huron St., Chicago, Ill.



5¢ EACH LITTLE BLUE BOOKS
Send postcard for our free catalogue. Thousands of bargains. Address: **LITTLE BLUE BOOK CO.**, Catalogue Dept., Desk 476, Girard, Kansas.

Make Money at Home!
GROW MUSHROOMS in your cellar or shed. Exclusive new process. Bigger, better, quicker crops. More money for you! Enormous new demand. Write for Free Book.
American Mushroom Industries Ltd., Dept. 129, Toronto, Ont.

AERO SOCKET LIMBS

Are made to be comfortable. Chafing, sore spots, blisters are unknown to wearers of Aero Socket limbs.

Write for circular today.
Aero Socket Artificial Limb Co., La Crosse, Wis.



SHIP MODELS
Get this dandy catalogue of top-scale models of Flying Cloud, Viking, Blue Nose, Golden Hind, deluxe fittings. Send 15¢ (in coin) for your copy.
ROY HANCOCK, 323 Douglas Ave., Portsmouth, Virginia

SIGNS AND SHOWCARDS EASILY PAINTED
LETTER PATTERNS. WRITE FOR FREE SAMPLES! J.F. RAHN, C2120 NEVA, CHICAGO

AIR CONDITIONING

today's big opportunity!

AIR CONDITIONING is the next big industry. Mark that prediction! Its opportunities are as big in winter as in summer. Plumbing and heating engineers must know Air Conditioning—the field in its broader aspects invites ambitious men. And a new, up-to-the-minute course on Air Conditioning now offered by the I. C. S. will help you qualify for advancement in this new field. Full information—free.

INTERNATIONAL CORRESPONDENCE SCHOOLS
BOX 5562-H, SCRANTON, PA.
Explain fully about your course in the subject marked X:
 AIR CONDITIONING

<input type="checkbox"/> Chemistry	<input type="checkbox"/> Accounting
<input type="checkbox"/> Radio	<input type="checkbox"/> Advertising
<input type="checkbox"/> Aviation	<input type="checkbox"/> Electrical Engineering
<input type="checkbox"/> Refrigeration	<input type="checkbox"/> Drafting
<input type="checkbox"/> Inventing & Patenting	<input type="checkbox"/> Show Card Lettering
<input type="checkbox"/> Architecture	<input type="checkbox"/> Good English

Name..... Age.....
Address.....

\$100 to \$10.00 CASH FREE



We Will Pay YOU for Your New Accepted Suggestion for SO-LO

Look! \$1.00 to \$10.00 cash may be yours **ABSOLUTELY FREE!** Millions now use SO-LO to fix shoes for as low as 1c a repair. SO-LO saves many other ways. But there are hundreds of NEW uses. How do YOU save money with SO-LO? Think up a new use. Write your suggestion on the back of a **SO-LO CAN LABEL**, and send to us. That's all. Send no money. You may get \$1.00 to \$10.00 cash.

Spreads Like Butter

Easy!—a child can do a perfect job quickly. SO-LO dries tough and smooth overnight. Waterproof, acid proof, flexible. Outwears rubber or leather. Guaranteed!

Extra FREE PRIZE

A valuable Surprise Free Prize will be sent to every entry! Get SO-LO now. One can will save you as much as \$25.00 cash. Send your suggestion on the can label today. Get SO-LO at Hardware and 5 and 10c Stores.

SO-LO WORKS, Dept. PM2 Cincinnati, Ohio

BECOME A RADIO EXPERT

- RADIO**
IN ALL ITS BRANCHES
- TELEVISION**
ACTUAL BROADCASTING
- ELECTRICITY**
COMPLETE GENERAL TRAINING
- BROADCASTING**
COMMERCIAL STUDIO FACILITIES
- TALKING PICTURES**
MODERN OPERATING EQUIPMENT

Be a radio expert. Biggest opportunity in 1935. Under guidance of practical instructors you quickly qualify for expert jobs, including Radio Repair Man, Television Expert, Control Operator, Station Technician, Sound Expert, Ship-operator, Broadcaster, Electrician, etc. All courses at price of one.

Learn in Los Angeles

Enroll in oldest, largest trade school in West. Est. 1905. 30,000 graduates. Most delightful place to train. You operate actual equipment and learn by practical shop experience. Our own broadcasting studios.

Earn Room and Board

The majority of students earn living expenses during enrollment. With limited finances you can enroll.

R. R. Fare Allowed

For limited time coach railroad fare from any part of U. S. to Los Angeles will be allowed. Send coupon for Free Book and details.

NATIONAL RADIO & ELECTRICAL SCHOOL - Los Angeles

Dept. 3-PMR, 4006 So. Figueroa St. Send Book and full details of Courses.

NAME
ADDRESS
CITY STATE



Hunters! Trappers!



WE CAN TEACH YOU TO MOUNT BIRDS

Send Coupon for Free Book

Tells all about Taxidermy, and how you can learn at home to mount life-like Birds, Animals, Game-Heads, Fish. Save your valuable trophies. Decorate your home and den. Learn genuine Chrome Tanning for harness and sole leather, buckskin and fine furs. Mount Common specimens, squirrels, rabbits, owls, even frogs, into marvelous craft-work groups, both useful and humorous. Wild-game not necessary. A marvelous hobby, great fun and fascination.

BIG PROFITS Turn your spare time to cash. Have a sideline profitable business. Mount game trophies for sportmen; sell your own mounts; save money and **Make Money** with expert tanning. Learn by mail from old reliable school, with 200,000 graduates. **Investigate Today.** Send coupon, or letter or post card **Right Now** for this marvelous **Free Book**—no cost—no obligation. State your age.

FREE BOOK

Northwestern School of Taxidermy, 3373 Elwood Bldg., Omaha, Neb.

Gentlemen:—Please send me your free 48 page booklet explaining Taxidermy.

Name Age
Address



Here's a fascinating, Profitable Hobby

Any Man, or Boy, who has a Passion for Making Things Needs this Book

IT'S ONLY A DIME

This book tells you how to make Electro-Magnets, Electroplating Outfits, Secret Locks . . . and 30 other Electrical Devices. You'll find the directions and diagrams easy to follow. Satisfactory too . . . because everything you make will work . . . 100%.



96 Pages—costs a Dime—Don't go another day without it

You'll never get more *real* instruction for any dime you've ever spent than what's crammed between the covers of this book. Send 10 cents (coin or stamps) to room 1328, Dept. P. M. 353, National Carbon Company, Inc., 30 East 42nd St., N. Y. C.



He has two mothers

... but still

he's lonesome

Johnny Rogers has two mothers. He sees his real mother for only a few moments each evening—because she has to work all day.

His substitute mother is *organized charity*, which does the best it can for him during the day.

If Johnny's father were alive, things would, of course, be different. But unfortunately he put off taking out life insurance; that is why Johnny's mother cannot give him her full time now.

You may think this just couldn't happen to your child. Why not get the suggestions of an Equitable agent and make sure it won't?

The Equitable agent is trained to recommend a plan to fit your needs exactly. This is what is meant by the Case Method. The special conditions of your case are considered—ages of your children, your income, whether you own your home, and other factors.

To The **EQUITABLE** Life Assurance Society of the U. S.
393 Seventh Avenue, New York, N. Y.

Please mail a copy of your booklet describing the Equitable Case Method of life insurance planning.

59 P.M.

NAME

ADDRESS

AGE



THE EQUITABLE

FAIR — JUST

LIFE ASSURANCE

SECURITY — PEACE OF MIND

SOCIETY

MUTUAL — COOPERATIVE

OF THE U.S.

NATION-WIDE SERVICE

Thomas I. Parkinson, *President*

When writing to advertisers please mention Popular Mechanics

E-23

Com. Don O'Shacks, 70 United
Air Lines, United Airport
Berkeley, Calif

SAFETY for OCEAN FLYERS

BY PUMPING GAS
IN TANKS AND FILLING
THEM WITH AIR, AUTOMATICALLY
SHIP IS MADE NON-SINKABLE

IN CASE OF EMERGENCY INFLATED
RUBBER BOAT HAS COLORED BALLOON
WITH 60FT. LINE, ROCKET GUN AND
FOOD FOR SEVERAL DAYS
IN WATER TIGHT
COMPARTMENTS



AMELIA
EARHART
PUTNAM



MASK THAT CONDENSES AIR
BY MEANS OF CHEMICALS INTO
WATER WITH CUP ATTACHED

VARIABLE
PITCH
PROPELLER
550 H.P. MOTOR

ICE WARNING DEVICE
ON WINGS



PLANE FOLLOWS RADIO BEAM
OUT OF HONOLULU AND
KEEPS IN CONTACT WITH
SHIPS AND LAND

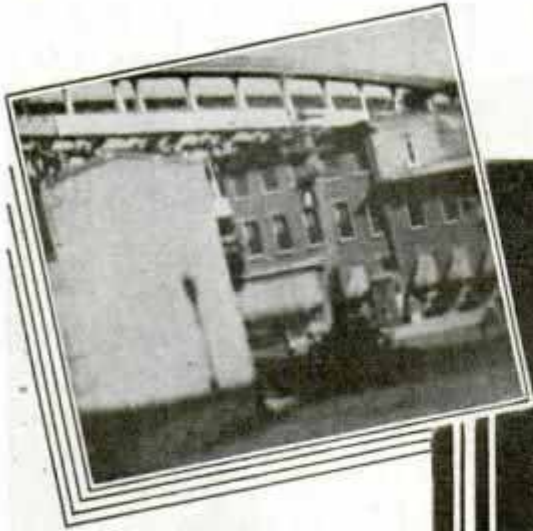
SELF INFLATING
LIFE PRESERVER
IS WORN IN CASE
OF EMERGENCY
LANDING ON WATER

Safety Equipment Carried by Amelia Earhart Putnam When She Became the First Person to Make a Solo Flight from Honolulu to California; Note Balloon Used to Attract Attention

cs-3

MIRACLES

D1647



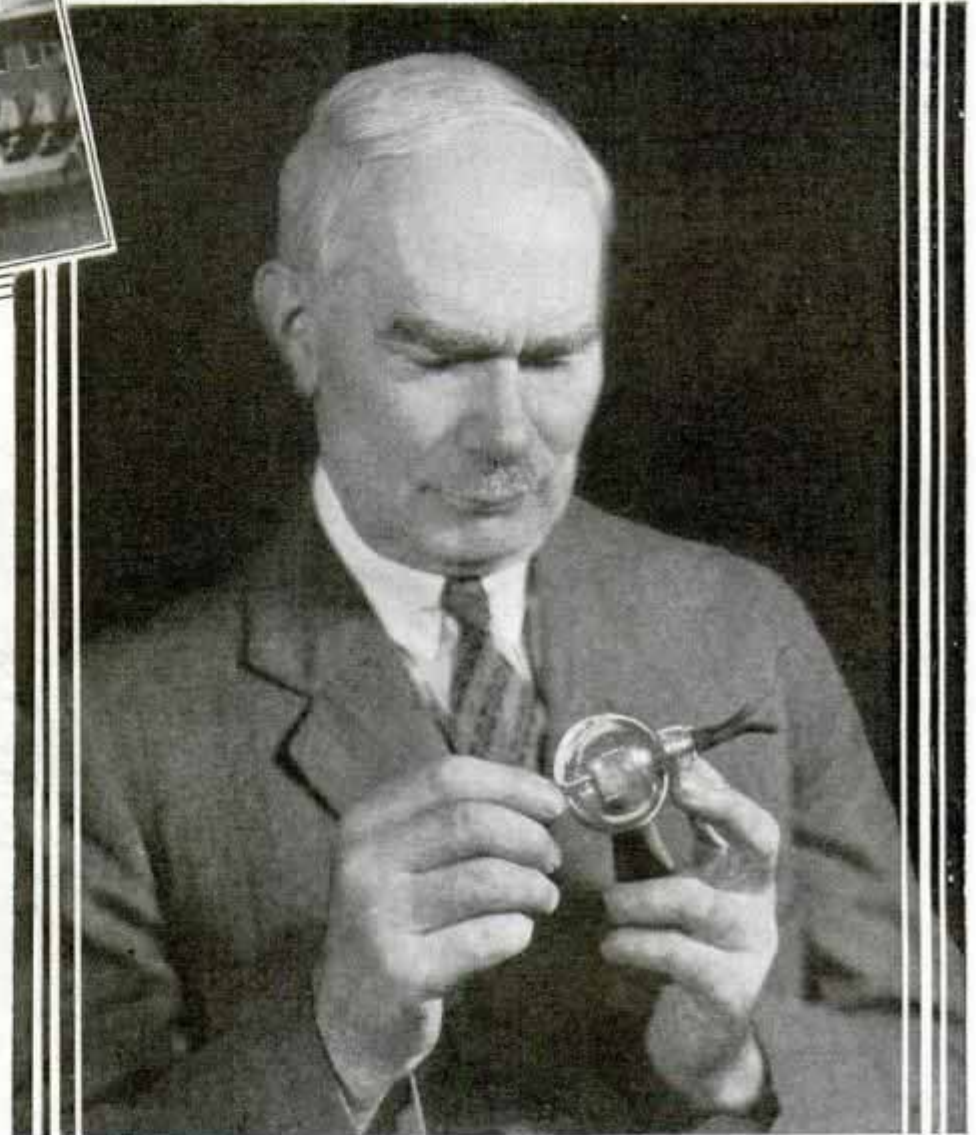
By DR. LEE DE FOREST

TELEVISION programs are being broadcast today, many of them on regular schedules, from nineteen different stations from New York to Los Angeles.

A television motion picture has been successfully reproduced in an airplane cruising among the clouds.

Long-wave television pictures put "on the air" in Los Angeles have been received at Oakland, 350 miles distant and at Houlton, Maine, 2,500 miles distant. Regularly programs of feature film plays and short subjects go out by short wave from scattered stations. How many thousands are receiving these programs, largely with home-made receivers, no one can say. Yet we stand today at the threshold of radio's next great advance—the wedding of television broadcasting to audio broadcasting. In several laboratories scientists are perfecting methods which soon will permit "pictures" in their various forms to be broadcast to the accompaniment of sound.

By the word "pictures," I mean groups assembled in broadcasting studios as well as nearly every kind of scene viewed by theater audiences today—staged events,



Left, Television Image Reproduced on Cathode Ray Tube from Outdoor Pickup; Right, Author Holding 1908 Tube Used in Radiophone

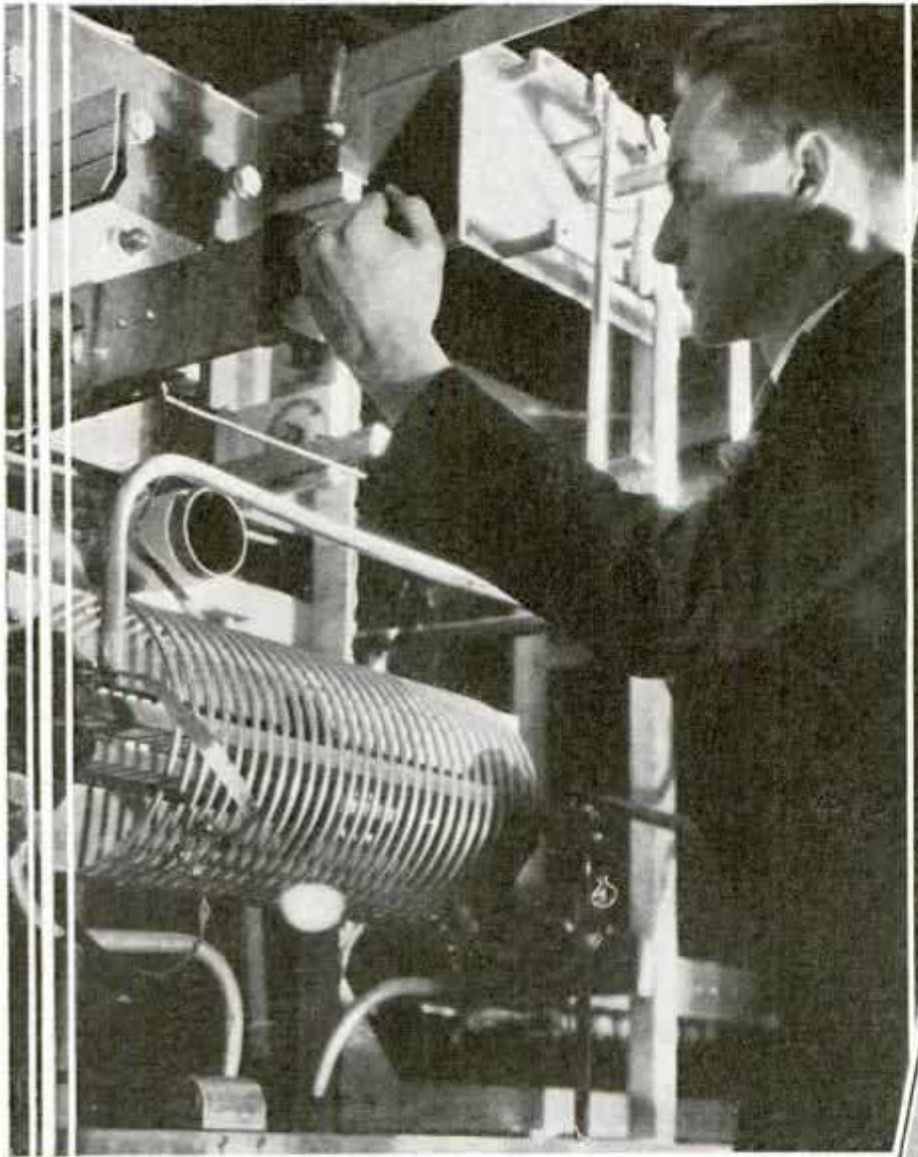
such as boxing, wrestling, ice hockey, operas, motion pictures, the President in his fireside chat—anything, in brief, which can be illuminated adequately and brought within range of the television camera.

Television will hook in with the present machinery of broadcasting. It can start probably before the close of 1935, in two important cities, with 1,000 receivers reproducing pictures broadcast from each station. From such a beginning, it will roll like a snowball across the continent, with transmitters in all cities now supporting radio broadcast stations.

Unlike present radio broadcasting, tele-

Mr. Don Massman
4 W. 10 3rd St. New York
Andrew B. Boone

in TELEVISION



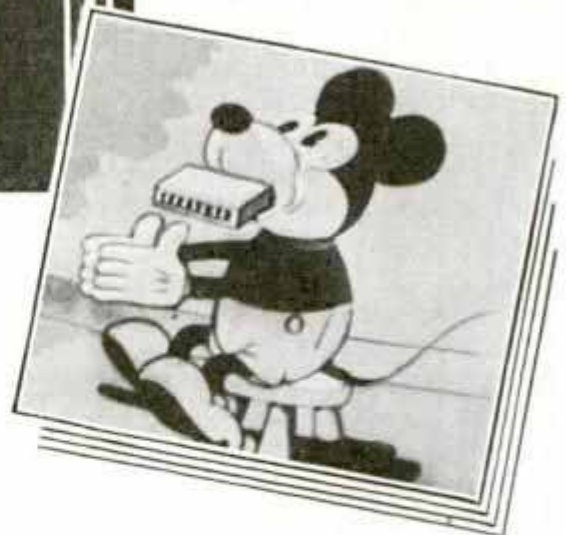
like long waves, are not reflected downward by the heaviside layers, those mysterious strata about fifty miles above the earth from which certain types of electrical impulses are turned back toward this planet. Also it will be impracticable for wires to carry these short-wave programs from coast to coast. Thus we must depend upon numerous local programs, sound and picture being broadcast simultaneously on long and short waves, respectively.

First television programs will adapt the present experimental method of motion pictures. In the homes, the television receivers will be located near present

Left, Operator at Switch of WLW's 500,000-Watt Amplifier; Right, Television Image from Movie

vision will have a comparatively short range. To create the illusion of motion successfully, each image must consist of no fewer than 180 parallel, shaded lines, twenty-four pictures appearing each second. This necessitates a wide band of frequencies, ranging from fifty to 1,000,000 a second, which represents such a broad range of the radio spectrum that we cannot transmit them except at high frequencies, or below ten meters.

These are known as "quasi optical" waves, which travel only about as far as the eye can see, or in the neighborhood of fifty miles. These ultra-short waves, un-



radio receivers, thus preserving the illusion of sound and picture emerging from a common source.

Eventually, television cameras will be pointed toward scenes in and out of doors. I have picked up outdoor scenes, including games of quoits and baseball. Wires

D 164-7

W. W. of Electric House
Virginia Embankment.



Marconi Micro-Wave Aerial System with Parabolic Reflectors; It Is Used in Experimental Work

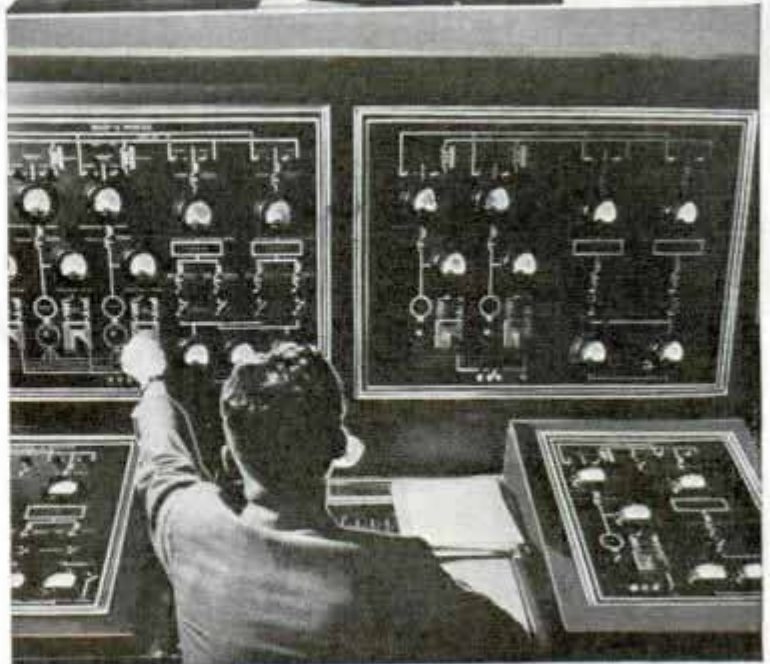
carried the impulses from the camera to an indoor receiver. Reproduction of great spectacles, such as parades and naval reviews, are not yet possible, as our picture of the amateur ball game proved. I planted the camera near the home plate and found we could catch the pitcher winding up and throwing the ball, the batter hitting out a two-bagger and running to first base. But the camera could see clearly no further than 100 feet, for the distance between lines forming the picture increased as it encompassed a broader scene, resulting in a blur.

In early broadcasts on a brightly illuminated stage, the actors suffered under the intense heat, but now we have improved photoelectric cells for the pick-up apparatus. The scanning disc pick-up with a single photo-electric cell has been superseded by a multiple-cell plate known as V. K. Zworykin's iconoscope, and the

electron picture of Philo T. Farnsworth.

The iconoscope is a vacuum tube containing an electron gun and a photosensitive surface consisting of millions of microscopically tiny droplets of caesium-oxide-silver on a sheet of mica. Though thicker than frost crystals on a window pane, each droplet not only is separated, but is also insulated from its neighbors. A lens in the camera focuses the image on the droplets, which in turn free electrons

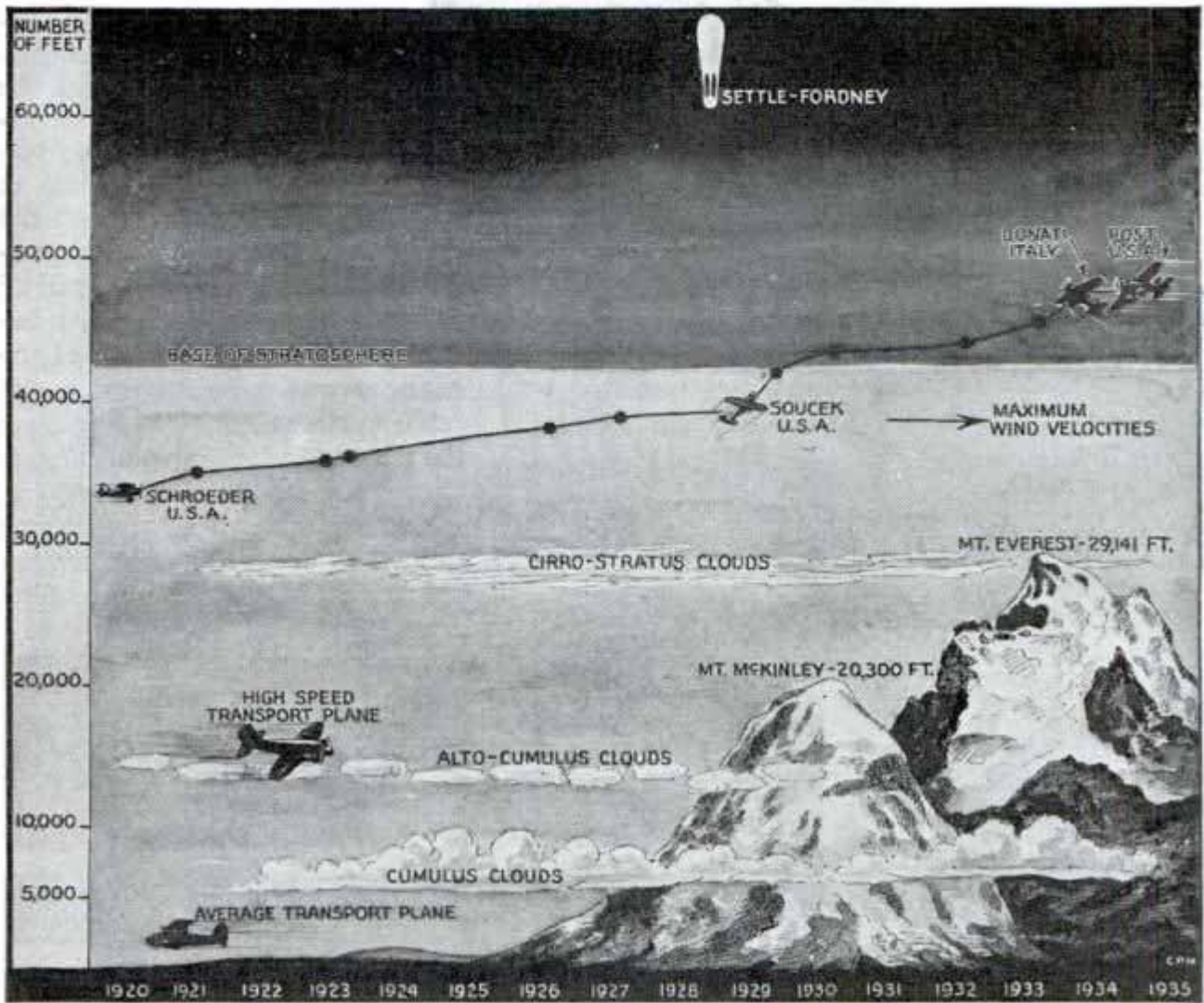
(Continued to page 130A)



Center, Dr. Zworykin with the Kinescope, "Heart" of Latest Television System; Bottom, Power Control Desk at NBC's Headquarters in Radio City

D155-3 Science Service 12/6/34

Altitude Records for Planes Rising Each Year



Drawing Indicating How Man Has Soared Higher and Higher with Each Succeeding Year; Note the Sharp Rise Since 1929 Attributed to Better Planes and Advances in Equipment

Altitude records for airplanes are rising about 1,500 feet a year. In 1934 a record of more than 47,000 feet was made by Donati, Italian airman, and Wiley Post made two attempts to better this mark but failed to set a higher record officially. Since 1920 when Major Schroeder climbed 33,113 feet, man made a gain averaging 690 feet per year to 1929. Since then the average altitude gain per year has been more than 1,500 feet. The greater gain in recent years probably is due partly to better operation of superchargers, the advent of controllable pitch propellers, the use of oxygen breathing equipment for pilots, the development of better fuel and better plane design. Flights indicated on the accompanying chart include the following: 1920, Schroeder, U. S., 33,113 feet; 1921, Macready, U. S., 34,507 feet; 1923, Sabi

Lecoite, France, 35,239 and 35,564 feet; 1926, Macready, U. S., 37,569 feet; 1927, Champion, U. S., 38,418 feet; 1929, Soucek, U. S., 39,140 feet; 1929, Neuenhofer, Germany, 41,794 feet; 1930, Soucek, U. S., 43,166 feet; 1932, Unwins, England, 43,976 feet; 1933, Lemoine, France, 45,277 feet; 1934, Donati, Italy, 47,352 feet, and Wiley Post's two flights.

D1577 Super Calorseal
PAINT WITH A RUBBER BASE

Oil paints often blister because of moisture penetration from below when applied to concrete floors, and water base paints sometimes lack the necessary wearing qualities. A rubber base paint now has been developed for use on concrete to overcome such disadvantages. It stops moisture from below and resists scuffing.

The Master Builders Co.
7016 Euclid Ave. Cleveland

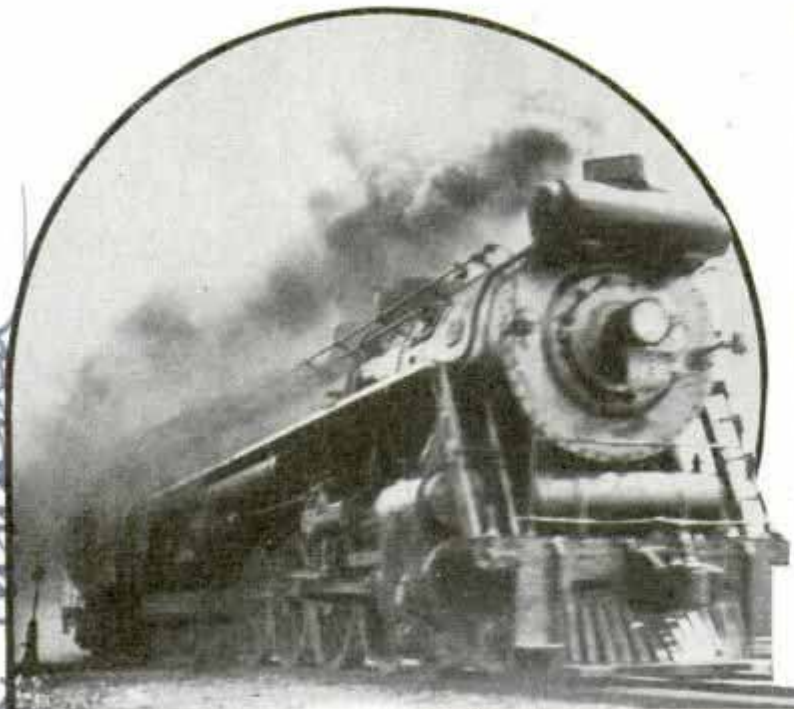
1920-1935
 Altitude records for planes rising each year
 1920-1935
 Altitude records for planes rising each year

cont. P.C. *Wichita* 208 *Chicago*

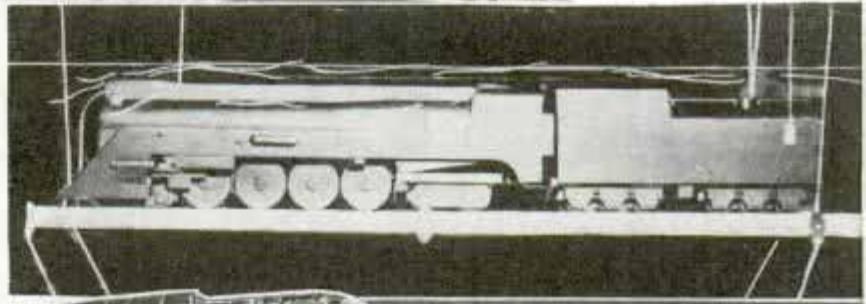
D1569

Wind Tunnel Shows Best Streamline Engine

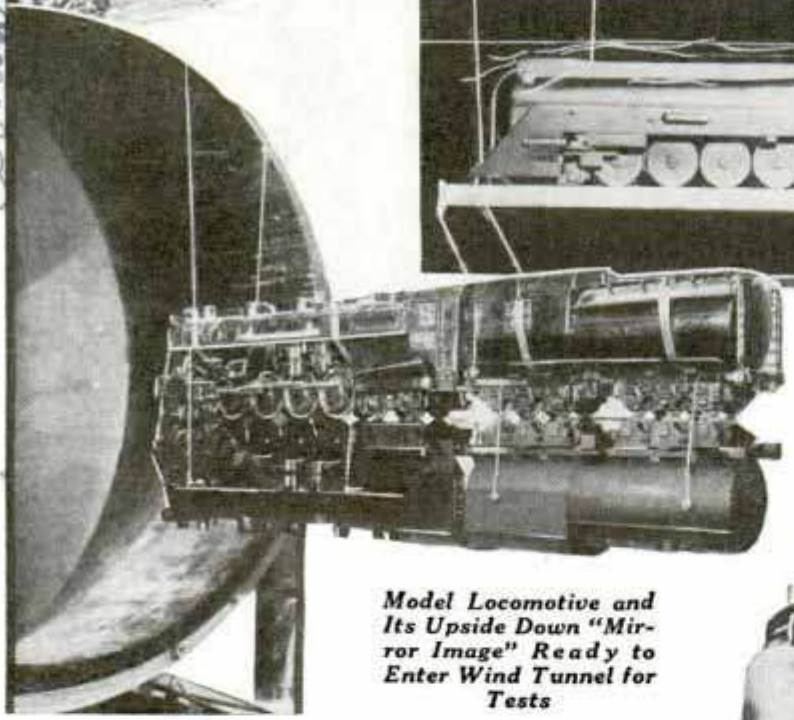
*National Research Laboratories,
Ottawa, Canada*



were replaced by a second identical model, so placed as to constitute a "mirror image" of the first model. So an identical wooden model was built and the two were placed bottom to bottom in the windstream, and from the readings thus obtained, air resistance figures were computed and modifications to reduce resistances were made. One of the changes was to add sheet metal "side curtains" extending from the pilot to the tender, thus assuring a smooth air flow along the sides. A hemispherical nose was added to the front and a section of sloping sheet metal extending



Top, Smoke from Standard Engine Obscures Cab; and Ribbons Showing Air Flow over Streamline Model



Model Locomotive and Its Upside Down "Mirror Image" Ready to Enter Wind Tunnel for Tests

Wind tunnel tests have indicated a method for streamlining a standard locomotive to reduce air resistance forty-three per cent. A one-twelfth scale model of a Canadian National Railways standard locomotive, made of steel, was built for the tests. Due to the absence of the ground, resistance measurements on the model were not applicable to actual practice. However, the effect of a boundary surface on the air flow past a body in its neighborhood is the same as though the boundary



Standard Engine Streamlined by Adding Metal Shell to Reduce Air Resistance

upward from the pilot prevented air entering underneath the model. A cowling covered protuberances on the boiler top, and a streamline "tail" was added to the smokestack, sloping up to join the cowling.

Chicago

8.46

Stout

Engineering Laboratory

POPULAR MECHANICS

2124

327

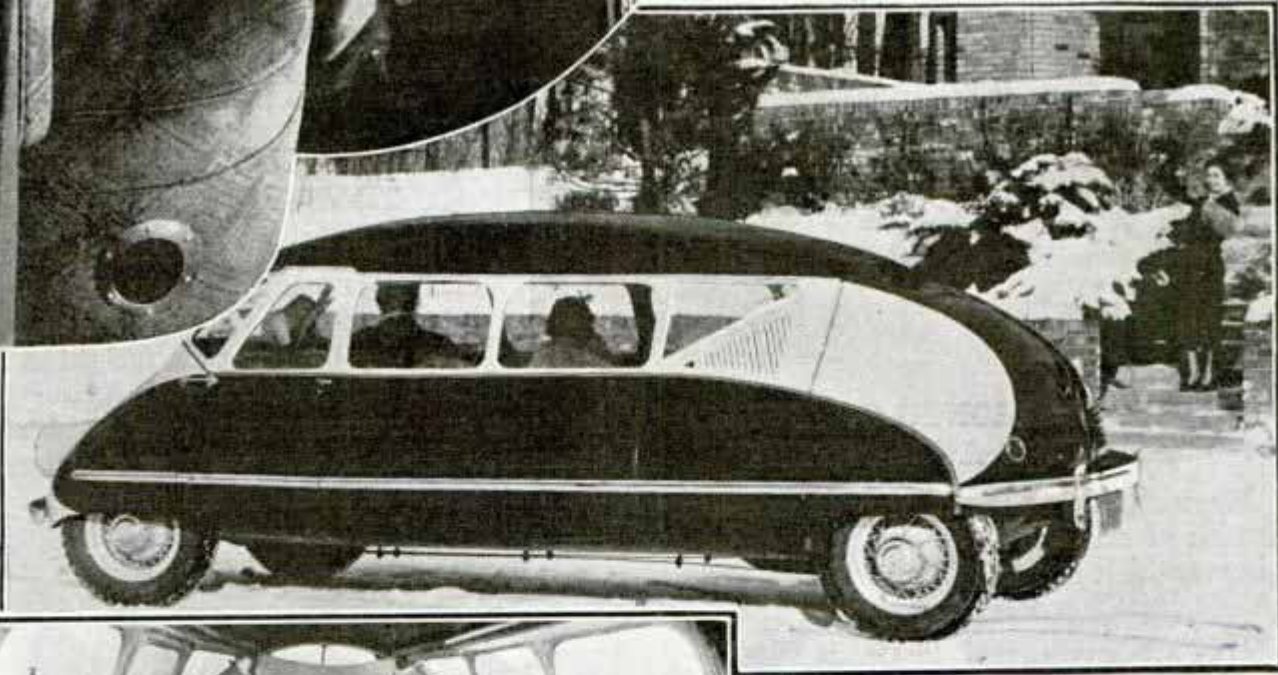
Dearborn, Mich Rose

Rear-Engine 'Beetle' Car Is America's Latest

4/4/35 - no price as yet.
no catalog available



Closely Resembling a Beetle, William B. Stout's "Scarab," an Entirely New Automobile, Is Introduced to America; Top, Right, Note Absence of Fenders and Running Board as Passenger Steps to Floor of Car from Ground; Lightweight but Strong, the Car Will Be Produced in Limited Quantities This Year



Top, Left, Movable Chairs Enable Passengers to Ride in Greater Comfort; Table Is for Reading, Eating, etc.; Center, Side View of Car, Which Has Its Engine at the Rear; Note That Windshield Is over Front Axle, Giving More Visibility; Controls Are Conventional; Unusual Riding Comfort Results from Spring Suspension Consisting of Airplane Landing Gear on All Four Wheels, Including Coil Springs with Large Oil Cylinders to Absorb Shocks

Bottom, Interior Which Has Five Inches More Headroom Than Conventional Car; Note Rear Seat Has Been Moved to Side and Extended for Sleeping, Making Day and Night Travel Easier

From Schiffer Associates
7338-10 1000
One Detroit

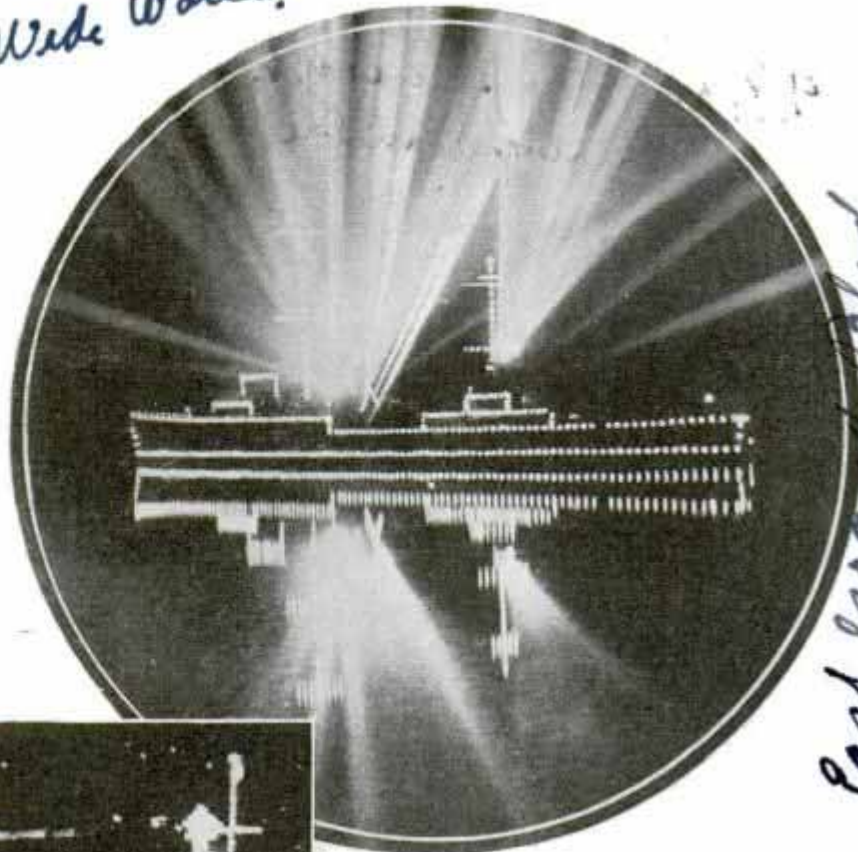
see Jan. 1936 62
Sept. 1932 440

Handwritten notes at the bottom of the page, including "Stout" and other illegible scribbles.

**WARSHIPS DRESSED
IN LIGHT FOR
NIGHT SHOW**

Wide World.

British battleships in English harbors celebrated the recent royal wedding of the Duke and Duchess of Kent by appearing in a blaze of lights and color the night following the ceremonies. The ships were decorated from bow to stern with thousands of electric lights while their powerful searchlights made an aurora over the fleet, forming a gorgeous spectacle for the spectators on shore.



*Carl Serravallo Blvd.
Cleveland, Mich.*

D-1621
British Battleships Ablaze with Lights in Celebration of a Royal Wedding



**STREAMLINE TAXICAB HAS
TRANSPARENT TOP**

Intended to attract attention and patronage by its attractive lines, a streamline taxicab has been designed and copyrighted by Hal Holtom of Detroit. Among its

features are a transparent roof inset and concealed lights in the radiator shell, giving the effect of illuminated grill bars.



*Hal Holtom
at St. Paul, Minn.*

Streamline Cab with Transparent Inset in Roof

Designed and copyrighted by Hal Holtom, Detroit, Mich.

**ONE FIVE-MILLIONTH OF AN INCH
MEASURED ACCURATELY**

By magnifying light waves one-hundredth of an inch wide so they appear as quarter-inch stripes, Chauncey G. Peters, chief of the bureau of standards interferometry section, has developed an extremely accurate method of measuring. By a tedious hand grinding process he has made quartz gauges so accurate they can detect errors in distance of less than two ten-millionths of an inch. Two sets of the fused crystals are nearly completed and will be sent to laboratories in Europe to be calibrated. If Mr. Peters' calculations are verified, it is expected an international conference will follow to give the world a new and revolutionary standard of fine measurement, much more accurate than that now in use by the bureau of standards and other governmental agencies.

*D-1566
Comd. Roger Hathorne
City of Wash. D.C.*

Washington, D.C.

D1299 see J. W. 1733

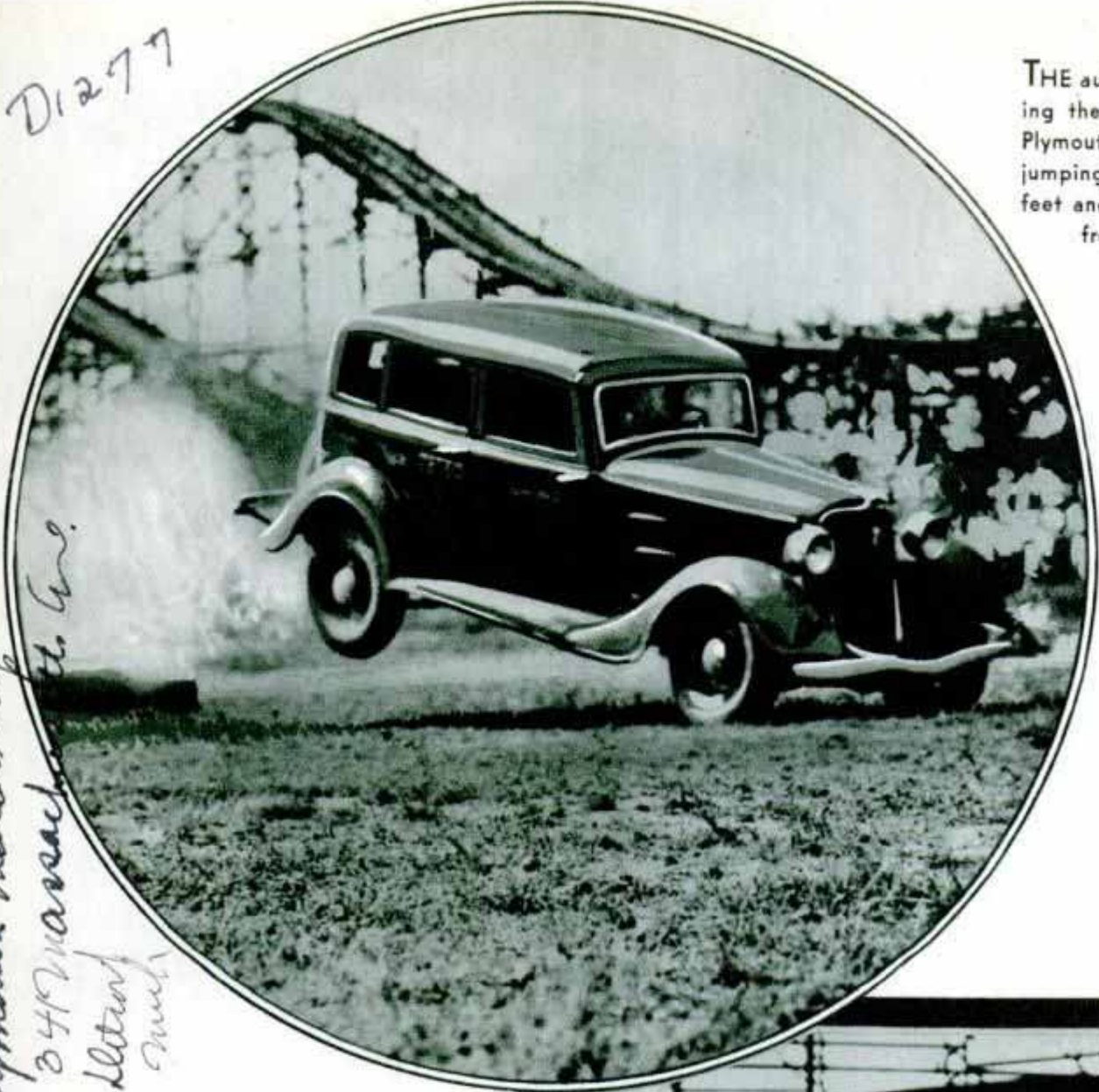


"LUCKY" Teter, stunt driver and author of this article, is about to take a bath. He is plunging into a lake after driving his test car down a chute to gain the necessary momentum.

**BREAKING THEM UP
TO MAKE THEM BETTER**

D1277

Plymouth Motor Car
349 Massachusetts St. W.
Detroit
Mich



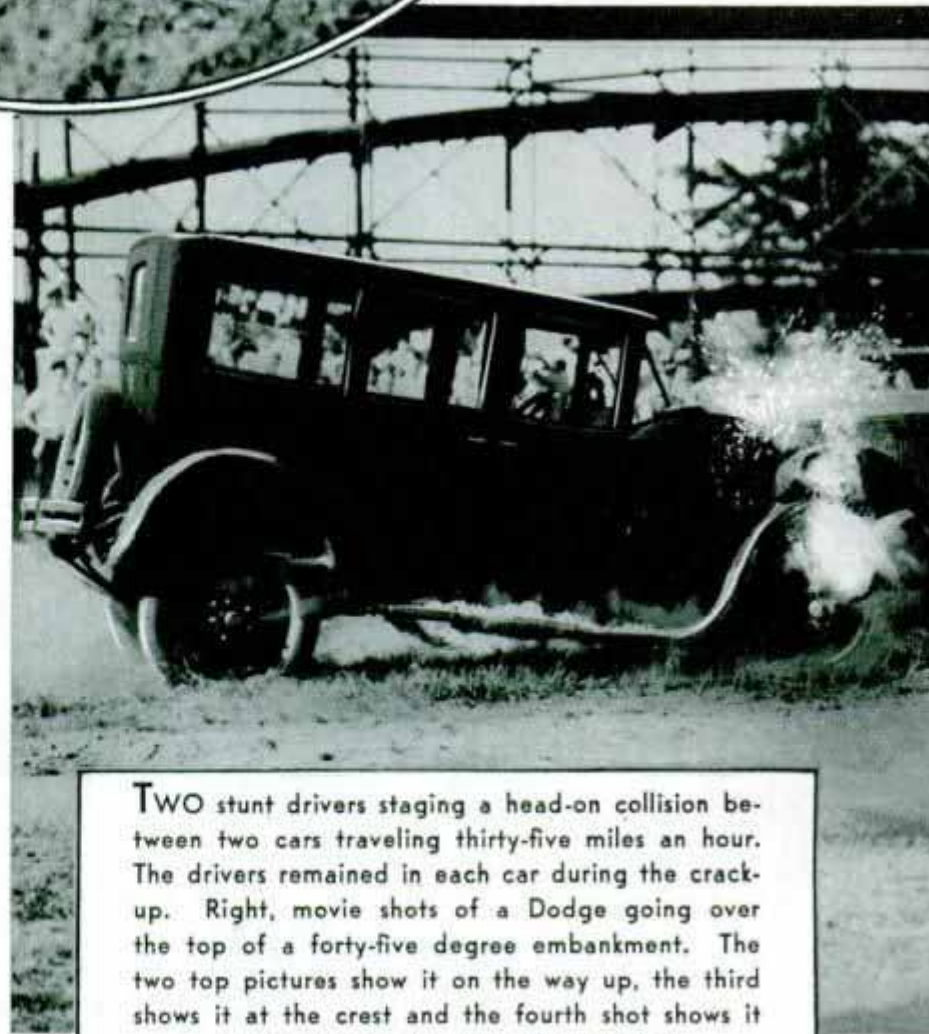
THE author demonstrating the sturdiness of a Plymouth by broad-jumping it twenty-five feet and landing on the front wheels.

By E. M. "LUCKY" TETER
Automobile Stunt Driver

I EARN a living by turning cars upside down at seventy miles an hour to produce thrills that demonstrate the ability of the modern automobile to "take it."

My friends call me "Lucky" because I manage to stay out of hospitals. You would probably call me a reckless driver. But my wrecks are not reckless. I don't believe in taking unnecessary chances. And in my business of turning cars upside down safely, I have learned a few things about driving them right side up safely.

But first, how about taking



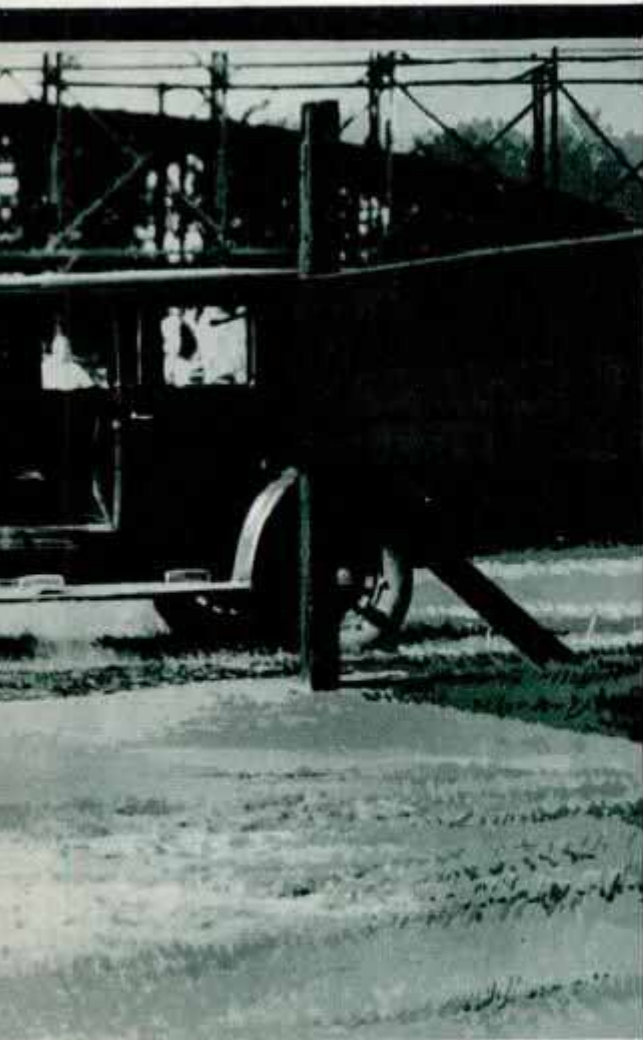
TWO stunt drivers staging a head-on collision between two cars traveling thirty-five miles an hour. The drivers remained in each car during the crack-up. Right, movie shots of a Dodge going over the top of a forty-five degree embankment. The two top pictures show it on the way up, the third shows it at the crest and the fourth shot shows it coming to earth after its "flight."

D1277

a ride with me? I can guarantee that our car will turn over at least once—maybe more. Here, put on this crash helmet. Strap yourself in the seat beside me with this safety belt. All ready? Hold onto your seat. Here we go.

Down the track—twenty miles an hour, thirty, forty, fifty, sixty—the speedometer creeps to seventy. Hang on, now's the time! Twist the wheel sharp right—hear those tires scream. Now we're starting over—we're leaving the ground—watch out for the crash. That first bump was when we hit on the side, now over again, and that smash was when we hit on the wheels.

Look out—we're going again. Feel your weight strain against the safety belt. Your head hit the top then. Good thing you wore that helmet. There—we landed on the side.





D1277



STUNT driver riding motorcycle through flaming wall of boards and "Lucky" Teter leaving his car as it plunges into a lake.

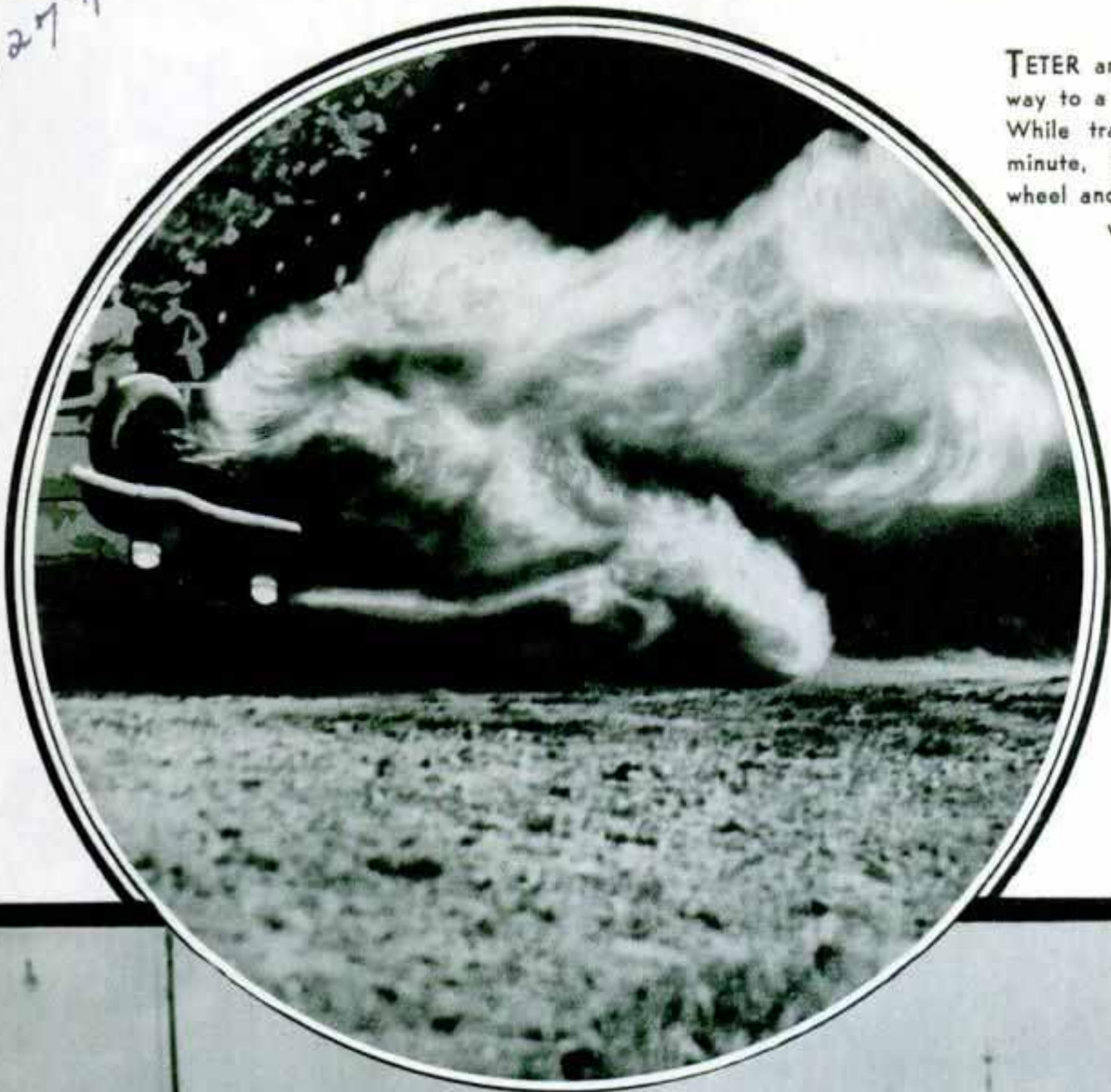
Don't move—here are the mechanics to push us right side up. Now we'll start the motor. Here we go under our own power. How do you feel? Wait a minute. I'm going to jump the car from that raised platform into twenty feet of water. Can you swim?

Well, here goes! There's the end of the platform and we hit sixty when we went over. Now watch us sail, see the front end settling. Now for the bath. Hold your breath. Boy, what a splash! Look out, we're turning over. Get off that safety belt and get out that window. O.K., now

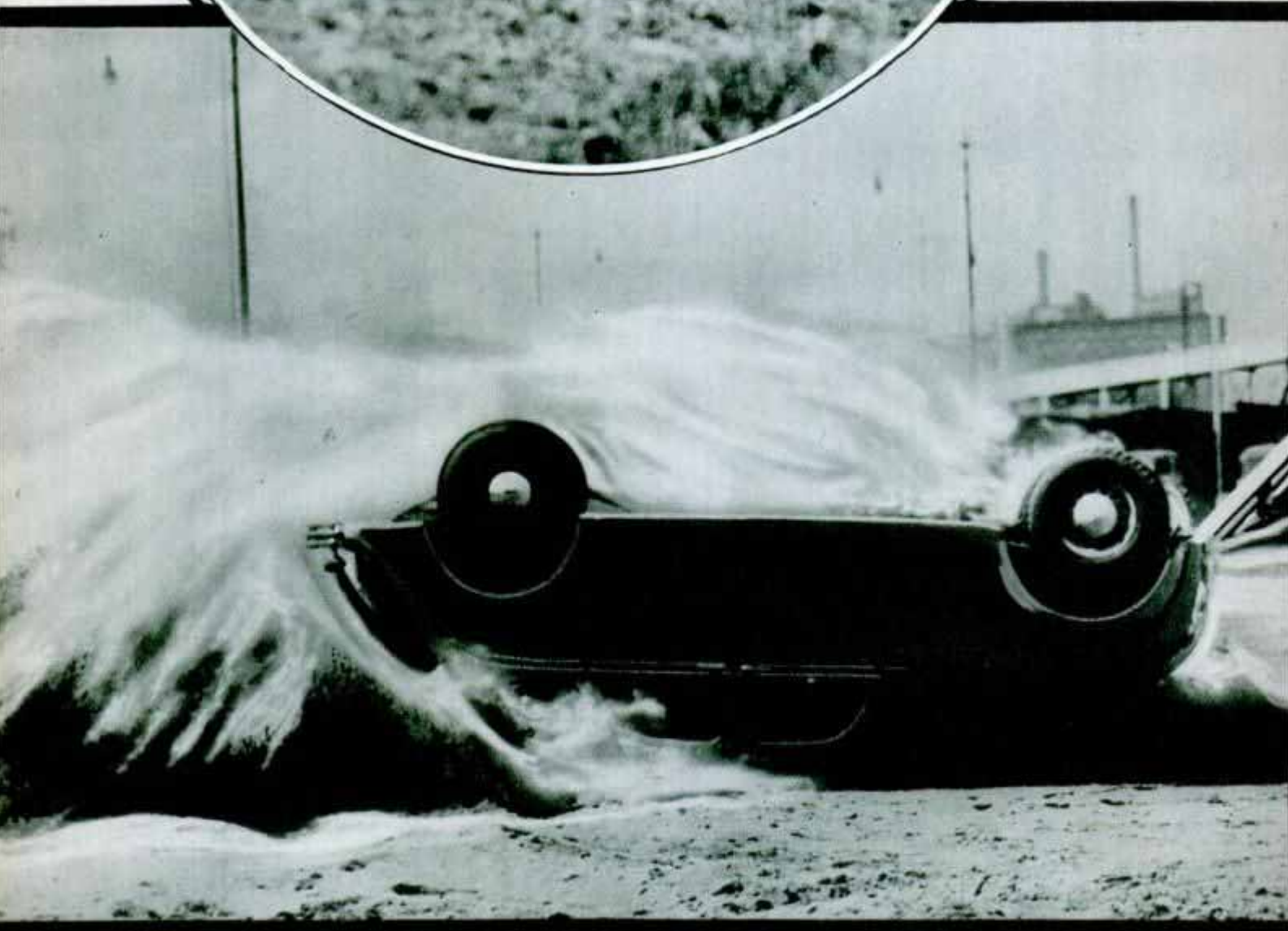
THE author strapped in his seat and wearing goggles and crash helmet. Below, turning over at sixty miles an hour to show the stamina of the modern car.



D1277



TETER and his car on the way to a "happy landing." While traveling a mile a minute, he twisted the wheel and the car is on its way over.



D1277



THRILLING finish of a flip-flop as accomplished by a stunt driver on the Chrysler test track at the Chicago World's Fair. The driver climbed out under his own power and the car was righted and driven away under its own power. Upper right, this looks like the end of a reckless driver's career, but it's only the author in the midst of a hand-made wreck.

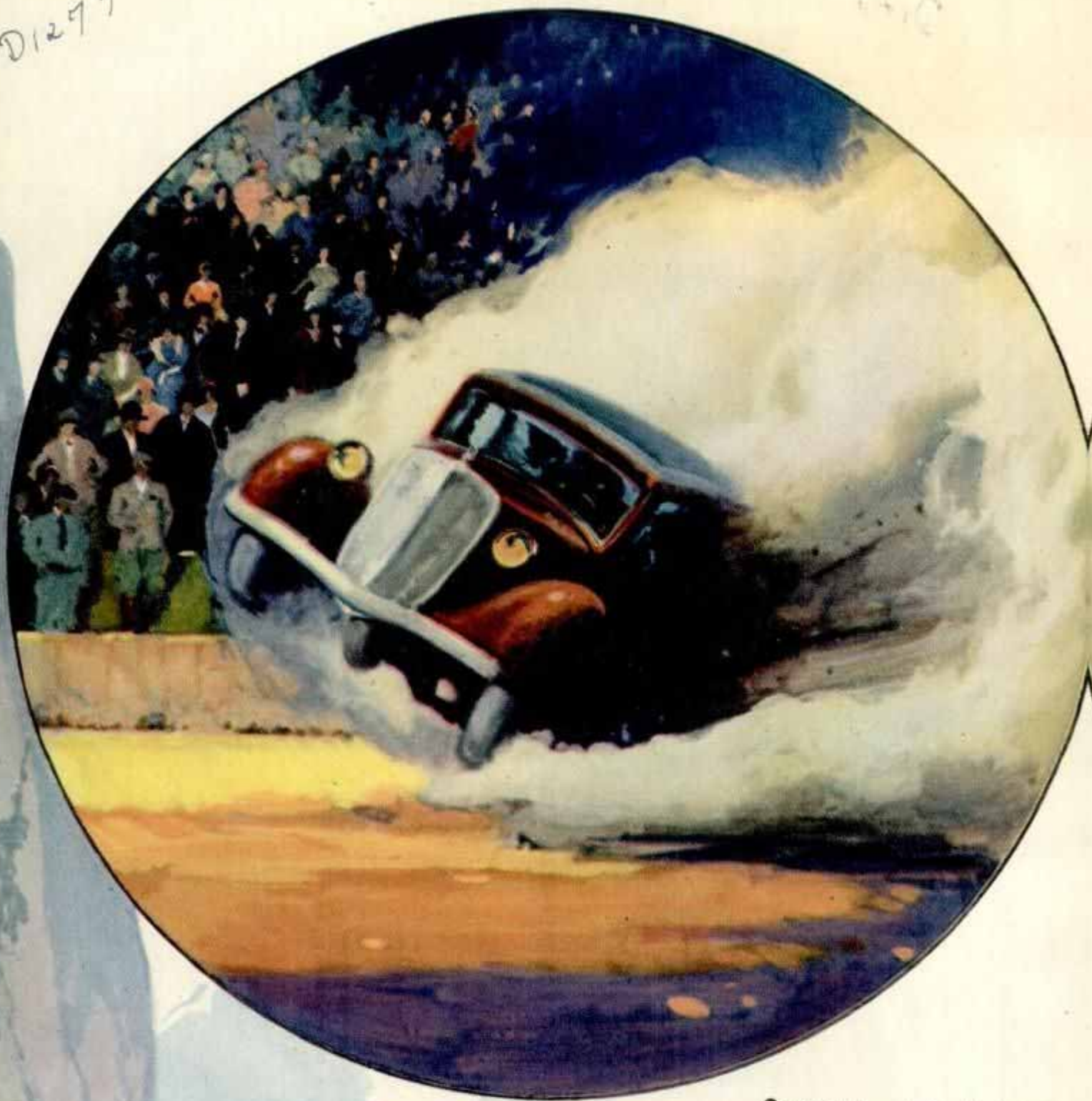
for a nice cool swim to shore. Wait until they pull the old bus out of the lake. Now let's see if it will run. Yes, she starts—and away we go. Hear the crowd yell. You're a hero!

That's the way it feels to make accidents. I've been manufacturing thrills for almost a year, traveling from one city to the next to appear before excited throngs. It's a strange job—this business of making thrills with spills. But I like it. I like the roar of the crowds. I get just as much fun out of the turn-over and water-jump stunts as the spectators.

The other stunts in my repertoire are almost as exciting. The ski jump, for instance. It's a real treat to jump my car as far as fifty-two feet. Of course I do my stunts for money. But there's another reason. I believe that my experiences are of real value to automobile engineers and motorists. I like to feel that I'm contributing something to automotive (Continued to page 116A)

D1279

1410



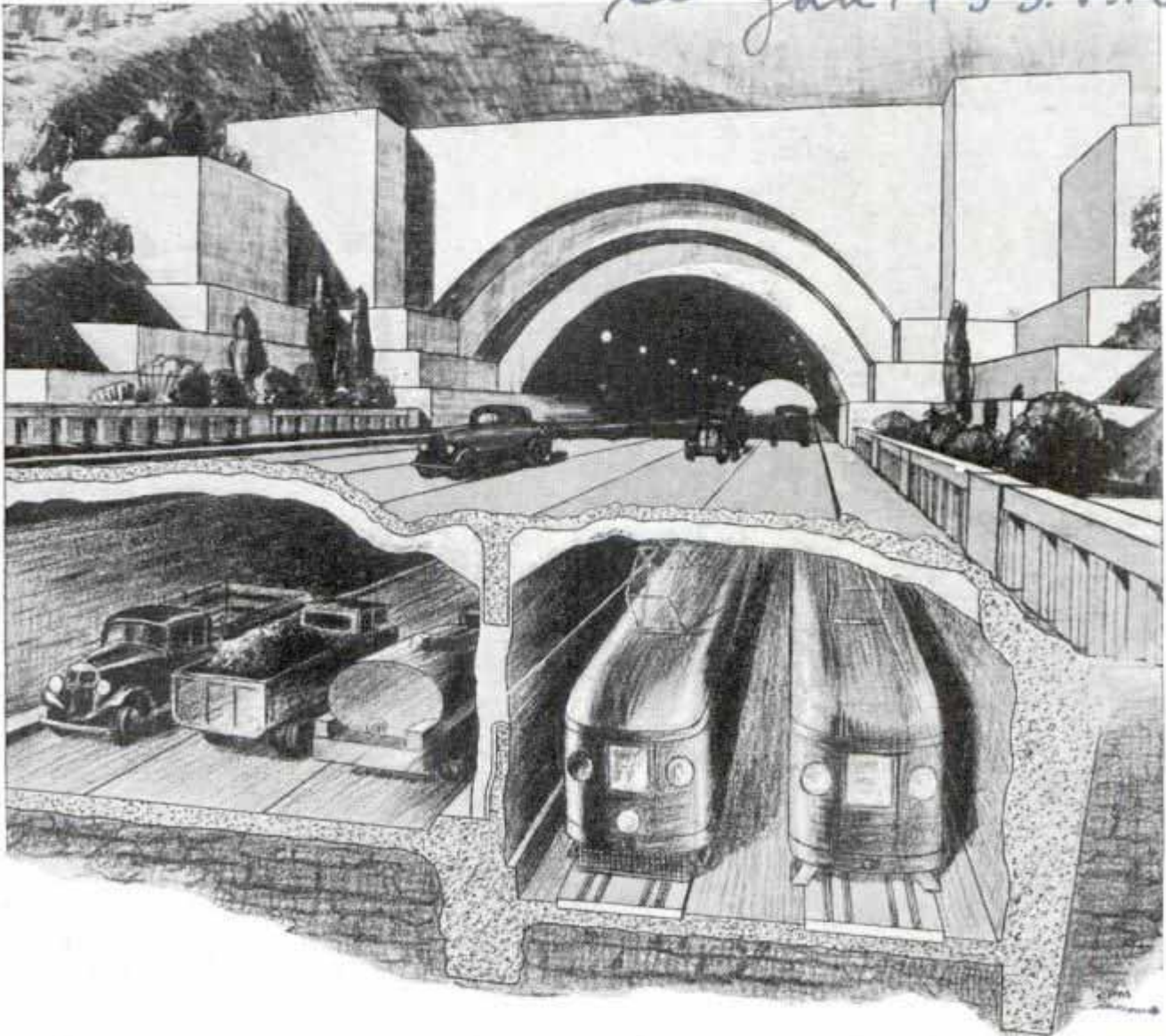
STUNT driver starting to turn upside down. Forcing cars to take such punishment may seem like cruelty to autos to the man who loves things mechanical, but if he were involved in the accident illustrated, he would be safer if he were in a car which was sturdy enough to stand such punishment.

D/1540

Union League Club

San Francisco call
see Jan 1933 P. 10

Two-Deck Tunnel Joins Spans of Big Bridge



Cross-Section Drawing of Underground Passageway, That Will Be Part of San Francisco-Oakland Bridge; Note the Different Levels Provided for Automobiles, Commercial Vehicles and Electric Cars

Motorists who cross the San Francisco-Oakland bay bridge will travel through an underground tunnel when part way across the bay. This tunnel is on Yerba Buena island where the spans of the giant bridge from the San Francisco and Oakland sides meet. The island tunnel, a concrete structure 540 feet long, seventy-six feet wide and fifty-eight feet high, will have two decks, the upper carrying six lanes of motor traffic, and the lower accommodating two interurban railway tracks and three lanes of truck traffic. The method of boring the tunnel is unusual. Five pilot tunnels are being driven through the island. When finished, these will be broken into the one large tunnel. The tunnel will have a grade rising toward the east to conform

to the war department's requirements for clearance of spans on both sides of the island to permit movement of water traffic.

D1661

DECIMAL MEASURING SYSTEM SIMPLIFIES AUTO MAKING

Simplification of designing, tool making and manufacturing operations is achieved in the Ford Motor company by using a decimal system of measurement. Instead of the common fractions, "halves," "quarters," and on up to "sixty-fourths," the system calls for decimal fractions for all subdivisions of the inch. Cumbersome dimensions are eliminated and no conversion tables are necessary. The new system greatly reduces the chance for error.

Emil Ayers & Son

Dearborn, Mich

Phone without Batteries Has Variety of Uses

Handset Telephone Which Is Operated without Batteries and Which Is Convenient for Talking from the House to Barn or Garage: It also Replaces Speaking Tubes on Ships and Other Places Where Exterior Current Is Unavailable

FROM THE HOUSE

TO THE BARN



TO THE GARAGE

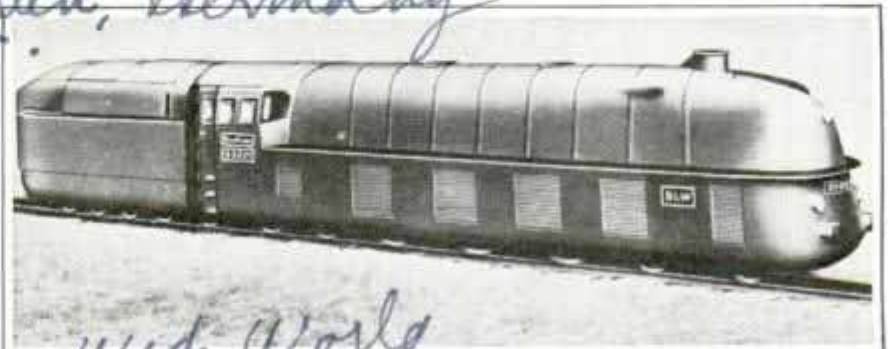
FOR YACHTS

Operated without batteries, a telephone instrument known as a magnetic monophone is replacing speaking tubes on ships and in other places where external current is hard to obtain. It is a modernization of Alexander Graham Bell's electromagnetic telephone. The magnetic unit is an efficient receiver and sensitive transmitter. It produces pure tones free from distortion. Methods of signaling have also

been developed which require no dry cells. The latest instrument embodies a receiving and transmitting unit similar to a magnetic loud speaker. When used as a microphone, sound waves vibrate a diaphragm and, in turn, an armature. This vibration sets up variations in the magnetic flux, inducing currents in the coils which form part of the magnetic system. These currents are transmitted to the line, and vary in frequency and intensity with the sound waves of the voice. The unit operates as a polarized receiver.

Engine Shaped Like a Bullet to Travel at High Speed

The German Railways company has constructed two streamline engines, designed something like giant bullets and intended to reduce head air resistance. These locomotives are expected to reach a top speed of more than 105 miles per hour in passenger service.



German Locomotive Whose Bullet Shape Decreases Head Air Resistance

Built by Borsig Locomotive Works

D1646

Berlin, Germany

Wid. World

6.-3

Acme newspaper, clus.
photo d. 220 E. 42nd
1997 New York

There's Still LOTS of LIFE in the OLD IRON HORSE

FASTEST train in the world! Mile-a-minute schedules! Four hundred miles in four hundred minutes! Top speeds of more than ninety miles an hour!

Such are the answers of the steam locomotive to the challenge of streamline trains, Diesel engines and electric motors. The old iron horse, monarch of the rails for more than a century, today is snorting defiance at its critics who have called it too slow, too heavy and too



Oil-Burning Locomotive Which Covers Schedule of 400 Miles in 400 Minutes; Note Virtually Solid Drive Wheels; Above, the Racing Iron Horse Traveling at More Than Mile a Minute

costly to compete with the newer forms of transportation.

Proof that this iron horse is not yet a lumbering plug fit only for freight service was offered dramatically the first of the year when the Chicago and North Western railway began operating what it terms the fastest train in the world—and it's powered with steam.

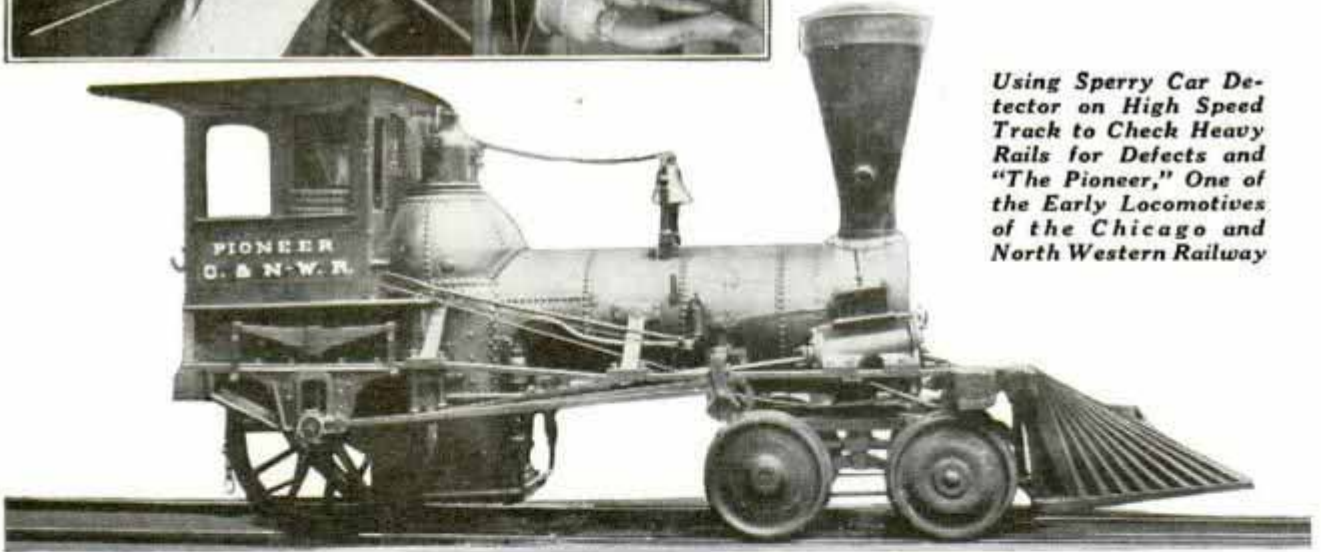
This train, the "400," runs between Chicago, Milwaukee, St. Paul and Minneapolis. The rail distance from Chicago to St. Paul is 408 miles. The train covers it in seven hours, or 420 minutes, thereby lopping nearly three hours off the fastest previous schedules. Three five-minute stops reduce actual running time to 405 minutes for the 408 miles—better than a mile a



a speed of seventy-one miles per hour. But no other train in the world today travels a regular schedule of 400 miles in as many minutes.

And the train which accomplishes this feat is not streamline or lightweight. It is a standard coach and Pullman train, air conditioned throughout, and it is pulled by a steam locomotive very similar to the standard passenger engine. Two important changes in the locomotive and improvement of the roadbed are responsible for the steam engine's latest bid for supremacy.

In the first place, the engine burns oil instead of coal. It carries 5,000 gallons of oil and 15,000 gallons of water compared with fifteen or twenty tons of coal and 8,750 gallons of water for the coal-burner. The oil costs a little more



Using Sperry Car Detector on High Speed Track to Check Heavy Rails for Defects and "The Pioneer," One of the Early Locomotives of the Chicago and North Western Railway

minute. The average speed, including stops, is more than fifty-eight miles an hour. The top speed is more than ninety miles an hour and the engine can do 110 miles an hour. It makes the eighty-five miles between Chicago and Milwaukee in eighty minutes.

For the distance traveled, the "400" today is the fastest train in the world operating on a regular schedule. Faster time for short distances and for non-stop runs are made by other scheduled trains, including the "Flying Scot" of England which covers some seventy-seven miles at

than the coal, but its use saves precious minutes because it is not necessary to refuel so frequently. This enables one locomotive to make a run of more than 300 miles without stopping for fuel and makes possible a round trip run with only three locomotives.

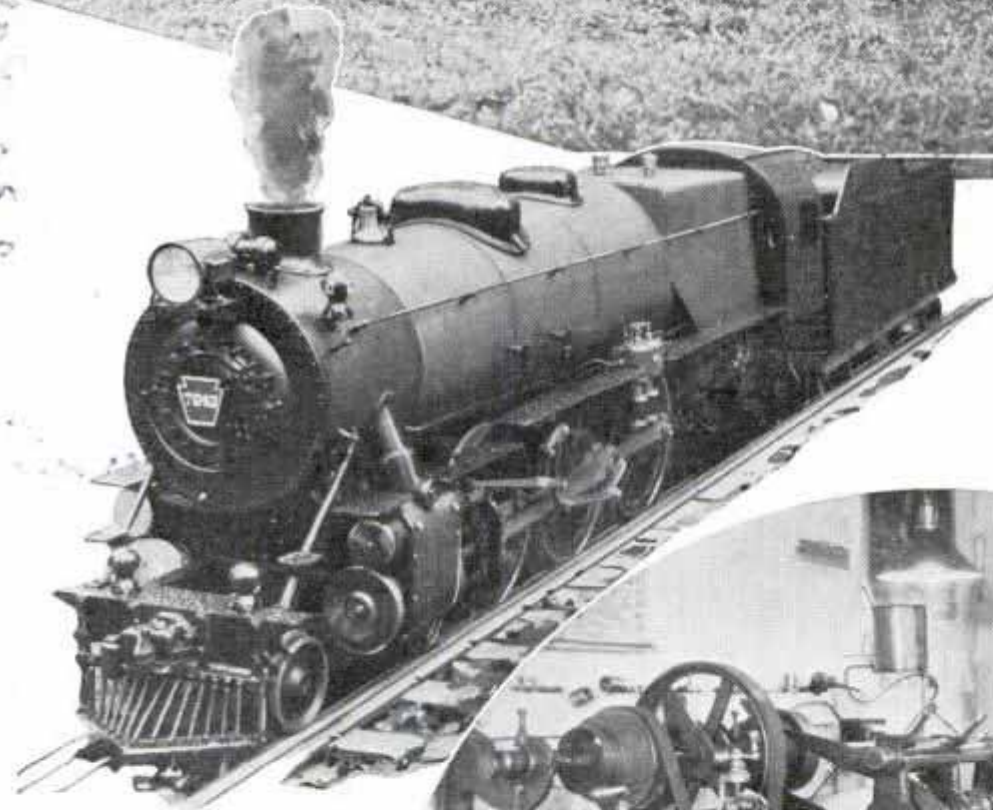
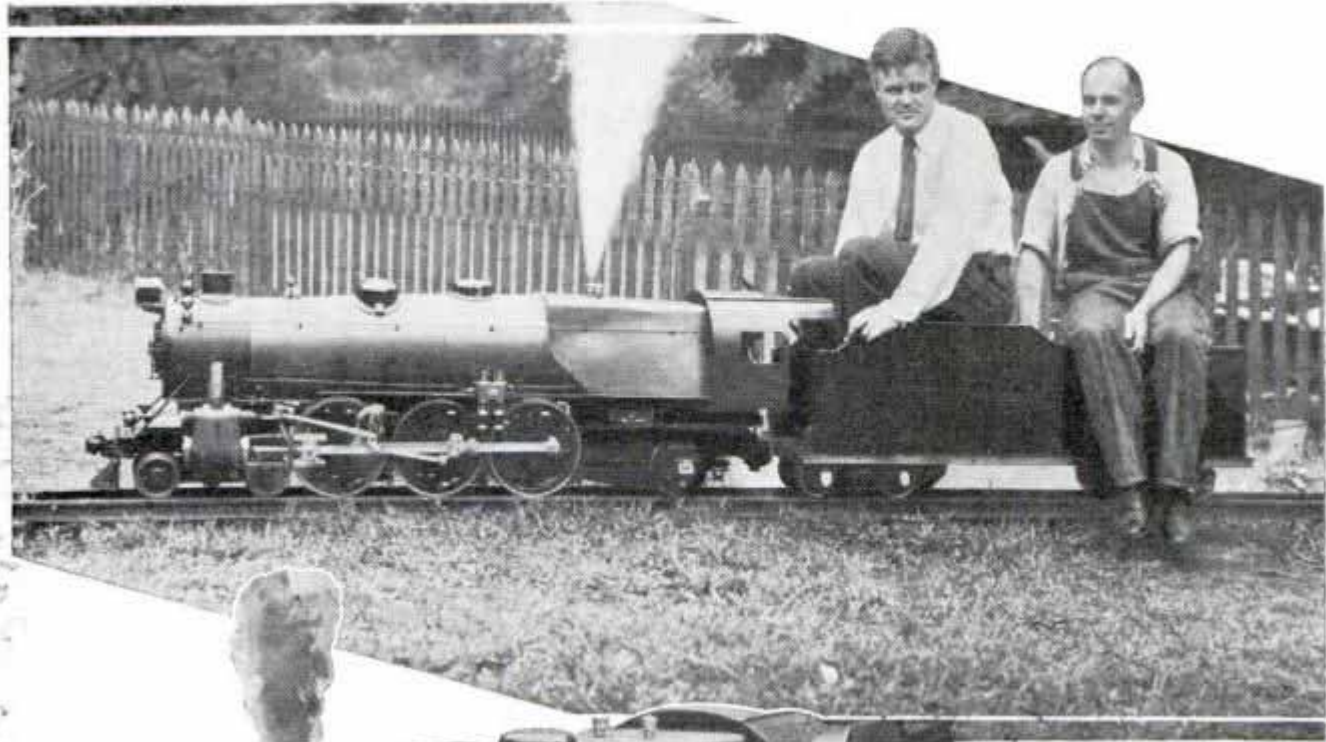
The drive wheels of the high speed engine are larger than those of a standard engine and the wheels are virtually solid, being entirely without spokes. Due to a hollow inner section, however, they weigh less than the smaller wheels. The unusual

(Continued to page 134A)

D 1528

Kaufman & Hawley Co.
425 S Wabash
Chicago

Baby Railroad Hobby Grows into a Business



Two Views of Model Locomotive Which Cost \$1,200 to Build; the Engine Burns Coal, Has a Water Injector and All Other Fittings and Will Pull a Load of 1,000 Pounds

Photos Courtesy
Publishers Photo Service

Calvert Holt, Greenwich, Conn., Started Building Model Locomotives to Exact Scale as a Hobby, but His Precision Work Attracted so Much Attention He Now Employs Several Men in Turning Out Baby Railroad Equipment; Right, Corner of Workshop Where Models Exact to within One Ten-Thousandth of an Inch Are Built

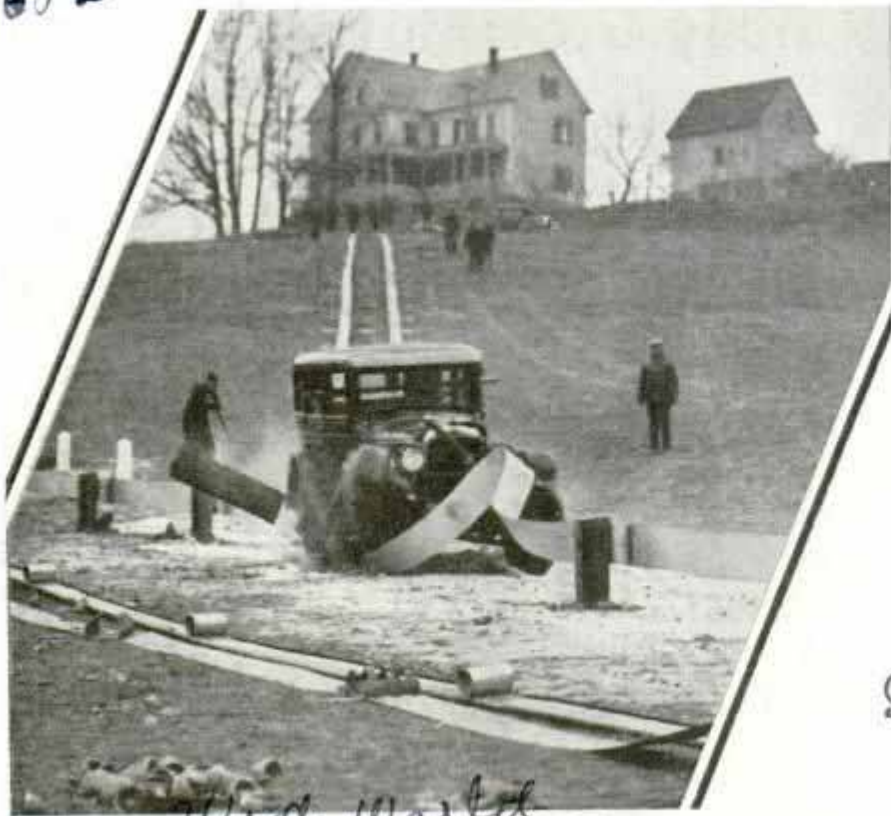


210

Calvert Holt
Greenwich, Conn.

Calvert Holt & Co. Inc.
Greenwich, Conn.

D1602



Testing Holding Power of Highway Guard Fence by Crashing Automobile into a Section of It

AUTOS CRASH INTO FENCES TO TEST SAFETY

Highway engineers in Massachusetts decided the best way to test protective fences designed for curves and other hazardous road sections was to crash cars into them. Sections of guard fences were erected at the bottom of a steep grade and cars were steered into the sections head-on. It was tough on the cars but it decided the fence which was able to take the most punishment.

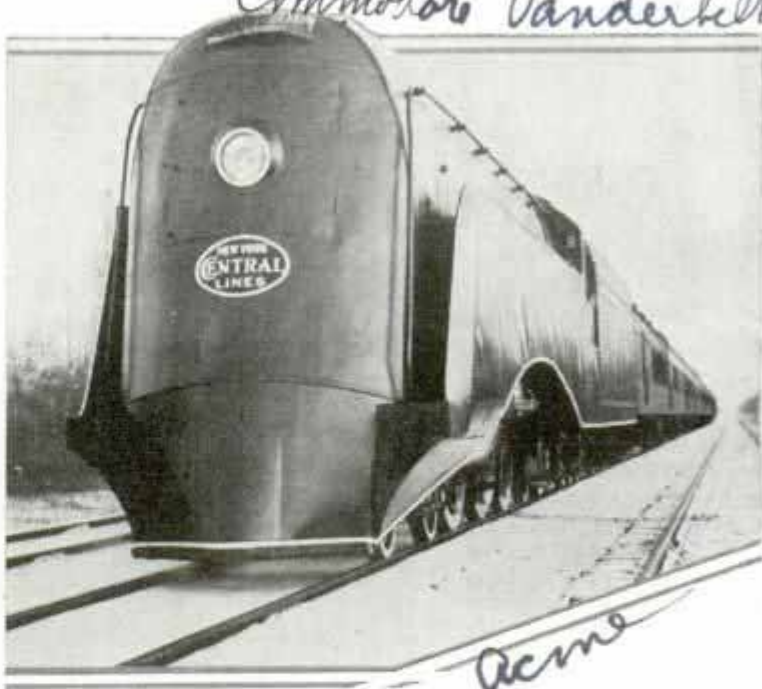
FAST TRAINS' BRAKES SET BY TRACK MAGNET

Electro-magnetic brakes are being installed on German railways to guard the latest fast trains from accident. A feature is that the system is highly efficient under all weather conditions, especially in the frost, snow and fog of winter. The brakes are operated by electric energy rays. No sources of electric current or other movable parts are required along the track except a signal current switch. On the locomotive there is a responding circuit housing a

magnet which acts as a transmitter of the energy rays. During the train's run, the transmitter emits electro-magnetic lines of force of certain frequency. When signals indicate "stop" or "warning" these lines of force strike a track magnet, weakening the current in the locomotive circuit and causing the brakes to set. If the engineer does not wish the brakes to operate, he presses an automatic release within a ten-second interval allowed before the brakes stop the train.

D1593 IRON HORSE GOES STREAMLINE TO INCREASE SPEED

Streamline engines of Diesel or electric power are fairly common, but the New York Central railroad now has a high-powered streamline steam locomotive which is being used for passenger service. The streamline shell cuts head air resistance about



Streamline Steam Locomotive Which Cuts Head Air Resistance When Engine Moves at High Speed

thirty-five per cent, at speeds of seventy to ninety miles per hour, and the engine develops more than 4,000 horsepower.

New York City

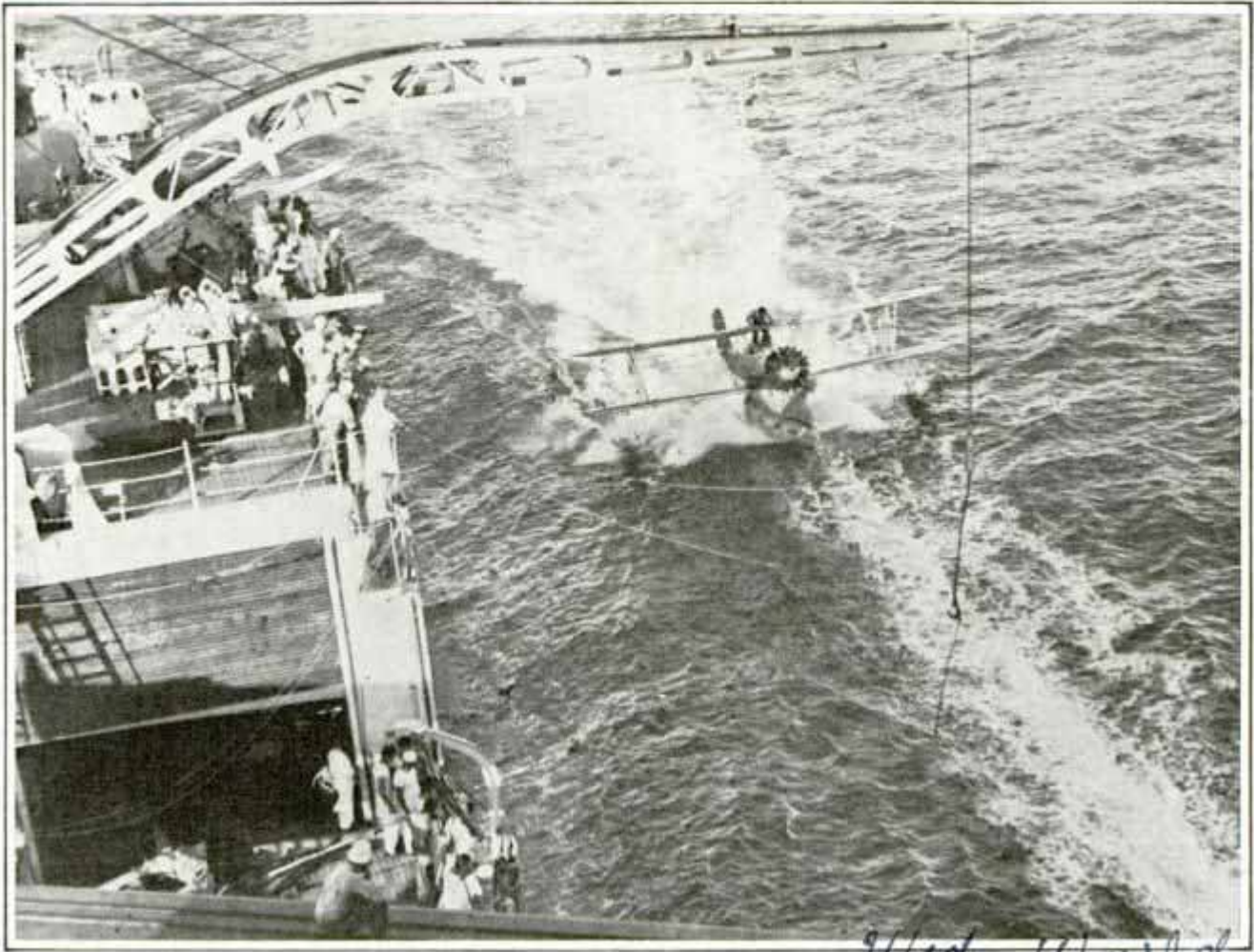
Commodore Vanderbilt

Acme

D1564
Sept. 12/5/24

Reported by Asst. Trade Commissioner, Railroad

Ship Hoists Planes to Deck without Stopping



Seaplane Being Taken Aboard Cruiser with the Boat Proceeding at Full Speed; the Plane Runs onto a Net and Is Then Hooked by a Crane and Raised to the Deck

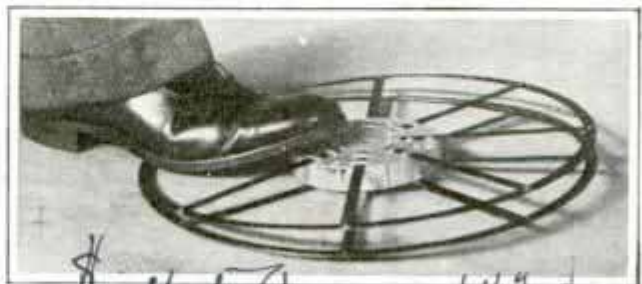
West World

Seaplanes returning from flights at sea to the mother ship can now be hoisted to the deck of a cruiser without stopping the vessel as formerly. The plane runs up on a net which is towed by the cruiser. The pilot then stops his motor as a hook on the pontoon engages the net and keeps the plane abreast of the crane which raises it to the deck. This method is also safer since the plane's motor is dead when the plane is hooked onto the crane, eliminating the danger of the propeller striking the hook.

strain. A space at the bottom of each spoke provides for molecular expansion which occurs when metal is subjected to violent strain. One feature of the reel is automatic threading. The operator simply lays the film over a well in the top of the hub, then presses the film into the well with the fingers. Once in the well, the film

D1604
FILM REEL OF SPRING STEEL
HOLDS ITS SHAPE

Dishproof and long wearing, the latest reel for motion-picture film has rims and spokes made of spring-steel bands to prevent permanent bending and twisting out of shape. The spokes are riveted to the rims, but slide under steel bands at the hub, permitting free movement under



\$4.50
 Stepping on Film to Show Its Durability under the Most Severe Handling

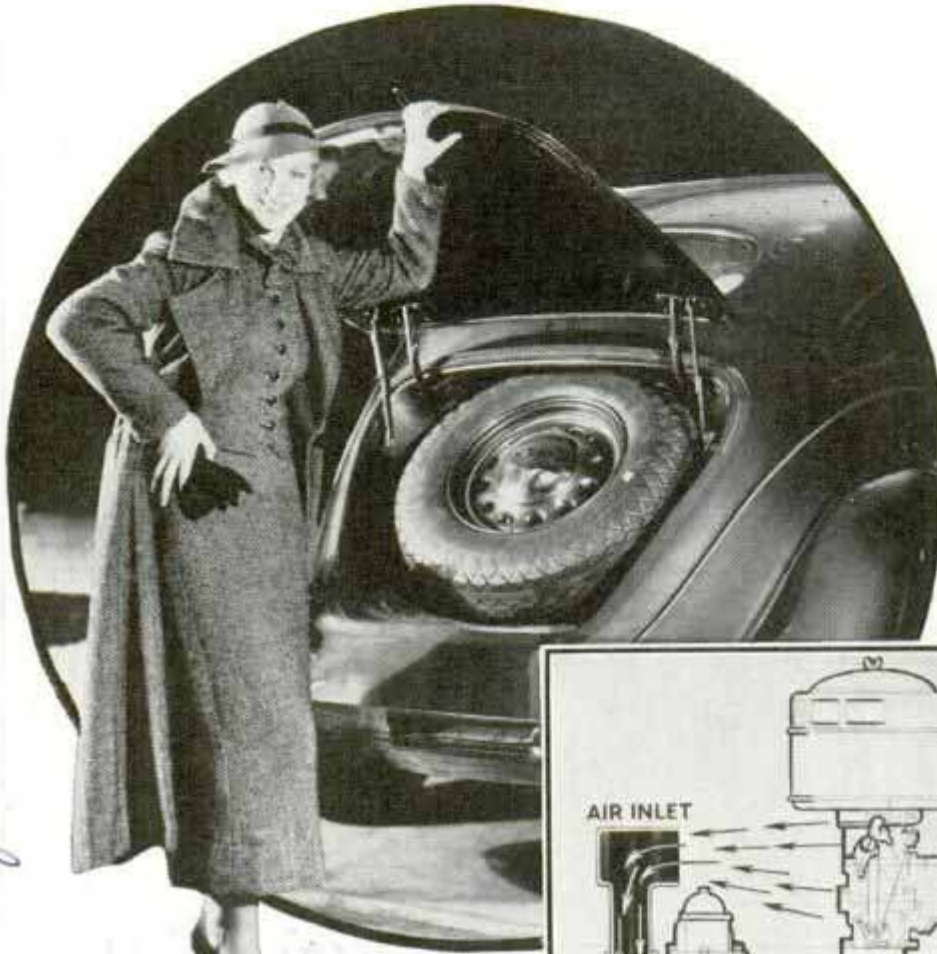
is automatically threaded. The reel is for sixteen millimeter film and holds a strip 1,600 feet long.

Handwritten notes on the right margin, including 'D1604' and '14" diameter'.

Iderman A. Le Vry. chue. 1111 Enter. Chicago 3147 Madison

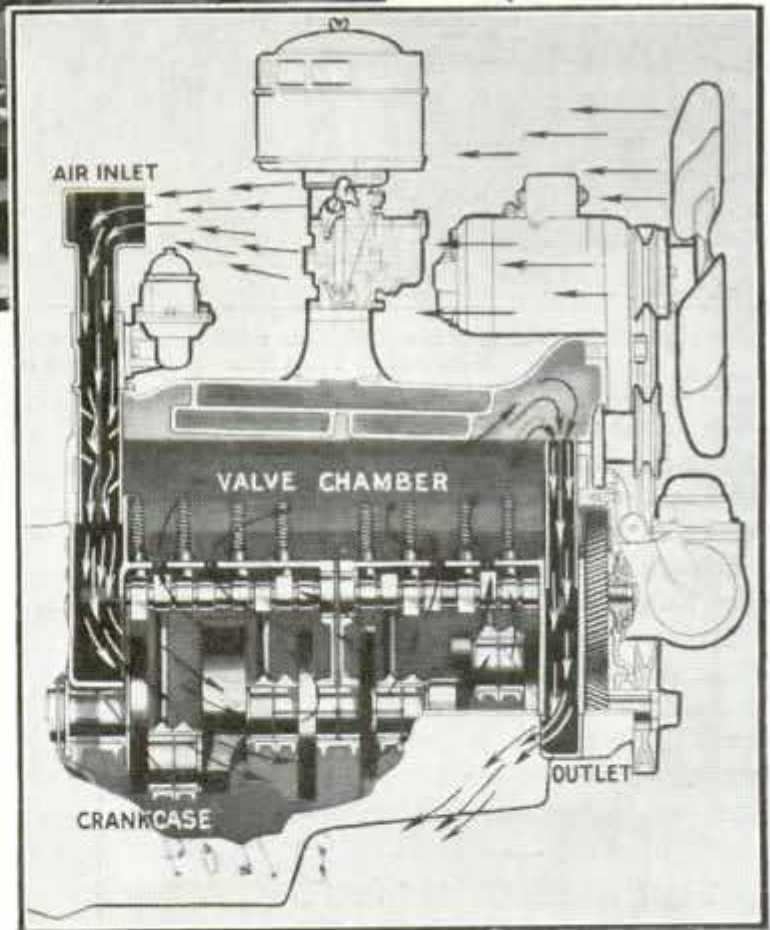
E. 4 Leggett

NEW CARS *Combine*



Left, Spare Tire of Air-flow DeSoto Coupe Fits into Special Compartment in Rear Deck; Below, Ford's Directed Flow Crankcase Ventilation System; Air Is Forced by Fan into Screened Scoop (Back of Motor) and Down into Crankcase, Then Up into Valve Chamber and Finally to Outlet, Carrying Away Vapors and Fumes Before They Can Condense and Dilute the Oil

N. 8



Not on market. in Hudson and Terraplane

THIS is a year of ease for the new car owner, a year of comfortable riding and greater safety. An armistice in the battle of speed has been declared by most manufacturers and instead of increased horsepower, we find wider seats, "softer" springs, more powerful brakes, stronger frames and tops, improved lighting systems and dependable steering featured.

Appalling traffic death tolls of the last few years have resulted in a trend toward more effective brakes. The swing to the hydraulic type is one of the year's major developments. An automatic equalizer for mechanical brakes appears for the first time, offered to keep pressure equally adjusted on all wheels. Brake drums are improved, the centrifuse type being popular. Oldsmobile and Pontiac use a high manganese

steel to resist scoring, while the Ford drums have additional ribs to increase the cooling area. Important is general adoption of a hand brake that works independently of foot equipment.

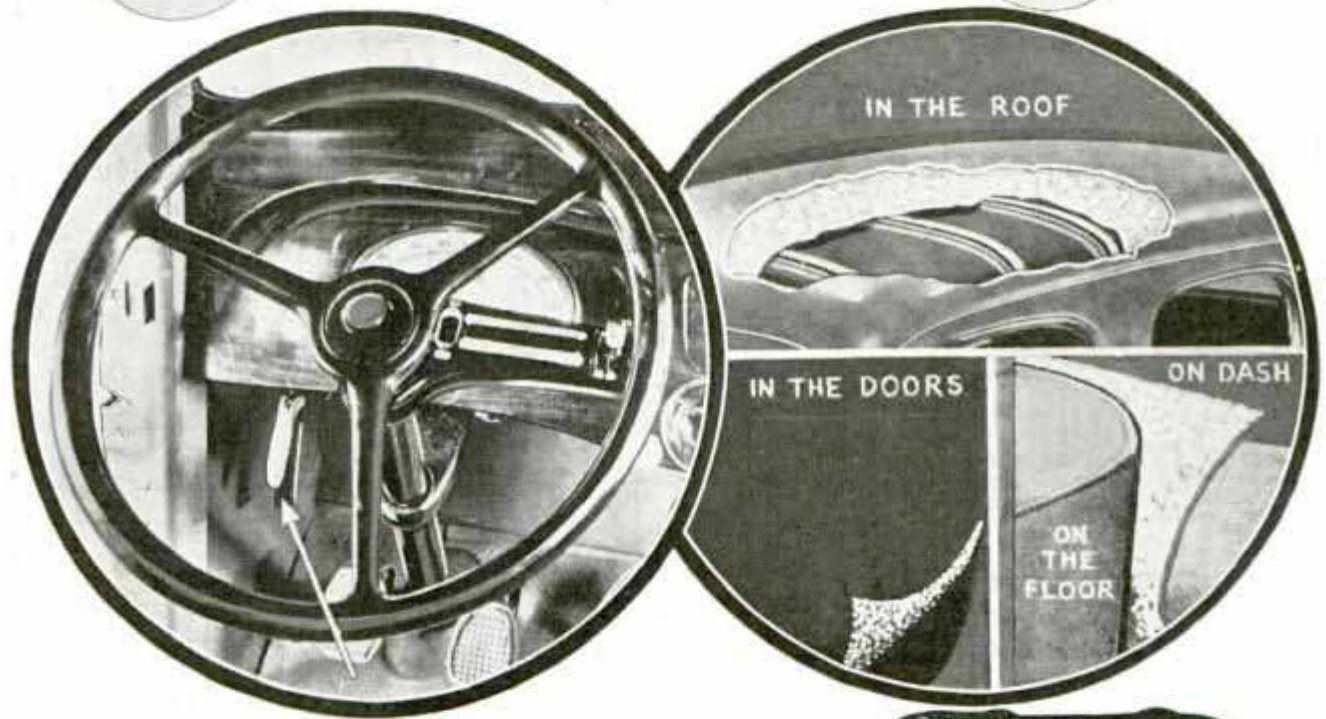
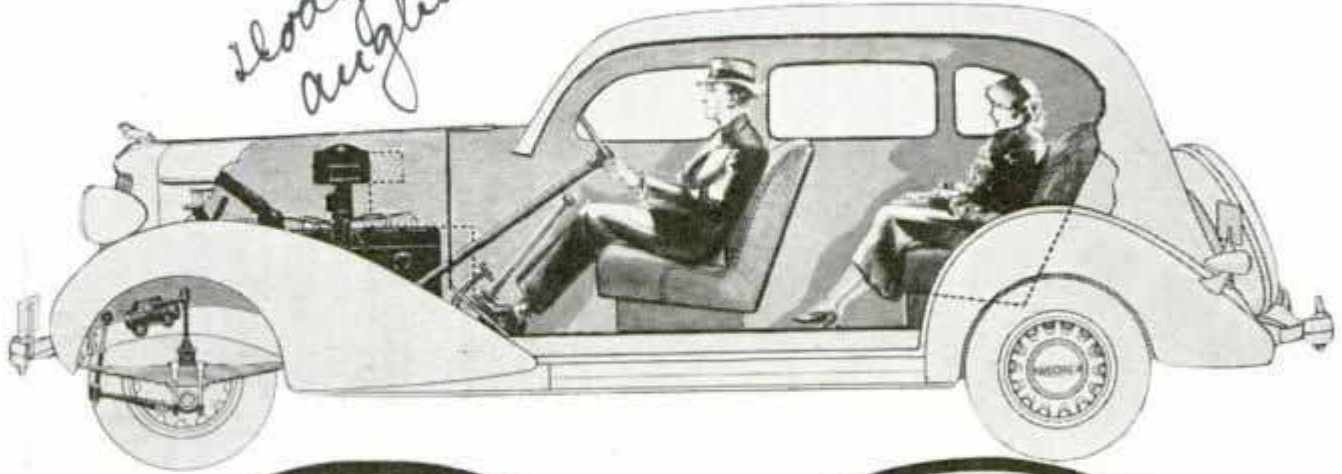
Redistribution of weight is gaining ground. Many manufacturers have moved

E 4

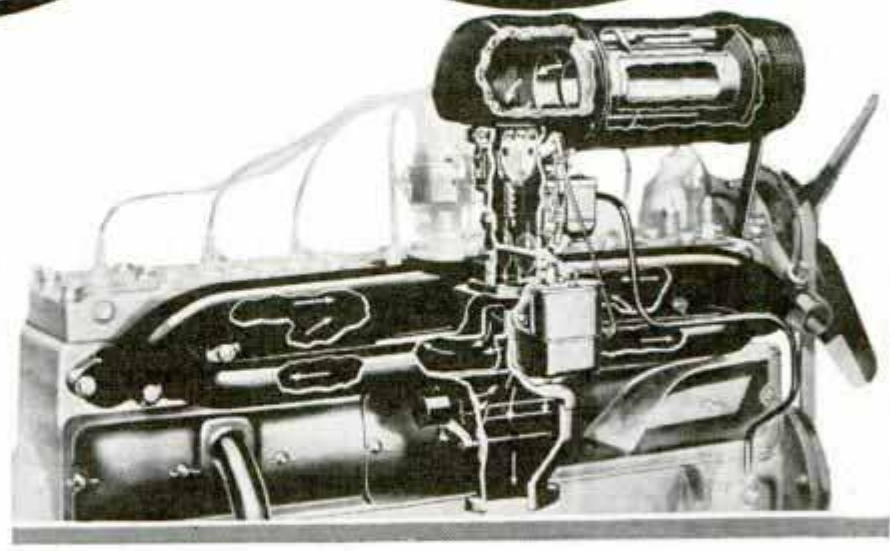
240

COMFORT *and* SAFETY

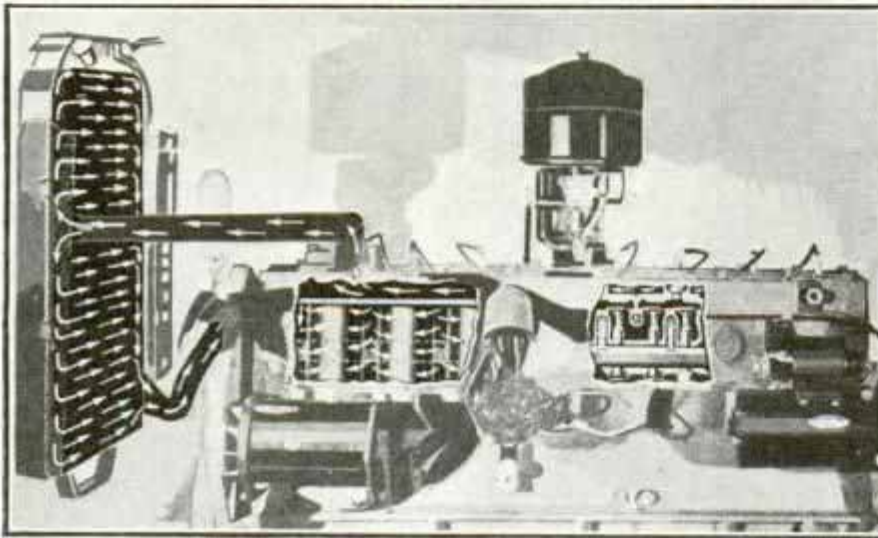
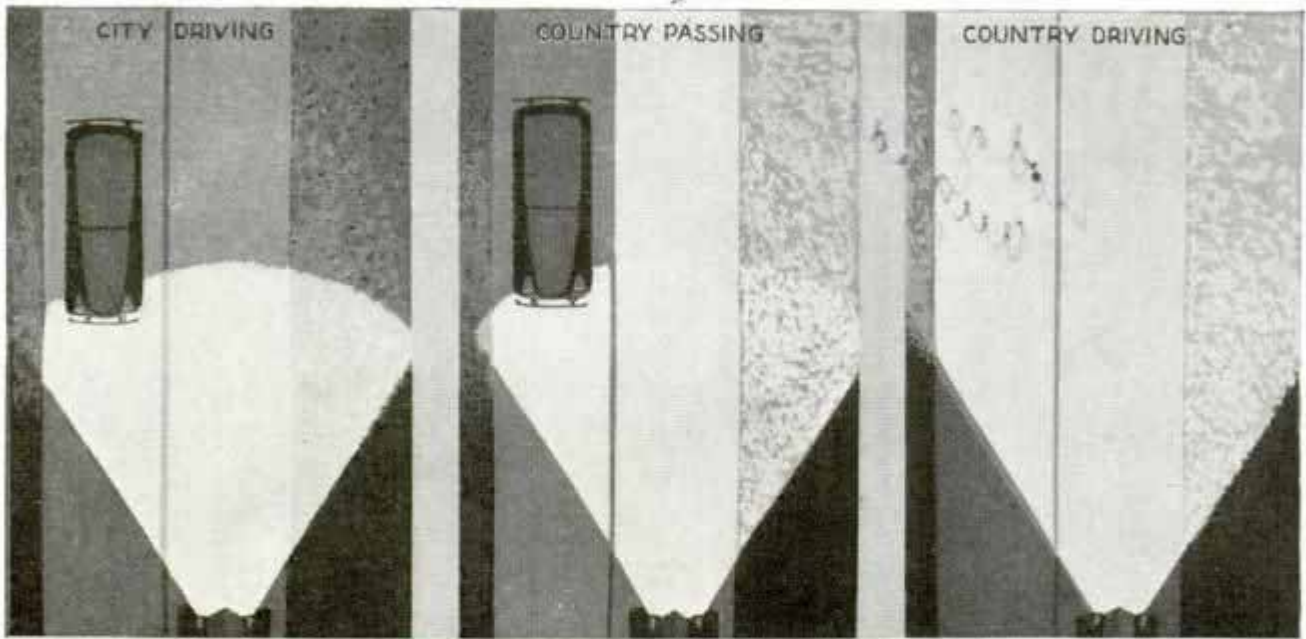
*Dodge
angle*



the engines forward in the frame, ranging from one inch in some cars to more than eight inches in the Ford. Rear seats have been moved ahead of the rear axle to produce a better ride. Chrysler Corporation has developed a steel known as "Mola," which permits the use of thinner spring leaves with tapered ends. A greater number of leaves are used to build up the spring which has a "soft" action. Some cars have abandoned independent wheel



Top, Dodge's Front Suspension and Equalized Weight Distribution; Dotted Lines Indicate How Motor Was Moved Forward; Center, Left, Hudson's Electric Gearshift; Arrow Points to Hand Brake Lever; Right, Cutaway Views Show Insulating Materials Used in Pontiac's Steel Top and Body; Bottom, Oldsmobile's Air Cleaner Takes Air from Fan



Top, Three Views of Pontiac Lighting System Indicate Varying Conditions for Which It Was Designed; Bottom, Cross-Flow Radiator and Cooling System of the Pontiac

suspension, although Packard, in the new "120," offers a suspension that uses torque arms to take the action of braking and holds the front wheels permanently in proper alignment. Elimination of the need for adjustments is claimed.

One of the year's outstanding contributions is the steel roof, offered by Hudson and by Fisher Body in several General Motors cars. Added to the all-steel body, the metal top extends protection completely around the passenger. Drumming, so annoying to passengers, is eliminated by acoustic felt or other padding between the top bows and the roof. In Chevrolet, Pontiac and Oldsmobile, the seamless metal roof panel extends from the top of the windshield opening to the rear to include the entire rear window opening.

Styling is more toward the "streamline," with narrower radiators, greater slope of windshield, more slanted rear panels, more rounded roof contours and wider doors. Seats are wider, a comfortable "three-in-the-front" ride being featured in many cars.

An electric gearshift located on the steering column is introduced by Hudson. Pre-selection of gears is possible and the shift is made when the clutch pedal is depressed

by the foot or automatically. Reo continues its self-shifter. Hand brake levers have been moved to the left side of the driver in some cars.

Extended use of a gear above "high" to reduce engine speed without reducing car speed is noticeable. Dual ratio and the overdrive, pioneered by Auburn and Chrysler, are retained and "cruising gear," offered by Nash, and "super-range," by Studebaker, are newcomers.

The hypoid rear axle is a feature that permits bodies to be built closer to the ground without a bow in the floor to accommodate the drive shaft housing. The construction causes the pinion gear to engage the ring gear below center, giving greater gear contact and longer, quieter

(Continued to page 133A)

D/15 21... Los Angeles... 107 Hills

Calif...

Model of London Built in Making Movie



This Model of the Heart of London Cost About \$200,000 to Construct; It Was Built for Making a Movie Depicting the Bombing of the City during the War

London has been built in miniature in a big dirigible hangar at Arcadia, Calif. The model of the heart of London was constructed for the filming of scenes in a moving picture dealing with the bombing of the British metropolis during the world war. The model cost about \$200,000 to build, and required hundreds of workmen several weeks to complete it. The city was not complete when the accompanying picture was taken, but the view represents a section of London about three miles wide and eight miles long.

forty per cent sodium metasilicate pentahydrate and five per cent sodium hydroxide. This compound is said to prevent the formation of film on dishes cleaned in a mechanical washer, no difference how hard the water or how greasy the dishes. It is also claimed the compound does not corrode aluminum utensils.

full measure
Calgon due 300 Ross St
Calgon...
D/507

Cont. John C. Macey
Box 292 Hollywood, Calif

Cont. J.C. Holahan
208 Hill St. Chicago

GLASSWARE FILM IS PREVENTED BY DISHWASHING COMPOUND

One of the disadvantages of mechanical dishwashers has been that an insoluble film usually forms on glassware and china when ordinary cleansing agents are used with the average city water which is more or less hard. This film can only be removed by hand scouring and rinsing in distilled or thoroughly soft water. To eliminate this difficulty, a special dishwashing compound has been developed by the Mellon Institute. It is composed of forty per cent sodium metaphosphate, fifteen per cent trisodium phosphate monohydrate,



Glassware at Right Washed with New Compound, That at Left Cleaned by Ordinary Methods

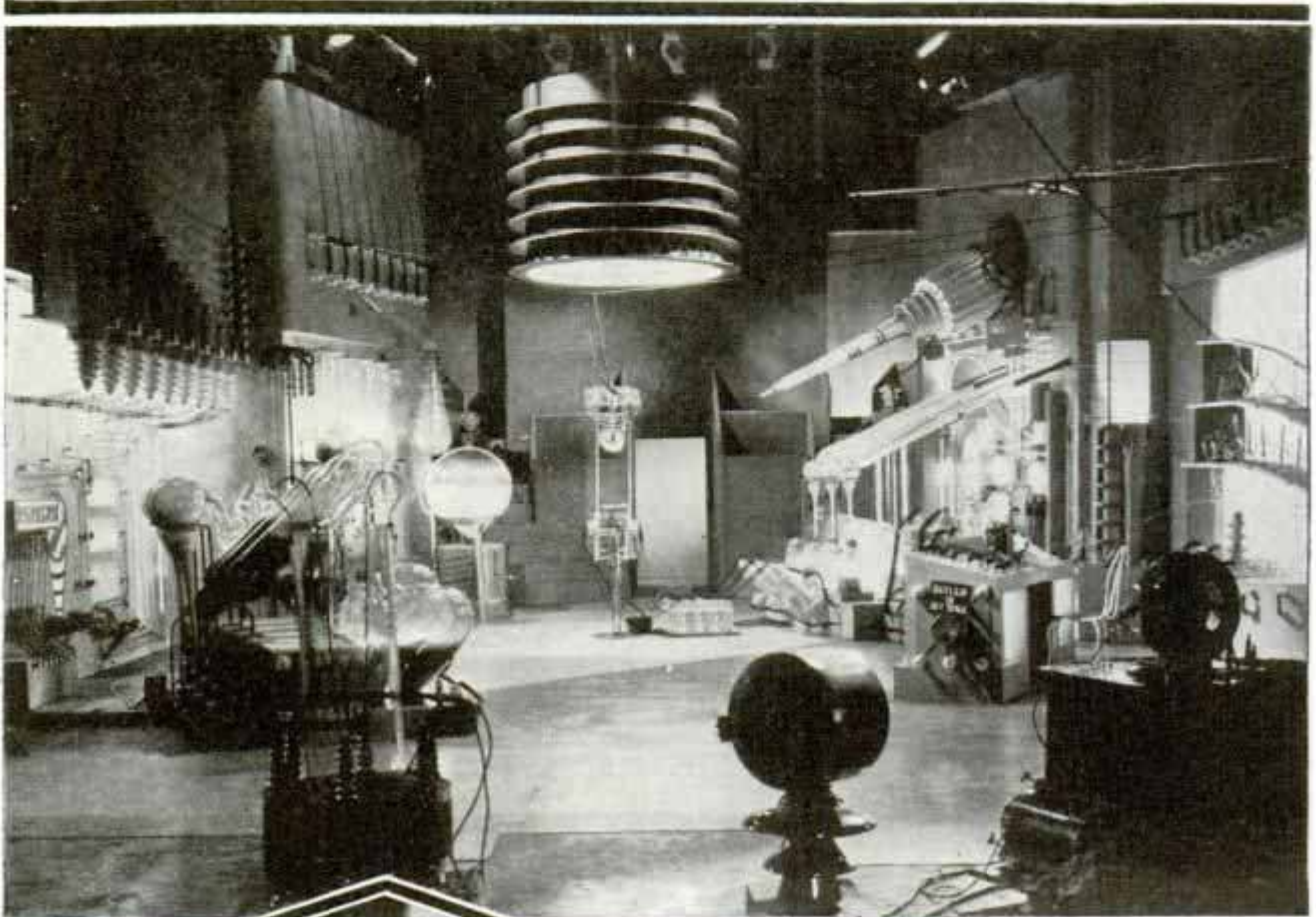
Mellon Institute
of Industrial Research

Calgonite

D165 2.

Mr. Keyser Stanley
2adaeh. 623 Monte Vista Av
Azusa Calif

The MASTER of



Hollywood. Calif
A FEW years ago Kenneth Strickfaden, a world war veteran, started experimenting with electricity in his home workshop. Today he provides many of the weird electrical effects seen in moving pictures.

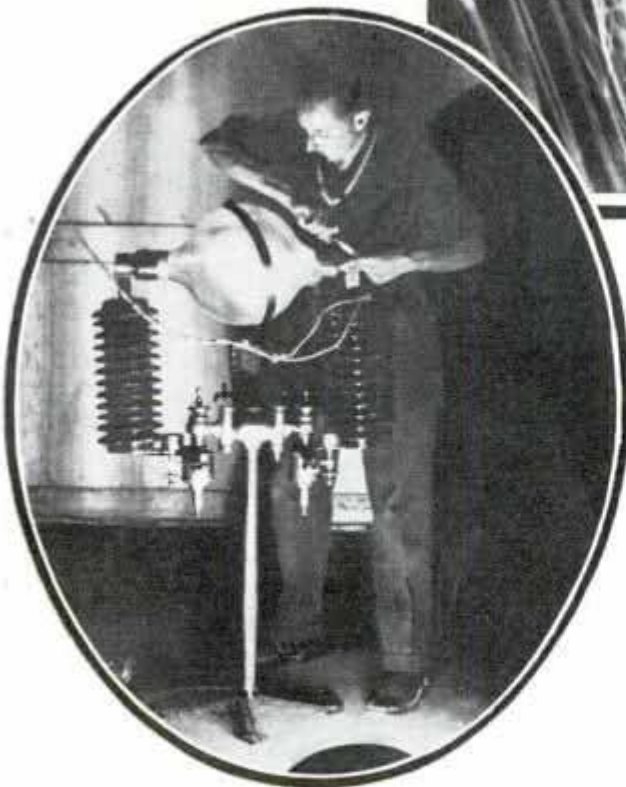
He began his experiments with a simple Tesla coil, such as any hobbyist might build in his garage or basement workshop and developed many pieces of equipment of his own design and worked out sensational and bizarre electrical effects for his own amusement. When a vogue for the mystery thriller picture hit the studios, the young experimenter got his chance to develop into the screen's foremost inventor of horror devices. His first work was the creation of the realistic sound of an electric chair snuffing out its victim's life. A high frequency current sent

Examples of Movie Shots in Which Complicated Electrical Apparatus Is Playing an Important Part

MOVIE THRILLS

through a piece of wood did the trick. The resistance the wood offered the current produced a sizzling sound and the smoke drifted across the set producing a realistic effect.

Next he blew up a tree with lightning for a movie. It was just a matter of running some wire up a "prop" tree. The high voltage generator did the rest. There was a flash of light as the tree crashed and demolished a native hut as it fell. Then he rigged up a rotary spark gap for a wireless station sound effect on board ship. A high voltage spark condensed to give out a pleasing tone accomplished the result. A more difficult stunt was the building of a machine



Mr. Strickfaden Working on Apparatus to Be Used in a Movie Scene and Posed with Electrical Effect He Has Created

supposed to send out a ray that would interfere with the ignition of an automobile. It consisted of a boxlike cabinet with a complex array of lenses, bulbs, coils, and dials. It was definitely a "prop" but it was authentic enough to seem capable of sending out all kinds of rays.

In the picture, "Frankenstein," the script called for the tapping of lightning to give the monster Frankenstein life. For this Strickfaden devised a piece of apparatus based on the principle of the horn gap and dubbed it the lightning bridge. The construction of the set and the requirements of the sensational effect desired necessitated moving half a ton of equipment overhead where it was very difficult to work.

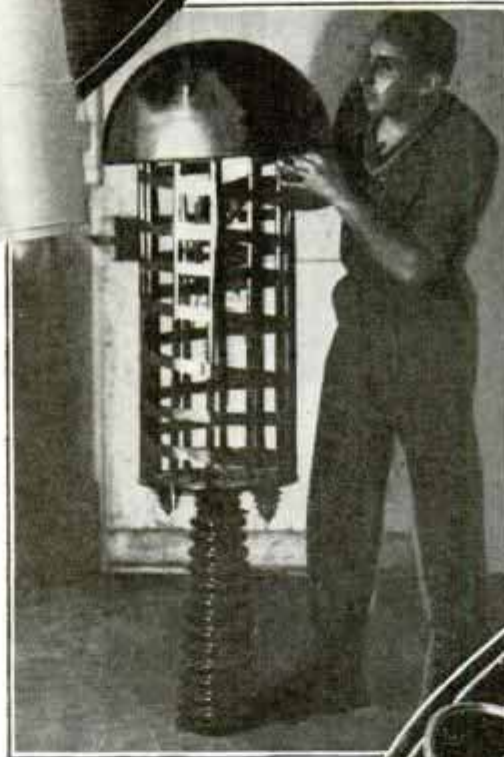
The type of picture based on weird elec-



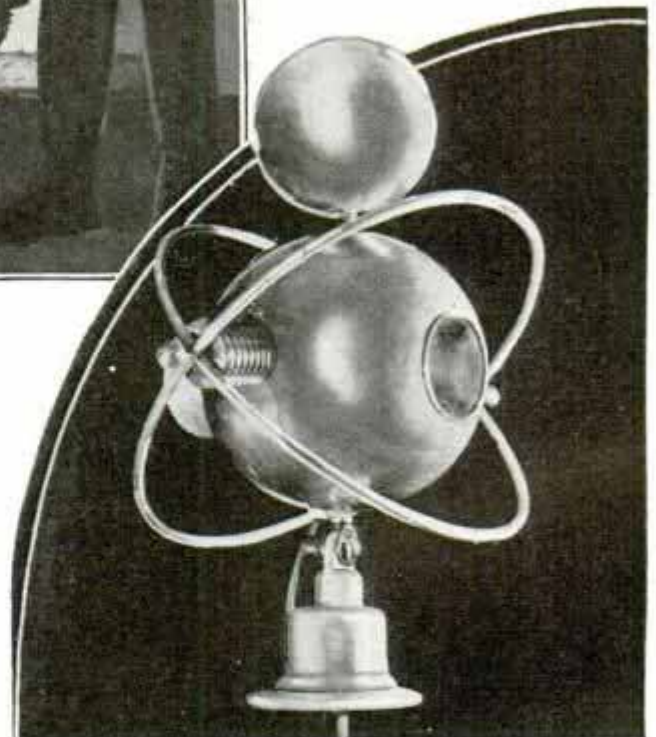
trical effects makes a difficult job for the technician for it calls for authentic apparatus that will perform sensational feats usually possible only in large electrical research laboratories furnished with thousands of dollars worth of equipment. Not only must effects be produced to satisfy the requirements of the story, but this or that space must be filled with a specially constructed piece of apparatus for atmosphere even though it plays no part in the electrical effects achieved. The electrical expert is expected to have in stock every conceivable kind of apparatus.

"If a picture requires a special type of machine that no one has ever heard of, I always assure the director that I have it," Mr. Strickfaden said. "Then I go home and work until I have a machine that will fulfill the need."

He pointed to an intricate and dust-covered piece of apparatus in a far corner



of the laboratory. "That," he said, "was used on one of the sets for a 'Connecticut Yankee in King Arthur's Court.' It was supposed to have the power of bringing back the sounds of past ages. I called it the retrogressive wave charger. It was used in connection with a high frequency generator which produced artificial lightning. In those days before directors had learned the full possibilities of electrical effects, life was simple. In later pictures, like 'Chandu,' studio officials wanted sparks all over a gun, they wanted the barrel to melt, and as a final touch the handle of an electrical control must be burned off and drop to the floor. This called for the handling of huge amperages to produce instantaneous heat, and the use of complicated and delicate resonator apparatus to produce a spark six feet long. To make matters worse the conditions under which the scene was photographed made it necessary to hoist the



High Frequency Apparatus in Action and Other Apparatus Designed for Electrical Effects in the Movies by Mr. Strickfaden

D/601

apparatus overhead."

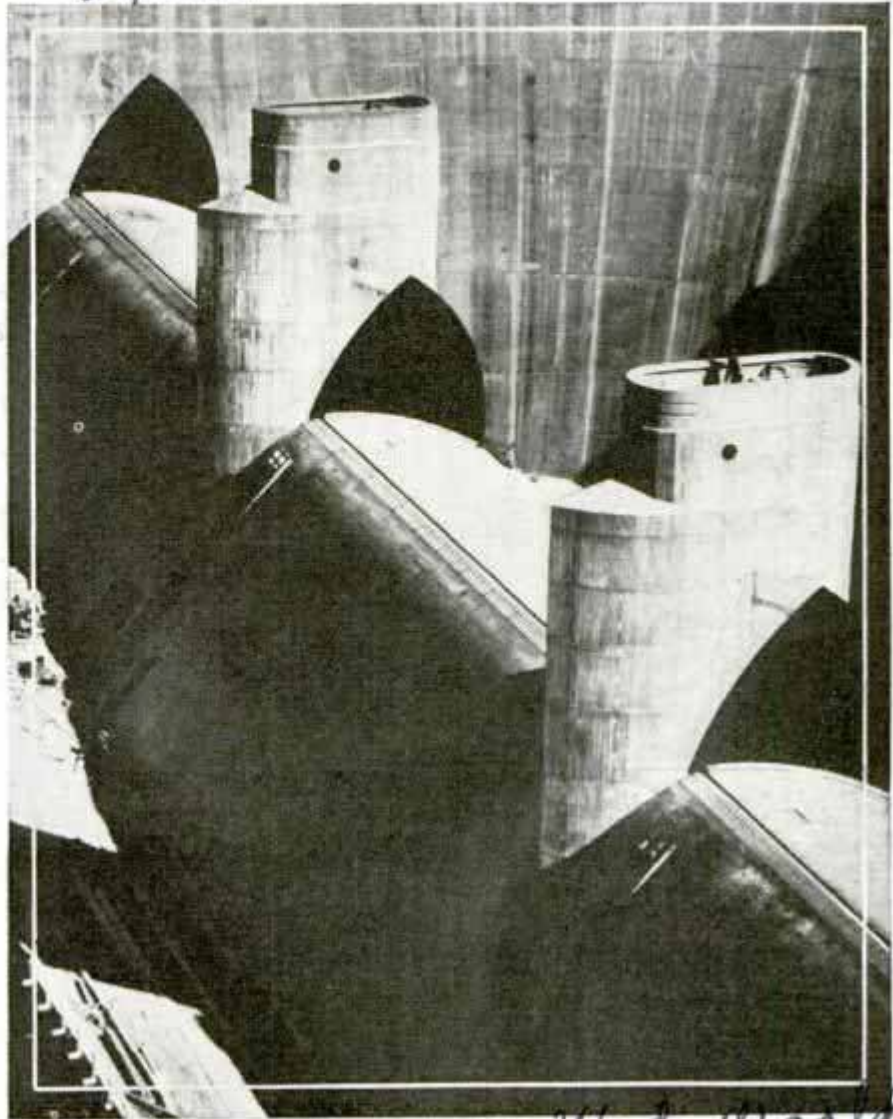
When an actor demurs at getting chummy with built-up amperages and high frequency current, and when trick photography cannot be used to achieve an effect, Strickfaden doubles for the timid actor.

"I have confidence in my knowledge and in my apparatus," he explained, "but there is always the possibility of an accident."

During the filming of "The Mask of Dr. Fu Manchu," Boris Karloff, playing the part of the Chinese scientist, was to transfer a six-foot 1,500,000-volt arc from the ball terminal of a piece of mysterious apparatus to a sword which was to be tested. He was to approach the roaring apparatus and calmly intercept the flame on his long Chinese fingernails and direct it to the sword which would or would not melt as its genuineness would determine. A brass sword and one made of gilded wax and magnesium powder were used.

In doubling for Karloff, Strickfaden used every precaution possible. A wire concealed under the clothing was run from the copper fingernails to the resonator apparatus ground through a safety gap. Everything was set for a take. The low hum of the apparatus swelled in volume as the arc developed from the electrode to the tips of the coppered fingernails. Just as the spark reached its full intensity and Strickfaden was about to transfer it to the sword, he did a spasmodic back flip with the fire still streaming from his fingernails. The power was cut off, the cameras stopped and the dazed double was helped to his feet. The cause of the trouble was soon found. Smoke led to the cable carrying 70,000 volts from the transformer to the rotary gap. The cable had punctured and

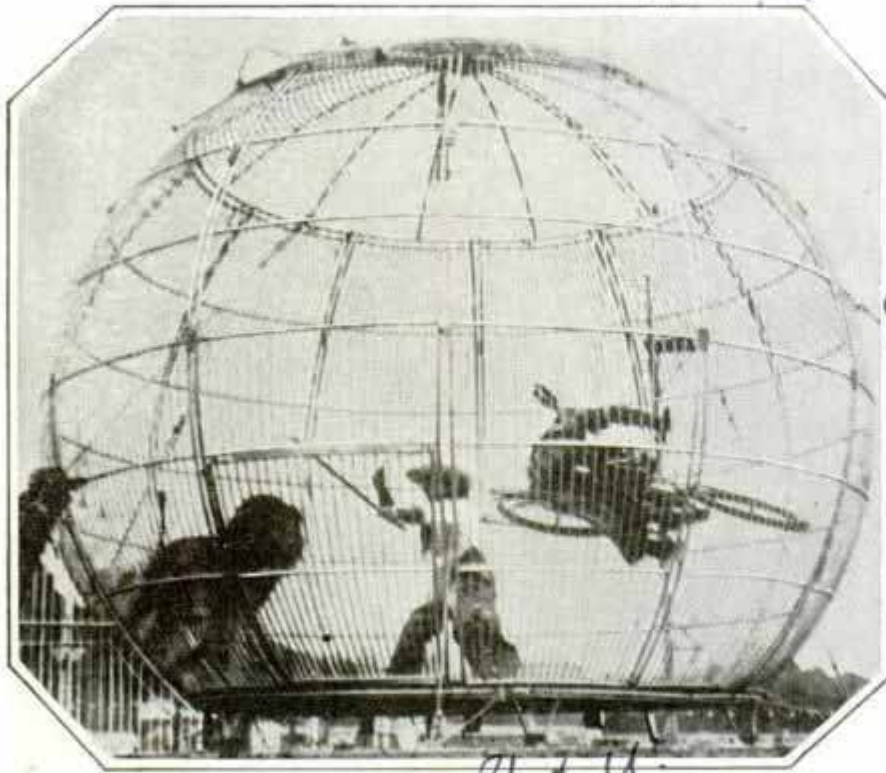
(Continued to page 133A)



Wide World
Strangely Like the Towers of an Ancient Castle or Fort, These Huge Gates Mark Another Milestone in Building of Boulder Dam

GIANT GATES OF BOULDER DAM LIKE ANCIENT FORTRESS

To the camera's eye, the giant steel gates of Boulder dam closely resemble the towers of some ancient fortress. With the sun at just the proper angle, portions of the gates appear in lights and shadows that add further to the illusion. Recently installed to form the overflow edge of the Arizona spillway, the gates are sixteen by 100 feet and can be raised and lowered to regulate the flow of water over the spillway. Already 625 feet above bedrock, the dam is approaching rapidly its final height. Thus, its height from bedrock would dwarf the 555-foot shaft of Washington's monument. Storage of water behind Boulder dam will be started within a short time after completion of the huge project. This will be the first step in supplying power from the dam to far western regions.



Here's Something New in Thrills; Trainer Keeps Lions under Control While Motorcycle Roars around on the Bars of Cage

MOTORCYCLIST IN LIONS' CAGE LATEST AT CIRCUS

Among the latest circus thrills is the riding of a motorcycle around the inside of a ball-shaped lions' cage while the trainer keeps the big cats under control. The trainer's task is far from easy, since the roar of the motorcycle excites the lions. Constructed of steel bars to form a large ball, the cage resembles the skeleton of the motorcycle arena found at carnivals, except that bars instead of wood form the floor or track for the motorcycle. The act, now being presented in Europe, will be brought to the United States soon.

COPPER PLATING ALUMINUM WITHOUT ELECTRICITY

Germany has developed a method for producing a copper plating on aluminum which will not peel off and which is applied without the use of electric current. Aluminum articles are first polished with an abrasive, then placed in a cleaning bath which is also a preliminary copper plating bath. This treatment removes the coating of oxide on the aluminum and produces a thin copper coating. The articles then are rinsed in plain water, rubbed dry and placed in a second bath when a plating of

Dept. of Commerce
12/29/24

Reported by Asst. Trade
Commissioner Ballou

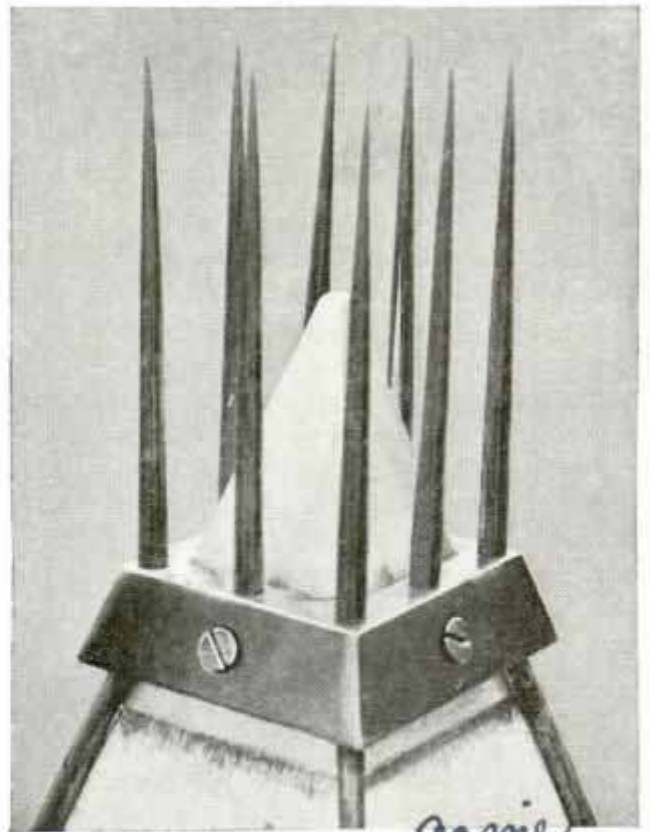
any desired thickness may be applied by regulating the time the articles remain immersed. Plating produced by this method can be subjected to any further processing without fear that it will peel.

D 1611

"LIGHTNING RODS" OF PLATINUM AND GOLD

Repairs to the Washington monument were climaxed recently when a lightning cap was installed on the tip of the shaft, giving a close-up picture of the top the appearance of a modernistic birthday cake. Each spike is made of gold and platinum, but the rods seem fairly safe

from thieves for it would require a very agile "human fly" to reach them without



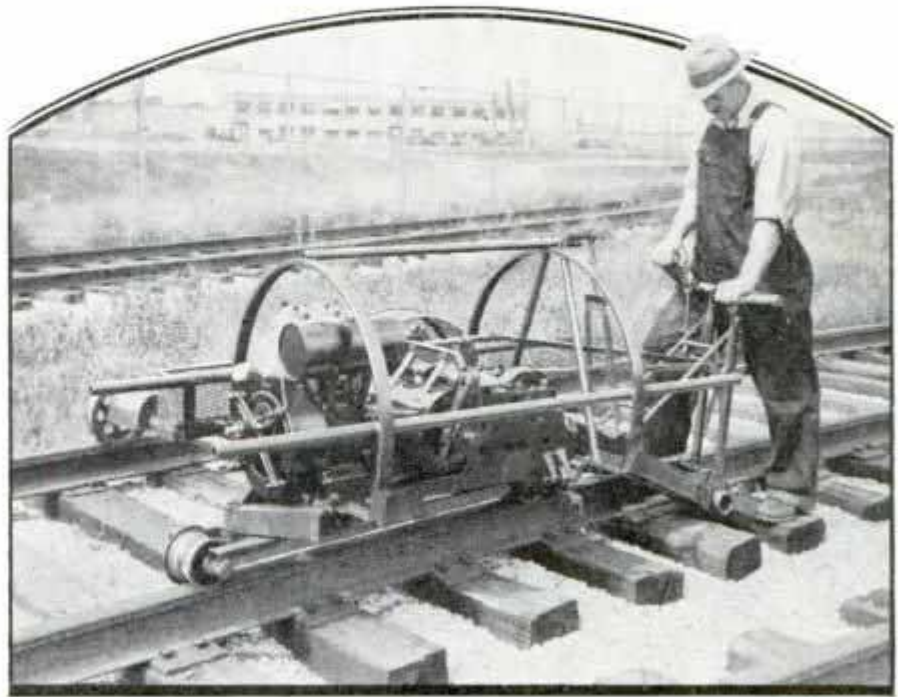
Costly Lightning Rods Cap Washington Monument to Protect It from Damaging Bolts

the aid of the steel scaffolding used by the workmen who installed the cap.

D1510 Chase and Oklahoma Milwaukee, Wis

Big Wrench on Wheels Tightens Rail Nuts

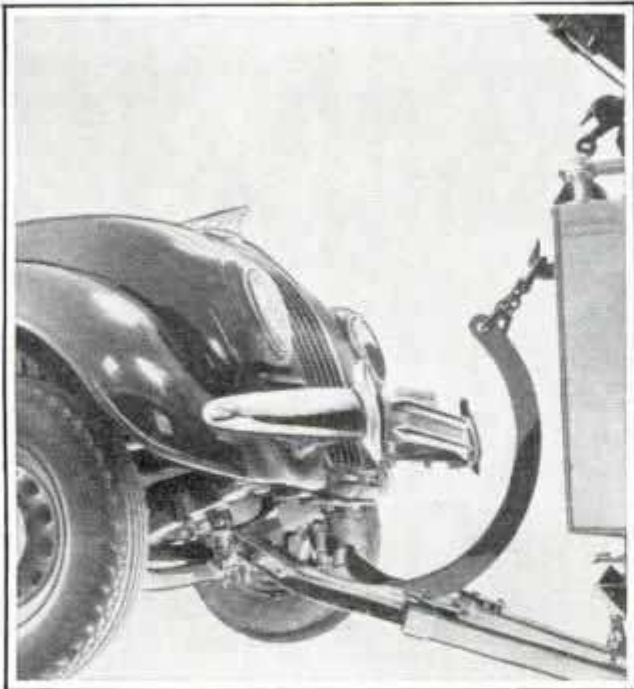
Nuts at rail joints and switches can be tightened or loosened quickly with the aid of a big wrench on wheels which one man operates and rolls along the track. A twist of the wrist is all the effort needed to operate the power wrench which pivots from a point at the back so the arm carrying the wrench can be shifted to either side of the track. This arm is supported by coil springs and only slight downward pressure is needed to place the socket in position to slip over a nut. Two speeds are used to remove nuts, one at the rate of seventy-one revolutions per minute and the other at twenty-five revolutions, the latter being powerful enough to loosen frozen nuts. The direction of rotation of the nuts



Power Wrench Which Tightens or Loosens Nuts at Rail Joints; a Four-Horsepower, Single-Cylinder Engine Supplies the Power

can be reversed by a turn on the hand controls. A four-horsepower, air-cooled, single-cylinder engine supplies the power to turn the wrench.

Universal Lift for Towing Handles Latest Automobiles



Showing One of the Late Model Cars Being Towed with Lift Adaptable to All Autos

projecting aprons and other construction features apt to make towing difficult, can be handled with a new type of towing lift. It consists of a derrick suspending a pair of C-shaped arms which are held out from the tow car by a pair of telescoping beams that come together in a "V" at the central point of the axle housing of the tow car. The curvature of the C-arms allows ample clearance for all outward and downward projections, while at the same time the arms take the weight of the towed car in a direct line from the cable pulleys to a point near the "shoes" which attach the device beneath the towed automobile. The "tow" follows the service like a two-wheel trailer, with no sidesway or surging. The lift also will handle old model cars.

All the latest automobiles with independently sprung wheels, skirted fenders,

Radio receivers outnumber telephones in the United States, there being 19,000,000 radios, exclusive of auto sets and homes having more than one receiver, compared with about 11,000,000 home telephones.

H. B. Pearson 2639

Sumner Service 12/5/34



Compartments in New Pacific Clipper;
Cabin Is Larger Than a Pullman

A LONG cherished dream of aviation—around-the-world air service—is coming true.

A group of four-engine super-flying boats are now being built by Pan-American Air Service for flying between California and China. Pan-American is already operating 3,000 miles of air lines in China, developed with the cooperation of the Chinese government. These lines tie in with European continental lines in the south of China. For the eastward journey of this round-the-world service, Dr. Hugo Eckener, noted dirigible navigator and expert of Germany, expects next summer to start an air service between Germany and the United States across the Atlantic. Dr. Eckener has made arrangements with the navy department for the use of its lighter-than-air base facilities at Lakehurst, N. J., and Miami, Fla., for this service.

Dr. Eckener's plan calls for the eventual development of regular four-day departure service for dirigibles across the Atlantic from Germany to this country. Crossings this way would be made in about fifty hours. While in



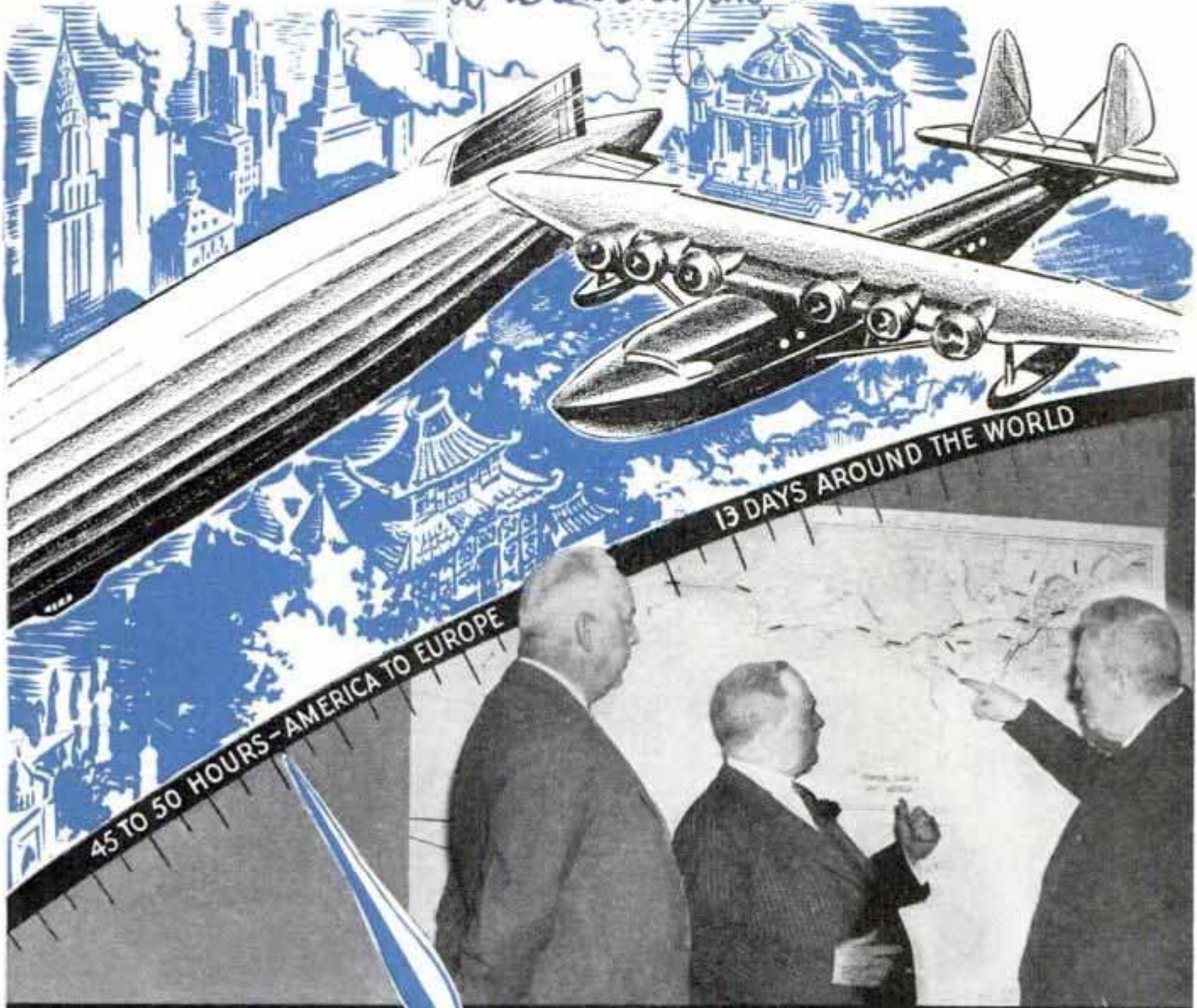
AIR TICKETS



01478
 135842nd
 newark
 10/2

Com. John L. Cooney,
3107. 14th St. N.W.,
Washington, D.C.

D1418



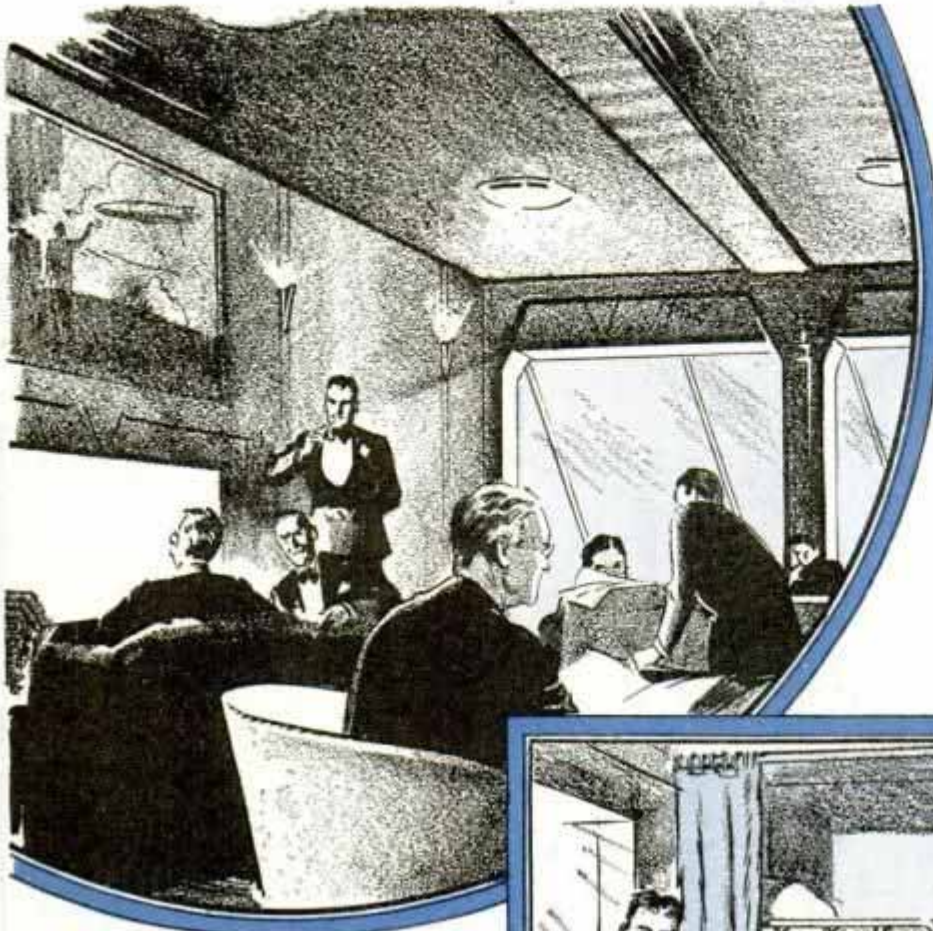
Around the World Please!



Top Photo © Underwood and Underwood
Above, Dr. Eckener Pointing Out Proposed Round-the-World Routes; Below, Passengers Landing at Miami from Brazilian Clipper

Washington last fall Dr. Eckener explained the proposed dirigible service as follows:

"A Dutch group, backed primarily by Dutch steamship companies, in cooperation with our Luftschiffbau Zeppelin has sought and found contact with an interested American group, and the plan has been proposed to organize a combined German-American-Dutch operating company, which would operate in friendly cooperation two main lines, one from Friedrichshafen to South Amer-



acter has already been acquired by the commander of the "Graf Zeppelin" over the Atlantic. The "Graf" had completed, when this was written, 415 trips for a distance of approximately 600,000 miles. She had crossed the Atlantic seventy-one times, sixty-four of which have been over the southern and seven over the northern area. She has crossed the Pacific the Arctic sea, made

ica, and the other from the United States to Batavia. These lines would cross at some point in southern France or northern Spain. Thus the possibility would present itself to organize connecting lines to Germany and Batavia, as well as to Rio Janeiro."

On a recent trip to Batavia, Dr. Eckener worked out a timetable of about seventy or eighty hours between the European intersecting point of his lines and Rio, from this point to Batavia, approximately 105 hours, and from it to America fifty-five hours. From America to Europe the time would approximate forty-five hours. The South America line of this service has been in operation for the past year or so.

Both the Pan-American service and the Zeppelin service will begin as experimental projects. This experimental period will permit the acquisition of accurate and detailed weather information over the Atlantic and Pacific. Information of this char-



Artist's Conception of Life on Passenger Airship of Near Future; Stateroom and Lounge Are Shown

many trips over the Mediterranean, and covered the continents of Asia, Europe and North America. On all of these voyages, especially the longer ones, she has encountered bad weather. And all of the trips were started on schedules previously worked out. Only once, says Commander Eckener, has she ever been delayed taking off. That was because of local wind conditions which would not permit the ship being taken out of her hangar.

D1418

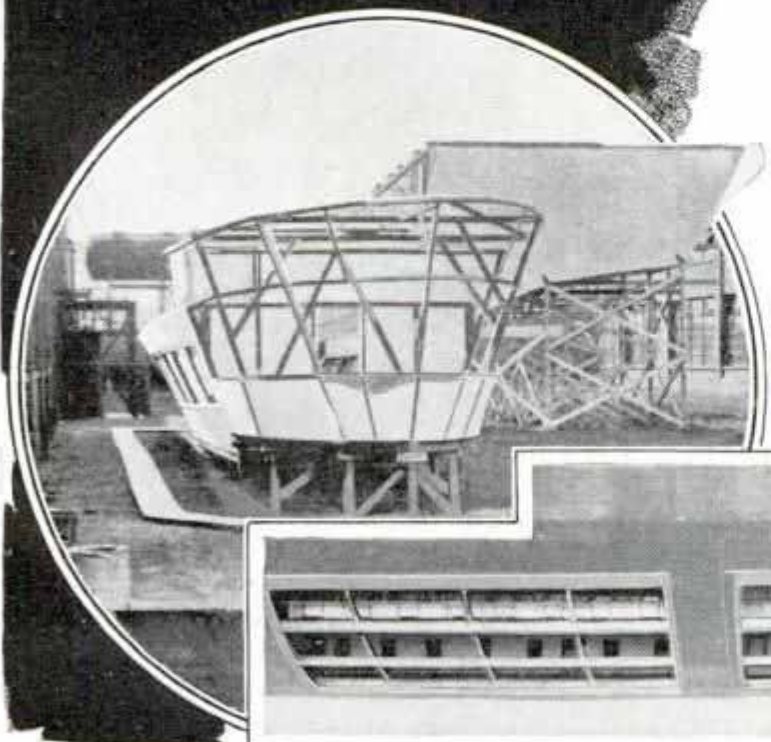
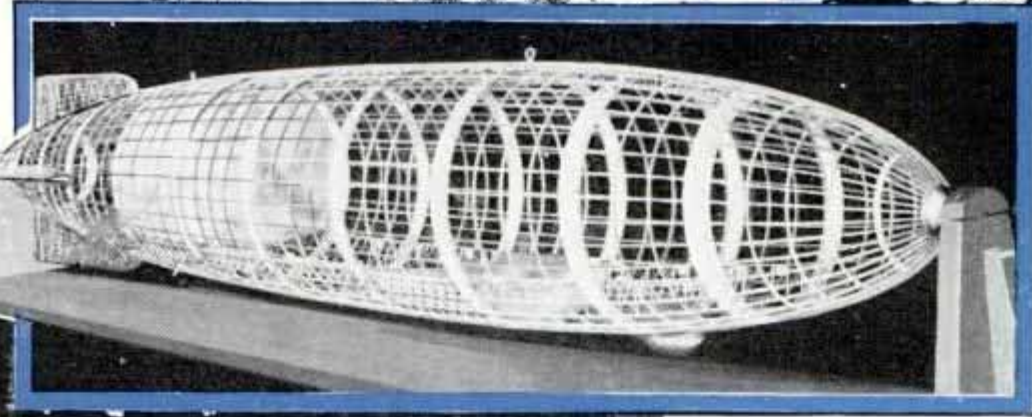
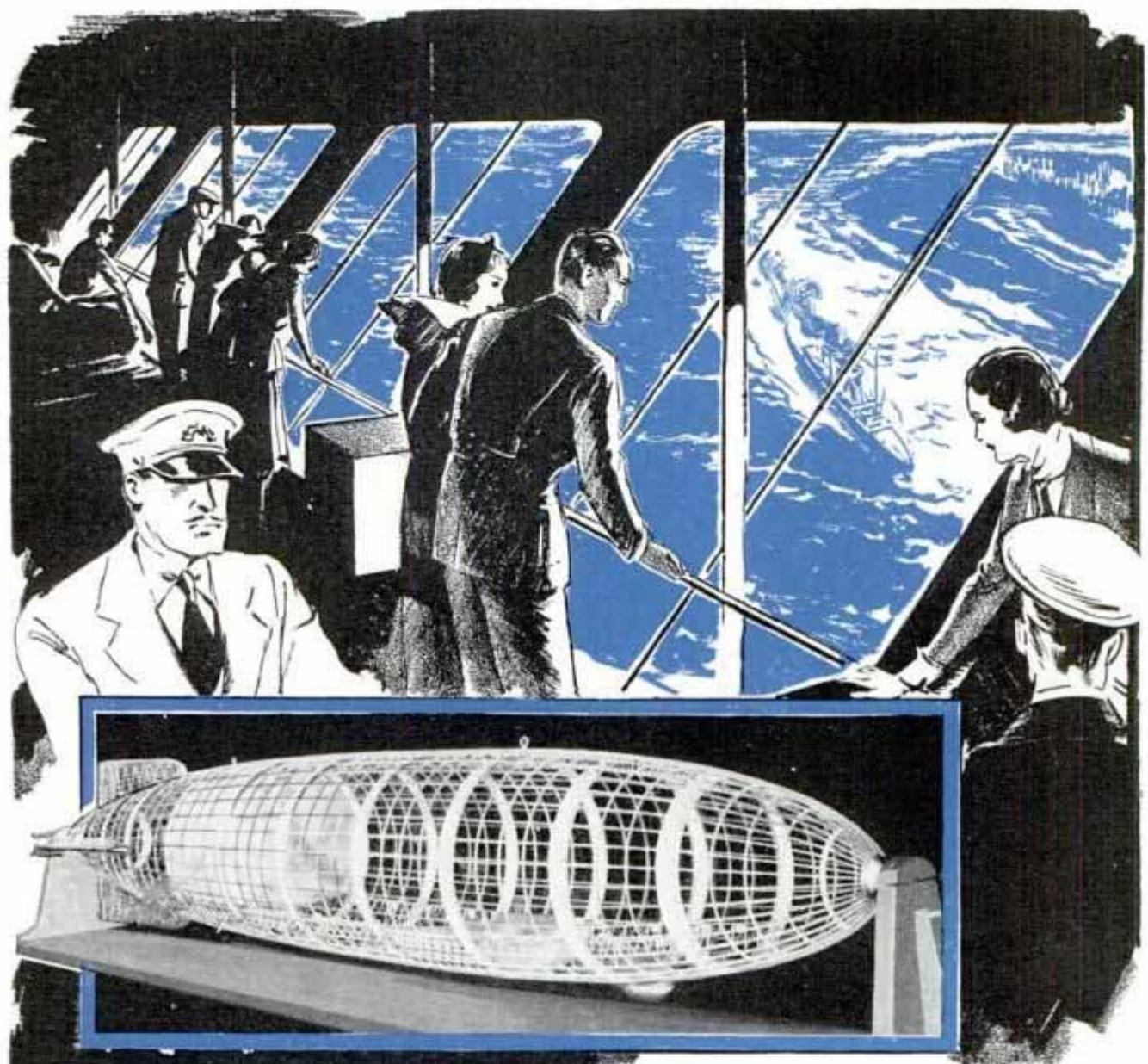
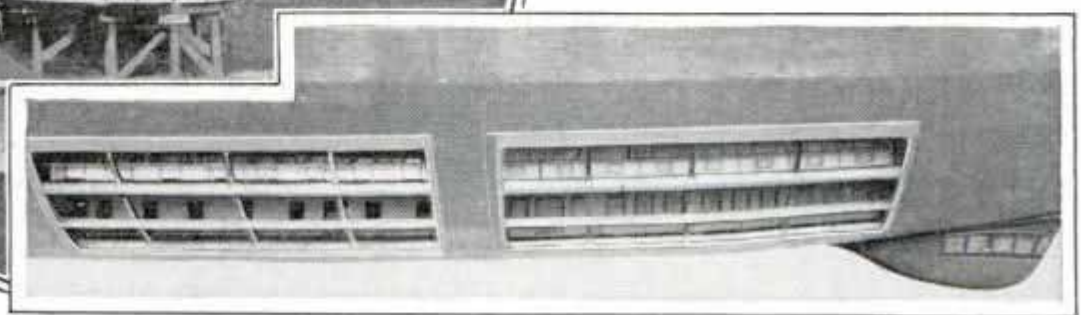
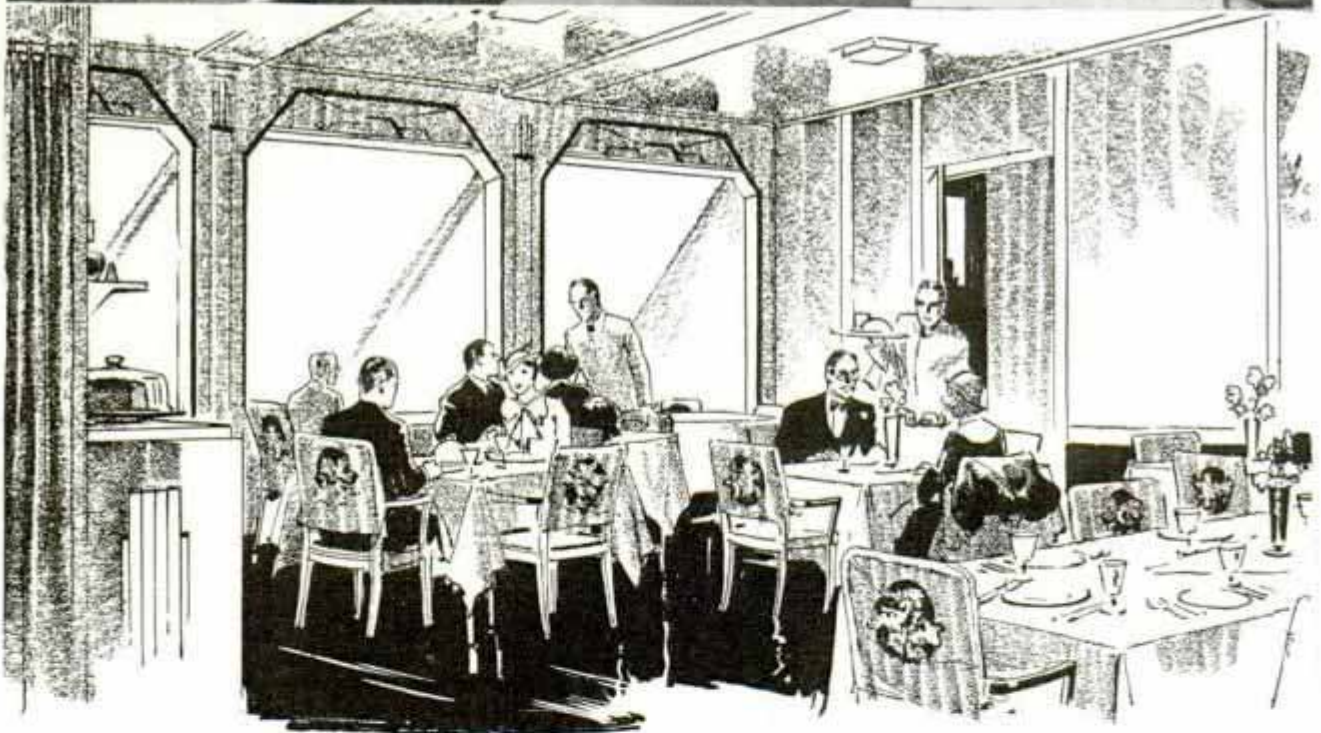
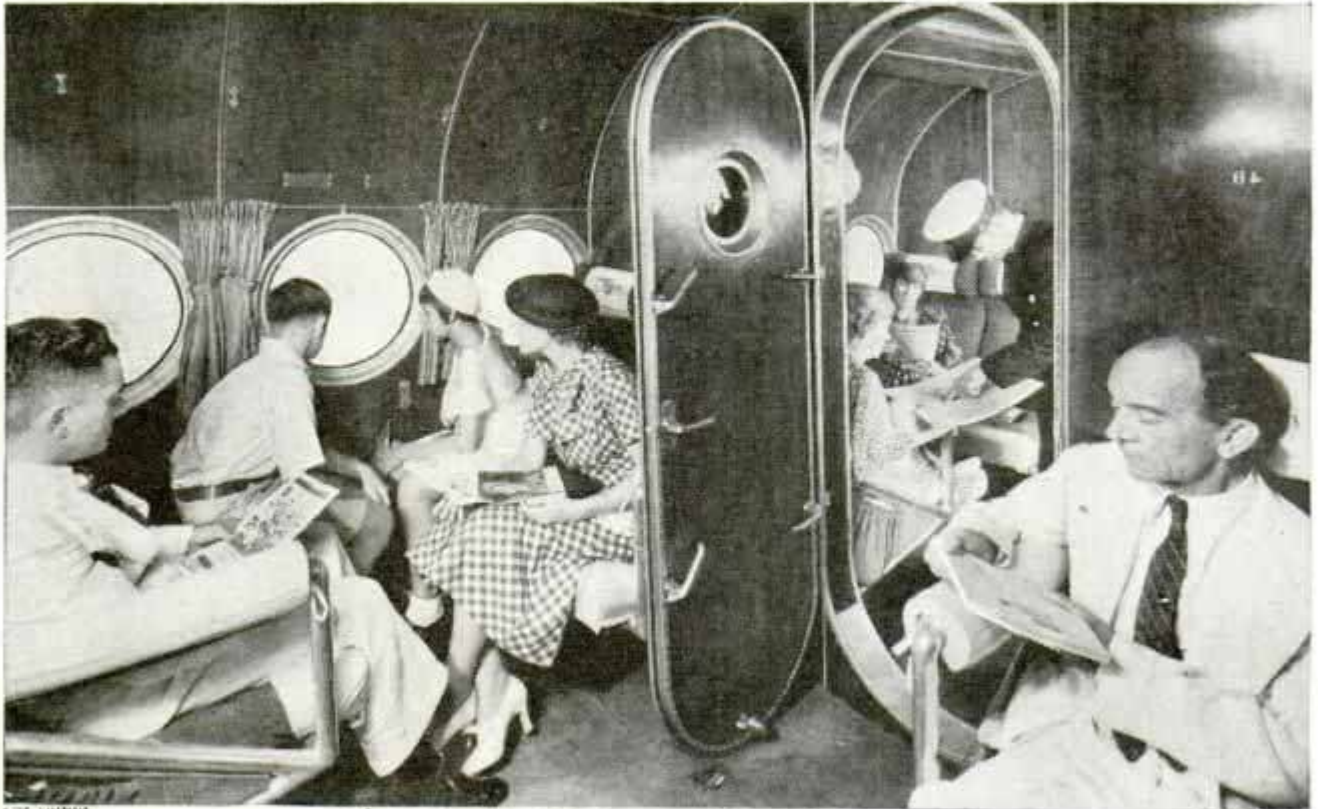


Photo at Left, Courtesy Akron, O., Times-Press
Promenade Deck of Commercial Airliner of Future, as Visioned by Artist, and a Scale Model, Showing Details of Construction of Frame of Commercial Airship; Left, "Mock-Up" of Commercial Zeppelin Airship Built by Good-year-Zeppelin Engineers to Demonstrate Arrangement of Decks and Passengers' Quarters; Control Car Is in Foreground; Below, Cutaway Model, Showing Arrangement of Promenade Decks and Cabins





Artist's Conception of Dining Room of Proposed Commercial Airliner and View of Interior of New Pacific Flying Boat, Showing Seating Arrangement Providing Window Views for Passengers

"All our trips were started and completed without consideration of general weather conditions," he said. "We never waited for days, as is generally the custom when making long demonstration trips, in order to encounter favorable or advantageous meteorological conditions."

This fact Dr. Eckener cites as conclusive proof that the airship is capable of coping with all kinds of weather. However, he

says, he would not like it inferred that the ship is capable of withstanding the "vortex of a hurricane or the center of a typhoon." Even the great sea liners, he points out, avoid these.

"On the famous trip around the world," says Dr. Eckener, "the airship ran into the area of a typhoon, which had crossed the Japanese sea shortly before we reached that point. I by no means tried to give the

vortex of the typhoon, which was pulling out to the northeast, as wide a berth as possible. On the contrary, I was concerned that the typhoon might have moved, by the time we arrived, so far away as to make it impossible for us to exploit the favorable northerly winds prevailing along the rear side of this disturbance. I set our course running far to the eastward along the coast of the peninsula of Sakhalin, in order to be able to make use of the northerly gales caused by the typhoon. It was extremely gusty under these conditions. We had to run for hours through thick fog and low clouds, but we had a wonderful north wind blowing at the rate of fifty and sixty miles per hour. The wind brought us in seven hours from the Okhotsk sea to the

(Continued to page 126A)

D/1608

MERRY-GO-ROUND CLOTHESLINE RUN BY ELECTRIC MOTOR

Drying the family washing is a simple matter if you own a merry-go-round clothes reel operated by an electric motor. It consists of an upright standard with

not a market



Clothesline Which Is Rotated by a Small Motor, the Motion Resulting in Rapid Drying

braces extending from it to support the reel on which the clothes are hung. A small electric motor revolves the standard when the clothes are in place and the whirling dries them in a jiffy.



Track Walker Inspecting Rails with the Aid of Small Instrument Containing Two Mirrors

TRACK WALKER FINDS FLAWS WITH AID OF MIRRORS

Just as the dentist uses a mirror to search for decay at the back of your teeth, the railroad track walker today is equipped with mirrors which aid him in finding longitudinal cracks on the underside of rails. Many rail failures result from these longitudinal cracks in the form of vertically split rail heads and cracks in the web. Forewarnings of such defects are given by flaked rust under the rail head or on the side of the web. To detect the defects, the track walkers of a southwestern railroad are equipped with a device which slides along the rails. It consists of a block of wood mounted on roller-bearing wheels pushed easily along the rails by means of a handle. To the block is attached a frame holding two adjustable mirrors, one at the top, the other at the side. The surface of the side mirror is curved so that it magnifies a reflection. In this mirror is reflected the web and the under surface of the rail. The top mirror reflects light into the lower mirror.

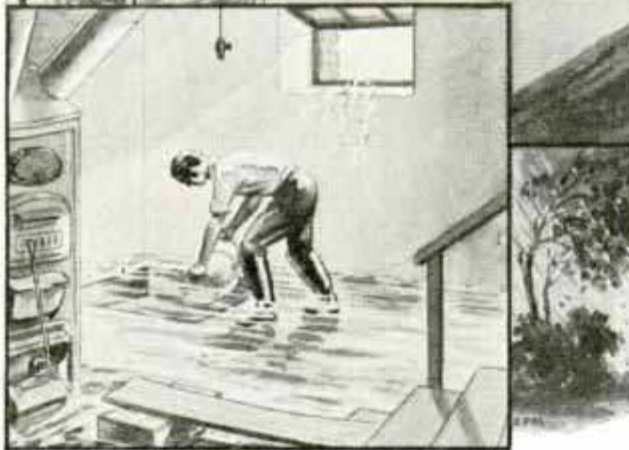
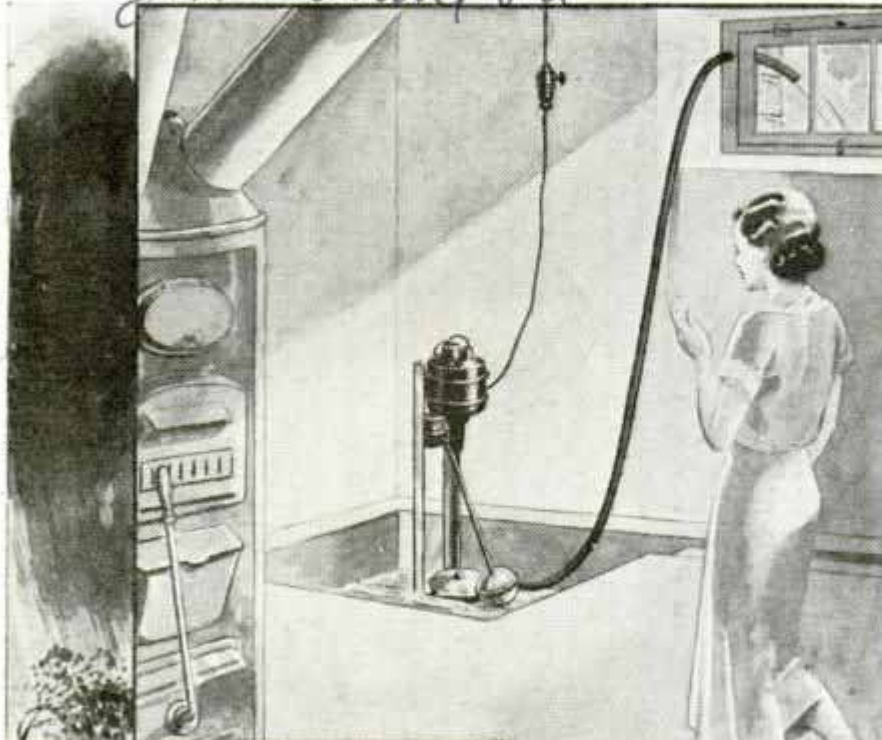
Used by Messrs. Kansas, Texas, Missouri, 310 W. Michigan Ave. Chicago

Carl J. M. Karcher
 4495 W. Pine Blvd

Mrs. Carl J. M. Karcher, General Delivery, The Dallas City

D 1456
360

61345 Esreenwood Ave
613 POPULAR MECHANICS
Jenkintown, Pa



Baling Out a Flooded Basement Is Unnecessary if This Automatic Electric Pump Is Installed

ELECTRIC PUMP FOR BASEMENT PREVENTS FLOODING

Basements which flood during heavy rains now can be kept dry with the aid of an automatic electric pump designed for the purpose. The unit consists of an angle iron frame twenty-seven inches high, supporting a one-fourth horsepower motor from which is suspended a vertical shaft operating a rotary pump, the motor being at the top of the frame and the pump at the bottom. A rod attached to a metal float ball connects with an automatic electric switch. The pump is placed on the floor at the lowest point or a special well about a foot deep is dug for it. The water rising in the well floats the metal ball which turns on the switch. The water is pumped through an ordinary garden hose

extending through a window or a hole in the wall. As the water lowers the ball drops down and the pump stops. The pump is of brass and the shaft is of stainless steel. The unit has a capacity of 1,500 gallons per hour and is also handy for draining ditches, irrigation pumping or operating lawn fountains.

D 1487

THREE-WHEELED DELIVERY CAR IS USED IN JAPAN

Three-wheeled delivery cars, a combination of motorcycle and some features of light trucks, are being used widely in Japan because it is claimed they are quicker in traffic, easier to park and less expensive in upkeep than the conventional four-wheeled vehicles. Most such cars utilize the standard American type of motorcycle, ingeniously fitted to a motor truck type rear-car chassis, but one company is using a two-cylinder V-type twin engine set transversely in the frame with unit clutch and gear box, shaft drive and differential, and automobile type steering on the front wheel. Due to the wedge-like front and the fact that the driver sits in the center of the car, these three-



This Combination of Motorcycle and Light Truck Is Used in Japan for Making Deliveries

wheeled vehicles can get through traffic more safely and quickly than the usual delivery car. The one front wheel, which

Harley Davidson

James H. Abacher, Tokyo, Japan

Cincinnati Ohio

can be turned at right angles, permits parking in any space equal to the car's over-all length, and the cubic capacity of the body is greater for any given wheel-base, due to the fact that the driver is above, rather than behind the engine. A canopy top protects the driver from the weather and the sturdy side frames of the chassis guard his legs. The car illustrated has a motorcycle engine and transmission, a rear axle with an automobile type differential and adequate internal expanding brakes. Three speeds forward and one reverse are provided and it has a maximum speed of forty-five miles per hour.

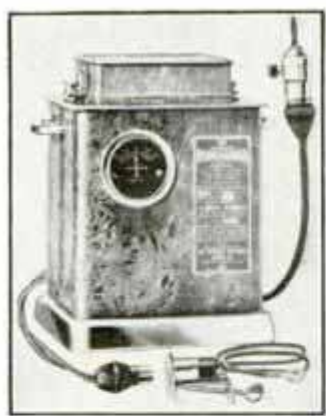


"Blinders" for Pilot Practicing Instrument Flying; Regular Goggles Are Taped to Limit Vision

D1543
FASTER HOME-TYPE CHARGER FOR THE AUTO BATTERY

Hi Rate Homecharger
Faster charging of the automobile or radio battery is made possible by a home-type charger that delivers about ten amperes. The charge is tapered as the power level of the battery rises, eliminating the possibility of damaging the battery. The charger works on the rectification principle, with a vibrator unit. The makers claim

that the average battery can be charged overnight at a cost of only a few cents. A clamp-on device is used to connect the charger to the battery. Only a single connection is made to the ammeter terminal back of the auto dash. This wire

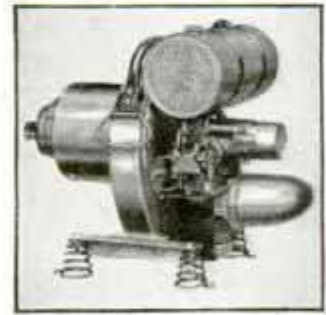


and the clamp are supplied. A special filtering system prevents interference with radio receiving sets.

for the take-off, the pilot donning the blinders when he is in the open. If he gets into a position from which he cannot recover while flying blind, he need only look over the side to see the ground and thus orient his ship. The blinders eliminate hooding the cockpit of a dual-control plane and enable the flyer to practice without the aid of a second man to take off and land for him.

D1554
FLOODLIGHT WITH OWN PLANT IN PORTABLE OUTFIT

Weighing only eighty pounds and contained in an outfit for easy carrying, a handy floodlight with its own power plant has many uses. It is weather and dust proof, fully automatic and needs no adjustment. If desired, it can be attached securely to a base for extended operating periods. The floodlight is powered by a built-in gasoline engine driving a 1,250-watt generator. The plant also may be used for operating electric saws, hammers, drills and other equipment.



D1508
"BLINDERS" HELP PILOTS LEARN TO FLY BY INSTRUMENTS

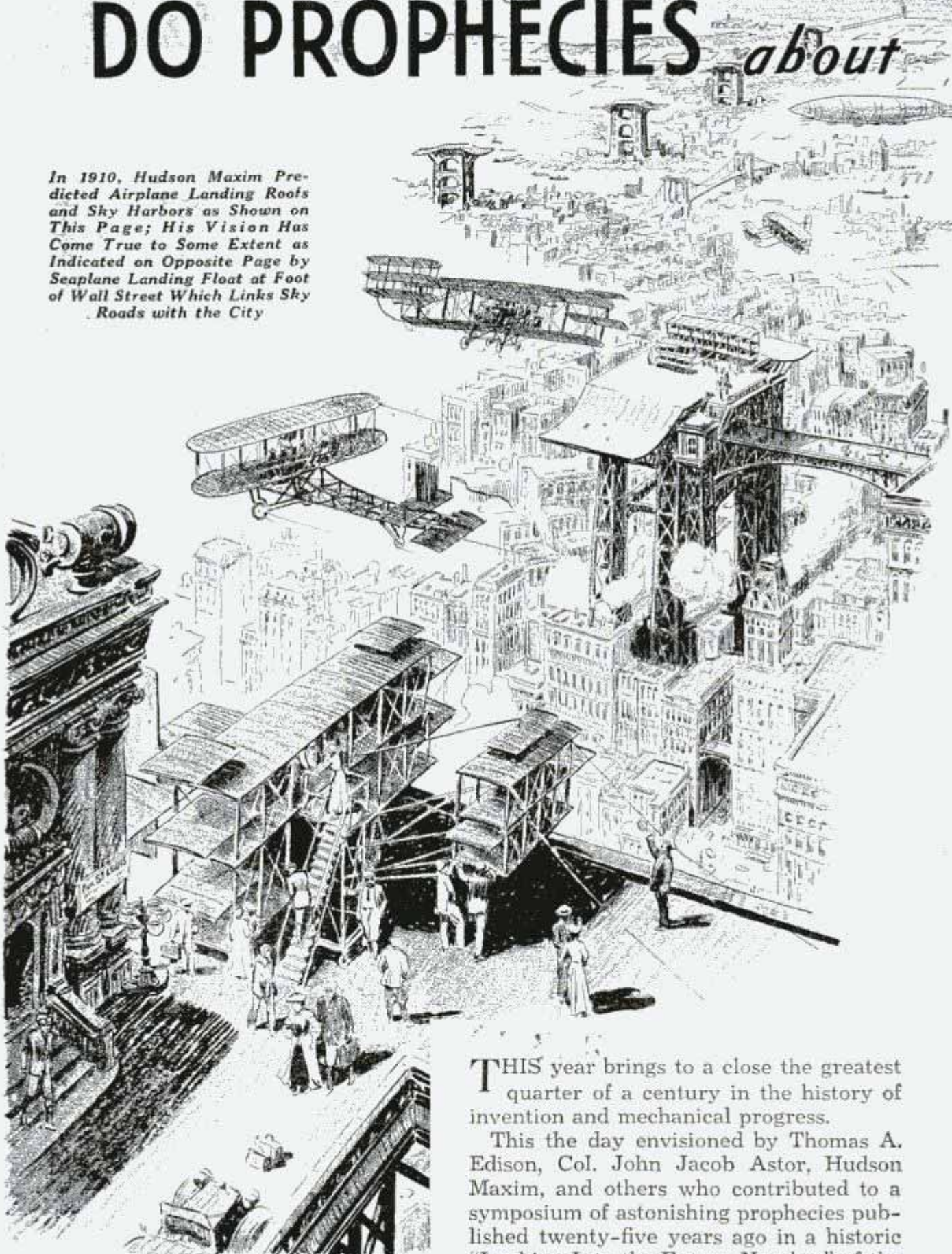
Pilots seeking training in blind flying are using "blinders" made from ordinary goggles for the purpose. By taping the goggles around the edges, the pilot limits his vision so that, when sitting in a normal position in the cockpit, he sees only the interior of the cabin and the instrument board. A regular pair of goggles is used

Comp Russell Scott
Lomelite Corp
New York

D1532 Cmt. Wm. Massman
4 W. 103rd St.
New York.

DO PROPHECIES *about*

In 1910, Hudson Maxim Predicted Airplane Landing Roofs and Sky Harbors as Shown on This Page; His Vision Has Come True to Some Extent as Indicated on Opposite Page by Seaplane Landing Float at Foot of Wall Street Which Links Sky Roads with the City



THIS year brings to a close the greatest quarter of a century in the history of invention and mechanical progress.

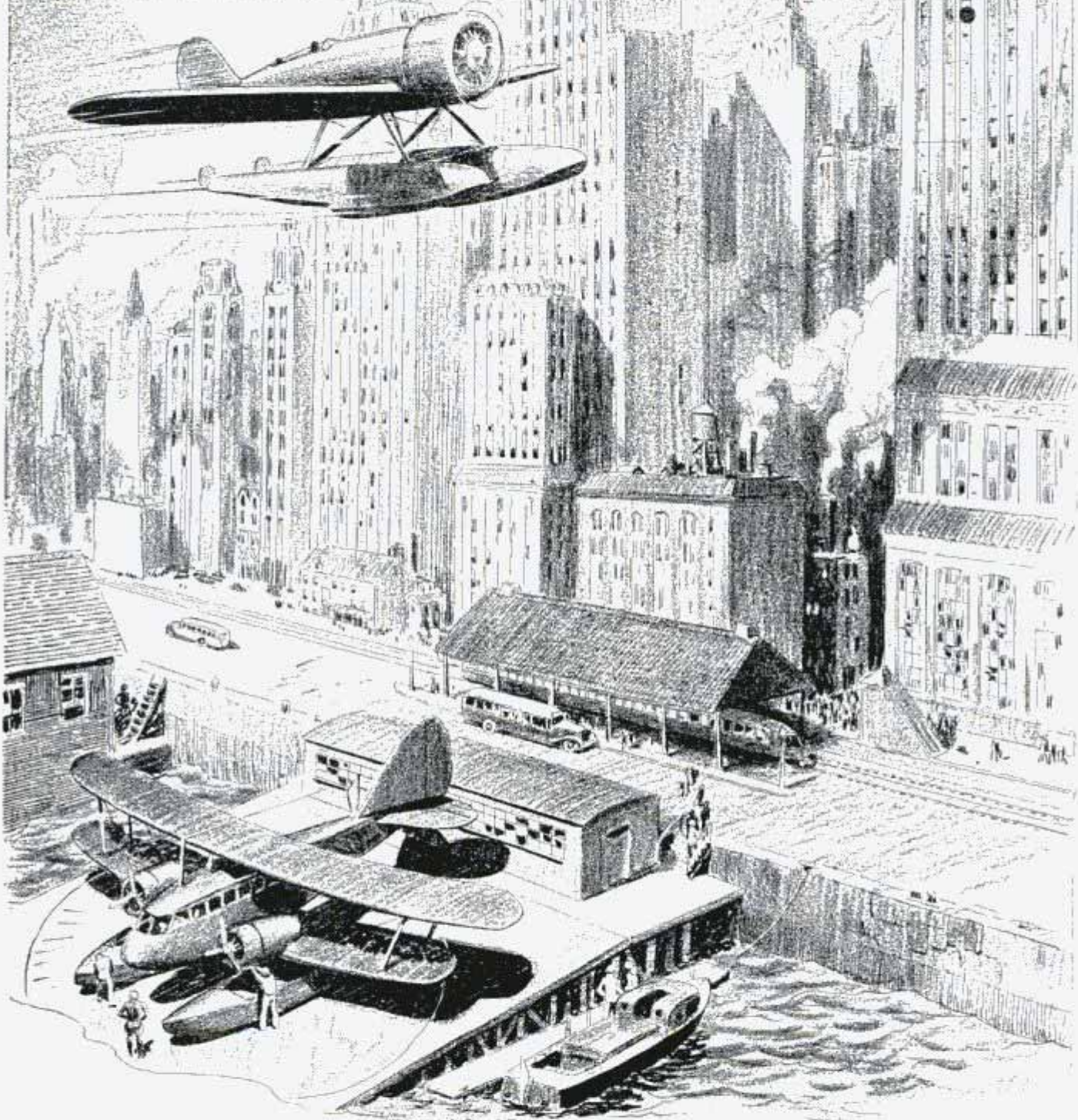
This the day envisioned by Thomas A. Edison, Col. John Jacob Astor, Hudson Maxim, and others who contributed to a symposium of astonishing prophecies published twenty-five years ago in a historic "Looking Into the Future Number" of the New York World.

In that year, 1910, only seven years after

© Press Publishing Co.

The Drawing on This Page Represents a Prophecy, That on the Opposite Page the Fulfillment

INVENTIONS *come* TRUE?



the first airplane flight, Edison made a prophecy that seemed wild and irresponsible to his countrymen, but which has proved accurate beyond a doubt.

"We are face to face with aerial navigation on a scale of which we have never dreamed," said Edison. Then he went on to predict that small planes carrying mail would travel 100 miles an hour and even-

tually would go much faster. In 1934 an airplane exceeded 400 miles per hour.

"I don't know how to do it," he said, "but a method will yet be discovered of wirelessly transmitting electrical energy from the earth to the motor of a machine in midair. There is no reason to believe it cannot be done."

In this Edison made a prophecy still un-



fulfilled. Scores of inventors are now working on it, however. James J. Hill, the railroad builder, was another who foresaw the mighty developments in human progress. With astonishing accuracy he foresaw the population trend.

"By 1930," he said, "the population will be 125,000,000, and before the middle of the century, more than 200,000,000 people must find room and food and employment within the United States."

Luther Burbank, the plant wizard, prophesying the future of man as an individual, observed:

"Man has by no means reached the ultimate. The fittest has not yet survived. In the process of elimination the weaker will fall. The fittest of the future is not the fittest of the past.

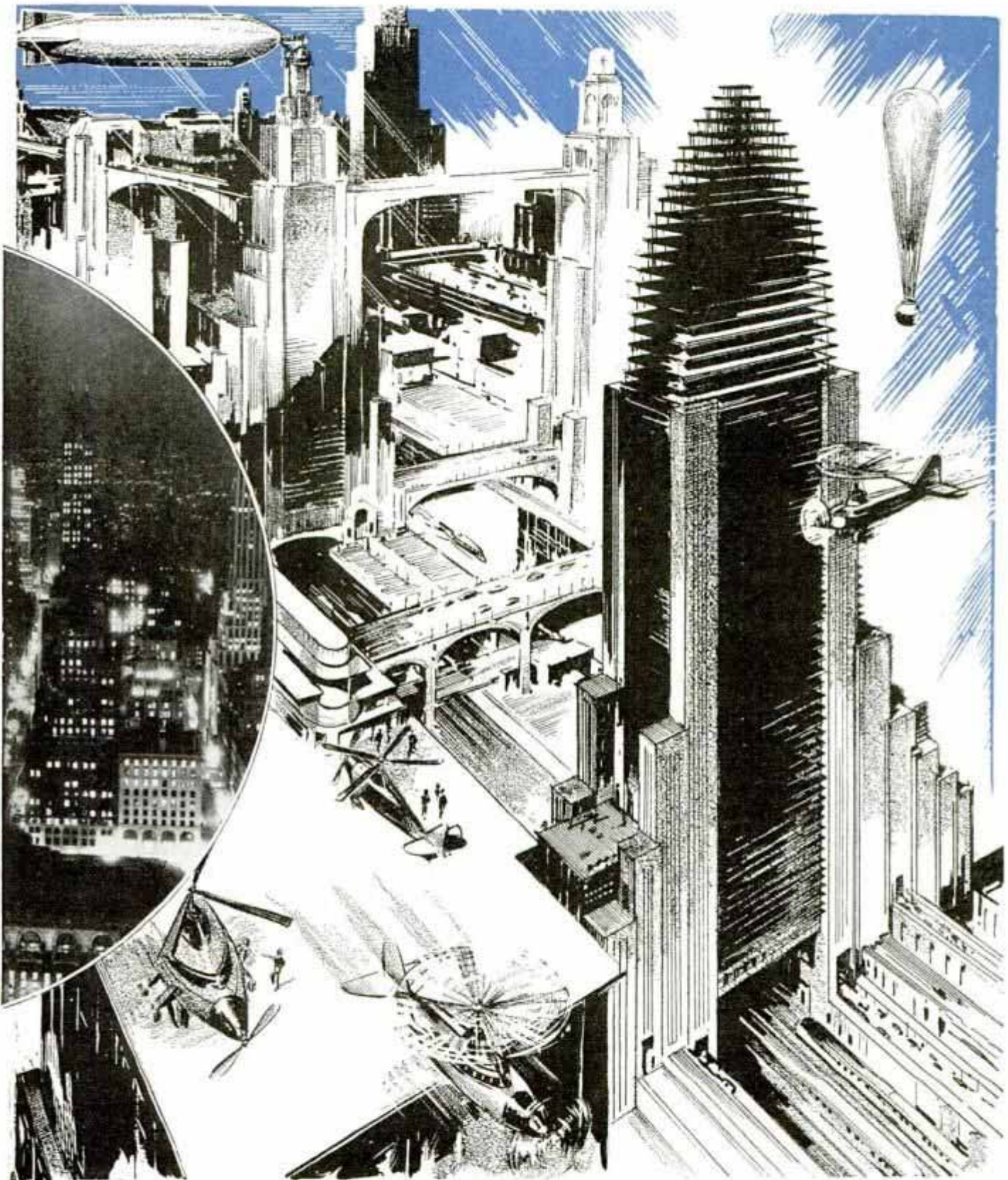
"The man of the future ages may prove of a somewhat different order of being from that of the present. He may look upon us as we today look upon our forbears."

And in the realm of the auto, which in 1910 looked like a milkcart, W. Irving Twombly uttered one of the most interesting prophecies:

"Invention of the future," he said, "will tend toward increased strength of materials, reduction in the weight and size of all moving parts, simplifying and standardizing of all moving parts so that they may be duplicated anywhere in the world at a fair price with the sure knowledge that they will fit in place when received.

The Evolution of a City; Above, New York as It Appeared in 1884; in Circle, as It Is Today, and, on Opposite Page, as Architects and Engineers Vision It Twenty-Five Years Hence

"The pneumatic tire as we know it will soon be a thing of the past. I do not mean that it will ever be successfully replaced, but I predict that a practical pneumatic tire will be produced, having all the resiliency of the present type and none of its weak points. It will be non-puncturable, impossible to blow out, will run from 10,000 to 20,000 miles without attention; little or no rubber will enter into its construction, cost will be reduced at least

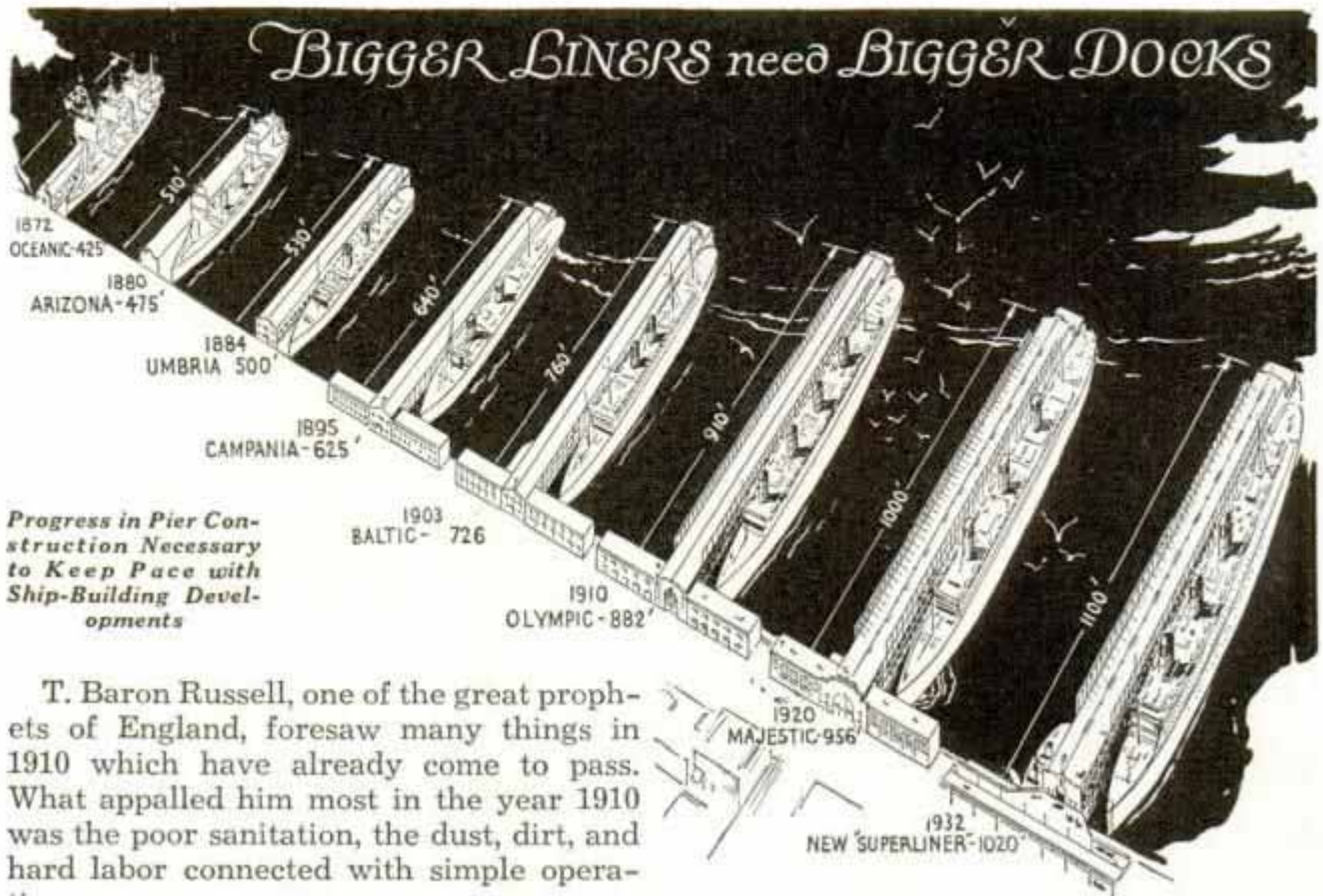


seventy-five per cent and repairs amount to little or nothing.

"The sale of pleasure vehicles will quadruple and the pleasure of motoring increase a hundredfold. The transmission as we know it today will be eliminated, and strong, efficient, durable motors will be produced, weighing less than two pounds to the delivered horsepower.

"Within the next twenty years (by 1930) it will be possible to buy a twenty-horsepower automobile for \$500 that will last longer and give much better satisfaction than those sold today at from \$2,000 to \$4,000 each."

And American automobiles in the \$500 class are rated today at more than twenty horsepower.



T. Baron Russell, one of the great prophets of England, foresaw many things in 1910 which have already come to pass. What appalled him most in the year 1910 was the poor sanitation, the dust, dirt, and hard labor connected with simple operations.

"The new age," he declared, "will be the clean age. Cooking will be a much less disgusting process than it is today. In no case will a domestic servant be called upon to stand over a roaring fire. . . ."

"When radiation has been fully studied, it will almost certainly be found that the sun, which is the source of practically all terrestrial activity, has been showering upon us the rays that are capable of correcting every sort of disease germination. The value of sun baths, of exposing the body to sunlight, is already discussed in connection with anæmia, chlorosis, and the early stages of consumption."

"The time has come," cried the famous inventor, Hudson Maxim, "to connect the city and the sky. The marvel of aviation has arrived in our time and it is destined to have a revolutionary effect in shaping the architecture of the future. We must make preparations to travel by the sky-road.

"Provision must be made for the housing of the vast number of airplanes that are destined soon to flock the morning and evening skies. The city will grow skyward to meet aviation. Roof gardens, roof playgrounds, roof hotels, connected with one another by enormous bridges and

promenades will unite and lock the city together into one great unit, one enormous structure."

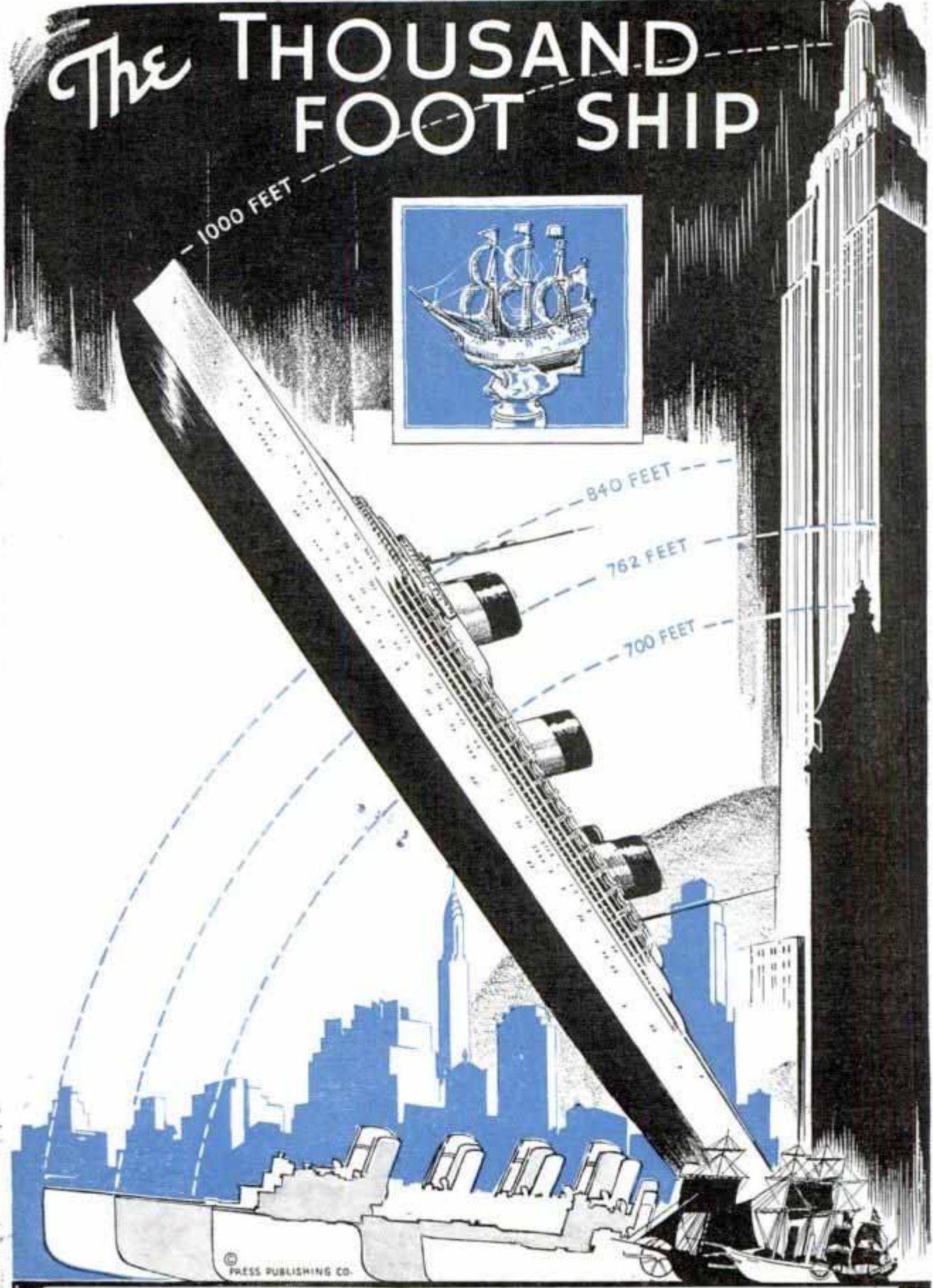
One of the most accurate prophecies made in the year 1910 concerned the coming of 1,000-foot ships to the shore of America. This, of course, will come true in the year 1935, one-quarter of a century after the prophecy was made.

In 325 years the length of ships coming into the Hudson river will have increased from sixty-three feet, the "Half Moon" of Henrik Hudson, to 1,027 feet, the French superliner, "Normandie." The time of crossing will have decreased from fifty-nine days, or 1,416 hours, to four days, or ninety-six hours. In 1910, the "Olympic" and "Titanic" were under construction for the White Star Line. The "Titanic" subsequently went down in a great sea tragedy. The "Olympic" was then the greatest ship afloat, 840 feet in length, and capable of twenty-one knots. Were it not for the "Titanic" disaster, the 1,000-foot ship would undoubtedly have come much sooner than 1935.

These prophecies, which are now part of history, furnish us ample proof of how responsible predictions may parallel the course of human progress.

DIS 32

The THOUSAND FOOT SHIP



1000 FEET

840 FEET

762 FEET

700 FEET

© PRESS PUBLISHING CO.

1911-OLYMPIC 1908-LUSITANIA 1900-DEUTSCHLAND 1885-UMBRIA 1874-BRITANNIC 1840-BRITANNIA 1819-SAVANNAH 1609-HALFMOON
 LENGTH, 840 FT. LENGTH, 762 FT. LENGTH, 662 FT. LENGTH, 500 FT. LENGTH, 455 FT. LENGTH, 207 FT. LENGTH, 160 FT. LENGTH, 63 FT.

Growth of the Transatlantic Liner from the Sixty-Three-Foot "Half Moon" of 1609 to the 1,000-Foot Liner of 1935; What May the World Expect in Another 300 Years?

Trailer with a Single Wheel Is Streamlined

See General Gumbo, Jr.



Two Views of One-Wheel Streamlined Trailer; Bottom, Illustrating Ease of Packing Extra Cases into the Trailer

Harmonizing with the flowing body lines of the modern automobile, the latest trailer rides on a single wheel which rotates freely on a caster-like device. The trailer is attached rigidly to the rear of the towing car. It has space for extra luggage.

contained in auto exhaust gases in a relatively high amount. It is heavier than air and Dr. Field believes it settles over the pavement and works its way into sewers where it becomes highly explosive and needs but a spark from a passing trolley or near-by tension wire to touch it off.

DOOR STOP SET IN FLOOR KEEPS OUT INTRUDERS

D1580

Preventing entry of strangers through the door until the householder learns their business, a steel bar set flush with the floor operates instantly. One end of the bar is raised by inserting the edge of the shoe sole under it. In raised position, the bar allows the door to open three or four inches. In closed position, the door swings open freely. The bar cannot be seen from the outside and causes no offense to callers but permits the housewife to converse with strangers without fear.



The door stop can be raised at night to afford additional protection against prowlers.

See this

D1565

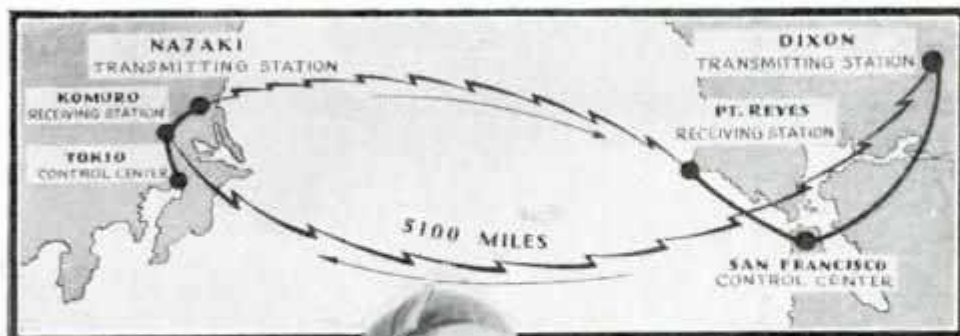
AUTO EXHAUST GAS MAY CAUSE SEWER EXPLOSIONS

Explosions in sewers which blow off manhole covers may not be caused by sewer gas but by methane gas from the exhausts of automobiles. This is the theory of Dr. George W. Field, consultant biologist for the government who believes that seepage of auto gases into sewer mains is responsible for manhole explosions. Methane, known to miners as "fire damp," is

Washington, D.C.

Helen Stargardt Co.
270 ... Ave.

Trans-Pacific Radiophone Scrambles Calendar



Wade World Photos
 Route of Radiophone Message to Japan, a Japanese Telephone Operator and Some of Powerful Tubes Used

Is today yesterday or is it tomorrow? That is a question faced by those using the recently opened radio-telephone service between the United States and Japan. The answer seems to be that today may be either yesterday or tomorrow, according to where you happen to be when talking. The scrambled condition of the calendar is due to the fact that a message transmitted across the Pacific crosses the international date line en route. For instance, if you are in Tokyo and decide to call a friend in New York at six o'clock Sunday morning, you need not worry about disturbing his Sabbath snooze. For in New York it will be only four o'clock Saturday afternoon and your voice will actually be traveling from Sunday to Saturday. But your friend's voice will be traveling from today into tomorrow. From San Francisco messages bound for Tokyo travel by wire to the Dixon, Calif., transmitting station, then by radio across the Pacific to Komuro receiving station, hence by wire to Tokyo. From Tokyo the messages travel by wire

to Nazaki transmitting station, then by wireless to Pt. Reyes receiving station and by wire to San Francisco. Eight tubes totaling 20,640 watts, including two tubes of 10,000 watts each, are among those used in transmitting from the United States.

TREE INSULATED BY ITS BARK IS RESISTANT TO FIRE

D1649

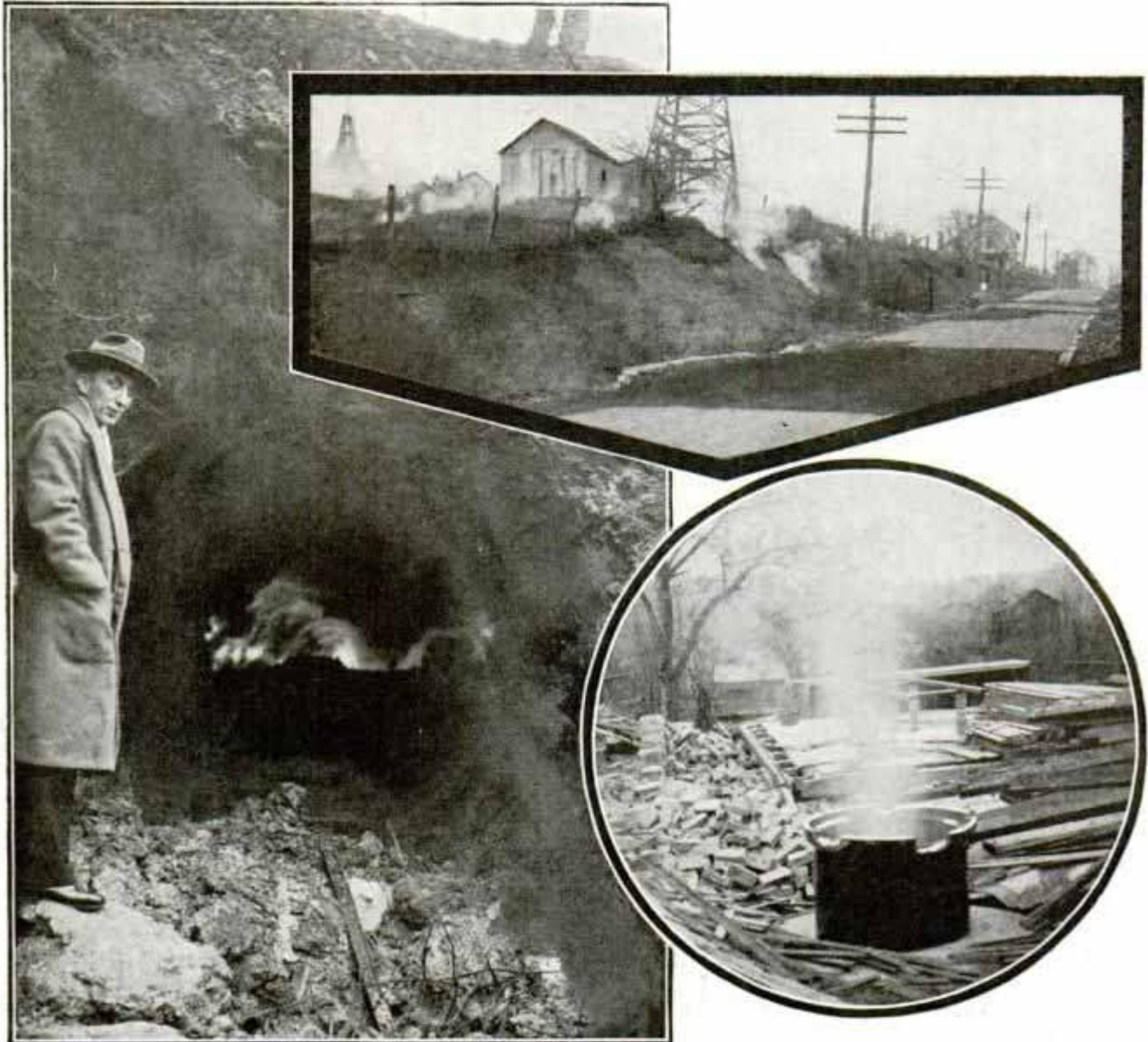
One of the curiosities of Colombia, South America, is the chaparro tree which is virtually fireproof since it can withstand the flames which often burn the grasses surrounding it. The reason is that the bark is arranged in loose layers so a considerable amount of air gets in between the bark and the wood. This air is a good insulator and a poor conductor of heat and the living tissues of the tree thus are protected from the flames. Only a short time after the passing of a fire, should the rainy season set in, this unusual tree may be sending out green leaves although its bark is charred.

Cont. by A. Eckhardt
 2-14-27 N. Park Ave. 11

D1556

Cent. C. A. Robinson
New Lexington, Ohio

Government to Attack Fifty-Year Mine Fire



A Coal Mine, a Highway and a Home Destroyed or Damaged When an Underground Fire in Ohio Reached the Surface; Note Smoke Issuing from What Was Once the Cistern of the Home

After burning steadily for fifty years and defying all man's efforts to extinguish it, a coal-mine fire near New Straitsville, Ohio, soon may become the object of an attack by the federal government. The fire was started in 1884 during a strike of coal miners when several loaded mine cars on a tippie were saturated with oil, ignited and run into the mine a mile under the hill. Now after half a century the fire has spread over six square miles, and several fortunes have been spent in trying to put it out. At one time the course of a creek was diverted into the mine. At another time cement walls were sunk into the earth in an effort to stop the flames. All known crevices were sealed and steam

was forced into the labyrinths eaten away by the flames. All the efforts proved fruitless, the underground fire has continued to rage and now it is estimated that it has burned coal valued at \$50,000,000 and threatens fuel worth \$60,000,000 more. During the years the fire frequently has eaten its way to the surface, its fumes and heat killing forests while the territory under which it has burned is honeycombed with caves, crevices and great cracks. For a time an \$80,000 high school was threatened by the flames under the ground and several farm homes were abandoned when the flames caused the foundations to sink. One farmer awakened one morning to find his cistern spouting fire. The flames had

*Dr. L. J. Hendry
1253
University
Parkway Chicago*

eaten their way to it and the cistern itself acted as a smokestack. The fire also caused a paved road to sink in several places, has threatened oil wells and has caused other small mines to be abandoned when it broke through into them. Recently the government sent investigators to the scene to map out a program for extinguishing the fire. This attempt, if made, probably will be a Public Works Administration project costing about \$500,000 and entailing the employment of about 500 men.

SUNLIGHT USED TO DRIVE SMALL MOTOR

Solar radiations are converted into mechanical motion by a sunshine motor demonstrated recently. Constructed by Dr. M. C. W. Hewlett of General Electric laboratory, the motor requires about 100 micro-watts of energy. This energy is supplied by several Hewlett photo-cells which convert sunlight into electrical energy.

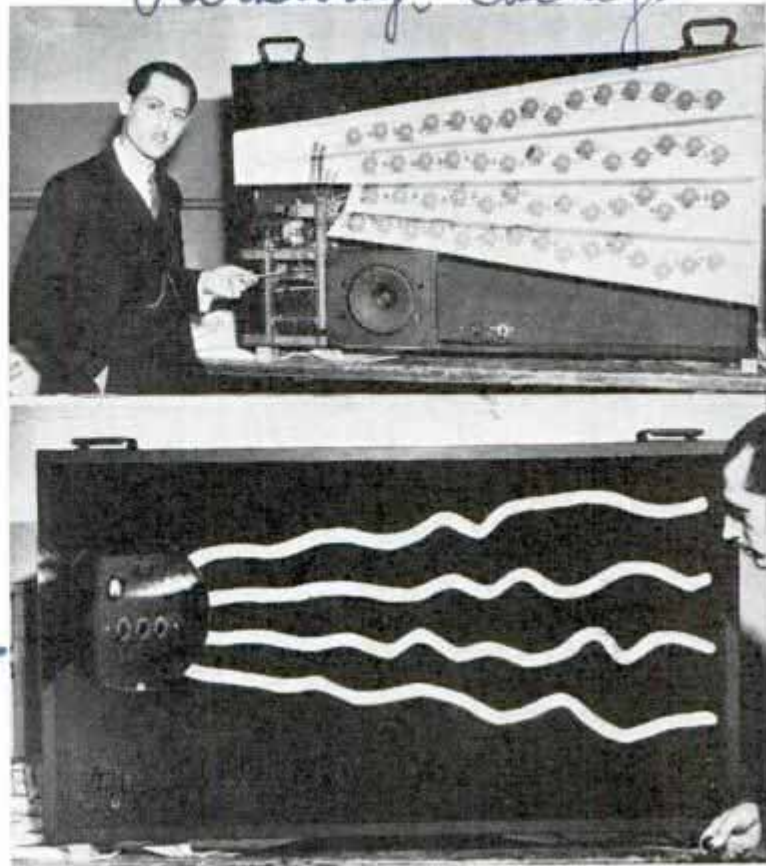
Schenectady, N.Y.



Small Motor at Left Is Driven by Energy Taken from Sunlight by Photo-Electric Cells

LIGHTNING-MAKER OPERATES ON HOUSE CURRENT

For a long time man has been producing powerful electrical discharges and



Apparatus Which Produces Harmless Artificial Lightning from House Current and a Sample of Its Ability

calling the result artificial lightning. Actually, what he has been producing is real lightning—on a very tiny scale. Now, however, there has been devised an apparatus which produces wholly artificial lightning, operating on ordinary house current but making a brilliant electrical display and the crackle associated with the discharge of a million volts of electricity. The entire apparatus is contained in a portable case weighing only 120 pounds. There are four troughs of ten-watt clear lamps treated by dipping them in a blue coloring solution to give an even distribution of light without accentuating the bright spots produced by the lights themselves. A small motor, through a gear reducer, drives a bank of cams and notches on the cams cause rapid flashes of the four banks of lights. Interruption of the current is utilized to simulate the sound of high-voltage discharge by coupling through condensers and resistors to a speaker having a powerful permanent magnetic field, thus requiring no field exciting current. Thus, a small spark, barely audible, is amplified to ear-splitting intensity. A screen with jagged slits covers the lamp troughs and indicates the path of "high voltage."

Wide World

D1458

10 2 22

D1620

Carl, Thomas E. Stinson Jr. 10 555 Robinson Ave. Los Angeles, Calif

HOBBIES of the



Left, Lew Ayres Locates Constellation on Star Globe Designed for Amateur Astronomers; Right, Siegfried Rumann in His Workshop



STRANGE as it may seem, screen stars are interested in the same hobbies that appeal to men less in the public eye.

One picture worker has a complete machine shop in a spare room of his apartment, with the lathe, drill press, and grinding machines mounted on sponge rubber blocks to prevent noise and vibration annoying his neighbors.

Rod La Rocque is one of Hollywood's most versatile craftsmen. Skilled mechanic and woodworker, he also is an artist at photography and an expert model builder. His two-story garage is almost entirely filled with equipment. La Rocque has applied for patents on numerous inventions, among them being an improved type of lens shade for cameras, a new kind of dry cell, and a self-fluorescing screen that, after exposure to the sunlight, illuminates a darkened room.

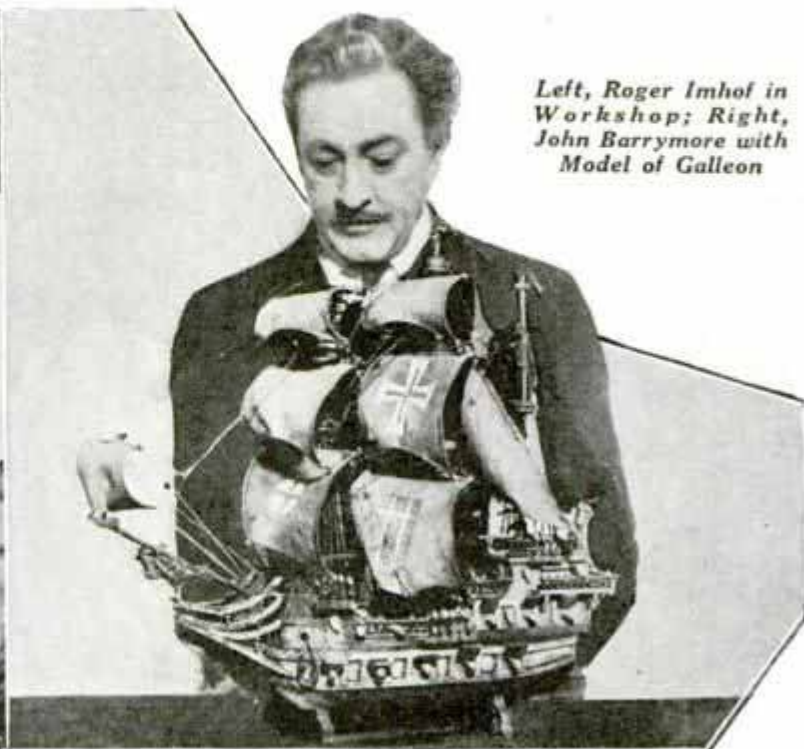
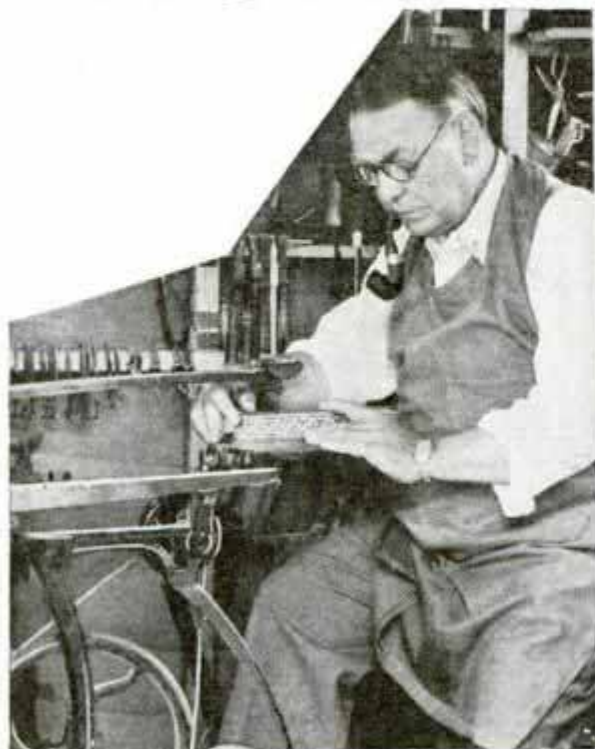
A revolver-searchlight that enables a marksman to fire in the dark without using his sights was originated by Warner Baxter, co-inventor with Albert B. Scott, firearms expert. The device throws a narrow ray in the shape of a tiny cross from a tube alongside the gun barrel. Unlike

other gun spotlights this one is shielded so that unless it is focused directly on a criminal's eyes, he cannot find the source of the ray.

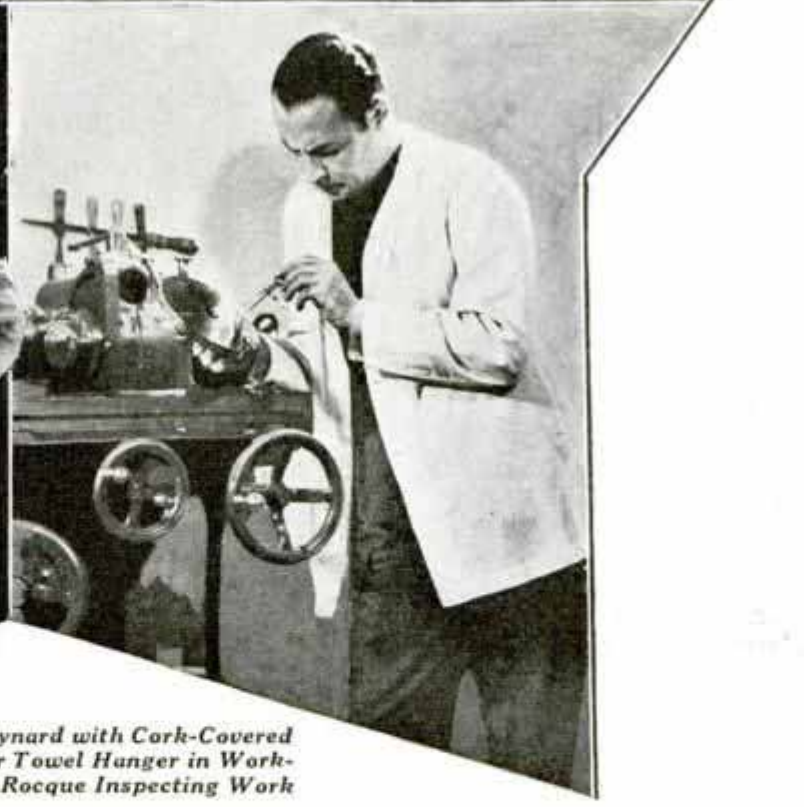
Perfecting by Alan Hale, veteran screen actor, a sliding theater chair allows spectators to push their seats backward instead of rising when late comers arrive. Hale has developed a fruit-jar lid that automatically seals itself, and a new type of "hi-brow" spectacles that gives a clear, unobstructed view in all directions. Just now, with the help of two engineers in his private laboratory, he is improving a new internal-expanding automobile brake. The first set, installed on his own car, has given efficient service for more than 70,000 miles.

Hollywood hobbies range from the magic tricks with which Lyle Talbot entertains

HOLLYWOOD STARS



Left, Roger Imhof in Workshop; Right, John Barrymore with Model of Galleon



Bottom, Left, Ken Maynard with Cork-Covered Bent Nail He Uses for Towel Hanger in Workshop; Right, Rod La Rocque Inspecting Work

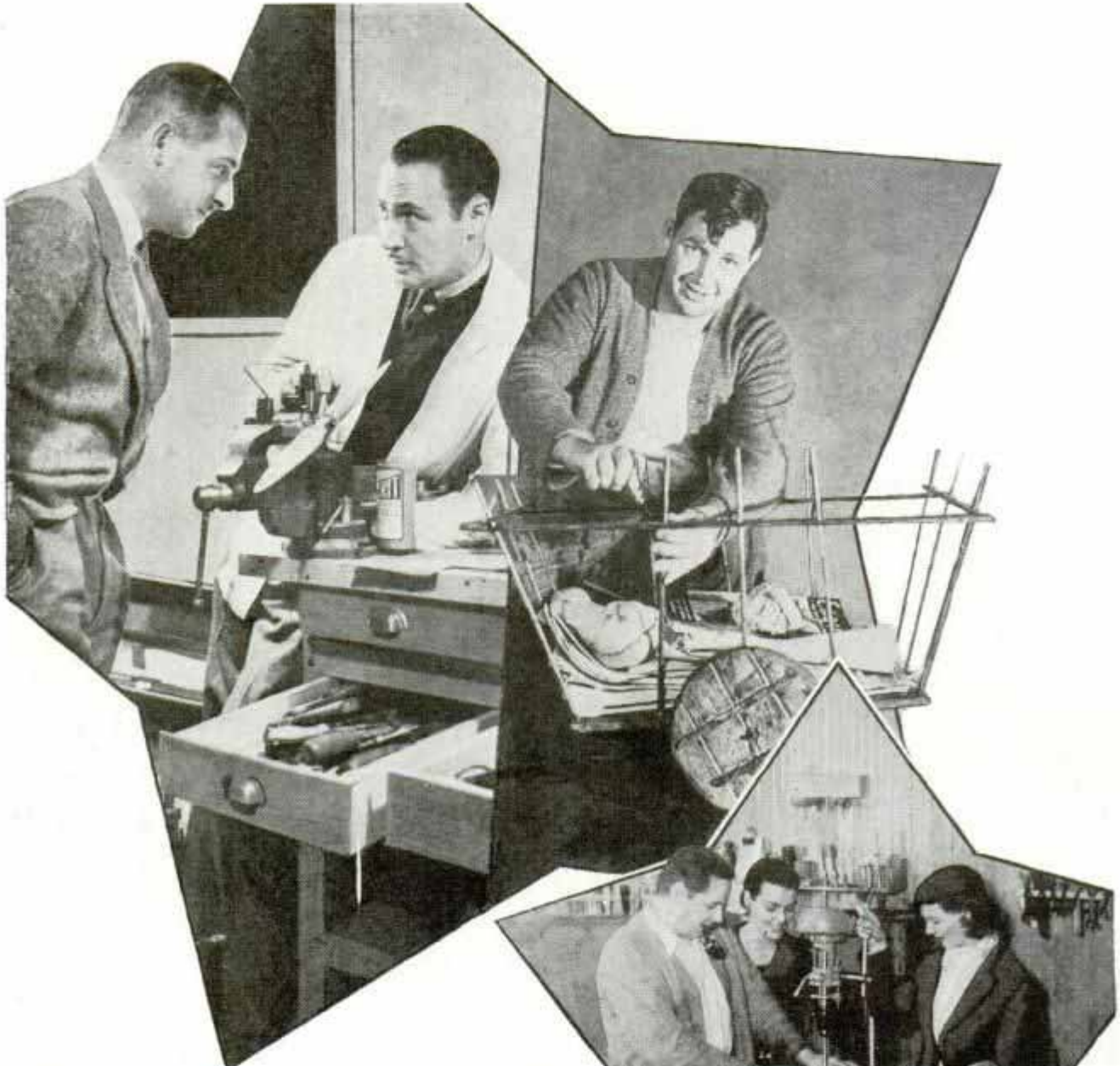
friends to the serious bacteriological studies of Siegfried Rumann, who has a complete research laboratory in his home.

One of the most popular pursuits is model making and wood carving, with Reginald Denny regarded as one of screenland's best builders of model yachts and airplanes. Denny builds most of his mod-

els at home but when he has an especially intricate piece of construction he goes to Rod La Rocque's house to use his equipment. John Barrymore builds models of old galleons in his spare time, and Henry Wadsworth and Jackie Cooper construct miniature airplanes.

Roger Imhof, feature player, carves in-

1620



Left, Reginald Denny and Rod La Rocque inspect Tiny Engine; Right, Top, Andy Devine with Model of Spanish Cart; Bottom, Elizabeth Allan, (Right) and Mrs. Boleslavsky Watch Richard Boleslavsky in Workshop

tricate wooden inlays and makes checkerboards and picture frames for his friends. Andy Devine likes to make Monterey-type furniture and has built the bookcases and some of the other furnishings of his home, including a miniature Spanish wagon with solid wooden wheels that is used as a magazine rack. Devine's chief tool is a pocket knife. Robert Armstrong, who also makes furniture on the days he is not at the studio, has a well equipped carpenter shop in his Mexican-type farmhouse home. Arthur Hohl, character actor, makes old-fashioned oak furniture and Edward Everett Horton spends part of his time in his wood-working shop at home. Lewis Stone

is another whose hobby is cabinetmaking. Robert Montgomery and James Cagney carve and work wood, and Henry Wilcoxon makes wood cuts.

As a diversion from painting pictures, writing books, and directing screen plays, Richard Boleslavsky fashions candlestick holders and flower vases out of bronze. Ivan Simpson, character actor, has won renown for the wrought-iron ornaments

(Continued to page 118A)

D/599. Architect. David Lynn Washington, D.C.

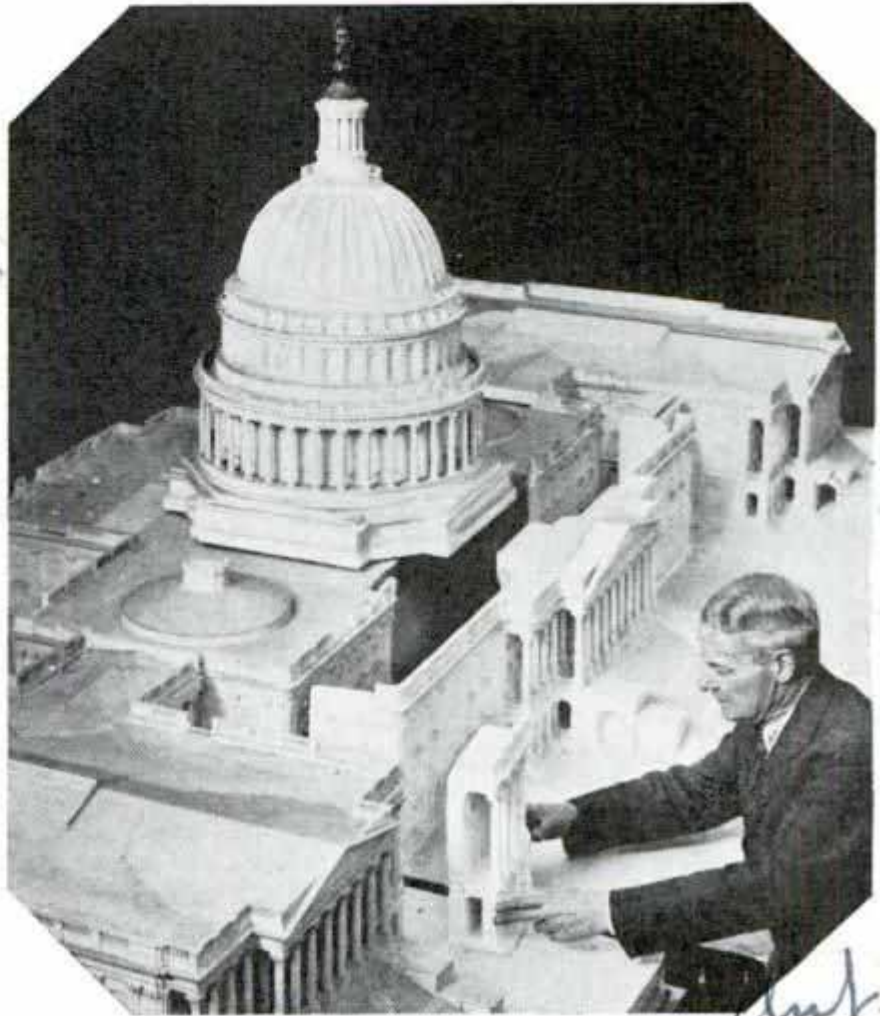
Face Lifting for Capitol to Center Dome

One of the next proposed projects of work on government buildings in Washington involves remodeling the east face of the capitol. In planning the remodeling, a model of the building has been constructed to aid architects. The changes would extend the center portion of the building, between the senate and house wings, forty feet and thus correct an optical illusion which now makes the dome appear off center.

D/590

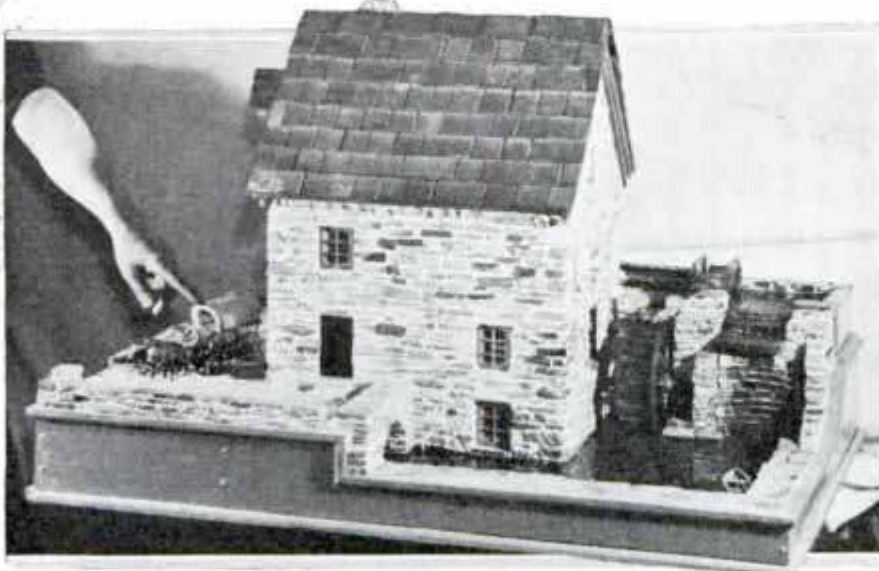
MODEL OF MILL MADE OF TINY CUT STONES

Miniature cut stones, of the style and shape of the original, were used in constructing a model of an old flour or grist mill. Regular mortar holds the stones together. The model has three stories, with a roadway to the main entrance and a ramp in the rear. The water wheel is made of wood and metal, its lower blades immersed in a pool of wa-



Model of Capitol Used in Planning Changes to Correct Optical Illusion Which Now Makes the Dome Appear Somewhat Off Center

ter that disappears through an arch under the roadway. The stream that turns the wheel is at a higher level at the rear of the model, excess water passing below a wooden foot bridge and overflowing into the pool at the right of the wheel. A water-tight box forms the base of the model. A wagon, pulled by oxen and resembling the freight wagons used in the middle of the nineteenth century, is a part of the model. The wagon, of the old covered type, is in position to receive a load of flour. The mill is a reproduction of a mill that did a flourishing business back in 1842.

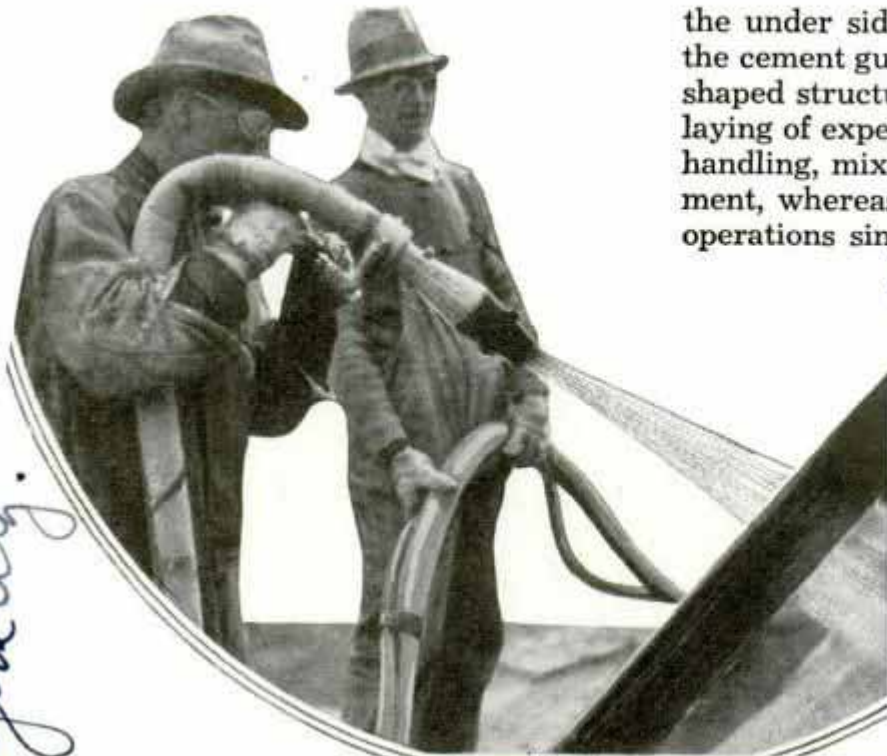


Miniature Reproduction of Historic Mill; Note Tiny Wagon Closely Resembling the Freight Vehicles of That Day

John W. Eschman & Sons. Lancaster Pa.

D1573

Planetarium Dome Formed by Cement Gun



Workmen Spraying Cement on Dome and View of Partly Completed Planetarium

To eliminate the need for an expensive set of forms and molds, a cement gun was used to form the dome of the Hayden planetarium of the American Museum of Natural History. The dome is self-supporting, and aside from the steel webbing in the concrete, contains no structural steel or supports. Instead of using forms, it was built by being shot out of a gun. Over a temporary dome-shaped backing, wire webbing was laid. Dry sand and cement then were pumped through a hose connected to the mixing nozzle of a spray gun which was connected to another hose through which water was pumped. The pressure changed the mixture into concrete which then was shot out of the gun at high speed and sprayed over the dome until the required thickness was obtained. The dome thus is one solid mass of concrete, a cork lining being placed on

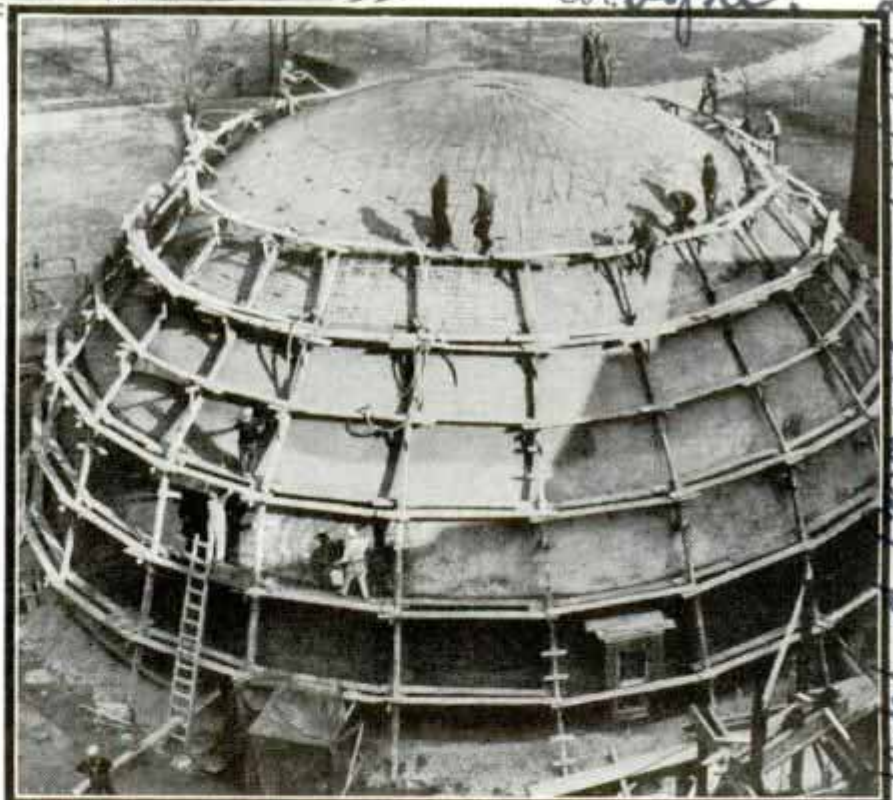
the under side to soundproof it. Without the cement gun, the erection of this dome-shaped structure would have required the laying of expensive forms and the separate handling, mixing and spreading of the cement, whereas the gun performs all these operations simultaneously.

D1638

COAL DUST IS USED AS MOTOR FUEL

Experiments with a motor intended to burn coal dust as fuel are being conducted in Germany. One of the difficulties encountered has been the abnormal wear to which all moving parts are subjected, but this problem

Cologne



has been partly solved by using special alloy metals. The coal-dust motor is able to burn any combustible dust. The coal used is treated to reduce ash content and is ground very fine to permit better combustion and a low ash residue. Germany produces coal but must import mineral-oil fuels and the coal-dust motor therefore is important from an economic standpoint.

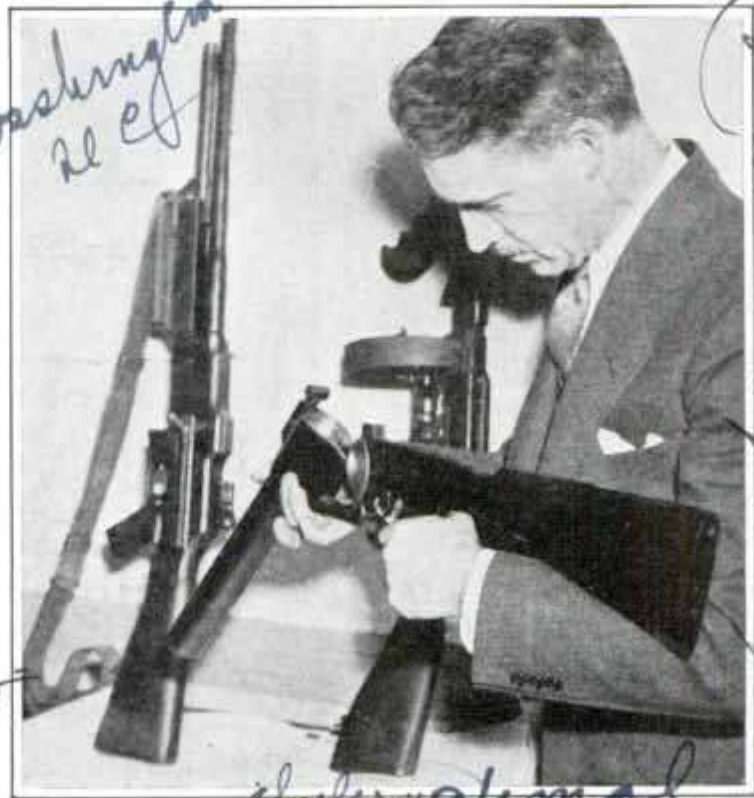
Reported by Vice-Consul

Columbus Avenue and 77th St. New York City.
Cement Gun Co. make such gun. Allentown, Pa.

Dept. of Commerce 12/1/19

Latest Weapons Used by U. S. in Crime War

For combating crime, the latest weapons have been placed at the disposal of agents of the United States department of justice. This action is one of the government's steps in adequately equipping its agents to battle the gangster, kidnaper and other types of criminal. Among the new weapons is a tear-gas gun that has been found highly efficient in routing the criminal from his hiding place. Another addition to the federal armament is a Colt monitor, which fires a thirty-caliber bullet accurately up to four miles.



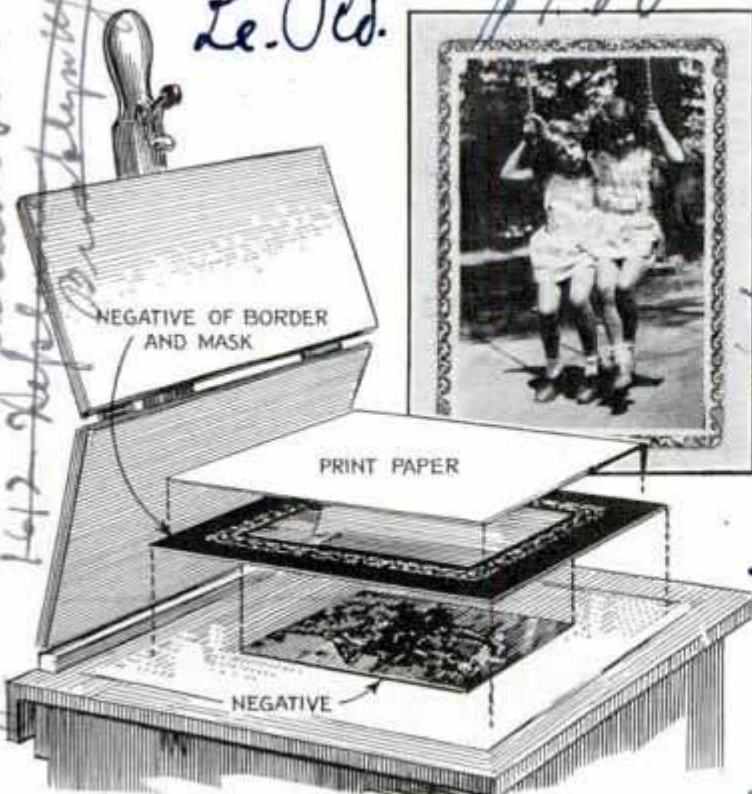
Examining Some New Weapons That Federal Agents Will Use in Nation-Wide Campaign against the Criminal

D1529

BORDER MASK IS PRINTED WITH THE NEGATIVE

Fancy borders and negatives can be printed at the same time by using a new border mask that makes the old double operation unnecessary. Formerly, the border of the photograph was printed first, the mask removed from the printing frame and then the negative and paper were

slipped into place. The new border mask has six different colors that take care of the difference in the densities of negatives, thus producing a border and photographic print of the same color. This makes it possible for the camera fan to print his own borders on his pictures without trouble. The borders are made up in artistic and modernistic designs with nameplate if desired.



Drawing of Negative and Border Mask Being Printed at Same Time; Upper Right, the Finished Product

D1624

FRUIT JUICES PRESERVED BY SILVER PROCESS

Apple cider, grape juice and other fruit juices can be kept from spoiling by a combination of silver and electricity that kills bacteria. Silver in minute quantities is added to the fruit juice and a small electrical current is passed through the solution. The electricity forces the silver into solution, preventing fermentation. The process is similar to the bacterial sterilization of water by the use of colloidal silver.

Company taken by Easton Photostate Corp 1-6-27

As not give me stop
Lawrence H. James and
A. A. Delevins, U. S. Bureau of Chemistry, Wash. D. C.

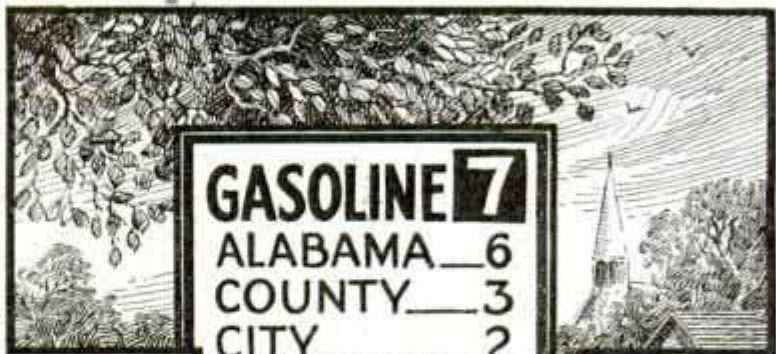
International Research Laboratories

D 1448

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

WHO PAYS the

Right, Sign Posted by an Alabama Filling Station Proprietor to Show Why He Sold Gasoline for Twenty-Two Cents a Gallon; He Paid Seven Cents for a Gallon of Fuel and the "Me" Represents His Profit of Three Cents; the Other Twelve Cents Paid by the Consumer Was Taxes; Below, Story of Taxes Collected from the Manufacturer of a Nationally Distributed Product



GASOLINE	7
ALABAMA	6
COUNTY	3
CITY	2
UNCLE SAM	1
ME	3
TOTAL	22
HIGHEST	
GAS TAX	IN THE WORLD



TAXES PAID BY SMITH BROTHERS

- | | |
|--|------------------------------|
| FEDERAL INCOME TAX | FEDERAL CAPITAL STOCK TAX |
| FEDERAL EXCESS PROFITS TAX | NEW YORK STATE FRANCHISE TAX |
| CITY TAX | CITY TAX |
| COUNTY TAX | COUNTY TAX |
| STATE TAX - NEW YORK | STATE TAX - INDIANA |
| AUTOMOBILE LICENSE TAXES | FEDERAL GASOLINE TAX |
| FEDERAL OIL TAX | NEW YORK GASOLINE TAX |
| TELEPHONE TAX | TELEGRAPH TAX |
| CHECK TAX | TAX FOR CODE ADMINISTRATION |
| PROCESSING TAXES ON SUGAR - WHEAT - CORN - PORK - COTTON - PEANUTS | |
| STATE OF INDIANA FOREIGN CORPORATION REGISTRATION | |
| STATE OF INDIANA TAX ON GROSS RECEIPTS | |
| STATE OF OREGON TAX ON GROSS RECEIPTS | |
| STATE OF WASHINGTON TAX ON GROSS RECEIPTS | |
| STATE OF CALIFORNIA PERSONAL PROPERTY TAX | |
| STATE OF WASHINGTON PERSONAL PROPERTY TAX | |
| STATE OF OREGON PERSONAL PROPERTY TAX | |
- We do Our Part...*

FACTORY PRICE OF 20 LEADING CIGARETTES NOW **3 7/10¢**
UNITED STATES INTERNAL REVENUE TAX **6¢**



CONSUMER SMOKING A PACKAGE OF 20 CIGARETTES A DAY PAYS AN ANNUAL TAX TO THE GOVERNMENT OF **\$21.90**

REDUCE GAS TAX

477-253
TEXAS - 1932

Sign Displayed by Motorist Who Favors Reduction of Tax on Gasoline, and the Factory Price of a Package of Cigarettes Compared with the Federal Tax Assessed against the Package

D1448



-YOU DO

Motorist Buying Gas Outside Town Limits to Escape City Tax and an Ox Team Traveling on a Concrete Highway Which Was Paid for by a Tax on Gasoline

IF the head of every family in the United States was compelled to work for the government three months out of each year without pay before he could start earning a living for his dependents, he would probably be willing to compromise on a less costly government in return for a bit less of his labor. Yet that is exactly what is happening in the United States today.

The income of the average family of 4.2 persons is \$1,184. The average tax bill—local, state and federal—is \$300 a family—more than a quarter of the annual income. In addition, each family is saddled with a debt of \$1,800, which must be paid through additional taxation as the government bonds fall due.

It is the prevailing idea among the majority, who are exempt from the income tax and who own no real estate, that only the wealthy pay taxes. In reality even the poorest person pays tribute to the government with even his smallest purchase.

Bread begins to be taxed when the

farmer pays the county tax collector. The processing tax then raises the price of wheat thirty cents a bushel, or about half a cent on a loaf of bread. Then the miller and baker must pay real estate and income taxes, and must pay their employes larger wages because they too are taxed. These taxes, amounting to about two cents a loaf, are all included in the cost of production and are paid by the person who buys the bread. With the government slaughtering little pigs and the packer paying a processing tax of \$2.25 a live hundredweight, the consumer pays about four cents a pound in taxes when he buys pork chops. It is conservatively estimated that out of every dollar spent by the housewife at the grocer and butcher, nineteen cents goes to the tax collector.

Clothing is not taxed so highly, yet at least two dollars out of every hundred go to run the government. We pay two cents tax on every 1,000 matches, two per cent

(Continued to page 128A)

D 1579



Kaufman & Fabry

© Publishers Photo Service

Two-Passenger Model of the River Boat, "Robert E. Lee," Which Is Propelled by a One-Horsepower Motor

MODEL OF FAMOUS RIVER BOAT IS PROPELLED BY MOTOR

After constructing a model of the famous river boat, "Robert E. Lee," large enough to carry two passengers, the builder decided to motorize the craft. It is propelled by a one horsepower motor and attracts much attention as it chugs along a river with its capacity load of two persons.

"SANDPAPER" ROAD DECREASES SKIDDING ACCIDENTS

Accidents due to skidding by automobiles can be decreased by building "sandpaper" roads. This is the opinion of Prof. R. A. Moyer, of Iowa State College, who made an exhaustive study of skidding characteristics of tires on various types of road surfaces and decided the most important anti-skidding factor on a highway is to give the road a sandpaper-like finish with gritty particles. Bends taking the

D 1538

Science Service 12/4/34 Ames, Iowa

shape of a spiral rather than a circle are needed for safety at speeds greater than fifty miles per hour, he said. In actual driving, he pointed out, most motorists execute spiral transition curves. In making a bend to the right, for instance, the driver often cuts to the left side before entering the curve, then goes to the right side while actually in it. This wandering from one side to the other is dangerous and highway engineers are giving thought to building curves in spiral fashion so drivers can take them as they do now, but with greater safety to approaching motorists.

D 1581

VOLTAGE TESTER IS USED WITH SIGHT METER

Used with the sight meter, a new indicator checks the socket voltage of a lighting system by turning volts into light foot-candles. The indicator uses a carbon-filament lamp, housed in a tubular container, with a plug-in cord. After the tester is connected, the end of the container is placed over the photronic cell or window of the sight meter, which then shows the intensity of the light in foot-candles on its dial. By using a conversion scale imprinted on the side of the container, the voltage of the lighting system can be determined quickly.



Inquiries as to makers of articles described in Popular Mechanics, will be answered by our Bureau of Information upon receipt of return postage.

General Electric Co.

Worson or Wright meter

D1584

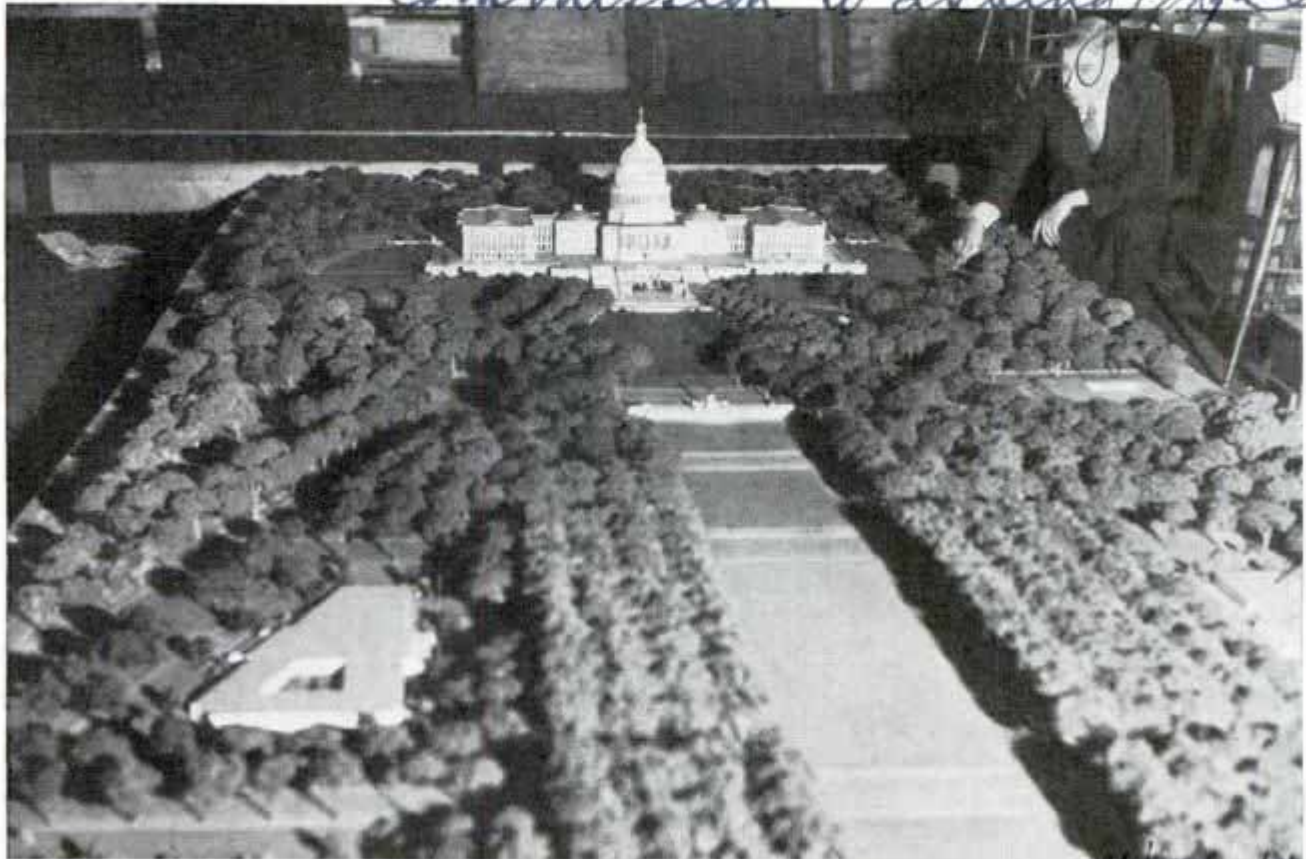
William S. Partridge,
Consulting Architect,

POPULAR MECHANICS

National Park Planning
Commission Washington

381

Model of Washington Helps Plan Changes



Model of Section of Washington Near the Capitol Used in Working Out Proposed Changes Before They Are Attempted; the Grant Memorial Is Shown in the Foreground

Changes being planned in the national capital first are worked out on a large scale model by officials of the national park planning commission in order to ascertain just how the proposed alterations will fit into the general plan for making the city more attractive. In the accompanying photograph is shown a model of Union Square, now being created at the east end of the Mall where the Botanic Gardens formerly were located. The model shows the Grant Memorial with the capitol in the background. At the north side of the new square is the Meade Memorial and at the south side a new memorial is to be erected. Its subject is not yet selected.

at the side of the camera, is rested on the eyepiece of the microscope, which is manipulated until the image is sharp and clear. Then the camera is swung over the eyepiece and the exposure made. Roll film No. 127, is used. The picture will be as sharp and rich in detail as the quality of the microscope will permit.

OUTFIT MAKES MICRO-PHOTOS AS EASILY AS SNAPSHOTS

With an outfit now on the market, the amateur can make photographs of objects under the microscope as easily as snapshots. The outfit consists of a camera, focusing tube, base, clamp and light-tight connector. Any make of microscope can be clamped to the base. The focusing tube,

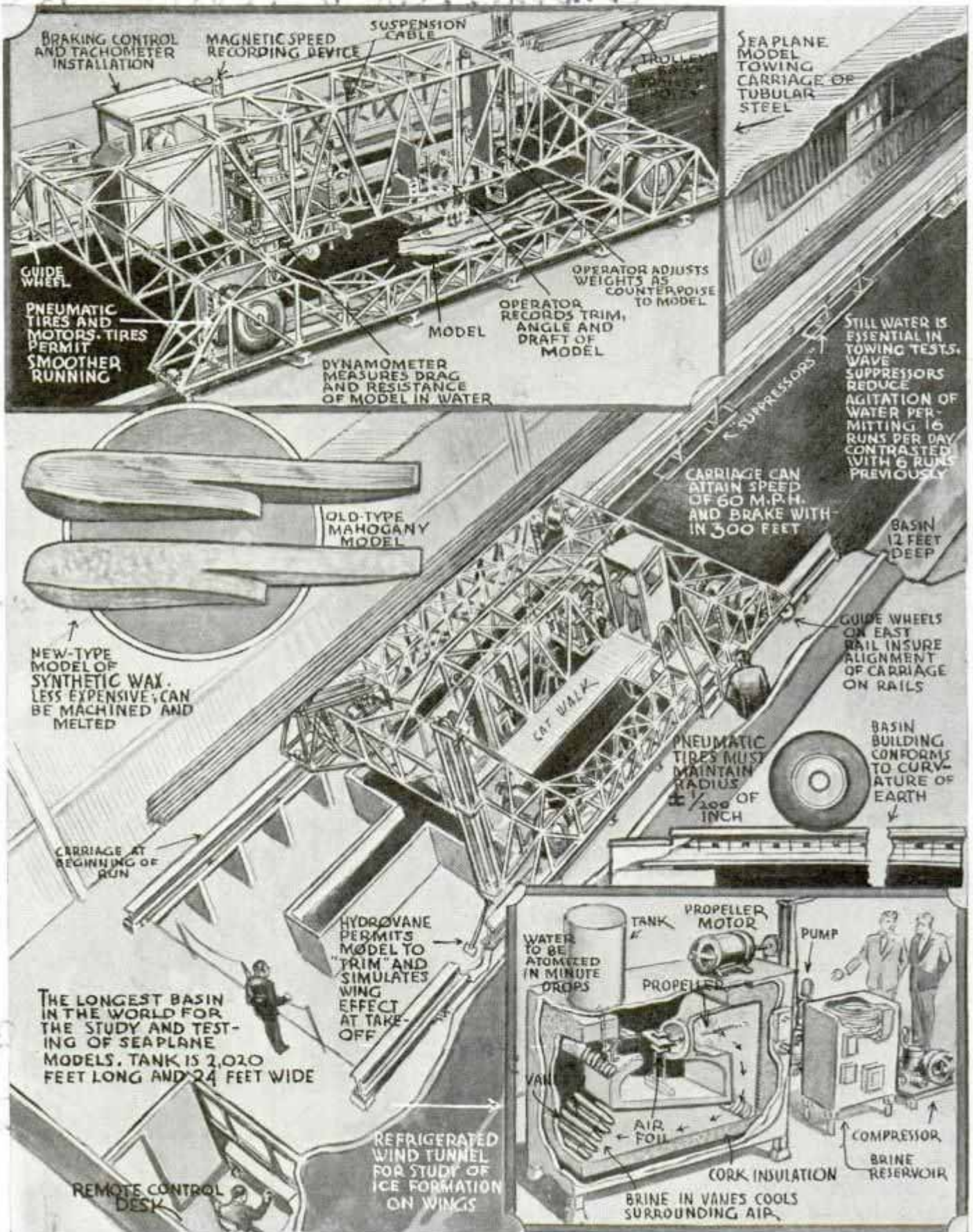


Equipment for Photographing Objects under Microscope; Its Operation Is Simple

Bausch & Lomb Optical Co.

637 St. Paul, Rochester, N.Y.

Seaplane Models Proved in Half-Mile Tank

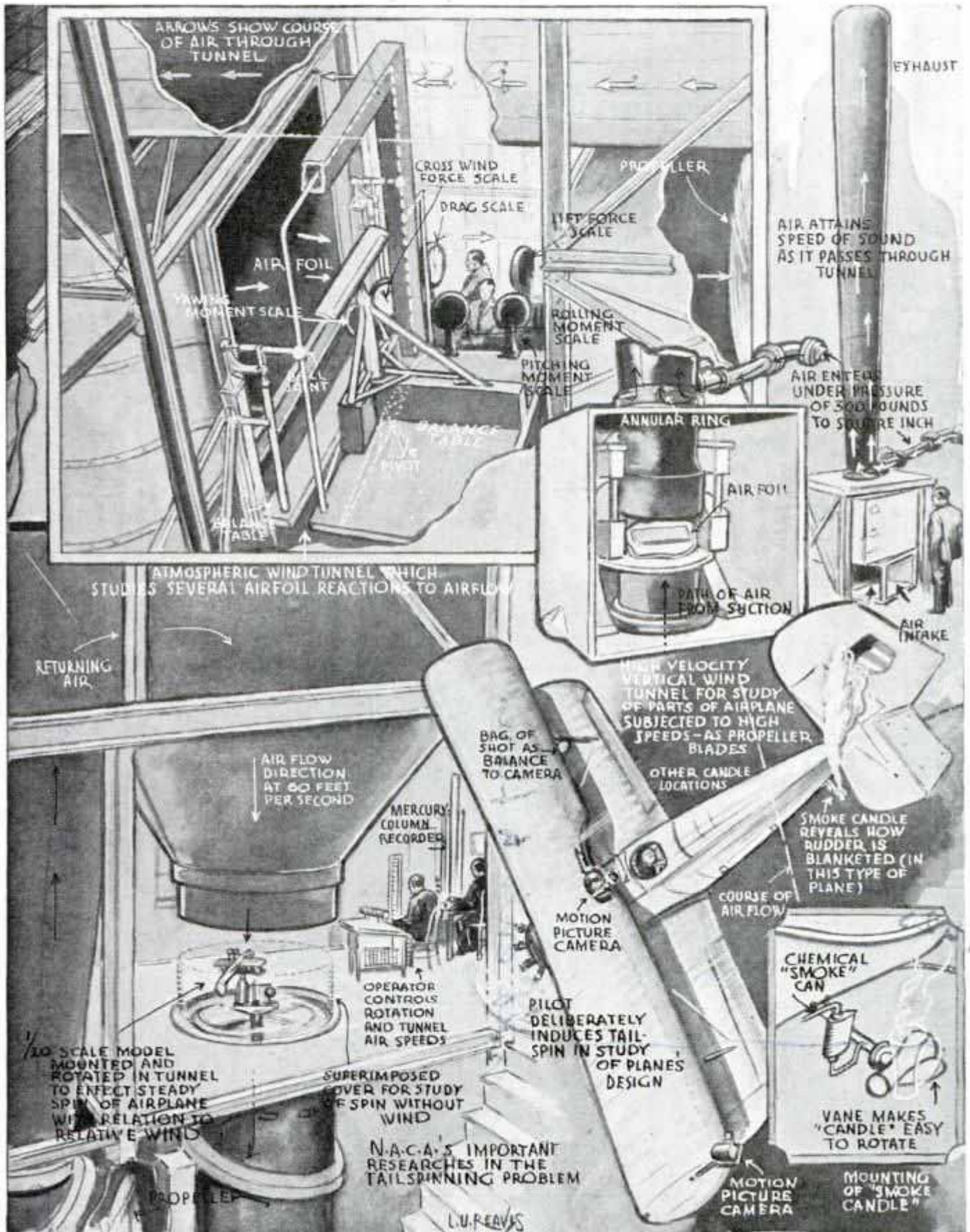


Here Are Some Aspects of the Work of the Langley Memorial Research Laboratories of the National Advisory Committee on Aeronautics in Promoting Safer, Speedier, Better Constructed and More Efficient Airplanes and Seaplanes; the Performance of Many of the Most Outstanding of Modern American Planes Can Be Traced Directly to Research Such as This

Washington, D.C.

D1489

High-Speed Wind Tunnel Tests Plane Designs



Seaplane Models Are Tested by Suspending Them from an Overhead Carriage in a Tank More Than 2,000 Feet Long; the Carriage Can Attain a Speed of Sixty Miles per Hour; High-Velocity Wind Tunnels Quickly Demonstrate the Efficiency of New Plane Designs and Also Aid in Studying the Properties of Individual Parts of a Plane, Such as the Propeller Blades

Logan H. Oscar D145

15th New York

D1598



License Plate with Reflectors Set in the Numbers, Making It Easy to Read at Night

REFLECTORS IN LICENSE PLATES ARE VISIBLE AT NIGHT

Automobile license plates which can be read at night were exhibited at a recent crime conference in Washington. The plates have reflectors set in the numbers, making the numbers themselves visible when the light from the car's own lamps or from a passing car falls on them. They are being urged for the entire country as an aid in identifying night drivers.

BEEES KILLED BY INSECT POISON SPREAD BY AIRPLANES

Bees are suffering from poison dusts spread from airplanes and intended for the destruction of harmful insects. Dr. J. E. Eckert, of the University of California, estimates the airplane dusting method is responsible for the loss of a million hives or colonies of honeybees in the United States during the past several years. The bees are not always, perhaps not usually, affected by the poisoning of the flowers of the plants being protected by the dusting. Apparently they are injured instead by the drift of part of the deadly dust into the flowers where they are working. Bees gathering nectar are usually killed by the

poison before they can reach the hive, it has been found. Pollen-gathering bees carry home the poisoned food and give it to the young bees, thus cutting off the increase of the colony at its source.

D1544

"TALKING BOOK" FOR THE BLIND IN PHONOGRAPH RECORDS

"Talking book" machines, which read to the listener, have been devised for the blind. Instead of reading by running his fingers over Braille type, the operator simply places a record on the combination phonograph and radio receiver and turns on the switch. The records are large and the grooves fine, making it possible to put a whole chapter of the average book or an act of a play on one side of the disk. The records reproduce the book as read by an announcer or other person with a good voice. Headphones are provided for night operation, making it possible to "read" without disturbing the neighbors. How-



Blind Person Being Taught to Operate Machine That Reads through Medium of Records

ever, normal operation is by loud-speaker, which serves phonograph and radio. Standard works of literature already have been transferred to records for use with the machine.

cannot locate

Entomologist at Davis. Cal

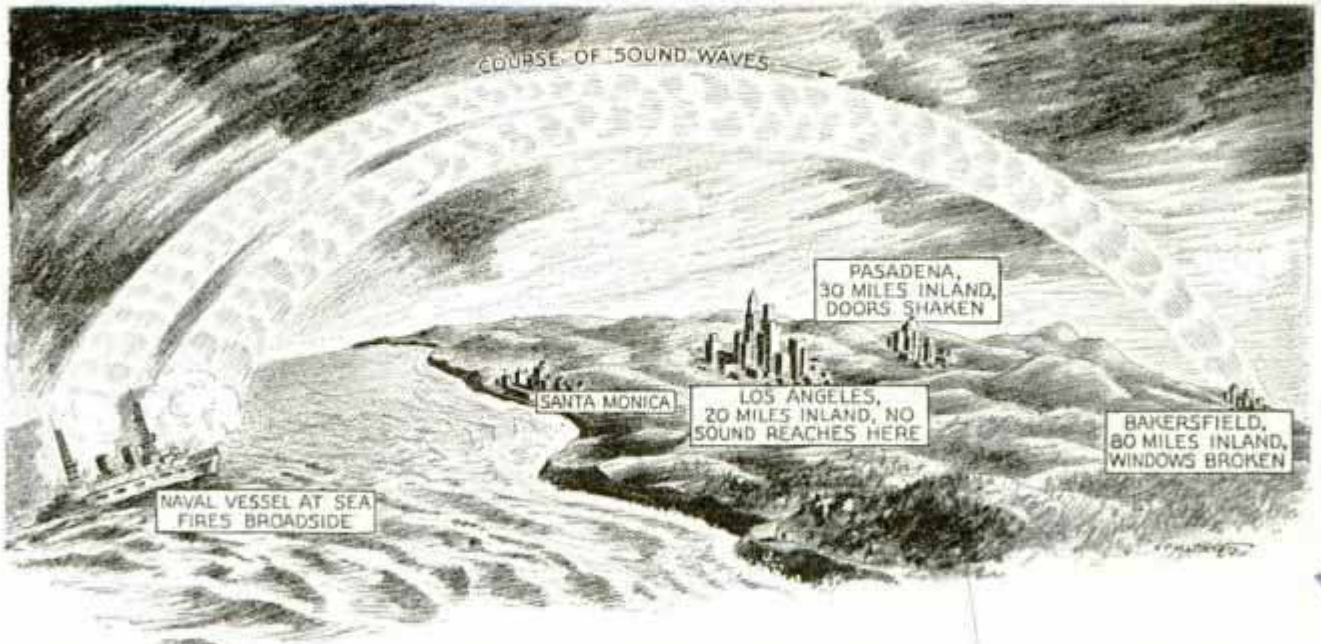
at meeting of American Association of Economic Entomologists

could only be blind

15 W. 76th St. New York. Cal. in mem. file.

American Foundation for the Blind

D/S 20 *Com. John C. Mary*
Box 292
Hollywood Calif
Sound Waves from Big Guns Travel in Arc



Drawing Showing Path of Sound Waves from Big Naval Guns Which Broke Windows Eighty Miles Inland but Did No Damage in Cities Much Nearer the Coast

During naval target practice in the Pacific near Santa Monica, Calif., windows were broken by the sound waves in Bakersfield, eighty miles inland. On the other hand, no sound from the guns was heard in Los Angeles, only twenty miles from Santa Monica, while at Pasadena, ten miles farther inland, there were slight repercussions and doors were shaken. Dr. Beno Guttenberg, geophysicist of the California Institute of Technology, explains this phenomenon with the statement that sound waves travel in an arc similar to that described by a shell, the course of the waves being curved by temperature changes in the stratosphere. A given set of conditions may cause the waves to be reflected sharply down to a small area on the ground far from the source of the sound.

Pasadena Calif
LIFE PRESERVER FOR AVIATOR IS INFLATED INSTANTLY

D/S 509
 Army flyers are using a special type of life preserver when traveling over or near large bodies of water. The preserver, which is a rubber cell, is in the form of a vest and slips over the head, being held in position by straps which buckle about the thighs. In an emergency the rubber bag or cell is inflated with gas almost instantly, although it is worn in a deflated condition. The gas supply is compressed and sealed

in two small cylinders attached to the front of the preserver. To inflate the vest, the wearer pulls a lever attached to the cylinders. This breaks the seal and releases the gas which inflates the cell. The preserver is light, compact, comfortable to wear and easy to operate. This makes it more adaptable for use over heavy flying clothes than the old type buoyant preserver of cork or some other bulky substance.



Life Preserver for Flyer Inflated by Breaking Seal in Cylinder in Which Gas Is Compressed

Material Lension, Wright Field Dayton Ohio

Comb. Curranell, with Sub. Photo. Clarke J. H.

Breathing LIFE into



Left, Walt Disney, Creator of Mickey Mouse Cartoons, Examining Sketches for a Forthcoming Production; Above, Ready to Record the Sound Effects for a Cartoon Movie; Note the Ear Phones, Bringing Each Man the Metronome Beat; Right, an Animator Using a Fellow Workman as a Model for a Picture, and an Operator Photographing a Tracing against a Background While an Assistant Is Preparing the Next Set for Photographing



WHEN figures in a series of pen-and-ink drawings were made to blend into an illusion of motion, the cartoon had moved a step forward. Now music accompanies the showing of the cartoon movie, sound effects follow the motions, and these creatures of an artist's pen speak and sing—a magic life has been breathed into the once flat, lifeless drawings!

The principle of motion in movie cartoons is simple. In a series of drawings showing a man raising his hand to his hat, the first depicts him with his arm hanging.

In the next, the arm is raised slightly and following drawings show the arm at higher and higher elevations, until the hand finally touches the hat. When the series is passed before the eyes at a rapid rate, it seems that the arm is making a continuous motion.

This is because vision "carries over" beyond the point where an object has been removed from sight, and one drawing blends into the next without consciousness of interruption. Movie cartoons are like any other motion picture in respect

11312
John R. Macey, Box 292, Hollywood, Calif.

CARTOON *Characters*



to this illusion of motion. Where the cartoon uses a series of drawings and blends them into motion by passing them rapidly in succession before the eyes, the ordinary movie uses a series of "still" photographs.

It is in the sound effects accompanying the picture that the cartoon movie differs radically. While the





Above, a Story Conference Where the Ideas Are Evolved; Below, Layout Men and the Picture Director Making the Rough Sketches

drawings are photographed one after the other by a "stop-action" camera that takes one exposure at a time, sound must be recorded continuously at the rate of ninety feet of film to the minute. Thus it is not possible to record both picture and sound together, as is done in the real life movie. In fact, the sound track is often completed

before the cartoon photographing is started.

Also the music, dialogue, and sound effects, are handled separately. A guide had to be found, so that the several parts of the production, when brought together would match. A steadily bouncing ball was tried, photographed along the edge of the picture so that the musicians could time their music with the action. Then a wavy line was used. Finally, the steady, never-varying revolutions of the city generators were enlisted. A synchronously driven contacting device controls an audio-frequency oscillator, and a constant

beat from the oscillator guides the mechanics of the production.

In an orchestra each member wears ear phones, bringing the rhythmic beat of the electric metronome. The men who supply dialogue and sound effects are likewise equipped. Music, words, and sound effects are so timed while they are being recorded

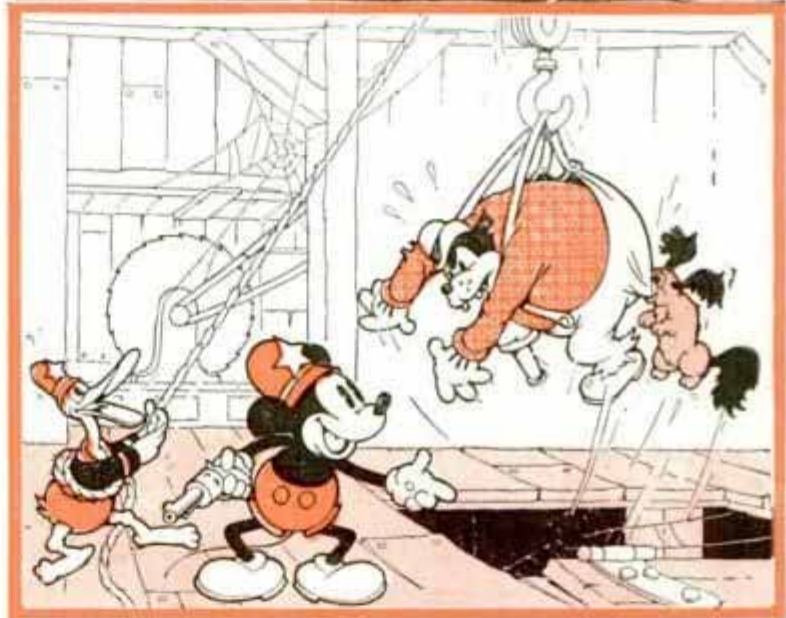
separately that they will later match accurately with each other and with the cartoon action.

When the sound is finished, the three—and sometimes four—tracks are run at once on separate sound projectors, and the composite sound is fed into the mixing chamber of a recording camera. The negative from this carries the synchronized result on a single sound track.

Film is standardized at sixteen frames to the foot, and projectors run the film at twenty-four frames per second. With this as a basis, the production of animated cartoons becomes a mathematical process. The script is divided into scenes and each is allotted a certain number of feet of film. The scenes are numbered to guide the cartoon animators and sound men. If a certain scene calls for twenty-four feet, or 384 frames, of film space, the cartoons are drawn so that the action is completed in just that length. Converting this into time, the musical director handling the sound for that scene must fit his work into sixteen seconds of elapsed time. The parts thus produced come together in the completed film so accurately that often no adjustment is necessary.

Instead of drawing each picture in a series complete with the background, the background for an entire sequence is now done on an opaque sheet of heavy paper, and sheets of transparent celluloid, or "cells," carrying tracings of the cartoon characters, are placed on top of this. The scene is photographed, then another set of cells is arranged in place on the same background and photographed.

(Continued to page 118A)



Top, Trying to Induce a Penguin Model to Change Its Pose by Offering It a Fish as a Reward; Below, Checking Finished Cells, Before Photographing

Choir Trained by Sound Film Split into Parts



Top, Singing Pupils, Each Wearing Headphones, at Lesson; Center, Teacher Instructs Each Pupil through Microphone as He Listens to Voices in Speaker; Bottom, Heart of Choir-Training System

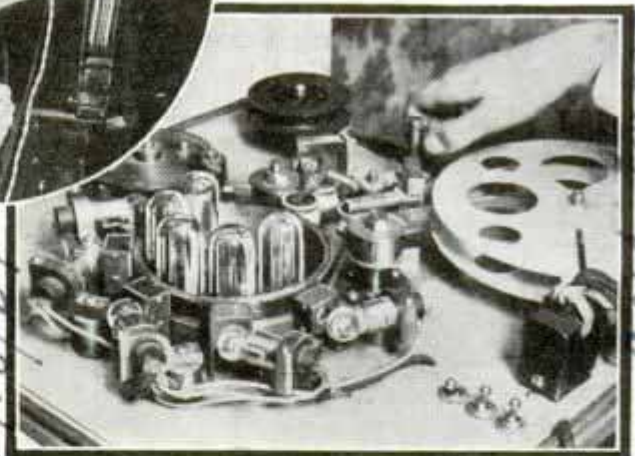


Scientific training of singers is made possible by a sound-film device that splits a song into parts and transmits each part independently into different loud speakers or headphones. Thus, the soprano group in one room will hear only soprano parts, the alto group in another room hears only alto and so on, with the tenor and bass. The inventor, Capt. Richard H. Ranger, in the monitor room, listens to the various groups separately and then to the complete melody by operating control switches. With the aid of a microphone, he instructs the groups as they sing. The basis of the invention is a small film on which have been recorded five sound tracks, side by side, one sound track for soprano, another for the alto, a third for tenor, a fourth for bass and a fifth for the complete melody. This film passes around a drum before five different photo-electric cells. In front of each photo cell is a miniature auto headlight and a small lens for bringing the rays of the light into focus, these rays then

passing through the film to the cells. Thus, the sound is carried to five separate rooms, each part going to a different loud speaker or to headphones worn by each singer. It is possible to train the choir together, each singer listening only to his part in the headphone.

PHOTO CELL GUIDES POSTAGE STAMP PERFORATOR

Because of the many complaints by collectors about postage stamps being out of alignment, an engineer of the bureau of printing and engraving was assigned the task of straightening the alignment of stamp perforations, an important item



with the collectors. As a result, photoelectric cells now are employed to guide the perforator. These cells, acting on opposite borders of stamps, serve as automatic eyes. When the perforator veers from center, the cells activate a compensating mechanism which turns the puncher back on the right line. During the last fiscal year the perforators operated on twelve billion stamps, punching 370 trillion holes along the borders. The paper which fell from the holes weighed thirty-five tons.

Alvin W. Hall
Director Bureau of

1574 Parker Ave. Newark, N.J.

Electric choir

D 1552

device 15-15-34

Bureau of Printing and Engraving, Washington

33 leaves - Habana, Cuba
LEAF AS EMBROIDERY BASE
RESULTS IN NEW BEAUTY

Poplar tree leaves treated to remove the leafy structure and leave only the fine veinwork, are used as a base for embroidery by a Cuban girl. The leaf is cut from the tree, those that have fallen being of no use, and placed in water for from fifteen to twenty days, the water being changed every day. This bath softens the green leafy structure so that it may be removed with a soft brush very carefully used with a patting motion on both sides of the leaf until nothing is left except the veinlike skeleton. The leaf is then hung in the air until perfectly dry. Then the desired design is drawn on the leaf, care being taken not to break the fine network of veins of the leaf. Only the outline of the design is drawn on the leaf. The design is then embroidered in regular stitches with silk thread of various colors. In such parts as the petals of flowers, one color is frequently put over another, in part, at least, to produce a raised effect as in other embroidery. The leaf is frequently finished with a small silk flower placed at the point where the stem joins the leaf.



D1545
CLOTH IS MADE WATERPROOF
BY USING "BAKELITE"

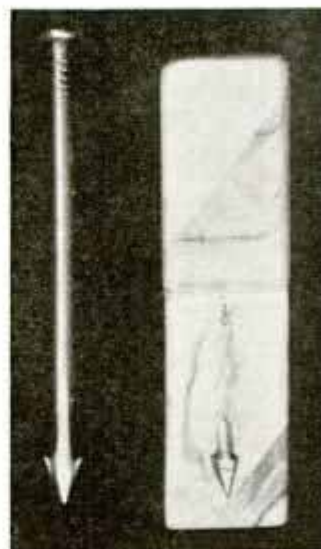
Made from a durable fabric treated with a flexible Bakelite resinoid material, a cloth is being produced which is resistant to water, oil, alcohol, fruit juices and most other liquids which stain or corrode. The cloth is available in several weights and a variety of metallic finishes, patent leather and gaily printed designs. It can be made into raincoats which can be rolled up and tucked into a handbag, slippers which can be cleaned with a damp cloth, colored sports overcoats and golf jackets. It is used for stage settings and costumes and in the home it is employed for cur-



D1567
Raincoat and Samples of Fabric Treated with "Bakelite" Resinoid Material to Make Them Waterproof

tains, valances, wall and shelf covers, decorative screens, card-table covers and shower-bath curtains. Burning cigarets have little effect on it, soapy water does not harm it and it does not stiffen with age. Should it become wrinkled, it can be ironed smooth.

D1576
BARB ON SELF-LOCKING NAIL
RESISTS WITHDRAWAL



Self-locking nails which cannot pull loose when once driven into wood are equipped with barbed tips, the barbs constituting the locking feature. The nails drive easily, but the force needed to extract them must exceed the strength of the wood fibers in which they are imbedded. The

longer such nails remain driven, the tighter they hold, it is claimed, due to the moisture changes in wood.

Bakelite Corp.

The Self-Locking Nail Co. 6348 Michigan

D1415

Thomas & Sumner, Jr.
10555 Holman Ave
Los Angeles, Calif.

SECRETS of the

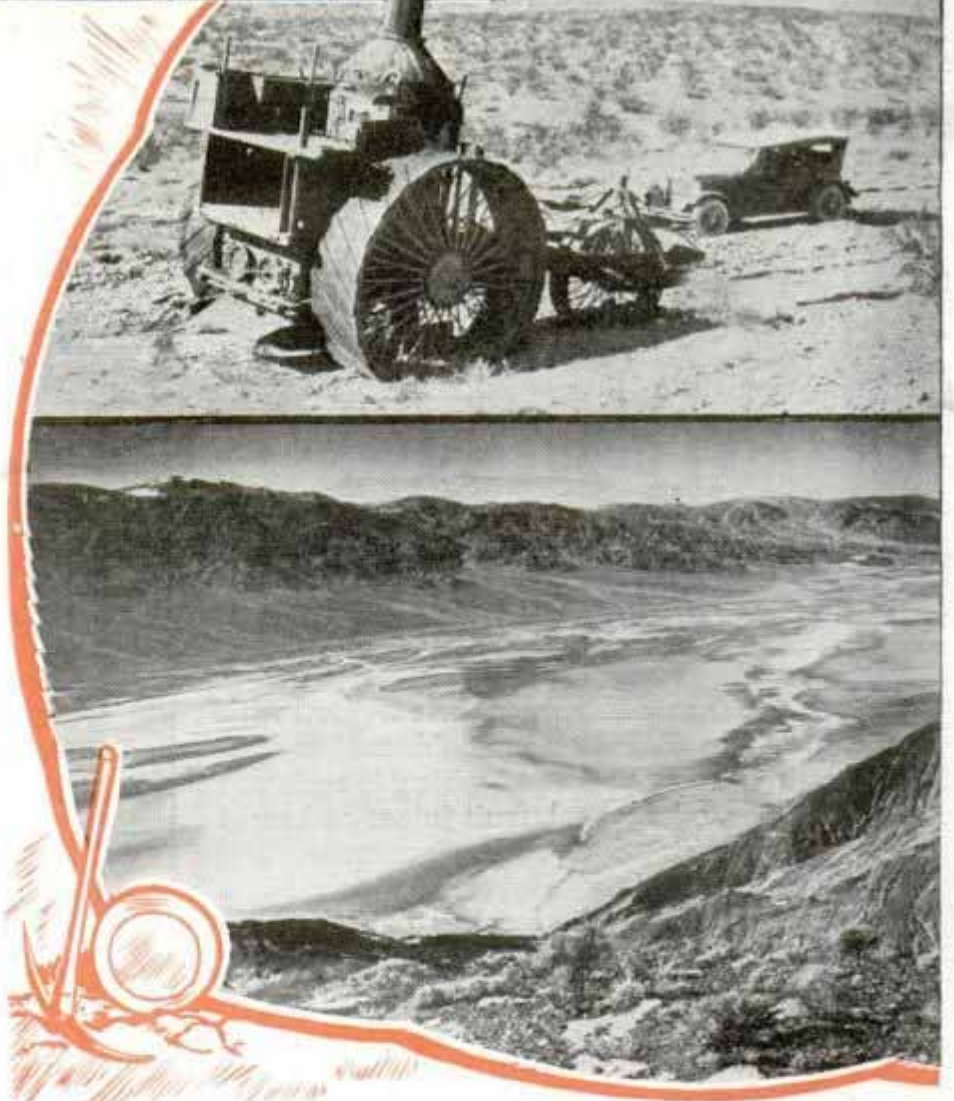


November 14th 1922

AMONG the legends of the old west are many stories of mysterious "lost mines" that are still hidden in the hills today in spite of years of patient search.

Some of them were lost when the discoverers forgot their way in the desert and couldn't retrace their steps. Others became legendary tales after the owners had died without leaving records of their locations. Scores of men have perished in the hunt for the elusive ore bodies although others have made strikes that were just as good or better than the mines they were seeking.

Many of the lost mine stories are classified as mere prospectors' yarns, but now that the west is being combed diligently for gold and silver the secrets of some of the real lost mines are being rediscovered. Such is the case of the long lost "mine with the iron door" worked by the Spaniards centuries ago. It received its name when the owners con-

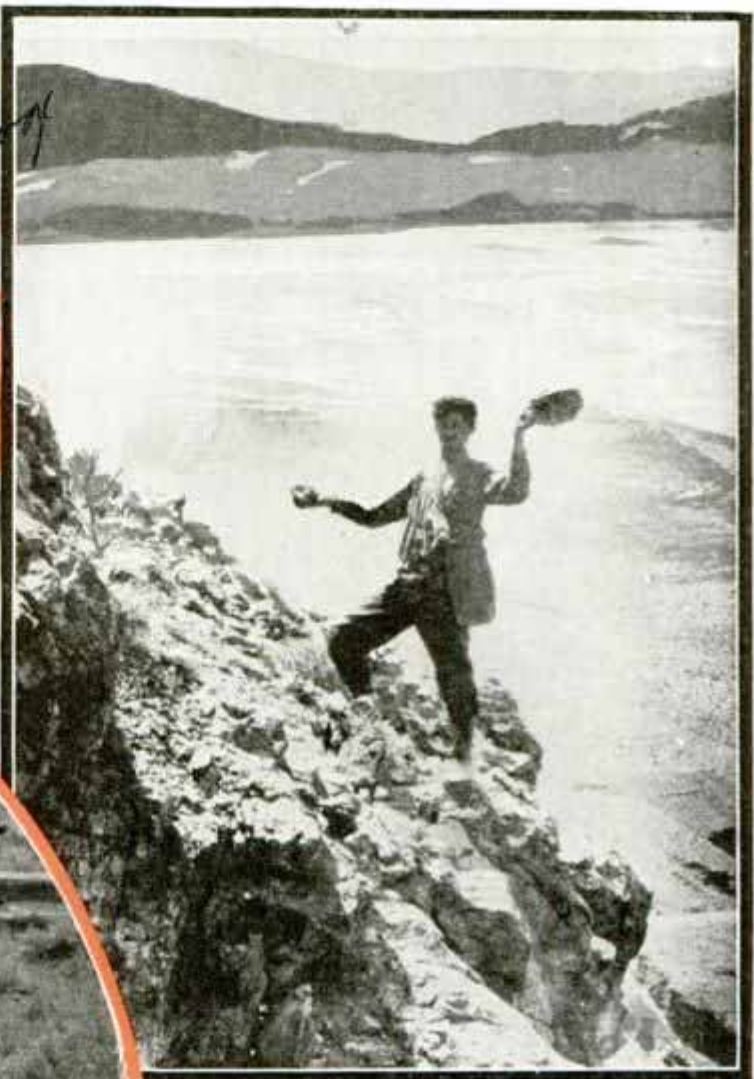


Lower Photo Courtesy Auto Club of Southern California
Adobe Hut Used by Early Miner, Steam Tractor Abandoned after Being Used to Haul Ore, and a View of Death Valley

Arava
in Rancho
Creek, ^{near} Oracle,
Calaveritas,
Calif.

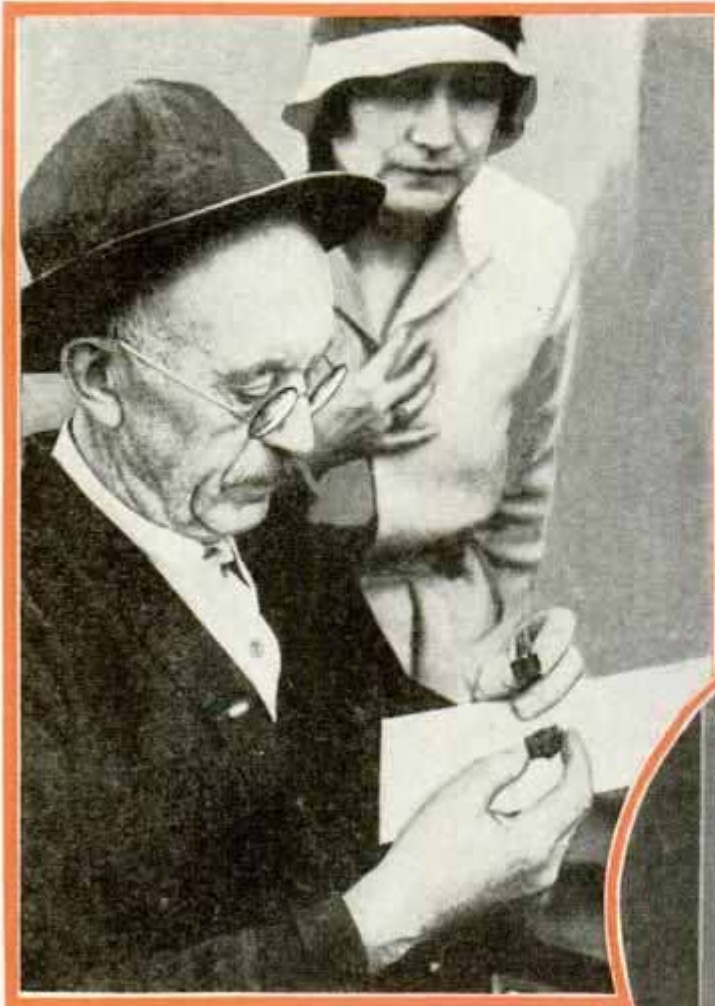
LOST MINES

Right, Signaling Discovery of Ore; Below, Ore Crusher Used by Spaniards, and "Shorty" Harris, Prospector Who Made Strike While Hunting for Lost Mine



cealed the source of their treasure under a dump of iron ore when hostile Indians drove them away. Only contradictory tales of the old mine remained and even its approximate location was unknown until several years ago, when the skeleton of a burro was found beside a bullskin containing thousands of dollars worth of high-grade ore in an eroded creek bank near Oracle, Ariz. With this clue to guide them prospectors finally uncovered the old mine.

The secret of the "Lost Shepherd," another of Arizona's famous lost mines, was solved last year by two prospectors who found a caved-in shaft and a small ore dump alongside a ledge of quartz ore that assayed \$1,000 to the ton. Hidden in a tunnel of the old mine, says



them to several lost mines if it were not for tribal taboos that forbid their telling of or even working in gold mines.

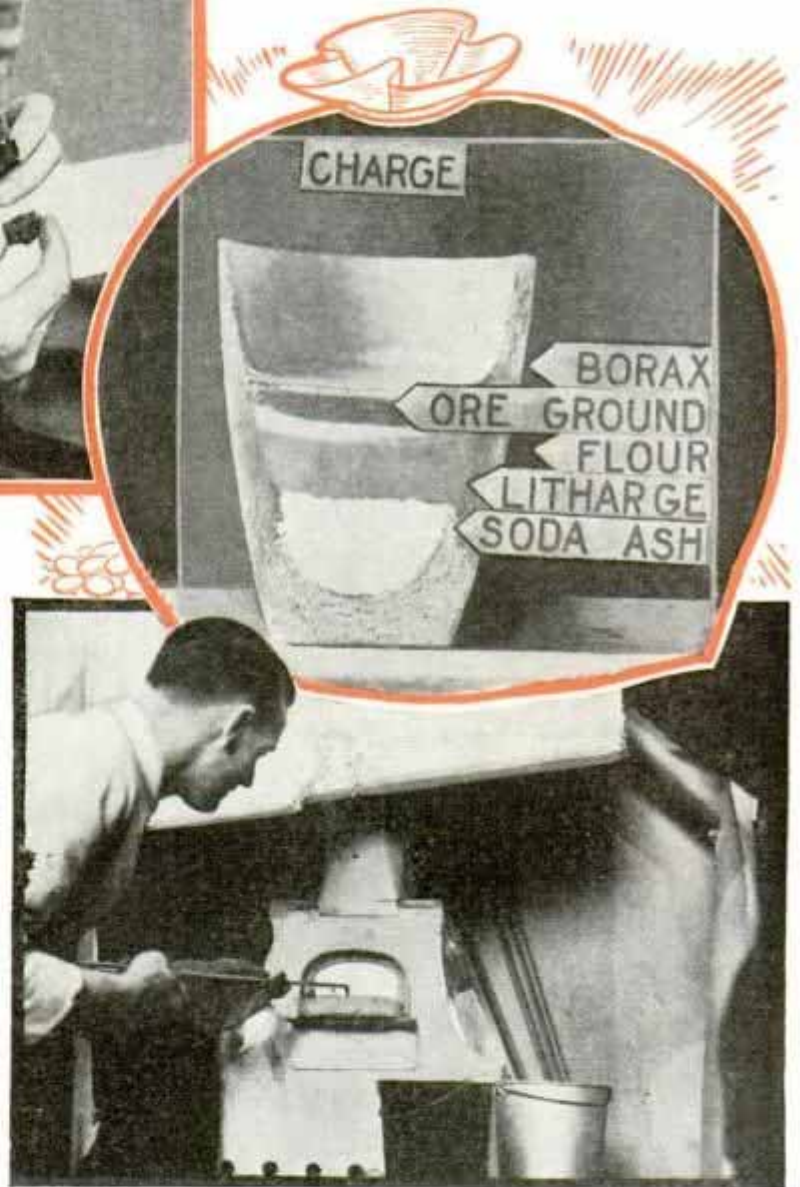
How do mines become lost in the first place? A typical story of a lost mine is told by a store owner in a small Nevada mining town.

"Years ago," he said, "a friend of mine staggered into town almost out of his head from starvation and thirst. In his pockets were hunks of rich ore. He said he had found hundreds of tons of this stuff, the

one of the many legends, is a "cleanup" of concentrated ore worth \$5,000,000 placed there by the original discoverers. Even if the new owners never find this treasure they will make a fortune from the rich ore.

Near Mesa, Ariz., was recently found the "Lost Padre," another mine worked by the Spaniards and lost when Indians forced them to abandon their work. The remains of an old stone building beside a shaft aided in identifying the mine.

An old Yaqui Indian revealed to Jesus Garcia and several others the location of an ancient gold mine that had laid undetected for decades within plain sight of motorists on a well-traveled road near Sonoyta in Sonora, Mexico. The old ore dumps looked like natural sagebrush-covered mounds until the Indian gave away the secret that his tribe had known for generations. Prospectors believe other Indians could lead



Examining Sample from Rediscovered "Lost" Mine, Charge of Chemicals Used in Assay Test for Gold, and Testing Sample in Assay Furnace

vein was a yard wide and he had it all staked out. If the rest of the ore were only half as rich as his samples he would be a rich man and I congratulated him. A week later he started back into the desert

with an outfit to go to work. The next thing I knew he was back in town for another grubstake. He hadn't been able to find the outcropping and he was trying again. He thought he knew just where it was, but he had lost his way after first discovering the ledge and it's still out there waiting to be found. Now it's a lost mine. The chances are that only a few inches of the high-grade ore are visible and that it will remain a mystery until someone is lucky enough to stumble on it."

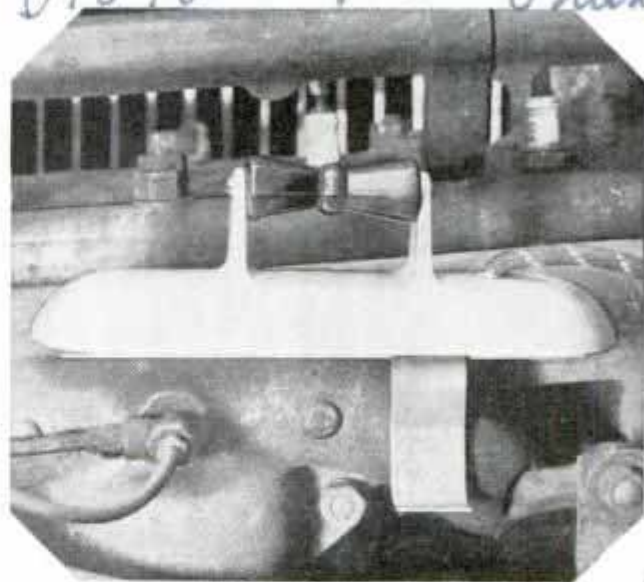
Not long ago a Los Angeles mineralogy instructor gathered several dozen samples of rock on a trip through the desert to show his students as specimens. Back at school, while demonstrating how an assay test for gold is made, he ground up one of the samples and put it in the furnace. To his amazement he found a tiny button of gold in the bottom of the crucible. The instructor thought he knew just where he had picked up the sample and went back to file a claim on the ledge. But he hasn't found the same ledge yet although he has prospected every canyon in the vicinity.

Thirty years ago much of the west was unexplored and a man who wandered through the hills for several weeks had a hard time going back to the spot where he had found good ore. Even today, although much of the desert has been surveyed and good roads criss-cross all parts of the west, a prospector may lose his way. Hundreds of square miles of hills look much the same and one canyon closely resembles another.

To a trained mineralogist a specimen of ore is as individual as a fingerprint and what convinces even a cynical engineer of the existence of some of the ghost mines is the fact that the first discoverers brought back samples unlike any other ores in the district. One such mine that has been sought unsuccessfully since the middle of the last century is the "Lost Cement Mine" somewhere in the mountains near Mono Lake, Calif. The mine consists of a vein of white cementlike material studded with chunks of gold. The man who found it worked it for years but kept his secret so well that no one ever followed him to the ledge and no one since has been able to discover the same ledge.

The "Lost Pegleg," is supposed to be

(Continued to page 122A)



Electric Motor Warmer Which Heats the Metal of the Engine and Enables Easy Starting

ELECTRIC HEATER FOR MOTOR AIDS IN STARTING CAR

Starting the car on a cold morning is made easier if an electric motor warmer is connected to it during the night. The heater, shaped somewhat like a flatiron, operates from a light socket and uses about one kilowatt of electricity for one night, or ten hours, of operation. It clamps on the intake manifold and keeps the metal of the engine warm by direct contact. It is claimed it will warm a cold motor enough so it can be started easily after only a few minutes of operation.

POCKET-SIZE WATER PURIFIER USES SMALL BATTERIES

Standard flashlight batteries provide the current for a pocket-size water sterilizer

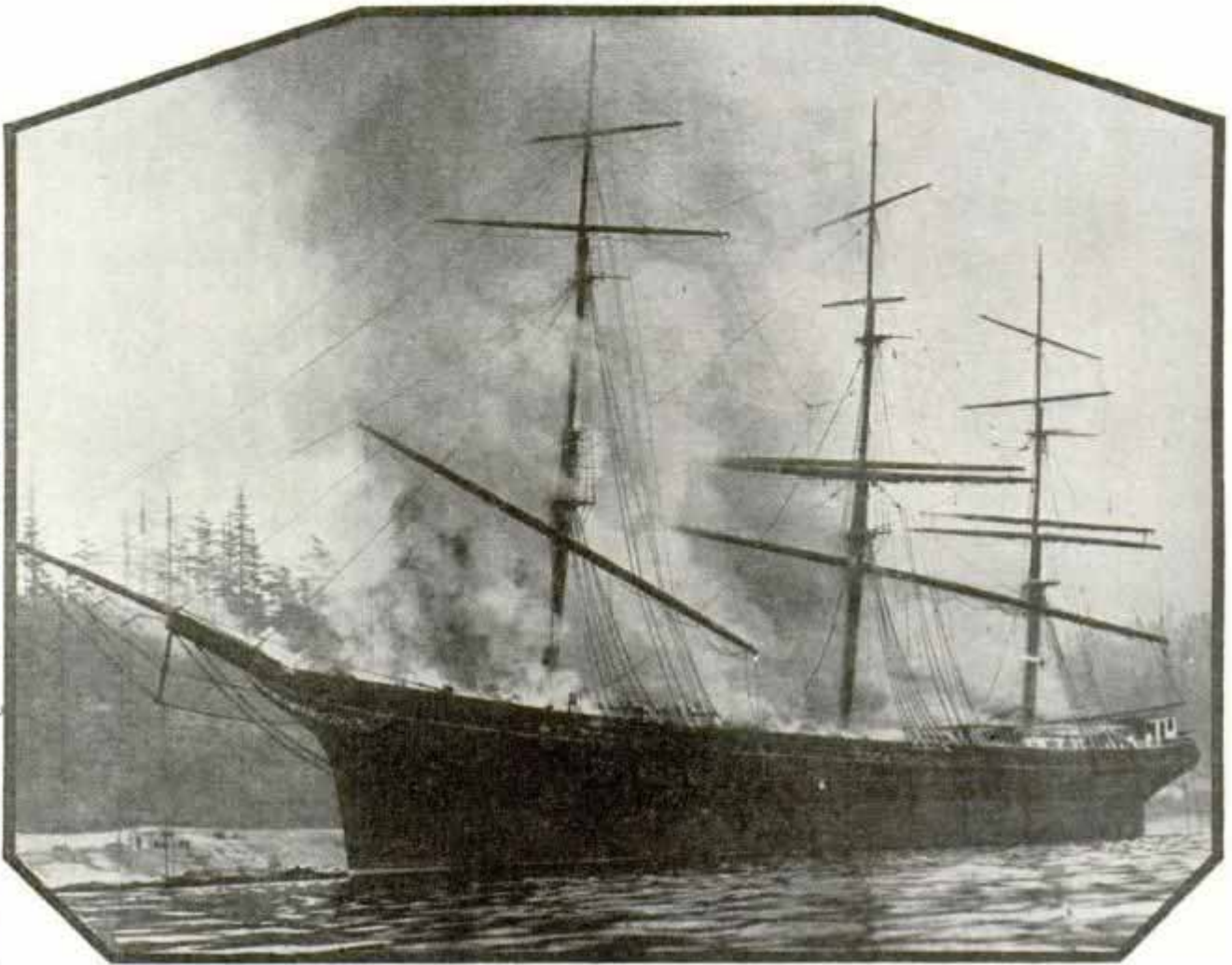


that is effective with only ten seconds of immersion. Two silver electrodes, attached to the sterilizer, may be removed and packed with the other equipment in a molded case. The sterilization is accomplished by small quantities of ionic-silver re-

leased in the water by the silver electrodes. The treatment does not change the taste, smell or color of the water.

Book Electric Heating Co
D1592 717 Frankfort
Dr. Cleveland Ohio
D1555
See Pub. 7934-575
Paradyne Inc.
11:11:42nd New York

Old Wooden Ships Burned to Salvage Metal



Large Wooden Ship in Flames Started by Salvage Crew; After All Wooden Structure Has Been Destroyed, the Metal Is Taken from the Hulk; Note Tiny Figures of Salvage Crew on Beach at the Left

During the last decade at least fifty wooden ships have been burned on the Pacific coast to salvage the metal in their hulls. Scrapping ships by hand is impracticable because of high labor costs. Infrequently hulls have been broken up for firewood but the trouble and expense of separating the metal from the wood made the job unprofitable and unworkable. Having purchased a ship for a relatively small amount, the salvager has many problems to solve. He must have tugs, scows and other equipment for handling the job and he must have a market for the salvaged metals. The costs are so heavy that only when there is a good demand with comparatively high prices for steel and iron scrap does the undertaking offer a profit. A suitable burning site must be found. A sandy beach is necessary, not too close to forests, dwellings or other buildings. There must be a wide tide range. The beach

must be as close as possible to urban facilities otherwise the cost of towing the ship to the beach and freighting the salvaged materials back to the market would eat up the profits. The first job is to strip the hull of all salvable material, including anchors, chains, donkey boiler, windlass, hoisting winches, steam pipes, kitchen utensils, bedding, sails, rope and provisions. Then the ship is towed away to be burned. At high tide the tug hauls the ship as far up on the beach as possible. When everything has been placed in proper order the salvager awaits calm weather before applying the torch. About two hours before high tide the fires are lighted. Quickly the flames spread, transforming the hull into an inferno. As the tide recedes the heat dries out the underwater section of the hull and the flames spread to every section. Within forty-eight hours the wreckage is sufficiently cooled to per-

Hilder and Marcus, Seattle Wash

Emb. Robert C. Hill 408 Marion St. Seattle Wash

1510.

321 Penobscot
 Rumford, Maine

mit handling. The wrecker floats a scow alongside. A steam caterpillar and crane pull the metal pieces from the mass and load them on the scow. In the case of long metal straps it is often necessary to cut them to convenient lengths with acetylene torches. When loaded, the scow is towed to the port's terminals where the material is usually transferred to freight cars to be hauled to a steel mill or to a modern steel ship bound for foreign ports. Several years ago, Puget Sound witnessed the burning of thirteen hulls in one pyre.

174 W
 Kellogg Blvd
 St Paul, Minn.
 6.75
 Canada
 9.00



Working on Radiator with Portable Soldering Outfit; Note the Acetylene Gas Tank

D1547
SHARPENER FOR SCISSORS USES BOTH FILE AND STONE

Built to hold the blades in an accurate position for grinding, a sharpener for scissors has space for both a file and a stone or for two stones of different fineness. The blade of the shears is clamped in a vise at one end of the sharpener and adjusted to a height which brings the edge of the scissors and the abrasive surface of the tool parallel by raising or lowering a ball-bearing head at the opposite end. The file or a coarse stone first is operated across the inner edge of the blade, then the finer stone is revolved into position and run over the edge. Stones of varying degrees of fineness can be obtained and are interchangeable. The castings are of aluminum.

Complete \$7.50



Scissors Sharpener Which Holds Blades at Best Angle for Grinding; It Has Both a File and Stone

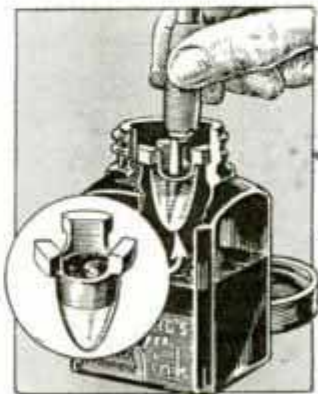
D1548
SOLDERING TORCH KIT WORKS ON GAS FROM TANKS

Designed for use with acetylene gas supplied in portable tanks, a new soldering outfit has many uses in small towns and farm homes where commercial gas is not available. The outfit operates with the small tank formerly used for lighting purposes, instead of the large commercial tanks. It includes a torch, four tips of va-

compressed-air tanks are necessary. Preheating is eliminated, the gas being ignited as soon as the connection to the tank is made. The torch heats almost instantly and is then ready for soldering, radiator repairing, lead burning, melting, tempering, light brazing, battery work, aluminum soldering and other work. The small size of the tank makes the outfit easy to carry.

D1549
INK BOTTLE WITH TOP WELL IS ALWAYS "FULL"

Smearing the penholder with ink or tipping the partly empty bottle to fill a fountain pen is unnecessary if the ink bottle you use is one containing a removable well which fits at the base of the neck. Ink is supplied to this top well by tightening the screw top, turning the bottle upside down and then back to the normal position. The well holds enough ink to fill a fountain pen or the pen can be dipped in the ink without danger of smearing the lower part of the holder.



2.16 W
 Chicago

S. S. Stafford, Inc.
 117 N. Dearborn St. Chicago, Ill.



Illustrating the Latest in Solemn Illumination Effects; Note the Brilliancy Achieved without Glare

MODERN LIGHTING OF CHURCHES BEAUTIFIES INTERIOR

Without sacrificing the solemnity of the surroundings, modern lighting effects are being used to beautify the interior of European churches. German electrical engineers, recently called upon to illuminate a new church in Sweden, used the new "Linestra" tubes, arranging the lighting in accordance with the architecture. A brilliant effect, yet without glare, was achieved by careful treatment of a crucifix.

PLANTS TO STOP SOIL EROSION BROUGHT FROM RUSSIA

After searching the deserts and foothills in Russia and Turkey for plants to help control soil erosion, two plant explorers of the department of agriculture have brought back to this country nearly 1,800 lots of seed, including that of a desert grass which may be uprooted by the wind but "lands on its feet" and takes hold again wherever it comes to rest. Most of the specimens

brought back represent grasses which form a thick turf close to the ground, enabling them to hold the soil against wind and water. Others are shrubs whose root systems act as soil binders. Most of the seeds are from plants which are edible by live stock.

ATTACHMENT CONVERTS PORTABLE SAW TO NEW USES

Conversion of a portable saw to the purposes of a bench saw is accomplished by a table attachment that consists of a sliding arm moving in a turntable bolted to the top of a suitable bench. The arm can be slid to any position or angle and clamped securely in place with a hand lever. This lever locks both the slide and the turntable. Clamps at the working end of the arm hold the portable saw and enable it to be held in any position from vertical to a tilt of forty-five degrees. The arm swings in the turntable sixty degrees to either side. A wire loop at the far end of the arm holds the electric cord out of the way. Using a saw made by the same manufacturer, the outfit will cross cut lumber twelve inches wide and



Portable Saw Being Used as Bench Tool by Addition of a Simple Table Attachment

will rip saw lumber eleven inches wide. The maximum depth of cut is one and seven-eighths inches.

Church of Bergfeld...

No. 2141 of agric. 6/26/38

Westover

The Portey-Cable 100

St. Syracuse, N.Y.

W. H. Asram U. pks. Esch. H. 158

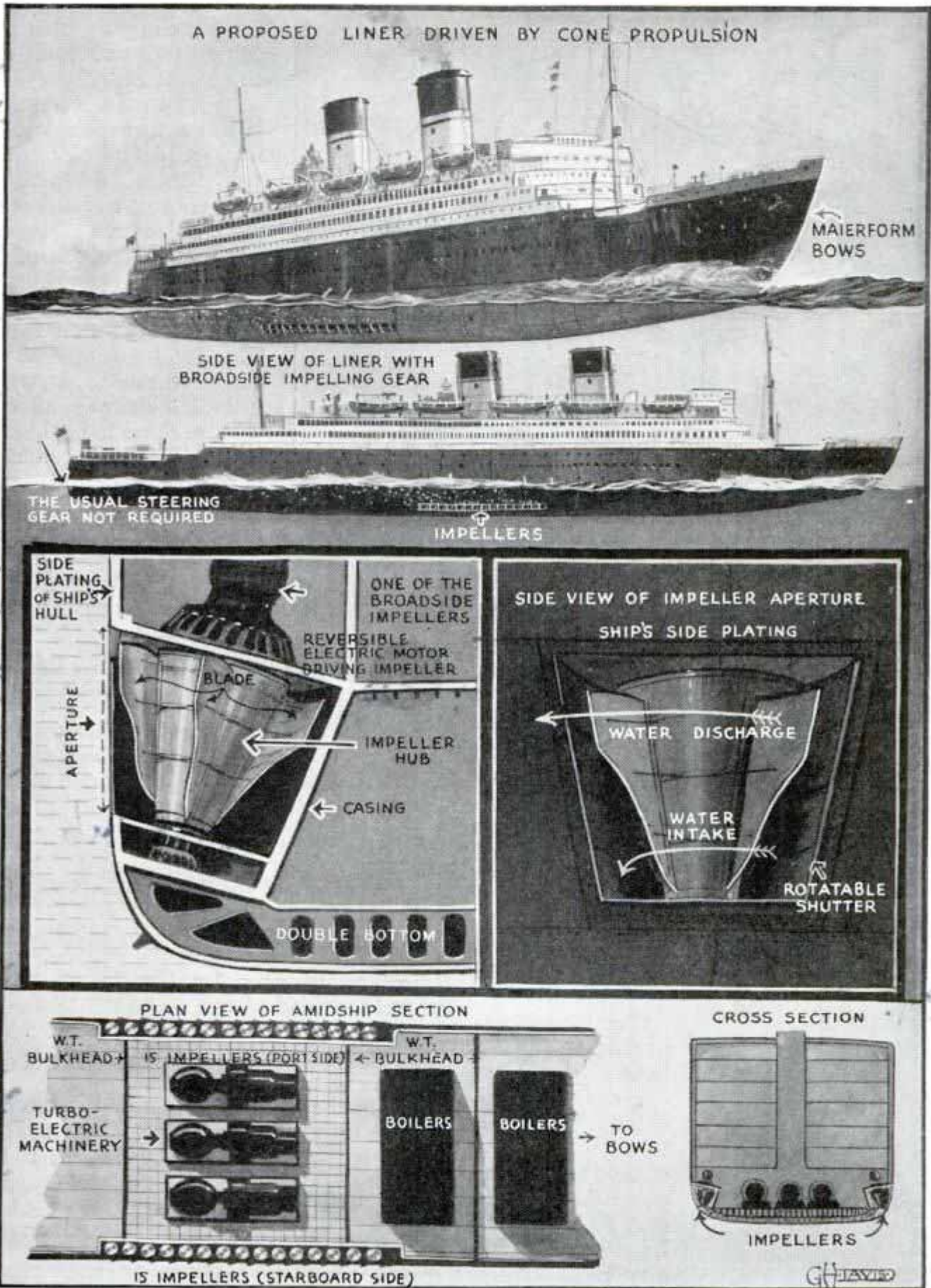
D/58

D/560

D1599

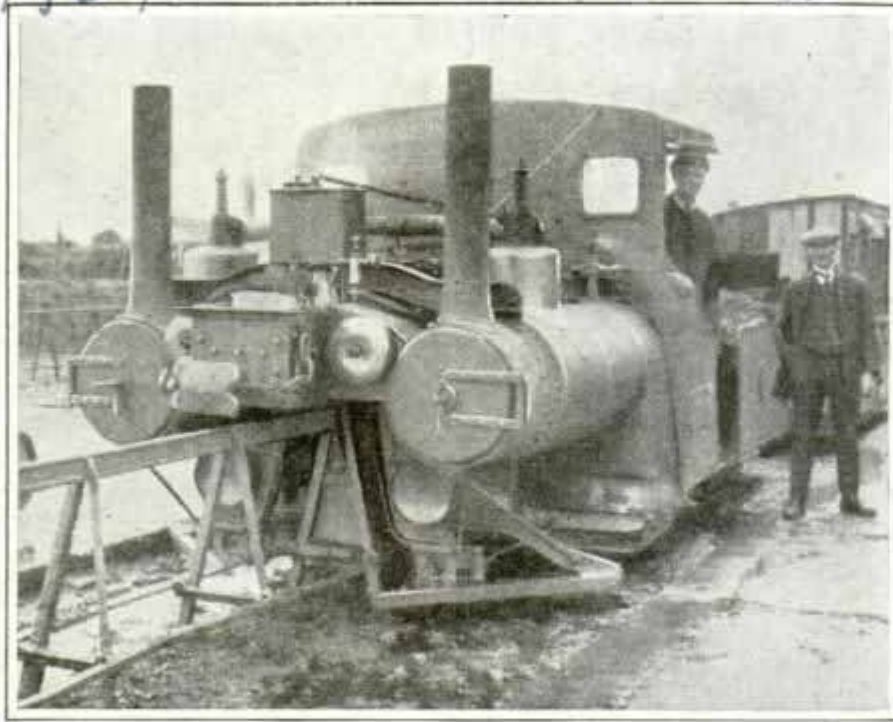
*Hillside Road,
Ewell, Surrey, England*

Cone Impellers Eliminate Ship's Steering Gear



Hydraulic Propulsion Method Proposed for Ocean Liner; Cone Impellers Amidships Would Be Driven by Reversible Electric Motors; Note That the Usual Steering Gear Is Eliminated

D 1527



© E. M. Newman

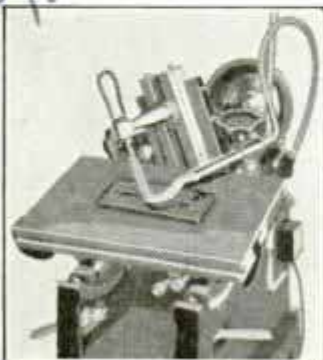
Monorail Line in Ireland and the Locomotive with Twin Boilers Which Pulls the Train; the Coaches Are Also Divided in the Same Way

TWIN LOCOMOTIVE AND COACHES RUN ON MONORAIL LINE

Between the towns of Bally-Bunion and Killarney in Ireland travel is by means of a monorail line on which runs a locomotive with twin boilers and coaches divided down the middle. Half the passengers occupy one side and the rest the opposite side as though riding in the "jaunting carts" famous in that country. There is no chance of a collision for the road boasts but two trains a day, the "down" one and the "up" one, and one run is finished before the other starts.

DIE-MAKING MACHINE ADJUSTED FOR VARIETY OF WORK

D 1539



Changes and adjustments can be made in a new die-making machine which suit it to a wide variety of uses besides the usual die sawing and filing. It can be adjusted for any combination

of angle filing and can be used with equal facility for sawing and filing delicate dies or for work on dies and tools of the most

sturdy construction. Any type of saw can be used without delay in changing holding fixtures as can all types of standard or special files from the smallest to the coarsest. It has a universal saw feed guide adaptable to straight, curved or irregular cutting without applying clamps, screws or other holding attachments, and an assortment of weights gives any desired tension on the feed. The feed mechanism is easily removed, leaving the table clear for filing. The machine is equipped with a roller saw guide, an adjustable table and ram and a combination hold-down and air nozzle.

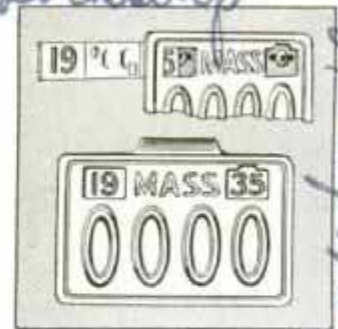
A one-fourth horsepower motor gives ample power and the machine can be plugged into any electric-light socket.

LICENSE PLATE LOCKED TO CAR WITH METAL STRIP

D 1522

Massachusetts is experimenting with a license plate which is virtually theft-proof. It is locked to the car by means of a metal strip containing the numerals indicating the year of issue.

Lockstrip



The locking plate is used on the rear of the car and is attached to the license-plate holder by reversing the usual method of attaching the bolts and nuts, the smooth bolt heads being at the back of the plate. The metal strip is inserted in a channel at the top of the plate, passing over the nuts as it is shoved into place. When finally in position, a hole in the metal plate coincides with one of the nuts. To remove the plate, it is necessary to withdraw the metal strip to get at the bolts, and withdrawing the strip tears the metal which must be pulled away from the nut.

Haley Mfg Co., 11-15
made in State
used 1935

D1513

Bottle Breaker "Digests" Empty Containers

Under a government regulation which prohibits the refilling of used liquor bottles, many hotels and cafes break the empty containers in order to protect themselves. A bottle-breaking machine for this purpose has been developed recently and consists of a chute leading into a metal box into which a shaft from an electric motor projects. The end of the shaft is equipped with several arms which are revolved by the motor and break the bottles. The latter are fed in by hand and are broken into one-half inch pieces or smaller. The broken pieces drop into a bag and thirty barrels of bottles require only one barrel to contain them after they have been "digested" by the breaker.

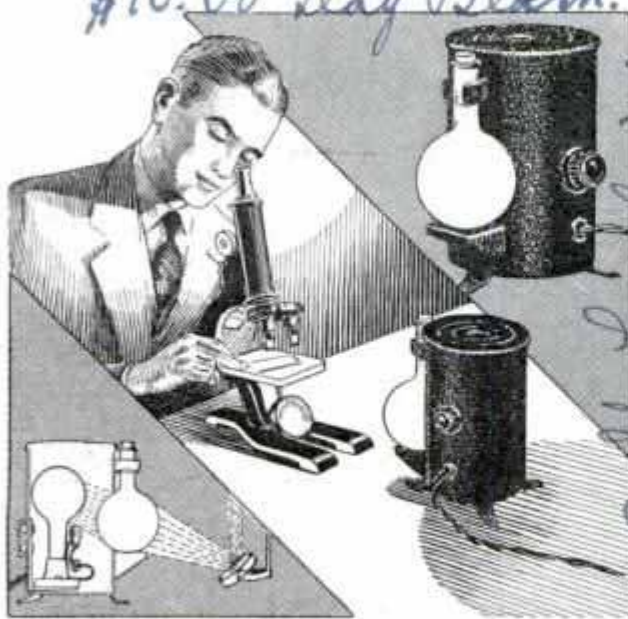


Bottle Breaker Which "Digests" Glass Containers, the Broken Glassware Finding a Ready Market

D1481
MICROSCOPE LIGHTING IS IMPROVED BY FILTER LAMP

Daylight is simulated by a new microscope lamp using a fluid lens and filter. Lens-filter solutions in standard Pyrex flasks are readily obtained and easily exchanged, a convenience to those

\$10.00 Day Beam.



Microscope Lamp with Filter; Bottom, Left, Illustrating How the Lamp Works

using filters of various colors. The lamp gives more than adequate light for high-

power work, oil immersion, binocular and tilted eyepiece, and it is exactly suited to photographic work. It may be used with any microscope. The outfit, made of steel, can be operated with any lamp from ten to 100 watts on standard 110-volt circuits.

D1502
WIRE TIE FOR CONCRETE FORM SPEEDS UP BUILDING

Handy wire ties for concrete forms are being used to speed up building. The wire, which is used to hold the forms together, is not twisted as is the case under old methods. Instead, the wire is simply wound up on a spool-like holder, the ratchet teeth of which sink into the wood, preventing the wire from unwinding. The operation is simple, quick and efficient.



The method is said to eliminate breakage of wire that frequently delays work.

Engineering Service Co.

Reptaine Specialties

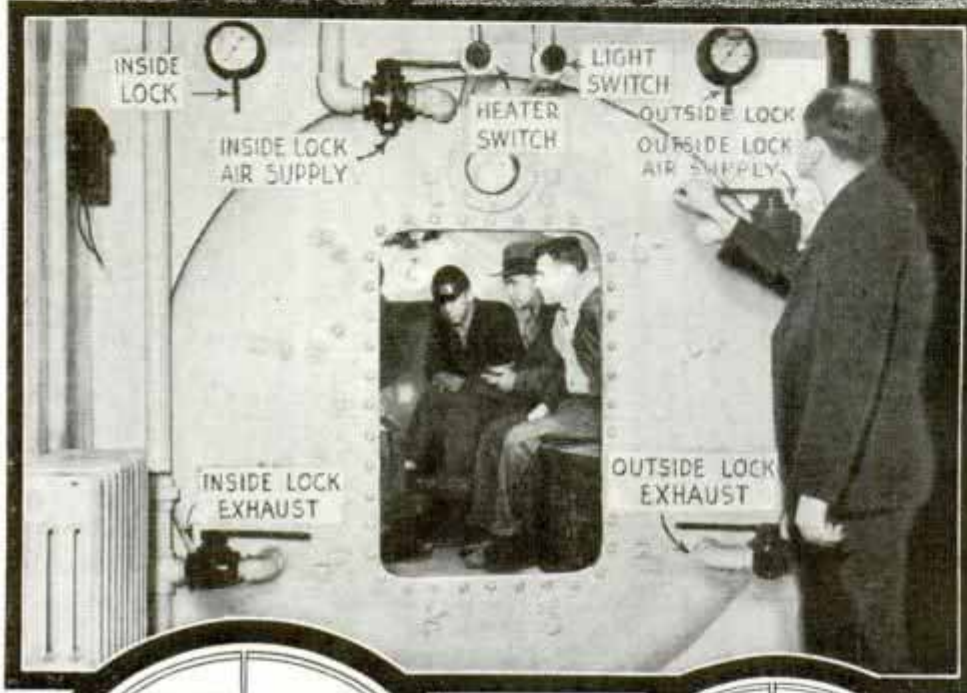
Pedro H. Los Angeles, Calif.

3720-A St. Lincoln

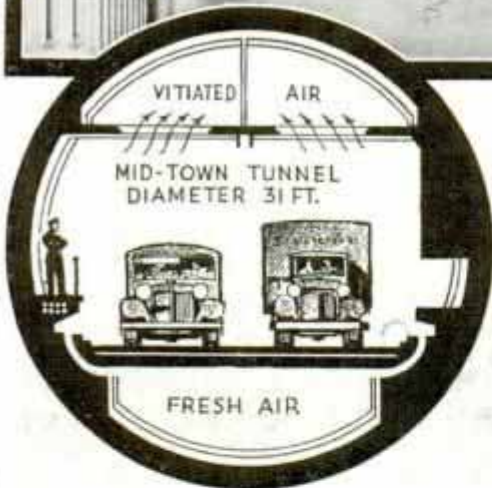
1922-706

D1450 Carl Blom Irlaseman
4 W. 10 3rd St
New York

MEN Against



Emergency Air Chamber for Treating Cases of "Bends" and Comparison of Size of New York's Tunnels



HUDSON AND MANHATTAN TUNNEL DIAMETER 16 FT. 7 INS.



NEW YORK'S Holland tunnel, the first vehicular tunnel under the Hudson river, has proved such a success that the government is financing a new \$37,500,000 tube to take care of the growing auto traffic between the states of New York and New Jersey.

Muckers and sand hogs, engineers and blasters are working today sixty feet below the keels of the ocean greyhounds where the air rings like an anvil, where a man cannot smoke for fear of an explosion, where a million tons of mud, sand, and

water crouch in readiness to smother them.

A queer place, under the river. You remind yourself that it is time for high tide, and you visualize the all-powerful ocean pushing itself into the river mouth. But the men work on, oblivious of high and low tides. Storms may rage or pandemonium break loose up above, but all is the same under the river. No day, no night. Just incandescent lights and air under pressure charged with oxygen.

Can you whistle under the river? Not a

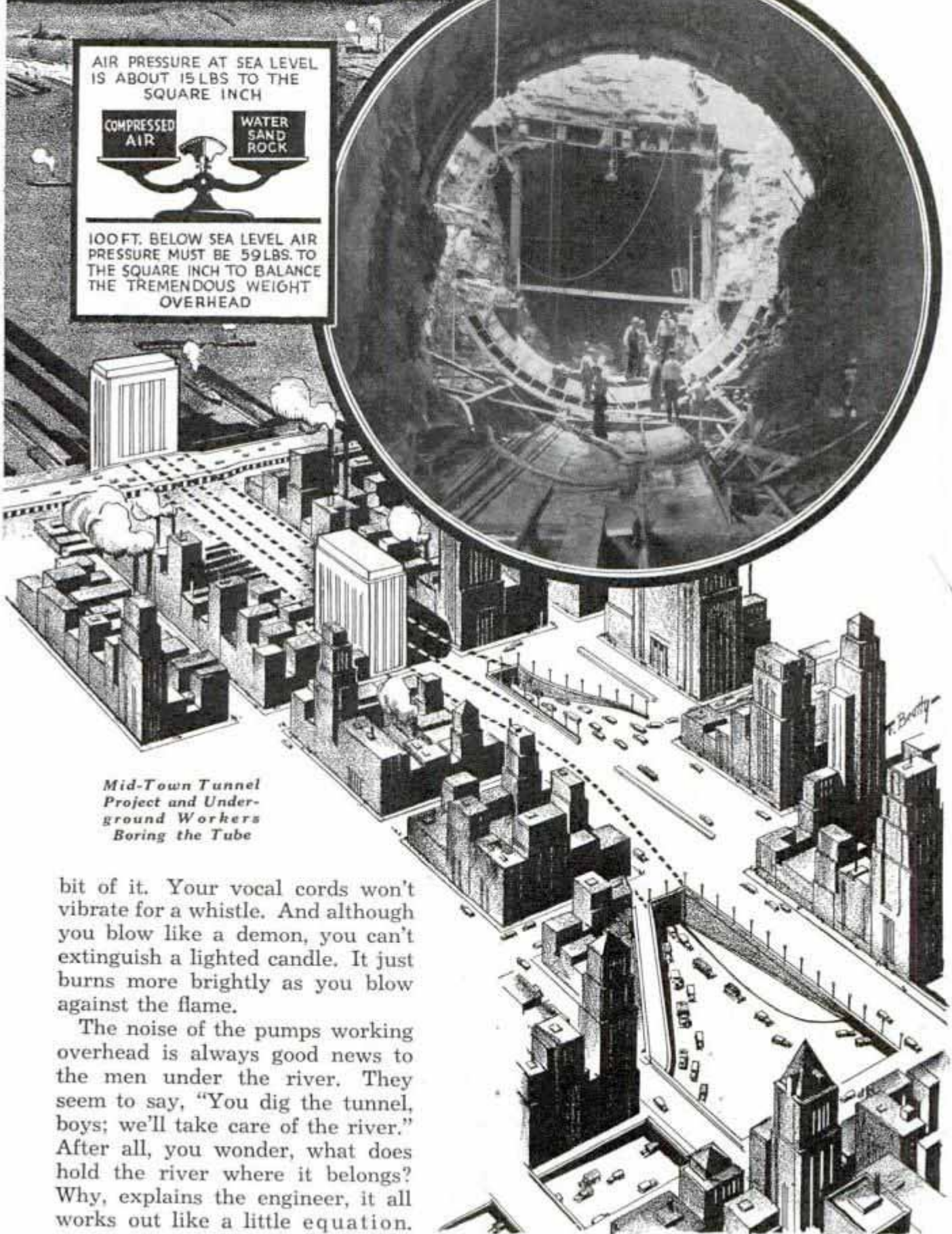
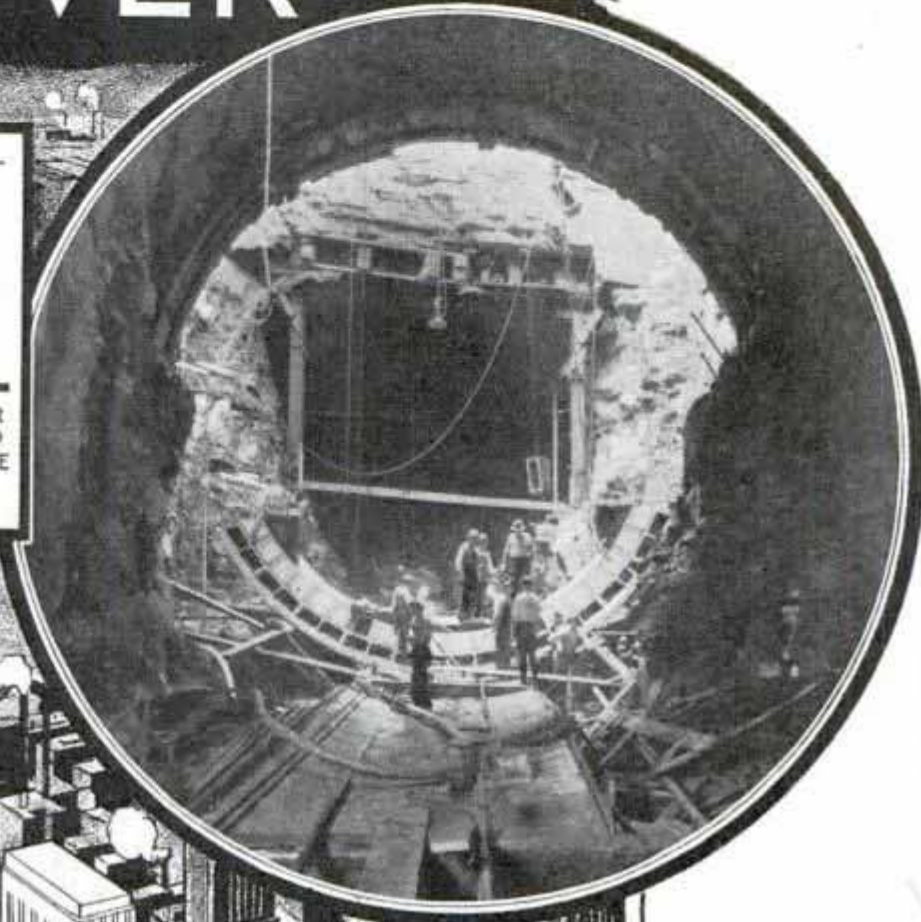
D 14 50

the RIVER

AIR PRESSURE AT SEA LEVEL IS ABOUT 15 LBS TO THE SQUARE INCH



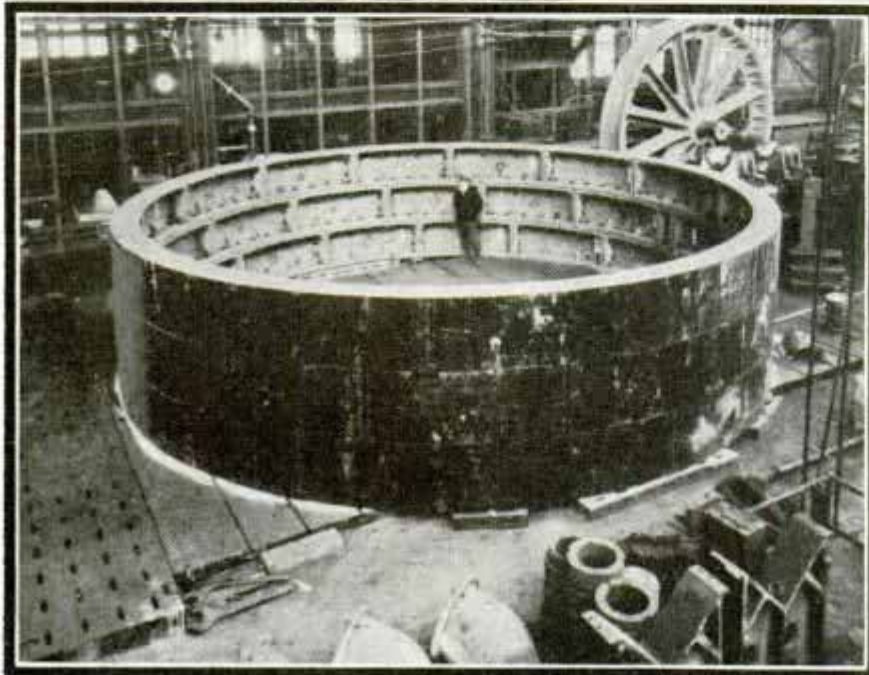
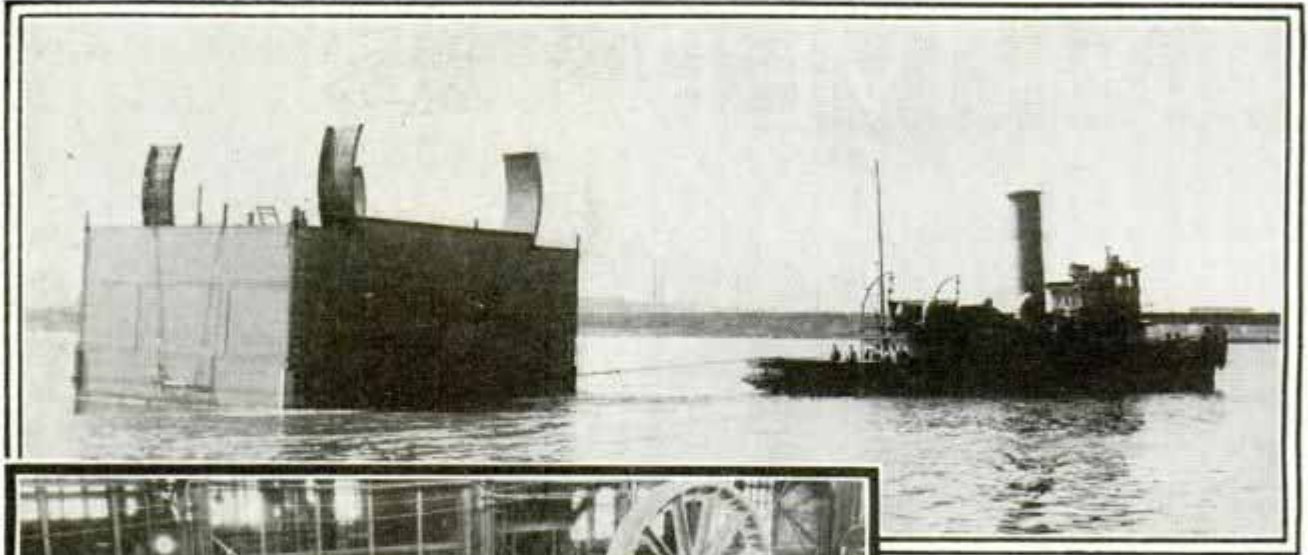
100 FT. BELOW SEA LEVEL AIR PRESSURE MUST BE 59 LBS. TO THE SQUARE INCH TO BALANCE THE TREMENDOUS WEIGHT OVERHEAD



Mid-Town Tunnel Project and Underground Workers Boring the Tube

bit of it. Your vocal cords won't vibrate for a whistle. And although you blow like a demon, you can't extinguish a lighted candle. It just burns more brightly as you blow against the flame.

The noise of the pumps working overhead is always good news to the men under the river. They seem to say, "You dig the tunnel, boys; we'll take care of the river." After all, you wonder, what does hold the river where it belongs? Why, explains the engineer, it all works out like a little equation.



Towing River Shaft Caisson to Drydock and One of the Cast Iron Tunnel Lining Segments for the New Tube

is approximately fifty-nine pounds per square inch.

Every possible precaution is taken to insure the air supply and the health of the sand hogs. Each man receives a thorough health examination and is constantly under a doctor's eye. The sand hogs enter the underground works through an air lock, where the pressure is increased gradually. Likewise, on quitting, they are subject to a gradual decompression of

You balance the water of the river against the air pressure in the caisson. If you upset that delicate balance, the air blows a hole in the river or the river blows a hole in the caisson.

The deeper you drive a tunnel under the river, the more air pressure is required to hold the river back. And as the air density increases, the sand hog's pay goes up and his working hours grow shorter and shorter, until he works no more than an hour a day.

Water pressures increase with depth, about half a pound to each foot. Hence at a depth of 100 feet below the river, the water pressure is forty-four pounds to the square inch, which must be balanced by an equal pressure of air. However, this is in addition to the fifteen pounds of pressure at sea level, which means that at 100 feet below the river surface, the pressure

the air. As a result of rigid precautions, very few men who work under the river become victims of the dreaded disease known as the "bends." In addition to the regular decompression locks, the sand hogs can take advantage of a special hospital lock kept in readiness all the time. In this steel chamber, the air density can be controlled by an operator on the outside. It provides a gradual compression and decompression, to accustom a man to ordinary atmospheric pressure.

When released too suddenly into the atmosphere, a sand hog is likely to suffer severe aches and has a tendency to reel like a drunken man. To preclude the possibility of his being arrested as a drunk, he wears a special badge, which identifies him and gives instructions for treatment in case he should lose self-control.

The hazards of sand hogging have been

D1450

405
Depth g

D1603 Terrestrial

cut considerably. Not a single death from compressed-air illness resulted in the seven years the Holland tunnel was under construction, although there were 756,000 decompressions. Sixty-four per cent of "bend" cases occur within the first hour after men are exposed to the free atmosphere. Hence, the regulations require that they accommodate themselves to it very gradually. While waiting to be decompressed, they play games or talk.

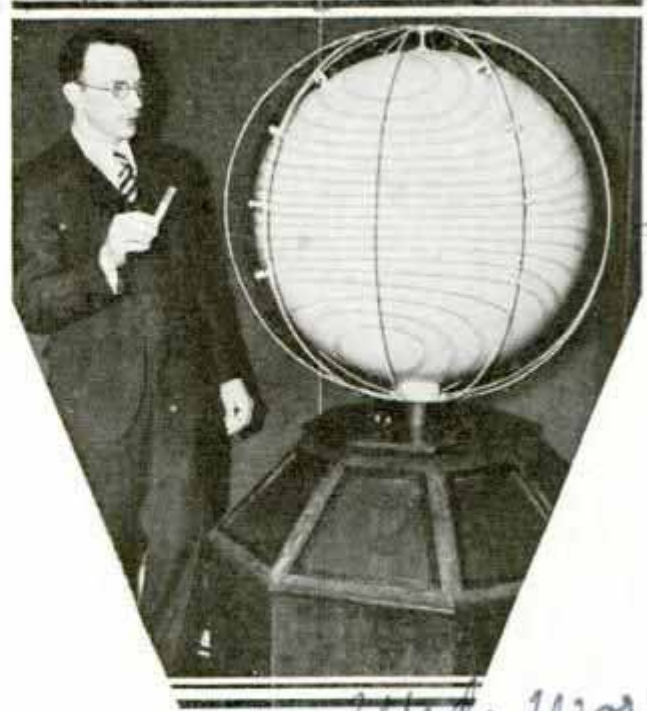
The new Hudson tunnel will have an outside diameter of thirty-one feet, an outside lining generally of cast iron, but in certain places of cast steel, and an inside lining of concrete. The cast iron and steel lining is a ring made up of fourteen segments with a "key" segment added, all bolted together and made watertight.

Most of the tunneling is done by the shield method under compressed air. The shield is like a great cylinder with a sharp cutting edge. It is driven forward through the earth as if it were cutting the core out of a giant apple. The men work under the shield with pick and shovel.

Two separate vehicle tunnels are now projected to form what is known as the "Mid-Town Tunnel." One tube is 7,250 feet long, the other 8,080 feet. The maximum grade against traffic will be three and one-half per cent; with traffic, the maximum grade will be four and one-half per cent. The roadway in each tunnel will be twenty-one feet six inches between curbs, eighteen inches wider than the Holland tunnel. This increased width is necessary for modern trucks and buses.

The capacity of such a tunnel is amazing. Since the opening of the Holland tunnel in 1927, more than 75,000,000 vehicles have passed under the river. About 2,000 cars can pass through each tube hourly.

The ventilation is something which demands the services of many experts. With thousands of cars discharging deadly carbon-monoxide fumes, the air must be changed constantly. In one minute the ventilation towers must deliver 4,000,000 cubic feet to the interior and exhaust an equal amount. Carbon monoxide in the tunnel atmosphere is limited to less than four in 10,000 parts. Engineers are investigating the use of sodium lamps for illuminating the tunnel. If adopted, one-half will be saved in lighting costs.



memorandum

This Globe Shows Changes in Earth's Magnetism

GLOBE REVEALS DAILY CHANGES IN EARTH'S MAGNETISM

At an exhibition sponsored by the Carnegie Institution, of Washington, D. C., a novel globe was exhibited. It shows the daily changes in the magnetic field of the earth.

REVOLVING SERVICE STATIONS SAVE TIME OF MOTORISTS

Revolving service stations are the latest time-savers for motorists. The car is driven onto a turntable which revolves around the dispensing equipment. This speeds up the work of attendants who can service a car with gasoline, oil, water and air in less than two minutes.



Turntable for the Car Speeds Up Servicing

93 Lafayette St. New York

Colonial Beacon Oil Co. 155 E. 44 St. New York

Edgerton Dept of Electrical Engineering



chub.
Three Views of Foot Meeting the Ball; Top, Note Depression in Ball at First Impact

CAMERA CATCHES A DROPKICK AS TOE MEETS FOOTBALL

What happens when the player's toe meets the football in a dropkick is revealed in photographs taken with the aid of high-speed electrical flashes. The camera exposure time was one-one hundred thousandth of a second. Valuable information on the "mechanics" of the dropkick, which is used frequently in football games to score a field goal, is obtained by this process. The photos show the impact

of the foot against the ball, causing it to be depressed at least half of its diameter. Then the ball recovers its full form and begins to rise, a halo of dust appearing just ahead of the ball. Finally, the completed kick is shown, the foot back on the ground and the ball soaring into the air. The fast exposures were made at the Massachusetts Institute of Technology.

D1525 - Cambridge, Mass

SPINNER TESTS AUTO WHEELS WITHOUT ROAD RUNS

Eliminating hazardous road tests for "shimmy" and wobble, a dynamic spinning device subjects each wheel to a similar test without removing the car from the repair shop. The machine consists of a spinner wheel mounted on the shaft of an electric motor and carried on a small rubber-tired dolly. The speed of the motor is controlled from the end of a tubular handle like a vacuum cleaner. The spinner wheel rocks from side to side for adjustment to the plane of the cambered auto wheel so that the tire will not be damaged. The test is made with the wheel on the spindle, each wheel being jacked up and spun with the machine. The motor quickly accelerates the wheel to eighty or 100 miles per hour. When the shimmy speed



Testing Wheels for Shimmy and Wobble; Easily Operated Spinner Eliminates Road Test

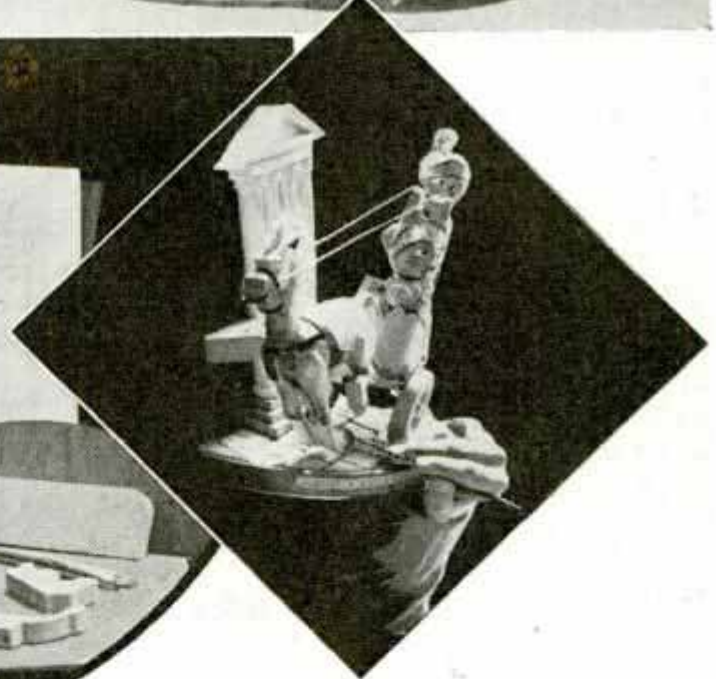
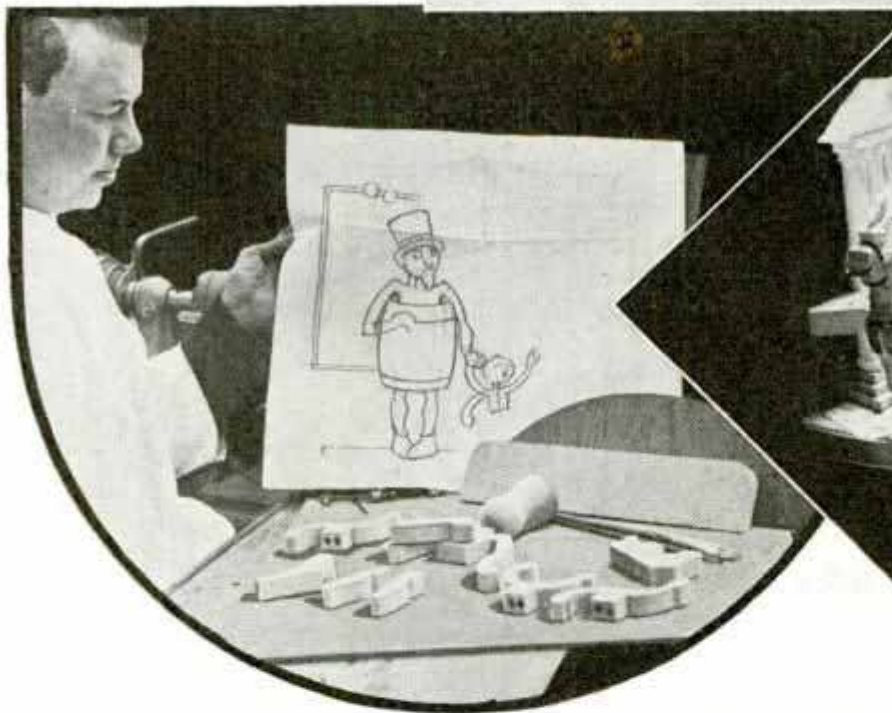
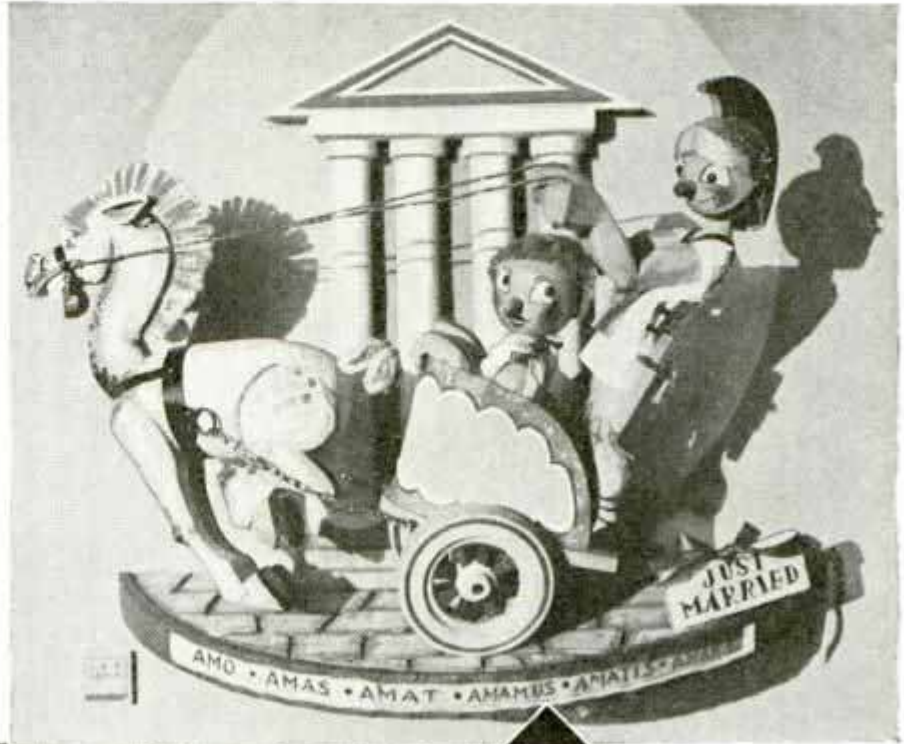
is reached the whole car shakes violently, indicating the wheel is out of balance and that it should be removed and trued up.

Weaver Mfg. Co. Ill.

Vertical handwritten notes on the left margin, including 'D1537' and other illegible text.

Three-Dimension Effect Is Latest in Art Ideas

Art of the three-dimension effect, of the kind found on some magazine covers, is being created by a California artist, Lee Brown. As reproduced on the printed page after photographing, the finished three-dimensional idea, which is almost like a miniature stage as it leaves the artist's hands, appears to foist itself right out at the reader. Various methods to obtain desired effects include working with soap, clay, sponge, cardboard, tin, plaster of paris, and even cloth, but the



Top, Finished Model That Achieves the Impression of Depth as Well as Height and Width; Bottom, Right, Side View of Model; Left, Beginning Work on Wooden Model, Following the Sketch

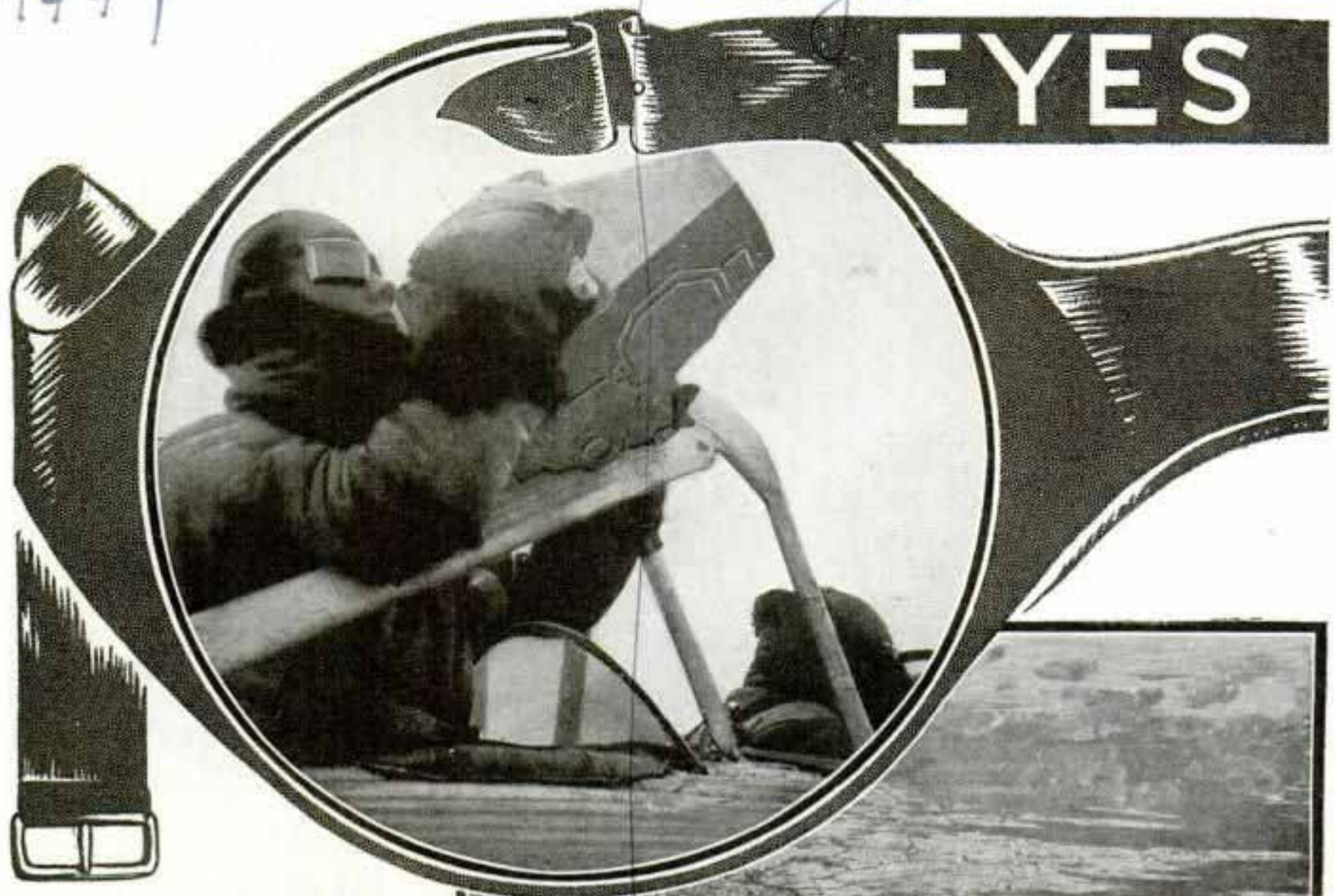
Californian uses wood. First he makes a thumbnail sketch of an idea, then enlarges it into a pencil drawing, to scale, of the finished model. Carving and turning by lathe of the segments follow. In the next step the figures are assembled and glued, then bolted firmly with concealed fastenings to a wooden background and base on a stage. Finally they are painted and garbed. For publication the model, which

is made to be shot "full front," is photographed in color, then transferred to engravings by regular processes. The artist gained his training by building model boats, making Christmas cards, dabbling in all phases of art, studying stage craft and the methods of photo-engraving. Some knowledge of each has proved essential in this new art. All his work is done in his shop at home.

232 E. 42nd St. New York

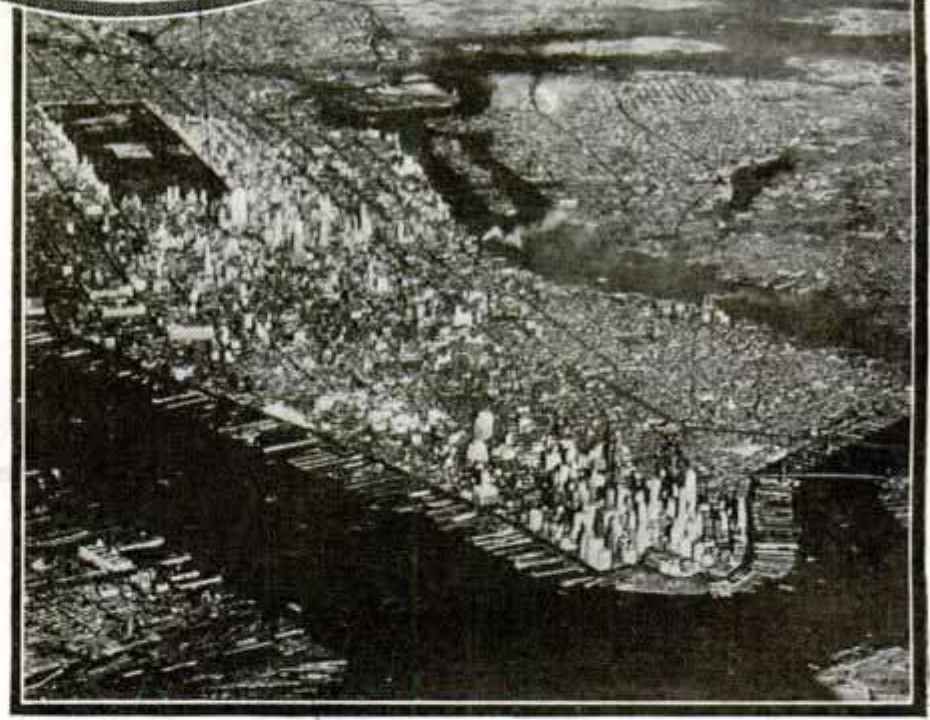
D1449

EYES



THE eyes of the air—modern aerial cameras—today are busy at a thousand peacetime tasks. In New York City where 5,000 workmen are building the gigantic Triborough bridge, the eyes of the air compiled an aerial right of way for their guidance. In Washington, D. C., engineers studying methods of effecting soil erosion relief are being aided by aerial photographs. Scientists in American museums are studying the curious markings on aerial photographs of Peru—pictures which may cast new light on the ancient Incas. Elsewhere cartographers are piecing together aerial photographs of the South Pole which will enable them to accurately map newly discovered land.

The aerial camera, a wartime development employed to photograph enemy territory has, during the past decade, undergone many refinements and improvements,



Top Photo Courtesy of Jay Hirz—All Other Photos © Aerial Explorations
 Above, Aerial Photographer at Work; Below, a Great Metropolis as Seen by the Eyes of the Air

emerging today as a peacetime aerial eye whose many uses, important though they seem, are still in a pioneer state. So new is the aerial surveying industry that there are scarcely a score of concerns engaged in the business and, in the opinion of Rob-

405 Lexington Ave
 New York City

D 1449

of the AIR



Photograph of Sloping Ground Made to Study Soil Erosion, and an Aerial Survey Crew and Equipment for Making Pictures; Below, Type of Plane Used

ert Shippee, president of Aerial Explorations and one of the country's foremost survey experts, there are not more than twenty capable aerial survey photographers in the United States today.

"Not only is there a dearth of



"As an example," states Mr. Shippee, "while making an aerial survey of soil erosion in West Virginia, it was necessary for us to wait seven weeks for proper weather conditions. When we did get into action however, in three and one-half hours of flying we accomplished more than could be

competent aerial survey photographers to operate the eyes of the air, but there are not two pilots in a hundred especially trained to fly them," states Mr. Shippee. "As this new and rapidly growing industry expands, the scarcity will become even greater unless steps are taken to develop recruits."

In no other business does the weather play such an important part. There is an average of only three flying days per month during which the eyes of the air may function to their fullest extent. Nor is there any way of foretelling just when these three days will occur. They may occur consecutively or at intervals. Days which apparently seem clear to the observer on the ground may have ground haze or small clouds which cause "gaps" in the photographic record. Nevertheless, the amount of work accomplished by the eyes of the air in spite of weather limitation is almost beyond belief.



Aerial Picture of Traveling Dunes of Peru and the Crater of a Volcano as Photographed by the Eyes of the Air

done by a land party of six surveyors working for a period of two years. I say more because the average party of land surveyors generally looks for one specific thing such as right of way or the topography of the traversed area, while the eyes of the air record everything completely and in short order."

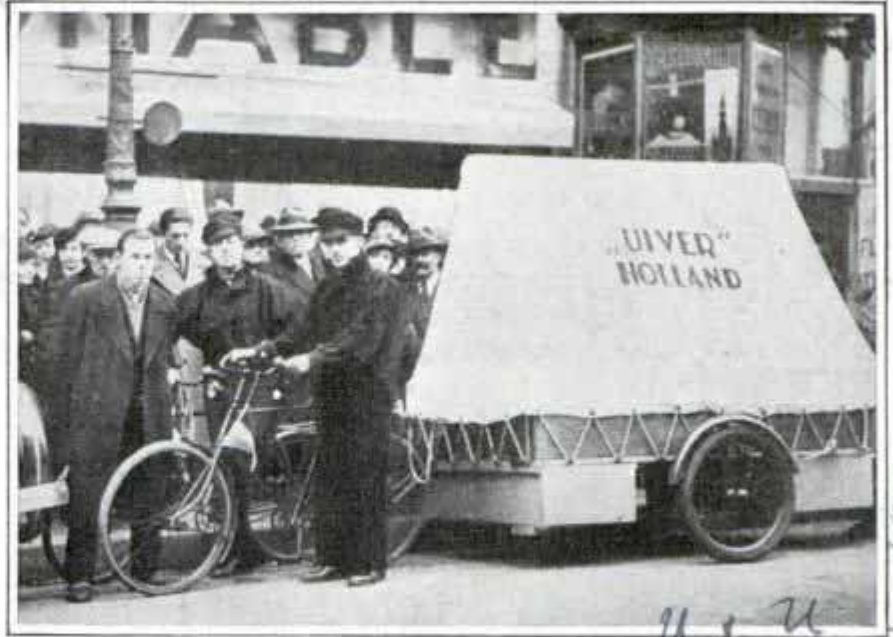
Dependent upon whether single or multi-lensed aerial cameras are employed, a territory ranging from 200 to 2,000 square

miles may be surveyed in a single day. In the interest of accuracy, each photograph taken on a continuous flight is overlapped by sixty per cent of the succeeding picture taken. When the plane turns to parallel the course it has first flown, there is a "side" overlap of fifty per cent in addition to the sixty per cent lengthwise overlap, thereby making only twenty per cent of each vertical photograph taken available for use.

"The pilot of the surveying plane and the photographer work as a team and there must be a perfect understanding between them," says Mr. Shippee. "If, for example, the surveying plane has completed one lengthwise trip over the territory and has turned to fly a parallel course in the opposite direction, a strong wind may make the pilot fly a course at an angle to his first course unless he is thoroughly competent. In this case side gaps will be found in the complete photographic record, while if the photographer is not thoroughly competent, lengthwise gaps may be found. These gaps are expensive for it means re-flying the course to fill them in."

Two types of aerial cameras are used. One is the vertical camera and the other the oblique camera. The vertical camera usually is mounted so it points downward through the floor and it generally operates automatically. The oblique camera is held in the hand. It takes pictures in perspective which the layman may readily interpret. It is heavy and bulky, sometimes weighing as much as seventy-five pounds. As the oblique photograph is taken outward and downward at an angle between the horizontal and vertical, it not only produces a picture in perspective but one whose stereoscopic factors are now being utilized. If, for example, a mountain is photographed from the air with a mapping camera first from one side, then from the other, it is possible by using a stereoplani-

(Continued to page 124A)



Large Trailer Pulled by Bicyclist; Despite Its Size It Is Lightweight and the Cyclist Towing It Can Make Good Time on Level Roads

BIG BICYCLE TRAILER CARRIES CAMPING EQUIPMENT

Two natives of Holland recently completed a bicycle tour of France, carrying clothing and camping equipment in a roomy trailer pulled behind one of the cycles. The cyclist is able to maintain a fair rate of speed with the trailer in tow.

MAKE-YOUR-OWN GASKET KIT FOR HOME OR GARAGE

Home mechanics and garage workers can cut their own gaskets with a new material and cutting kit now on the market. Using the old gasket as a pattern, the mechanic cuts the new one from sheet material constructed of layers of thin aluminum and fine mesh wire bound by an elastic compound. The material can be cut with tools in the kit.

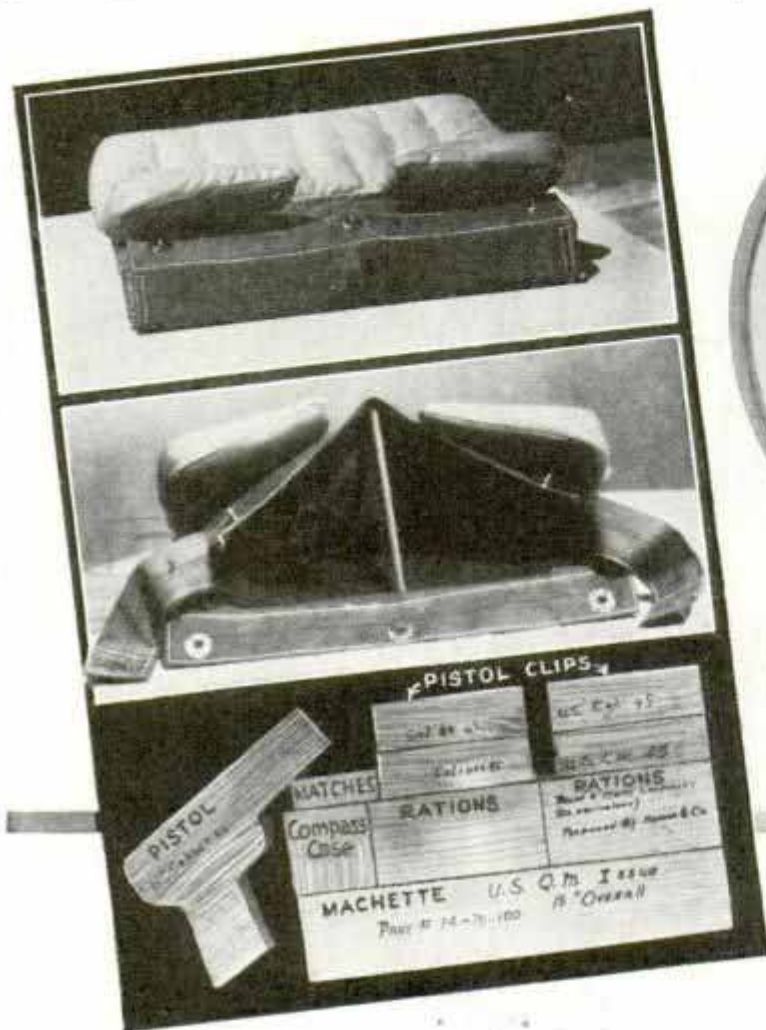


Handy Outfit for Cutting New Gaskets by Using the Old Gasket as a Pattern

Field Products Mfg Co
Chicago

see sketch 1935.394.

Jungle Crash Puts Safety Kit on Parachute



Several Views of Kit Attached to Service Flyer's Parachute; Bottom, Left, Illustration of What the Kit Contains

With the purring ease of mechanical perfection, six of Uncle Sam's single-seater fighters, in the familiar three-plane fighting formation, were returning to Panama City.

"P1 calling P6—P1 by for P6," sounded the voice over the command set to the element leader behind. "P6 to P1—" floated back over the ether. "Received you O. K.—P6 off." Interplane communication had been established.

Eighty miles distant an operator at the field picked up the message. A hum filled the air as his powerful transmitter switched on. "GA calling P1—GA calling P1—What is your position now?—GA by for P1."

Faintly came the answer, "P1 to GA—Our position is ten miles north of Chame point,—What is the weather at Albrook?—P1 by for GA." "GA to P1—Visibility excellent, ceiling five thousand feet. GA off."

Suddenly the right wing man of the sec-

ond element pulled sharply out. His motor sputtered and the propeller slowed jerkily to a stop—forced landing—three thousand feet up, with a choice of jumping or riding the plane down to a crash in the jungle. The remaining five circled their crippled companion. Down and down, dropping swiftly—two thousand feet—why doesn't he jump?—one thousand—five hundred and too late to jump now.

The powerless plane headed for a flat stretch of jungle swamp between two high hills. Slower and slower glided the plane—twenty feet,—ten feet—crash! The landing gear caught in the high bunch grass and the plane whipped over.

The birdmen aloft anxiously watched the half-concealed wreckage. Two minutes elapsed, but there was no sign of movement. All planes were low on gas. Reluctantly the leader signaled assembly and headed again northeast.

"P1 to GA—P1 to GA—P7 forced down near La Playa river, crashed in swamp,—

D 1490 For John Carl
444 W. 56 St
New York
and
Warner
Box 100

No movement to indicate he is not hurt.—
We are low on gas and are coming on in—
send plane out to patrol wreck—P1 by for
GA.” Buzz-z-z-zz sounded the ground
transmitter, “GA to P1, GA to P1,—re-
ceived you O. K.—will notify operations,
GA off.”

The relief plane arrived fifteen minutes
later, to find the pilot seated atop the
wreckage waving with one hand and com-
bating mosquitoes with the other. He had
been pinned under the wreck and had
taken some time to release himself. A map
was dropped showing him the way out to
the coast. Nine hours later he emerged
near a little fishing village a bedraggled
figure worn almost to exhaustion. When
questioned as to why he had not jumped,
with his parachute, he replied. “I was
afraid of finding myself in the jungle un-
harmed, defenseless, with no food, water
or quinine. Knowing I had these things
behind me in the plane I took the chance
of being hurt to get them. I could not have
gotten to the coast without them.”

As a result an emergency kit was de-
vised to be attached to the parachute
cushion. The whole assembly is fastened
securely to the parachute.

**INHALER WITH A POCKET CLIP
IS CARRIED LIKE PEN**

D/530

Equipped with a pocket clip, an inhaler
which also can be used for spraying the
nasal passages is carried conveniently like
a fountain pen. If an inhalant is used, a



glass vial is filled
to the inhalant
level at which a
saturated air solu-
tion is allowed to
come in contact
with the nasal
passages. For
spraying, the con-
tainer is filled to
the spray level
where a saturated
vapor is dissemi-
nated. From a na-
sal guard the vapor
or spray passes

into the throat and nose in a natural way
without any need for mechanical forcing,
it is claimed.



Gun with Spotlight Attached to Barrel to Illuminate
Target When Shooting at Night

**ACCURACY IN NIGHT SHOOTING
IMPROVED BY LIGHT BEAM**

Accuracy in night shooting is greatly
improved by a sighting attachment for
firearms in the form of an electric spot-
light. This light automatically illuminates
the target as the gun is pointed and the
shooter takes aim. It is intended particu-
larly for police assigned to night work.

**FISH LURE CAN BE TAKEN APART
TO CHANGE COLORING**

D 1492

Designed so that its color may be
changed with little effort, a new type of
trolling or casting lure is available to the
fisherman. The plug is made of two halves
of a transparent, magnifying material, fas-
tened together with a clamping device that

permits the plug
to be opened. The
design or coloring
material is a thin
sheet of foil, paper
or cloth placed be-
tween the trans-
parent halves. A
stainless steel link
extending be-
tween the two
halves lengthwise



provides a means of changing the hooks or
leaders when the bait is opened.

Stephenson Mfg Co 221
Lewist St. Springfield, Mass.

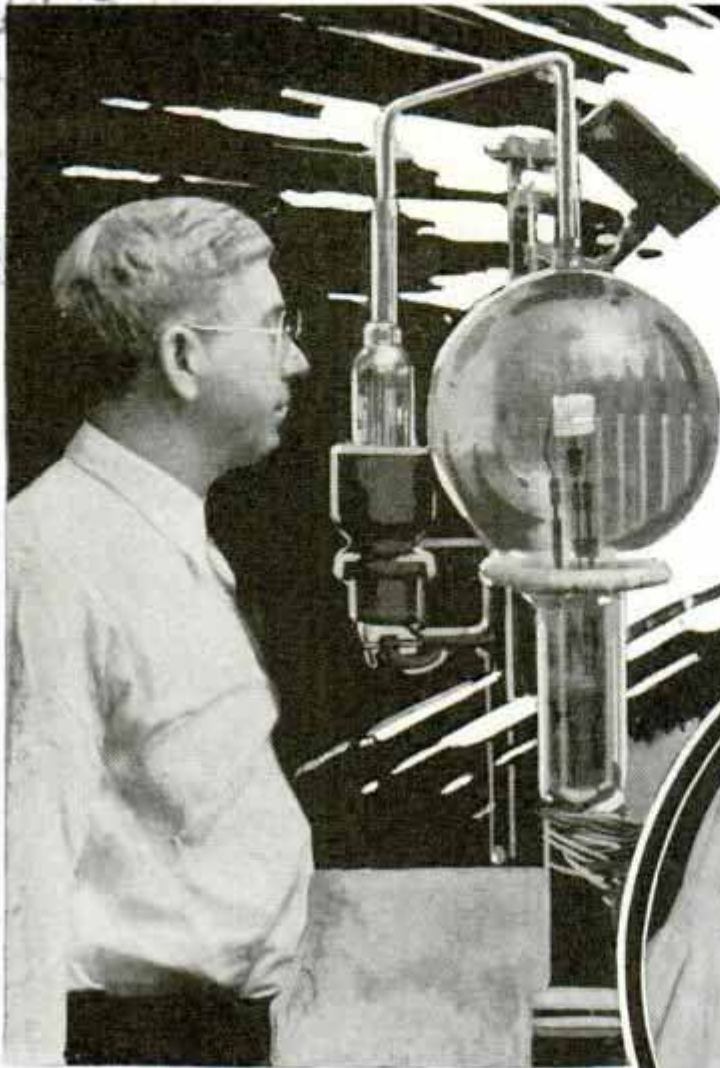
multis lure
Bldg. Van Nuys
dno. Ry W. Post
note. Peakwith

1423

METALS

more costly
than

JEWELS



LITTLE did Michael Faraday dream in 1800 that, in propounding the theory of electro-magnetic force, he was sowing the seeds for a vast development in the twentieth century. Or, that electricity was to usher in a new "Age of Metal" in which rare elements were to be isolated and harnessed.

For more than a decade now, rare metals have given us the incandescent lamp, the X-ray tube, the photo-electric cell. With these, medical men have so improved the methods of diagnosis and health treatment as to make strides in the prolongation of human life.

Like diamonds, metals are classed as "rare" because of their scarcity. When first isolated, some of these metals are many times more costly than the rarest of jewels. Less than ten years ago, rhenium was valued at \$10,000 per gram, or \$4,500,000 per pound. Since then, increasing usage has brought its value down to \$3,375 per pound, but it still dwarfs the \$560 a pound for gold. The great cost is due to

Left, Heating Pellet to Form Solid Metal; Right, Treating Infection with Ultra-Violet Radiations

the fact that it takes 1,000,000,000,000 parts of the earth's crust to produce one part of this metal.

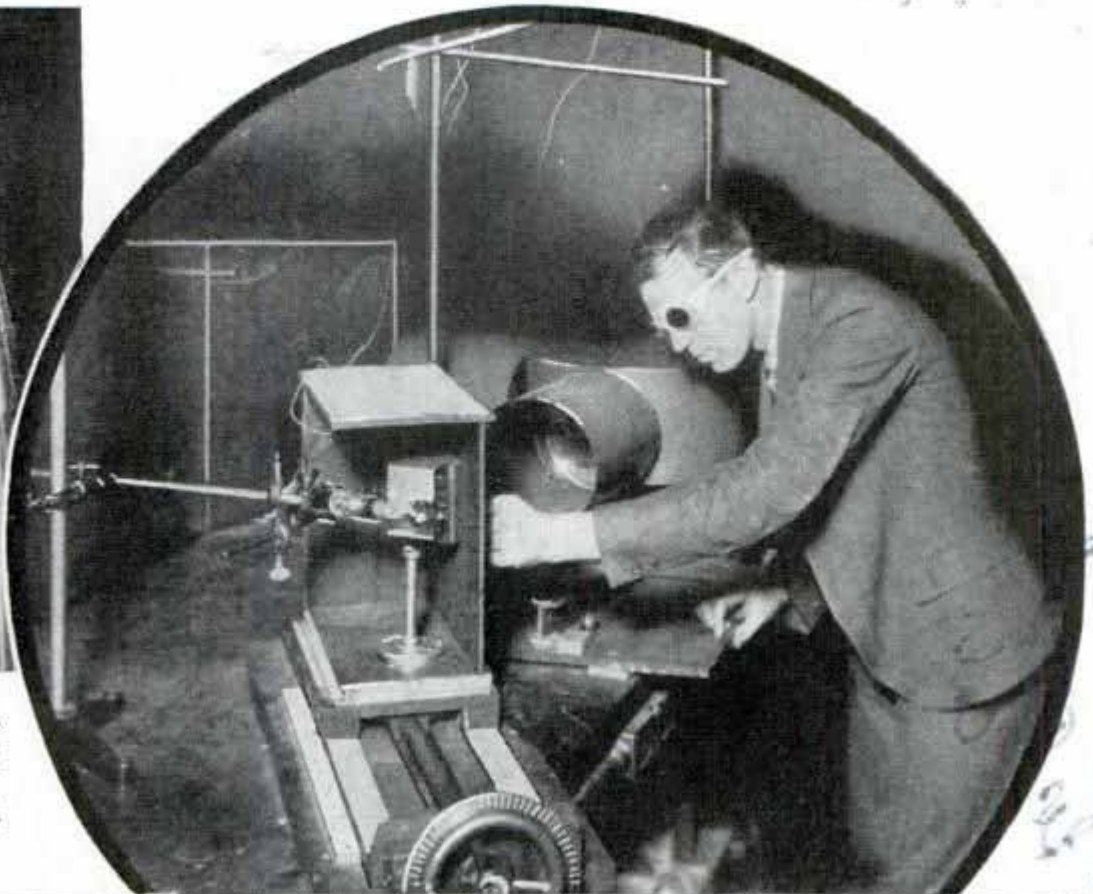
A metal remains rare only so long as its usage is limited. A pound of aluminum once sold for \$25. Tungsten, the heart of the electric lamp, is still regarded by many as a rare metal, because a generation ago it was scarcer than gold. Now it is consumed by the thousands of pounds daily for electric lamps and high-speed steel.

"Isolating a rare metal is only a small part of the job," says Dr. John W. Marden, assistant director of research of the Westinghouse Lamp company. "Handling and

750 Broadway



Left, Uranium Is Self-Igniting in Air at Room Temperature; Right, Spectrograph Containing Rare Metals



fabrication to the ductile state where it can be worked into wire and combined with other metals to form alloys, is often the more difficult problem."

Some rare metals are more temperamental than our touchiest prima donnas, requiring the greatest of diplomatic finesse before they will submit to the whims of the research metallurgist.

"Uranium, the heaviest of all metals, is a good example," adds Dr. Marden.

"As a fine powder, it is highly inflam-

(Continued to page 124A)



Center, Observing Crystalline Structure of Rare Metals; Bottom, Two Types of Westinghouse Photo-Cells in Which Rare Metals Play Important Part

Wasps May End Black Widow Spider Menace



Laboratory Worker Handling Poisonous Black Spiders While Studying Their Habits

tions of them in electrically regulated incubators in which the cocoons are hatched and the whole life cycle is studied. The creatures are handled with gloves and tweezers. It has been discovered that certain types of wasps are natural enemies of the black widows. Two kinds have been found to lay their eggs in the cocoon of the spider and to hatch out parasites which devour the baby spiders. If the parasites can be raised in large numbers, they may be widely distributed to

feed on the spider cocoons, thus holding in check the black widow. The virus of the black widow, weight for weight, is more deadly than the poison of the rattlesnake but such a small amount is injected that death is infrequent although a person may be ill for weeks or even months. The only known remedy is a serum recently developed which helps to combat the effects of the poison.

Entomologists are seeking spider-eating insects in their fight against the black widow spider whose poison has brought serious illness or even death to many victims in the past few years. Aided by favorable climatic conditions, the spider has multiplied so rapidly that it is becoming a real menace to man. In a laboratory at the University of California, these spiders are being studied by raising many genera-

Los Angeles.

Ent. Max well Reed Grant
54 1/2 Alameda Blvd
Los Angeles
see also
Feb 1935
193

D 1526

Free Wing Flying School,
on St. Clair Ave.
D1536

**WEATHER-WARNING INDICATOR
USED BY OIL STATION**

One Cleveland, Ohio, oil station in-

aid of
advise
nd the
r oil,
is in
meter
-inch
with
in is
class.
trips
are
llers
the
used
nc-
ow-
sec-
ngs
by
ire.

sons who have recovered from the bite of the black widow spider, and could be prepared by any well-equipped laboratory such as would be found in a large hospital. Otherwise, the doctor with whom I talked there knew of no other successful treatment.

I am sorry to disappoint the reader mentioned in your letter of February 26, but at the Laboratory of the Los Angeles County General Hospital, where a black widow spider serum was developed and has been used very effectively, I am told that the treatment must be applied within twenty-four hours if it is to aid.

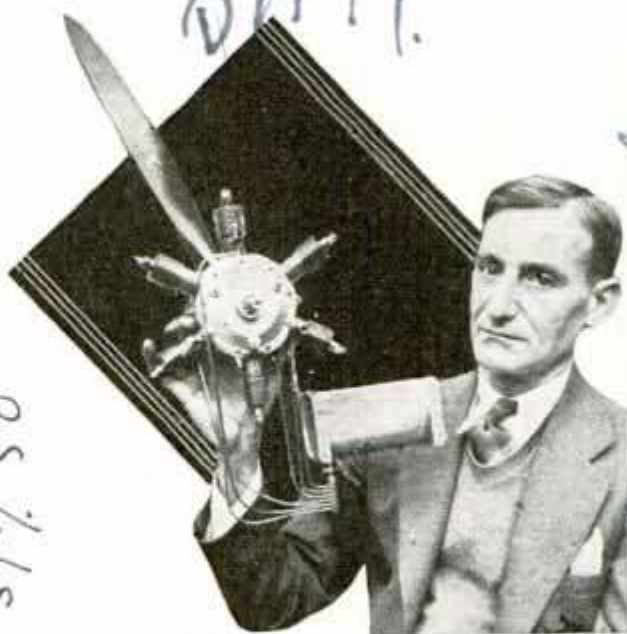
The serum is made from the blood of per-

Sincerely yours,

Maxwell Peit Hunt

**MOTOR DRIVES MODEL PLANE
AT HIGH SPEED**

Developing five horsepower, a miniature motor weighing five pounds is capable of driving a model plane at seventy-five to 100 miles per hour. It will make possible

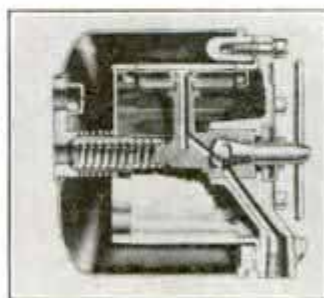


Inventor with Five-Pound Motor That Can Drive Plane with Fifteen-Foot Wing Spread

a radio-directed plane of fifteen-foot wing spread, since that size craft is large enough to carry a radio receiver to pick up remote-control signals. The motor is a six-cylinder, two-cycle engine and is connected to a thirty-inch propeller. The power is sufficient to keep a glider aloft without aid of the wind.

**SELF-CLEANING OIL FILTER
NEEDS NO REPLACEMENTS**

Replacement of the oil filter is said to be eliminated by the introduction of a self-cleaning filter. Turning a handle causes the filter to eject sludge collected from the oil. The element is a heavy brass cage with an extremely fine machine thread cut around the outside. This thread is the locating groove in which is wound one long space of tinned steel wire. A tiny space of only two and one-half thousandths of an inch between each coil is the "mesh" through which the oil is filtered. Sludge and abrasive matter are collected on the inner surface of the mesh. The filter is cleaned, while the engine runs, by turning a handle, causing a reverse flow of oil under full pressure to flush out the sludge.



Dandy Governor Corp
202 W. 7th St.

Hardeman Clyde
1428 W. Bristol St. Phil

Walter

Lehman. Mech

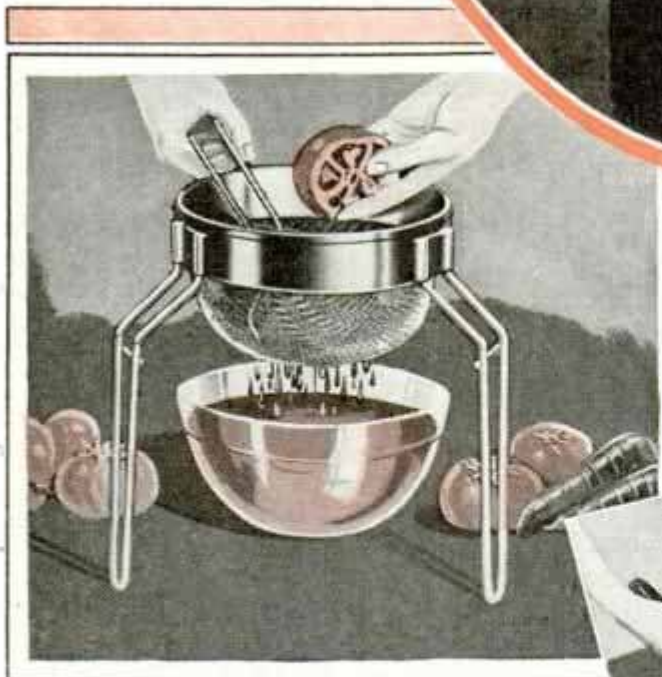
Making HOME



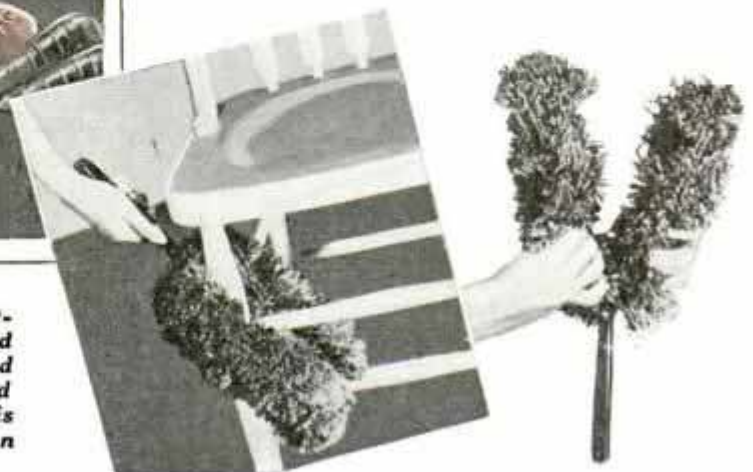
Above, Double-Acting Scissors Sharpener Designed to Eliminate Sharpening One Blade at a Time; Wall Holder Has Two Sets of Revolvable Steel Wheels; by Working the Scissors Up and Down in Holder, the Wheels Dress Each Blade Uniformly



Left and Below, Latest Mixer Speeds Up Cooking; Guard Prevents Splashing; It Is Designed to Lift Mixture and Allow Air to Mix Freely with It Before Returning It to Container; the Device Is Adaptable to Any Size and Shape of Container; One Feature Is Easy Cleaning



Left, Latest Device for Straining, Draining, Ricing and Washing Foods and Vegetables; Roller Type Pestle Crushes Whole Fruits and Vegetables; Two Six and Three-Quarter Inch Bowls, Coarse and Medium Mesh, Give Wide Working Range; Although Rigidly Constructed, the Press Is Easily Taken Apart for Washing



Right, Latest Duster Is Spliced to Make Dusting Easier and to Facilitate Cleaning Plain and Fancy Carved Tables and Chairs; Rungs and Backs of Chairs and Legs of Tables Are Cleaned and Polished Quickly with Little Effort; This Device Makes It Unnecessary to Get Down on Hands and Knees to Dust the Furniture

TASKS *a* PLEASURE

Below, Screw-On Nipple for the Baby's Bottle Is Easy to Put on; Only a Twist of the Fingers Is Necessary, Even in the Dark; the Nipple Is Sanitary, Since the Fingers Never Touch the Inside of Nipple Nor the Neck of the Bottle; It Cannot Be Removed by the Baby

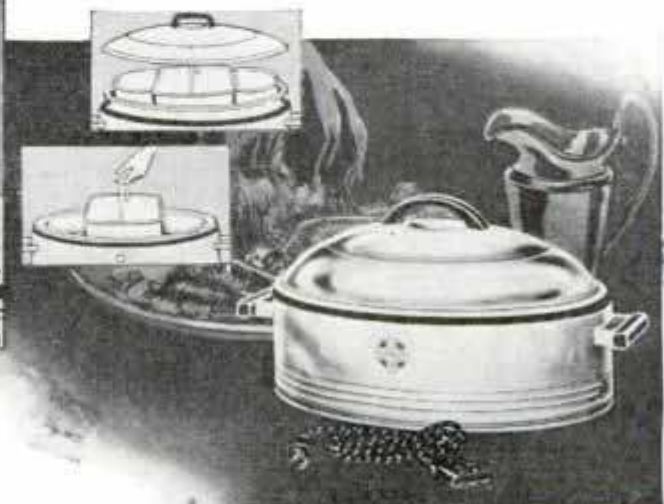


Above, "Pin-It-Up" Study Lamp Which Can Be Hung over Desk or Study Table; It Gives Thirty Foot-Candles of Light as Specified by Science; Opal Glass Diffuser Softens Light

Oval, Left, Glass Top for Home Canning Is Sealed in Place by Rubber Gasket After Air Is Exhausted by Hand Pump; Hole in Center of Top Is Covered with Small Rubber Cup; When Rubber Shoe of Pump Is Placed on Top, Air Is Sucked from under the Cup, Sealing Hole; Below, Electric Roaster May Be Used for Roasting, Baking, Frying, Toasting and Even Canning



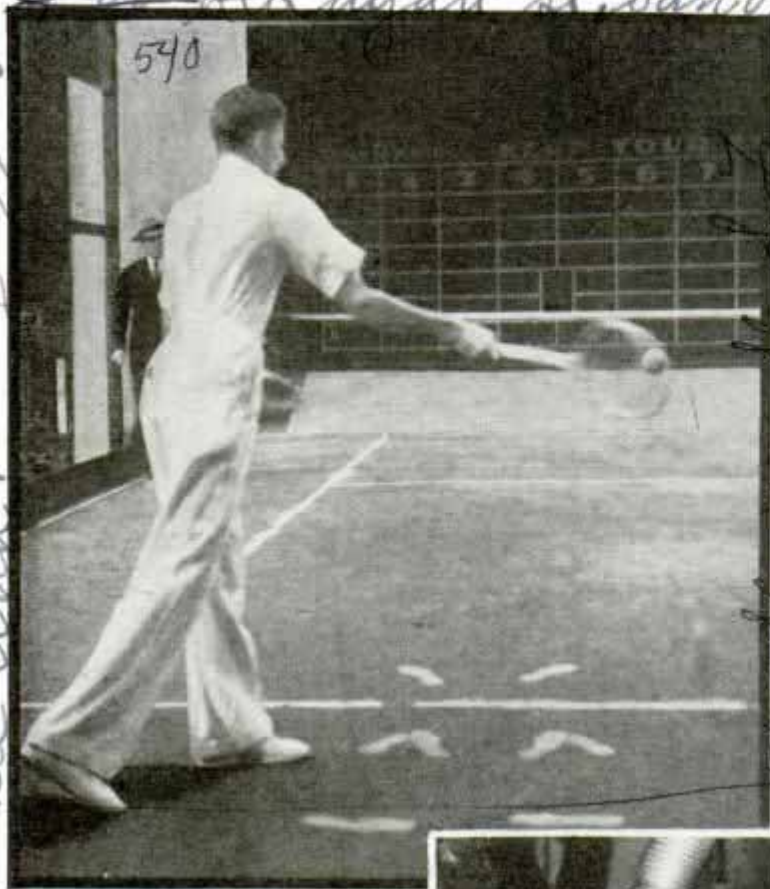
Above, Steamer Ring Converts Two Pans into Double Boiler; It Fits All Kettles; Arrangement as Illustrated Is Possible, Only One Flame and One Stove Eye Being Used; After Both Vessels Boil Separately, One Is Placed over the Other with Steamer Rings between



San Francisco

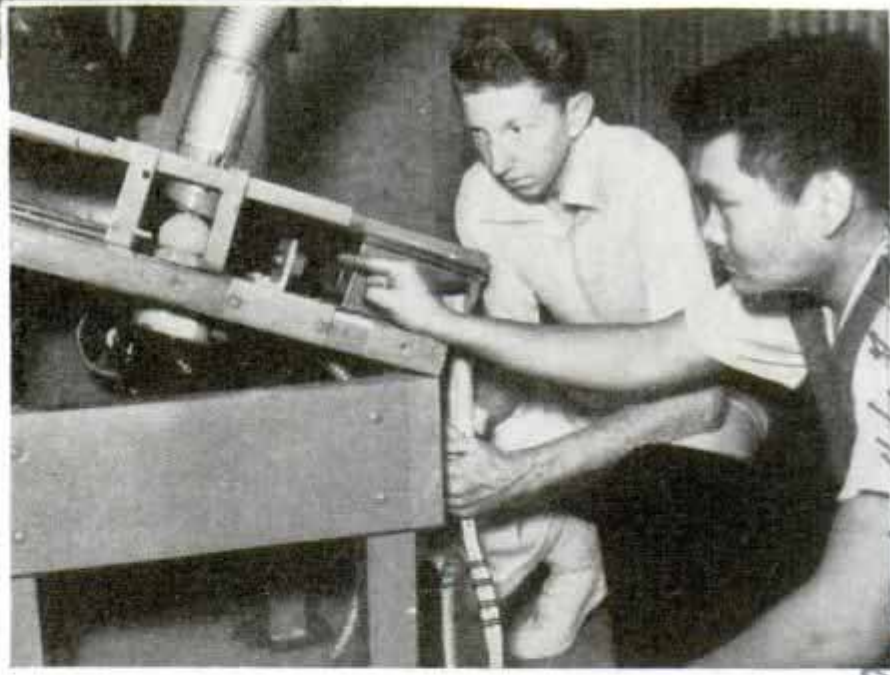
see golf tee. may 19 36 100

Tennis Robot Tosses Balls for Practice Shots



Player Returning a Service by the Tennis Robot, and the Mechanism Which Tosses Out Balls for Practice Shots

Tennis players can practice without bothering to find someone to serve if they are equipped with a robot which actually is a mechanical tennis player. The device delivers various types of shots, enabling the player to practice in much the same manner as though a companion were serving.



100,000 feet. The official altitude now is 61,237 feet made by Lieut. Com. T. W. G. Settle and Maj. Chester Fordney, although a Russian balloon has an unofficial record of 72,000 feet. The problems faced in going much higher become most complex. As the balloon is made larger, weight is increased. As height increases, more ballast must be carried to get it back to earth. And at great heights in the stratosphere, the temperature gets warmer instead of colder, and this complicates matters. While a balloon capable of a maximum altitude of 75,000 feet would need to weigh about 5,300 pounds, carry 2,100 pounds of ballast, have a diameter of 179 feet and a gas capacity of 3,000,000 cubic feet, one capable of a maxi-

ALTITUDE LIMIT FOR BALLOON IS SET AT TWENTY MILES

If man is to travel into the sky higher than twenty miles, he probably will be compelled to go in some rocket-parachute device. Computations based on the experiences of recent stratosphere balloon flights indicate that it is unlikely any balloon can be built capable of ascending

num altitude of 100,000 feet would need to weigh 22,300 pounds—four times as much—carry 7,600 pounds of ballast, be 373 feet in diameter and have a capacity of 27,300,000 cubic feet of gas—four and one-half times as much as the airship "Macon." It has been suggested that if the ballast carried were liquid hydrogen, it might serve in liquid form as ballast and in gaseous form to increase buoyancy.

Tenn. O. make Lee and Henry Mfg Co

540 Langman St

since 4/11/39

D145

Mr. L. E. Tuckerman, U.S. Bureau of

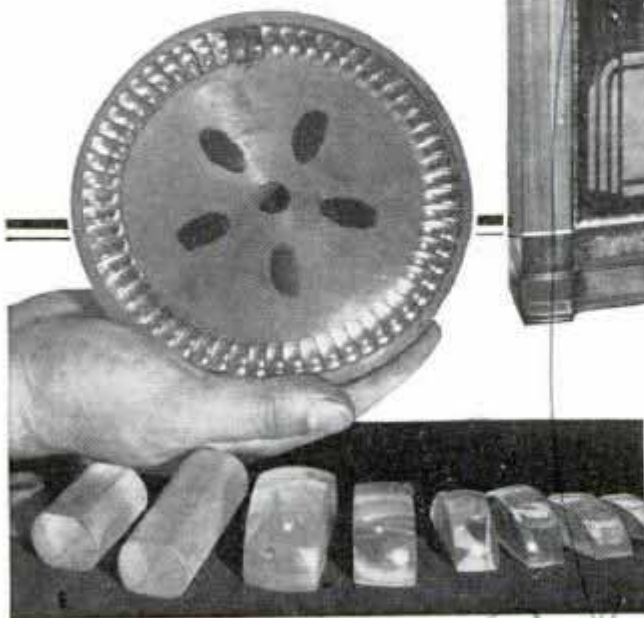
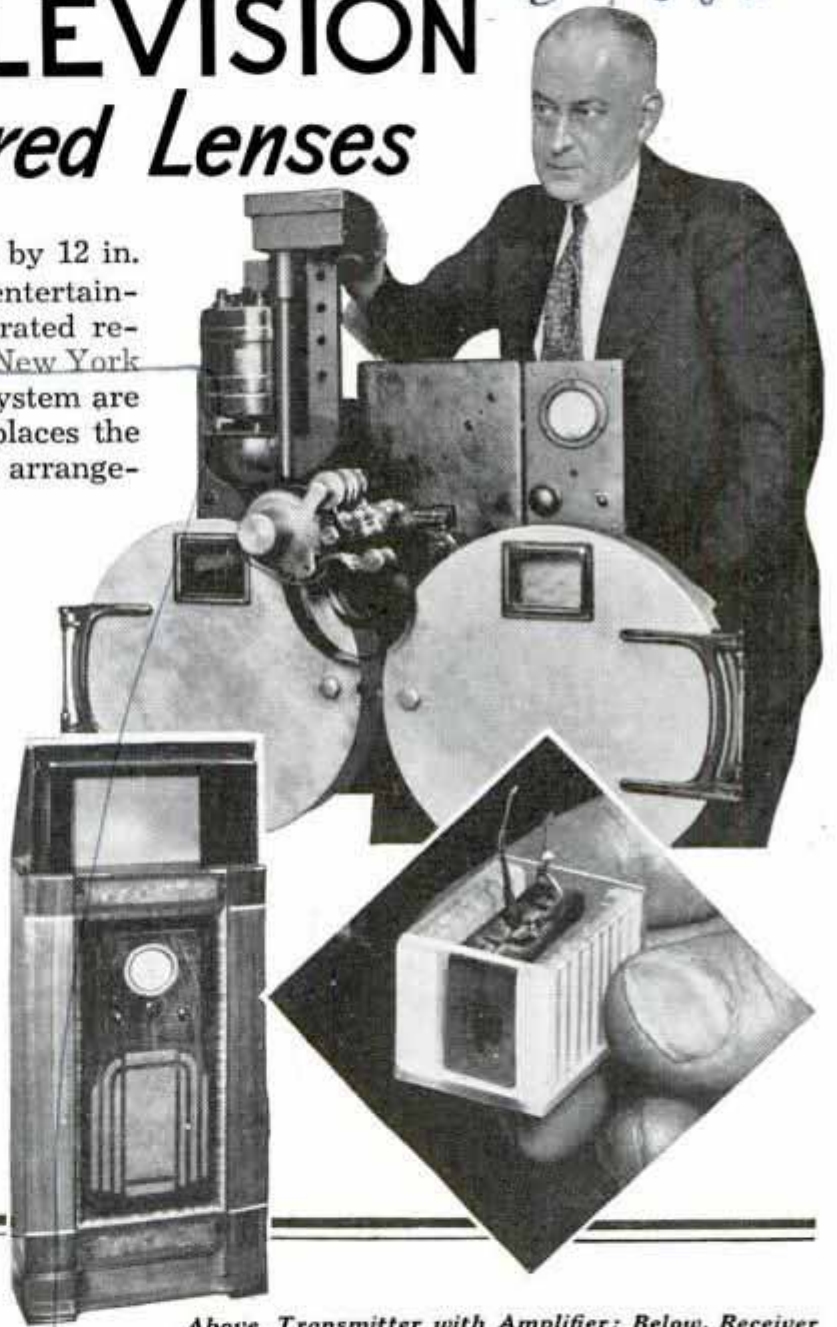


D4685

FILM TELEVISION *with Mirrored Lenses*

BRILLIANTLY illuminated 10 by 12 in. television pictures, of real entertainment value, have been demonstrated recently by Mr. William H. Peck of New York City. The main features of the system are a miniature Kerr-cell, which replaces the usual bulky photo-cells, and an arrangement of mirrored lenses that project the light beam from the cell to the viewing screen.

Standard-size movie film is employed in transmission, a special high-speed motor being used to provide 24 pictures per second. Vertical scanning is obtained by the continuous motion of the film, while horizontal scanning is performed by means of a disk containing many glass lenses, each mirrored on the rear surface. The

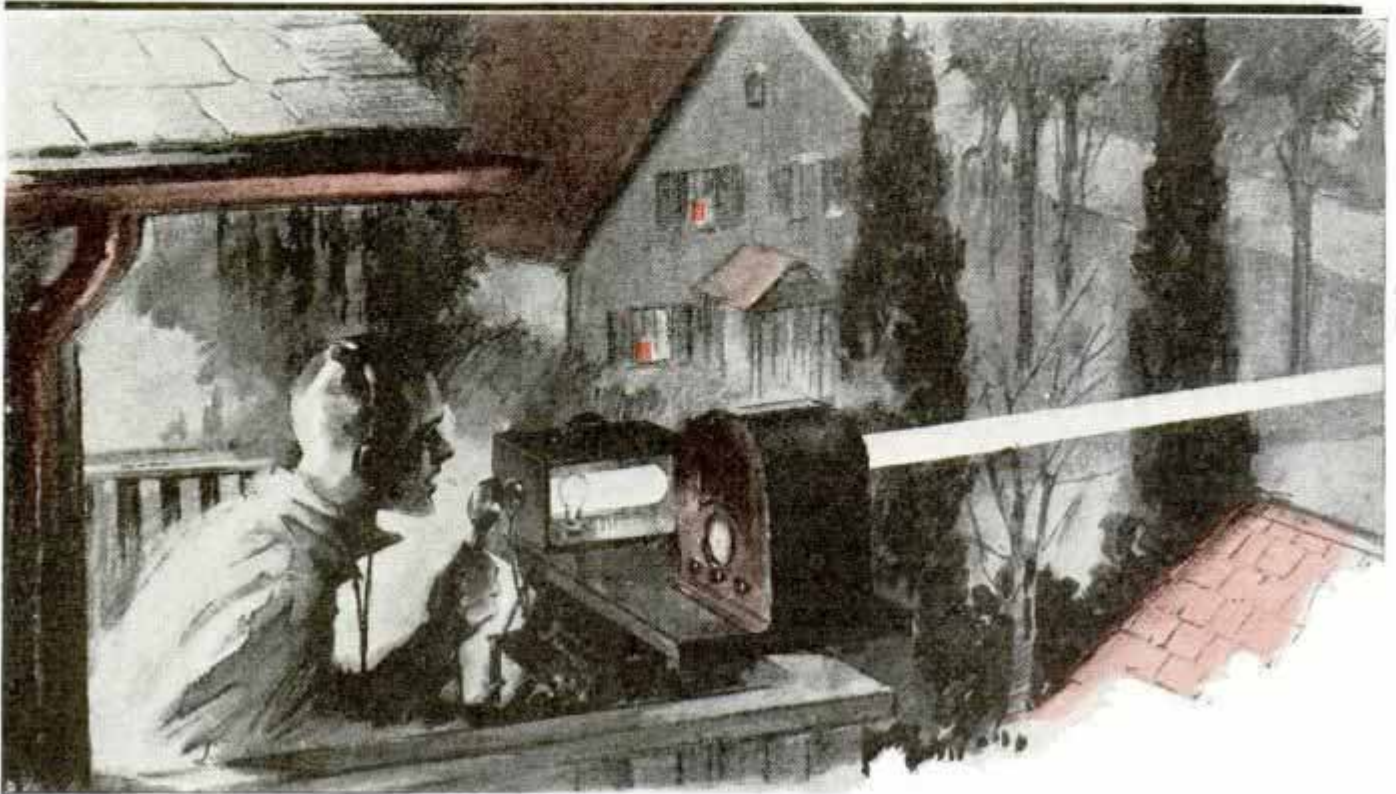


Above, Transmitter with Amplifier; Below, Receiver and Miniature Kerr-Cell; Left, Receiving Disk and Cast-Glass Lenses

light source is an ordinary auto headlamp placed within a collecting lens which directs a brilliant beam to the rotating lens disk. Sixty-line transmission was used in the demonstration; this can be increased easily by speeding up the scanning wheel.

*Peck Television Corp
421*

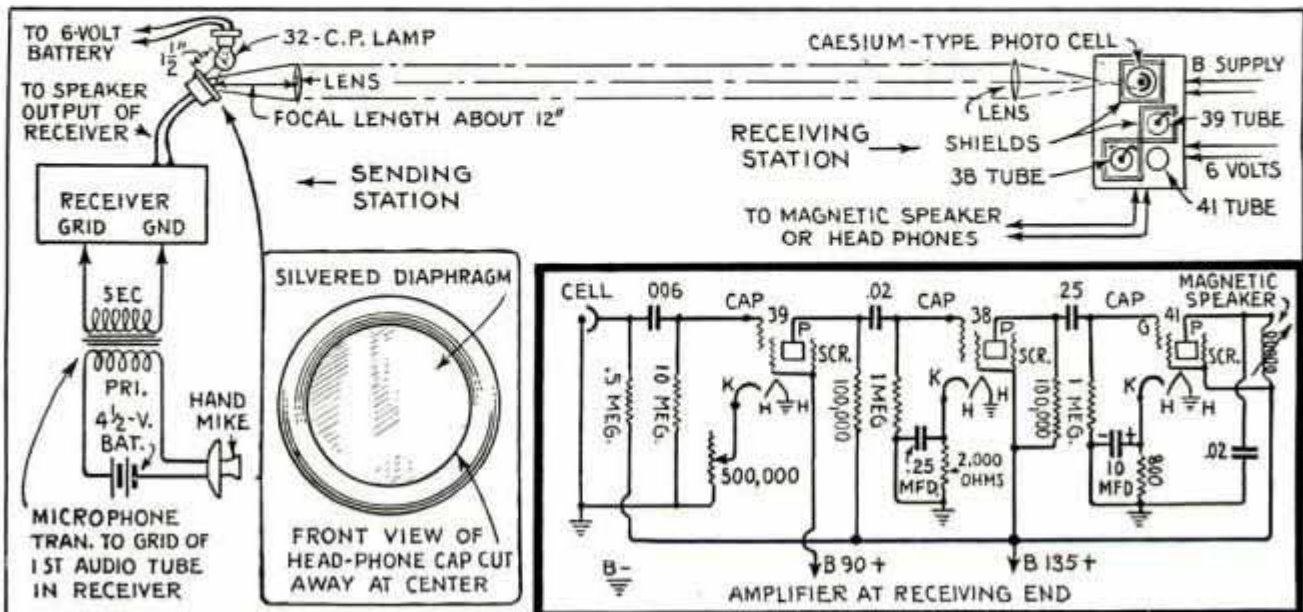
How to Chat Over



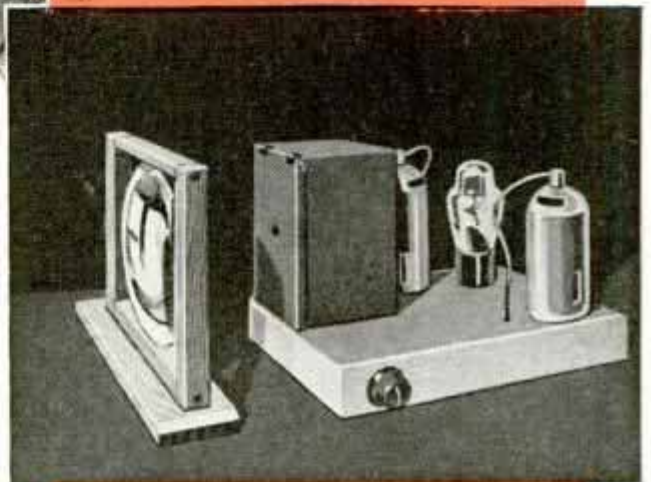
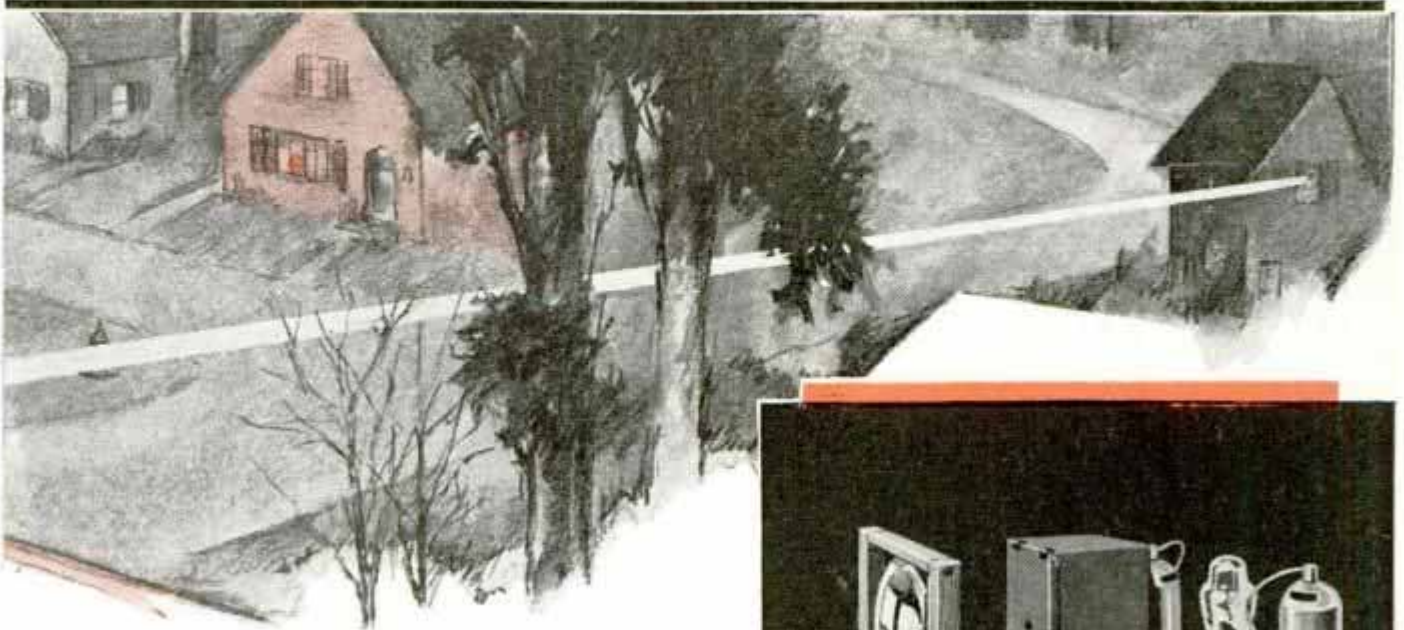
By FRANK S. PEARNE



ANYONE can assemble the simple parts necessary to talk over a light beam. Ever since the days of tin-can telephones, experimenters have been interested in various methods by which they could communicate with each other over short distances. Wire-line telegraph and visual signaling by mirror or lamp, all require a knowledge of code while a modulated beam of light may be used to carry the voice over



a LIGHT BEAM . . .



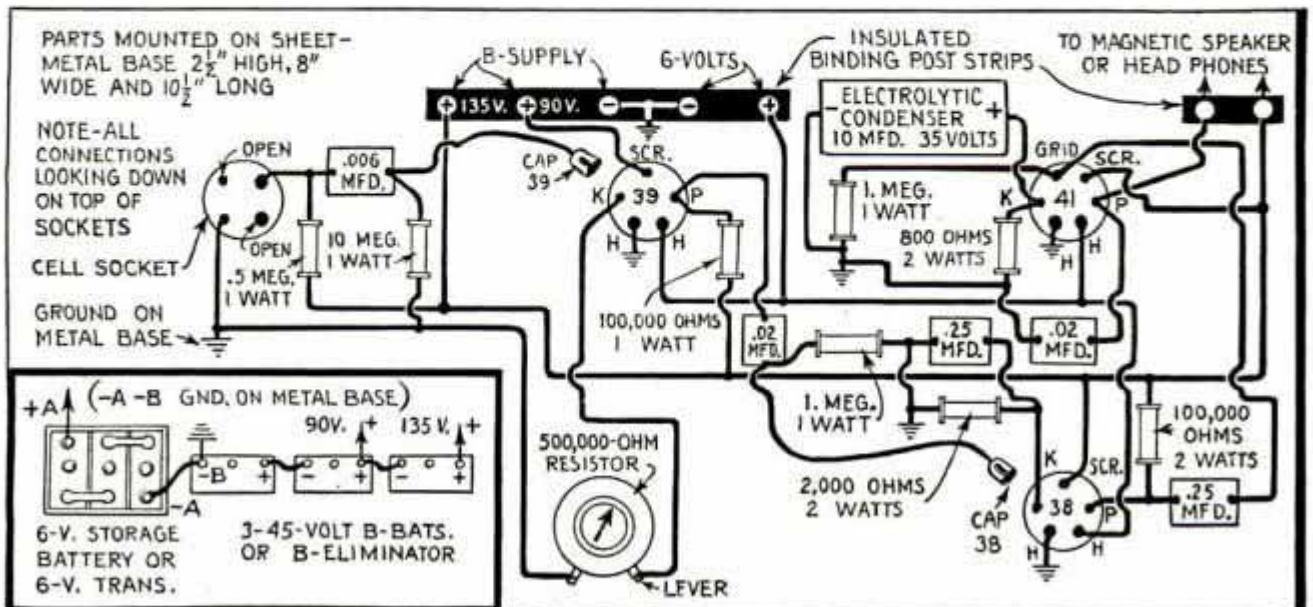
distances up to about one-half mile, and no code is required.

This system to be described has given excellent results, and most of the parts will be found in the average experimenter's junk box. Very few extra parts are necessary at the sending end; a hand microphone is connected to your regular broadcast receiver in a manner similar to that used in home broadcasting stunts for breaking into programs with personal announcements. However, instead of connecting the microphone directly to the audio amplifier in the receiver, a separate microphone transformer and a small 4½-

volt battery are used as shown in the diagram of the sending station. A Na-Ald home broadcaster adapter for the 1st audio tube socket in the set will simplify the connections to grid and ground.

The best type of broadcast receiver for the purpose is one that employs a speaker

(Continued to page 114A)



Crystal Microphone and Carbon Plate Tubes



By **FRANK L. BRITTIN**

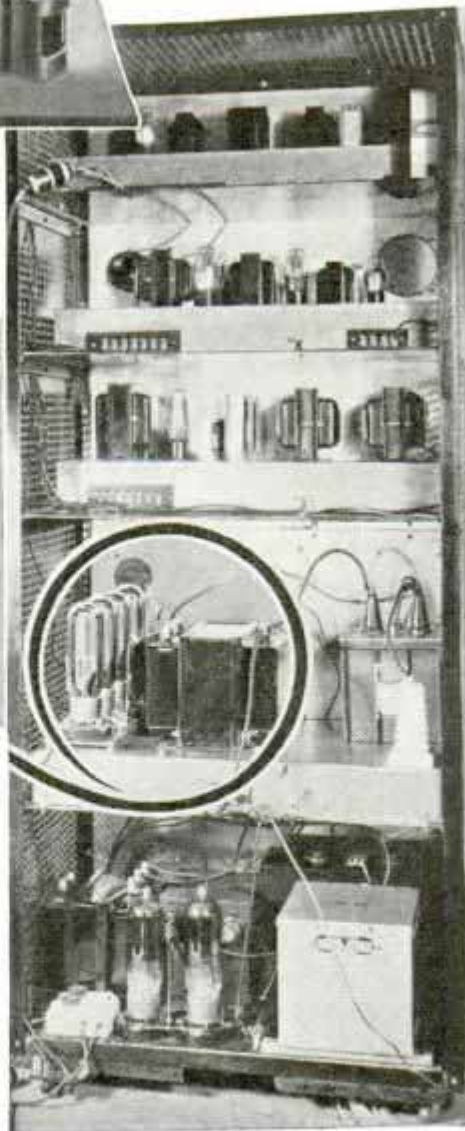
ROCHELLE salt crystals and carbon play important parts in recently developed radio apparatus. The crystal microphone makes good use of the electrical properties of a rochelle salt crystal and requires no energizing current of any kind. It may be worked directly into an amplifier tube of a public-address system, or speech amplifier of an amateur transmitter, without the usual matching transformer. When used with the Turner line amplifier, shown in the upper photo, this inexpensive microphone was operated at points remote from the main amplifier with excellent results. Free from hiss and background noise, the crystal-type microphone works well in any position and may be moved about while in operation.

The rapid growth of short-wave radio has encouraged tube engineers to look around for something better than nickel or other metals for transmitting tube plates. Carbon, or in its purer form "graphite," was finally selected for greater heat dissipation and its ability to withstand heavy overloads. A solid block of commercial carbon is machined to the proper dimen-

sions and is then mounted on the stem as shown in the photos at center.

As the non-warping carbon plate is stronger mechanically than the usual metal plates, the completed tube will stand rough handling. At the present time, the R.C.A. Radiotron and Sylvania carbon-plate tubes are of the types usually employed in transmitters and public-address systems; however, the same principles apply to receiving tubes and these may follow later. Stabilized tubes

(Continued to page 120A)

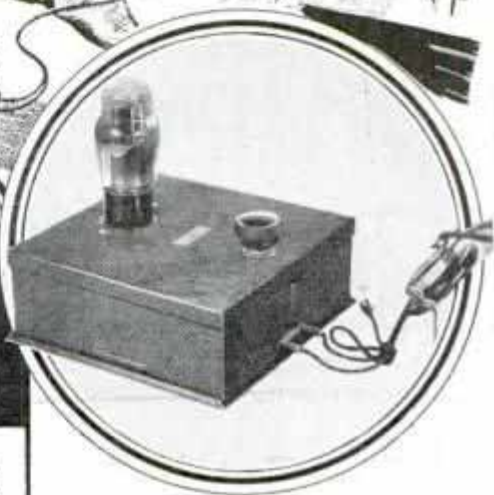
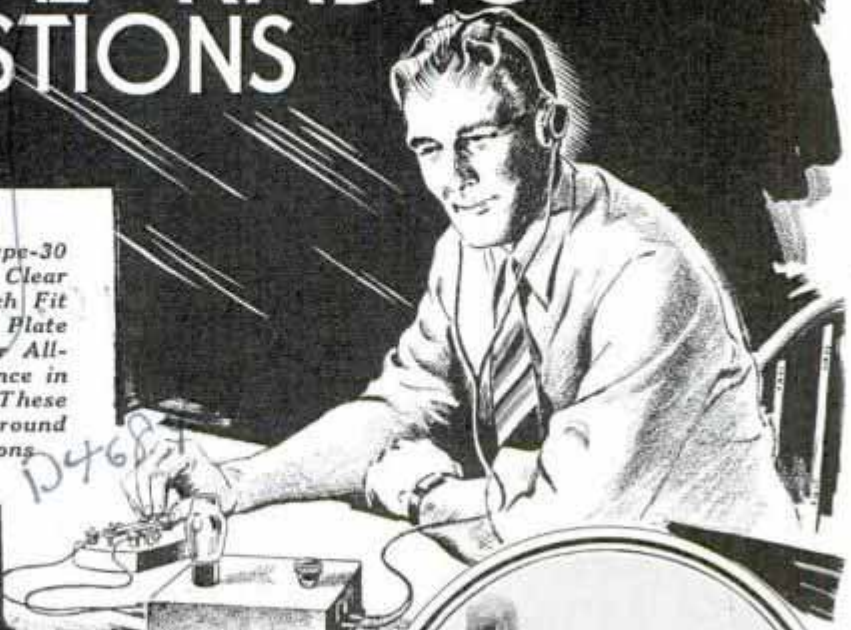


National Co. Inc.
638 Sherman St.
Malden Mass

Technical Appliance Corp
37 Jackson Ave
Long Island City, NY

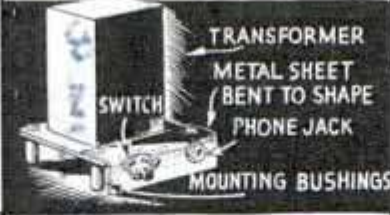
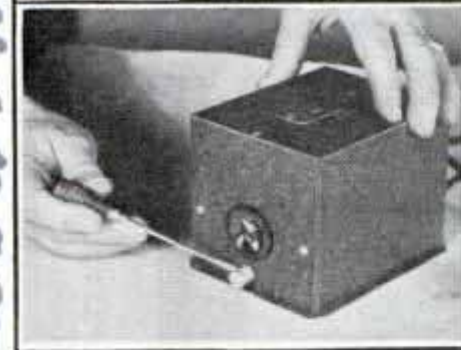
PRACTICAL RADIO SUGGESTIONS

Right, Code Practice Set Uses a Type-30 Tube as Audio Oscillator for Good Clear Signals; Four Flashlight Cells, Which Fit Inside the Case, Supply Filament and Plate Current; Below, Line-Noise Filter for All-Wave Receivers, Eliminates Interference in Short-Wave and Broadcast Bands; These Filters Are Necessary Where Background Noise Persists Due to Line Conditions

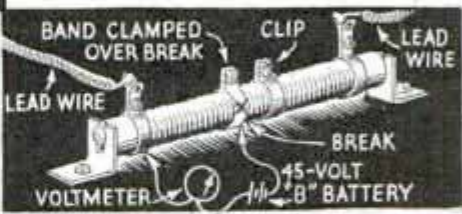


Above, Threaded Brass Tubing Makes Good Shield for Screen-Grid Tube Lead

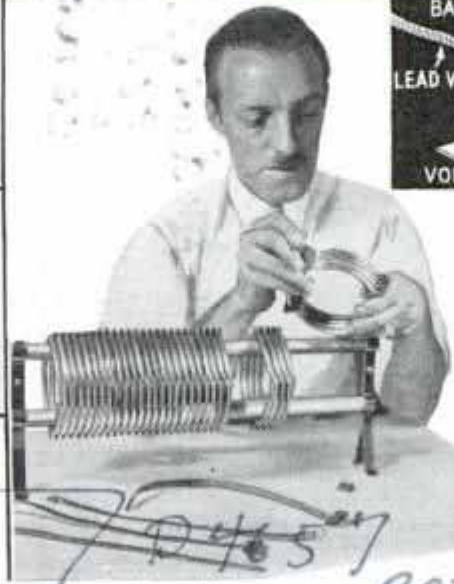
Left, Compact Transformer Assembly Saves Space in Portable Receivers or Transmitters; Room Is Provided on and under the Base for Mounting Jacks, Switches or Variable Resistors, Enabling the Builder to Keep Leads Short for Best Results; Shielding Is Simplified as Parts Are Grouped



Below, Easily Installed Gap-Type Lightning Arrester Is Housed in Porcelain Container so Designed That Snow and Ice Cannot Collect on Surface to Cause Signal Loss



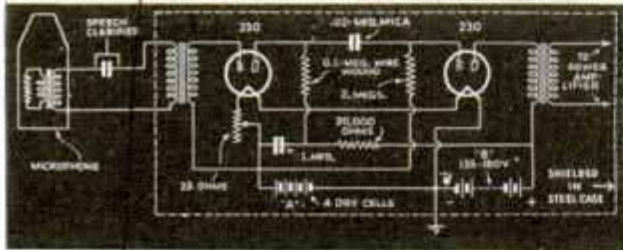
Above, Ordinary Adjustable Resistor Clip for Handy Temporary Repair on Burned-Out Voltage Divider; Voltmeter Test, Used to Locate Break, Is Made with the Line Supply Disconnected



Right, Single Adjustable Transmitting-Coil Unit Covers All Short-Wave Bands; Divided into 4-Turn Units, Each Unit and Individual Turn Is Joined by a Removable Clip

Porcelain Products Co. Monday, Ohio

Hordson Electric Supply Co. 425



Shielded Ribbon Microphone and Suggested Two-Tube Battery-Operated Pre-Amplifier

Ribbon Microphone Is Directional

Placed at an angle of 90 degrees from any near-by source of undesirable noise, this directional ribbon-type microphone reduces the interference to a minimum and also helps to eliminate acoustical feedback. It employs a ribbon of aluminum alloy and is not affected by temperature.

Light Column Aids in Tuning Receiver

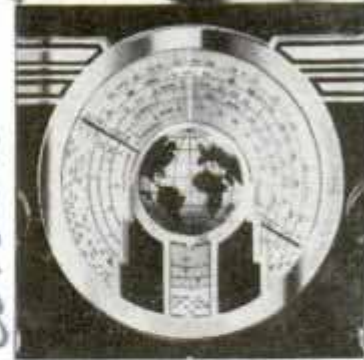
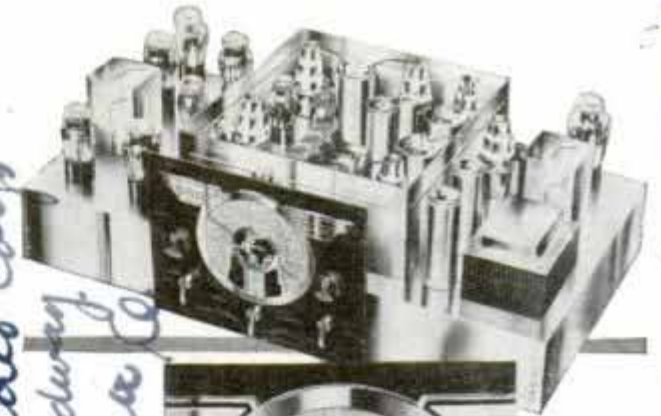


Control Knobs Showing Light Column at Center for Visual Tuning

Accurate tuning by means of a column of green light is a feature of one of the new English receivers. A small glass tube, about an inch long, and resembling a thermometer in appearance, is located in a panel escutcheon directly below the speaker grille. Medium and long wavelength tuning scales appear elsewhere on the panel. As a program is tuned in, the column of light rises to maximum height when the station is accurately located.

Sixteen-Tube Set Covers Five Wave Bands

This multi-tube all-wave receiver brings in ultra-short, short, medium, broadcast and long waves. The controls have been simplified so that only two knobs need be adjusted for receiving American broadcast programs. There are no switches on the back or bottom of the cabinet; the on, and off, switch is controlled by the same



All-Wave Receiver Chassis with Triple-Calibrated Airplane-Type Dial

knob that adjusts sensitivity. Call letters of American broadcast stations are printed directly on the illuminated dial.

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.

Turner Microphone Co. Cedar Rapids, Iowa

Amperite Corp. 561 Broadway

D4687

D4689

D4688

Midwest Radio Corp. 909 Broadway Cincinnati

Mr. Richard Arbib, His Master's Voice, 108 Clerkenwell Road London

Worcester, Mass.



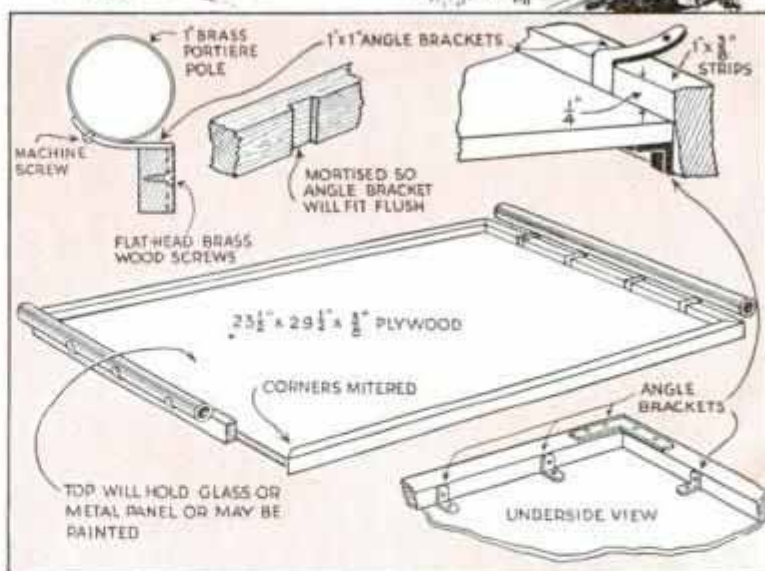
Two Simple

**HURLEMAN
ARISTOCRAT**
MODEL AIRPLANE MOTOR
1/2" Bore, 1" Stroke, 4500 r.p.m.
PRICE \$17.50
Light weight Colls—Plugs
Send 3c Stamp for Folder
Mfg. Solely by
WALTER HURLEMAN, INC.
1428 W. Bristol St., Phila., Pa.

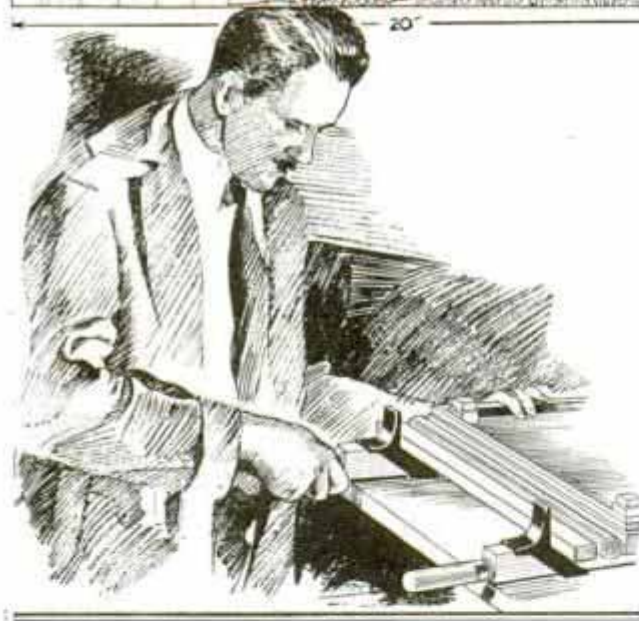
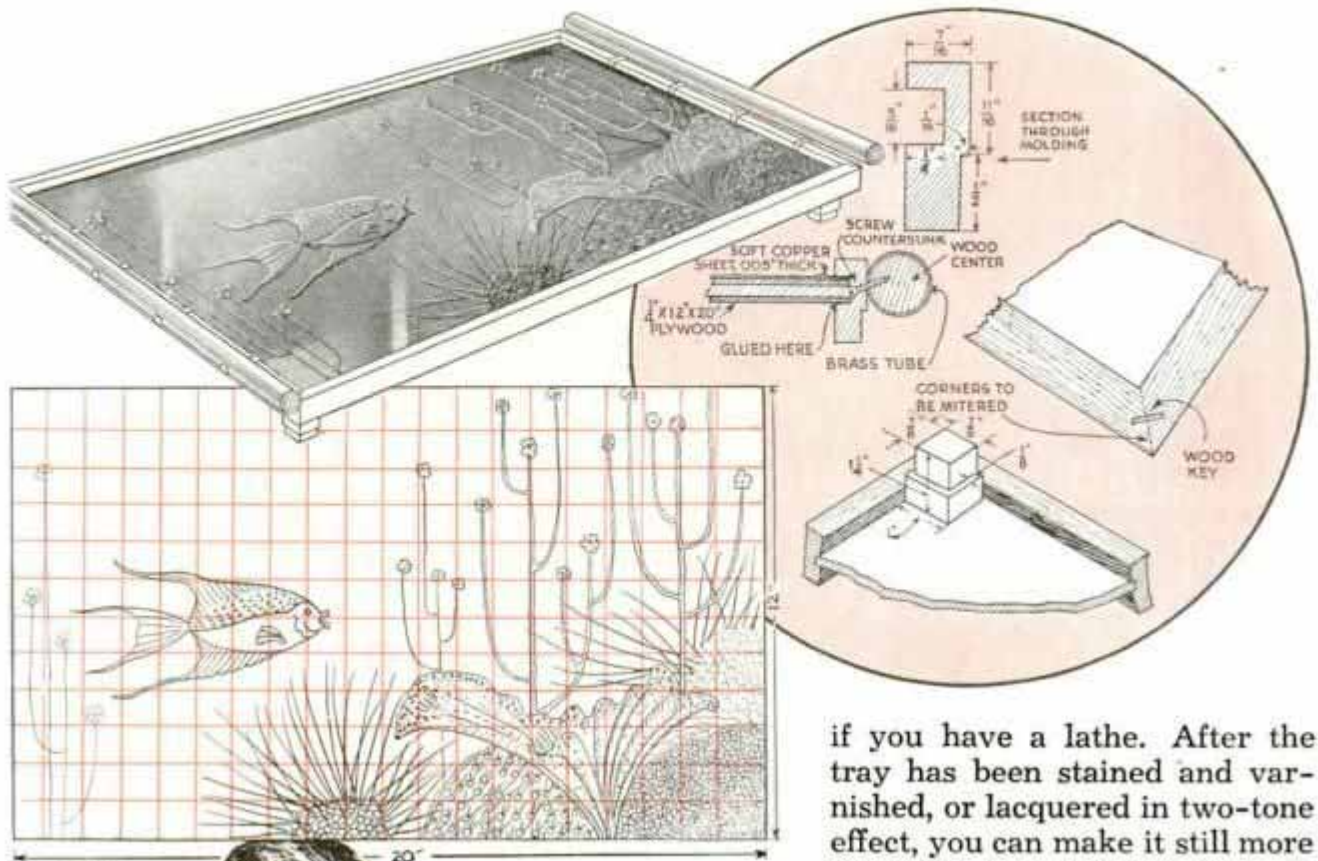


By
OSKAR J. W. HANSEN

SIMPLICITY is the keynote in the construction of two kinds of serving trays described in this article. In the first one, detailed on this page, the bottom is a piece of plywood of suitable size, which fits inside of a frame, mitered at the corners. Small angle brackets are used on the underside of the bottom to hold it securely to the sides. Larger angle brackets are mortised in the end members of the frame to hold the hand grips, which are pieces of 1-in. brass portiere poles, available at almost any hardware or department store. You will note that the angle brackets are mortised so that they will fit flush. The ends projecting horizontally are bent over slightly to fit the contour of the hand grips. While flat-head brass wood screws are used to attach the angle brackets to the frame, machine screws are used to attach the brackets to the hand grips, the latter being drilled and tapped for the screws. Another detail of construction is the method of reinforcing the frame with corner braces, which is necessary to keep the mitered corners from spreading



apart. As these pieces of metal will scratch a finished surface, it is a good idea to glue a piece of felt over them, or to drive rubber-head tacks into the underside of the frame to raise it. If desired, you can eliminate the use of angle brackets to hold the tray bottom to the frame, by rabbeting the frame so that the tray bottom fits

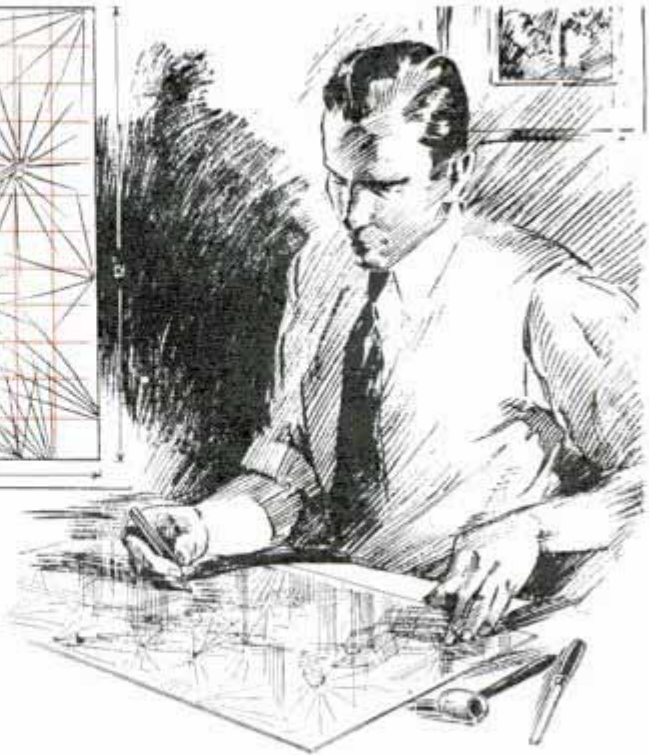
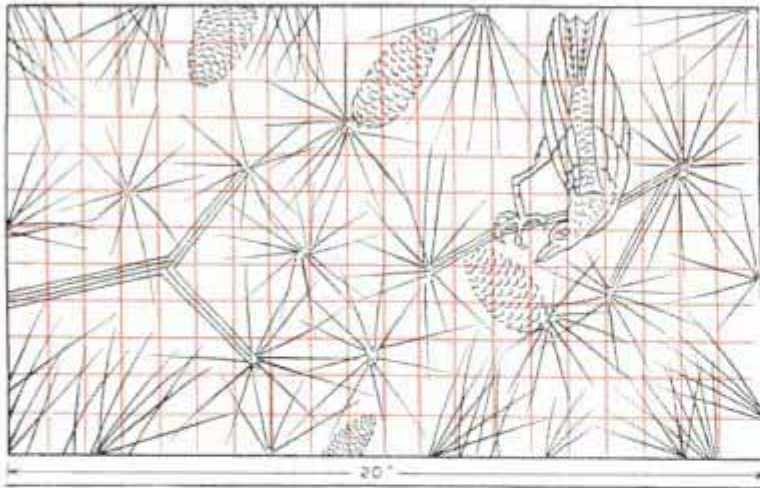


snugly, after which small flat-head screws or glue are used to hold the assembly together. Another improvement is the use of a wood spline at the mitered corners, and if you use this method, the corners should be glued. The brass hand grips should be polished bright and given a coat of transparent metal lacquer to prevent them from tarnishing quickly. A satin finish can be obtained by using No. 3-0 sandpaper, holding the sandpaper in the palm of one hand around the tubing and then twisting the latter. Of course, such a finish can be accomplished in much less time

if you have a lathe. After the tray has been stained and varnished, or lacquered in two-tone effect, you can make it still more attractive by cutting a piece of fancy-design wall paper to fit the tray, and then placing a piece of glass over this. If you use plate glass for this purpose, its thickness should be taken into consideration when the tray bottom is fitted in the frame, as the frame should project above the glass.

Trays having hammered-copper tops, the design in pleasing repousse, are really artistic as well as practical. You can use almost any suitable design obtained from a magazine or newspaper, or you may like the suggestions given in the accompanying drawings. Just take a sheet of heavy paper, rule it off in 1-in. squares, and then draw in the design. The pattern thus made is easily transferred to the sheet of copper, by means of carbon paper. In doing this, remember that the design should be on the back of the metal, as it is going to be pressed or hammered from the back. If your design has any lettering, this part of the work must be carefully considered. The sheet copper used should be about .005 in. in thickness, and it should be of the softest grade.

In the case of the tray illustrated the wooden handle of the mallet was used for making an indentation for the body of the fish in the soft copper. The outline of the fins and tail was then pressed into the de-



sign with the dulled edge of an old wood chisel. The eye was punched with the rounded end of an old nail set. The scales were imitated by using a small octagonal machine lock-nut lever. The long lines of the stems of the polyps reaching through the water were made by simple hand pressure upon the rounded nail set, drawing with it much as one would with a pencil. The coral formations were first pressed into general rounded form with the wooden handle of the mallet and then decorated afterward by gently hammering upon the small octagonal lock-nut lever. The star corals were made with the dull edge of a 1-in. wood chisel. It is important that the

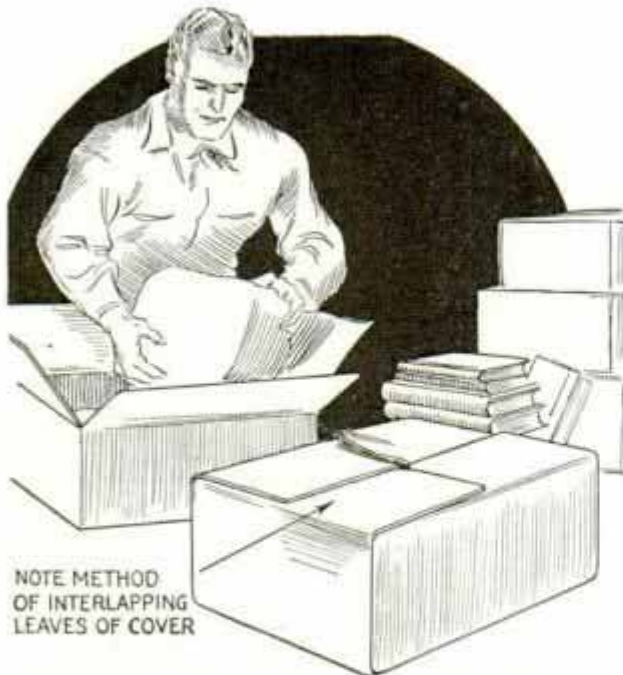
hammering be done gently, to keep the work in low relief. Distance is obtained in the picture by the different pressures one applies to the tools. A hardly visible line pressed into the copper will appear as an object far into the distance and a line or detail hammered with more vigor will show up as in the immediate foreground.

Length of Chain Serves as Substitute for Camera Tripod

When it is inconvenient to carry a camera tripod on an outing trip, a length of small chain that can be carried in your pocket will serve as a substitute. A tripod screw is fastened to one end of the chain for attachment to the camera. By keeping the free end of the chain taut with the foot while making an exposure, the camera can be held steady. If all exposures are made from about the same height, a loop may be formed permanently in the end of the chain to take the toe of the shoe. A better method, however, is to make a loop on one end of a length of wire, and then bend a hook on the other end. This may then be attached to any link in the chain to get the height desired.—Harry Starnes, Houston, Tex.



Plaster casts can be glazed by dipping them in a solution of water glass and then baking them in an oven.



NOTE METHOD OF INTERLAPPING LEAVES OF COVER

Old Cardboard Boxes Closed Securely by Interlapping the Four Leaves of the Cover

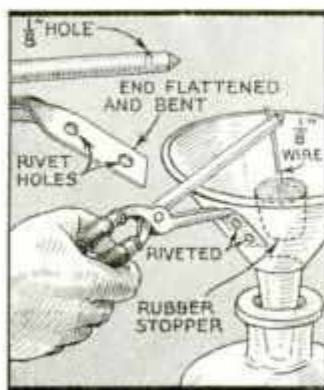
Simple Method of Closing Old Cardboard Boxes

When old corrugated cardboard boxes are used around the home for storing books, packages, etc., the four flaps of the cover can be fastened down by interlapping them as shown. This is better than using string, as the contents of the box are readily accessible without the trouble of untying and re-tying the package.

Combination Dipper and Funnel Has Many Uses

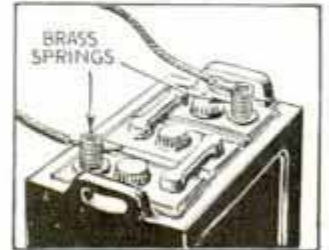
Many uses can be found for this combination dipper and funnel. It is made from a tin funnel and an old curling iron, one jaw of which is flattened and riveted to the side of the funnel. The other jaw is drilled near the end for a small wire which carries a rubber stopper. In use, the spring in the handles of the curling iron keeps the stopper in the

mouth of the funnel spout so that it serves as a dipper, but pressure on the handles removes the stopper so that the contents may be emptied.



Small Brass Springs Facilitate Connecting Wires to Battery

In the experimental laboratory where dry cells or storage batteries are often used, small brass coil springs provide good connectors for attaching wires. The springs are slipped over the battery posts and the wires connected by slipping the bared ends between the coils. In this way, several wires may be connected or disconnected instantly.



Hairpins Hold Cut Flowers in Wide-Mouth Vase

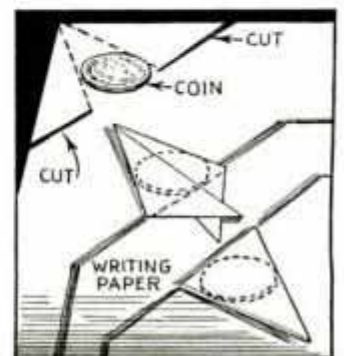
When flowers are cut with long stems and there is only a wide-mouth vase at hand to put them in, they can be arranged neatly with a spider made from hairpins.



These are twisted together as shown, and the ends are bent to form hooks, after which the resulting spider is concealed within the foliage where the hooks engage the stems and prevent them from spreading apart.

Mailing Small Coins Safely

If small coins must be sent through the mail and no regular holder is available, wrap them in one corner of the letter as shown. In this way, when the letter is folded, there are two or three thicknesses of paper around the coins so that they are not likely to wear a hole in the envelope. This method also assures that the receiver of the mail will notice the coins as they are attached directly to the writing paper.



Novel WINTER KITCHEN draws sandwich trade

CIRCULAR WINDOW ON EACH SIDE

CLIPBOARD
DOOR
SHELF
HOT PLATE
SHELF
PLAN

PLYWOOD, CANVAS COVERED
NAILED TO ROOF FROM UNDERSIDE
CUPOLA OVER VENT
ROOF COVERED WITH HARD PRESSED BOARD, CANVAS AND TAPE TACKED ALONG EDGES
CURVED MEMBERS SAWED FROM 3/4" X 6" PINE
VENT
SHELF
LINOLEUM
INSULATING BOARDS
1" X 1" STRIP
TOWING BAR
3" X 1" FLAT-IRON YOKE
ROOF SHOULD HAVE 2 COATS OF PAINT

Comfortably housed in a portable kitchen mounted on a sled for easy transportation, an enterprising vendor makes a neat profit from hot drinks

ALL FRAME MEMBERS ARE 3/4" X 3" PINE (UNLESS OTHERWISE INDICATED)
ENTIRE FRAME COVERED WITH HARD PRESSED BOARD AND PAINTED
2" X 3" X 3/4" HARDWOOD
CORRUGATED FASTENERS
CELLULOID HELD TO FRAME WITH MARINE GLUE & TACKS
VISIBLE JOINTS FILLED WITH PUTTY AND PAINTED
SERVICE OPENING
ROUND FRAME MADE UP OF SIX 60° SEGMENTS CUT ON A 12" RADIUS

DOOR DETAIL
24" X 36"
HARD PRESSED BOARD ON A WOOD FRAME

REAR END
SIDE VIEW
BLACK LETTERS ON CREAM BACK GROUND
DETACHABLE TOWING BAR



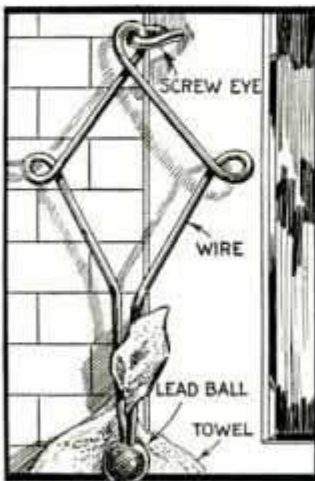
Steel Phonograph Needle Held in Automatic Pencil Serves as Emergency Glass Cutter

Glass Cut with Phonograph Needle

If you have an automatic pencil in which a steel phonograph needle can be inserted, it will serve as a tool for cutting glass in the absence of a regular cutter. Leave a short piece of lead in the pencil to prevent the needle from being forced back too far. The tool is used in the same way as a regular cutter, changing the needle each time a stroke is made across the glass.

Sure-Grip Towel Hanger Made from Spring Wire

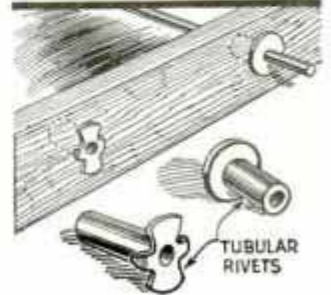
Formed from galvanized or spring-brass wire, this hanger holds a towel securely, yet releases it instantly when the towel is given a slight jerk. A screw eye is provided in the upper end for attaching to a wall, while the lead ball at the lower end is formed with the aid of a mold. A simple soldering job, or a wire clip to hold the ends together, will serve equally well. If a board jig is provided to form the hangers, they can be made up in quantities at low cost and sold at a good profit.



together, will serve equally well. If a board jig is provided to form the hangers, they can be made up in quantities at low cost and sold at a good profit.

Tubular Rivets Serve as Bearings on Toys and Models

Tubular rivets of brass or copper provide a ready supply of bearings for toys and models. After selecting a rivet of suitable size, drill a hole through the head to take the shaft and insert it into the housing. If this is metal, a little glue or cement will help hold it in place. Or, if the housing is wood, four notches may be filed in the rivet head and two of the tabs formed in this way are bent over so that they can be driven into wood.—H. Reid Hearn, Greenville, S. C.



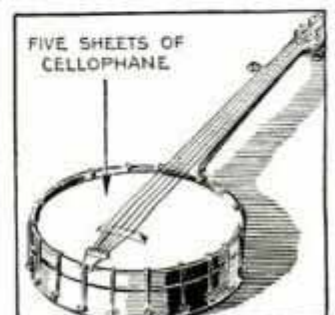
Rubber Pad Improves Bit Brace

When a brace and bit are used frequently, it is an advantage to attach a sponge-rubber pad to the handle of the brace with glue or rubber cement. If the latter is used, be sure to first roughen both the rubber and the brace handle, then apply a thin coat of cement to each surface. Let this dry and then press the pad in place.—Kenneth Murray, Sturgis, Mich.



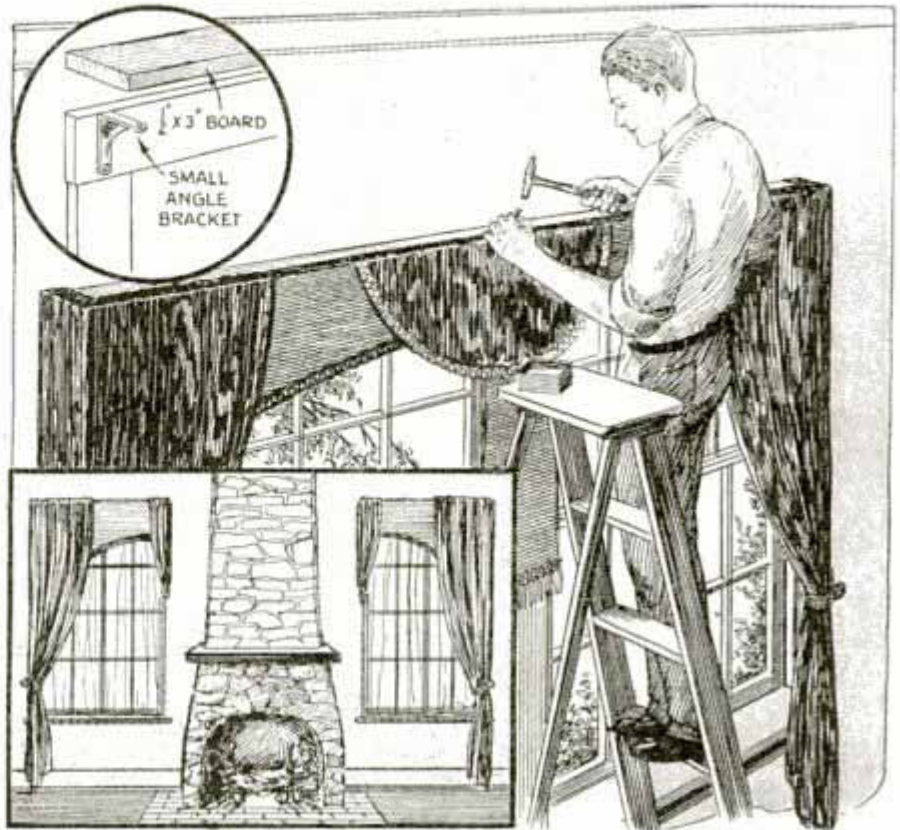
"Cellophane" Used as Banjo Head

When the head of a banjo is broken and a regular calf-skin head is not readily obtainable, try using four or five sheets of Cellophane as a substitute. Cellophane is tough enough to stand considerable abuse, and I have found that the instrument produces just as clear a tone as when fitted with a calfskin head.—John Hoffman, Bronx, N. Y.



Concealed Board Holds Window Draperies

Some interior decorators are now using a board from which to hang window draperies. This is much less expensive than the conventional metal or wood pole, especially for tenants who have to cut up their decorative poles or purchase new ones when they move, as the arrangement of windows is usually different in each house. A $\frac{1}{2}$ -in. by 3-in. board is recommended and it is installed above the window on small angle brackets, which are available at any dime store. Tacks are used to fasten the draperies over the edge and around the ends of the board so that it is entirely concealed. Where two or three windows are together, one long board can be used with brackets at the ends and the center to give the necessary support. In two-window arrange-



Concealed behind Window Draperies, a Narrow Board to Which They Are Tacked, Makes a Substitute for a Decorative Pole

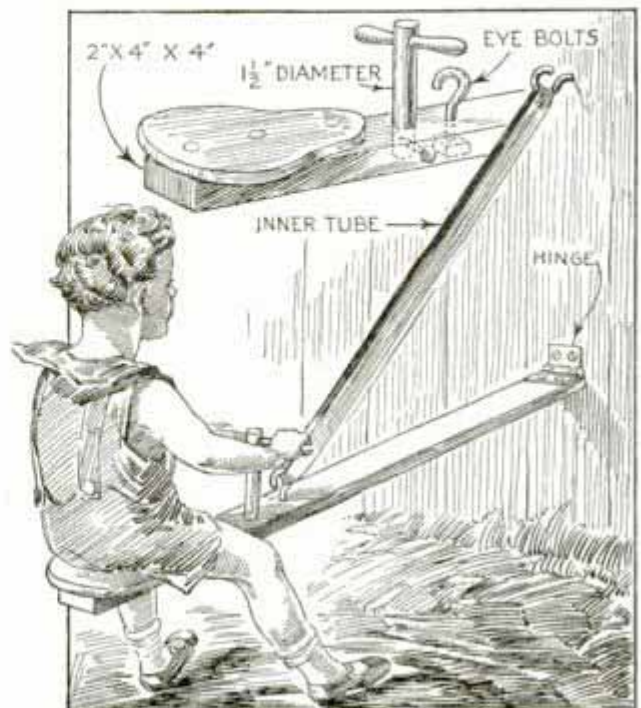
ments, the draperies may be hung the full length on one side of each window, festooned above each window, and continued about halfway down between the windows.

Seesaw Fastened to Building Is Operated by One Child

Differing from the usual type of seesaw in that one child can operate it, this one is hinged to the side of a building or a large post. It gets its teetering action from one or more old inner tubes or a coil extension spring, fastened to the seesaw and to the building by means of large eye bolts, which are opened to allow the band or spring to be attached. It is a good idea to close the eyes of the bolts so that the tubes will not slip off.

Cleaning Rugs Quickly

When beating a rug, turn it first face down and beat it on the back. This loosens the dirt which has gathered and packed in the coarse strands of the weave so that it will whip out of the nap readily when the rug is reversed and beaten on the nap side.





Your LIVING-ROOM

By
John Winters Flemming

MANY normal plants can be taken into the home, located at spots a considerable distance from the windows, and be kept in healthy condition for a reasonable length of time under 60 to 100-watt lamps, burning about five hours each evening. It is unnecessary to use special lamps such as sunlight or daylight lamps. Best results have been obtained from the ordinary electric lamp. The garden plot may be almost any container from an Easter flower basket to a regular floor lamp, from a flower pot to a strawberry jar. All that is essential is light and this light preferably should shine down on the plant from above so that the plant will grow upward to the light. Light shining on the plant from one side tends to draw the plant toward it, causing the plant to bend, sometimes to bend so far as to touch the lamp and burn the plant. As a usual thing, the foliage type of





Neat homemade fixtures with metal shades, assembled from parts of old lamps, may be used to light cut flowers or growing plants, giving a pleasing decorative effect

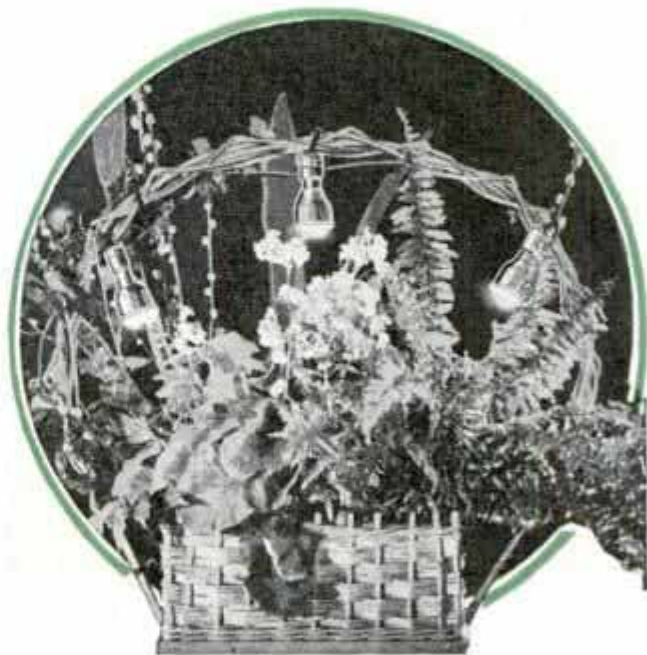
GARDEN..

plants and vines requires lower intensities of light than the flowering type and the foliage type accommodates itself to indoor conditions more readily than the flowering type. For growing plants, at least 100-watt lamps are recommended.

Properly arranged, the beauty of your plants will, when combined with lamps, greatly enhance the attractiveness of your home. Flowerpot holders, suspended from wrought-iron wall lamps or forming part of a floor lamp, are exceptionally neat in appearance. Even an ordinary table lamp may be the center-piece of a wide, shallow bowl containing some of your favorite plants. The photos show how easy it is to arrange plants in such combinations. Another innovation is to arrange small electric lamps, fitted with suitable shades, to illuminate baskets or pots of flowers. The handle of a basket may serve as the support on which the lamp is mounted as in the lower right-hand photo. Other examples of this practice are shown at the top and left, the lamps being mounted on a pointed rod for easy insertion into the earth of the pots.



Above, this lighted plant fixture was made from a wrought-iron flower-pot stand and part of a floor lamp. Below, small lamps and reflectors spaced along basket handle





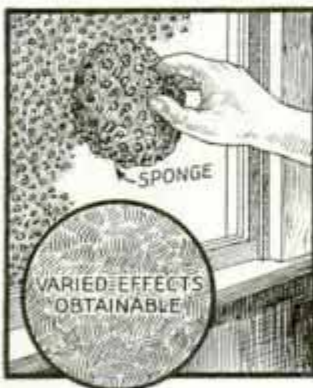
Patterns Made from Wire Solder Save Time When Bending Heavy Wire for Certain Jobs

Wire-Solder Patterns Simplify Bending Stiff Wire

When it is necessary to bend heavy wire for a certain job, it is often difficult to gauge the length and angle of each bend correctly, and time is lost in making adjustments. This may be overcome almost entirely if a model of the required shape is first made from wire solder and then used as a pattern in bending the wire. The solder bends easily and any inaccuracies are readily corrected.

Frosting Window Glass with Paint

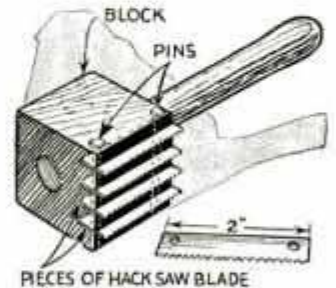
If there are windows in your home that should be frosted, apply paint to the glass and stipple it with a clean sponge. Any color of paint may be used, but it must be applied in a thin coat. Varied designs of stippling are possible, depending on how you handle the sponge. If you are not satisfied with the first attempt, go over the wet paint with a brush



and try again. Or, still better, experiment on a scrap piece of glass until the desired effect is obtained.—R. Newell, Cranford, New Jersey.

Steak Maul Utilizes Hack-Saw Blades

Short lengths of old hack-saw blades, set in grooves which are cut in a block of hardwood 2 in. wide, provide an efficient steak maul. The hardwood block is provided with a handle and the hack-saw blades are held in place by pins inserted through holes in the block and blades. It will be necessary to anneal the latter by heating and quenching them in water before drilling them for pins.



Rubber Band on Salt Shaker Keeps Cap from Sticking

Usually the caps on aluminum salt-and-pepper shakers must be screwed down tightly if they are prevented from loosening, which often makes it necessary to use a pair of pliers to remove them, and sometimes results in crushing the cap.



This trouble may be avoided by slipping a short rubber band into the last thread on the shaker. The rubber will prevent the cap from slipping, yet allow it to be removed with the fingers.

Coat Hook Serves as Flag Bracket

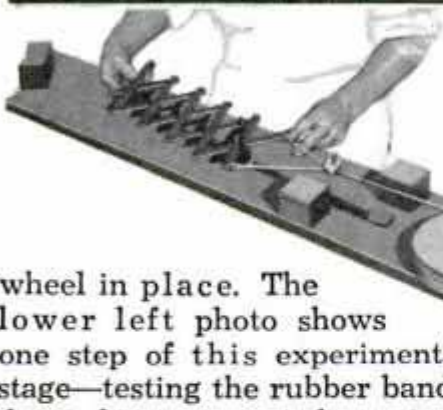
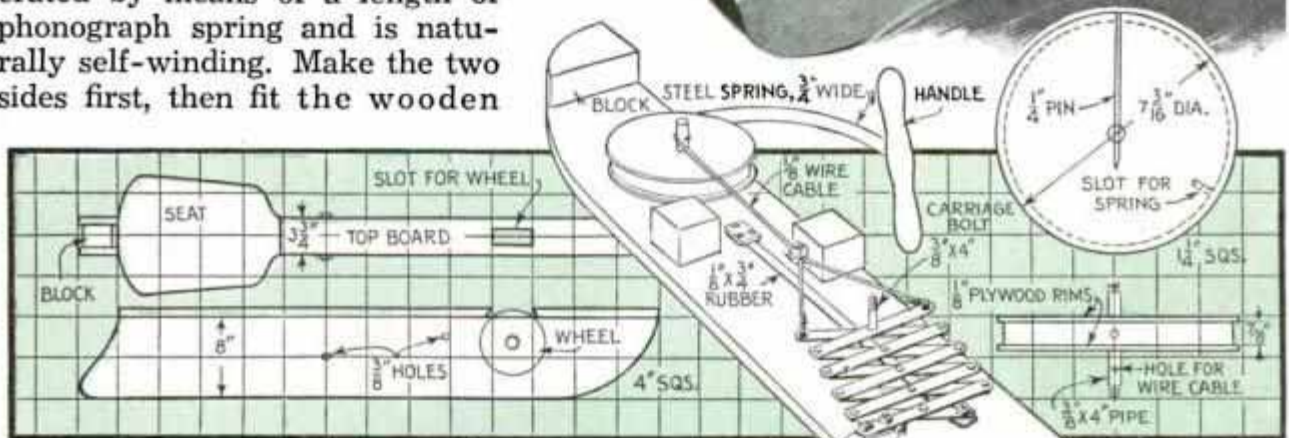
Instead of nailing the staffs of small flags to porch posts or the sides of a building, as is often done, screw wire coat hooks into the desired positions and then spread the prongs to receive the flag staffs as shown. The looped end of the upper prong should engage the staff snugly to prevent it from slipping.



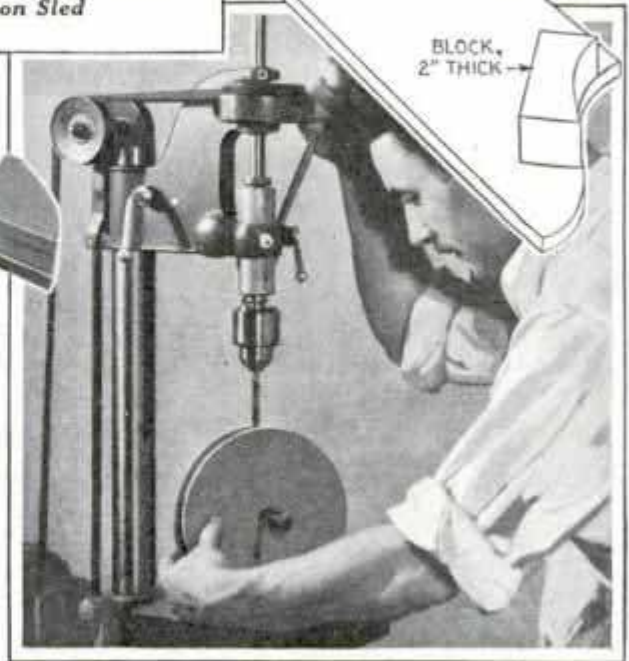
You Can Really Go With This ICE SCOOTER

FOR real fun—if you like the tang of a wintry air as you zip over smooth ice—build this speedy little ice scooter. An extension arm such as is used on telephones, is worked by means of cables so that the power stroke will force the sharp point on the end of the projector arm into the ice. A stout rubber band is fixed to the end of the projector and carried forward so that the mechanism will automatically return to a closed position at the end of each stroke. The drum itself is operated by means of a length of phonograph spring and is naturally self-winding. Make the two sides first, then fit the wooden

15
MILES AN HOUR
IS EASY WITH
THIS UNIQUE
ICE SLED

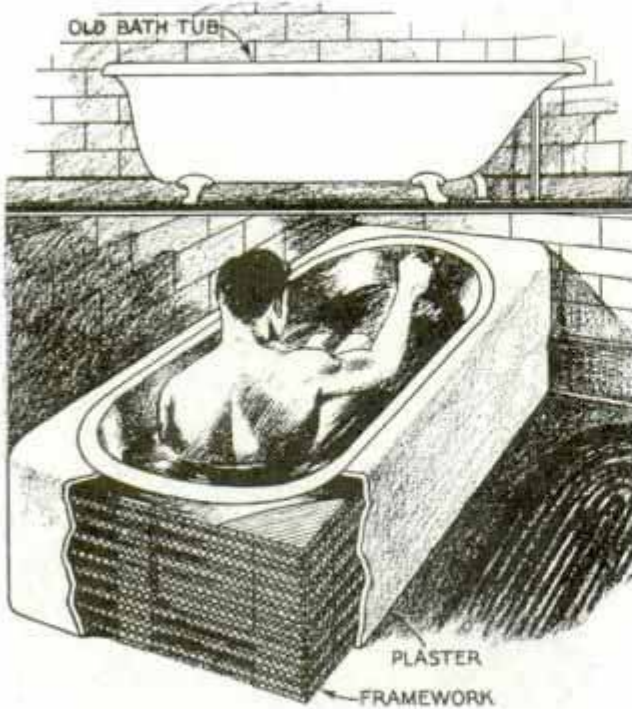


An Iron Rod, Bent as Shown, Combines Foot Rests and Runners of This Pump-Action Sled



wheel in place. The lower left photo shows one step of this experimental stage—testing the rubber band to see that it has just enough tension to pull the arms back to the closed position. You will notice that the wheel must be securely fixed on its pipe axle. This is accomplished by inserting a 1/4-in. pin completely through the pipe, after first drilling the required hole, as shown in the lower right photo. The unit shown has a stroke of about 22 in., but this could be increased if desired.

☛ Transparent celluloid, dissolved in acetone, makes a good lacquer for silver.



Plaster Shell Made around Old Bathtub Gives It Appearance of Modern Built-In Type

Cheap Method of Modernizing Old Bathtubs

With lath and plaster and a little careful workmanship, anyone can modernize an old bathtub so that it will have the appearance of a built-in apron type. First put a light framework around the tub on which to fasten wood or metal lath, and then apply the plaster, rounding the corners and upper edges to get a rolled effect. A coat of sizing and one or two coats of enamel or paint to match the bathroom fixtures complete the job. After the plaster has dried thoroughly and the shrinkage causes a crack between the plaster and the tub, oil putty is used to fill the crack.

Preventing Shoe Heels from Catching in Trousler Cuffs

If you are annoyed by having the inside corners of your shoe heels catch in your trouser cuffs, round off the corners with a file or sharp knife. By removing just enough to prevent catching the cuff, the appearance of the heel will not be marred.



Roll Roofing Cut with Ice Pick

Instead of using a knife to cut felt or tar roofing paper and have the blade gum up, use an ice pick or similar pointed tool. Two or three strokes with the pick will cut through the paper, using a straightedge as a guide. If one side of the paper is sanded, cut from the smooth side to avoid dulling the point of the pick. —Earl E. Moffat, Hollywood, Calif.



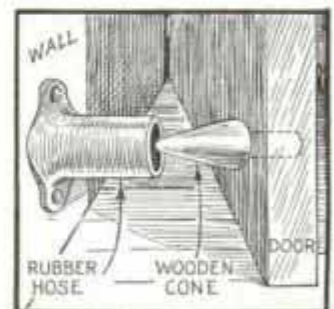
Reducing Amperage Capacity of Small Electrical Fuses

When a small electrical fuse is needed and the only one available is of too large capacity, the current it will pass may be reduced from 3 to 5 amps. by stretching the wire inside the fuse. To do so heat one of the metal end caps until it can be loosened, and then turn the cap to the right or left. This twists and stretches the wire and reduces its size, making it burn out at a lower amperage than its original rating.



Combined Bumper and Door Stop Made from Rubber Hose

An unusual door stop is made from a short piece of rubber hose and a wood cone. One end of the hose is cut to leave small projections which are nailed to the wall as shown, while the cone has a short dowel turned on one end for attachment to the door. When the latter is pushed firmly against the hose, the cone is forced into it to hold the door.



—G. E. Hendrickson, Argyle, Wis.

Three Helpful Ideas around a Kitchen Stove

From odds and ends, anyone can make small articles that will be helpful around the kitchen stove such as the three shown



in the drawing. A simple receptacle and extinguisher for matches used in lighting oil and gas stoves is shown in Fig. 1. This is merely a tobacco tin with three holes in the lid to take the matches, and a small portion of the back cut and bent to form a clip for attaching it to the back of a stove. Women who prefer to use a

cast-iron skillet will find that a hardwood handle attached with small bolts counter-sunk in the wood as shown in Fig. 2, is much cooler to handle than a metal handle. The problem of finding a convenient place for the teakettle when the stove top is crowded, is solved by a wire bracket bolted to the edge of the stove as in Fig. 3.

Effective Photo-Print Straightener for Home Photographers

Anybody can make this photo-print straightener, which is merely a strip of soft leather kept under tension by a screen-door spring fastened to a wall, and straightens the prints by pulling them under a rod as shown in the photo. The rod is drilled at the ends and is screwed to a couple of vertical pieces fastened to a base, which is in turn screwed to the work table. Small wood blocks fastened to the ends of the leather strip provide a hand grip for operating the straightener and a means of attaching it to the spring. To use the straightener, pull the leather strip taut under the rod, place the photo face down on its surface and then let the spring pull it under the rod, keeping a fairly tight tension on the strip.

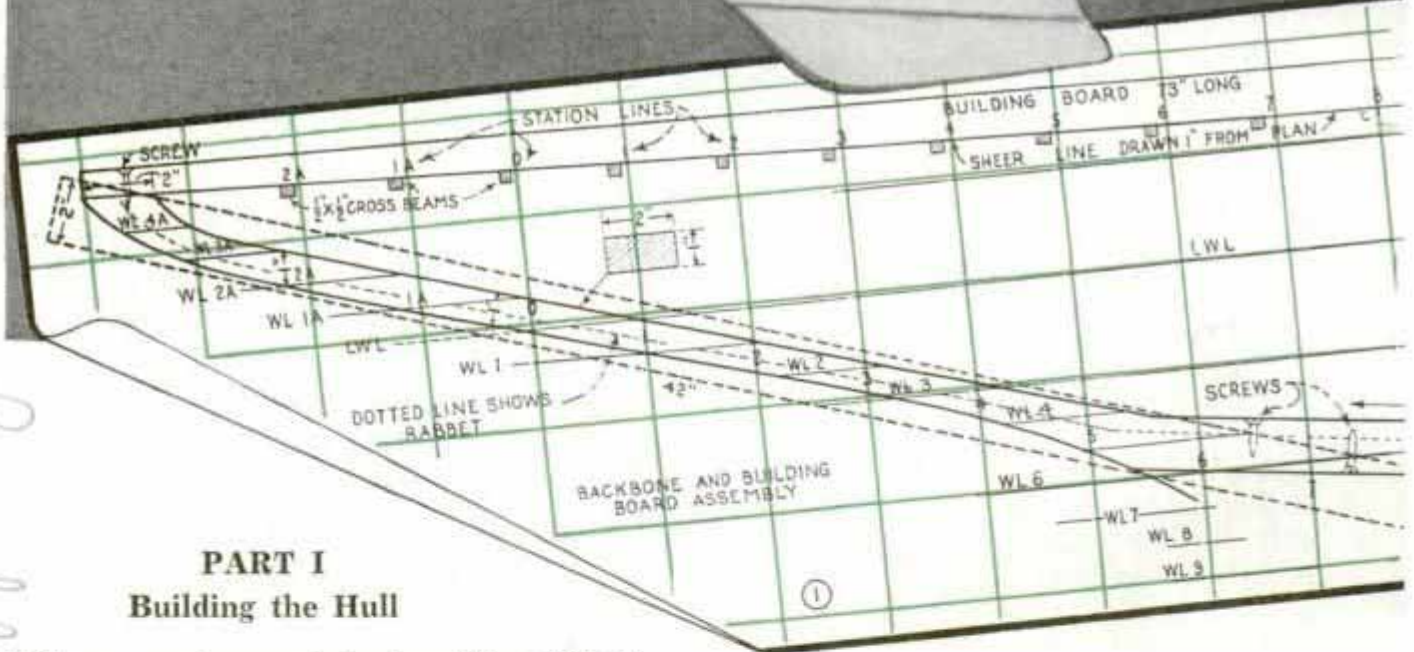


Photo Prints Straightened by Pulling Them under Rod with Strip of Soft Leather

Supplies from A. J. Fisher, 1002-1 Elowah Ave
 Seattle, Wash.

"VANJA" Fast, Class-A,

by . . .
 Geo. Baron



PART I Building the Hull

IN my previous article describing "Zip," a model racing yacht of the Marblehead class, published in the June, 1934, issue of Popular Mechanics, I followed the "bread-and-butter" method of constructing the hull. But in such a large model as "Vanja," a 72-in. class-A yacht, I prefer the planked method.

Backbone and Building Board

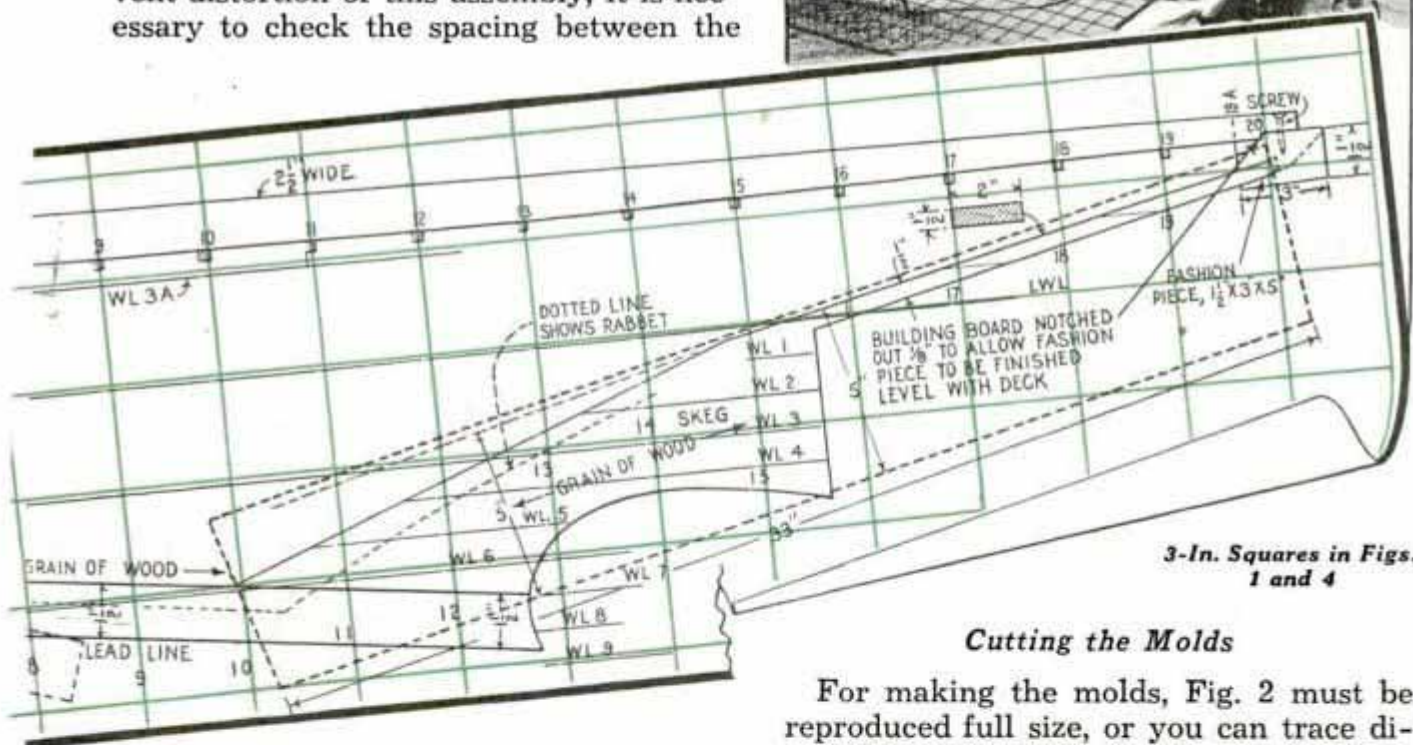
First make a full-size pattern of the backbone and building board assembly as

in Fig. 1. Lay off 3-in. squares on a 15 by 75-in. sheet of tough paper and then carefully draw in the lines. The backbone is to be made up from three pieces of 2-in. white pine, as indicated by the dotted lines of Fig. 1. Using carbon paper, the outline of the backbone is transferred to the pieces of wood, which are then cut to shape and joined with ambroid glue and brass wood screws. Mark all station lines and center line on the backbone and check these with

Model Racing Yacht

In July, 1933, "Vanja," designed by George Baron, of Chicago, was awarded first place in the United States National Championship Race at Port Washington, Long Island. It then became the U. S. challenger in the International Championship Races at Fleetwood, England, held in August of the same year

the pattern. Then add the fashion piece, Figs. 1 and 9, which later forms the transom. Join the backbone to the building board, also of 2-in. white pine. To prevent distortion of this assembly, it is necessary to check the spacing between the

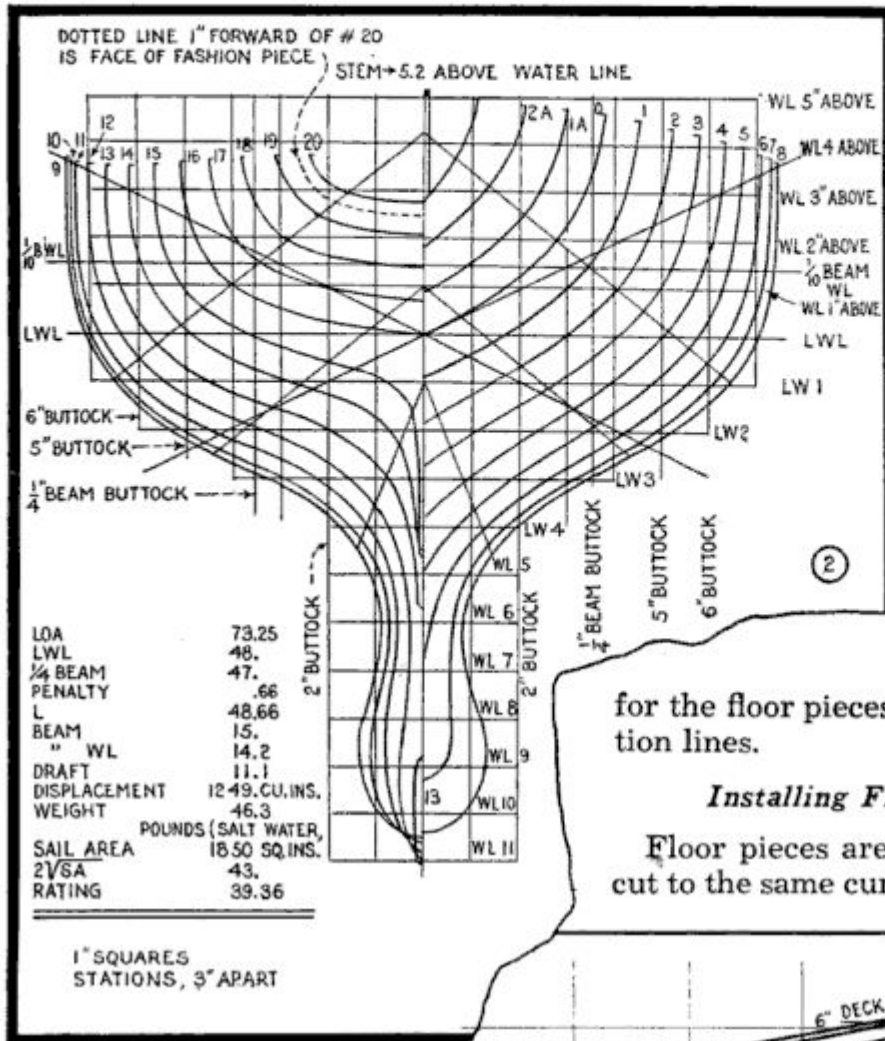


3-In. Squares in Figs. 1 and 4

Cutting the Molds

backbone and building board, and then install two temporary strips near stations 6 and 10, to hold the two in their correct relation, until the molds are installed. The bottom side of the building board is cut to the shape of the sheer line, Fig. 1. Station lines are marked on all sides of the building board and the center line is marked on the top and bottom. Then, to save weight, the width of the stem, forward of station 5, can be reduced to 1½ in., and similarly, the stern, aft of station 16, is cut down.

For making the molds, Fig. 2 must be reproduced full size, or you can trace directly from blueprints. Then, trace each station line on a separate sheet of paper. To get a symmetrical template of the entire cross section of the hull at each station, first trace the station curve, fold the paper at the center line, and then cut the doubled sheet along the curved line. Next, with a compass, make a line exactly ¼ in. from the curved edge of each template, except No. 19A, and cut off at this line. (Template 19A is only reduced ⅛ in. instead of ¼ in., as this one goes on the fashion piece.) The ¼-in. allowance is for the ribs and planking. The patterns are

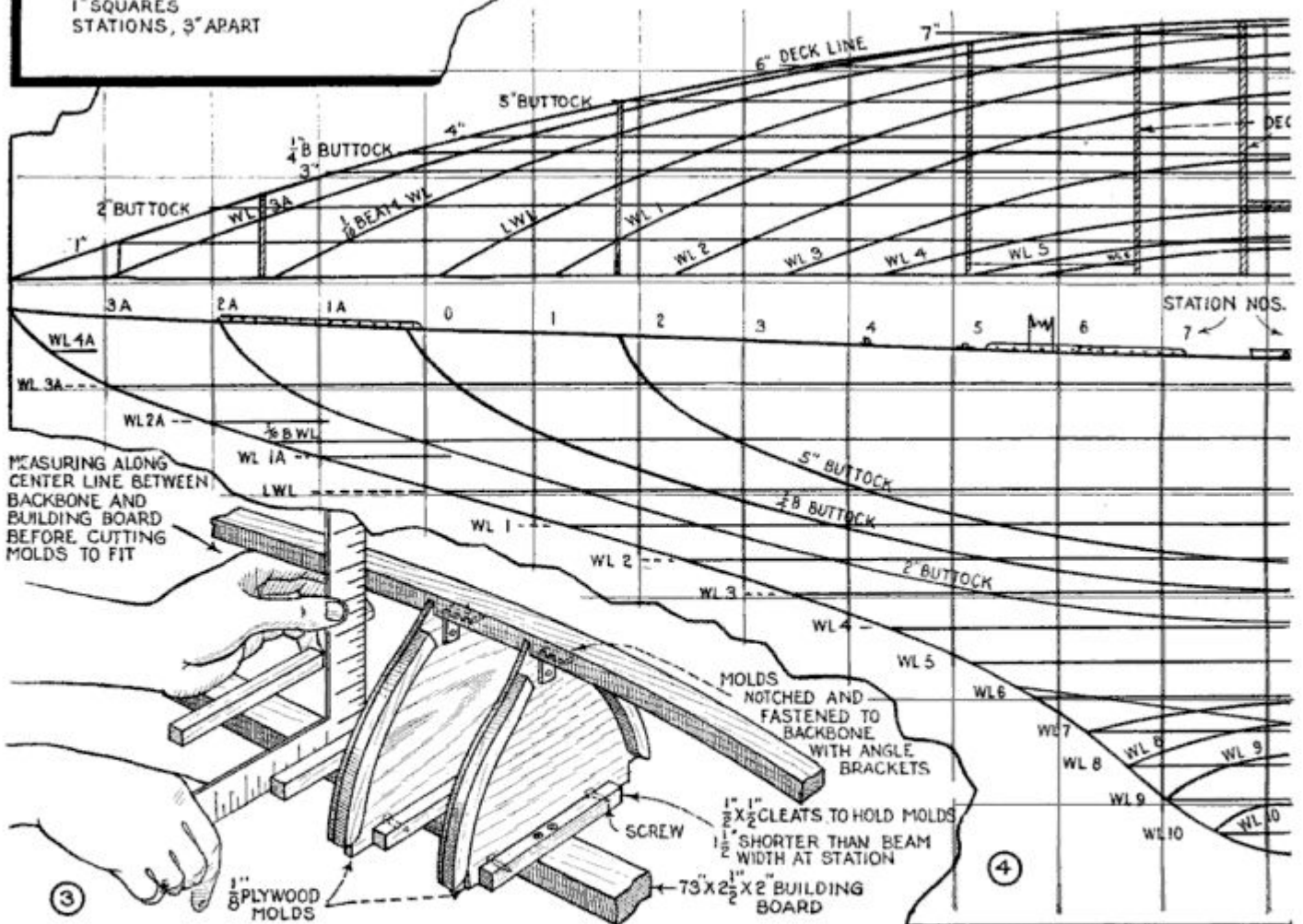


pasted on 1/8-in. plywood and cut to shape. After numbering the molds, thus formed, notch them 1/2 by 1/2 in. at the corners to allow space for the in-wales. Then cut strips from 3/8-in. white pine to fit along the edges of each mold as shown in Fig. 5, these strips being glued to the molds. The strips give the necessary thickness to support the ribs and also form a ledge to clamp the ribs and planking in place. On the molds for stations 7 to 10 inclusive, allowance must be made

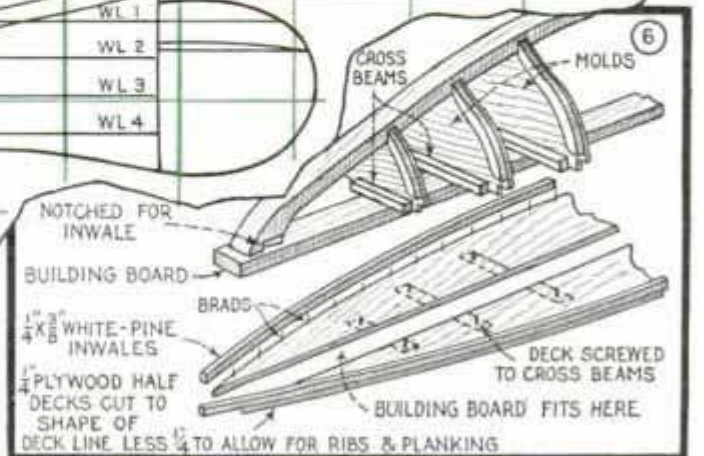
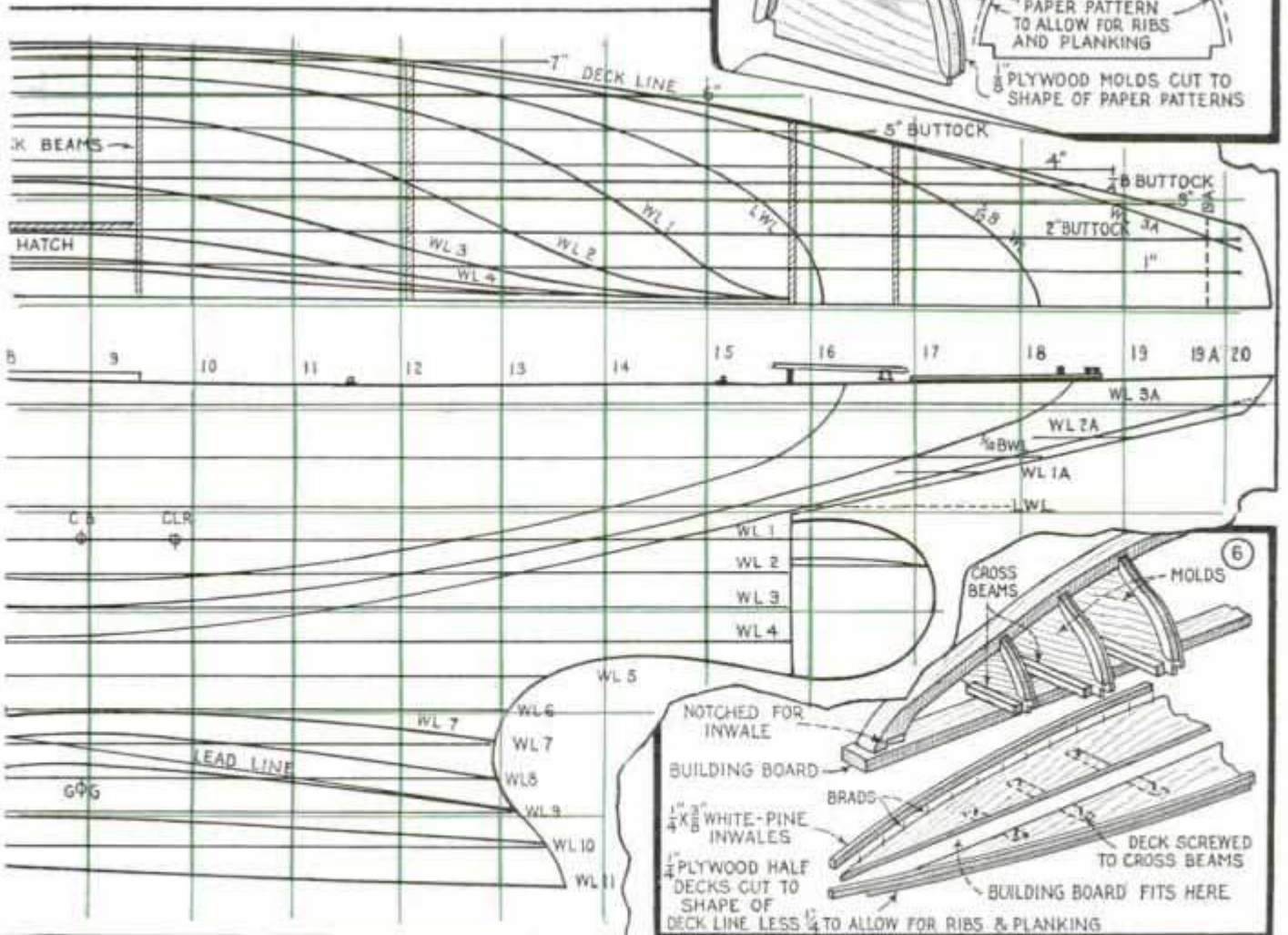
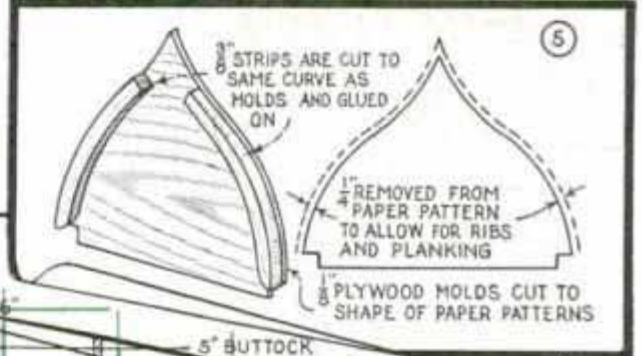
for the floor pieces to be installed at these station lines.

Installing Floor Pieces and Molds

Floor pieces are strips of 1/2-in. oak or elm, cut to the same curvature as the molds and fas-



tened to the backbone with brass screws as in Fig. 7. The purpose of the floor pieces is to distribute the weight of the keel. When you have prepared all the molds (except Nos. 7 to 10 inclusive), they are fitted between the backbone and building board, one at each station, as in Fig. 3, which is laid off in 3-in. squares. For attaching the molds to the building board, $\frac{1}{2}$ by $\frac{1}{2}$ -in. cleats or cross beams are screwed on. Each cleat should be $1\frac{1}{2}$ in. shorter than the width of the mold it is to hold. Be sure to locate the cleats as indicated in Fig. 1; they are placed forward of stations 7 to 2A and aft of stations 9 to 19, but the cleat at station 8 is placed centrally over the line. In fitting the molds the lower end of each is notched to fit the backbone to which it is fastened with a small aluminum angle bracket. Also, the molds must be screwed to the aft side of the cleats from stations 7 to 2A inclusive, and to the forward side of the cleats from stations 8 to 19 inclusive, although this is incorrectly shown at stations 9 and 10 in



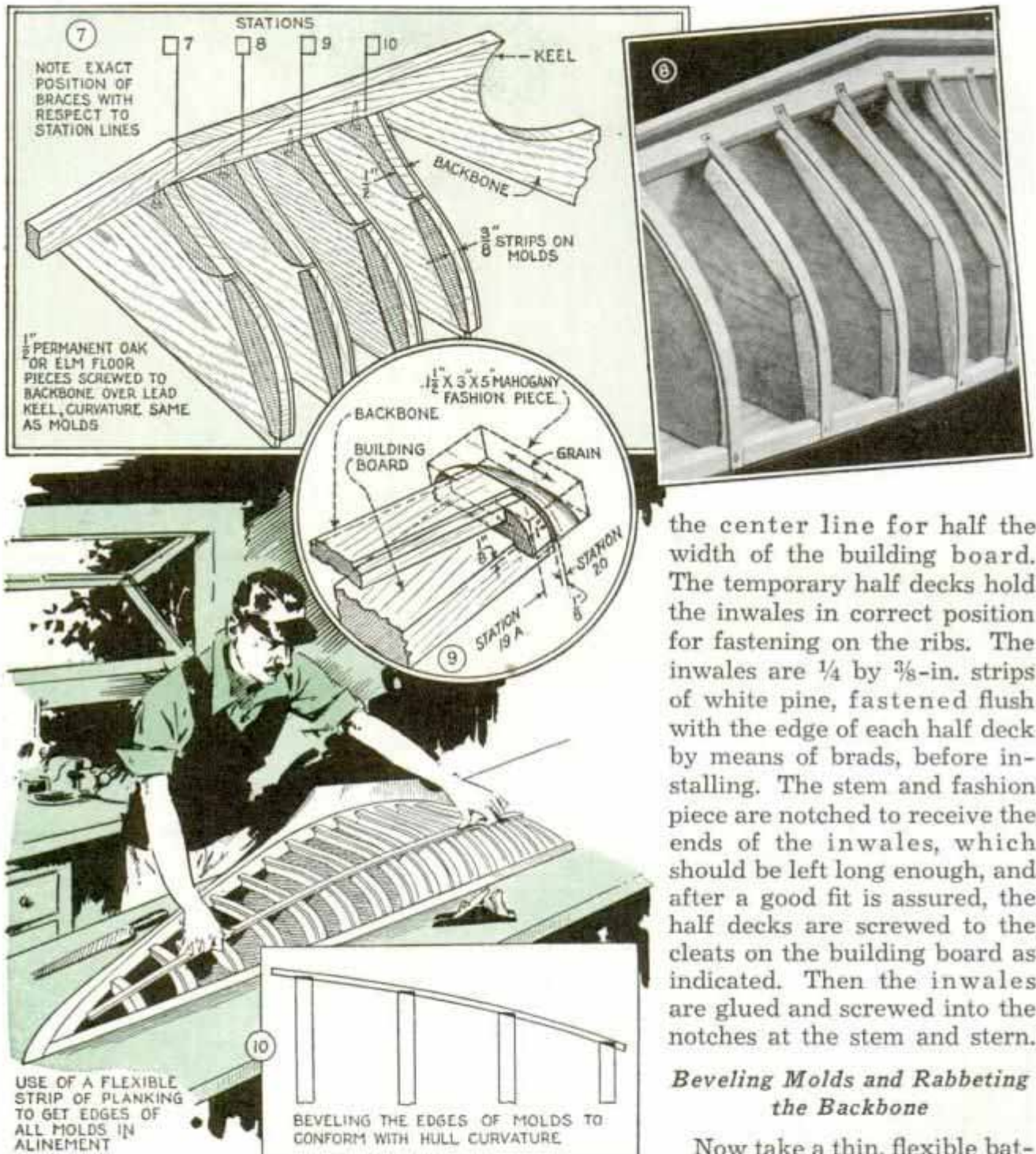


Fig. 7. The strips on the mold must be in line with the cleats.

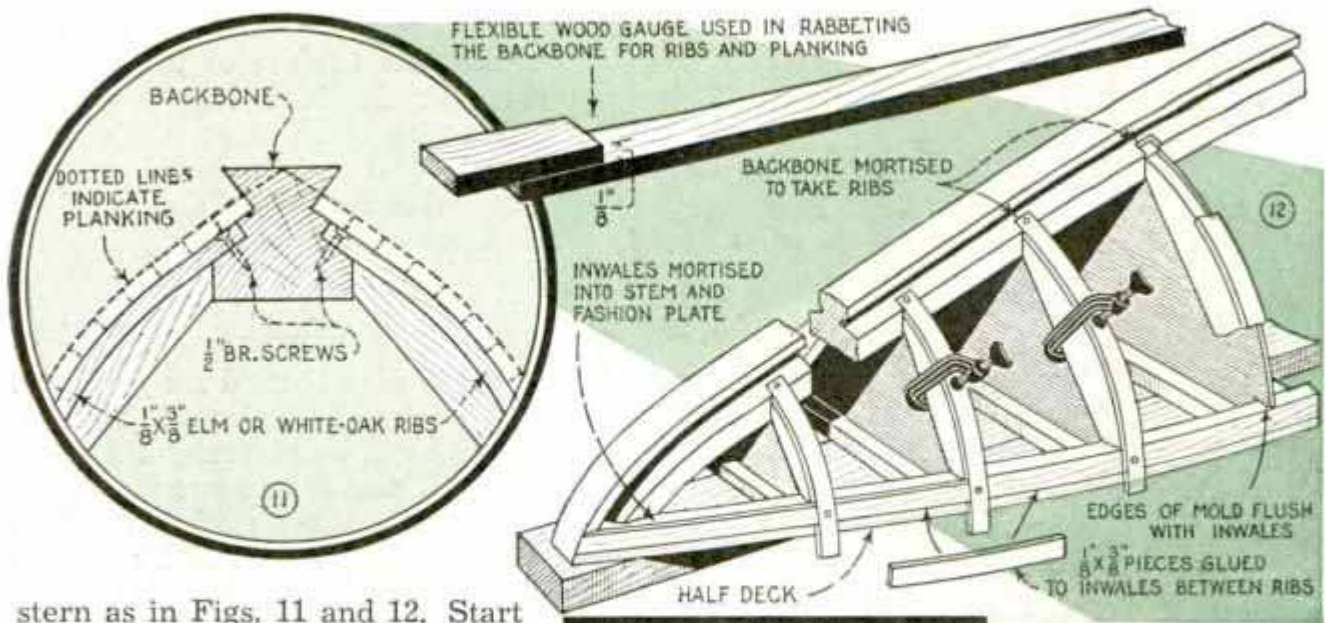
Half Decks and Inwales

After the molds have been installed, two temporary half decks are cut to fit on each side of the building board, as in Fig. 6. The curved deck line is obtained from Fig. 4, which is laid out on paper cross-hatched in 3-in. squares. Cut the half decks $\frac{1}{4}$ in. inside the curved edge as transferred from the pattern. This allowance is necessary for ribs and planking. Also allow 1 in. at

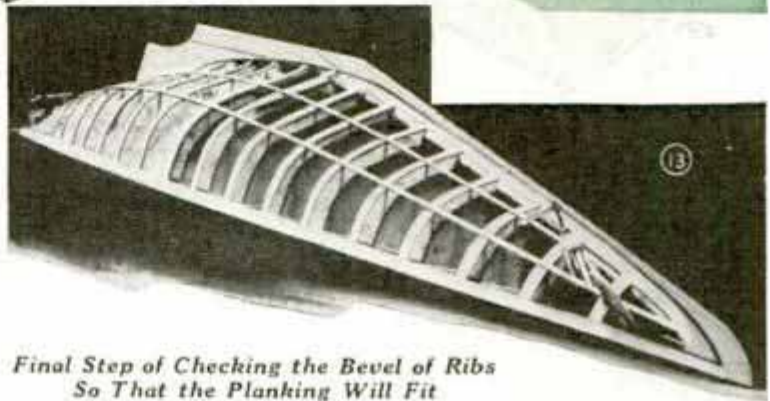
the center line for half the width of the building board. The temporary half decks hold the inwales in correct position for fastening on the ribs. The inwales are $\frac{1}{4}$ by $\frac{3}{8}$ -in. strips of white pine, fastened flush with the edge of each half deck by means of brads, before installing. The stem and fashion piece are notched to receive the ends of the inwales, which should be left long enough, and after a good fit is assured, the half decks are screwed to the cleats on the building board as indicated. Then the inwales are glued and screwed into the notches at the stem and stern.

Beveling Molds and Rabbeting the Backbone

Now take a thin, flexible batten and place it over the molds as in Fig. 10. You will notice that the batten touches only the forward and aft edges of the molds, which must be carefully beveled until it rests on the entire width of each mold. A coarse file is best to start, and rough sandpaper, glued to a 30-in. strip of $\frac{1}{8}$ -in. wood about $1\frac{1}{2}$ in. wide, for finishing. Be careful not to remove too much wood from any mold as you will then get a hollow. To correct such a mistake, glue cardboard over the hollow before the ribs are installed. Next comes the rabbeting of the backbone from stem to

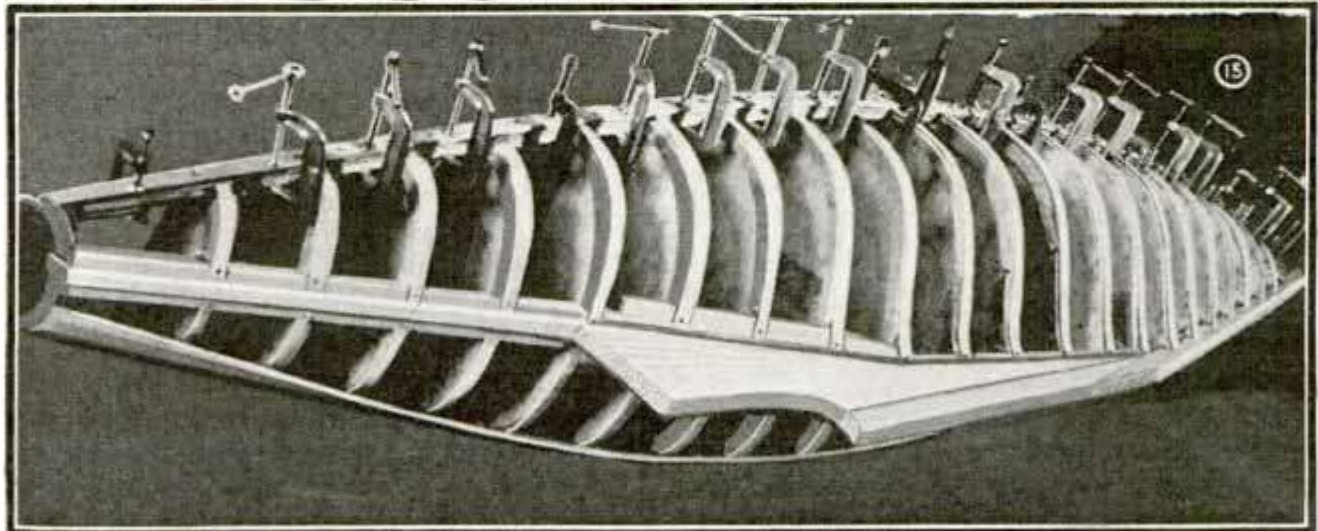


stern as in Figs. 11 and 12. Start at the after end of the skeg, marking two lines on the backbone, each on one side of the center line, 3/8 in. from it at the skeg and 1/4 in. from it at the transom. Then cut a 1/8-in. rabbet along this line. Next, cut mortises, 3/8 in. wide, for the ribs. The bottom of these mortises should be continuations of the edges of the molds. At the skeg it is best to cut the rabbet from the side as shown in Figs. 11 and 20. After the ribs are installed, which is to be done next, the rabbet for the planking is beveled so that a flexible batten placed over the ribs will fit flush in the rabbet. This will assure getting the planking to fit snugly. The fashion plate is also cut to shape and rabbeted.



The Ribs

The ribs are next. They are 1/8 by 3/8-in. strips of elm or white oak. A small hole is drilled and countersunk about 3/16 in. from each end, to take a No. 3, 1/2-in. brass screw. The ribs are steamed to make them pliable, just before screwing them in place.

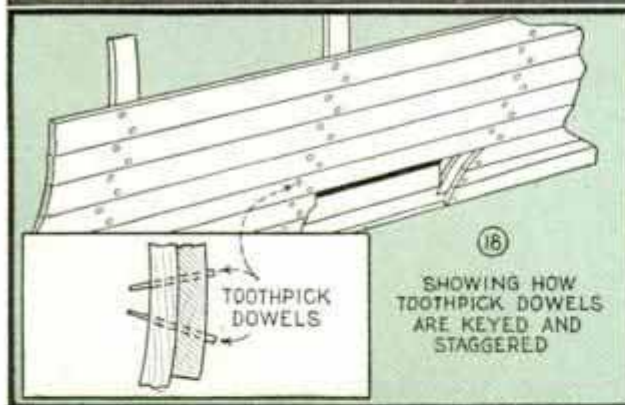
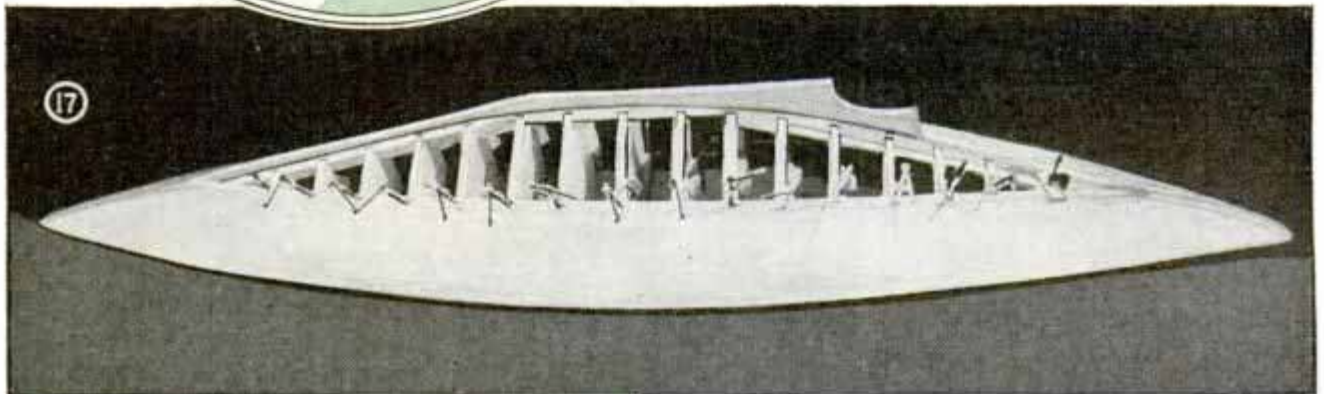




fore planking, repeat the work of truing the surface of the ribs so that thin, flexible battens will touch the entire width of each rib, as in Fig. 13, and that the inwale will be beveled to the flare of the hull. Fig. 8 shows the hull ready for the planking.

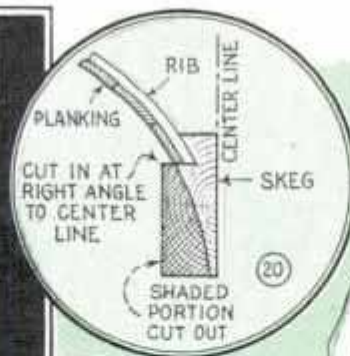
Planking

Sugar pine is used for planking. Get a 6 by $\frac{3}{4}$ -in. piece, 12 ft. long, which must be perfectly straight grained. Cut it into two pieces $6\frac{1}{2}$ and $5\frac{1}{2}$ ft. long, and rip it into strips $\frac{1}{8}$ by $\frac{3}{4}$ in., which are then reduced to $\frac{1}{8}$ by $\frac{5}{8}$ in. My method of planking is quite different from the customary procedure, but has



For steaming, a piece of pipe can be arranged on the end of a kettle spout, or a wire rack can be made to fit inside of a wash boiler. After a rib has been steamed, it is quickly screwed to the backbone and then bent over the mold, fastened with one or two clamps, and then screwed to the inwale. When all the ribs have been placed, cut short strips of $\frac{1}{8}$ by $\frac{3}{8}$ -in. white pine and glue these to the inwales, between the ribs, to come flush with the surface of the ribs. See Fig. 12. As a final operation be-

proved successful and economical. In following this method, the planks are cut to $\frac{1}{8}$ by $\frac{5}{8}$ in., and are then shaped to the contour of a master plank shown in Fig. 14. It is 42 in. long and is tapered toward one end, only one edge being curved, the widths at various points being indicated. After the curved edge has been marked for easy identification, the widest end is laid on the center of a full length plank to be cut, and, with the straight, top edges of both planks carefully aligned, the curved lower edge is traced, after which the master plank is turned over to make the curve on the other half. This is the way to cut all the planks except the first one, which is next to the deck. This one must be $\frac{1}{8}$ in. wider than the master plank to permit it to project above the inwale. At the ends, owing to the flared shape of the boat, the inside edge of the plank will have to be high so that the outside edge will be flush with the deck. Start by fitting the bow end of the plank into the rabbet, with the



straight edge of the plank toward the deck, and clamp in position temporarily, as in Fig. 15.

The planks are fastened to the ribs with small dowels cut from round toothpicks. Take four or five at a time and snip off about $\frac{1}{4}$ of their length with a pair of cutting pliers and then break them in the middle. With the deck plank clamped in position, drill small holes as in Fig. 16 for the dowels, into the inwale, two holes between each rib, two in the stem and three in the fashion piece. The dowels are not placed at the ribs in case of the sheer plank, as the screws holding the ribs are in the way. The size of hole should be such that only one half of the dowel goes into the hole. After the holes have been drilled, remove the plank and apply a good coat of waterproof casein glue to both the inwale and inner surface of the plank. Then fasten it in place with the dowels, first dipping them in glue and tapping them down with a small hammer, being careful to avoid splitting the plank.

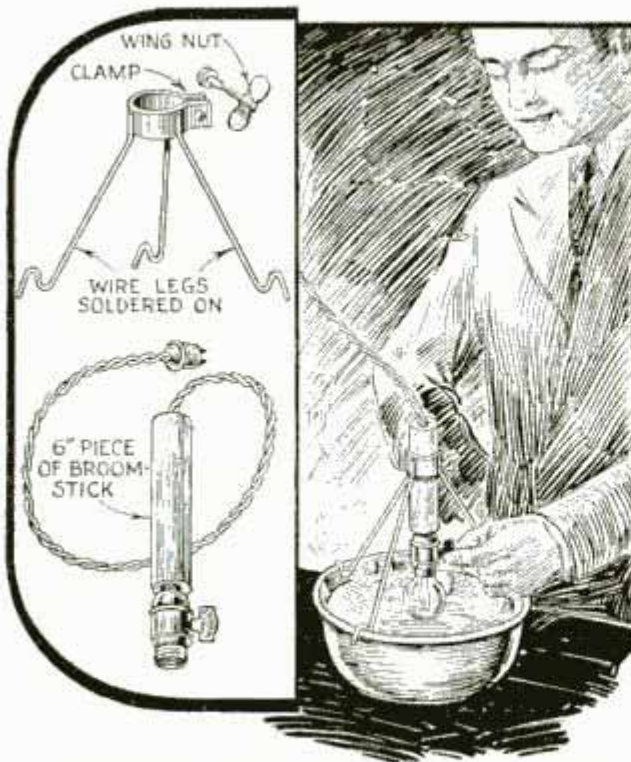
When fitting the straight edge of the second plank against the first, you will notice that the straight side will have to be beveled at the bow and stern. The same applies to the next few planks, the amount of bevel changing with each one. Careful fitting between all planks is necessary. The dowel holes are staggered and drilled at an angle, $\frac{3}{4}$ in. deep, as shown in Fig. 18. Before driving in the dowels, adjoining edges of planks are coated with glue, which should ooze out when the planks are pressed in place. Snip off the projecting ends of the dowels—they will be sanded flush later. As the planks get shorter, you will not have to cut them so narrow at the ends, which is taken care of by putting the master plank in the middle of the plank you are cutting. Fig. 17 shows the plank-

ing about half finished. When you get to the skeg, fit the aft ends first. Long tapering ends are planed down to fit as in Fig. 19, holding a small block against the flat side to prevent breaking off the point. After the planking has been finished the entire surface is dressed down smooth with sandpaper as in Fig. 21, and a coat of spar varnish is applied.

Removing the Molds

The half decks and the building board are next removed, after which three or four strips of wood are screwed across the inwales to keep the hull in shape until the deck beams are fitted. The molds are then carefully broken away from the strips that were glued to them. For this you will need a chisel. To remove the strips from the ribs, to which they are fastened with dowels, take a pair of cutting pliers and snip the wood off in pieces. You can also remove some of the surplus wood along the stem and stern, to still further reduce the weight. As a guide to weight, Vanja's hull weighed 5 lbs., 5 oz. The inside of the hull is then given three coats of good spar varnish, allowing each coat to dry before applying the next. This will effectively waterproof the inside and prevent warping.

(To be continued)

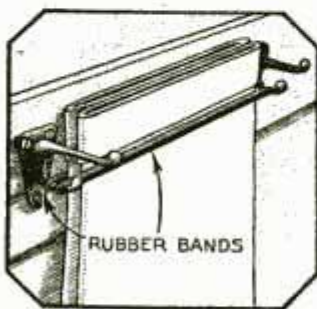


Vapor for Sick Rooms Produced by Suspending Electric Bulb in Pan Filled with Liquid

This Homemade Vaporizer Uses an Electric Bulb

When a vaporizer is needed to furnish medicated vapor for a sick room or a vapor-bath cabinet, the simple humidifier shown will be helpful. It consists of an electric bulb, socket, cord and a short piece of broomstick assembled as shown, and fastened to a small tripod. The latter is a sheet-metal clamp having three wire legs soldered to it. In use, the tripod is set over a pan containing the liquid to be vaporized and the bulb adjusted to extend into it. Rapidity of vaporization is determined by the size of the bulb.

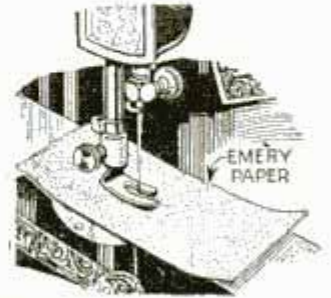
Rubber Bands Serve as Substitutes for Trouser Hangers



Stretched between two coat hooks as shown, a couple of heavy rubber bands serve nicely as an emergency trouser hanger. The trouser legs are merely placed between the two bands, after which the latter are pushed close together under the cuffs to hold the trousers in place.

Sewing-Machine Needle Cleaned with Fine Emery Paper

If the needle on your sewing machine pulls when sewing fine silk or similar fabrics, run a strip of fine emery paper back and forth under the presser foot of the machine so that the needle will penetrate the paper rapidly. This will sharpen and polish the needle so that it will operate efficiently. Rusty needles can also be polished in the same way.



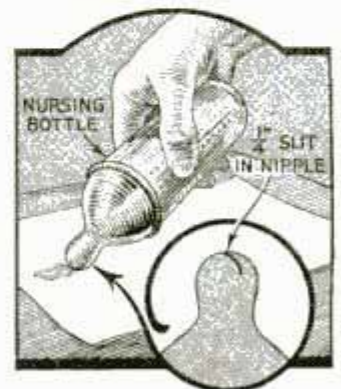
Aerial Posts Supported on Roof with Shelf Brackets

When it is necessary to mount an aerial on the ridge of a roof, heavy shelf brackets will be found handy for bracing the aerial support posts. The brackets are screwed to the ridge board posts, thus making a much neater job than is possible with the usual method of toenailing the posts to the roof and then bracing them with small wood strips.



Nursing Bottle Used as Glue Spreader

An ordinary nursing bottle with nipple attached provides an effective container and spreader for glue. A $\frac{1}{4}$ -in. slit in the end of the nipple allows the glue to come out when the bottle is inverted. When the bottle is set away, the film of glue around the slit dries and prevents air from entering. Squeezing the end of the nipple with the fingers before using the bottle again will break the film so that the glue will flow.—A. H. Waychoff, Tempe, Ariz.





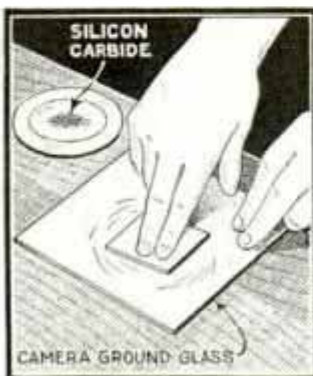
Small Model Airplanes Give Realistic Imitation of Flying When Suspended from Traveling Belt Driven by Motor

Belt-and-Pulley Arrangement to Fly Model Planes

Small, non-flying models of airplanes can be given a realistic appearance of flying by suspending them with fine wire from a traveling belt, which is motor-driven and runs over an arrangement of V-pulleys similar to the one shown in the detail. The arrangement of pulleys may be varied to suit, the only requirement being that the one driven by the motor be a double pulley. The basement is the best place to fly the planes as the pulleys can be suspended from the floor joists with lag screws, which serve as spindles.

Improving Your Camera Ground Glass

Some camera ground glasses have a coarse grain with the result that it is rather difficult to get a sharp enough focus to bring out small details on the photo. If you have experienced this trouble, remove the ground glass and grind it with silicon carbide of the grade used as razor-



strop dressing, which may be obtained at most hardware stores. Shave a small quantity of the dressing into a dish and add a little gasoline to dissolve the wax. Put a few drops on the ground glass, and with a circular motion, grind it with a flat piece of glass. Examine the work at intervals until the coarse grain is removed and a fine one obtained. Then, after cleaning the ground glass, rule two cross lines on it with a fine, hard lead pencil. The cross lines will make it easy to level the camera.—Erwin W. Fick, Davenport, Ia.

Clothes Reel Made from Wood Barrel Hoop

When small articles of clothing are washed on stormy days and it is necessary to dry them inside the house, this clothes reel, made from a wood barrel hoop, can be suspended from a short line stretched across one corner of a room or between two chairs where it



Reel Made from Barrel Hoop for Drying Clothes inside House Takes Very Little Space

will take little space. Two screw eyes that have been opened slightly, are attached to opposite sides of the hoop to suspend it from the line, after which spring-type clothespins to hold the clothes are screwed to it as shown.

REFINISHING

Varnished Floors



Renovation of varnished floors, at the first sign of wear, pays

By **BERTON ELLIOT**

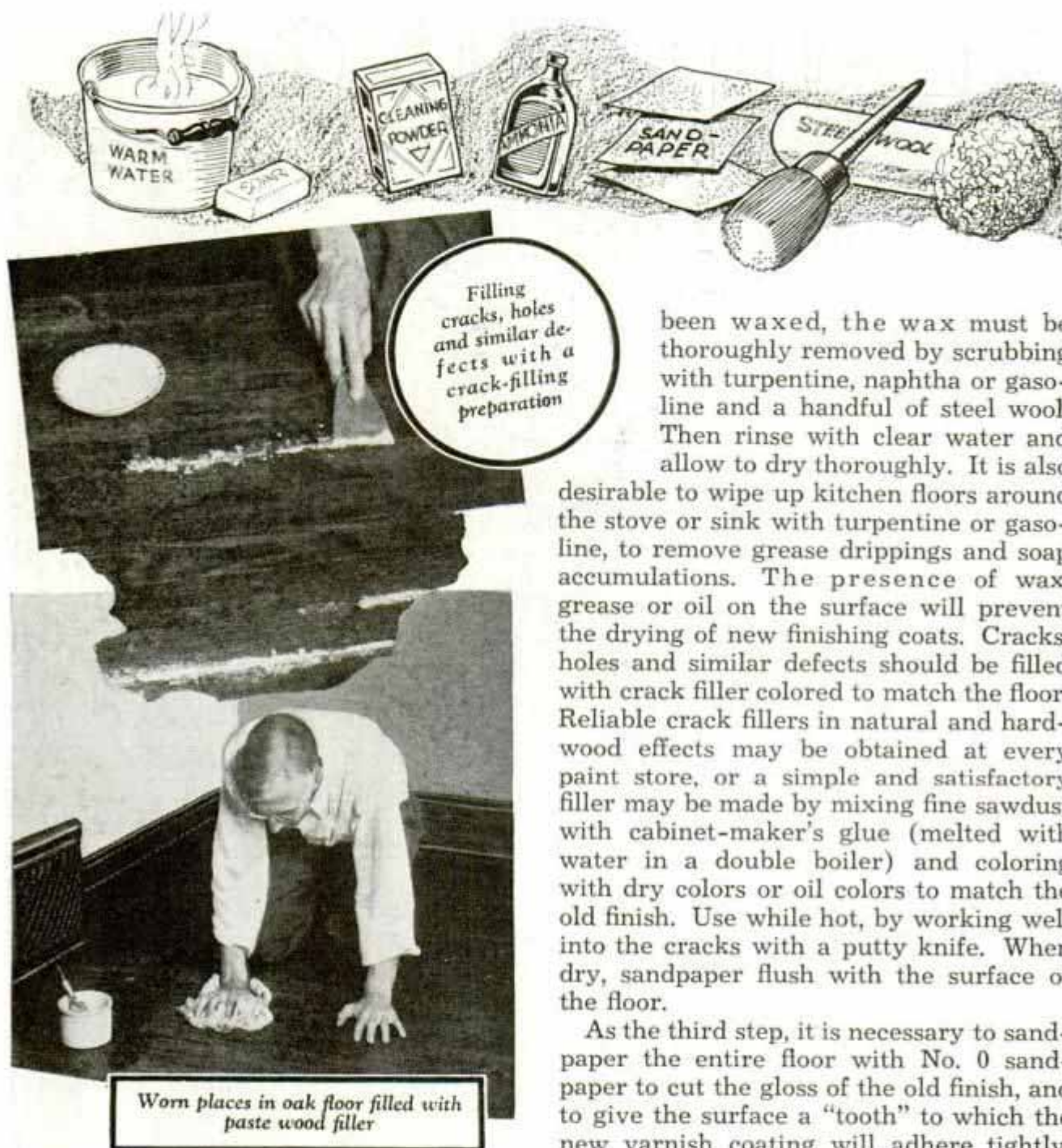
OLD floors—no matter what condition they are in—can be restored to their original beauty at a reasonable cost, by following the same methods that are used by professional floor finishers.

If your floors are in reasonably good condition, where the old finish has not become worn through to the bare wood, they will require very little preparatory work. However, this is important; painters generally spend more time in preparatory work on high-class refinishing operations than they do in actually applying the finish. The first step is to make sure that the floor is absolutely clean, as any dirt on the surface will be covered with varnish. Scrub the floor thoroughly with soap and



Scratches, caused by moving heavy furniture, sanded out with sandpaper and gasoline

water, to which a little ammonia or other reliable cleaning agent has been added. Scrub out all the cracks thoroughly. Be sure to rinse the floors thoroughly with clear water, as any traces of soap or cleaning preparation remaining on the surface are harmful to the new finish. Be sure,



Filling cracks, holes and similar defects with a crack-filling preparation

Worn places in oak floor filled with paste wood filler

also, to allow time for the moisture to dry out of cracks and crevices—overnight, with good ventilation—before proceeding to the next operation, keeping the floor clean meanwhile.

The second step is to examine the floor for marred places, dirt ground into the surface with furniture casters, stains, and other surface imperfections. These blemishes cannot be hidden by clear varnish. Stains and dirt ground into the surface can usually be removed with sandpaper dipped in gasoline or turpentine. For sanding out scratches and grooves, fold the sandpaper and use the folded edge. If the floor has

been waxed, the wax must be thoroughly removed by scrubbing with turpentine, naphtha or gasoline and a handful of steel wool. Then rinse with clear water and allow to dry thoroughly. It is also

desirable to wipe up kitchen floors around the stove or sink with turpentine or gasoline, to remove grease drippings and soap accumulations. The presence of wax, grease or oil on the surface will prevent the drying of new finishing coats. Cracks, holes and similar defects should be filled with crack filler colored to match the floor. Reliable crack fillers in natural and hardwood effects may be obtained at every paint store, or a simple and satisfactory filler may be made by mixing fine sawdust with cabinet-maker's glue (melted with water in a double boiler) and coloring with dry colors or oil colors to match the old finish. Use while hot, by working well into the cracks with a putty knife. When dry, sandpaper flush with the surface of the floor.

As the third step, it is necessary to sandpaper the entire floor with No. 0 sandpaper to cut the gloss of the old finish, and to give the surface a "tooth" to which the new varnish coating will adhere tightly. The next or fourth step, is to be sure the surface is dust free immediately before applying the varnish. Specks of dust make what is known as a "dirty" finish, which is very disfiguring, especially when direct sunlight shines on the floor from certain angles. Brush up all sand particles and other surface dust. Then wipe over the floor with a lintless cloth moistened with gasoline, to which fine particles of dust will cling.

You are now ready to start applying the varnish which is the final step. Only a varnish intended for floors should be used, as floor varnishes are not only extremely hard but very elastic as well; hence have



the greatest durability to withstand hard wear. It also pays to use high-grade varnish for the severe service to which floors are subjected. Cheap floor varnishes are generally brittle, and chip off easily from the scuffing of heels, scraping of chair legs, moving of heavy furniture, etc., and also turn white from water. Select a dry day for varnishing if possible, preferably warm weather or when the house is warmly heated in winter. Varnish flows out better to a smooth, even finish when warm, and dries more rapidly in dry weather. Be careful that no dust is raised in the room while you are applying the varnish, and until it has set dust-free. Remember people moving about in an adjoining room will stir up dust that will settle into your new finish. Be sure that your brush is clean. New brushes are often covered with a white powder, and generally have a few loose hairs, which should be worked out with the fingers after wetting the brush with turpentine. Start working in a corner opposite the door, and plan your work so that the place of exit will be done last. Do one strip five or six boards wide, entirely across the room. This gives you a chance to get back to start another strip before the varnish commences to set up. In this way, you avoid showing laps where the two strips join. Brush lengthwise with the grain, with long, even strokes, having the brush well filled with varnish, but brushing it out moderately well. Be careful not to skip any places. Skipped places, often called "holidays" by painters, are very disfiguring to an otherwise perfect finish. By getting down close to the floor after completing each strip, and looking across toward the light, any skipped spots will be apparent. They should be coated before the varnish sets; while you can still reach



Above, sandpapering old finish to cut the gloss so refinishing coat will adhere well. Below, worn spot is matched with rest of floor by wiping on stain



them. Remember that a uniformly even thin coat makes a harder, more wear-resisting finish than an over heavy coat. Ordinarily one coat is sufficient for a good revarnishing job over an old finish in average good condition. When finished varnishing, if you are going to use the brush the following day, it may be stood overnight in a container of water, or it may be

kept several days in a mixture of half linseed oil and half turpentine. After the job is entirely finished, clean the brush thoroughly with turpentine, then wash in soap and water, dry thoroughly, and put away in a paper bag to keep it free from dust.

The best way to refinish badly worn floors is to have them sanded with an electric sanding machine. This not only takes off the old finish but re-surfaces the wood, so that it is exactly like new flooring. You can then build up a new finish from the bare wood. Varnish or paint is also sometimes removed from floors by scraping with a carpenter's steel scraper or by planing; then sandpapering by hand. This is tedious and laborious work for the inexperienced and not always successful, but for those who are used to carpenter work it is a satisfactory and efficient method.

Another method of removing old floor finishes is to use chemical paint and varnish removers. For those without previous experience, this is one of the most satisfactory methods, if directions are followed exactly. Caustic soda and lye, however, should never be used, as they discolor the wood badly. Prepared removers, which may be obtained at any paint store, are used by brushing the remover onto the surface, allowing it to stand a few minutes until the old finish becomes softened, and then scraping the old coatings off with a broad putty knife or painters' scraper. Have good ventilation in the room to carry off the fumes while working, and be



sure no open flame is burning in the room. After using paint and varnish remover, it is absolutely necessary to remove all traces of the remover by scrubbing and washing up with gasoline, turpentine or denatured alcohol, being sure to scrub out all cracks and crevices thoroughly. Any traces of the remover left on the surface will prevent the drying of refinishing coats. In case there are any badly discolored, greyish places where the floor has been worn down into the wood, in doorways, etc., these should be bleached as will be explained presently. After the old finish has been taken off the floor by one of the foregoing methods, you are ready to build up the new finish.

If the floors are oak, ash or other open-grain wood, it will be necessary to fill the open pores of the wood, the same as in finishing new floors. This is done with wood filler, which comes in heavy paste form, to be reduced, immediately before using, with turpentine or benzine to about the consistency of varnish. Apply the filler with a brush, let it stand a few minutes until it commences to lose its luster, then wipe off all excess filler, across the grain, with a piece of cloth, burlap or excelsior, being sure to wipe clean. Allow to dry overnight; then sandpaper well, and dust clean. If floors are to be finished natural, use "natural" filler; if to be stained, use "walnut" or "oak" filler, etc. If floors are to be stained, apply one coat of stain, being careful to brush it on evenly. If penetrating dye stain is used, the stain must be sealed in with a thin wash coat of shellac (ordinary commercial "4-lb. cut" shellac reduced with an equal part of

denatured alcohol). All that now remains is to apply the finishing varnish coats. For a thoroughly durable finish, three coats should be applied. Two-coat jobs will not withstand grinding footwear for a satisfactory length of time. For the finest finish, sandpaper lightly, with fine sandpaper, between all coats.

If you do not wish to go to the labor and expense of removing the old finish and building up a complete new finish, a satisfactory "touch up" refinishing job can be done, as follows: Clean the floor thoroughly. Examine floor for marred places, scratches, and discolorations, and sand them out with sandpaper and gasoline, also fill cracks, as previously described. Bleach all greyish, discolored places, which have been worn down into the wood, with oxalic acid, as follows: Dissolve 1 oz. of oxalic-acid crystals in a pint of boiling water. Apply this to the worn places, let stand 3 or 4 hrs. and then rinse off with clear water. If floor is oak, ash or other open-grained wood, "fill" worn places as previously described. Then bring the worn places to an approximate match with the rest of the floor by touching them up with stain to match the floor. If stain is too dark, it can be lightened a little by adding turpentine. Next, apply two coats of floor varnish over the worn places, allowing each coat to dry thoroughly, sandpapering the old finish before starting to cut the gloss and also sandpapering lightly between coats, being sure to dust away sand particles and sawdust. Finally, apply the finish coat of varnish over the entire floor.

Simple Method of Improving Salt- and Coffee Containers



By cutting small openings in the lid and top edge of a can containing salt, ground coffee or sugar, a hole is provided for pouring out the contents. The hole is opened or closed by turning the lid to the right or left. If the lid is a loose fit, it should be held with one hand when pouring out the contents.
—A. H. Waychoff, Tempe, Ariz.

By cutting small openings in the lid and top edge of a can containing salt, ground coffee or sugar, a hole is provided for pouring out the contents. The hole is opened or closed



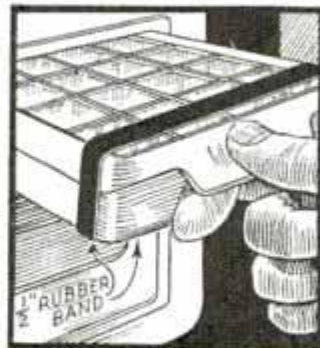
When No Fruit Juicer Is at Hand, a Cabinet Door Will Serve the Purpose

Cabinet Door Serves as Lemon Squeezer

The next time you need a lemon squeezer and none is at hand, try squeezing the lemon between the door and bottom shelf of your kitchen or bathroom cabinet. Place the lemon as near the hinged side of the door as possible to get the greatest amount of leverage and hold a glass underneath to catch the juice.

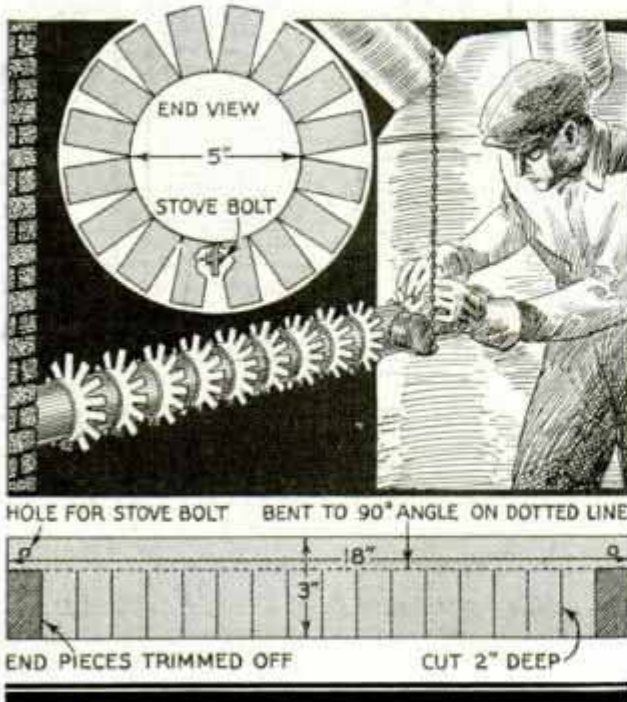
Rubber Band Helps Prevent Sticking of Ice-Cube Trays

If the ice-cube tray in your refrigerator has a tendency to stick, a 1/2-in. rubber band slipped over the end of the tray will help to prevent this trouble. The band raises the tray so that the bottom does not make full contact with the freezing chamber. Besides this precaution, it is a good idea to wipe water off the bottom of the tray each time it is filled.



☐ Melted paraffin poured over the surface of paint left in a can after use, will prevent skin from forming and also keep the paint from drying out.

Sheet-Metal Fins Attached to Furnace Smoke Pipe Help Warm Basement



Fins Clamped to Furnace Smoke Pipe Radiate Waste Heat to Help Warm Basement

Much of the heat that ordinarily goes up the chimney from the home heating plant can be utilized to heat the basement by fastening these radiating fins around the smoke pipe. The fins are cut as indicated by the pattern in the lower detail and are clamped to the pipe with stove bolts. When attaching the fins, be sure to clamp them tightly so that the heat will be conducted readily from the pipe to the fins.

Section of Inner Tube Provides Grip on Large Bottle

To avoid breakage of a large bottle or similar container by having it accidentally slip out of your hands, cut a section from an old inner tube and slip it over the bottle.

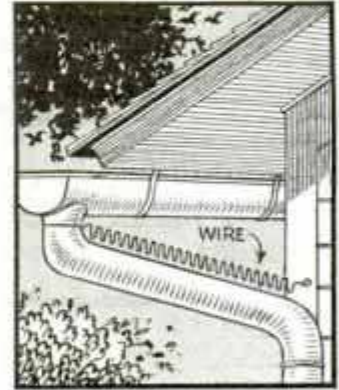


Such a holder can be made still more effective by punching small holes near the edges of the rubber and inserting skewers or lengths of small dowel

rods as shown. The rubber also cushions the bottle when it is stored with others.—F. W. Bentley, Jr., Missouri Valley, Ia.

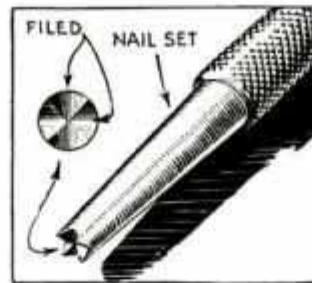
Wire Prevents Birds from Roosting on Eave Spout

To prevent birds from roosting on horizontal sections of eave spouting above windows, doors and sidewalks, crimp a length of wire as shown, and stretch it above the spouting. One end of the wire is wrapped around the spouting and the other end is fastened to the building.



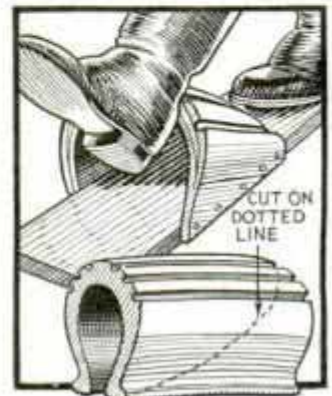
Repairing Worn End of Nail Set

When the end of a nail set, which is usually ground to a cup shape, becomes worn so that it slips off the nail heads, I grind the point square and then file two slots in it as indicated. This leaves four projecting points, which prevent the nail set from slipping off the nail heads. The repair lasts just as long as the original cup point.—R. H. Cooley, Oakland, Calif.



An Efficient Bootjack

A good bootjack can be had by cutting a wedge-shaped piece from an old auto tire as indicated by the dotted lines and then nailing it to the edges of a short, narrow board. A tire that is fairly stiff and of large size should be used for this purpose.—G. E. Hendrickson, Argyle, Wis.



Saving Photoflood Bulbs Used in an Enlarger



To effect a saving in the life of photoflood bulbs used in an enlarger, a double-pole, double-throw knife switch, converted as shown, was installed in the circuit so that the bulbs could be burned at half brilliance for focusing, and at full brilliance when making an exposure. The switch is housed in a wood box with a double receptacle on one side. The wiring

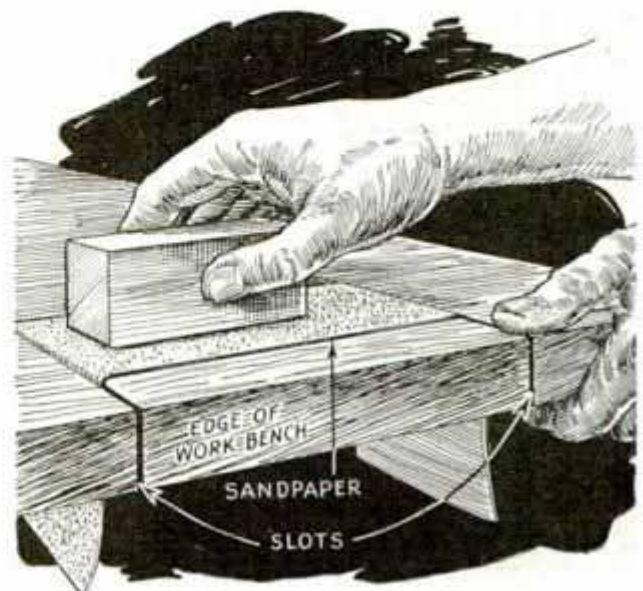
diagram shows how the line wires connect to the two movable arms of the switch, while two lines run to the enlarger, two photoflood bulbs being used on each circuit. If more bulbs are required, be sure to have the same number in each circuit. The switch may also be used with photoflood bulbs for taking night photographs. —Geo. Z. Gilbert, Hollywood, Calif.

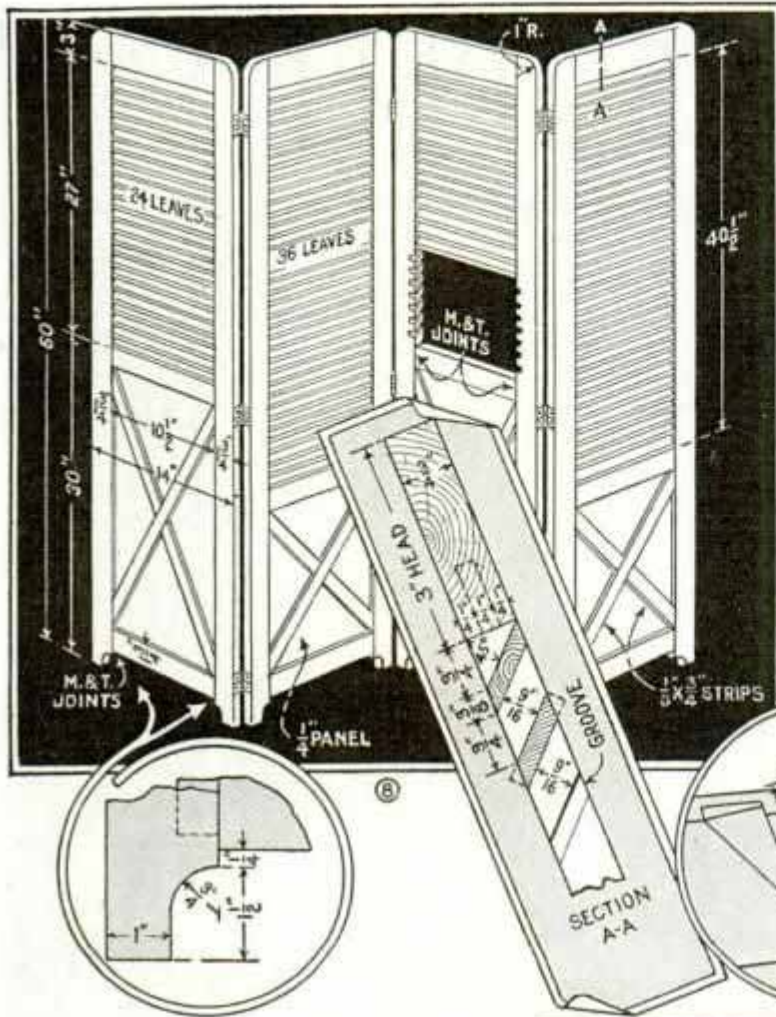
Sandpaper in Slotted Edge of Bench Top Finishes Work

A simple method of finishing small pieces is had by sawing two slots in one edge of the workbench and then fitting a strip of sandpaper in them as shown. In this way, the work can be finished smoothly and rapidly by pushing it back and forth over the abrasive. It only takes a few seconds to change the sandpaper when necessary.

Glue for "Cellophane"

An excellent glue for sealing packages wrapped in Cellophane is made by dissolving gum arabic, 2 lbs. 3 oz., in water, 3¼ qts., and glycerine, 4 lbs. To this sticky solution is added formaldehyde, ⅛ oz. The glue is best applied with a brush.

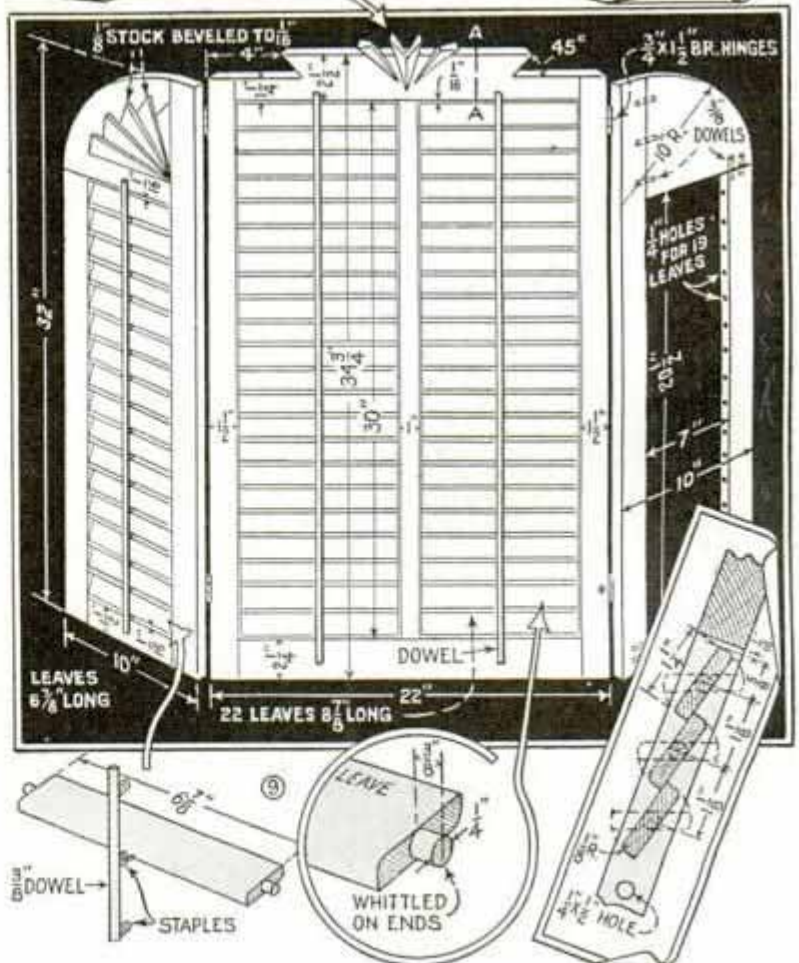




to the spacing shown in the sectional view, and drilled to a depth of 1/2 in. The dowels are sawed and whittled to fit into the ends of the leaves, using a jig similar to the one in Fig. 2. The dowels should be a fairly loose fit so that the leaves will work freely. In order to operate the leaves in unison, a length of dowel rod is linked to each leaf with staples as shown in the detail. The overlay pieces on the wing panels and top rail are made of cigar-box wood and are beveled toward one edge as shown in the detail. Brads and glue are used to fasten these

into a series of diagonal grooves instead of in mortises, and the edges are planed to the angle of the slant. This type of construction is particularly convenient if a circular saw is available, for by this means the grooves can be cut accurately and with ease. Decorative diagonal strips may be placed on the panels or they may be left plain. One of the pieces runs the whole distance while the other is divided into two sections, glue and brads being used to fasten the strips in place.

The fire screen shown in Fig. 9 has movable leaves just like those used on a window blind, making it possible for one to permit as much heat as desired to pass through the screen. The center panel is framed up in the same manner as previously described, then a series of dowel holes are laid off with dividers



pieces into place on the face of the top cross member. As there is no occasion to swing the wing panels forward, ordinary hinges are suitable for this screen. Stationary leaves may be substituted for the movable leaves, if you desire.

Enamel finishes are coming back into popularity and screens of this type are especially attractive when finished in white or pastel shades such as ivory, ice green or orchid. Two-tone effects are also effective. A flat finish is usually desired and therefore a gloss enamel should be rubbed flat with powdered pumice stone and water after the enamel has thoroughly dried and hardened.

Application of Chalk Helps When Filing Soft Metals



Before filing soft metals, take a piece of chalk and rub it over the file to fill the teeth. This prevents small particles of metal from wedging tightly between the teeth, thus lengthening the time between cleaning periods. It also makes the file easy to clean. The chalk does not interfere with the effectiveness of the file.

Rubber Tubing on Spectacles Protects the Ears

Instead of wrapping thread or cloth around the temples of your spectacles as is often done to prevent irritating the ears, use pieces of spaghetti tubing as shown. This is more pliable than cloth and provides better protection for the ears. A little glue will hold the tubing in place.



Water placed in a newly painted room will help eliminate the odor of paint.



Push Bar Attached to Coaster Wagon Lets Small Boy Steer, But Gives You Control

Push Bar Gives Parent Control of Boy's Coaster Wagon

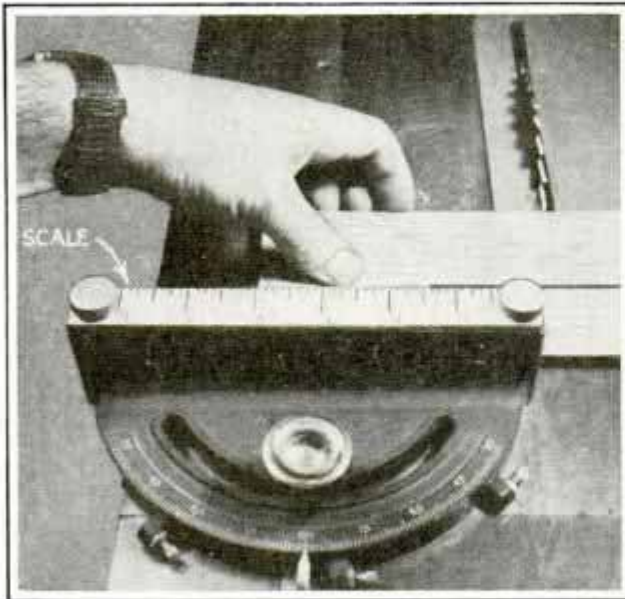
To allow a youngster the thrill of steering his coaster wagon, yet have control of it yourself, bend a length of $\frac{1}{4}$ -in. iron rod to a U-shape and attach it to the rear axle. In this way, you can push the wagon and stop it when necessary.

Small Flashlight Illuminates Dial on Telephone

If you have a dial telephone and it is located in a dark corner, a pen-type flashlight, obtainable at a ten-cent store, can be attached as shown to illuminate the dial. The holder for the flashlight is made from a length of stiff wire wrapped around the telephone and the flashlight. Used intermittently, the flashlight will last for quite a while.



Scale on Miter Gauge Aids in Cutting Work on Circular Saw



Accuracy Assured When Cutting Off Work on Circular Saw by Scale on Miter Gauge

Cutting small strips or blocks of wood to exact lengths on a circular saw is done easily with the aid of a scale or ruler attached to the top of the miter gauge. When cutting the ruler to proper length, be sure to allow for the distance from the saw to the edge of the gauge so that the reading will be accurate. Then drill a hole in each end of the ruler and place it under the nuts used for tightening the stop rods. The same idea can be used on long work by letting the ruler extend beyond the left-hand edge of the miter gauge.

Homemade Mixture Cleans Guns

A non-corrosive cleaner for guns is made by mixing together sperm oil, 1 oz., turpentine, 1 oz., acetone, 1 oz., kerosene, 2 oz., and lanolin (anhydrous) $\frac{1}{4}$ oz. This cleaner is applied with a swab in the usual manner.

What Do You Want to Make?



"Sovereign of the Seas"

400 POPULAR MECHANICS BLUEPRINTS

that save time and effort by showing how numerous practical things should be made. This meets your hobby interests, pictures methods of home improvement and offers ideas to make money in your spare time. Send 3 cents to cover postage for complete, free list.

Models Worth While—(Selection of 39)

"ZIP"—A 50-in. yacht that meets requirements for racing tournaments. Set of 4 prints, (880 to 883)—\$1.00.

"SOVEREIGN OF THE SEAS"—Museum-type model completely dimensioned. 8 prints, (828 to 835)—\$1.50.

To Make for Children—(Also 32 novel toys)

DOLL HOUSE—41 by 23 by 24 in. in size. An unusually attractive design. Set of 2 prints, (507 and 508)—50c.

WOBBLE-GO-ROUND—Combination merry-go-round and see-saw. Made from standard wood stock. 564—25c.

8-FT. BOBSLED—Has auto-type steering gear and carries big load. Supports from pipe fittings. 632—25c.

Winter Sportcraft

FRONT-STEERING, NON-TIP ICE BOAT—786—25c. Other designs available.

HOMEMADE SNOWSHOES—Shows how to bend frames and string with rawhide. 796 and 797—50c.

AIR-PROPELLED ICE SPEEDSTER—Motorcycle power plant and a streamline body. 785—25c.

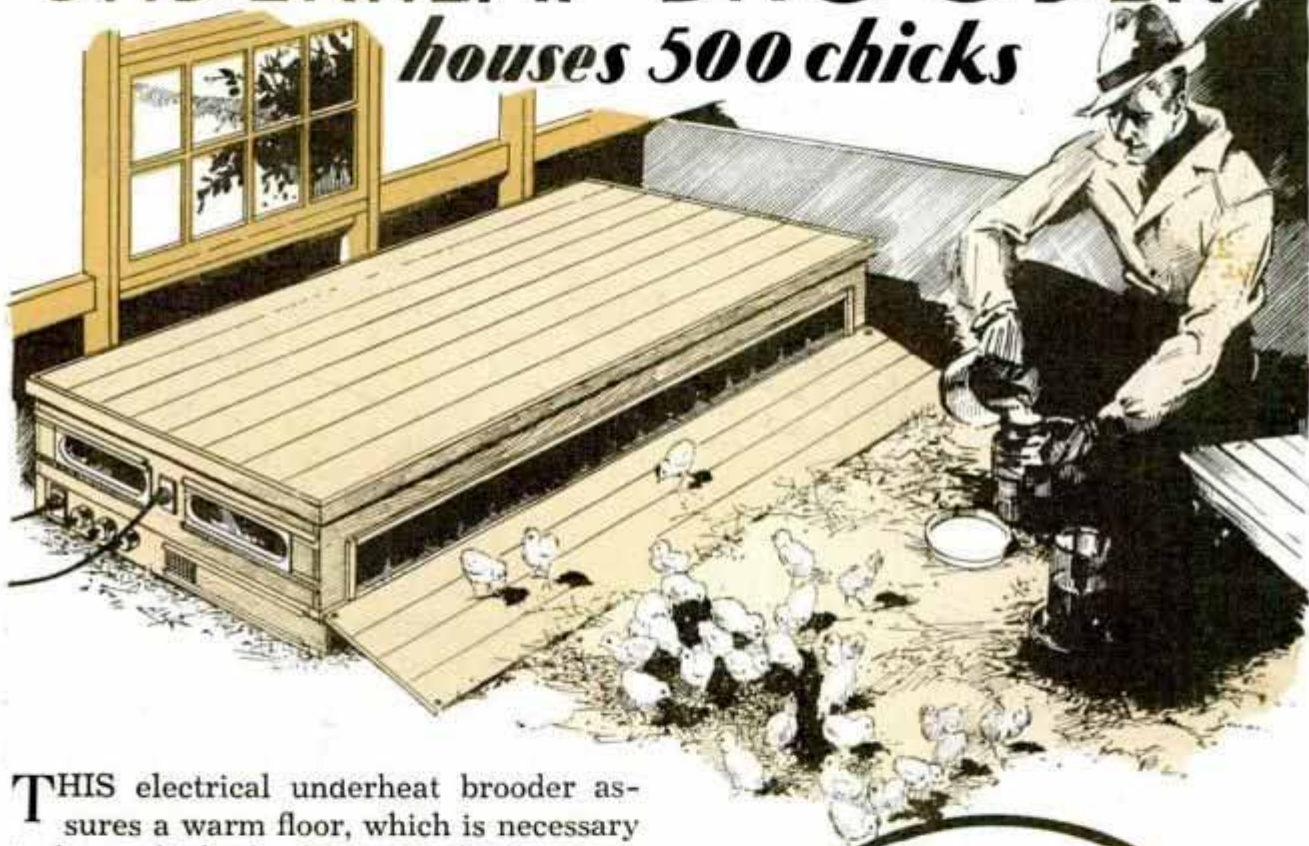
Address Blueprint Department, Popular Mechanics Magazine, 200 East Ontario Street, Chicago.



Planking "Roamer"—Popular Mechanics' Outboard Cruiser (765 to 770)

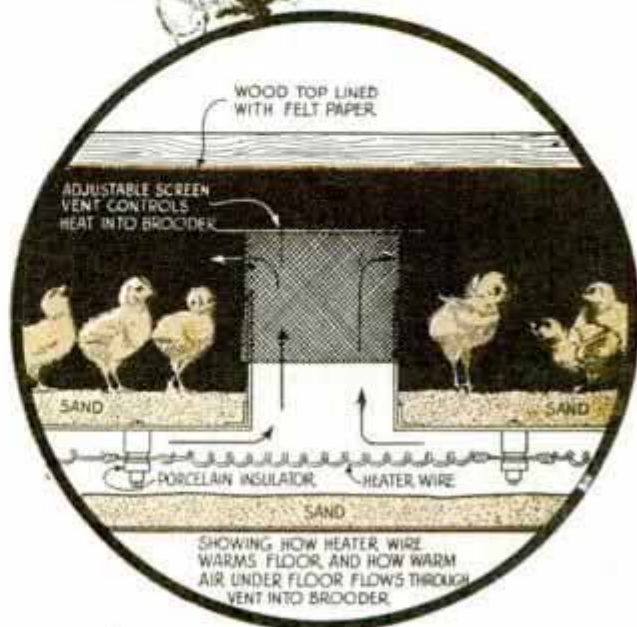


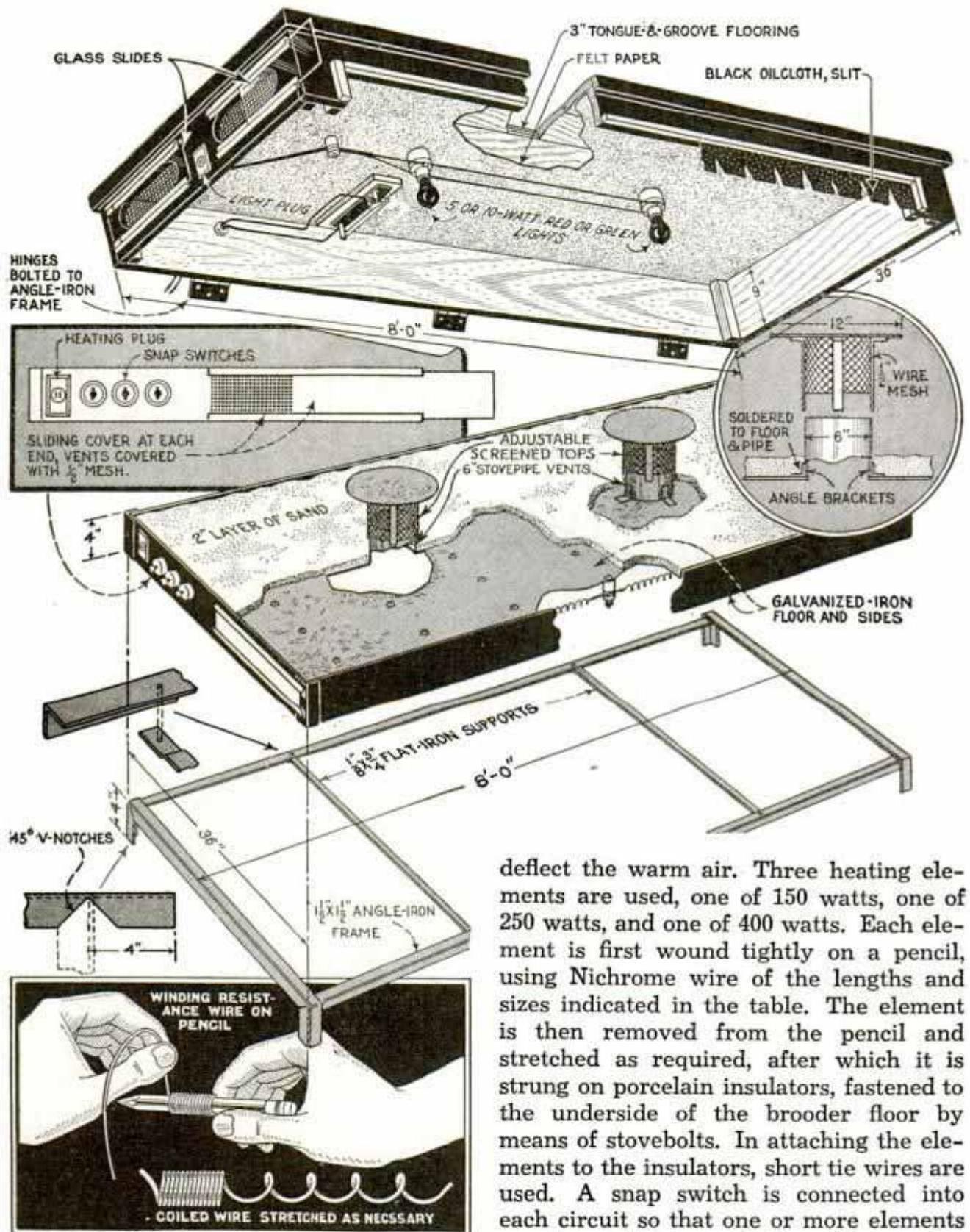
Electric UNDERHEAT BROODER *houses 500 chicks*



THIS electrical underheat brooder assures a warm floor, which is necessary to keep chicks healthy. Fresh air enters vents at each end of the lower portion, where it is heated by elements under the floor, and then passes up through adjustable, screened vents into the brooder chamber. The warm air is deflected from the top of the brooder down on the chicks and passes out through the lower portion of an oilcloth curtain, which covers an entrance opening on one side.

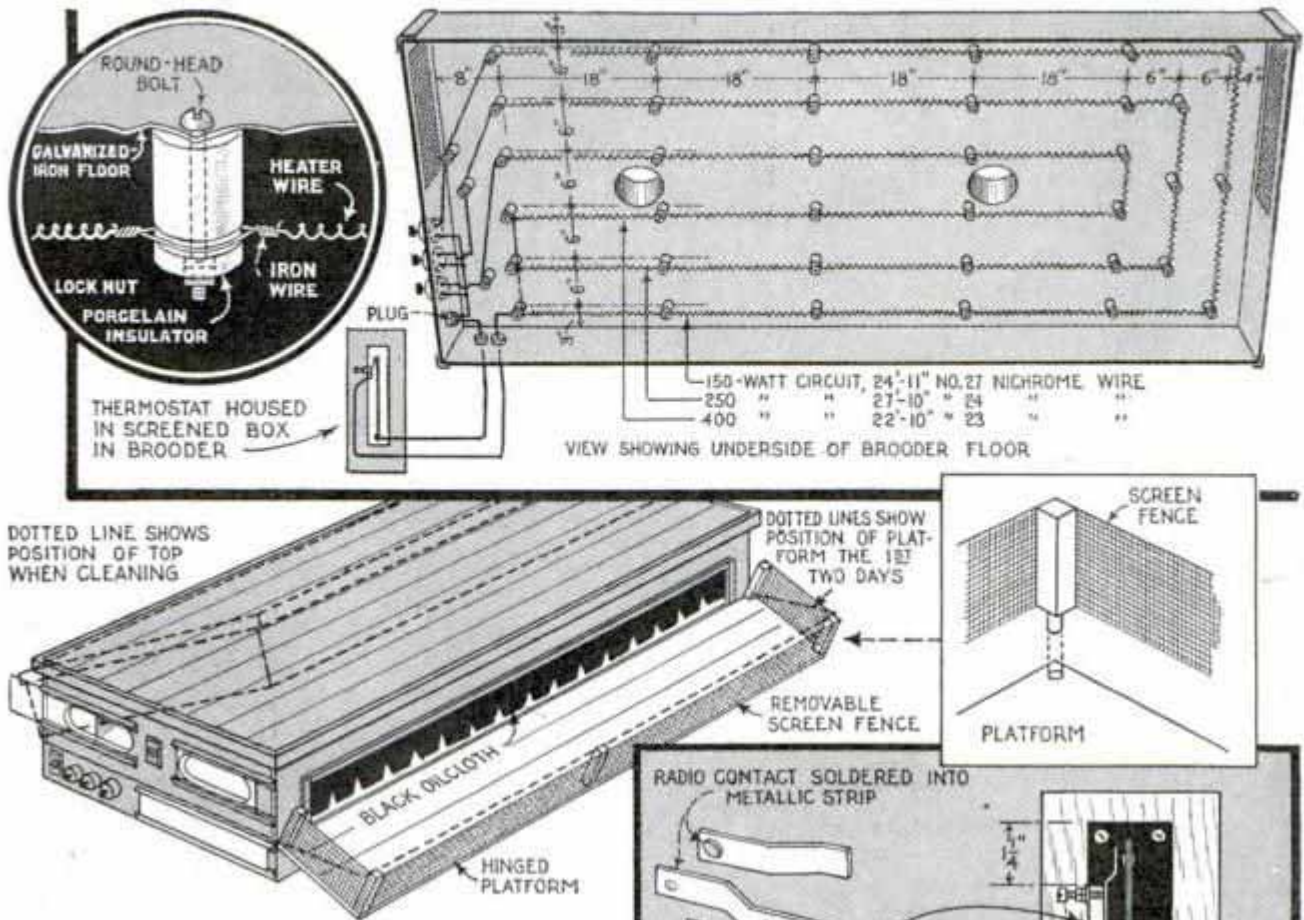
The floor of the brooder is made from No. 24-ga. galvanized sheet iron, the sides and ends being turned down to form an apron over an angle-iron frame, which is cross braced with two pieces of flat iron. The frame is supported on short legs made by bending down the ends of the cross





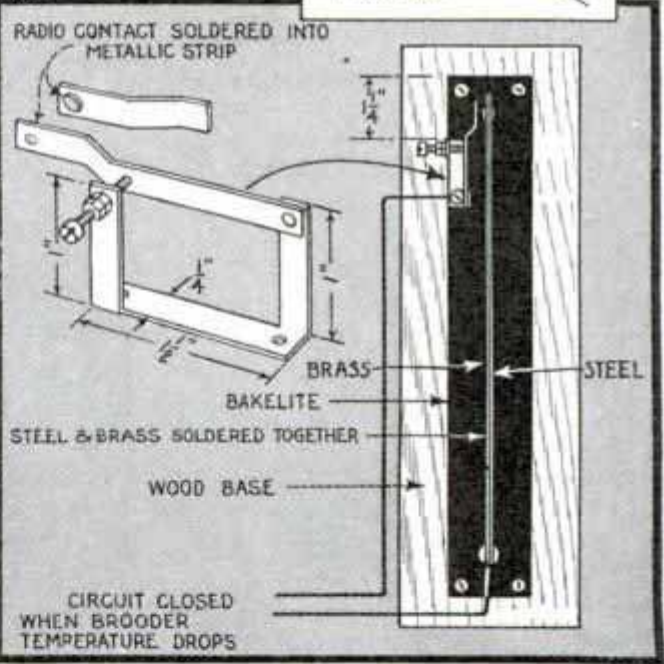
deflect the warm air. Three heating elements are used, one of 150 watts, one of 250 watts, and one of 400 watts. Each element is first wound tightly on a pencil, using Nichrome wire of the lengths and sizes indicated in the table. The element is then removed from the pencil and stretched as required, after which it is strung on porcelain insulators, fastened to the underside of the brooder floor by means of stovebolts. In attaching the elements to the insulators, short tie wires are used. A snap switch is connected into each circuit so that one or more elements may be cut in or out, depending on the temperature inside the brooder. Careful study of the wiring diagram will show how a thermostat is connected into the circuit to control the temperature automatically. It is mounted in a screened box inside of the brooder, opening the element circuits when the temperature rises above a predetermined point, and closing them when

members. To do this, it will be necessary to cut V-notches where the bends are to be made. The adjustable, screened vents are fastened with angle brackets over holes in the center of the floor, and consist of short sections of stovepipe over which wire-mesh sleeves are slipped, the latter being topped by 12-in. tin disks to



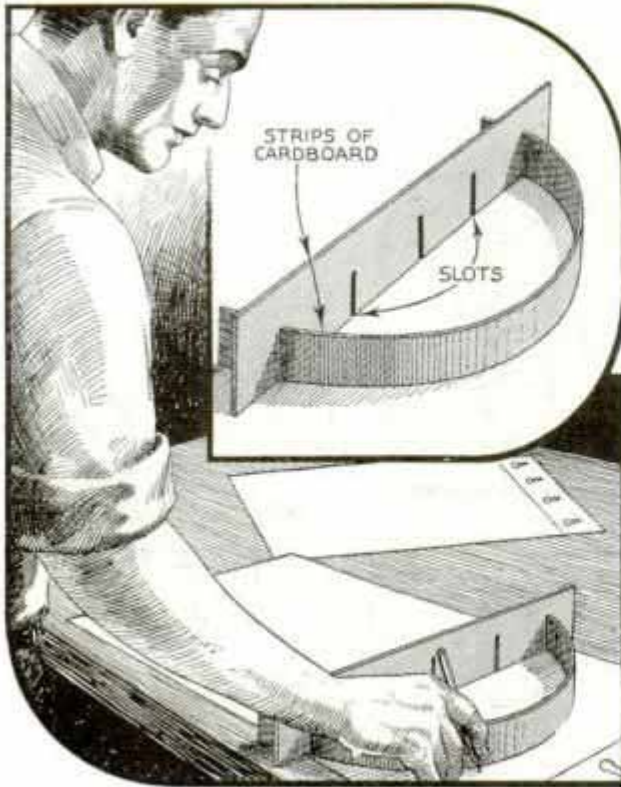
the temperature falls. The thermostat may be purchased, or it can be made by soldering a strip of brass and steel together. If this is done, it may be necessary to wire a condenser across the points to prevent arcing.

The top part of the brooder is made of 3-in. flooring nailed to a frame of 1-in. stock, and is hinged at the back to the angle-iron frame of the floor. Lined with felt paper, the top is well insulated to retain heat. It has an entrance opening cut out the length of one side and covered with an oilcloth curtain, which is slit at intervals to help prevent loss of heat, yet allow the chicks to pass through readily. To permit inspection of the chicks without disturbing them, two sliding windows are provided at one end, and two colored lamps of low wattage are mounted in porcelain sockets, which are screwed to the underside of the top. These are wired to a receptacle at one end. The windows also provide additional ventilation on warm days. A feeding yard with a screen-wire fence is placed in front of the entrance opening, and is used the first few days when the chicks are small, after which the fence is removed and the yard



dropped down to serve as a runway. After the brooder has been set up, the metal floor is covered with a 2-in. layer of dry sand. It is also a good idea to put sand on the floor under the brooder. The sand, besides serving as a protection against fire, absorbs heat and will help keep the chicks warm for several hours if the current should happen to be shut off.

When it happens that a part to be sawed or notched on a model is inaccessible to ordinary saws, a short section broken from a jewelers' saw blade can be clamped in a pin vise and used for the work.



This Guide Will Be Found Better than a Compass for Scribing Arcs on Mimeograph Stencils

Cardboard Guide Aids in Tracing Arcs on Mimeograph Stencils

Due to the difficulty of using a compass to scribe arcs on mimeograph stencils, one operator uses the guide shown. A wide strip of heavy cardboard 12 in. long is slotted at 2-in. intervals to receive a narrow strip of the same material. The latter may be adjusted to provide any arc desired and then serves as a guide for the stylus.

Skid-Chain Links Used as Bails on Improvised Buckets



take the opened end links of the chain, or,

Around the shop or farm where pails and other containers are often improvised from old cans, the cross links from large skid chains will provide good bails and handles for carrying them. Small holes punched on opposite sides of the pail near the top

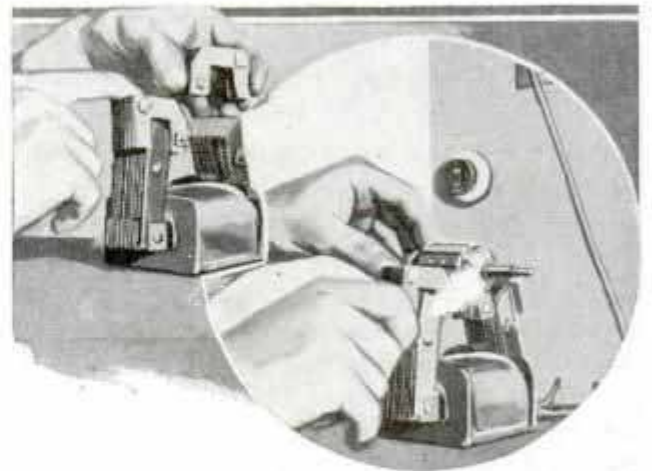
if there is a rolled rim around the top, the ends of the links can be beveled to slip under the rim, where the weight of the container will keep them in place.

Remodeling Old Buildings for Use as Brooder Houses

With a few slight changes, buildings not originally intended for brooding chicks can often be converted into satisfactory brooder houses at small cost. The changes usually necessary to convert the building consist of insulating it thoroughly, covering cracks, putting in the proper floors and windows of either glass, glass substitutes or muslin. Insulation can be in the form of commercial insulation board, building paper, lumber or even straw, while the floor may be alternate layers of sand and paper with a thick layer of dry sand on top. The windows should face south and should open to admit sunshine. Muslin cloth, dipped in boiled linseed oil, becomes quite transparent and thus permits excellent ultra-violet radiation.

Adapting Large Growler to Armatures of Small Motors

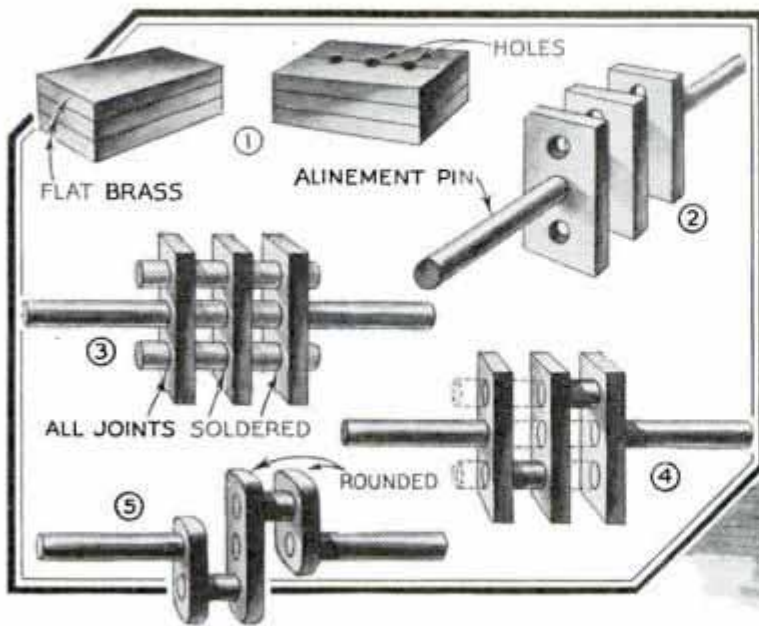
An ordinary growler for testing motor armatures is readily adapted to very small armatures by fitting it with these jaws of laminated stovepipe iron. The laminations



Extra Jaws of Laminated Stovepipe Iron Adapt Large Growler to Handle Small Work

are about 1½ in. square and are notched on one side to slip over the growler jaws as shown, the upper inside corner of each extra jaw being beveled to form a cradle for the small armature.

Improvement in Making Model Crankshafts

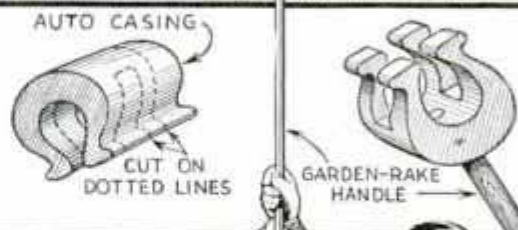
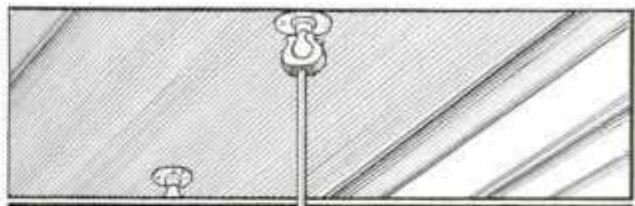


The usually difficult job of making small crankshafts for models is greatly simplified with the method illustrated in the drawing. Clamp together three pieces of flat brass and drill three holes exactly in the center as shown in Fig. 1, spacing the outside holes an equal distance from the center one. Next, insert an alignment pin, Fig. 2, and two shorter pins as in Fig. 3.

Then carefully space the brass pieces to allow for the width of the connecting rods and sweat-solder the pins in place. To complete the crankshaft, saw off the pins as indicated by dotted lines in Fig. 4 and with a file round the brass pieces as in Fig. 5.—S. O. Stanfield, Orange, Calif.

Efficient Tool for Changing Electric Bulbs in High Ceilings

A piece of small-size auto casing and a broomstick or garden-rake handle are all you need to make a handy tool for removing electric bulbs that are out of reach. Cut out the walls of the casing as indicated by the dotted lines to leave four prongs and then screw it to the end of the handle. When pushed over the bulb, the rubber prongs will grip it firmly so that it can be screwed out of the socket.



Compound for Cleaning Bottles

Bottles and other glassware may be cleaned thoroughly with a solution made by dissolving the following dry chemical mixture in hot water as needed: Sodium metasilicate, 1 part, soda ash or sodium carbonate, 2 parts, and trisodium phosphate, $2\frac{1}{2}$ parts. The solution made by dissolving this cleaning powder in water is very effective and may be used for a large variety of cleaning operations.

CORRECT

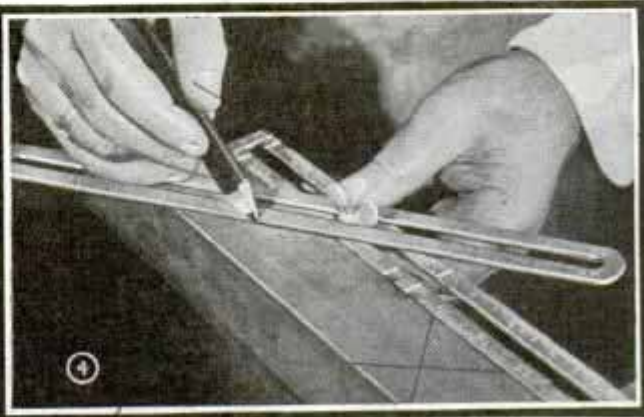
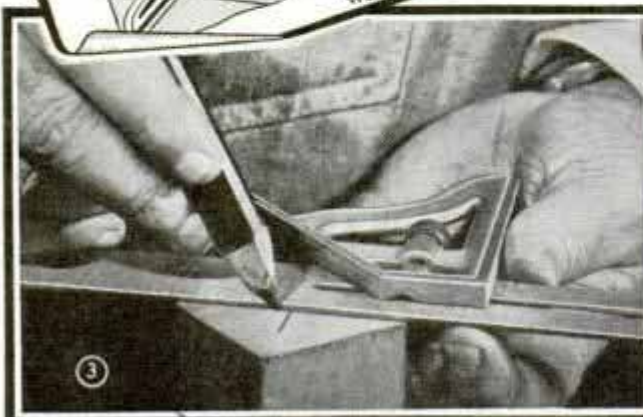
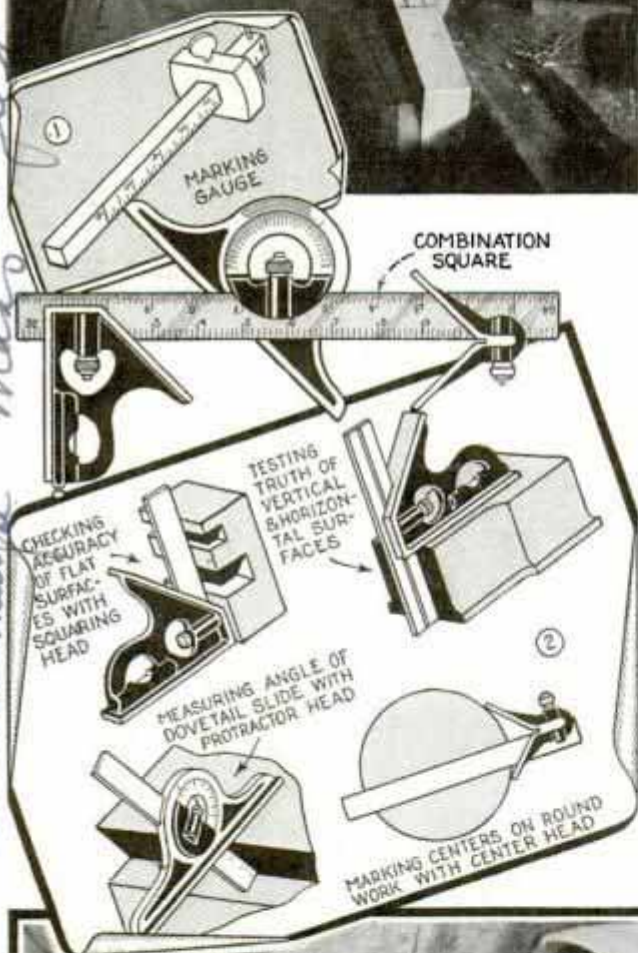
the key to fine

By W. CLYDE LAMMEY

BEFORE you cut a piece of stock to size on the circular saw or turn down a shaft in your metal-turning lathe you must gauge width and length, diameter and thickness with the proper measuring tools. Making accurate measurements is the first step in the production of high-grade work.

Common measuring tools for use on both metal and wood are the various types of squares, rules, and other devices for measuring length and depth; the spring and firm-joint caliper and the micrometer for extremely accurate measurement of diameters, and also the many types of measuring devices used in layout work, such as the trammel and surface gauge and the combination square in its several variations. In addition to these there are many other measuring tools made for special work in connection with the lathe. Some tools of the same general design are made up in different types, each adapted to a special purpose, particularly the caliper and the micrometer.

One of the most commonly used tools in both measuring and layout work on either metal or wood is the combination square fitted with a squaring head, a protractor head and a centering head. Fig. 2 shows typical uses of this versatile tool. The blade is graduated in fractions of an inch, an accurate spirit level is built into the



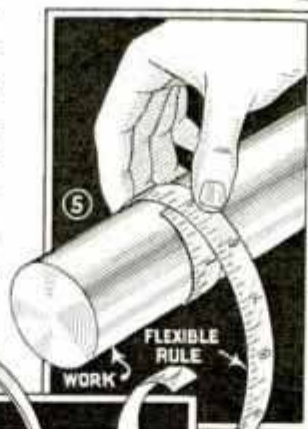
*1. Stanley
Comb square Pratt
or Brant Sharpe
made*

Stanley Rule & Level Co

MEASUREMENTS

workmanship . . .

squaring head, and any one of the three heads may be used on the same blade interchangeably. Fig. 3 shows a similar type of combination square which is used more exclusively on woodwork, the head so formed that the graduated blade may be placed on the stock in either the 45° or 90° positions. Fig. 4 shows another variation of the same thing, a handy tool for the woodworker. It consists of two slotted and graduated blades on a sliding pivot which permits accurate adjustment to any angle desired. You can use a square and a pencil to lay out a mortise, but the marking gauge shown in Fig. 1 is handier and far more accurate. This tool will also serve as a depth gauge. The flexible rule, Fig. 5, provides a quick means of accurately measuring a circumference as well as the length or width of flat or curved work. Like many other measuring devices the trammel, Fig. 6, can be used for fine layout

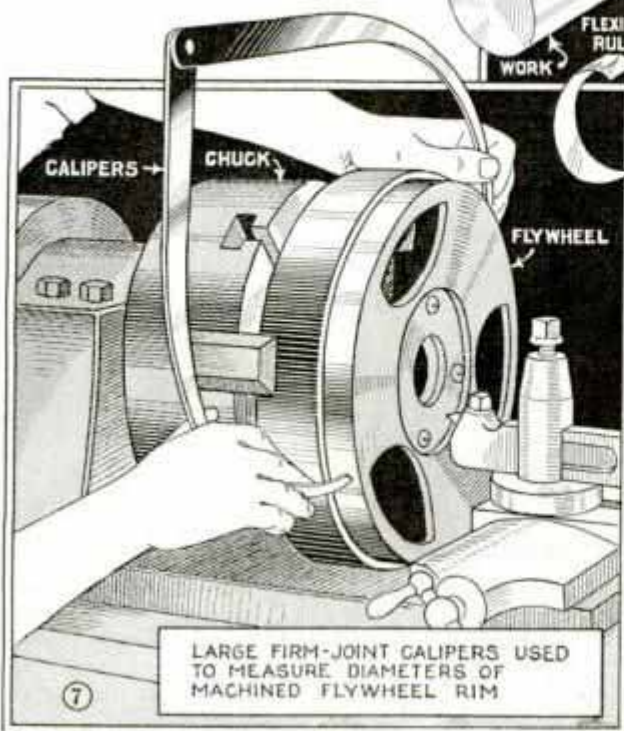


MACHINISTS' BEAM TRAMMEL USED IN SCRIBING CIRCLES, SEGMENTS AND IN TRANSFERRING MEASUREMENTS

6

work on either metal or wood. Patternmakers, diemakers and machinists make extensive use of this tool.

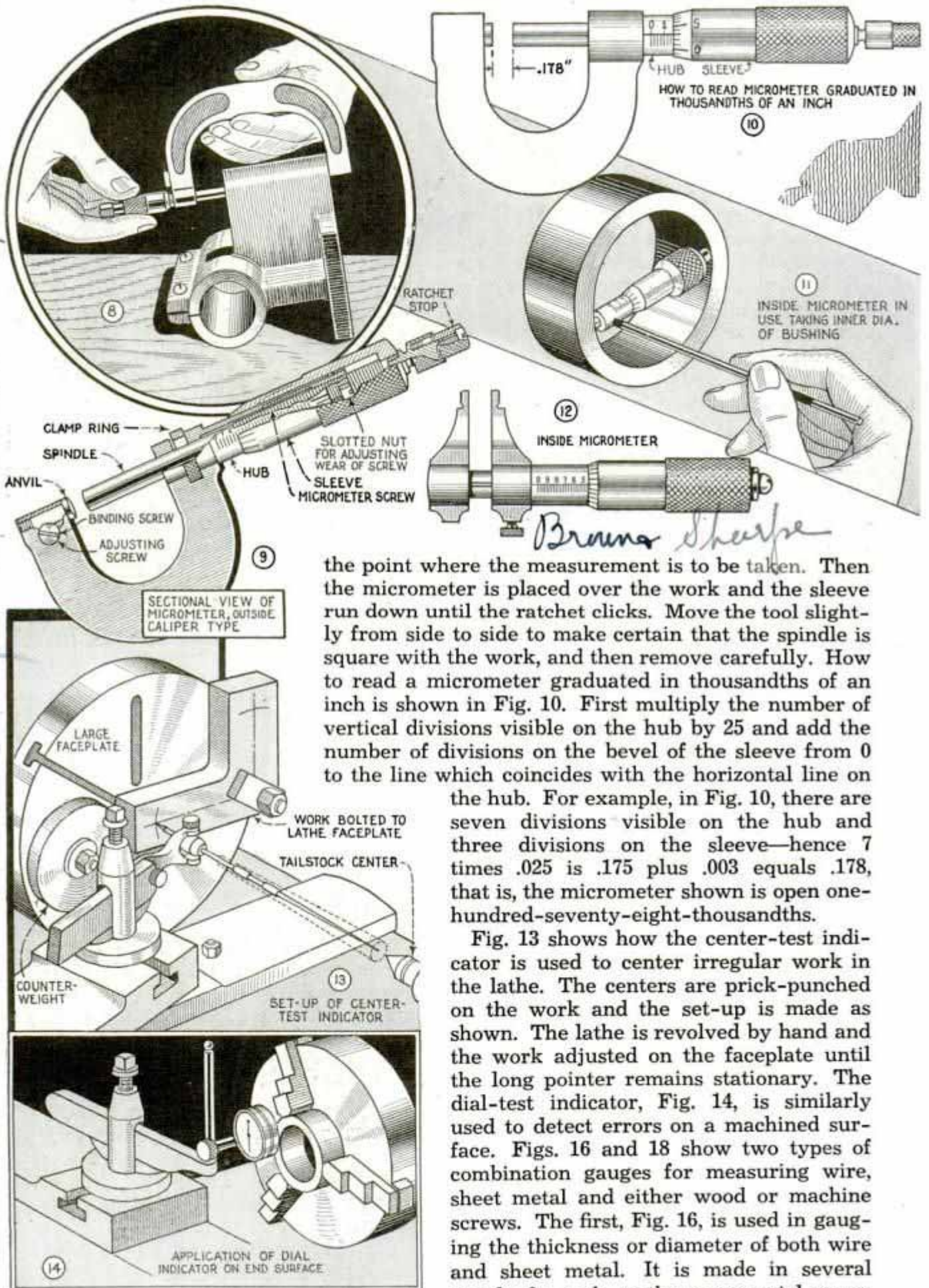
When you turn large work to diameter in the lathe you will need the firm-joint calipers shown in Fig. 7. Fig. 21 shows how to transfer a measurement from an inside caliper to an outside caliper. This is often necessary when fitting parts together accurately. The trick in taking accurate measurements with any caliper is first an exact setting by means of a rule, then the tool is held very lightly in the fingers as the legs are passed over the work. Never grip a caliper when taking a measurement; the tool must always be supported as near the ends of the fingers as possible, for the accuracy of the measurement depends on the sensitivity of your finger tips. The same is true of the micrometer, Figs. 8 to 12 inclusive. First, see that there is no dirt on the anvil or spindle and clean the work at



LARGE FIRM-JOINT CALIPERS USED TO MEASURE DIAMETERS OF MACHINED FLYWHEEL RIM

7

Woodell Pratt or Orman and Sharpe



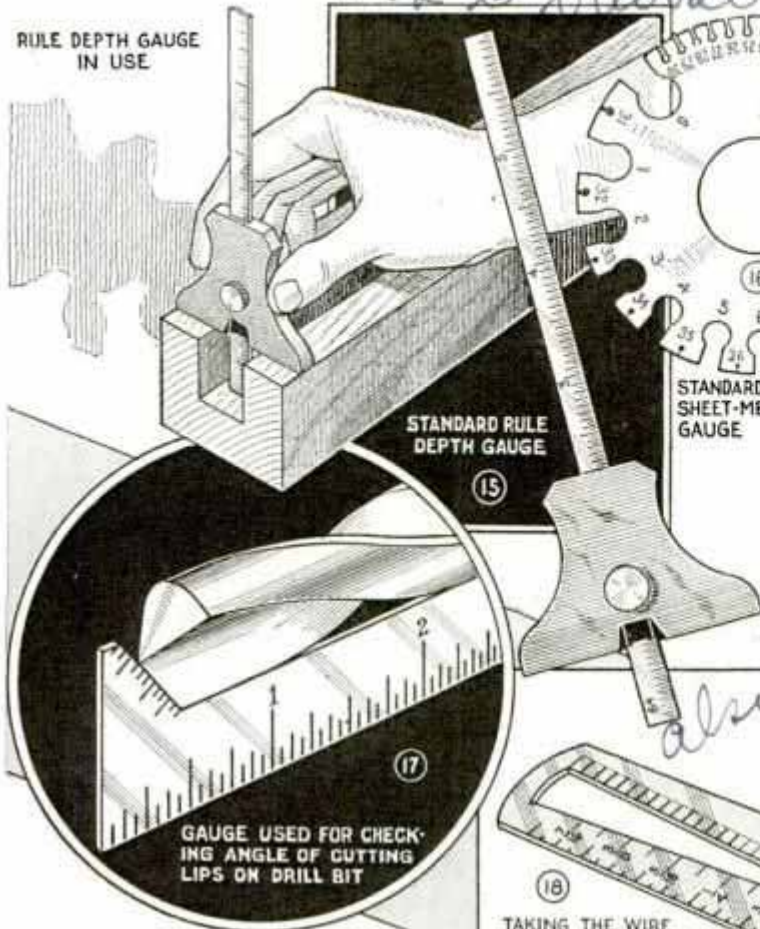
the point where the measurement is to be taken. Then the micrometer is placed over the work and the sleeve run down until the ratchet clicks. Move the tool slightly from side to side to make certain that the spindle is square with the work, and then remove carefully. How to read a micrometer graduated in thousandths of an inch is shown in Fig. 10. First multiply the number of vertical divisions visible on the hub by 25 and add the number of divisions on the bevel of the sleeve from 0 to the line which coincides with the horizontal line on the hub. For example, in Fig. 10, there are seven divisions visible on the hub and three divisions on the sleeve—hence 7 times .025 is .175 plus .003 equals .178, that is, the micrometer shown is open one-hundred-seventy-eight-thousandths.

Fig. 13 shows how the center-test indicator is used to center irregular work in the lathe. The centers are prick-punched on the work and the set-up is made as shown. The lathe is revolved by hand and the work adjusted on the faceplate until the long pointer remains stationary. The dial-test indicator, Fig. 14, is similarly used to detect errors on a machined surface. Figs. 16 and 18 show two types of combination gauges for measuring wire, sheet metal and either wood or machine screws. The first, Fig. 16, is used in gauging the thickness or diameter of both wire and sheet metal. It is made in several standards, such as the commercial gauge

15. Brown & Sharpe
Providence, R.I.
or L.S. Starrett
Waltham Mass.

as Miller
Tool
Co. Miller
Waltham
Mass.

RULE DEPTH GAUGE
IN USE

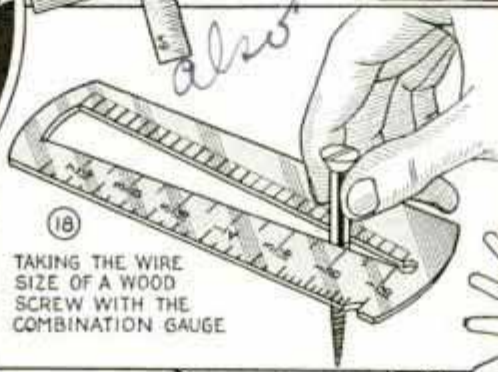


STANDARD RULE
DEPTH GAUGE

15

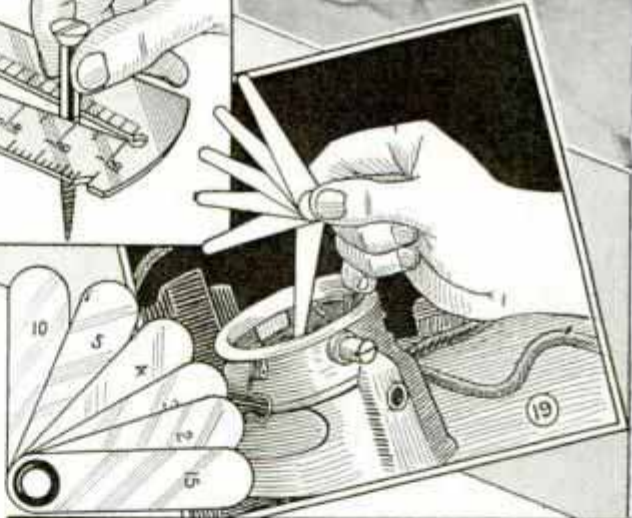
STANDARD WIRE &
SHEET-METAL
GAUGE

16

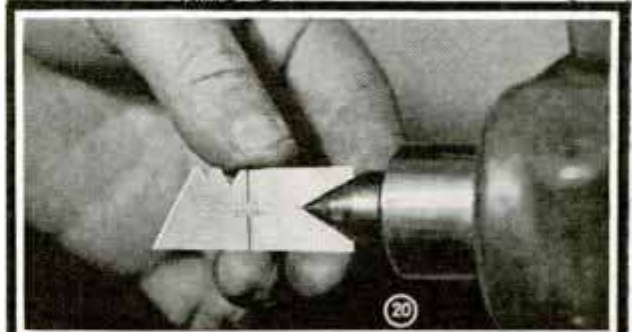


16

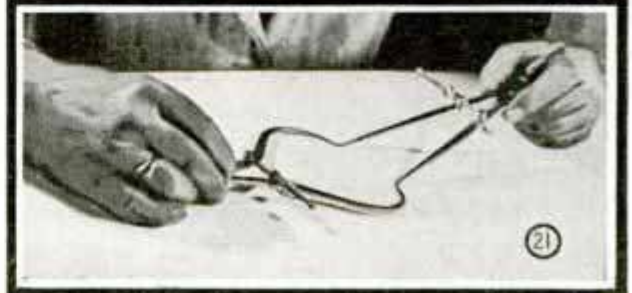
TAKING THE WIRE
SIZE OF A WOOD
SCREW WITH THE
COMBINATION GAUGE



19



20

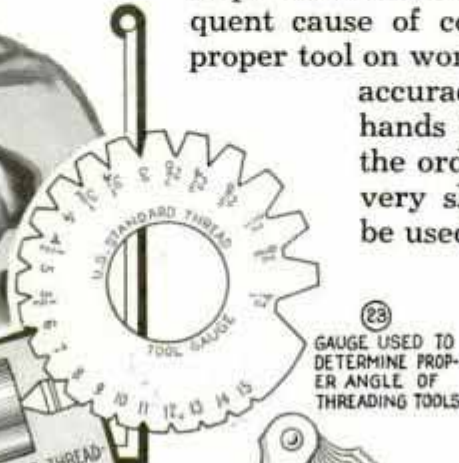


21

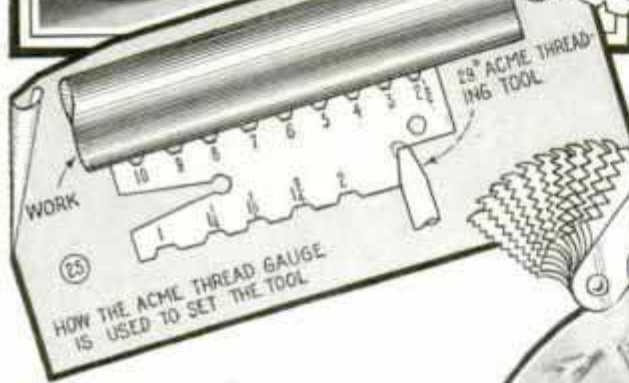
for uncoated sheet and plate iron and steel, for piano wire only, for steel wire and drill rod and for soft wire and non-ferrous sheet metal. A second type for wire and wood or machine screws and the manner of using it is shown in Fig. 18. Fig. 15 shows the ruled depth gauge and the most common use of this tool though it can be adapted readily to other work. It is handy as a square on small delicate parts. The thickness gauge, or "feeler," as it is called, is used chiefly for gauging clearances between moving parts. Two types are shown in Fig. 19. Figs. 22 and 17 show two gauges that every mechanic should have. The first, Fig. 22, shows all the twist drill sizes from 1 to 60 inclusive and in addition gives the tap and body drill sizes for standard machine screws. The second, Fig. 17, is essential for accurately gauging the angle of the cutting lips when grinding a drill bit. When you cut threads in the lathe you will find the screw pitch gauge, Figs. 24 and 27, useful in finding the size of a thread that must be reproduced. Fig. 27 shows how this gauge is used. The stand-



Gauge Giving All Twist-Drill Sizes from Nos. 1 to 60, and Also the Tap and Body Drill Sizes for Standard Machine Screws



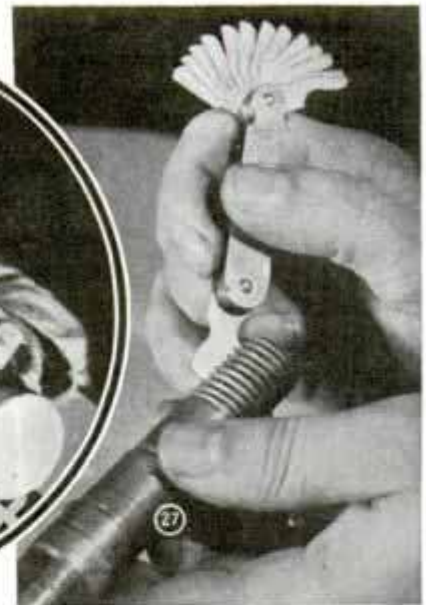
GAUGE USED TO DETERMINE PROPER ANGLE OF THREADING TOOLS



HOW THE ACME THREAD GAUGE IS USED TO SET THE TOOL



METRIC SCREW-PITCH GAUGE

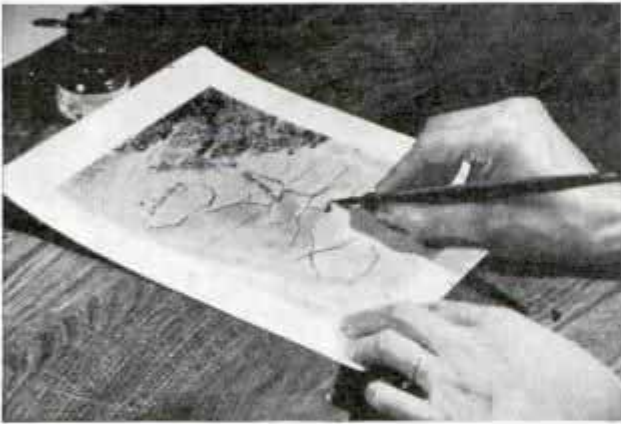


ard thread tool gauge in Fig. 23 and the Acme thread gauge, Fig. 25, are necessary when you must turn out an accurate piece of work to a given specification. The surface gauge, Fig. 26, is used for layout work on irregular surfaces that will not permit the use of other measuring tools. The mechanism of the lathe will take care of the pitch if properly adjusted but it is essential that you have your threading tool ground to precision limits. To accomplish this the tool must be ground to the angles of a precision gauge. The condition of the lathe centers is of the first importance when cutting and chasing threads. Before beginning work, check the lathe centers with the gauge shown in Fig. 20 and if necessary re-grind the centers to the correct angle.

When working with precision measuring tools, acquire the habit of handling them carefully and always support the tools with the fingers only. Be sure, when taking measurements on metal, that the surface is clean and see that there is no dirt or metal chips on the measuring tool. In precision work the presence of grease and chips between meeting surfaces is a frequent cause of costly errors. Using the proper tool on work that requires extreme accuracy is important. In the hands of a skilled workman, the ordinary caliper will detect very slight errors. It can also be used to bring parts to a reasonably close fit. Yet this tool can in no way approach the micrometer caliper in precision measurement. Likewise, it is impossible to substitute a rule and scribe for the surface gauge in laying out

irregular-shaped work. It is well to check measurements over before beginning work and record on paper each measurement taken as the work progresses. When you measure round work with calipers, the tool should be held at right angles to the work, as otherwise an appreciable error will result. Keep an oily rag or a bit of clean oiled waste handy and wipe off the tools when you finish using them. A rusty precision gauge or micrometer is useless.

Two Useful Ideas for Artists and Draftsmen



When it is necessary to put lettering on a photo or to make a pen-and-ink copy of it, yet leave its appearance unmarred, stretch a sheet of clear Cellophane over the face of the photo and use India ink. The Cellophane may be cemented to the back of the photo near the top edge, and then folded over the face.

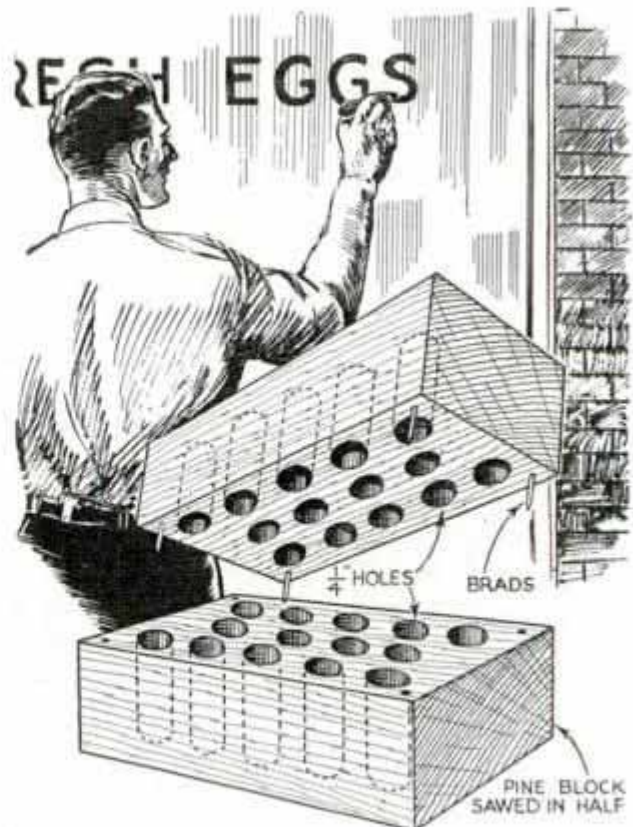
To save time and help to assure accuracy when using a T-square, some artists and draftsmen tack a strip of inner tube



across one edge of their drawing board as shown. The rubber holds the square snugly against the edge of the board and prevents it from slipping off, if the board is set at an inclined position.

Preparations That Make Colored Pencils to Write on Glass

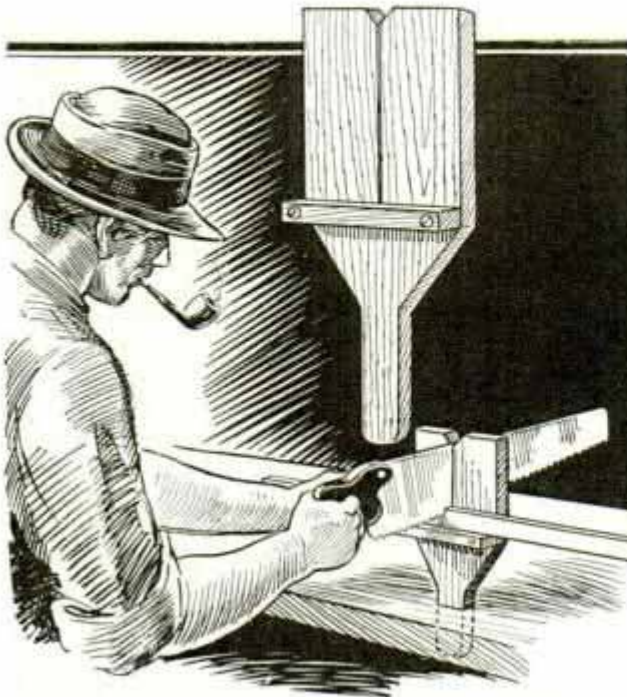
Colored pencils for writing on glass are easily made with the following mixtures, which are cast in a mold: To make black pencils, mix lampblack, 10 parts, white wax, 40 parts, and tallow, 10 parts. For white pencils, mix white lead, 40 parts, white wax, 20 parts, and tallow, 10 parts. If Berlin blue, 10 parts, is substituted for the white lead in the last preparation, the pencils will be blue. Or, they may be made yellow by using chrome yellow, 10 parts, instead of the lead. To make dark blue pencils, mix Berlin blue, 15 parts, lampblack, 1 part, gum arabic, 5 parts, and tallow, 10 parts. In mixing the preparations, first melt the wax and tallow together and then add the pigment. A mold for casting the pencils is made from a soft-pine block, which has several $\frac{1}{4}$ -in. holes drilled in it. The block is then sawed in half and fastened together with brads so that it can be taken apart to remove the pencils.—Herman Myers, Worcester, Mass.



Wooden Mold Made by Drilling Holes in Pine Block to Form Colored Wax Pencils for Use in Writing on Glass

☐ Rubbing a glossy varnish with a mixture of oil and pumice stone will dull it.

Simple Tool Aids in Sawing Lath Strips

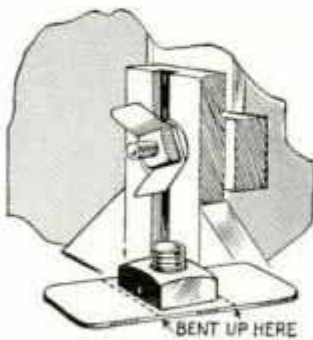


Much Time Is Saved in Squaring and Sawing Lath by Using This Tool

To save time in squaring and marking small lath strips for sawing, one worker used the squaring tool, which was made from a scrap piece of 1 by 6-in. stock. In use it is set in a slot cut in the workbench top. A vertical slot in the tool guides a saw, while a cleat screwed to the block supports the work.

An Improved Wingnut

Square nuts that must be loosened and tightened frequently, are easily turned by hand if a small strip of sheet metal is drilled and slipped over the bolt, under the nut. Then, by bending up the ends of the strip, an improved wingnut is formed. Sharp corners of the strip should, of course, be filed smooth.



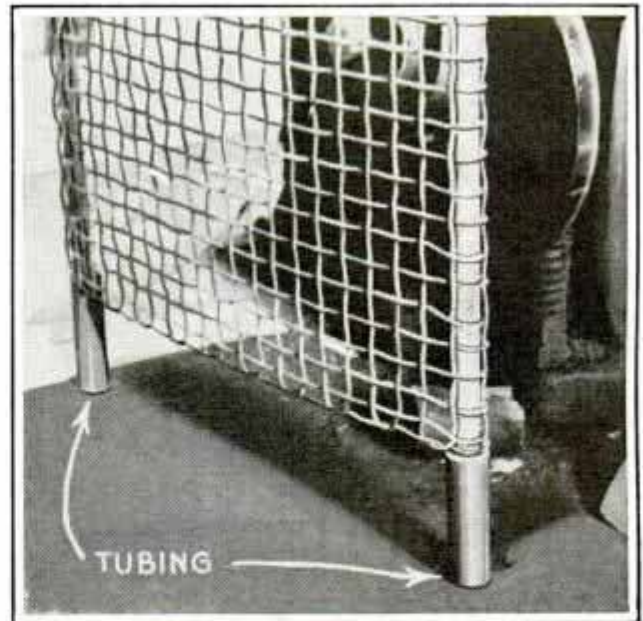
Underground Heating System Hastens Growth of Vegetables

In order to market his vegetables early in the spring while prices are high, an Oklahoma farmer hastens the growth of

the plants by warming up the winter-chilled ground in his garden with an underground heating system before planting the seeds. The garden is made into beds 30 by 36 ft. in size under which lengths of 6-in. pipe are laid parallel to each other and 3 ft. apart. The furnaces are set at one end of the pipes and chimneys are built at the other end to draw the smoke and heat through them. At the front end of the beds where the furnaces are located, the heat, of course, is greater and the pipes are buried 21 in. under the ground with a general incline as they approach the chimneys until at the rear, they are only 5 in. under the ground. As an added protection, sawdust is placed 4 or 5 in. deep over the beds and removed just before planting time.—Frank Reynolds, Ft. Morgan, Colo.

Tubing in Shop Floor Supports Safety Guards in Front of Machines

In a shop where wire-mesh safety guards are used in front of some machines, short pieces of pipe or tubing, imbedded in the concrete floor, provide good sockets for supporting the guards, which may be removed when the machines are not in use.



Safety Guards in Front of Shop Machines Supported by Tubing or Pipe Imbedded in Floor

This idea is especially handy in shops where the floor space is crowded with machines. The sockets may project above the floor or they may be flush, with a small hinged cover to keep out dirt.

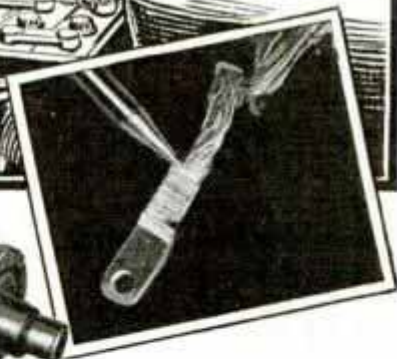
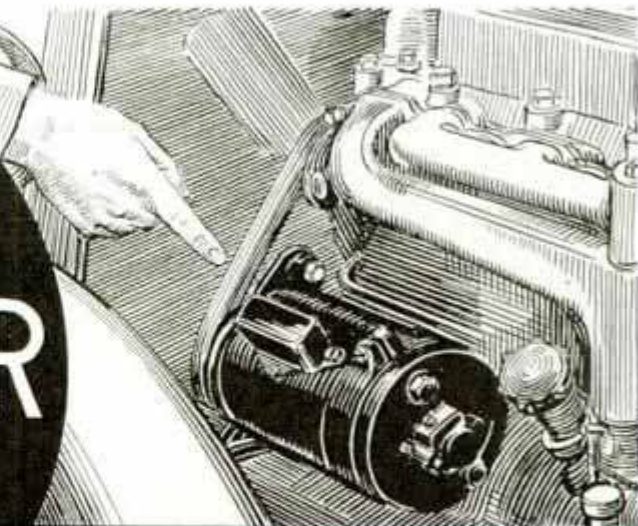
Avoiding GENERATOR TROUBLES

by A.C. Vance

MANY auto-generator troubles are due to neglect and may be avoided by making periodic inspections of the charging circuit, eliminating corrosion and poor contact at all electrical connections, truing worn commutators, replacing worn bearings, and, generally, keeping things in shape. Your dash ammeter is the "watch dog" of the charging circuit and should be glanced at occasionally when driving. When the ammeter does not show charge, it indicates trouble in the circuit. First look at the generator commutator to see if it is clean and bright. Grease and carbon on the commutator prevent the brushes from making good contact. To remedy this condition hold fine sandpaper against the commutator while it rotates. Never use emery cloth as this may damage the bearings. If the commutator is in good condition, remove the cover from the electrical cutout, usually located on the generator housing, and see if the points close to allow passage of current. If you find trouble in either generator or cutout but cannot correct it immediately, ground the generator at once by connecting a wire from the output terminal to a



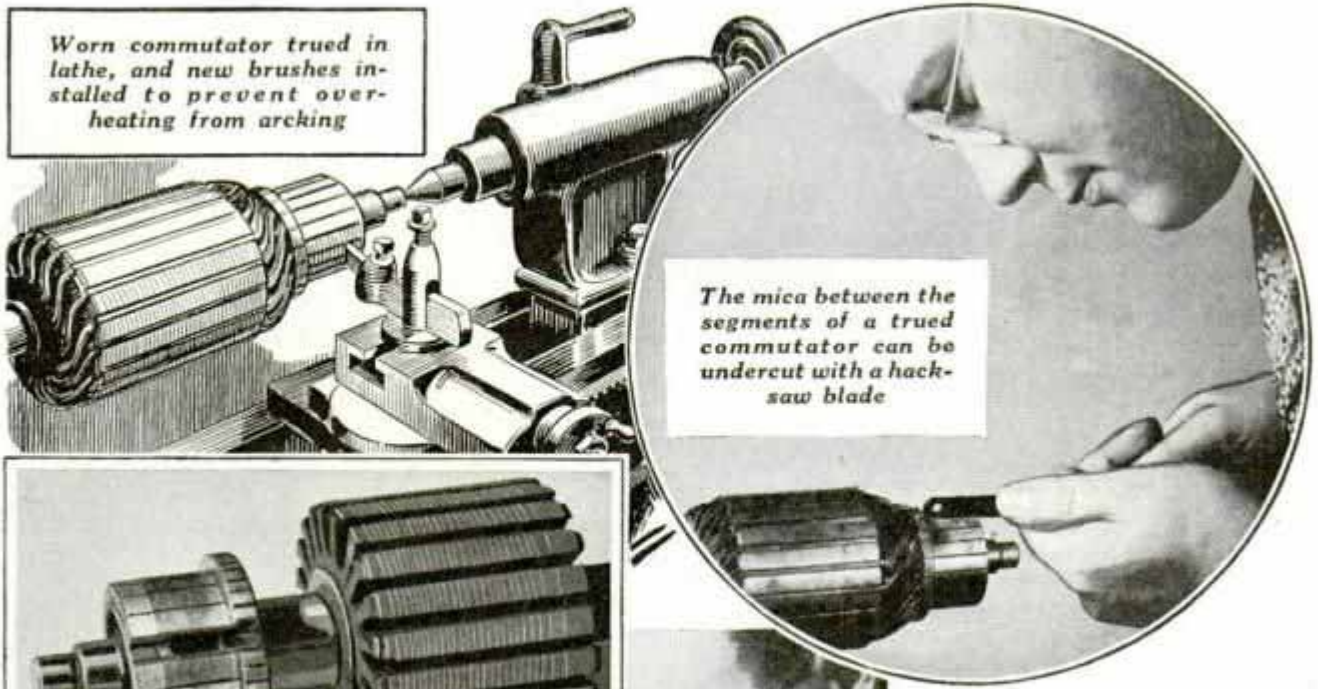
Corroded and frayed battery cables and terminal posts resist passage of current and may cause generator to burn out. Evidence of solder on the commutator indicates over-heating caused by resistance in charging circuit



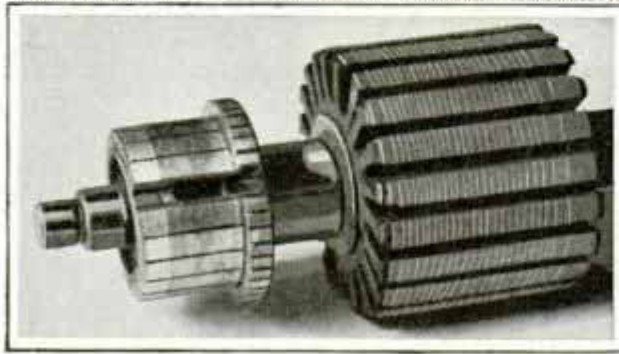
convenient bolt on the motor. If this is neglected, an excessive amount of current is forced through the field windings, which will over-heat them and probably cause them to burn out, unless they are protected with a fuse.

Battery terminals are another source of generator damage as corrosion on the terminals produces high resistance to the current, which forces an abnormal amount

Worn commutator trued in lathe, and new brushes installed to prevent overheating from arcing



The mica between the segments of a trued commutator can be undercut with a hack-saw blade



Above, badly worn generator bearings allow armature to rub against field-pole pieces scoring the armature core, while shifting brush holders may loosen commutator segments. Right, when there are no short circuits, slightly burned windings can often be repaired by applying several coats of shellac



through the field windings, with resulting damage just mentioned. Corroded terminals should be scraped clean to assure good electrical contact. A frayed ground cable will, owing to its reduced size, prevent the normal amount of current from passing, which is equivalent to increasing the resistance in the circuit. Therefore, it should be replaced immediately. Always be sure that the connections of the wire leading from the electrical cutout to the starter switch are tight as this is the conductor for the current from the generator to the battery.

If, on examining the generator, you find melted solder thrown from the commutator where the armature wires are connected, it is a direct result of the commutator over-heating which is caused by high resistance in the line or poor contact of the brushes on the commutator. The latter condition may be caused by mica strips projecting beyond the surface of the commutator segments, by worn bearings, which

allow the armature to chatter, or by worn brushes and weak brush-holder springs. If no other damage has resulted, re-soldering can be done, but the job must be finished cleanly so that the segments are well insulated from each other. However, if over-heating is due to high mica or a worn commutator, the latter should be trued on a lathe and the mica under-cut below the surface of the segments.

This can be done with a piece of broken hack-saw blade, if handled carefully. Insufficient lubrication sometimes allows the bearings to wear so that the armature core rubs against the field pole pieces, which results in scoring the core, and often produces sufficient heat to burn the windings. Brush holders of certain types sometimes shift and drag on the commutator, resulting in serious scoring, and even loosening of one or more of the segments. Pressure of auto-generator brush springs ranges from 12 to 16 oz. If the pressure exceeds this, friction of the brushes against the commutator will cause over-heating. On the other hand, if the pressure is insufficient, arcing between brushes and commutator will over-heat the latter.

In case of an over-heated generator, the winding may have been burned slightly,

without causing a short circuit. It is then possible to re-insulate the wire by applying several coats of shellac, allowing each coat to dry under fairly high heat conditions. If two bared wires touch each other, a repair can often be made by prying them apart and slipping a piece of insulating cloth between them and then applying a heavy coat of shellac to hold the cloth in place.

Shifting Gear on Flywheel Prevents Starter from Locking

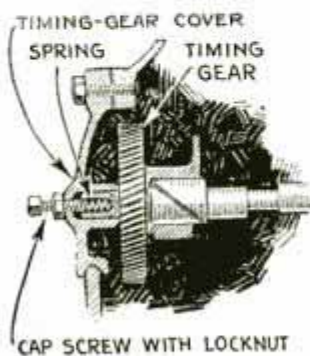


When the teeth on the flywheel of a car motor become worn so that the starter locks, one mechanic makes a repair by simply shifting the ring gear around the flywheel so that the starter

engages unworn teeth. He finds that this method works on practically all cars as the starter gear usually engages the flywheel in one of four, six or eight places, depending on the number of cylinders in the motor. This, of course, is due to the fact that the motor usually stops at the start of a compression stroke on one of the cylinders.—Edgar H. Luck, Orillia, Ont., Can.

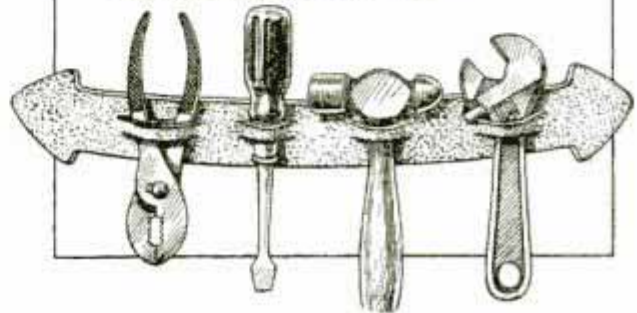
Eliminating Knock in Cam Shaft of Model-A Fords

Some model-A Fords have an idling knock caused by a warped timing gear, which moves the cam shaft back and forth as it rotates. To eliminate the knock, I tap



a hole in the timing-gear cover and insert a $\frac{7}{16}$ -in. cap screw so that it bears against the spring at the end of the shaft. A lock nut keeps the screw from turning.—J. L. Baker, Cooper, Tex.

When installing car fenders, put all the bolts in place before tightening any of them.



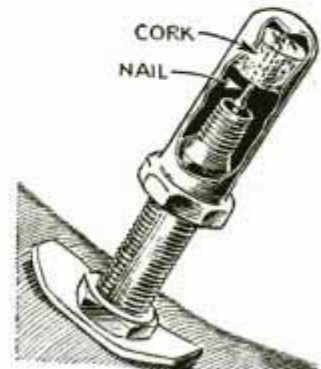
Shaped Like Arrowheads, Ends of This Tool Belt Readily Engage Loops on Your Trousers

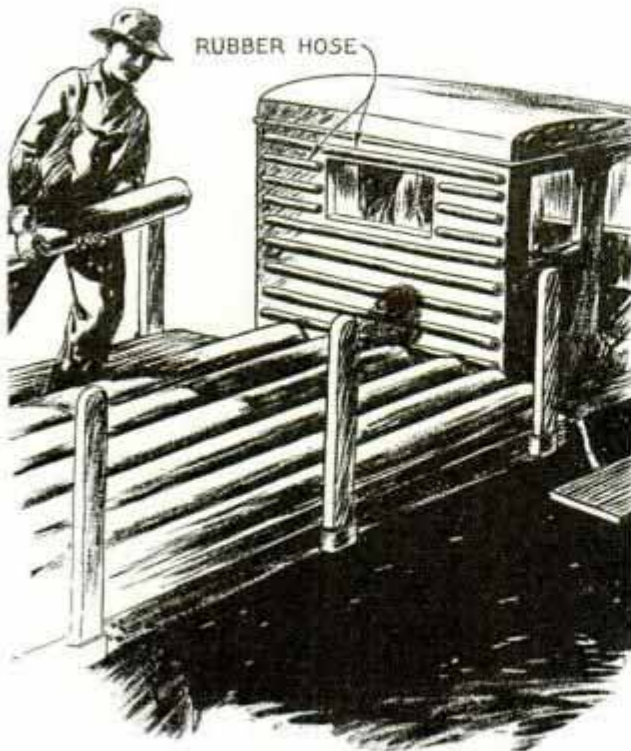
Tool Belt Is Quickly Attached or Removed

Filling-station operators, garage mechanics, linemen and others who have occasion to don a tool belt hastily for small jobs, will find this one easy to attach or remove. A leather strap is slit at intervals to provide loops for the tools, and the ends are cut to the shape of arrowheads for easy insertion through the belt loops on your trousers.

Altered Valve-Stem Cap Deflates Tire

An auto mechanic who does tire repairing has found this deflater highly satisfactory. It is merely an old valve cap fitted with a cork in which a nail is driven to depress the valve when the cap is screwed onto the stem. A small hole in one side of the cap lets the air escape.





Nailed to a Truck Cab, Pieces of Garden Hose Protect It against Damage from the Load

Pieces of Garden Hose Protect Back of Truck Cab

To protect the back of his truck cab, one owner recommends using pieces of old garden hose. These are spaced about 6 in. and nailed or bolted horizontally to the back of the cab as shown. The hose cushions the back of the cab so that when any part of the load jams against it, the cab is not broken or cracked.

Screw Eyes Serve as Terminals on Spark-Plug Cables

Emergency terminals for spark-plug cables on marine, auto, or motorcycle motors may be made from small brass screw eyes.



These are merely screwed into the ends of the wires where they will hold securely.—C. E. Packer, Chicago.

Drop-Center Rims Cause Punctures

Mysterious punctures which often occur in inner tubes on drop-center rims are sometimes due to a defect in the rim itself. This type of puncture is generally caused by shrinkage or displacement of the fabric strip that is cemented to the bottom of the

drop center which allows the tube to be pinched between the strip and rim, or to make direct contact with rust along the side of the strip. A permanent remedy can only be had by replacing the damaged fabric strip with a new one.

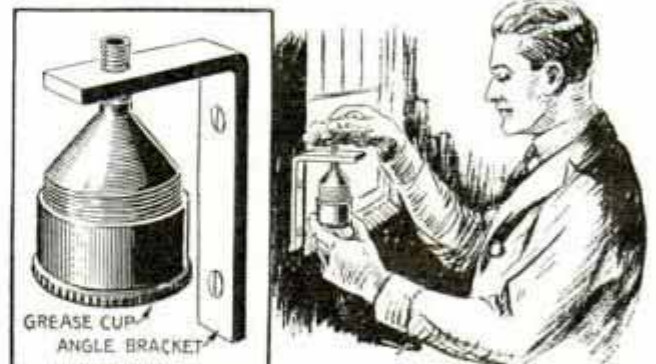
Small Tools Carried on Radiator Tie Rod

Small tools that are used frequently around the car are most conveniently carried in a small tool kit fastened to one of the radiator tie rods. The kit should have a large flap, which is folded over the rod where it is held with three or four strong snap fasteners of the kind used on auto curtains. In this way, it is unnecessary to disturb the passengers to get a small wrench, screwdriver or a pair of pliers.—W. Waldemar, Millbrae, Calif.



Prussian-Blue Dispenser for Mechanics

Mounted on the wall near a workbench, a large grease cup will be found handy in a garage or shop for dispensing prussian blue. The threaded end of the cup is screwed into a tapped hole in an angle bracket, which is in turn screwed to the wall.



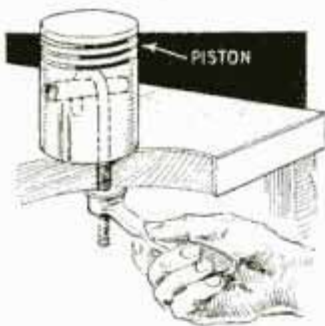
Large Grease Cup Mounted on Garage Wall Serves as Dispenser for Prussian Blue

Installing Cylinder-Head Gaskets

Considerable time and labor can be saved when installing new cylinder-head gaskets on Chevrolet cars if two men are

put on the job. First remove the spark plugs, push-rod cover and both rocker-arm shafts. Then pull the rocker oil line down through the head and take out all the push rods, placing them in order so that they can be put back on the same tappets from which they were removed. Next remove all the cylinder-head bolts and then have one man raise the left side of the head. A couple of screwdrivers will serve as handles for this purpose. The other worker raises the right side of the head by means of a heavy punch which is inserted in the No. 4 spark-plug hole. He then removes the old gasket with one hand and pushes the new one in place with the other hand. Re-assembling the head and tightening the bolts completes the job.—J. L. Baker, Cooper, Tex.

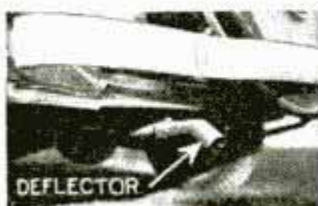
Simple Tool Holds Pistons to Install New Rings



Here is a cheap, efficient clamp to hold pistons when installing new rings. It is an iron rod threaded at one end for a nut and bent to form a hook at the other end. In use, the hooked end is slipped over the wrist pin, after which the rod is inserted into a hole in the workbench top and the nut tightened, using a washer to prevent the nut from biting into the wood.

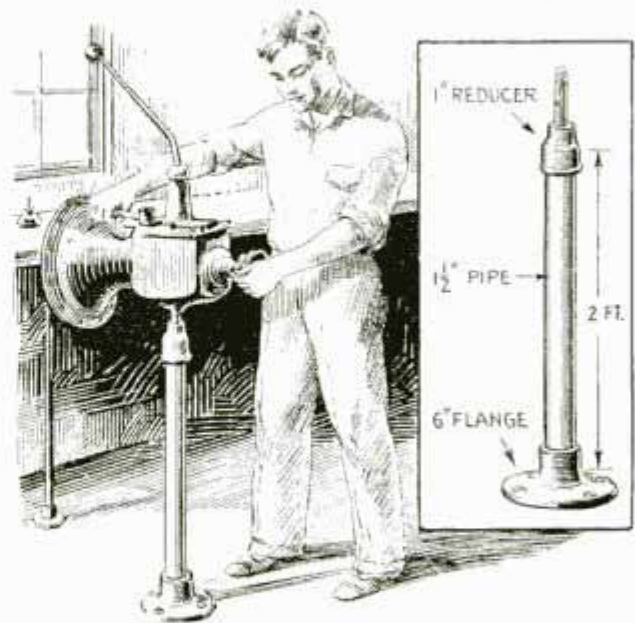
Deflector for Chevrolet Exhaust Pipe

To prevent the rear part of the body on my late-model Chevrolet from being sprayed with soot and grease from the exhaust pipe, which is turned upward slightly at the end, I clamped a tin deflector to the end of the pipe. The lower half of the deflector is cut out so that there is no tendency to clog



the exhaust pipe.—Colin Kerr Cameron, Sunnyside, L. I., New York.

Transmission Stand Made of Pipe

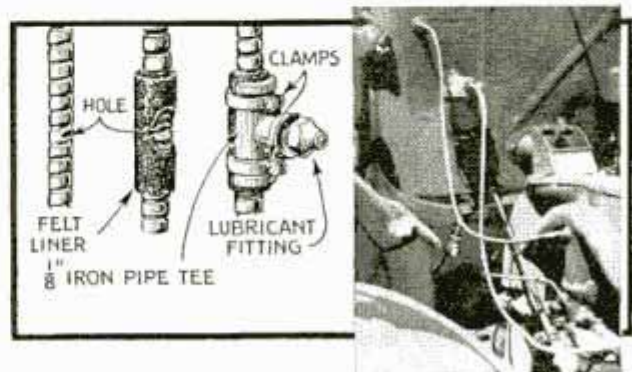


Assembled from Pipe and Fittings, This Stand Simplifies Auto-Transmission Work

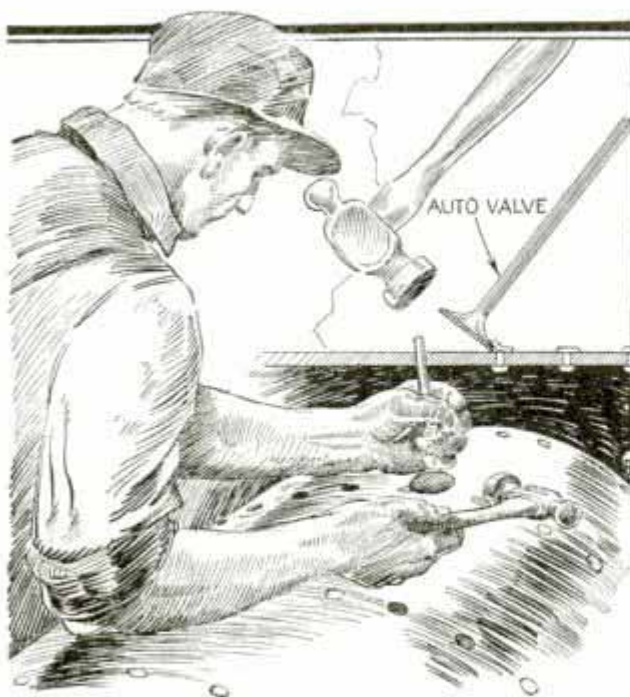
Here is a stand that will take almost all transmissions. It is merely a length of pipe fitted at the lower end with a floor flange, and at the upper end with a reducer to take a short 1-in. pipe nipple, which is threaded to screw into the drain hole in the transmission. The stand is fastened to the floor with lag screws or expansion bolts.—James W. Clift, Columbus, O.

Improvised Attachment Lubricates Speedometer Cable

One car owner has found that an efficient method of lubricating a speedometer cable is to use a split pipe tee, which is provided with a lubricant fitting as shown. The tee is clamped over a small hole filed in the speedometer cable, using a felt liner or sleeve as a seal between the cable and tee. Light grease that contains graphite is recommended for lubricating the cable.



Speedometer Cable Greased with Attachment Which Is a Pipe Tee Provided with a Lubricant Fitting



Old Auto Valve Will Be Found an Efficient Rivet Cutter When a Cold Chisel Is Unavailable

Auto Valve Used to Cut Rivets

Used in the manner indicated, an old valve from a car motor will serve efficiently as a rivet cutter when a cold chisel is not at hand. The metal in these valves is hard and can be used to remove many rivets before the cutting edge becomes dull.

Adhesive That Sticks Celluloid to Metal or Wood

A strong adhesive for fastening celluloid to wood or metal is made by dissolving shellac, 2 oz., in denatured alcohol, 4 oz., and adding spirits of camphor, 3 oz., after which the mixture is allowed to stand overnight in a tightly closed container. If all of the shellac has not been dissolved, the mixture should be cautiously warmed over a water bath away from an open flame while stirring.

The Next Issue

PLASTER NOVELTIES CAST IN FLEXIBLE MOLDS

It's fascinating pastime to cast plaster novelties in flexible molds. Many useful and ornamental articles, such as book ends, wall plaques, flower holders, ash trays, etc., can be made in this way. The technique is easily mastered and the items, finished in attractive colors, can be sold at a handsome profit.

MIRROR FRAMES IN TRUE COLONIAL STYLE

You can make a copy of the mirror that once hung in Longfellow's Wayside Inn. Other styles, including Chippendale and Queen Anne designs, also shown.

STAGE SETS FOR AMATEUR PLAYS

Simplified construction of stage sets for amateur theatrical productions. The equipment described was used in high schools of Pasadena, Calif.

REGRINDING MILLING CUTTERS

Milling-cutter teeth can be re-sharpened without annealing—a process which is being successfully used in a number of large American manufacturing plants.

A RECORDING THERMOMETER

How uniform is the temperature in your home? A recording thermometer gives an accurate record of temperature variations over twelve-hour periods.

HOW TO USE HANDSAWS

Expert describes the tricks of using your handsaw in order to make accurate cuts efficiently, and what kind of saws to use on certain types of work.



Riding the PONY EXPRESS!

HARD riders — those men of the pony express. Urging foam-flecked ponies over winding trails. "Make time" — was the watchword of those daring men of other days. And "make time" is the slogan of Harley-Davidson riders today. Their tireless mounts need no urging. A twist of the throttle—and the new '35 Harley-Davidson takes you whizzing along the trail hour after hour. It's got what it takes for thrill-riding. Plenty of get-away — speed — stamina — and high-stepping style. No need longing to own one. Ask your Harley-Davidson dealer about his Easy-Pay Plans. Then have your Harley-Davidson NOW — when you want it most!



1935 HARLEY-DAVIDSON

Mail this Coupon

Harley-Davidson Motor Co., Dept. P., Milwaukee, Wis.
Interested in new 1935 Harley-Davidson.
Send illustrated literature. Enclosing
postage stamp to cover mailing cost.

Name _____

Address _____

My age is () 16-19 years, () 20-30 years, () 31 years
and up, () under 16 years. Check your age group.

UNRULY HAIR

*-Now Neatly
Combed*

**Costs but a few
cents to use—**

IS YOUR HAIR difficult to keep in place? Does it lack natural gloss and lustre?

It is very easy to give your hair that rich, glossy and orderly appearance so essential to well-groomed boys. Just rub a little Glostora through your hair once or twice a week—or after shampooing, and your hair will then stay, each day, just as you comb it.

Glostora softens the hair and makes it pliable. Then, even stubborn hair will stay in place of its own accord.

It gives your hair that natural, rich, well-groomed effect, instead of leaving it stiff and artificial looking as waxy pastes and creams do.

Glostora also keeps the scalp soft, and the hair healthy by restoring the natural oils from which the hair derives its health, life, gloss and lustre.

A bottle lasts for months

Try it!—See how easy it is to keep your hair combed—any style you like—whether parted on the side, in the center, or brushed straight back.

A bottle of Glostora can be bought for a trifle at any drug store and will last for months.



Glostora
FOR THE HAIR



HOW TO CHAT OVER A LIGHT BEAM

(Continued from page 423)

of the magnetic variety as the speaker is replaced by an ordinary head phone with a specially prepared diaphragm for modulating the light beam. The hard-rubber cap is removed from the head phone, and the center is cut away as shown in the sketch. The metal diaphragm is slipped off and taken to any plating firm to be finished in the same manner as an auto head-light reflector. The completed unit is assembled in the wooden frame as shown in the photo. A 32-candle-power auto head-lamp is mounted on a separate block of wood placed about 1½ in. from the silvered diaphragm and should be movable for proper focus.

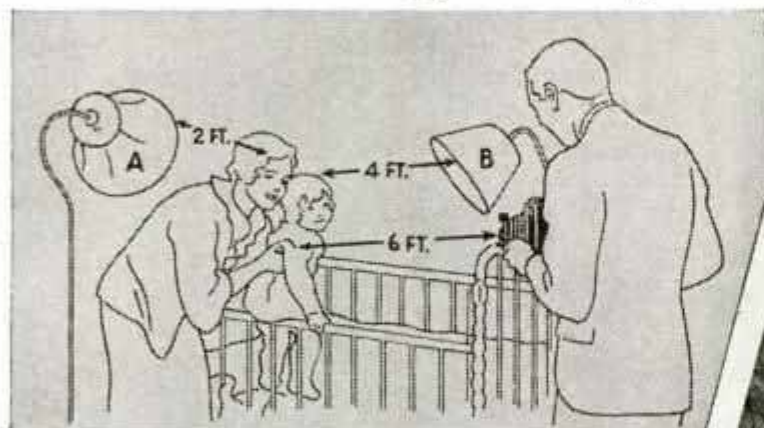
A 3½-in. lens, or reading glass, is mounted in the opposite end of the case which is about 12 in. long. Removable sides can be used on the case if desired. The lamp should be placed in a position so as to reflect the light from the silvered diaphragm to the lens. Practice focusing to obtain a small bright spot of light on a near-by wall. It is also a good plan to have the lens movable, so that it can be adjusted back and forth, as well as the lamp.

The receiving station consists of a caesium-type photo cell, (good cells are advertised as low as \$3.00) a 3-stage audio amplifier and an inexpensive magnetic speaker. Both schematic and simplified diagrams are given for this amplifier, also the necessary battery hook-up. The parts can be assembled on a small breadboard or on a metal base, 2¼ in. high, 8 in. wide and 10½ in. long, as shown in the photo at upper right. The photo-cell, and its socket, are housed in a metal box to exclude light from sources other than the beam from the sending station. A ⅜-in. hole is drilled in the hinged front of this shield directly on a line with the photo-cell. Any unnecessary light on the cell cuts down the efficiency of reception. The metal shield box is 4¼ in. square and 6 in. high. A complete list of materials and additional construction data may be obtained upon application, without charge.

When both units are ready for operation, the photo-cell is placed in the modulated light beam for preliminary tests. At a distance of 1,000 feet it is necessary to use a lens at the receiving station to con-

(Continued to page 120A)

Here's a snapshot you can make *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.



ALL YOU 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¢.



KODAFLECTOR — Inexpensive, efficient . . . makes 2 Photoflood bulbs do the work of 9. Complete with stand, reflectors and cord, \$5.



KODAK VOLLEDDA (*f.3.5*)

—a fine miniature camera. Takes sixteen 13/16 x 1 9/16 in. pictures on a roll of "vest pocket" film. Eight-speed Compur shutter . . . *f.3.5* lens . . . eye-level finder. Ideal for snapshots at night. Price—\$33.50.

ONLY EASTMAN MAKES THE KODAK

HOW much happens after sundown that would make treasured pictures. Now you can get them—easily—as so many others are doing. You can take snapshots indoors, at NIGHT.

Just use any camera with an *f.6.3* (or faster) lens, loaded with Kodak Super Sensitive Panchromatic Film. This high-speed "SS" Film is three times as fast as Verichrome, six times as fast as ordinary film, under artificial light. Two or three Mazda Photoflood bulbs give ample light.

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.*


FREE . . . BOOK

Here's a book you'll want in your library. Complete details about indoor pictures with Photoflood and Photoflash bulbs. Tells you how to make outdoor night pictures of lightning, lighted buildings, fireworks. How to make moonlight photos. Write to the Eastman Kodak Company, Rochester, N. Y.



Name _____
Address _____
City _____ State _____


The
"ELECTRIC EYE"
says:

THIS  MAZDA LAMP
 IS A real BARGAIN
 FOR 20¢

MAZDA
 30 WATTS

Only through elaborate and expensive tests of thousands of lamps can lamp quality be accurately determined. Such tests show that there is a wide difference in light output between a good lamp and one of inferior make—often as much as 30 per cent. Since two lamps of equal wattage use exactly the same amount of current, why take chances with unknown lamps which may fail to produce all the light they should?



The poorly-made "bargain" lamp is no bargain, says the "electric eye." A lamp is only a bargain to this marvelous instrument when it delivers ALL the light it should for the current it consumes. General Electric MAZDA lamps do just that! You don't need the electric eye to see it or to be sure that you are getting a real bargain in light. Just look for the famous General Electric monogram . General Electric Co., Nela Park, Cleveland, Ohio.

25-40-60-watt MAZDA lamps are 20 cents.

The 100-watt size only 25 cents.

GENERAL  ELECTRIC
MAZDA LAMPS

BREAKING THEM UP TO MAKE THEM BETTER

(Continued from Roto Section)

01277
 research. Motorists want to know what will happen to a person in a car if it turns over at high speed. I show them to the best of my ability. I am a dare-devil, but I don't take any more chances with my life than I have to. I wear the football helmet and I strap myself in the car. I drive cars with all-steel bodies.

Since I entered the strange topsy-turvy profession of thrill-making, motorists often have asked me how I turn over automobiles. I never can understand why they want to know because I know they certainly don't intend to try it.

Contrary to general belief, it is very difficult to turn over a modern automobile. Modern cars have low centers of gravity. They are constructed to hold the road. The engineers are improving them every year—making my job more difficult. I turn over a car by driving it at a high rate of speed and then swerving the wheel to throw the car off balance. This is difficult to do, even at seventy miles an hour. On several occasions, I have tried as many as three times before succeeding in turning over.

I'd much rather tell motorists how to keep their cars running upright than tell them how to turn the cars over. It's easier. I've learned a lot about skidding autos.

Here's my advice to you, as one who has survived hundreds of handmade accidents:

First—Never drive over fifty miles an hour. You don't have to speed these days to get where you are going. You can almost average the speed you travel on today's good roads.

Second—If you must travel over fifty miles an hour, hold your steering wheel with a firm grip. Never take your eyes off the road, even for a fraction of a second. At sixty miles an hour your car occupies 263 feet of roadway each second. Keep that in mind.

Third—If your car ever starts skidding, either on a slippery pavement or in loose gravel, forget that you have any brakes. Step on the accelerator. Let your car pull itself out of the skid. Then, apply the brakes and slow down.

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

\$75
less
motor drive

For the New South Bend

9" x 3' "Workshop" Lathe

BACK-GEARED, SCREW CUTTING, METAL WORKING



Operates
from
Lamp
Socket
for 2c
per hour

on Easy Payment Terms

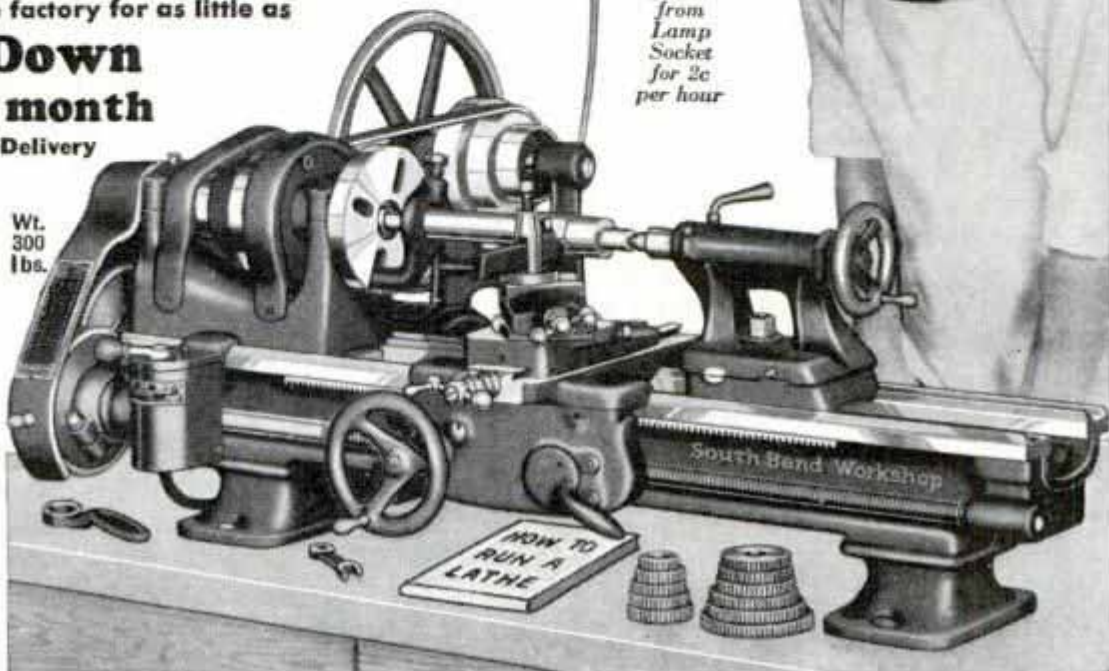
You can buy this South Bend Lathe
Direct from the factory for as little as

\$19 Down
\$6.50 a month

Immediate Delivery

THE new 9 1/2" swing by 3' bed "Workshop" Bench Lathe turns, faces, bores, cuts threads and performs all kinds of machining operations on cast iron, steel, all soft metals, wood, compositions and other materials. Has the power to reduce the diameter of a steel shaft 1/2" in one cut. Takes 18" between centers; weighs 300 lbs. Constructed entirely of cast iron and steel. It is a rigid, powerful, accurate, modern lathe.

Wt.
300
lbs.



FEATURES include back-geared head-stock with six spindle speeds; cuts threads 4 to 40 per inch; has automatic longitudinal feed to carriage as fine as 350 per inch; graduated compound rest; 3/4-inch hole through spindle; three V-ways, one flat-way on bed; all gears machine-cut of steel and cast iron. It is a genuine South Bend Lathe, accurately built and recommended for the most accurate work. Satisfaction guaranteed or your money back.

PRICE of \$75 includes bench lathe complete, as illustrated, but does not include motor drive. Price with motor drive, including 1/4 H.P. reversing motor and drum reversing switch as shown \$94. Other bed lengths 3 1/2', 4' and 4 1/2' in Bench type and Floor Leg type, countershaft and motor drive at similar low prices.

USED by manufacturing plants, machine shops, government laboratories, schools and home shops. Used in Automotive service shops for armature work, valve re-facing, machining pistons, making bushings, etc.

SEND in your order now with down payment for 30-day trial in your own shop. Lathe is shipped immediately on receipt of down payment. Small monthly payments will take care of the balance.

Free Bulletin on "Workshop" Lathe



Get a copy of this valuable and instructive 32-page catalog illustrating, describing and pricing the 9" "Workshop" Lathe and all its accessories and attachments. If interested in a larger lathe, also ask for General Catalog No. 94. Mailed free post-paid, to any address.

NRA SOUTH BEND LATHE WORKS
603 East Madison St., South Bend, Ind., U. S. A.

Lathe Builders Since 1906—Users in 97 Countries

9 1/2" swing x 3' bed "Workshop" Bench Lathe with Horizontal Motor Drive **\$94.00**
Complete with reversing motor and reversing switch as shown. Wt. 300 lbs.
\$24.00 Down, Balance \$7.00 a Month, Immediate Delivery.

LARGER SIZE LATHES 9" TO 18" SWING

South Bend Back-Geared, Screw Cutting Precision Lathes are built in ninety-six other sizes and types from 9-inch to 18-inch swing with Countershaft Drive and individual motor drive. Price range \$140 to \$1500. Prices of a few of the popular size lathes are listed below. Other sizes and bed lengths can also be supplied. If interested write for General Catalog No. 94—mailed postpaid to any address.

Popular Size Standard Change Gear Lathes	Mtr. Dr. Wt.Lbs. Crated	COUNTERSHAFT DR.			MOTOR DRIVE		
		Cash Price	Down Mnth. Pay't	Mnth. Pay't	Cash Price	Down Mnth. Pay't	Mnth. Pay't
18" x 10' Lathe	3300	\$689	\$135	\$37	\$879	\$175	\$45
16" x 6' Lathe	2195	480	100	29	622	125	34
16" x 8' Lathe	2355	520	108	31	662	135	37
15" x 6' Lathe	1975	430	90	26	570	115	34
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	300	60	20	393	80	26
11" x 5' Lathe	975	312	65	22	405	90	26
9" x 3' Lathe	461	225	45	16	244	50	17
9" x 4' Lathe	511	245	50	17	264	55	19
9" x 3' Junior	416	170	35	12	188	40	13
9" x 3' Toolmaker	340	140	31	9	158	35	12

SOUTH BEND LATHE WORKS
603 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 (free)

How to Run a Lathe (160 Pages) (25c)

Name.....

Address.....

City.....State.....

BREATHING LIFE INTO CARTOON CHARACTERS

D1318
(Continued from page 389)

Walt Disney, creator of Mickey Mouse and the Silly Symphonies, hands a mimeographed draft of the idea for a cartoon to every member of his staff at a gag meeting. At the next meeting, such gags and situations as each individual may have worked out for that story are handed in. These are given to the story department and a scenario is evolved.

Then the director, music conductor and set designer, or "layout man," get together. The layout man prepares rough sketches of the various scenes to serve as a guide for the general atmosphere and action. From these the backgrounds are sketched, and the finished backgrounds prepared. Such portions as will later be occupied by the animated figures are left subdued.

After the story has been mapped on a layout sheet, where each scene is allotted a certain number of feet, a production schedule is prepared and the scenes are given identifying numbers. The exposure sheet breaks the scenes down into terms of frames. On this, every frame is marked to indicate the exact sound and action it will carry. The music conductor's master sheet carries the same information.

Now the animator makes his progressive drawings, numbering them in the order in which they are to be photographed, and recording them on the exposure sheet as they are completed. He makes the drawings of the extreme action only, to serve as a guide to his assistant who makes the in-between drawings. Then the drawings go to apprentices, who fill in details. It takes about 15,000 of these drawings for the average short movie cartoon, 600 to 700 feet in length.

The drawings are traced in India ink into celluloid sheets seven by nine inches. The registering holes in these cells and those in the animator's drawings are placed together over registering pegs so the tracing, and the later position of the animated figure in respect to the background, will be accurate. After the tracing is completed, the cell is reversed and the figure is given a backing of opaque paint.

When all the cells are ready, they go to the photographer. The background drawing is placed first in the frame. Then the cells, each carrying one character, are laid

down in place on registering pegs. Compressed air clamps a glass tightly over the cells, the lens shutter clicks, and the photographer is ready for the next set. Fifty feet of film, or 800 frames, is a good day's work. Nearly twice that many feet of sound track can be recorded in one minute.

When over 10,000 frames have been photographed, and the three-ply sound track has been made, put together, and added, a picture that will take just seven minutes of screen time is ready for you.

HOBBIES OF THE HOLLYWOOD STARS

(Continued from page 374)

that he makes at his own forge. Lionel Barrymore makes copper etchings. Nils Asther repairs antique furniture, and Roger Pryor builds and experiments with musical instruments.

Star-gazing is the part-time hobby of some of the stars and among the serious students of astronomy is Lew Ayres, who owns two refracting telescopes. Rod La Rocque has constructed a six-inch reflecting telescope with an equatorial mounting.

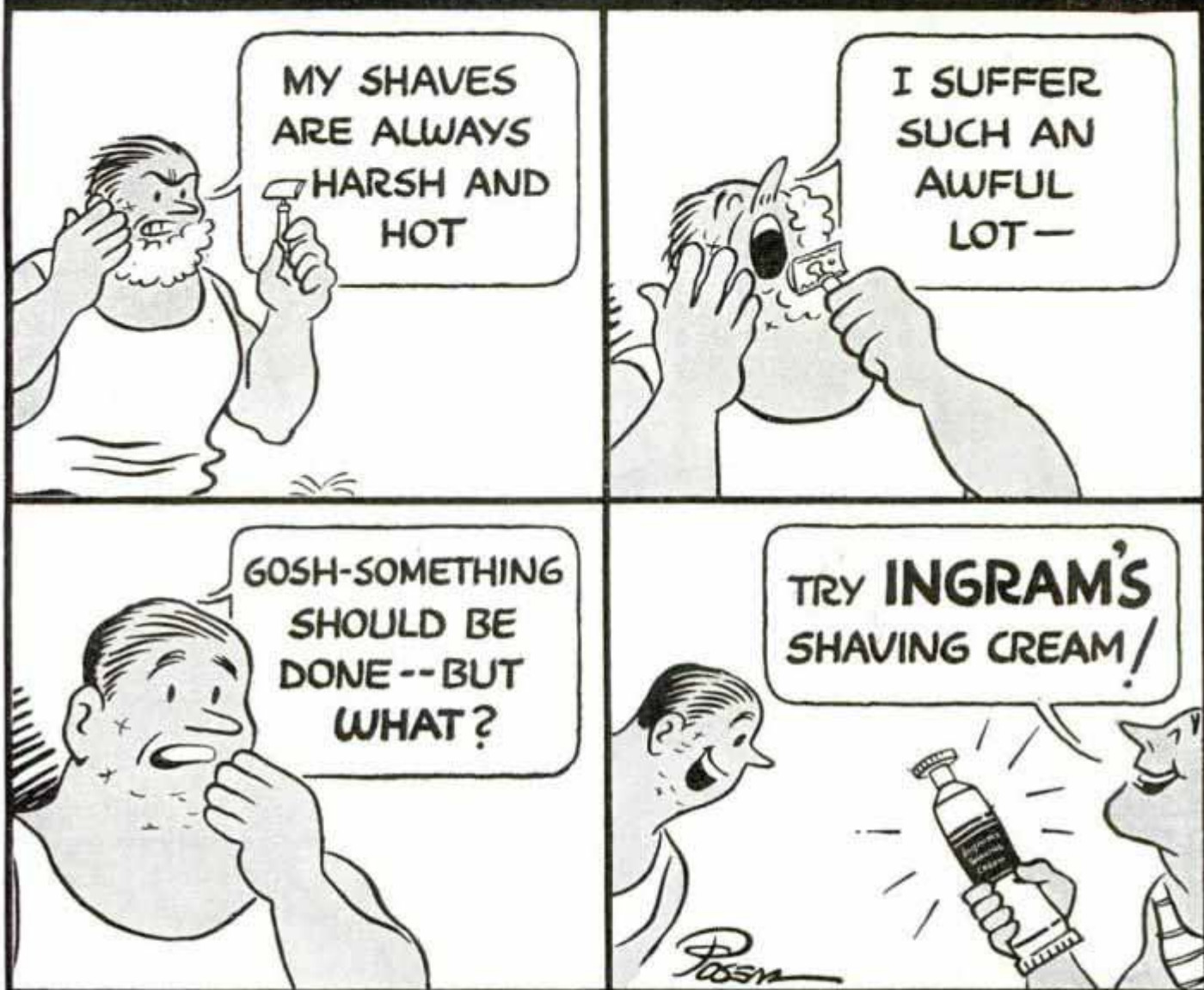
Gary Cooper is an amateur taxidermist and helped mount some of the heads that he brought back from an African hunting trip. Cooper also makes feathered Indian war bonnets in his spare time. Cecil B. De Mille collects old armor, weapons, and guns as a hobby, and Clark Gable, whose hobby is shooting, is an expert gunsmith. Richard Cromwell makes life masks of his friends, and Bing Crosby and Dick Arlen are short-wave radio "hams."

Stamp collecting is the hobby of some of the picture players, including Robert Graves, who specializes in United States issues, and Carl Laemmle, Jr., and Jean Hersholt. Gene Fowler, the writer, specializes in air-mail issues.

Like many of the stars, Wallace Beery flies his own plane. He is the dean of Hollywood pilots, having a transport license and more than 3,000 hours in the air. Johnny Weismuller is working over an outboard speed boat that he expects to race next season.

Sir Guy Standing makes a hobby of naval architecture and has designed several racing hulls. John Barrymore, James Cagney, Lee Tracy, and Warren William, among others, are experienced sailors and have yachts of their own.

ENJOY THE WORLD'S COOLEST SHAVE



Oddly enough, some men still believe they must pay for a quick, close shave with a burning, stinging face. But—they haven't tried Ingram's!

Ingram's Shaving Cream makes every shave cool and comfortable. It wilts whiskers quickly,

and at the same time soothes and tones the skin. No need for a lotion—your face feels fine without it.

Next time, lather-up with Ingram's Shaving Cream and get a shave you'll *actually* enjoy!



Ingram's

SHAVING CREAM

TUBE OR JAR

BRISTOL-MYERS CO., Dept. E-2
110 Washington St., New York, N.Y.
You bet I want cool shaves! Send a 10-shave tube of Ingram's, free.

Name _____

Street _____

City _____ State _____

TRY THE
WORLD'S COOLEST
SHAVE

When writing to advertisers please mention Popular Mechanics

Why is a newly-painted fence like EVEREADY FLASHLIGHT BATTERIES?

Because both have "signs" to show THEY'RE FRESH!

LOOK FOR THE "DATE-LINE!"

Batteries are apt to "go dead" on dealers' shelves—but the "Date-Line" guarantees the FRESHNESS of all Eveready Batteries. Fresh batteries give long, dependable service... National Carbon Co., Inc., New York, N. Y.

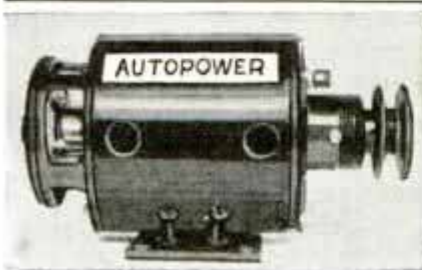
EVEREADY
TRADE MARK
EXTRA LONG LIFE BATTERY
NATIONAL CARBON CO., Inc.
MADE IN U. S. A.

BURN YOUR NAME ON TOOLS WITH THE ARKOGRAF

PROTECT YOUR TOOLS FROM THEFT
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.
Complete Outfit \$3.50 — Prepaid Anywhere
Interesting illustrated circular free. Write today. Agents wanted.
ARKOGRAF PEN CO., 3927 S. E. Stark St., Portland, Ore.

NEON SIGNS WHY? HOW?

Big Opportunity in the Neon Sign business! Learn all the hows and whys in this complete practical home-study course. FIVE PARTS—199 large size pages, over 150 illustrations. Covers all branches: Glassblowing—Transformers and Circuits—Vacuum Pumps—Service Work—EVERYTHING! Never before obtainable at any price—now yours at a cost absurdly low. Generous-paying Neon business needs more trained men right away! Learn it in this complete, untechnical course—**ONLY \$4.95**, postpaid to your door! Send Now! Don't lose out by waiting. Mail check, express or postal money order—**TODAY!**
COMMERCIALITE LABORATORIES, Dept. 47, Omaha, Nebr.



TURN SCRAP INTO MONEY

The new and revised edition of "Auto Power" with all the ten original specifications and ten new ones is now off the press. Convert old generators into A. C. and D. C. generators and motors with voltages of 6 to 400 volts, for power, light, welding, and radio operation. Create new generators adaptable for home, automobiles, or trucks. They can be driven by fan belt, wind, or water. This book, with complete illustrations, tells you how easily and economically these changes can be made. Also instructions for rewinding auto armatures, 350 definitions of electrical terms, etc. Already used and endorsed by thousands. Price, only \$1. **AUTO POWER, Dept. B, 410 S. Hoyne Ave., Chicago**





Oilstones win skating races

HOCKEY PLAYERS and champion speed skaters use India *Oilstones* for taking the burr off newly ground skates. Exhibition rink performers are able to leap, dance and gyrate because they, too, keep their fine steel blades very sharp and true with an *oilstone*.

A famous mechanical engineer once said: "Reputations for skill are made only by workmen who know the fine points about sharpening the tools they use." All fine craftsmen take special pride in fast, easy-cutting hand tools—kept keen with their bench *oilstones*. Drills, reamers and other metal cutting tools need less regrinding and last much longer when *oilstoned*.

A FREE BOOK

"How to Sharpen" is packed with practical facts. It tells why the "India" (electric furnace abrasive), why the rare Arkansas quarried oilstones are used—and how to care for them, too. Thousands of readers of POPULAR MECHANICS sent for this book during the last few months.

NORTON  *Established 1823*
Use what Experts use **PIKE Products**

BEHR-MANNING CORP., U. S. Sales Representatives
Dept. E, Troy, N. Y.

Send me free, Norton Pike Book, "How to Sharpen."

Name.....

Address.....

SECRETS OF THE LOST MINES

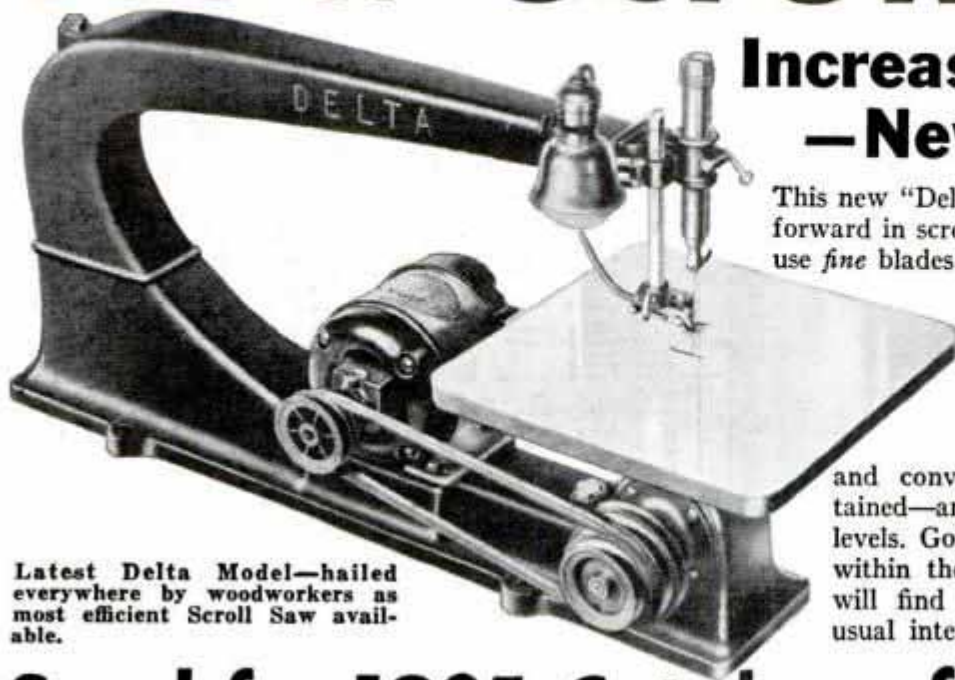
(Continued from page 395)

1415
somewhere in the Colorado desert of California. One legend has it that "Pegleg" Smith, a one-legged prospector, found an outcropping of dark crumbling quartz on the top of three small buttes within sight of a tall mountain that has a spring of clear water at its base. That was undoubtedly a story told by Smith to keep others away, for no such buttes have been found. Smith made trip after trip to his mine, always shaking off pursuit, and always returning to San Bernardino with a load of virtually pure gold. Finally he disappeared and later his body was found stretched out in the sand, one hand clutching a sack that contained fifty pounds of rich ore. The finder emptied the sack of half its load and carried it with him, but when he reached San Bernardino he was so exhausted that he died before he was able to tell just where he had found Smith's body. The "Lost Pegleg" has been the goal of hundreds of prospectors.

Another lost mine that seems to have vanished into thin air is the "Superstition" somewhere on Superstition mountain near Phoenix. This was a large body of rich ore worked by a party under the command of Don Jose Peralta more than 100 years ago. After the miners had taken out a fortune they were massacred by Indians. Two boys were the only survivors and later they were found by a prospector wandering in the hills. The story goes that the boys took the prospector back to the mine and that he killed them in order that no one except himself should know its location. The new owner worked the mine for years and eventually died on a visit to a frontier town without telling its location. The "Lost Dutchman," also supposed to be on Superstition mountain, was named after an ex-soldier who disappeared after taking out one load of gold ore. This mine also has not been found and many believe that the "Lost Dutchman" and the "Superstition" are the same mine, the later prospector having discovered the same vein that had been worked by Peralta.

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

New Scroll Saw



Increased Efficiency —New Features

This new "Delta" Scroll Saw is another great step forward in scroll saw performance. Enables you to use *fine* blades at *full motor speed* without danger of breakage. Has many other novel and useful improvements. This year the Delta line of motor-driven woodworking tools is more complete than ever before. Delta standards of efficiency, quality, and convenience have been strictly maintained—and Delta prices still kept at their low levels. Good compact motor-driven tools are within the reach of all. Every woodworker will find the new 1935 Delta line of unusual interest.

Latest Delta Model—hailed everywhere by woodworkers as most efficient Scroll Saw available.

Send for 1935 Catalog of "Delta" Tools

The 1935 catalog of Delta quality motor-driven tools is now off the press. It is crowded with photographs and information about the new line of 1935 Delta tools. It shows how Delta tools are built to stand the grind of production work, and yet are so low priced as to be within the reach of all. Send coupon so your name will be placed on the mailing list to receive the 1935 Delta catalog without delay. Enclose only 10c at same time for Book of Practical Delta Projects, 32 pages of new and novel things to make with many blue prints, working drawings, photographs and illustrations—and complete directions.



Delta Manufacturing Co.
3775 N. Holton St., Dept. A335, Milwaukee, Wis

DELTA MANUFACTURING COMPANY
3775 N. Holton St., Milwaukee, Wis. Dept. A335

I enclose 10c (stamps or coin), for which please send me one copy of "Practical Delta Projects." Also place me on your mailing list to receive 1935 Delta catalog of quality motor-driven woodworking tools.

Name.....Age?.....

Address.....

City.....State.....

Check here if you are a Delta user now.

BE INDEPENDENT—Sell METLMACHES
The Modern Mach

THE 20TH CENTURY INVENTION THAT REVOLUTIONIZED THE MACH INDUSTRY. A REAL WATER, CHILD AND RAT PROOF SAFETY MACH MADE OF METAL. LIGHTS 1000 TIMES OR MORE.

SEND \$1 FOR 15 METLMACHES. SELL THEM FOR 10c EACH. MAKE 50% PROFIT.

IF INVESTED TODAY MAY MEAN YOUR FUTURE INDEPENDENCE. COMPETENT MEN WANTED.

EVERY DEALER A PROSPECTIVE CUSTOMER. SAMPLE AND SALESMAN'S TERMS 15 CENTS.

METALMATCH CORPORATION, DEPT. 115 WARSAW, ILLINOIS

COMPLETE ELECTRIC PLANTS

ONAN A.C. PLANTS furnish the same current as city service. Operate Radio, Water System, Refrigerator, all Appliances.

SIZES 300 WATTS UP

Have A.C. Current anywhere. Models \$100 and up. Easy to install. Available from stock. Ideal for farms, camps, lake homes and commercial purposes.

D. W. ONAN & SONS
942 Royalston Ave., Minneapolis, Minn.

PRINT—MAKE MONEY

printing letter and billheads, stationery, tickets, cards, circulars. **Start A Spare Time Business Of Your Own.** free instruction book, learn quickly, easily. **Printing Press, \$12.00**, new type, supplies. Send stamp for list. **EXCHANGE E1, 22 Orient Street, Meriden, Conn.**

WEAVING MATERIALS BAMBOO RATTAN
Reed, Colored Ruffia, China Grass, Chair Caning, Chair Frames and Stools, Basketry and Furniture Weaving. *Send 10c for Catalog. Instructions Free.* **AMERICAN REEDCRAFT CORPORATION**
Dept. P 130 Beekman Street New York, N. Y.

Pins 35¢ Rings 1.95

BIG CATALOG FREE Get Yours Today

CLASS PINS—any letters, any year, any colors, Silver plated, 1 to 11, 40c ea; gold plated, 50c ea; sterling, 60c ea. Silver plated, 12 or more 31c ea; gold plated, 45c ea; sterling, 60c ea. Sterling silver rings as shown, 1 to 11, \$1.90 ea; 12 or more \$1.65 ea.

Metal Arts Co., Inc., Factory 44, Rochester, N. Y.

Stoves AT FACTORY PRICES!

Sale Catalog—FREE

Over 200 Styles and Sizes of Stoves, Ranges, Furnaces at Factory Prices and Easy Terms—as little as 18c a day. More Bargains than in 20 Big Stores. New styles, new features, new colors. Year to Pay—30 days free trial—300 days approval test—24-hour shipments. Over 900,000 Satisfied Users. 35 Years in Business. Write for FREE Catalog.

Kalamazoo Stove Co., Mfrs.
391 Rochester Avenue
Kalamazoo, Michigan

"A Kalamazoo Direct to You"

When writing please mention Popular Mechanics

WOOD IN CANS SEALS CRACKS AROUND TUBS



Permanent — Waterproof

For sealing around pipes — permanently replacing loose tiles — repairing damaged toilet seats — loose towel racks, glass holders — 1001 other household uses.

Plastic Wood is the scientific marvel of the age — wood in putty form that dries to hard, permanent, waterproof wood.

It adheres to any clean, dry surface — wood, metal, glass, stone, porcelain — can be painted, varnished or lacquered — can be worked with any wood-working tools; can be planed, sawed, sanded, turned on a lathe — will hold screws and nails firmly — will not split or crumble. Get your can or tube at any hardware, paint or department store.



Plastic Wood also comes in white which is ideal for bathroom repairs.

FREE

Write The A. S. Boyle Co., Inc., 1934 Dana Ave., Cincinnati, O., Dept. PM-3 for booklet "200 Things to Do."

PLASTIC WOOD

"Athlete's Foot" INSTANT RELIEF

LUCKY TIGER ANTISEPTIC OINTMENT

Does the work and does it now. Get a jar today and prove it in Athlete's foot, Fire and Sun Burns, Itch, Cold Sores, Skin Irritations, Rash, etc. Generous sample Free upon request.

Lucky Tiger Mfg. Co., Kansas City, Mo.



METALS MORE COSTLY THAN JEWELS

D1423

(Continued from page 415)

mable, and often ignites in air of room temperature. Consequently, to obtain a mere thimbleful of uranium requires no end of delicate handling. Days of trying work are often spent in preliminary steps only to see the powder suddenly go up in smoke while attempting to press it into the pellet which later is heated electrically to form the ductile metal."

Foremost among the possible uses of rare metals is that of targets in X-ray tubes. Tungsten is responsible for the practical X-ray tube of today. The high melting point of tungsten has been responsible for this progress. However, the rare metals, uranium and thorium, promise more efficient X-ray tubes by virtue of their characteristics of producing a more intense beam of X-radiations.

Rare metals possess other life-saving possibilities in the field of ultra-violet radiation. They have an inherent characteristic of setting up a flow of electrons when subjected to radiant energy, both visible light and invisible ultra-violet. Each rare metal has its own peculiar "finger-print" sensitivity. Thus, in photo-electric cells, these rare metals make it possible to classify certain bands of the energy spectrum, "seeing" far beyond the range of the eye.

Research metallurgists devote their lives to their microscopes, attempting to discover the widest use of rare metals to promote longer life. These rare metals then, are extending the life expectancy, and helping man to weather adverse storms.

EYES OF THE AIR

(Continued from page 411)

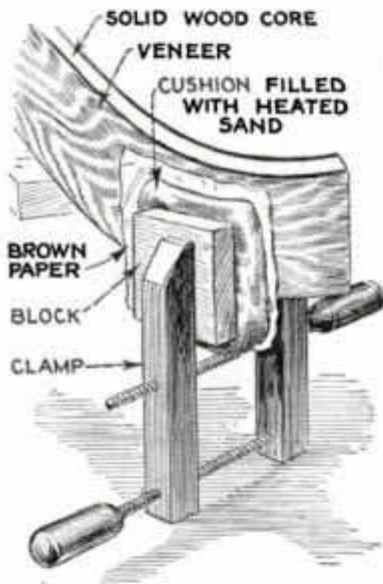
graph to put all the contours in a map of that mountain without actually surveying the mountain from land. In this manner Mr. Shippee secured scientific data of the Valley of Volcanoes in Peru in less than a month which he estimates it would take ten years for a land party enduring tremendous hardships to obtain.

During the past decade, science has developed the aerial camera to a high degree of efficiency. It had to reckon with a human factor whose visibility at 10,000 feet altitude was about 130 miles to the horizon

(Continued to page 129A)

Regluing Veneer on Curved Surfaces

A problem often met with by the home mechanic is that of refastening veneer which has been loosened as a result of water-soaking or drying of the glue. This occurs frequently on chair joints and seats, on curved dresser fronts and a variety of places where rare veneers are used. In factories, cauls or specially shaped forms are used, but these would take considerable time to make at home. The following method has been used with success: First loosen the veneer with a knife and scrape away the dust and old glue between the veneer and the solid wood or core. Then apply glue to both surfaces. Have ready some fine, clean sand that has been heated in a pan. Fold a quantity of the sand inside of a piece of heavy cloth or canvas to form a cushion. Put the cushion over the



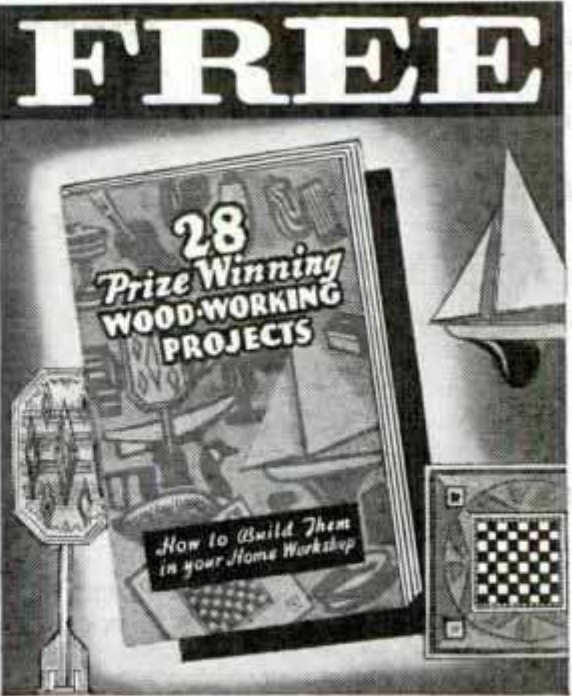
loose veneer with a piece of brown paper between them. Lay a block of wood over the cushion and clamp together, as indicated in the drawing. Under the pressure of the clamp the veneer will be held against the wood at all points. Allow

the glue to dry for 24 hours and then remove the cushion. Usually the paper sticks to the wood, but this can be removed with a cloth moistened in water.

Glue Spreader Made from Linoleum

Liquid glue can be spread evenly over a smooth surface with a tool, which is made by cutting shallow notches at $\frac{1}{2}$ -in. intervals along one edge of a piece of linoleum or stiff cardboard 6 or 8 in long. It is advisable to make the tool about 5 in. wide, so that the fingers will not come in contact with the glue.

☐ An inexpensive ladies' earring from a dime store makes a good clamp for holding tiny model parts while gluing them.



COUPON BELOW BRINGS YOU YOUR COPY OF THIS FASCINATING BOOK

From Coast to Coast, the cream of home workshop production. Packed between the covers of a book, the pick of the skill and ingenuity of people interested in wood working.

Yours to study...learn from...and duplicate. Yours, FREE...when you send in the coupon below.

The projects illustrated and explained in this new CASCO book, range from vases to portable camp refrigerators, and from wooden jewelry to smoking sets. Each one was actually made, not merely an idea. Every one is useful or decorative, and is put together to give a lifetime of service.

We think that giving away this book is a good way to introduce CASCO Glue. We know that once you see these articles...and realize how much of their permanence depends upon sticking together...you'll use this famous waterproof, heatproof, super-strength industrial glue, that is now available for home crafters.

FREE! Send for this free booklet today. Put your name and address on the coupon, and send it to the address below; or just write on a postcard: "Send me CASCO Project Book."



THE CASEIN MFG. CO. OF AMERICA, INC., Dept. 335
352 Madison Avenue, New York, N. Y.

Please send me Free copy of the new CASCO Project Book.

Name.....
Street.....
City..... State.....

Accept this Sensational 10 Day Trial Offer FREE Mail coupon for details

.... Send
No Money



Genuine Brand-NEW ROYAL PORTABLES

For the first time, you may obtain a genuine, new, latest model Royal Portable on 10 days free trial.

Lowest Prices and Monthly Terms

Unusual new sales plan places amazing convenience of the Royal Portable easily within reach of readers of this magazine. Try a Royal Portable at no expense to you. Even if you have never typed, you can use one *instantly*. If not pleased in every way, it may be returned without question.

Learn Touch Typing Royal's "Simple System of Touch Typewriting," prepared by expert instructors, will enable you to acquire professional typing speed and facility in spare time at home. "Astonishingly quick results."

FREE Typing Course . . . CARRYING CASE included in This Offer

This is Your Opportunity Business and Professional Men and Women, Students, Teachers, Parents! Be sure to sign and mail the coupon. This entails no obligation. Remember — Royals are the finest of portables — made and fully guaranteed by the world's largest organization devoted exclusively to the production of typewriters. Smooth, rhythmic action of an office typewriter. Will last a lifetime.

Act at once! Offer not guaranteed after March 15th

Royal Typewriter Company, Inc., Dept. PM-3
2 Park Avenue, New York City

Please send me complete information concerning Royal's special new sales plan on latest model Royal Portable Typewriters with details of 10-DAY TRIAL OFFER FREE.

NAME.....
STREET.....
CITY..... STATE.....

AGENTS...Smash Go Prices!

Santos Coffee, 12c. lb. 4-oz. Vanilla, 8 1/2c. \$1.00 size Tonic 14c
Razor blades 10 for 8 1/2c. 100 sticks Chewing Gum 12c. 150 other bargains. Experience unnecessary. Write
CARNATION COMPANY PO-2 ST. LOUIS, MO.



CREEK CHUB'S NEW BAIT BOOK

**TELLS HOW TO CATCH
MORE & BIGGER FISH**

Chock-full of helpful pointers and many fishing facts, this New Bait Book describes in detail how, when, where and why Creek Chub True-to-Nature Lures, such as the Famous Pickle Minnow and other Creek Chub Lures and Flies—not only Catch More and Bigger Fish—but also many World's Records! Beautifully illustrated. It's yours for the asking!

CREEK CHUB BAIT COMPANY
413 Randolph St. Garrett, Ind.

AIR TICKETS AROUND THE WORLD PLEASE!

(Continued from page 359)

D14R

northern cape of Hokeido, the main island of Japan. We had the airship safely under control in this turbulent atmosphere. She rode so smoothly that the passengers slept undisturbed, without even realizing what was going on."

Pan-American also has had opportunity to acquaint itself with weather conditions on the Atlantic side. For the past four years the company has maintained a regular air transport service across the Caribbean from North to South America. The weather experience and knowledge gained here is expected to be of service on the trans-Pacific route. The Post Office department is greatly interested in both the Pan-American and Eckener plan to supply the missing links of round-the-world air service for the United States.

From a commercial standpoint Dr. Eckener believes that dirigible service over the Atlantic can be made to pay although there is a deficit in operating the "Graf Zeppelin" between Germany and South America. The "Graf," however, would not come to the United States. In its stead would come the largest dirigible in the world, now building at Friedrichschafen, the "LX-129." This ship will have accommodations for fifty passengers and will be able to carry between 45,000 and 60,000 pounds of freight and mail, depending upon the time of the year.

The great trans-Pacific ships of the Pan-American are to be found duplicated in the "Brazilian Clipper," now plying the air above the Caribbean. Empty, the "Clipper" weighs 19,000 pounds. She has a carrying capacity equal to her weight. Her cruising speed is 160 miles per hour, her top speed 190 miles. She has a landing speed of sixty-five miles per hour, her range is 1,200 miles without refueling, her gasoline capacity is three and three-fourths tons. Her wing spread is 114 feet, two inches, her length sixty-eight feet, and she is capable of carrying thirty-five passengers, 2,000 pounds of baggage, mail and express.

Under the new trans-Atlantic service it will be possible for a California to London trip to be made in approximately two days time. Around-the-world service would possibly occupy another eleven days.

DIFFERENT!

The New
**AERO-BUILT
OUTBOARD MOTOR**

JOHNSON'S latest and greatest contribution to outboard motoring—embodying advanced features of aeronautical design—offering new compactness, easier portability, greater power, easy starting, flashy performance. It's the talk of the industry! Write for illustrated Handy Chart, describing this new Sea-Horse Aero-Built 300 and the 5 other great motors in the '35 Sea-Horse line. Just off the press.

FREE!

JOHNSON MOTOR CO., 400 Pershing Rd., WAUKEGAN, ILL.
Canadian Johnson Motor Co., Ltd., Peterboro, Canada

**JOHNSON
SEA-HORSES**

ENGINES

Enclosed,
Self Oiling, Roller Bearing

The sensation of the year, something new. Runs smooth as an electric motor. Low operating cost. Let this engine make money for you. Big illustrated Catalog Free.

ALL LIQUID FUELS

WITTE ENGINE WORKS
1743 OAKLAND AVE. KANSAS CITY, MO.

S AGENTS 500% PROFIT
GUARANTEED GOLD LEAF LETTERS
For Store fronts and office windows. Anyone can put them on. Free samples. Liberal offer to general agents.
METALLIC LETTER CO., 438 N. Clark St. Chicago

FUN! BIG PAY EASY for YOU

WITH an easy-playing, sweet-toned Buescher you play tunes right away. Be a social "hit," win new friends; popularity; increased income. Opportunities for good-pay jobs. You can qualify quickly.

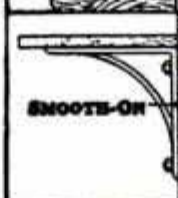
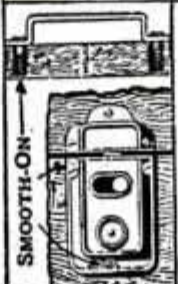
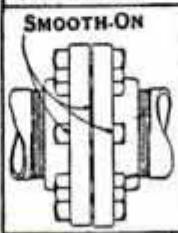
FREE on trial, any Buescher instrument. Write now for details and handsome Free Book. Mention instrument: saxophone, cornet, trombone, etc.

BUESCHER
BAND INSTRUMENT CO.
310 BUESCHER BUILDING
ELKHART INDIANA

YOU NEED THIS FREE HOME REPAIR BOOKLET



Contains diagrams and simple instructions for emergency and routine repairs that every home and auto owner can and should make himself. Revised edition, greatly enlarged and completely rewritten. Get a copy for your workshop.



Be thrifty—do your own work—and keep the money otherwise paid to plumbers, repair men and for new parts.

With Smooth-On No. 1, you can stop leaks at joints, seams and cracks in pipes, boilers, heating systems, tanks, pails, auto radiators, water jackets and crank cases, tighten loose parts, reset stripped screws, bolts and nuts, and make dozens of other equally practical repairs—all at almost no cost, and in emergencies without the delay of waiting for outside help.

Smooth-On No. 1 is applied without heat or special tools, hardens into metallic iron and holds permanently under any pressure and on any metal, masonry, wood and tile. Leading power and industrial plants have used it for 35 years, and with this new booklet as a guide, you can make equally successful applications.

When you know where and how to apply Smooth-On No. 1, you will make constant savings. Be prepared. Ask us for the booklet and buy Smooth-On No. 1 in 7-oz., 1-lb. or 5-lb. can from your hardware store.



Do it with SMOOTH-ON

SMOOTH-ON MFG. CO., Dept. 37
574 Communipaw Ave., Jersey City, N. J.
Please send the free Smooth-On Repair Book.

Name

Address

3-35

When writing please mention Popular Mechanics

SWEETENS STOMACH GENTLY (CONTAINS) (NO SODA)



**Delightful Mint
Relieves Gas..
Heartburn..Sour
Stomach..Quick
Relief for Million**

PHYSICIANS have warned against treating acid indigestion with harsh, raw alkalies—

the tumbler and spoon method. Strong, water-soluble alkalies, taken in excess, may turn the stomach juices into an *unnatural* alkaline condition—actually arresting digestion!

TUMS free you from this danger. They act as an acid "buffer." The scientific explanation of TUMS is that it acts *gently*—just enough of the antacid compound is released to counteract *over-acidity*. When your heartburn or sour stomach is corrected—the balance passes on inert and undissolved, without affecting the blood or kidneys.

Try TUMS. Munch 3 or 4 when distressed. Millions have turned to this gentle, *effective* treatment—it's quite likely you will, too. 10c at all druggists. 3-roll carrier package, 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-CMM, St. Louis, Mo.



TUMS ARE
ANTACID . . .
NOT A LAXATIVE

FOR THE TUMMY

HANDY TO CARRY

For a laxative, use the safe, dependable Vegetable Laxative NR (Nature's Remedy). Only 25 cents. **NR**



Forms to cast Lead Soldiers, Indians, Trappers, Hunters, Wild and Farm Animals. 239 different forms to select from. Every form guaranteed to cast perfect figures. Send 5c stamp for illustrated catalogue.

HENRY C. SCHIERCKE Spencer Rd, GHENT, N.Y.

HAND-EE GRINDER

**QUICKER
BETTER JOBS**

Weights 1 pound. Plug in any light socket and do 1001 jobs. Do away with slow hand work. Grinds, routs, drills, carves, sharpens, cuts, engraves. For shop, home or tool kit. (Model A), A. C. or D. C. operation, 110v., 13,000 r.p.m. Order on 5 day trial. Satisfaction guaranteed.

Ask for FREE Booklet



\$10.00
and up
Postpaid
U. S. A.
With 3 wheel shapes Free. Order today.

NEW MASTER CRAFTS-MAN'S SET
17 useful accessories to grind, drill, polish, sand, cut, carve, engrave, etc. Prepaid \$5.00

CHICAGO WHEEL & MFG. COMPANY
108 S. Aberdeen St. Chicago, Ill.

D1448
WHO PAYS THE TAX

(Continued from page 379)

on candy and chewing gum, and ten per cent on such luxuries as electric refrigerators, fur coats, cameras and sporting goods.

A disproportionate slice of the taxpayer's bill is levied against his automobile. The motorist has seemingly been taxed on the theory that a person that can afford a car can afford almost anything; but with four out of five families in the United States owning autos, the "soak the rich" theory no longer holds water.

The average motorist pays an annual direct tax of \$47.77. The biggest item here is on gasoline, which ranges from two to seven cents in the various states, in addition to the one cent federal tax. The average motorist uses 600 gallons of gasoline a year, on which he pays \$21.75, and this does not include the local taxes collected by some counties and cities. State registration fees average \$12.67, in addition to the local registration required in some cities. Federal excise taxes average \$10.40, and personal property and municipal taxes come to \$2.95. Income and property taxes of the manufacturer and dealer have not been included, although the owner pays these when he buys his car. Taxes on garages, repair shops, refiners, pipe lines, filling stations, and accessory dealers are all passed along to the consumer, until the average motorist pays the value of his car in taxes every two years.

How would you smokers like to be able to buy a package of your popular brand of cigarettes for only seven cents? That is actually what you are paying for the cigarettes now, for the other six cents is the federal internal revenue tax which the blue stamp signifies has been paid, but which has been passed on to you and included in the price. The smoker who uses a package of cigarettes a day pays \$21.90 a year for those blue stamps.

During the fall of 1934 the federal government alone spent an average of \$17,000,000 a day. The biggest item is the administration of relief for the needy. Nearly 20,000,000 persons have been helped by funds obtained from the government. In addition there are government pay rolls—federal, state and local. With one person out of three being supported by taxation, it is no wonder that a quarter of the family income must go to the government.

EYES OF THE AIR

(Continued from page 124A)

compared to six or seven on the ground and whose eyesight encompassed from eighty to 100 square miles on the ground in contrast to about 50,000 square miles at 10,000 feet. It had to contend with intense cold at high altitude, cold which required heating not only the camera but the film itself to prevent it from becoming brittle. It was faced with the necessity of making spools of film which would take over 100 pictures at a single loading, film which in some cases was seventy-five feet in length, requiring special developing on reels made for that purpose.

When an airplane flies over land which has no distinguishing landmarks from which bearings may be taken, it is necessary to take compass bearings which, when used as a guide for aerial surveying, require extreme accuracy. The aerial surveyor is, as a result, placed on his mettle in surveying such territory as swampland, sand deserts and shorelines.

When Lieut. Col. Blacker flew over Mount Everest he placed a small red electric light bulb on the pilot's instrument panel and with each picture he warned his pilot to steady the plane by flashing the light. The late Lieut. G. R. Johnson, chief photographer for Aerial Explorations, developed new and efficient types of camera mounts as well as a process of checking aerial surveys which enabled maps to be completed with unusual speed.

"There is no telling to what new use the photographic products of the eyes of the air may be put," says Mr. Shippee. "One of the most unusual was recently demonstrated by C. W. Collier of the federal soil erosion department. He had endeavored to get a group of farmers to terrace their lands to prevent erosion. They couldn't see much in the idea. Mr. Collier showed them an aerial oblique photograph showing how the Incas had terraced their farm land hundreds of years ago. The photograph convinced them that terracing wasn't so 'new fangled' after all.

"The traffic branch of Scotland Yard used an autogyro to determine why there was a terrific jam in Westminster. They found the answer at a point far away where there was a bottleneck. In the same way the eyes of the air might be employed in solving traffic problems here."

Enjoy your swim
My darling daughter.
Wet-Pruf can't be
hurt by water!



NEW!

BAUER & BLACK

Wet-Pruf

ADHESIVE TAPE

● Snow white and 100% waterproof. No matter how often Wet-Pruf gets wet, it won't curl up or ravel around the edges. Wet-Pruf has a smooth, kid-like finish—



resists soiling—washes clean. Costs no more than regular adhesive tape. All regular sizes, 5¢ to 70¢.

BAUER & BLACK, Division of The Kendall Company, 2500 South Dearborn Street, Chicago.

Astonish Your Friends

MAKE A beautiful

WOOD INLAY CHECKERBOARD

WE SEND ALL MATERIAL: "light squares" of finest mottled Aspen; "dark squares" of famous Australian Oriental Wood; cut precisely to 2" squares; 17½x17½" substantial wood base; includes a border of African Koko Wood and a finishing beading. Clear instructions enclosed. Great fun. Easy to make. Money-maker, too, if desired. (You know how much inlaid boards cost in stores!) ONLY \$1.25 postpaid. Send check, money-order, or cash. Money back guarantee.



Special Offer: assortment of 12 different exquisitely colored wood veneers from 6 countries; standard for beautiful inlay work of all kinds. Only \$1.10 postpaid. Money back if not entirely satisfied.

M. D. WILLIAMSON CO.

Beaver Dam, Cockeysville, Md.

MIRACLES IN TELEVISION

(Continued from page 324)

in proportion to the intensity of light reaching them. As the electrons are freed, a cathode-ray beam scans the plate or droplets and reproduces the picture created by differences in light intensities.

Farnsworth transforms a picture appearing on a flat, metal photo-sensitive plate into a picture in electrons, which are focused from their diverging paths by magnetism into a picture at the other end of the tube. Then through an ingenious multiplier, the scientist increases the number of electrons a thousand times until the projected picture is many times brighter than is possible with the original beam.

Three years ago, William Priess, a veteran radio engineer of New York, began the development of a novel method of mechanical scanning which recently has been so simplified it offers the key to the solution of television. Priess employs a polished steel mirror one-fourth-inch square and plated with rhodium alloy, a metal having high reflecting value. He mounts the mirror midway on a six-inch length of piano steel wire and welds each end of the wire into an iron yoke supported by two small metal rods, the outer ends of which are welded to blocks of iron. Back of the mirror is a steel fin located in the air gap of an electro-magnet, through whose coil is passed alternating current of 5,000 cycles.

The current causes the mirror to swing right and left about the axis of the steel wire through a total angle of seven and one-half degrees, which throws the reflected beam of light through an angle of fifteen degrees. Meanwhile, the yoke supporting the wire and mirror is caused to oscillate at right angles to the swing of the mirror. The mirror as it vibrates reflects the beam right and left. In order to obtain a square, magnets move the mirror up and down twenty-four times a second. This square beam, then, scans an object 5,000 times a second right and left and twenty-four times up and down.

Fortunately, no fabulous sum is needed to give the world efficient television. From the hands and minds of these experimenters, television is almost ready. Miracle will pile upon miracle from a simple beginning until we have brought into our homes sight and sound of great educational and entertainment values.

What Other Leaders Say

"It should be appreciated that technical solutions are but one phase of a national television system, which, in order to exist, must provide lasting entertainment and not deteriorate into a novelty of passing interest," says W. R. G. Baker, vice president of the R. C. A.

Here are some of the problems which Mr. Baker has in mind:

First, there must be general agreement among manufacturers and broadcasters as to the system of television which should be employed, in order to make it possible for any home receiver to intercept the full broadcast range of signals.

Second, believing that television will ultimately finance itself, there is yet no visible means of making it pay during the early days.

Next, the industry is considering the supply of televizable material. If it falls back on movie films, it encounters a knotty copyright situation. Besides, the present movie production is inadequate for the needs of television since the whole movie industry produces only 300 feature films per year, an equivalent of 350 hours of entertainment.

John V. L. Hogan, who invented single dial tuning on broadcast receivers, holds the opinion that television is no longer around the corner—it's here.

"The reason no television broadcast programs are available is that the three essential elements of such a service are lacking. They are: first, an adequate television transmitter; second, a source of interesting program material, and third, a supply of television receivers that can be distributed at a reasonable price and which will give good reproduction. Another essential is that picture programs shall be accompanied by synchronized sound.

"It is quite probable that before very long some forward-looking broadcasters and manufacturers will combine their facilities in such a way as to provide a useful and interesting television service."

David Sarnoff, chief of the RCA-Victor forces, said:

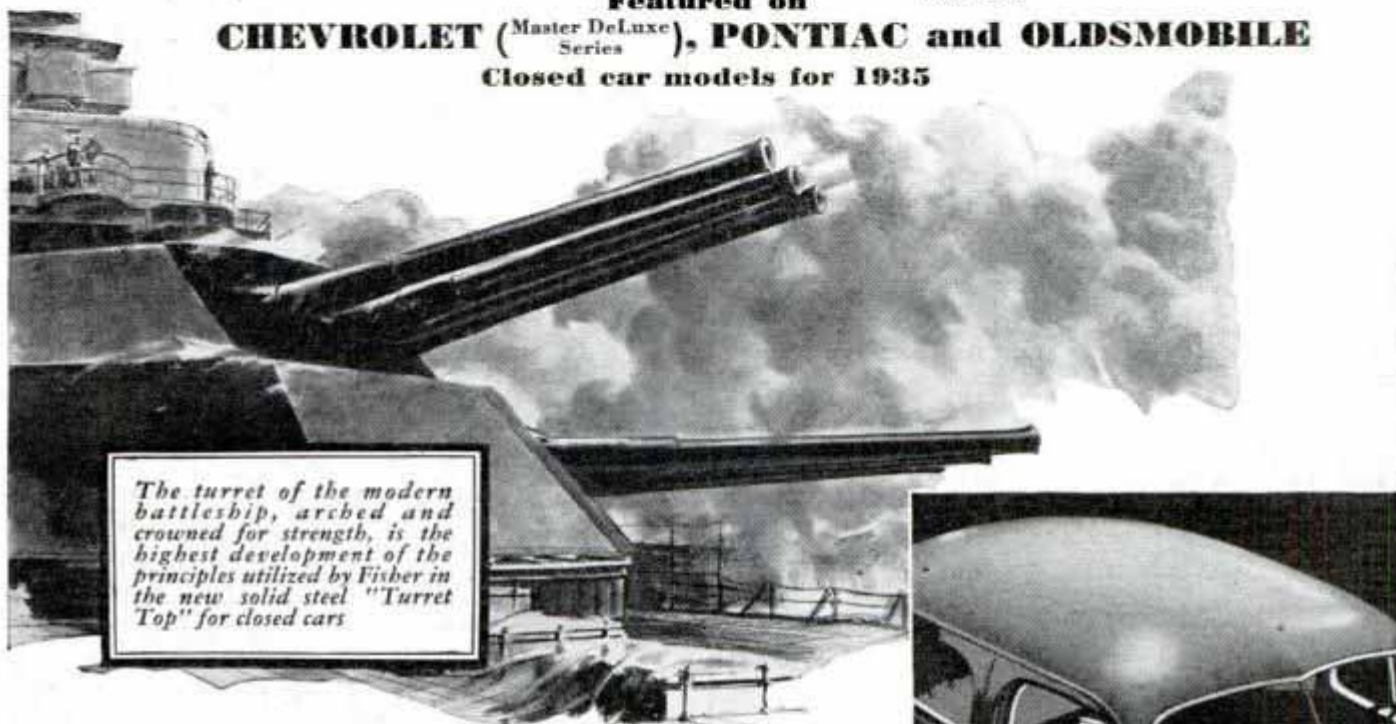
"If we use our imagination, we also may dream of television in faithful colors. I believe that dream will come true one day, and when it does, every home equipped for reception can at certain times become an art gallery."

Now even the roof is steel!

new solid steel

FISHER "TURRET TOP" ★

★Registered
Featured on
CHEVROLET (Master DeLuxe Series), PONTIAC and OLDSMOBILE
Closed car models for 1935



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

FISHER engineers have realized for years that a *roof of steel* was the desirable thing for the modern closed car. Yet no one had ever successfully created such a roof. It involved new methods, new principles, the designing of vast new presses.

Huge sheets of tough, seamless steel had to be drawn and fashioned into these beautiful, protective roofs.

Now, success has crowned Fisher efforts. The safety steel roof *has been perfected* and named the "Turret Top" from its resemblance to the armored battleship turret.

This roof is all steel—even to the bows—and is unit-welded to the steel body panels. It is also singularly smart and graceful—and scientifically insulated against

heat, cold, drum, rumble, rattle or noise of any kind—even at high speed.

We regard it as the greatest advance in motor car safety in a decade—and one of the greatest advances in smartness also.

Of course there are other worthwhile advantages in Body by Fisher for 1935—Fisher No Draft Ventilation is as important as ever—and you will find full streamlining, more luggage room, windstream V-type windshield, wider seats, more



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

headroom, bigger doors as well. But the most vital advance of all is the new solid steel "Turret Top"—introduced on the new Chevrolets (Master De Luxe Series), Pontiacs and Oldsmobiles—and found, *like Body by Fisher, ONLY on General Motors cars.*



PONTIAC

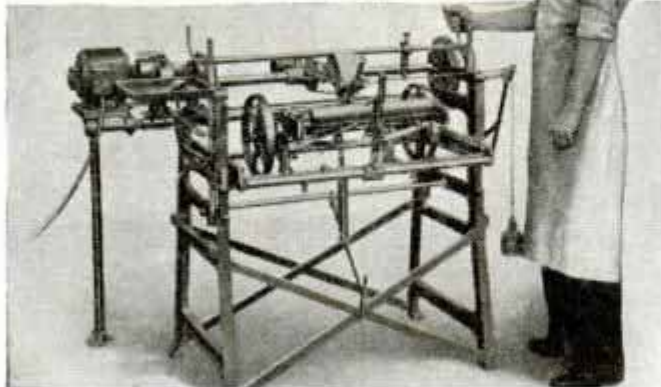
BODY BY FISHER on GENERAL MOTORS CARS ONLY:

CHEVROLET • PONTIAC • OLDSMOBILE • BUICK • LA SALLE • CADILLAC

When writing to advertisers please mention Popular Mechanics

COMPLETE PLANS

FOR A PERMANENT PROFITABLE BUSINESS OF YOUR OWN *free*



MAKE \$30 TO \$40 A WEEK

Our free plans show you how to build a successful business of your own sharpening lawnmowers. Positively no experience necessary. Most men average from \$30 to \$40 a week. J. B. Van Dlen, Ridge-wood, N. J., writes: "Some weeks I earned \$40 a week with my Ideal just as a side line." H. Greenlau, Fond du Lac, Wis., writes: "In May I sharpened over 200 mowers at \$1.00 each." Niles C. Race, Rochester, N. Y., writes: "I have sharpened 785 mowers at \$1 each."

THE IDEAL LAWNMOWER SHARPENER

Makes old, dull lawn mowers cut like new. Mowers run easier, stay sharp longer—customers come back year after year. Start right at home. Attach the Ideal to your lamp socket. Sharpens any make of mower in 15 to 20 minutes—you get \$1.00 to \$1.50. Attachments for grinding skates, grass shears, hedge shears, sickles, scythes, axes, etc.

Send Post Card for FREE CATALOG and Complete Plans

THE FATE-ROOT-HEATH CO.
435 Bell St., Plymouth, Ohio



GOOD TOOL CHESTS
For Machinists and Toolmakers
Preferred by Particular Men
FREE CATALOG
GERSTNER TOOL CHESTS

439 Columbia St. Dayton, Ohio

HAS HE A COUGH OR A COLD?



Give **GLOVER'S EXPECTORANT MIXTURE** to your pet to relieve coughing. **GLOVER'S FEVER REDUCER and STIMULANT Medicine** should be administered in the early stages of colds, bronchitis, pneumonia or other diseases accompanied by high fevers. Protects the animal from more serious complications. Lowers the high fever in distemper.

GLOVER'S NEW FREE DOG BOOK is an invaluable aid in the Care, Training and Feeding of your dog. Explains symptoms, causes and treatment in detail. Write for it today to **GLOVER'S, Dept. Y, 462-468 Fourth Avenue, New York City.**

GLOVER'S ANIMAL MEDICINES

When writing please mention Popular Mechanics

LOOK FORWARD TO



Fun!

POINT the prow of an Old Town toward real pleasure. Exploring. Hunting. Fishing. Miles and miles of fun . . . Indian-fashion. Own an Old Town Canoe. It's a tough twin of the birch-barks. Quick. Light. Easy to paddle or portage.

Get a free illustrated catalog. See all the different models and prices (starting at \$68). Sponsons, sailing canoes, square-stern types. Also a fleet of outboard boats, including big, fast, seaworthy craft for family use. Rowboats and dinghies. Write to Old Town Canoe Co., 133 Main Street, Old Town, Maine.

"Old Town Canoes"

MAKE MONEY



There's lots of work for you surfacing floors by the American Electric Method. Let the coming Spring rush get you started into something for yourself. No large capital or experience required. Complete information free—without obligation—write today.

THE AMERICAN FLOOR SURFACING MACHINE CO.
523 So. St. Clair St. Toledo, Ohio

WOOD WORKING MACHINES FROM OLD AUTO PARTS!

Save! Build your own from auto parts using our plans and special parts. Band saw; circular saw; drill press; shaper; lathe. Send dime for illustrated catalog containing details, several free plans, and treatise on wood finishing. A big dime's worth! (Refunded on first order.)

BUILDERS SERVICE CO.
21 N. Commonwealth Ave. Dept. G Elgin, Ill.

GUARANTEED ONE YEAR



1935 MODELS

Benjamin Super Single Shot Air Rifle—Bolt Action—Hammer Fire—Hair Trigger—shoot lead or steel BB shot and 177 or 22 pellets and darts. Illustrated and described in New "BB Magic" Free—Write Today—get full details of Benjamin 25 Shot Repeater and New Benjamin Air Pistol—Free Targets—SPECIAL INTRODUCTORY and TRADE-IN OFFERS.

BENJAMIN AIR RIFLE CO. 697 N. Broadway St. Louis, Mo., U. S. A.

FREE BB MAGIC
THE SHOOTER'S DIGEST



AMAZING AUTO COMPASS

Don't lose time and money by taking the wrong road and going many miles out of your way. This new AIRPLANE TYPE COMPASS constantly tells your direction of travel. Sticks to windshield. Base 1 3/4" diameter. ONLY \$1.95 POSTPAID. Including Compensator. SATISFACTION GUARANTEED or your money refunded if returned within ten days.

DEALERS WANTED!
HULL MFG. CO., Box 246-D3, WARREN, OHIO

THE MASTER OF MOVIE THRILLS

(Continued from page 351)

formed an arc across the flooring to a pipe underneath, completing the circuit up through Strickfaden's body along the wire on his arm to the safety horn gap which broke the circuit and prevented possible electrocution. Repairs were soon made, the cable moved and a subsequent take was made without further trouble. Strickfaden said the only sensation he felt was a strangely painless flash of light.

Between pictures he loads his movie props and high voltage apparatus on a special trailer of his own construction and goes on tour. Music over light beams, electric snow, artificial lightning, photo electric and gaseous tube effects are just a few of the features that make up his electrical circus.

NEW CAR FEATURES

(Continued from page 346)

operation. A rear-wheel bearing, which is lubricated for life, has been made standard equipment on several cars.

Lighting systems are better, with more efficient headlamp bulbs. A tiny bulb of low candlepower is used as an indicator to show the driver whether lights are dimmed or bright. Batteries are larger, to take care of the load imposed by radio, electric clock and other equipment. The Pontiac "eight" has a seventeen-plate, 107-ampere hour battery that spins the engine at fifty-two revolutions per minute at zero temperature. The ventilated generator is gaining ground, since it produces a larger supply of current without overheating. In the Oldsmobile, "step voltage" control, greater charging, with a partly discharged battery, is obtained by a resistance in series with the field windings and cut in or out by contact points controlled by the line voltage.

Engines have not increased materially in horsepower. Rather, there is a tendency to make them more reliable. Among the advancements are: full-length water jackets, long-wearing plated pistons, full-pressure lubrication, with connecting rods drilled to carry oil to the piston pins, more counterweighting of crankshafts, high-compression with cast-iron heads and cadmium-silver-copper alloy bearings. Ford introduces a crankcase ventilation system.

Graham, Hudson and Pontiac offer new

(Continued to page 134A)

**WHY DO
NEW CARS
NEED
"LIGHT" OIL
?**

Car makers, in their constant efforts to step up the *efficiency* of your motor, have been fitting the wearing surfaces *closer and closer together*.

This helps to seal the motor against power loss. But it presents a serious problem in lubrication. Your oil now has only a fraction as much space in which to flow between the wearing surfaces, a space too narrow for any but a "light" oil.

Obviously, the "lighter" the oil, the *better it has to be*. Not only because there is a *thinner film* of it on the working parts (though that is reason enough!) but because with the new high-speed motors, your oil is subjected to *greater heat and tension* than ever before. Therefore, if you would avoid motor damage, buy only the best!

You will probably find that your motor consumes a little more oil with the "light" grades. But the slight extra cost here is easily offset by the extra mileage from your gasoline . . . an economy made possible by the new closer-fitted motors.

There is no reason to worry about whether your motor will be "broken-in" safely with "light" oils . . . *if you buy the best*. That's why you'll find more new car owners using Quaker State this year than ever before. Quaker State Oil Refining Company, Oil City, Pennsylvania.

"First choice of Experience"

**QUAKER STATE
MOTOR OILS**

NEW CAR FEATURES

(Continued from page 133A)

"sixes," while Packard enters a lower price class with the "120," a 110-horsepower, eight-cylinder car on 120-inch wheelbase. In contrast to Graham's new sixty-horsepower "six," Auburn introduces a supercharged eight with a certified speed of 100 miles per hour and Duesenberg has a supercharged roadster guaranteed to do 165.

LIFE IN THE IRON HORSE

(Continued from page 340)

shape gives a better distribution of weight and better counter-balance, both important for high speeds.

Every foot of the road bed was reconditioned to make the fast schedule possible. It was newly ballasted, equipped with heavy rails and oiled to make it dust free. Curves were "spiraled," or banked properly to enable trains to take them at high speed. Rails are inspected regularly with a Sperry detector which locates any defects as it moves along the track.

Except that oil fuel is a little more expensive than coal, this high speed train costs no more to operate than a slower steam train and probably not as much as a streamline train powered with a Diesel engine. According to one champion of steam power, Diesel engines pulling lightweight, streamline trains are more expensive to run than steam engines and the much heavier standard trains. This authority has estimated that it costs about \$103,000 to operate a 250-ton locomotive and six fifty-ton cars for an average of 110,000 miles per year while the cost for the streamline train with Diesel power would be more than \$184,000. While fuel costs less for the Diesel train, initial cost and maintenance are much higher.

"We are not opposed to streamline equipment, Diesel engines or any other form of progress in rail transportation," explains Fred W. Sargent, president of the Chicago and North Western road, "but why throw away good equipment when we can increase speed by a few simple revisions in the equipment and road bed? When steam equipment has worn out, it is quite likely the new streamline trains will be used by our road. But there's still plenty of life in the old iron horse. If necessity demands, we can even run a still faster schedule."



The Home Craftsman's MOST USEFUL TOOL

One home expert says: "I can do 60% of many jobs with Nicholson Files." Another says: "Forty", some go as high as 70%.

There is little doubt that the world's most popular file—Nicholson—is the home craftsman's most useful tool.

Here are ten of the most popular Nicholson Files selected by a vote of expert home craftsmen: Metal working—Round, Flat, Mill, Half Round, Three Square; for Wood Working—Cabinet Rasp, Half Round Wood Rasp, Last Makers Cabinet Rasp, Flat Wood Rasp.

Hardware stores everywhere carry Nicholson Files—priced to meet popular demand. Nicholson File Company, Providence, Rhode Island, U. S. A.

Genuine

NICHOLSON FILES

A FILE FOR EVERY PURPOSE

Catch Fish!

Eels, Mink, Muskrats with our new folding galvanized

STEEL WIRE TRAP. Write for our FREE TRAP OFFER and Bargain Catalog. \$1 Box of our famous Fish Bait FREE to introduce our traps. WALTON SUPPLY CO., 3509 JUNIATA AVE., ST. LOUIS, MO.



HOME AUTOMATIC CIGARETTE MACHINE

Have YOUR OWN Monogrammed Cigarettes. Put tobacco and block of papers on machine. TURN THE CRANK—PRESTO—CIGARETTES. Easy—simple. All metal construction. Guaranteed. No cloth ribbons; no special tube or crumpled papers required. ASK FOR FREE ILLUSTRATED FOLDER. AUTOMATIC CIGARETTE MACHINE WBS, PM-3, 1053-57 Sheridan Rd., Chicago, Ill.

MATCHES ALWAYS DRY!

—if you carry a Marble's water-proof match box in your pocket. Absolutely water-proof —holds supply for several days. Made of seamless brass, size of 10-gauge shell. Only 60c at your dealer's, or sent postpaid. Get one today. Write for complete FREE Catalog.

[A5]

Marble Arms & Mfg. Company
578 Delta Av. Gladstone, Mich. U.S.A.

Thompson
BEATS
the World
on BOATS **Better Built**
Lower Prices

Canoes
\$45
and up

Some all wood, others canvas covered. Light, swift, safe, strong and durable. Many color combinations.

Rowboats
\$36
and up

Most complete line ever offered, at real money-saving prices.

Out-board
Boats
\$42
and up

ONLY THOMPSON BOATS HAVE FULL LENGTH SPRAY RAILS. KEEP PASSENGERS PERFECTLY DRY AT HIGH SPEEDS.

SNIPE SAIL BOAT

Crosby-Rudder design. Eligible for racing in its class. A very fast and able craft that will outsail many boats having double its sail area. Safe and dry under actual sailing conditions. Length, 15 1/4 ft.; width, 5 ft.; depth, 20 in. Weight, 450 lbs. Price, \$185.



CATALOG FREE—SAVE MONEY—PROMPT SHIPMENT
Please state the kind of boat you are interested in (75)

TWO LARGE FACTORIES
THOMPSON BROS. BOAT MFG. CO.
213 Ann St. Write to 113 Elm St.
PESHIGO, WIS. [Either Place] CORTLAND, N.Y.

MAKE MONEY!
INSTALL YOUR OWN BURNER

At last! A quality burner in the low priced field. Our burners bought by U. S. Govt.! Now you can buy direct at one low price complete with full set of electric controls, wire, etc., plus complete instructions for making your own installation. Write for amazing low price and free literature today!



CHALMERS OIL BURNER CO.
1242 Central Ave., Minneapolis, Minn.

FREE LITERATURE
SEND TODAY

WILL YOU WEAR THIS SUIT
and Make up to \$12 in a Day!

Let me send you this fine all-wool tailored suit **FREE OF COST**. Just follow my easy plan and show the suit to your friends. Make up to \$12 in a day easily. **No experience—no canvassing necessary.**
Send for Samples—**FREE OF COST**
Write today for **FREE** details, **ACTUAL SAMPLES** and "sure-fire" money getting plans. Send no money.
H. J. Collins, Progress Tailoring Co., Dept. G-216,
500 S. Throop St. Chicago, Ill.



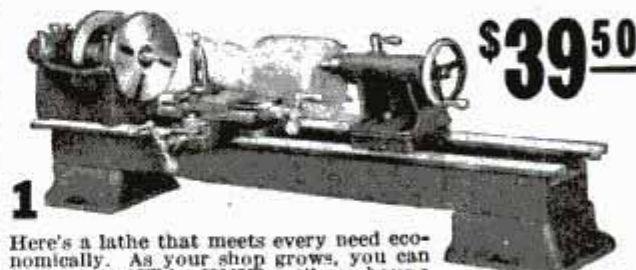
CONDON'S New Wisconsin
BALLHEAD CABBAGE

100% Yellows Resistant—LATEST INTRODUCTION—ENTIRELY NEW AND DISTINCT. Earliest of all Ball Heads, Fine texture, flesh pure white. Very uniform type—Enormous Yielder. **Biggest Money-Making Cabbage for Home & Market.** Wonderful Keeper. We want every reader of this paper to try this wonderful new Cabbage. Send 3c stamp to cover postage and will mail you **150 SEEDS FREE** and our Big 1935 196 page illustrated Catalog of Seeds, Plants and Bulbs. Write today.
CONDON BROS., SEEDSMEN, ROCKFORD, ILL.



ATLAS QUALITY
Shop Equipment Since 1911

1935 Model Atlas "Unit-Plan" METAL-WORKING LATHE
... designed so units may be added



1

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

\$39⁵⁰

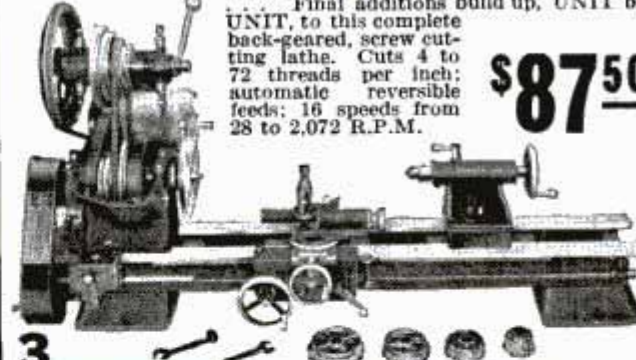


2

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.

\$54⁷⁵

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.

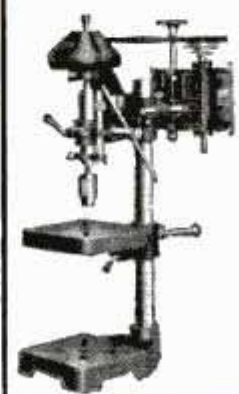


3

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.

\$87⁵⁰

ATLAS DRILL PRESSES
\$13.95 to \$33.45

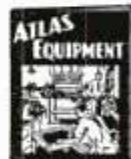


The ATLAS does WELL any job within its size capacity, with highest degree of accuracy and an abundance of power. Sold on 2 weeks' trial, with money-back guarantee. Full line of attachments at new low prices.

ATLAS PRESS COMPANY
1843 N. Pitcher Street, Kalamazoo, Mich.

FREE CATALOG

Send your new FREE catalog of ATLAS metal lathes, wood lathes, drill presses, attachments, arbor presses.



NAME

ADDRESS

CITY..... STATE.....

When writing please mention Popular Mechanics

WHEN A SMELLER NEEDS A FRIEND!



THE hound's nose was keen and alert. The hunter's pipe was strong and neglected. So the rabbit trotted safely back to his home and missus.

A few pipe cleaners and a tin of mild, fragrant tobacco like Sir Walter Raleigh would have put a happier ending to the hunt. Sir Walter's an extremely gentle tobacco, a blend of Kentucky Burleys fragrant as the woods in spring and mild as a May morning. Well-aged, slow-burning, it has become a national favorite in mighty short order. Try a tin. You'll find it kept fresh in heavy gold foil.

Brown & Williamson Tobacco Corporation
Louisville, Kentucky. Dept. P-53



FREE BOOKLET tells how to make your pipe taste better, sweeter. Write for a copy.

It's 15¢
—AND IT'S
MILDER



READY CUT HOMES

Save \$500 or more on complete low-priced homes. \$416 and up, freight paid, ready to assemble. In addition to all lumber, price includes Thermafill insulation, Spring Bronze weatherstripping, built-in ironing board, medicine cabinet. Attractive 1-panel doors and latest hardware. Building plans, nails, lath, paint, varnish, shingles, etc. furnished. Send 25c today to cover mailing for catalog in full color, complete information. 80 good practical low-priced homes to choose from, also summer cottages and garages.

International Mill & Timber Co.
Dept. PM-35, Bay City, Michigan

FULL COLOR CATALOG FOR ONLY 25¢

GENERATORS - CHEAP! \$10.00 Down

Make your own light plant or battery charging outfit, using engine, windmill, water wheel or other power. These new generators (made by Robbins & Myers) are 1000 watts, 32 volts, D.C., Ball Bearing, built-in motorizing coils to self start a gas engine. Wt. 100 lbs. Regular price \$90.00. While they last, \$25.00 cash or \$10.00 down, \$3.00 per month for 6 months.

VICTOR MFG. COMPANY Money-back
Adrian, Michigan Guarantee

Saw Filing PAYS!

Steady growing business, all cash, no canvassing. Start in spare time. No experience needed. No eyestrain. With a **FOLEY Automatic Saw Filer** you can file hand, band and circular saws, easily, quickly, accurately! Small investment. Send postcard for **FREE PLAN** and Special Offer. No obligation.

FOLEY MFG. CO., 316-5 Foley Bldg.
11 Main St. N. E., Minneapolis, Minn.

THE Smooth WAY TO "ROUGH" IT

Self-Built DeLuxe House Trailer gives you economical travel-convenience. Complete interiors—4 models. Progressive Buying Plan. Any workman can build. Beautiful Trailer Builders' Guide, 150 illustrations; Luggage Rack and Hooks; Hitch; Combi-Chair; axles; Parking Legs; Sinks; Stoves; Inner Spring Beds. Send only 50c for Trailer Builders' Guide.

Full Size Blueprints FREE With Parts.

HAMMERBLOW TOOL CO. Dept. 13, 606 Third St. Wausau, Wis.

Cuts Cost of Hot Water Heat

Connect an Aquapush to the return pipe on your hot water system. Speed up circulation. Warm your house an hour quicker. Force hot water into "cold" radiators. Save fuel. Aquapush is easy to install. Works on coal, gas or oil — and with any boiler. Low cost. Durable. Simple. Cheap to operate. Soon pays for itself.

Write for Details Illus. circular gives ten reasons why Aquapush will give you satisfaction.

U. S. FOUNDRY & MACHINE CORP.
P. O. Box 123 Jersey City, N. J.

Standard & Walsh Garden Tractors

Powerful Tractors for Small Farms, Gardeners, Florists, Nurseries, Fruit and Poultry Men.

1 & 2 Cylinder Models
Write for Free Catalog
STANDARD ENGINE CO.
3221 Como Ave. Minneapolis, Minn.

WOOD SHAPER \$3 post Less cutters "The Shapemaker"

(C.O.D. on outside U. S. \$3.25)

Uses standard 5/16" cutters. Table is heavy gauge pressed steel, 8"x5 1/4"; stands 5 3/4" high. Base, table support and spindle adjusting slide, heavy gray iron castings. Oilless bearings.

Order now or send 3c stamp for **NEW 1935 24-page Catalog** fully describing all our equally low priced power tools and accessories, including JIG SAW, DRILL PRESS, SANDER, LINE SHAPY, LATHE, ETC., ETC.

J. & H. METAL PRODUCTS CO. 466 St. Paul St., Rochester, N. Y.



HOME CHARGE

Your BATTERY for a NICKEL!

Compare THESE FEATURES

1. Fast—10 Amperes Will charge fully overnight
2. Uses Less Current 5c recharges average battery
3. 90% Less Upkeep than any bulb or "dry" type
4. Fully Automatic Cannot discharge or harm battery
5. Self-Polarizing May be connected either way
6. Absolutely Safe
7. Ammeter Equipped
8. Portable—Handy
9. Beautiful Finish

only **The New Hi-Rate**
10 to 6 Ampere AUTOMATIC
HOMCHARGER
Does it

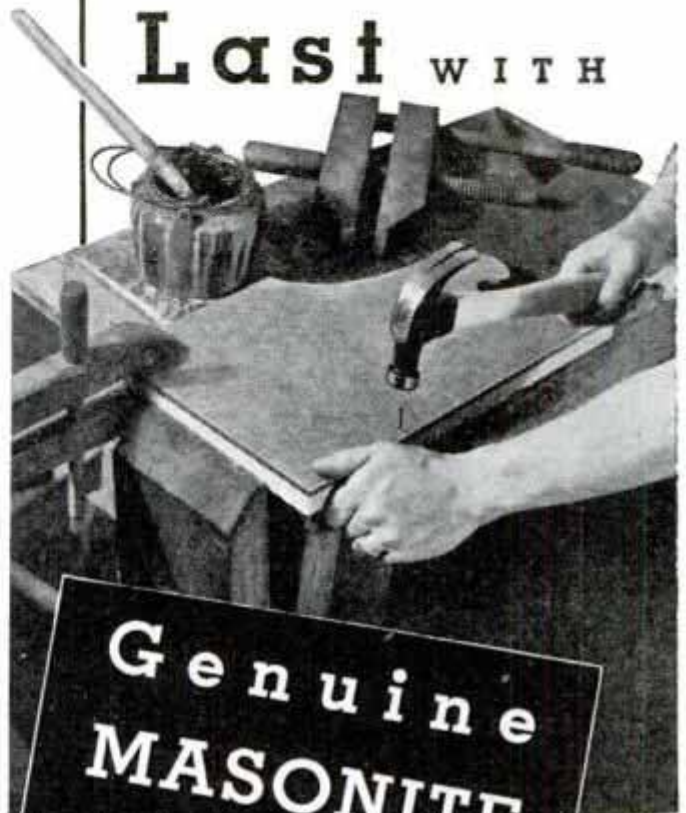
PLUGS in lamp socket. Charges any auto-type battery overnight and for a NICKEL. Creates no radio interference. Uses no expensive bulbs, "dry" units, or messy liquids. Has only ONE wearing part, replaceable for \$1, after thousands of hours use. The FASTEST, MOST EFFICIENT, MOST ECONOMICAL. Nearly One Million HOMCHARGERS Sold Since 1920. Complete with 10 ft. Approved cables — ammeter, charging plugs, dash receptacle, etc. (50-60 cycles).....\$16.95.

The Automatic Electrical Devices Co.
Dept. 18 324 E. 3rd St. Cincinnati, O.



Build

THINGS THAT Last WITH



Genuine MASONITE PRESWOOD

THERE'S a thrill in knowing that things you build today will last a lifetime . . . and longer. There's a thrill in turning out an article . . . sturdy . . . strong . . . built for service. The thousands of home-craftsmen who are now relying on genuine Masonite PRESWOOD know these thrills.

A joint or surface of this all-wood material "stays put exactly according to specifications." PRESWOOD will not warp, chip or crack. Grainless surface is ideal for permanent gluing.

PRESWOOD can be cut or sawed to any desired shape. Available from leading lumber dealers everywhere, in thicknesses of 1/8", 3/16" and 1/4" . . . very reasonably priced. Can be used either in its own natural, warm brown shade, or varnished, painted or enameled with standard finish.

Why not use PRESWOOD on the next thing you build? Send the coupon for descriptive booklet and a sample of PRESWOOD, absolutely free.

MASONITE CORPORATION PM-3
111 W. Washington St., Chicago, Ill.

Please send me your free descriptive booklet and a sample of PRESWOOD.

Name _____
Address _____
City _____ State _____

When writing please mention Popular Mechanics

BIG 1935 LEADER

Genuine Leather Ties, 4-In-Hands and Bows—Men's and Boys'. Fancy patterns. Look like silk. Cleaned with a damp cloth. Durable; won't wrinkle. **SELL ON SIGHT.** Big profits; repeat orders. Be independent; have your own business. B. M. SOLD 30 IN 1 1/2 HOURS. No sales ability needed. Send 50c or stamps for sample and kit. Information free.

CENTURY TIE CO., Dept. 2, 2333 W. Grand Blvd. DETROIT, MICH.

ARMY AND NAVY SUPPLY CO.

Bargains—Army, Sport Goods, Firearms, Clothes, Shoes, etc. Send 10c for new catalog, to be redeemed on first order.

Army & Navy Supply Co. 4772 Lester St. Richmond, Va.

FREE RADIO'S LEADING CATALOG

Send for the 1935 ALLIED Catalog—a great book devoted exclusively to Radio. Over 100 pages packed with the latest in Set-Building Kits. Also a complete listing of new World-Wide Radio Receivers, new Short Wave, All-Wave and Broadcast models—and the greatest line of Radio Parts and Accessories ever listed. Special sections on new Sound Equipment, Amateur gear, etc. Write for Radio's most valuable Catalog. It's FREE! Address Dept. K, 833 W. Jackson Blvd., Chicago, Ill.

Allied Radio CORPORATION
833 W. JACKSON BLVD., CHICAGO, ILL.

BIG MONEY BUILDING New Portable SPORTSMAN'S BOAT



For FISHING-CAMPING HUNTING-SAILING

MEAD Sportsman's KI-YAK is the most sensational boat development in years. Exclusive new structural features set a new standard for lightness, strength,

and

PAY AS YOU BUILD!

durability, beauty and ease of home-assembly. Easily **PORT-ABLE**. Low introductory prices! Special "Pay As You Build" Plan. Opens new world of sport in sailing, paddling, camping, fishing, auto touring! \$5 Paddle now GIVEN with your Cut-to-Fit Kit or Factory-Built KI-YAK—if you hurry. Each 10¢ for Catalog today!

MEAD GLIDERS 15 South Market Dept. B-3 CHICAGO

CHEAP OIL BURNER INVENTED SWEEPING THE COUNTRY



Beats Coal or Wood
Slips Into Any Old Stove, Range or Furnace. No Dirt, Ashes—Twice the Heat, Half Cost

COOKS A MEAL for 1c
Beats any oil burner ever gotten out for low cost, perfect performance. Slips into any old stove, range or furnace; burns cheap oil a new way, without generating or clogging up. Intense heat instantly BY SIMPLE TURN OF VALVE.

AGENTS, SALESMEN BIG MONEY
Here's a REAL one. Clark of Ind. sold 93 in 30 days. O'Toole of Mass. sold 104 in July. Get YOUR OWN oil burner FREE and Make REAL Money. Write quick.

TRY AT OUR RISK —30 DAY TRIAL— prove it ends drudgery and dirt of coal or wood; cuts fuel bills in half, pays for itself quickly by what IT SAVES.

FREE SAMPLE TO AGENTS offered to one energetic man or woman in each locality who will demonstrate and take orders. Write quick, be first to learn how to make REAL MONEY right now, spare or full time—mail 1c postcard today. UNITED FACTORIES, C-751 Exchange Bldg., Kansas City, Mo.

EARN MONEY Stringing TENNIS RACKETS



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.

FREE: Write today for FREE folder "Earn Money Stringing Tennis Rackets", also FREE restringer's catalog and price list of TOMGUT "Court-Tested" Tennis Strings and Restringing Equip. Write today!

THOMPSON MFG. CO. 453E Packers Ave., CHICAGO
Makers of TOMGUT "COURT-TESTED" Tennis Strings & Restringing Equip.

SAW 10c

filling is imperfectly understood, even by expert filers. The result is 50% efficient saws. My booklet THE ART OF SAW FILING and THE FILING MODEL will help you to get a much better saw. Send dime. A. P. SHEBEL, 730 S. 2nd St., Milwaukee, Wis.

NO MORE OIL CHANGES

The new sensational **Auto Reclaimo** keeps your oil permanently full bodied and clean. A real oil re-refiner attached to exhaust manifold in place of oil filter. Removes dirt by filtration, dilution and water, by evaporation. Equally effective for Diesels and Tractors and low in price. Our commercial size reclaimo at \$4 per gallon. Get "Oil-Wise" folder free.

P. SCHWAIGE CO., 2510 FLOURNOY STREET, CHICAGO, ILLINOIS

GO INTO BUSINESS Make 100% to 300% Profit!

Sell new and used clothing direct from your home, auto or store. Underbid all competition. EASY SALES—FAST REPEAT ORDERS! We furnish experience necessary and show you how. Handsome profits every day in the year. No selling experience necessary. Satisfaction guaranteed. Write at once for our Big Money Catalog—It's FREE!

LIQUIDATION MERCHANDISE CO., 550 East 43rd St., Dept. D-111, Chicago, Ill.

MAKE MONEY at Home!

Exclusive new process. Bigger, better, quicker crops. More money for you! Mushroom book free. **AMERICAN MUSHROOM INDUSTRIES, Ltd.** 130 Woolnough Bldg. Toronto, Ont.

EARN up to \$25.00 A WEEK or More

Grow Mushrooms in your cellar or shed

BUILD the NEW MODEL TORPEDO BOAT DESTROYER

We will send you all parts cut to fit and ready to put together with exact diagrams and instructions. Hull, 32 ins. long, is fully shaped and sanded. Introductory price, for short time only, \$4.00 plus postage, 5 lbs. (regular \$6.00). Send 3c stamp for beautifully illus. catalog this and many others.

MINIATURE SHIP MODELS, Dept. NA, PERKASIE, PA. CANADIAN 336 RUNNYMEDE, TORONTO

CHICAGO SCOUT FLYING Roller Skates

It's Easy To Win Races

Try "CHICAGO'S" — set New Records! Champions all use them. You get more SPEED and ACTION — More Fun for Your Money.

No. 101 WITH FAMOUS TRIPLE-TREAD, "TRIPLE WARE" WHEELS
Only "CHICAGO" Roller Skates have these patented steel wheels that give More Speed and More Miles at lowest cost. No. 101 shown above. Reg. Price \$2.25. Special Only \$1.95 Postpaid.

NEW Streamline Super "SILENT-FLASH"
Students and Grown-Ups prefer these high Speed, Noiseless Rubber Tire Skates with reinforced channel arch and wide toe clamps. They outwear Steel Wheels. Reg. Price \$4.00. Special Only \$3.75 Postpaid.

Send dealer's name with remittance, if he can't supply. Demand "CHICAGO'S"—name stamped on wheels.

GET CLUB PIN and FREE BOOK
Write Today! Enclose 10¢ if you want beautiful GOLD P. Skate Club Pin.

CHICAGO ROLLER SKATE CO.
Roller Skates with Records for over 30 years.

4414 W. Lake St. Chicago, Ill.

Information on any book free. Write Popular Mechanics Press, Chicago, Ill.

DOUBLE YOUR PROFITS with Modern Service Equipment!

AUTOMATIC AIR SERVICE



Brings business right to your door—profits pay for it. Beltless, space saving, always ready. Liberal trial to prove it.

8 HR. BATTERY CHARGING



Earns \$50 to \$100 monthly profit, puts your shop above competition. Cuts electric bills in half. Investigate now.

ARC WELDING



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



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-35 Troy, Ohio

30 Days Use to Prove it... No Investment Terms WRITE TODAY

When writing to advertisers please mention Popular Mechanics

"Keep Out"

Says the RCA Noise Reducing World Wide Antenna To Man-Made Interference

No more need your short-wave reception be prey to every passing street car—every electrical gadget in your building! The new RCA double-doublet antenna says "No!" to man-made noises—and brings in far more foreign stations.

Ask your dealer or service engineer for a *Certified Installation*. Write for booklet, "Antenna Facts".

\$6.00 plus installation



RCA Parts Division
Dept. M
Camden, N. J.



AGENTS MAKE UP TO \$50.00 A WEEK

Startling, New, Sure-Fire Plans Put Quick Cash in Your Pocket

Own a traveling store—all everyday essentials—over 300 household necessities, groceries, drugs, things people must have to live—proven fast sellers—repeat daily. Earn big money first day. I'll start you at once. Big display outfit and my million dollar plans placed in your hands ON TRIAL. You risk nothing. Send no money. Just rush me your name on penny postcard. Do it now!

ALBERT MILLS, Pres.
7482 Monmouth Ave.
CINCINNATI, OHIO



with this Case!

NEW "BOICE-CRANE 'TILTING-ARBOR' SAW 'Deluxe Model'"



"The Peer of All Saws"

This "Tilting-Arbor" SAW is acclaimed the most logical and fully practical type of saw any woodworker could possibly hope for. It will eclipse any tilt-table saw we know of.

And talk about capacity and refinement! This Boice-Crane has a huge 20x27 inch table. With 10 inch dia. blade, cuts 3 inches thick. Cuts-off 12 inches, and rips as wide as 21 inches.

"Deluxe quality throughout." Has 3 point "Auto-Set" Miter Gauge. Rip Fence is "Micro-Set" to accurate "inch" scale. Handy cranks tilt and lower blade.

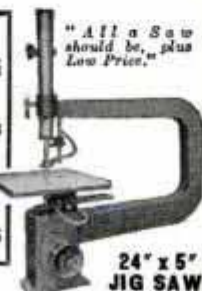
"To see it, to like it."

Write for FREE CATALOG

"All a Saw should be, plus Low Price."

4" and 6" Jointers

Also Shapers Band Saws Thickness Planers



24" x 5" JIG SAW

W. B. & J. E. Dept. PM 3-L TOLEDO, O.

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.

Learn Touch Typewriting Complete (Home Study) Course of the Famous Van Sant Speed Typewriting System—fully illustrated, easily learned, given during this offer.

Money-Back Guarantee

Send coupon for 10-day Trial—if you decide to keep it pay only \$3.00 a month until \$44.90 (term price) is paid. Limited offer—act at once.

INTERNATIONAL TYPEWRITER EXCHANGE, 231 West Monroe St., Chicago, Ill., Dept. 301
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.
Name.....Age.....
Address.....
Town.....State.....



The Worlds Greatest FOUNTAIN PEN VALUE

Genuine SAGER \$1.00 Vacuum Pen

More than 300,000 people now use Sager Vacuum Pens

5 EXCLUSIVE FEATURES

- 1-VACUUM PRINCIPLE (Pat. U.S.A.)
- 2-DOUBLE CAPACITY
- 3-VISIBLE INK SUPPLY
- 4-SELF CLEANING
- 5-LEAK PROOF

The Sager is a fine quality, smooth writing pen—Rich in appearance, made of unbreakable DuPont jet and transparent pyralin—attractively trimmed in chrome. No rubber ink sack to spoil. Fills automatically—Holds more ink—supply is always visible. Tells when to refill—stays clean—absolutely leakproof. If you paid five times the price you could not buy a better pen. Sager will outperform any pen regardless of the price or make. Guaranteed against all defects.

Your Name in Gold Letters FREE

GIVE SAGER PENS ON ALL OCCASIONS

Excellent gifts for Birthdays, Anniversaries, Card parties, Prizes, etc. The extra large ink capacity of the Sager makes it the most satisfactory pen for school and office use. Give yourself—a Sager.

SEND NO MONEY

Just send your name and address. Pay postman only \$1, plus few cents postage, when delivered to you.

SAGER VACUUM PEN CO., 8 So. Dearborn St., Dept. 102, Chicago, Ill.

Gentlemen: Send me..... Sager Pens.

Name..... (Print Name Plainly)
Address.....
City.....State.....

Check This Now! EARN MONEY SELLING SAGERS FACTORY REPRESENTATIVES WANTED

When writing please mention Popular Mechanics

\$200 My First Week



... Now in his OWN Business.

L. A. Eagles took in \$200 his first week. Harry Hill says: "Paid for home with H-B Rug-Washer. Earned \$86 first day." H. I. Riley averages about \$35 a day. C. R. Bergseth writes, "My profits run about \$400 every month." A. L. Miller says, "Have had H-B Rug-Washer 6 years—have earned as high as \$92 a day." Many others make \$125 to \$200 per week. Thousands earning quick, easy profits. Electricity does the work. Finishes rugs like new, on customer's floor. Hundreds of customers in your vicinity and nearby towns. Write today for booklet.

EASY TERMS

Inexpensive equipment. Pay part down—balance monthly. No shop necessary. Backed by \$58,000,000 Company. Used by United States Government and Statler Hotel System. Every machine guaranteed.

FREE Booklet

Send today (no obligation) for booklet illustrating Rug-Washer and telling how you can earn large profits at prices below other methods: how you can build a permanent year around business; and how you can pay on easy terms. Enjoy a larger income. Write today—NOW.

H. B. COMPANY

6093 H. B. Bldg. Racine, Wis.



SHUMWAY'S

DIRECT TO YOU
At Grower's Prices
None Better at any Price

GOOD SEEDS CHEAP

SINCE 1870

New Sensation TOMATO

FREE

Try my New Sensation Tomato, "King of the Earlies;" big solid scarlet fruit, disease-resistant, heavy yielding; 125 seeds free with my big 1935 catalog of garden, farm, flower seeds, fruits, bulbs, shrubs, 800 illustrations, showing standard varieties and amazing new introductions. 500,000 customers save money annually on my seeds. Write today for free Tomato Seed and Catalog. Send 3c stamp to cover postage.

GET MY BIG NEW CATALOG
800 Illustrations
85 in Natural Colors

R. H. SHUMWAY SEEDSMAN
ROCKFORD, ILL. BOX 390

Earn Money with this WONDERFUL NEW INVENTION!



Real Money Maker for Part or Full Time AGENTS!

Make quick PROFITS with new, patented invention—sells on "flash" demonstration. Main or side-line. Big, new market.

Soldering Iron and Blow Torch IN ONE!

Light, portable. Eliminates pump, pressure system, stove, charcoal—ALL!

PROOF IT SELLS—Agent Rowland earned \$300 a month. —Wares sold 50 Irons while stopping in hotel "Going like hot cakes," says Halley.

WRITE quick—get established for EXCLUSIVE territory. A postal will do!

JUSTRITE MFG. CO., 2061 Southport, Dept. 13-53, Chicago

NEW TENNIS INVENTION



INCREASE YOUR SALES WITH TENSION-TIGHTENER!

My amazing new WONDER Tension-Tightener invention enables you to **INCREASE** your re-stringing business, **assures** uniform string tension, **banishes** "hand-pulling". **LOW** cost. SILK strings and instructions, 85c prepaid. **WRITE** today for New Invention details!

W. A. BICKEL, 899 W. Madison, Dept. 13-53, Chicago, U.S.A.

NEW COLOR CATALOG
Write for Free copy showing new Ranger models, marvelous new prices and special offers!

FREE!

30 Days' Trial We ship on approval. If not satisfied after trial return the bicycle at our expense.

Tires lamps, wheels, equipment at half usual prices. Let Mead SAVE YOU MONEY on sundries.

Mead CYCLE COMPANY



DEPT. R-114, CHICAGO **RIDER AGENTS WANTED**

World-Wide Short Wave Reception with your Present Radio Receiver! The Sensational New EXPLORER "A.M.O." ALL-WAVE CONVERTER

The 1935 EXPLORER makes ANY radio a powerful, complete all-wave receiver, equal to expensive all-wave sets. Amazing performance! Full **LOUD SPEAKER** reception of foreign short wave stations; aircraft, amateurs, police calls, etc. Exclusive new A.M.O. circuit gives tremendous reserve power! Complete range of 15 to 200 meters in four bands. Precision calibrated dial, automatic band selector, heterodyne station locator, dual regeneration, Headphone Outlet; other exclusive features. Simple, permanent installation. Can be used *alone* as short wave receiver. Only \$16.95. Money Back Guarantee. Postcard brings **FREE LITERATURE**. **RIM RADIO MFG. CO., 695 GRAND STREET, BROOKLYN, N. Y.**

50c WILL BUY THIS SIMPLE, EFFICIENT ELECTRIC EYE

A Photo Electric Cell that will operate anything by electricity. For experimenters, inventors, practical men, etc. Lots of Fun Experimenting! Complete, with directions, 50c.



Winston & Company, Dept. 7, Hartland, Wis.

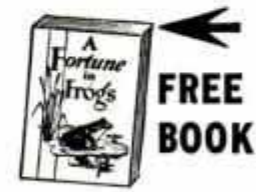
RAISE GIANT FROGS



BIG PROFITS!—NO COMPETITION!

Breeder lays 10,000 eggs (833 doz.) each year. Bullfrogs sell \$1-\$5 dozen. Biggest money-maker you can raise. **BACKYARD POND STARTS YOU.** No experience necessary. Raised in any climate.

Get the facts on this new industry. Our big **FREE** book explains everything. Write today!



FREE BOOK

AMERICAN FROG CANNING COMPANY
Dept. 133-C
NEW ORLEANS, LA.

World's Largest Frog Market

You get a fast clean cut



KEYSTONE K-61 HOLLOW GROUND COMBINATION SAW

YOU get a fast, clean cut when you use the **Keystone Home Workshop Saws** that **DISSTON** makes for you. They fit your machine, suit your work, stay sharp, make good results easy. Cross Cut, Rip, Combination; also Hollow Ground Smooth-cutting Combination. Diameters: 6", 7", 8", 10", at \$1.00, \$1.25, \$1.40, \$1.80; Hollow Ground, \$2.50 up. In Canada, prices slightly higher.

Ask your dealer for Disston-made

KEYSTONE

Home Workshop

SAWS and TOOLS

Write us for valuable home workshop aid FREE—the "Disston Saw, Tool and File Manual". Henry Disston & Sons, Inc., 311 Tacony, Philadelphia, U. S. A., Canadian Factory: Toronto.

425-POWER \$18.50

Produced by Lens Specialists



Highest magnification you can buy at anywhere near this price. Fine optical quality, too—made by same experts who produce our world-famous movie and portrait lenses. Magnifications, 100 diameters to 425. Corrected for photomicrography. At dealers, \$18.50. Or direct (check with order or C. O. D.) postpaid, under money-back guarantee. Other Models: 110 to 235-power, \$15.50; 70 to 150-power, \$12.50; 100-power, \$5.00; Home Slide-making Set, \$3.50.

Write for Free Catalogue

Wollensak Optical Co., 895 Hudson Avenue, Rochester, N. Y.

Wollensak

TELESCOPES
MICROSCOPES
BINOCULARS

MAKE MONEY AT HOME

Home Industries Bi-monthly Will Show You How
Hundreds of plans, schemes, ideas and suggestions for a business of your own. Also many offers of money making books, specialties, etc. 6x9 inches, 32 pages. Six months' trial subscription, 10 cents. Home Industries, Box 84, Irvington, Neb.

BABY CALCULATOR
CHICAGO U.S.A.
PATENT APPLIED FOR

COMMON

ADDITION
SUBTRACTION
MULTIPLICATION
DIVISION

VEST POCKET ADDING MACHINE

Adds, Subtracts, Multiplies, Divides. Does work of costly machine. Not a toy. Million dollar capacity. Simple and accurate. Guaranteed 5 years.

FREE TRIAL \$2.50
—SEND NO MONEY— Total Cost

Just name and address. We will ship Calculator immediately. On delivery pay postman \$2.50 (plus few cents postage). (If outside U. S. send cash.) 10c additional in Leatherette Case. If not satisfied after 10 days' trial you get your money back. THOUSANDS OF SATISFIED USERS. Write for Agents' Proposition. CALCULATOR MACHINE CO. (Mrs.) P. O. Box 1118, Dept. 31, CHICAGO, ILLINOIS

110 Volts A. C. in Your Car or Motorboat



Easy to Install. No Drain on Car or Boat Battery. Ruggedly constructed and fully guaranteed against factory defects. Once installed, requires no upkeep.

Operates from the fan belt and draws no current from car or boat battery. Fits any type of car or boat engine. Delivers 110 Volts A.C. for Camp Lighting, Radio Receivers, small Speech Amplifiers, Neon Signs, Spot Lights, small motors and Electrical Appliances. POWERACK delivers the same electric current as you have in your home. Indispensable for the camper, tourist, traveling salesman, and Doctor or for emergency or Towing Cars. Can also be used for farm lighting at fixed locations.

THIS OFFER IS LIMITED—ACT NOW!

This is an introductory offer and only a limited amount will be sold at this price. Comes complete, ready for installation with mounting base, BX cable, Outlet Box, Output Control Rheostat and full operating instructions. Shipping Weight: 29 lbs.



Model 21 — 50 Watts

\$9.50

F. O. B. New York City
Cash with Order

THE POWERACK COMPANY
224 West 30th Street, New York City, N. Y.

A
Marvelous
Tool!



Simplex Ball Bearing Jack

NEW! Here's a wonderful, new Ball Bearing Jack—just 3 inches high, yet it lifts more than 500 lbs. It's a real jack, not a toy, just the tool you want in manual training or on work bench.

BOYS! This miniature Simplex is just like the Big Simplex Jacks used by bridge builders, house movers and railroads. **Suggest to Dad** that he, too, can use a Simplex Jack for all odd jobs around the house requiring lifting, straightening or supporting.

Sturdy and strong—beautifully finished in Red, Blue, Green or Orange Enamel, Chromium plated lever bar. Now for a limited time at 25c postpaid. If this little Simplex, an exact reproduction of the big Simplex Jacks found in leading hardware stores everywhere, isn't more than satisfactory, your money will be refunded at once.

25¢

POSTPAID
In Canada
35c

Mail the
Coupon
Today

TEMPLETON, KENLY & Co.
(Est. 1899) 1020 South Central Ave., Chicago, Ill.

I enclose.....for (check color).....Simplex Screw Jacks at 25c each. Money to be refunded if not more than satisfactory.

RED ORANGE BLUE GREEN

Name.....
Address.....

This Is Your Last Chance To Buy at Bottom Prices

FROM Maine to California, from Canada to Mexico, all over the world, thrifty, far-sighted people are going to take advantage of this last chance to buy quality watches and diamonds at these low prices.

We Bought These Watches for You at Bottom Prices

When these are gone, even our great buying power will not enable us to continue selling these fine watches at such low prices.

Send No Cash!

Think of it! You can take advantage of these bargains NOW and pay when prices have gone up. These watches are guaranteed for a lifetime of satisfaction not only by the Santa Fe Watch Company, but by the great Illinois Watch Factory. They are so accurate that railroad and government officials carry them—they are so beautiful and so perfect that jewelers say that they are worth from 1/2 to 1/2 more than we ask for them. We will send one to you and let you wear it for thirty days on trial.

Diamond Rings and Wrist Watches

Write for our New Diamond Ring of Romance and Bulova Wrist Watch Catalog, showing marvelous new designs at prices which cannot be continued. This catalog is FREE. All Watches and Diamonds sold on Easy Payments.

Don't Delay—Send for Catalog at Once

SANTA FE WATCH COMPANY
36 Thomas Bldg. Topeka, Kansas

Santa Fe Watch Co.,
36 Thomas Bldg., Topeka, Kansas.

Please send me the catalog I have checked.

Railroad and Dress Pocket Watches.....

Ladies' and Men's Wrist Watches.....

Ladies' and Men's Diamond Rings.....

Name.....

Address.....

WE BUY OLD GOLD

Cash for Old Gold—Gold Filled—Silver—Watches—Antique Jewelry. Goods returned in 10 days if you're not satisfied.

OHIO SMELTING CO., Inc.
315-P Hippodrome Bldg., Cleveland, Ohio

EARN MONEY WITH PERFECTED TENNIS RESTRINGING VISE

ENJOY CHEAPER TENNIS

Newly perfected Tennis Vise invention enables anyone to re-string tennis rackets at big savings or for BIG PROFITS. Just follow simple instructions. Save on your own tennis...earn money too! Write for Free details.

BUY Factory-fresh-Strings Save Cash

Now you can buy genuine GUT strings direct-from-factory-to-you. High quality, low cost! SILK strings, too. Our Free Tennis Equipment Catalog will SAVE YOU MONEY.

WRITE for your FREE copy today and details of Perfected tennis vise invention!

H. E. WILLS CO.
1047 W. 47th ST. Dep. 13-53 CHICAGO, U.S.A.

FREE TENNIS CATALOG

MFR. OF QUALITY GUT STRINGS

With MI-LOCO You Can Accomplish Amazing Results

Big new 48-page catalog of Mi-LoCo Truscale Railway Equipment—Lee B. Green built—reveals new era in model making: 100 pictures and drawings; You can build locomotives, cars, etc., easier, at lower cost, and get accuracy and fidelity hitherto impossible. Most remarkable book on miniature railway building ever published. Send today 35 cents, in coin if convenient.

The Miniature Locomotive Co.
14566 Lorain Ave., Cleveland, Ohio

DEAFNESS IS MISERY

Many people with defective hearing and Head Noises enjoy Conversation, Movies, Church and Radio, because they use Leonard Invisible Ear Drums which resemble Tiny Megaphones fitting in the Ear entirely out of sight. No wires, batteries or head piece. They are inexpensive. Write for booklet and sworn statement of the inventor who was himself deaf.

A. O. LEONARD, Inc., Suite 699, 70 5th Ave., New York

NEW LOW PRICED "PINLESS" CURTAIN STRETCHER!

PAY AGENTS UP TO \$10 IN A DAY

Saves time—eliminates ironing. Stretches curtains up to 48 inches wide—any length—in a jiffy. No pins to cause injury and tear costly curtains—no heavy wooden frames. Just two triple cadmium plated rods, and a hanger. Can't rust—lasts a lifetime. Low-priced.

EVANS MFG. CO. FREE SAMPLE OFFER!
Dept. 6673, Cincinnati, O.

BUILD YOUR OWN FANS. 20 inch aluminum propellers for aeroplane fans \$3.85. Shipped collect.

Michael Electric Co. Fort Worth, Texas

Men & Women Earn Cash at Home!

Grow fancy giant mushrooms in cellar, attic, barn Easy, odorless method. We show you how, furnish guaranteed materials and buy crops. Valuable big book, pictures free if you write quickly. (Est. 1908.)

UNITED CO. 3848 Lincoln Ave. Dept. PM-3, CHICAGO

Every Wood Craftsman Should Have This 100 Page Book No. 8

It is full of beautiful things that you can easily make—hard to find Woods. Lists and illustrates 76 Blue Print Designs for Scroll Patterns, Inlay Table Tops, etc.

New Process of Inlaying—22 Boxes, Bookends—Trays, Plaques, etc., Kits for which come complete—anyone can make these wonderful articles at a fraction of store cost. They make exquisite Home Decorations. Write today.

CRAFTSMAN WOOD SERVICE CO.
We Ship All Over The World
2728 MARY STREET CHICAGO

only 10¢



IF YOU GLUE ANYTHING
Glue it to stay

CASCO Glue fixes Teakwood Table after everything else fails!

You can benefit from the experience of A. M. C. of Tujunga, Calif., who writes:

"I have a coffee table of teakwood and a stand. Both of them with six legs and twelve glued joints. I have tried both hot and cold glue and three kinds of marine cements, but all would loosen in from six to twelve months. It is about eighteen months since I gave them a liberal coating of CASCO Waterproof GLUE. Today, they're as good as new, in spite of the fact that this climate is the absolute limit for wood shrinkage!"

Build your own projects with CASCO and get a new idea of glue strength. Whereas ordinary glues set merely by evaporation, CASCO hardens chemically...and becomes proof against moisture and heat.

FREE!! GENEROUS TEST SAMPLE & HANDY REPAIR GUIDE

Write your name and address on penny postcard. Say "Send free sample and copy of 'Casco Gluing Guide.'"

Hardware, Paint, Lumber Dealers Sell CASCO

THE CASEIN MFG. CO. OF AMERICA, Inc.
352 Madison Avenue • Dept. 335 • New York, N. Y.



How to Build This Fine Trailer

Complete PLANS 2

With our set of 8 detailed blueprints you can build this 14' x 6'6" trailer, weighing 1700 lbs., exactly as illustrated—or in any other length desired. Correct designing and engineering in every detail. Itemized list of all materials, with prices and sources of supply included with plans. Mailed for \$2 postpaid. Send today.

Trailer Designing & Engineering Co., Box 54, Oak Park Station, Flint, Michigan

AT LAST! A REAL POCKET RADIO



Can actually be carried in pocket or purse! No tubes—batteries—nothing to wear out. NO Crystals to adjust! Simply clip to any metal object as desks, beds, telephones, etc., for clear reception locally! One control—gets all stations 50 up to 100 miles under favorable conditions. Short Wave and police calls also! No complicated hookups. Fool-proof—and practical—great novelty. Can be used ANYWHERE ANYTIME—in auto, etc. Complete with tiny phone—NOTHING else to buy—ready to listen to! Send only \$1.00 and pay postman \$1.95 plus postage or send \$2.90 (M. O. Currency Check.) Ideal gift. Complete Ina, Included, Guaranteed. Order now!

TINYTONE RADIO CO., Dept. (P3) Kearney, Nebraska

REWARD!!! WE PAY UP TO \$2500.00 EACH FOR OLD COINS
Liberty Head Nickels worth up to \$200.00 each; Dimes \$325.00; One Lincoln Head Pennies \$2.00. Send 10c TODAY for our catalog of all United States coins, which lists the prices we pay, Dept. HG2, CONTINENTAL COIN CO., Incorporated 111 W. Jackson Blvd. Chicago, Ill.

MAKE MONEY PRINTING

letter and billheads, circulars, cards, for friends, spare time. Easy to learn, easy to get jobs. Printing Presses \$12; new type faces, complete supplies, lowest prices. Send stamp for catalog. PEIFFER CO., 32-A; 6 Columbia St., Newark, N.J.

TEAR GAS Protection DEVICES

Send Today for Big Illustrated Catalog showing complete line of Tear Gas devices for protection of life and property. AGENTS Wanted for this quick-selling long-profit non-competitive line. LACHRYTE CORP., P. O. Box 1719 Dept. D80, Chicago, Ill., U.S.A.

CHEMISTS NEW CATALOGS

Catalog listing 10,000 chemicals, drugs, flavors, etc., and 1,700 Scientific Books, sent for 25c. Catalog with 3,000 illustrations of laboratory apparatus, 50c. Glass Still as illustrated, Cap. 1 Qt., \$9.00. LABORATORY MATERIALS CO., 639 E. 71st St., CHICAGO, ILL.

new Invention SAVES GAS!

CUTS GASOLINE COSTS up to 30%

Creates New Mileage Records It's Here! VACU-MATIC—"The Carburetor That Breathes!" AUTOMATIC CONTROL guarantees constant peak performance. More power, smoother running, quicker starting. Fits all cars; installed in a few minutes.

Don't wait! Just send name and address for details about VACU-MATIC and our FREE TRIAL OFFER. Write Today! AGENTS WANTED

VACU-MATIC CO. 7617-81 W. State St., Wauwatosa, Wis.

When writing please mention Popular Mechanics

Rifle Shooters!
Helpful Information FREE!



Coupon below brings valuable shooting booklet ABSOLUTELY FREE. Full of helpful information. Tells how to improve your shooting. Contains many pointers you'll be glad to get. Interesting to tyro and expert alike. Learn about remarkable shooting that is possible with Western Super-X long range .22 smokeless cartridges and Super-Match .22 Long Rifle smokeless.

One shooter says: "The Super-X .22 Long Rifle packs a wallop great enough to finish the ravaging career of woodchucks at distances of 90 yards and more."



MAIL COUPON TODAY!

Western Cartridge Company, Dept C-46, East Alton, Illinois

Send your FREE booklet on small bore rifle shooting and information on Western rim fire cartridges.

Name.....
Address.....
Post Office.....State.....



Catalog No. 35 Illustrating Electrical, Mechanical and Model Makers' Supplies, Small Steam & Gasoline Engines, Motors, Generators, Lathes, Drill Presses, Bench and Band Saws, etc., 16 & 32 Dyna-Motors, School Projects, Engine Castings, Motor Parts, etc., Books, Blue Prints, Brass and Steel Tubing, Gears, Pulleys, Hangers, Experimental Material.

Big Copy. Mailed anywhere for 30 cents. 25 cents Canada, refunded first order.

LOOMIS ELECTRIC COMPANY
2822 N. California Ave. Chicago, Ill.

KINKADE GARDEN TRACTOR

and Power Lawnmowing Attachments
A Practical, Proven Power Cultivator and Plow for Gardeners, Suburbanites, Truckers, Florists, Nurserymen, Fruit Growers and Poultrymen. Low Prices—Easy Terms.

AMERICAN FARM MACHINE COMPANY
1058 33rd Ave. SE. Minneapolis, Minn.



new- READY SHAPED LOW COST RACING CRAFT



Get this sensational sailboat kit. Make authentic speed models in a few hours. All the hard work is done for you. Hull is already shaped and hollowed. Needs only smoothing down and painting. Then you "step" mast, adjust sail, rigging and rudder and she's ready, to launch! Watch her go! See her outdistance all competition. Easy to follow instructions and all necessary parts furnished.

KITS AS LOW AS 25c. Buy Racing Craft Kits at dealer or department store. If they can't supply send money order for 7" solid hull kit, 35c; 15" hollow hull kit, \$1.00; or 22" hollow hull kit, \$2.50. Sent prepaid in U. S. All materials guaranteed. Send for Big Free Thornecraft Book, shows lister sailboats, Speed Scout Motorboats, Raceboat, and Buck Rogers Stratosphere Balloon.

SEND FOR FREE BOOK

THORNECRAFT

Dept. 3, 2518 Montrose Ave., Chicago

LEE JELT DENIM DEFEATS TUBBING and RUBBING!



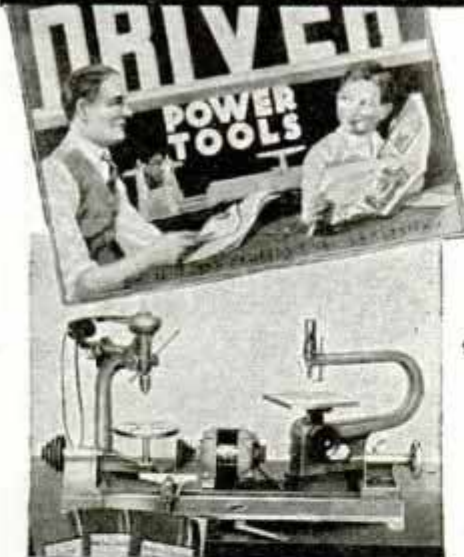
EXTRA YARN GIVES LEE OVERALLS AMAZINGLY LONGER LIFE

WEIGH a Lee—then an ordinary overall. Wash them. Weigh again. See how much heavier the Lee is, now that starch and cheap filler are soaked out of the ordinary pair! That's because Lee alone is made from heavy, tough *Jelt Denim*, with 1716 extra feet of yarn in every pair. 22 other exclusive features besides. No wonder the Lee wears months longer—saves you MANY DOLLARS. *Insist on Lee.*

THE H. D. LEE MERC. CO., Dept. C-171
Kansas City, Mo., Salina, Kan., Trenton, N. J., South Bend, Ind., Minneapolis, Minn., San Francisco, Calif.

UNION-MADE
Lee OVERALLS
UNION-ALLS — SHIRTS — PANTS — PLAY-SUITS

A HOME WORKSHOP



Send for **FREE 40 Page Catalog**

Shop as illustrated including three 72 page Instruction Books
\$49.95

Scores of men in every community find relaxation in their home workshops. Working in wood and metal . . . creating attractive and useful articles of furniture, novelties and toys.

A few years ago a home workshop was an expensive luxury which only a few could enjoy, today finest quality Driver Power Tools are well within the reach of all. Driver Power Tools which popularized the home workshop idea—provide superior quality at lowest possible cost.

If you want to know the most about your Power Tools send for free folder on new Driver Instruction Books.

WALKER-TURNER CO., Inc.
135 Berckman St., Plainfield, N. J.

Please send 40-Page Catalog. Check here . . . if you want free Instruction Book folder.

Name.....

Address.....

When writing please mention Popular Mechanics

DEPENDABLE POWER WITH THIS LOW-COST TRACTOR



New Air Tires!

New models equipped with popular low pressure balloon tires for greater speed and economy or standard steel wheels with pyramid lugs, if you prefer.

Models for every need, 1 to 5 H.P., walking and riding types; air cooled engine; gear shift with 3 speeds forward and reverse; attachments for every kind of farm work. Write for FREE CATALOG picturing all models and giving LOW FACTORY PRICES

Save at Factory Price!

Buy direct from factory and save! Famous SHAW DU-ALL TRACTOR saves time, labor and money. Dependable. Guaranteed. Just the thing for farms, truck gardens, orchards, nurseries; poultry farms, ranches, estates, golf courses, etc. Plows, harrows, discs, furrows, seeds, cultivates, harvests, mows, rakes, and hauls hay, mows lawns, cuts tall weeds, operates washing machines, concrete mixers, wood saws and other belt machinery. Easily operated by woman or boy. Handles adjustable.

10 Days' TRIAL

Use it 10 days at our risk. Write for generous offer. Address nearest office.

SHAW MFG. CO., Desk 4503

GALESBURG, KANSAS
COLUMBUS, OHIO
5812 Magnolia, Desk 4503, Chicago, Ill.



AGENTS

Write nearest office for Generous Offer to Agents. Make big money demonstrating SHAW DU-ALL Tractors to your neighbors.

MAKE MONEY SPARE OR PART TIME

Make Colorcrete products. New designs—fascinating work—easy to make—we tell you how. You use local materials that cost but a few cents per piece. Finished products sell for \$1.00 up. 40 designs and over 30 beautiful colors and shades available for porches, gardens, lawns, cemeteries, golf courses, etc.

Now is the time to start. Be ready for the big spring demand. Operate either part or full time. Then expand from earnings. We furnish metal molds for making thousands of each design \$20 up. Exclusive territory protected by franchise. Learn about this great opportunity today. Send for free catalog No. 22.

COLORCRETE INDUSTRIES, Inc.
570 Ottawa Ave. HOLLAND, MICH.

BUILD IT YOURSELF

JIM DANDY CABIN TRAILER
Classy! Roomy! Easy to build at low cost! Plans and instructions only \$1.00—include all Diagrams, Sketches, Photos, Material List, etc. Big Value! Mail Dollar Bill to Jim Dandy, Box 125-A, Wausau, Wis.



Print Your Own

Cards, stationery, circulars, tags, labels, advertising, etc. Save money. Print for Others; Big Profits; easy rules sent. Will do popular Raised Printing like Engraving. Junior press \$5.90, job presses \$11 up. Send for catalog and all details.

THE KELSEY COMPANY, A-37 MERIDEN, CONN.

STRING your own RACQUET

Same Quality String As in Expensive Racquets. Easy to restring racquets—better than new. Saves real money. Send for this professional outfit today. Good profits made restringing other players' racquets. 37 ft. string, colors Purple, Green, Red or White—also Scarlet and Black Spiral—with contrasting silk trim, awls, illustrated easy directions. Money back guarantee.

MAKE MONEY TOO! Send check or Money Order \$1.65 which includes Postage and Insurance. Sent C.O.D., if desired, 15c extra.
Pro Tennis String Co., Dept. Q-7, Harmon, N.Y.

A BEAUTIFUL TABLE

*Beautifully
finished*



A photograph cannot do justice to this beautifully inlaid table. It deserves the permanent place it occupies in the maker's living room.

"Couldn't have finished it like that without a Stanley Router-Shaper" was the comment of the amateur who built it.

With a Stanley Router-Shaper in your workshop you too can make more complicated models and turn out work to compare with that of a master craftsman.

For corner beading, dovetails, inlaying, dado, rabbet and molding cuts, carving and other finishing operations this Router-Shaper is not approached by any other equipment. It is a quality machine with a speed of 18000 R.P.M. — the ideal speed for woodworking.

Send for this descriptive catalog. It will show you a new, inexpensive way of doing things you haven't been able to do before.



STANLEY
STANLEY ELECTRIC TOOL DIVISION
THE STANLEY WORKS
105 Elm St. - New Britain, Conn.

STANLEY ELECTRIC ROUTER-SHAPER

Made by the Makers
of the World Famous STANLEY TOOLS

ONE-MAN SAWMILL FARM MODEL 549

TURN TREES INTO MONEY WITH A BELSAW!

Makes lumber, shingles, lath, ties, crates, boxes, cases, all forms lumber

Three capacities: 10, 14 and 20 feet. Accurate set works, positive dogs. Full or one-way type power feed runs on low power—many owners use old auto engine.

Pays for itself quickly—thousands in commercial service, everywhere. Write for free lumber handbook and catalog of mills, supplies, tools, saw tables, and woodworking equipment.

BELSAW MACHINERY CO.

811-B Davidson Bldg., Kansas City, Mo.

New LAWN ROLLER

Wonderlawn Roller is the finest, most efficient roller available. Assemble it yourself and save money. Get parts direct from manufacturer. Sturdy steel construction bronze bearings. Lasts a lifetime. Write today for FREE literature and full information.

WONDERLAWN PRODUCTS CO.
22228 Grand River, Detroit, Mich.



**MONEY-BACK
GUARANTEE**

AMAZING NEW 1935 ALL ELECTRIC ALL WAVE RADIO!

NEW SENSATION STARTLES
RADIO WORLD!

A complete ALL ELECTRIC—ALL WAVE radio for only \$6.95. Not a toy—a real receiving set that brings in standard broadcasts, police calls, amateur broadcasts, and airplane calls just like the most expensive radios. Beautiful metal cabinet. Amazing selectivity—full vision dial—single knob volume control—wave band lever.

SEND ONLY \$1.00 pay the balance \$5.95, plus a few cents postage, when your radio is delivered. Write for FREE details.
STEINBERG, Inc. Dept. PM-3 Cincinnati, O.

Only
\$6.95
COMPLETE
With Earphone

POLICE-AIRPLANE-AMATEUR AND STANDARD BROADCASTS

A NEW AND REVOLUTIONARY IDEA IN AUTOMOBILE BRAKES

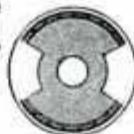
For
**FORDS and
CHEVROLETS**

Install it Yourself and enjoy 4 TIMES GREATER BRAKE EFFICIENCY

The biggest advance in brake engineering ever offered to the American motorist — HAWLEY Floating Lining BRAKES. A single piece of brake lining floating between the drum and an expanding shoe. Covers the entire brake drum circumference. Gives, 4 times the usual braking surface on each wheel. No grab, chatter or squeal. No drum scoring—prolonged lining life. Assures quick, quiet braking—safer high speed stops on slippery roads.

HERE'S HOW THIS AMAZING NEW PRINCIPLE WORKS

The
Old
Way



2-piece lining equal to about 50% of drum circumference — breaking surface on one side only — riveted to complicated mechanism.

The
Hawley
Way



1-piece lining floating between drum and shoe—covers entire drum circumference — brakes on both surfaces. No rivets.

**Easy to Install—Cost Only \$21.00
\$7.00 Down—Balance 2 Monthly Payments**

No holes to drill. No special tools required. Average mechanically inclined man can install in 2 hours. Simply remove wheel and hub assembly—slip on HAWLEY assembly, put lining into place, remount wheel and adjust brake rods. A tremendous addition to motoring safety for only a few dollars more than an ordinary relining job. Mail coupon for full information.

Wanted—Dealers and Distributors
Many good territories still open. Write for details.

HAWLEY FLOATING LINING BRAKES

HAWLEY BRAKE CORP.
CORNING, NEW YORK

I am interested in HAWLEY FLOATING LINING BRAKES.

for my car

for resale

Name.....

Address.....

City.....

The name of a good independent garage in my community

is.....

When writing please mention Popular Mechanics

TROUSERS PRESSED IN A FEW MINUTES BY ELECTRICITY Brings in Quick Cash!



**JUST LOOK
AT THAT
CREASE! MAN
—WHAT A
DEMONSTRATION!**

**AGENTS! Here's that
QUICK CASH you want!**

Robinson made 51 sales in one bank. K. Leaberry made \$367.00 in one month—made 42 sales in one day. Agents the country over are cleaning up quick cash with this amazing new invention—a new, low priced ELECTRIC presser, that puts razor edge creases in trousers in a jiffy. Quick, easy demonstration makes all men want it. Saves scores of pressing bills—made of beautiful plated steel—complete with 6 ft. rayon cord—weighs less than 8 ozs.—individually packed in beautiful gift boxes—backed by a full year's guarantee. Don't send money—simply your name and address. Without experience or investment risk we start you. Write quick—territories going fast.

**Sample Presser
FREE
Without Extra
Charge**
Complete outfit weighs 10-ozs., easily carried in your pocket. Write now for all the details—FREE.

**THE
FINISHED
JOB
1/4¢**

**THE EMPIRE
ELECTRIC CO.**
Dept. 42, Cincinnati, Ohio

**Exhibited at
World's Fair!**



LET YOUR MOTOR PAINT YOUR CAR IN ONE HOUR ALSO FURNITURE

"AUTO SPRAY"—a professional needle valve spray gun, large capacity compressor (fits all cars), air cleaner and water trap, enough air hose to reach around car; 40-page book, "Painting Secrets for the Amateur"; and enough 10-minute-drying, high-gloss, best-grade auto enamel (any color) to paint whole car. Send \$6.90 for complete outfit, postpaid. State color wanted. Fully guaranteed. Or send stamp for circular and enamel color card. Auto Spray Co., 132 E. Palmer, Compton, Calif.

No experience necessary to do professional work with this equipment.

HIGH POWERED TELESCOPE

GENUINE BROWNSCOPIES AT AMAZING PRICES

Most powerful in America for the money! 15 power long range telescope. Can see moon's craters or time on pocket watch a block away. 5 sections. Approx. 3 ft. long. Fine lenses. Brass bound. Can be used as powerful microscope. Vol. magn. 512X. Only \$1.69 postpaid. C. O. D. 24c extra

\$1.69

Special Super-Power 30X Telescope. Similar to above but more powerful. Guaranteed to see 900 times larger in aerial lenses. Large field. Includes powerful microscope feature. Only \$1.98 postpaid.

BROWNSCOPE CO. Dept. 43 234 Fifth Ave., New York, N.Y.

"Jorgensen" CLAMPS

Jorgensen for firm joints, greater strength, handiness and long life. Furniture factories and cabinet makers insist on genuine "Jorgensen" Handscrews that grip straight on at angles. Will not split, spread or loosen. (2 No. 1 Handscrews 10-inch jaws, open 6 inches, \$2.80 plus postage, 6 lb.) "Pony" Fittings that go on ordinary 3/4" pipe to make clamps of any length. (Fittings for 2 "Pony" 500 Clamps, \$3.00 plus postage, 6 lb.)

ADJUSTABLE CLAMP CO., "The Clamp Folks"
421 N. Ashland Ave., CHICAGO, U. S. A.

Write for Free Catalog

Give RADIO'S AWAY!

Earn up to \$100.00 WEEKLY

NEW MONEY-MAKING PLAN for AGENTS, SALESMEN, DISTRICT MANAGERS. NO EXPERIENCE. PROFITS START IMMEDIATELY LOG CABIN RADIO. Amazing little 7 lb. portable AC & DC radio for home, office, auto, farm, etc. Wonderful tone. Gets police calls. \$30 value. Licensed by RCA and associated companies. Write at once. We'll show you how to make big money giving away these wonder radios and over 30 other popular items.

LEVORE CO., 844 W. Adams St., Dept. 44, Chicago

Like Taking LIGHTED Cigarettes from Your Pocket

MAGIC CASE AMAZES EVERYBODY
Gaze in wonder while I show you a new way to smoke. LOOK! I take a beautifully smoked case from my vest pocket. I touch a magic button! There is a Spark... a Flame. Just one motion... the pressure of one finger delivers a LIGHTED cigarette to my lips. I PUFF and SMOKE! No matches or separate lighters necessary.

15-DAY TRIAL OFFER
Get a Magic Case on 15 days' trial at our risk. Get amazing facts how this great invention can make you big money without selling.

Agents
Get facts that fairly scream big profits.

Magic Case Mfrs., Dept. C-379
4234 Cozens Ave., St. Louis, Mo.

For Economy BUY—For Income SELL

The **EIFEL-GEARED PIERRENCH KIT**

NEW 7" and 8 1/2" Sizes—
Each with 3 instantly changeable Jaws
A \$50 Service at the Cost of One Tool!
Mail this Ad Today with your address
Get **FREE**—7-Edge End-&-Angle
Screwdriver, 101 Picture Manual of Mechanics, with
 User Offer, or Distributor Territory and Free Kit Offer.
Be a Pierrench Man, They're making \$35 to \$125 Weekly!

AMERICAN PIERRENCH CORP'N CPM-4809 N. Ashland Ave., CHICAGO, ILL.

BUILD DUTCH WINDMILLS

Lighthouses, Lawn Figures, etc.

BEAUTIFY YOUR GARDEN
24" High x 20" long, winds operate former NEW MODEL 830 at buck saw. Operates in the slightest wind. Plans and instructions only 45c. **WINDMILL**

SPECIAL OFFER: Knock-down Kit for Model 830 Windmill Only \$4.10 (Regular Price \$5.75). OTHER PLANS (ACTUAL BLUEPRINTS): Model 825 (Wings operate girl churning butter) 50c. Model B10 (Hexagon style, 30" high) 75c. Model H10 Lighthouse (Octagon style 40" high), \$1.00.

Send 10c for Illustrated Catalog.

CRAFTSMAN'S MODEL CO.
2030 N. 41 Street, Dept. P-3 Milwaukee, Wis.

IF YOU'RE INTERESTED IN ARC WELDING PROFITS

This new Hobart "Simplified" Welder lets you start big paying business of your own—lets you make hundreds of dollars extra profit each month. Unusually low prices lets you easily pay for it out of increased profits it brings.

get this NEW Arc Welding Book FREE

**30 DAYS TRIAL
AT OUR RISK
\$30 MONTHLY!**

Thousands of shops are earning big money with Hobart—cash in on the profitable jobs and construction work it lets you handle. Comes in 125, 250, 300 and 400 ampere sizes. Electric, Belted or Gas Engine Driven. Write us today for new low prices and **FREE ARC WELDER MANUAL**.

HOBART BROS.
Box M-351 Troy, Ohio

BOYS! THROW YOUR VOICE



Into a trunk, under the bed or anywhere. Lots of fun fooling teacher, policeman or friends.

THE VENTRILO

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. 847 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.

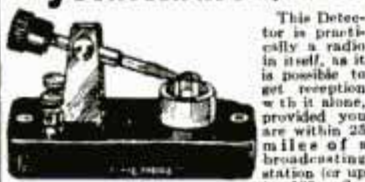
PRICE 15c Each, 3 for 40c. Shipped by Express, not prepaid.



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 35c

This Detector is practically a radio in itself, as 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 connecting much easier, also making it possible to make changes quickly. Everything complete, including the stand, crystal cup, arm with cutwhisker and necessary screws, an ultra sensitive crystal of the finest grade, two terminals for wire connections mounted in handsome housing.

EVERYTHING COMPLETE FOR ONLY 35 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, lacy, 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.

Price for Complete Outfit, only 25 cents postpaid.

WONDERFUL X-RAY TUBE



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 head in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. Price 10c, 3 for 25c, post.

250 Magic Tricks

An excellent little book containing nearly 300 tricks for parlor or stage that anyone can do. Tricks with cards, coins, handkerchiefs, eggs, bottles, string, etc. Also Second Sight, Shadowgraphy, etc. Profusely illustrated. 10c postpaid.

125 CARD TRICKS and sleight of hand. Contains all the latest and best card tricks as performed by celebrated magicians, with exposure of card tricks used by professional gamblers. Price 25c postpaid.

SNAPPY JOKES. A splendid collection of rich and rare jokes, compiled by a jolly bartender for stag parties, smokers, etc. 10c.

FORTUNE TELLING BY CARDS, dice, dominoes, crystal, etc. Gives meaning of every card, how to deal and lay them out, etc. Price 10c postpaid.

LEARN TO HYPNOTIZE. Book tells how to hypnotize, how to produce sleep, how to awaken a subject, medical hypnotism, hypnotism in diseases, how to hypnotize animals, etc. Price 10c postpaid.

STAR TOY MAKER



Greatest boys' book written. Tells how to make a Pinhole Camera, a Cannon, model Railroad, a Telephone, Boomerang, Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, a Dog Sled, Bird House, Rabbit Yard, etc. 64 pages. 100 illustrations. PRICE 10c.

MIDGET BIBLE. Size of a postage stamp. Over 200 pages. Remarkable curiosity. Said to bring good luck. Price 15c postpaid.

DREAM BOOK AND FORTUNE TELLER. Tell your own fortune. With dictionary of dreams and interpretations, lucky numbers, oracles, divinations, palmistry, etc. 10c.

HOW TO TIE KNOTS. 32 page book tells how to make different knots, hitches, splices, etc. 100 illustrations. Price 10c postpaid.

5-MINUTE HARMONICA COURSE. A new easy self-teaching method. Teaches how to play, to use the tongue, tremolo, fully illustrated. Price 15c postpaid.

BOY ELECTRICIAN

Book tells all about electricity in simple language. How to make batteries, dynamo, motors, telephones, bells, coils, engines, lights, telegraph apparatus, alarms, radios, etc. 64 pages. Fully illustrated. PRICE 10c postpaid.

JOHNSON SMITH & CO.
 Dept. 847 RACINE, WIS.
 A copy of our NEW CATALOG mailed on receipt of 10c., or the De Luxe Edition with cloth binding 25c. Bigger and better than ever. Only book of its kind in existence. Contains all the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, rubber stamps, unusual and interesting books, curiosities in seeds and plants, etc., unobtainable elsewhere. Remit by Coin, Money Order, Check or unused U. S. Postage Stamps, for all articles listed above, Canadian money, stamps, Postal Notes and British P. O. Orders accepted.

PEA-MATIC REPEATER-12 SHOT



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 Holster for Pea-matic 50c.

25c Post-paid.

The Art of DANCING



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.

25 CENTS Postpaid

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.

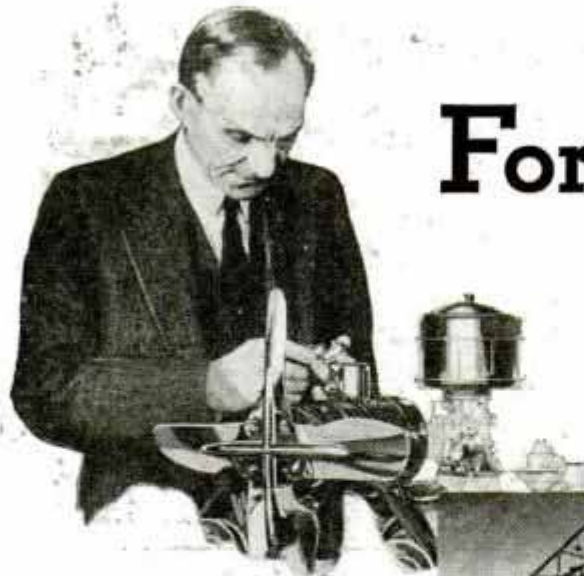
BLANK CARTRIDGE PISTOL

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. 847, Racine, Wis.



Mr. Henry Ford inspects a part of the history-making Ford V-8 engine. He insists on the finest materials and workmanship.

THE most important material used in automobiles is steel; more steel is used than anything else. Ford uses thirty-six different kinds. Most people haven't any idea that there are so many steels, each with a different analysis. Some are low in carbon content, others high. Many contain elements — nickel, tungsten, chromium, molybdenum, vanadium—used to secure high physical properties.

The quality of much of the steel used in Ford cars and trucks is controlled at its source—in the Ford steel mills. Grades of steel are selected to provide high physical properties in all Ford parts. That's why they have high quality.

Skill in manufacture is important, not only in development and selection of material but in the production of parts. Ford uses many new and unusual methods of casting, machining and inspecting. Some were thought to be too scientific, too expensive to be used for producing auto-



mobile parts — until they were put into use in the Ford factory.

Precision has much to do with the quality of parts. The precision limits set for Ford parts established new high standards. Modern science is used in the manufacture and inspection of Ford parts. Inspection machines that have photo-electric cells, or electric eyes, and audio amplifiers like those for radio, are used to check precision. Automatic machines, for example, can inspect 1500 piston pins an hour. And if they vary in dimensions more than one ten-thousandth of an inch they are auto-

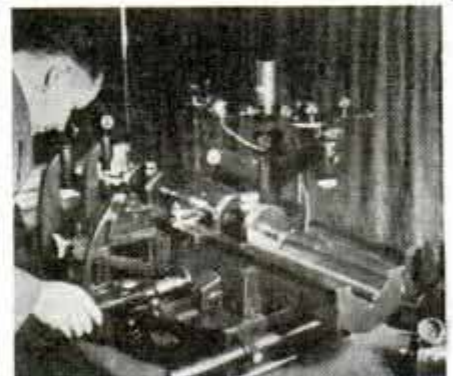
Ford Materials and Methods

The quality of much of the steel used in Ford cars and trucks is controlled at its source—in the Ford steel mills.

matically rejected. The high capacity of these machines makes it possible to inspect every single piston pin, rather than a percentage of the production. Such methods further insure the high quality of Ford parts.

Experience and equipment in manufacturing is vitally important. Without it there would be no certainty of high quality. That is another reason why Genuine Ford Parts are so dependable in quality—the best parts you can buy for Ford cars and trucks.

Make sure that you get Genuine Ford Parts. Buy them from a Ford dealer or from garages that display the Genuine Ford Parts Sign.



Checking the angle, pitch, diameter and lead of thread gage by an improved optical method.

FORD MOTOR COMPANY, Dearborn, Michigan

ANNOUNCING AMAZING TYPEWRITER BARGAIN

BRAND NEW MODEL No. 5
**REMINGTON
 PORTABLE**
10¢ A DAY
 MONEY BACK GUARANTEE



**10 DAY
 FREE TRIAL
 OFFER**

FREE EASY HOME TYPING COURSE

● Positively the greatest portable typewriter bargain ever offered! Now for the first time Remington, world-famous manufacturer, offers a NEW purchase plan... only 10¢ a day buys this latest model machine! Not a used or rebuilt typewriter. Not an incomplete machine. A beautiful brand new regulation Remington Portable. Standard 4-row keyboard; Standard width carriage; margin release on keyboard; back spacer; automatic ribbon reverse; every essential feature found in standard typewriters!

Money making opportunities always open

Hundreds of jobs are waiting for people who can type. A typewriter helps put your ideas on paper in logical, impressive form... helps you write clear, understandable sales reports, letters, articles, or stories. A Remington Portable has started many a young man and woman on the road to success.



A Gift for Every Member of the Family

If you want a gift for birthday, Christmas, or graduation... one that Father, Mother, Sister or Brother will use and appreciate for years to come... give a Remington Portable. It's the one gift that can be used with both pleasure and profit by every member of the family.

ACT...WHILE LOW PRICE HOLDS GOOD!

New wage scales in our own factories, and in the factories of the companies which make our materials, point definitely to higher prices. Stocks of machines on hand make possible the present unbelievably low cash price on this machine. Everything points to higher prices. We cannot possibly guarantee this low price in the face of constantly rising costs in every one of our departments. So we say... "Act fast!"

10 DAY FREE TRIAL OFFER

You can try this machine for 10 days without risking one penny of your money. Not even shipping charges. Send for complete details on this most liberal offer. Get attractive new catalogue illustrating and describing the many Remington models available on unusually low terms. Clip coupon today!

EVERY ESSENTIAL FEATURE found in Standard Machines

Buying a typewriter isn't like buying a suit of clothes. Many Remington portables, seeing 10 years of hard service are still in active use. When you buy... buy a machine with every standard feature. The Remington No. 5 is the most compact and durable portable ever built... includes all essential standard typewriter features. This beautiful machine

represents the height of economy... unequalled economy in first cost... unequalled economy in service.

It is today the best value ever offered in typewriter history... and that statement comes from the company that has constantly made typewriter history. Buy now. It is a real bargain offer.

Specifications...

The Model 5 includes every essential feature found in standard typewriters. It has standard 4-row keyboard, complete visibility, standard width carriage for long envelopes. Carriage return lever of exceptional design for easy and rapid operation.

tion. Margin release on the keyboard. Automatic ribbon reverse. Back spacer. Two color ribbon shift.

Variable line spacer. Adjustable margin stops. Auto set Paragraph Key (one of the most useful features found on any typewriter). Weight 11 lbs. 13 oz. Furnished with Pica or Elite type.

TYPING COURSE **FREE**

When you get your new Remington No. 5, you will get with it... ABSOLUTELY FREE... a 10-page course in typing. It teaches the Touch System, speeds up work. It is simply written and well illustrated. Instructions are easy as A.B.C. Even a child can understand this method. A little study and the average person, child or grown-up, becomes fascinated. Follow this course during the 10-DAY FREE TRIAL OFFER that we give you on your typewriter. At the end of that time, you should be able to dash off letters faster than with pen and ink.



CARRYING CASE **FREE**

With every Remington No. 5, a FREE carrying case sturdily built of 3-ply wood. Covered with heavy DuPont fabric. Top is removed in one motion, leaving machine firmly attached to base. Can be used anywhere... on knees, in chairs, on trains.



Remington Rand Inc., Dept. 152-3, Buffalo, N. Y.

Please tell me how I can buy a new Remington Portable typewriter for only 10¢ a day. Also enclose your new catalog.

Name _____

Address _____

City _____

State _____

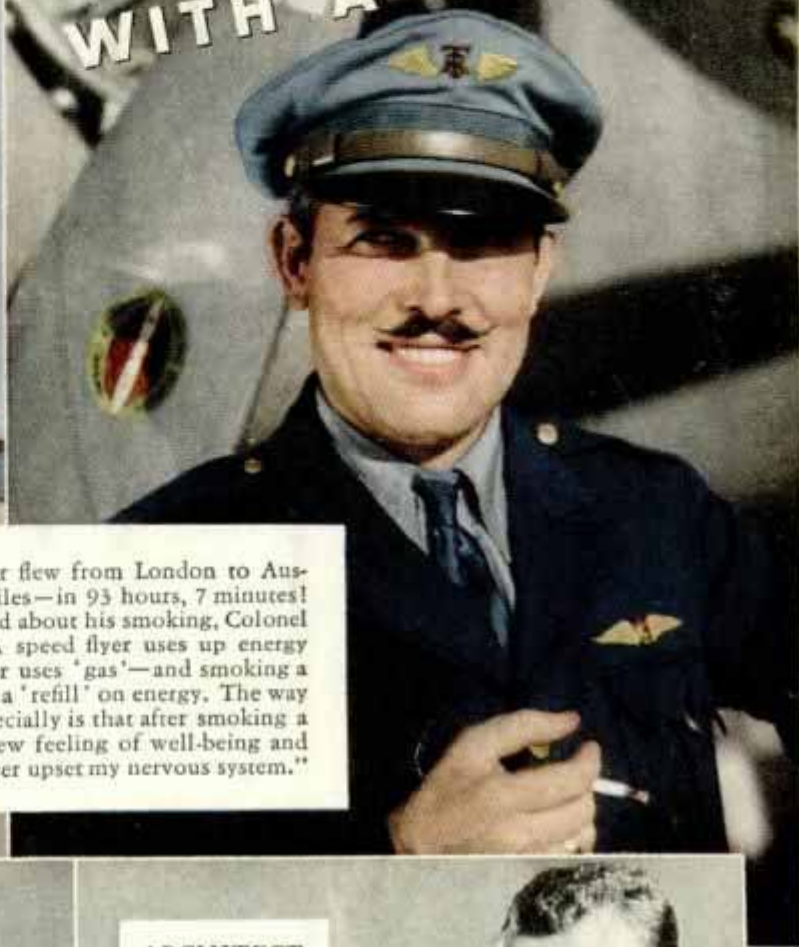
CLIP COUPON NOW

REMINGTON RAND INC., DEPT. 152-3, BUFFALO, N. Y.

TO WARD OFF
FATIGUE . . .



GET A LIFT
WITH A CAMEL!



• Roscoe Turner flew from London to Australia—11,323 miles—in 93 hours, 7 minutes! When questioned about his smoking, Colonel Turner said: "A speed flyer uses up energy just as his motor uses 'gas'—and smoking a Camel gives one a 'refill' on energy. The way I notice this especially is that after smoking a Camel I get a new feeling of well-being and vim. Camels never upset my nervous system."

PHYSICAL INSTRUCTOR.
Charles Adams:
"A Camel gives me a sense of renewed vim . . . and Camels never interfere with healthy nerves."



ARCHITECT.
W. R. Ballard reports as follows: "Whenever I feel listless, a Camel restores my energy. And my mind's clearer."



LEAF-TOBACCO EXPERTS AGREE:

"Camels are made from finer, More Expensive Tobaccos—Turkish and Domestic—than any other popular brand."



MRS. LANGDON POST,
young society leader: "When tired, I find that smoking a Camel gives me a 'lift.'"

*You Are Invited to
Tune In on the All-Star*

CAMEL CARAVAN

with WALTER O'KEEFE
CASA LOMA ORCHESTRA
ANNETTE HANSHAW



Walter O'Keefe

TUESDAY	}	10:00 P.M. E.S.T.	8:00 P.M. M.S.T.
		9:00 P.M. C.S.T.	7:00 P.M. P.S.T.
THURSDAY	}	9:00 P.M. E.S.T.	9:30 P.M. M.S.T.
		8:00 P.M. C.S.T.	8:00 P.M. P.S.T.

Over Coast-to-Coast WABC - Columbia Network



CAMEL'S COSTLIER TOBACCOS NEVER GET ON YOUR NERVES!

TELEVISION SOON SAYS DEFOREST

POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

MARCH
25 CENTS
30¢ IN CANADA

SEE PAGE 362





Luckies



They Taste Better

Copyright 1966
The American Tobacco Company