

MARCH

25 CENTS

POPULAR MECHANICS

MAGAZINE

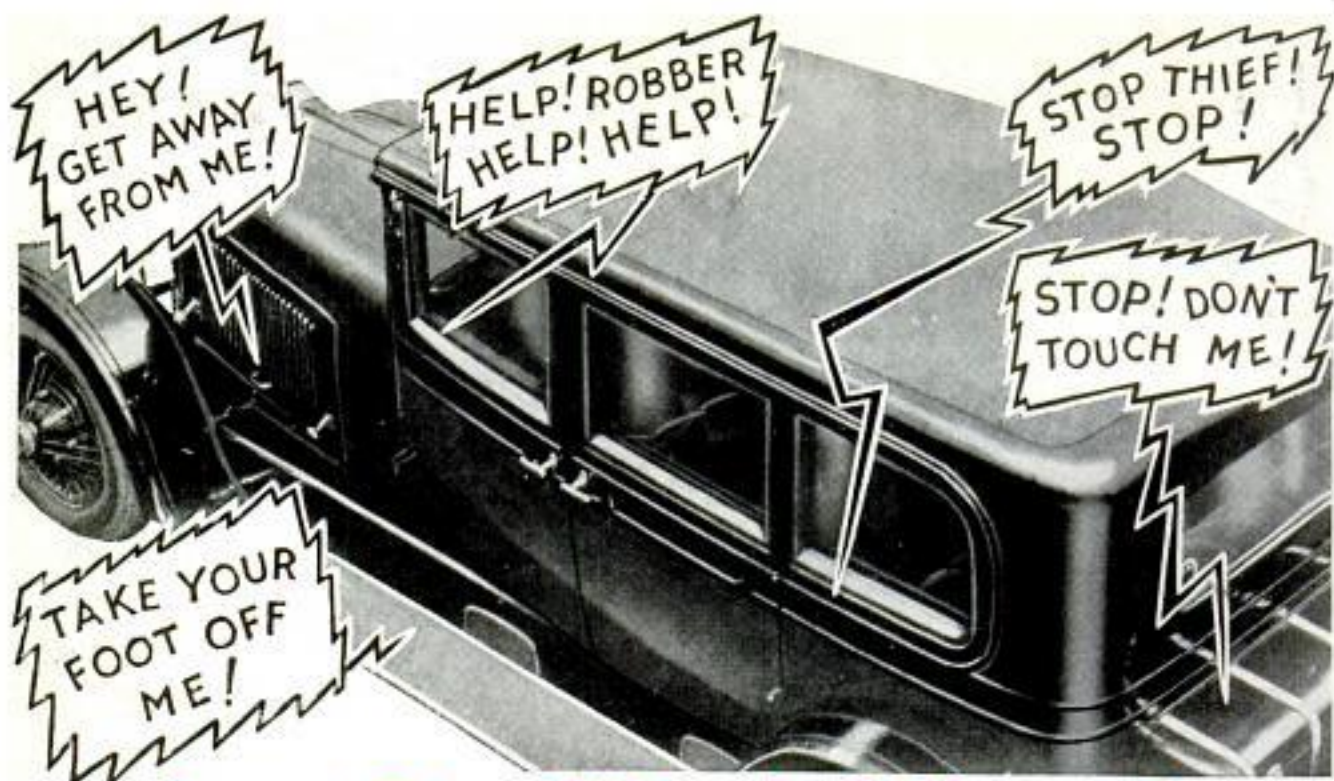
WRITTEN SO YOU CAN UNDERSTAND IT

REG. U.S. PAT. OFF.



SEE PAGE 394

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Astonishing Electrical Invention Protects Your Car from Thieves *...Automatically!*

This unquestionably is the queerest, most incredible invention since the first discoveries of radio! A magical, automatic watchman that actually is far more than human! Never sleeps, rests or gets tired! Stands

guard over your entire car from spare tire to headlights and steering wheel! Endorsed by police! Approved by Motor Associations! Now offered on generous 5-day test basis! The coupon brings full details.

A Startling Uncanny Money-Maker for Agents

"WHAT makes it work?" "Where on earth did you get it?" "Bet you five dollars he's got some one hiding in there!" "It simply can't be true." A running fire of comment like this breaks out whenever and wherever this new invention is exhibited. And why not? When no one ever heard of such a startling, uncanny device before! In fact few people would even dare to dream there could be such a thing! So this, men, is something really NEW, something to grip the imagination of everyone, something that sells to every autoist on sheer novelty alone. Distributors, "star" salesmen every man who wants to double and triple his present income should note carefully the following facts.



**A
Mere Handful**

Note the tiny size of this amazing invention in the above picture. The switch, wire and sealed tube containing the "activator" is all there is to it. The entire cost is scarcely more than an ordinary radio tube! Test it! Mail the coupon today.

or less. There is absolutely no cost for operation. It will last as long as the car. Fits any car from Ford to Rolls Royce without adjustment or fussing.

For introductory purposes a special 5-day test offer is now being made. If you are interested in learning about the most astonishing invention since the radio first came in, use the coupon at once. If your present income is less than \$50 a week, the profit possibilities as our agent may astonish you. The coupon brings details of all offers. Mail it now.

NORTHWEST ELECTRIC CORP.
Dept. C-10 PUKWANA, SO. DAKOTA

AUTOMATIC
DEVIL DOG

The Secret Of A Theft-Proof Car

Now in this amazing new way, every car can be protected from theft for 24 full hours a day. In the garage or parked on the street, if any thief so much as pulls at your spare tire or touches his foot to your running board—ZOWIE! A riot of noise starts instantly! And your car never shuts up till the thief leaves. And listen to this. Even if the thief is wise to what's up, you alone place the secret control button anywhere you want it around the car. The thief can't possibly find it. If he wastes time looking for it—Bingo! He's caught and on his way to jail! This astonishing invention guards your spare-tire, head-lights and spot-lights as well as the car itself.

Installed In 10 Minutes—Costs Nothing To Operate

The inventor has asked the U. S. Government to protect his patent rights on this revolutionary discovery. Because of its uncanny powers and to distinguish it from everything else on earth this queer discovery is now called "Devil Dog." Among its amazing features is the fact that it can be installed by anyone in 10 minutes

Northwest Electric Corp., Dept. C-10,
Pukwana, So. Dakota.

Rush details of your big 5-day test offer and big profits for agents.

Name

Address

Town State

Check here if interested only in one for your own car and not in agents' money-making offer.

Mystery "TWIN-RAY" Light Makes Night Driving Safe



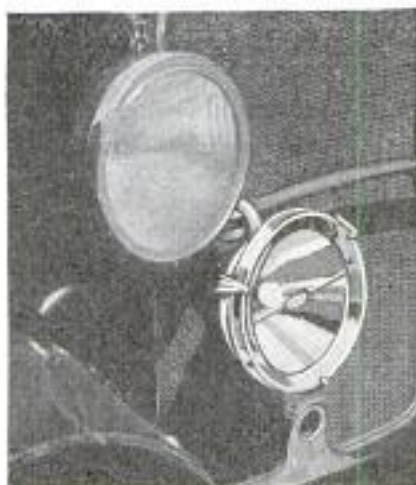
OVER ONE-FIFTH OF MILE
OF LIGHT

67,000
CANDLE POWER
NO GLARE

AGENTS Cleaning Huge Profits With This Instant Seller!

A GENTS and distributors all over are getting set for the biggest money of their lives with a brand-new road light that ends all the dangers of night driving. 24,000,000 motorists want this protection which guards lives against the dangers of glaring lights—yet lights up the road as clear as day. Hundreds of men have made big fortunes out of makeshift spot lights that only did half the job; hundreds more have pulled huge salaries out of lights that couldn't approach this new protection, in efficiency.

So judge for yourself what you can do with a light like this—a light that throws a 67,000 candle-power beam for over 1,000 feet—yet which absolutely CAN'T glare in the eyes of approaching drivers! A light which costs 30 per cent less than the prices charged for some of the best sellers in the market! A light that not only can't glare itself, but which kills the glare of the other fellow's oncoming "brights!" No wonder this light was awarded the Grand Prize and two gold medals at the Paris International Exposition—and no wonder that the very earliest agents are already cleaning up big—cleaning up like Kinney, who sold 12 lights in a day—and made \$96 for just a few hours' work. No wonder new car distributors are



You can attach and adjust the Speedlight in fifteen minutes. Once fixed, it can't get out of alignment—it keeps a steady 1000-foot beam of glareless light between you and every danger.

equipping cars like Packard, Nash, Cadillac and Chevrolet with it.

There's no light like it in the world. It's not a spot. It embodies an absolutely new principle in headlighting, discovered by a famous lighting engineer. With this amazing Speedlight you can drive at 50—60—even 70 miles an hour, with perfect safety, on a road as brilliantly lit at midnight as at mid-day. Lights up the road in spite of driving rain and snow—defies even thick fog.

MAIL THE COUPON NOW and find out how we're putting the chance of a lifetime into your hands, with an amazing introductory offer. Find out how you can use this great device to build up a crew of your own—and double your earnings—earnings which by themselves will be bigger than you ever saw before. Do it now, before you turn this page!

SPEEDLIGHT CO., Dept. G-10,
1731 Belmont Avenue, Chicago, Ill.

SPEEDL
1731 Bel
With
Speedlig:

Name...

Address...

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

This One



OTNO-LP6-OHTO

Think of it! Genuine UNDERWOOD

Yours for 10 Days TRIAL

Regular \$100. Model **Now Only 39.90**

Yes—this world-famous Underwood is yours for full 10 days. See for yourself the *real bargain* it is. See how beautiful and new it looks—compare its neat, perfect work—without obligation.



Buy Direct at Below 1/2 Mfg's Original Price



My unchallenged direct sale price and easy terms on this genuine Underwood refinished No. 4 is the lowest ever offered. While they last—less than half (1/2) the manufacturer's original price—and easy terms besides. Do not confuse this genuine late model Underwood with inferior or frail machines worth only one-half as much. This is the full sized standard Underwood with 4-row keyboard and late improvements, manufactured to sell originally for \$100. *Fully Guaranteed* in writing.

Easy Terms — Only 10c a Day

Think of it—a genuine late model Underwood reduced to \$39.90 (Cash). A saving of over \$60 by acting now. Send only \$1 deposit for a 10-day Trial. Then only 10c a day on my easy year-to-pay plan. And you use and enjoy your typewriter all the time. This Underwood all refinished like new is without question the greatest value ever offered at this rock-bottom price. (See column to right for its many outstanding features and improvements.)

Limited Quantity—Send at Once!

This exceptional bargain offer is for a very limited time only. Remember, every typewriter is sent on 10-days' Trial and Fully Guaranteed.

International Typewriter Exchange,
231 West Monroe St., Chicago, Ill., Dept. 301.

I am enclosing \$1.00 deposit. Please send the Underwood No. 4 F.O.B. Chicago at the special reduced price for 10-day Trial, with the understanding that if I am not perfectly satisfied I can return it Express Collect and get my deposit back. If I keep it I will pay \$3 a month until I have paid \$44.90 (term price) in full.

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

Address.....

Town.....State.....

FREE Complete 9-Piece Office Supply Set and Typewriting Course

We teach you speed typewriting free. Complete Home Study Course of the Famous Van Sant Speed Typewriting System, fully illustrated, easily learned. We also give complete office supply set free during this sensational sale.

Now \$**DOWN**
Easy Terms

REASONS
WHY
it is the
Best Value
Offered

Standard 4-
row Keyboard

4-color Ribbon

4. Back Spacer
5. Ribbon Reverse
6. Tabulator
7. Automatic Release
8. Shift Lock
9. Lowest Price
10. Easiest Terms
11. 10-Day Trial
12. Fully Guaranteed



Geno. 469
Meyers looks like 377
helps capital 377

Heater check 449

[4]

[Contents - Continued]

Isays Cleaning
with Calcium Carbonate
candle stand 499

Golf
billiard-table golf course 385
course for the parlor floor 470
midget toy for desk shows proper strokes 428
new golf ball will help improve your game 396
tunnel for indoor practice 465
Helium—from sand 460
Household Devices 462
House Plans—plan No. 4-B-20 527
Insects—"ghost" photo of insect wings laid to the
action of gas 393
Lawn—grubs that ruin, killed by chemical 431
Lighthouse—to talk and sing through electric cell 460
Lightning—as man's servant produces nitrogen 390
Locomotives
earth acts as brake to stop 457
latest giant of rails uses high pressure 431
Mail—register for parcel post speeds handling 439
Metals—age of world is revealed by bit of metal 466
Mirror—set in circle of light eliminates shadows 456
Models—stove of Franklin is model for Independence
Hall 394
Motor—hot spark ball on, helps save fuel 465
Moving Pictures
movies with depth are produced by double picture
silent film becomes talkie with "mike" for speech
sound filters for the talkies 385
Oil—see synthetic oil clue to mystery of petroleum 391
Phonograph—sound records easily made on portable 401
Photo-Electric Cell
and relay set combined in cabinet 398
tells temperature of stars 439
Pipe Cover—tinted asbestos, is easily cleaned 471
Pipe Lines—better method of welding 449
Plants
greenness of plant shows presence of vitamin 417
straw jackets for shrubs prevent freezing 448
Potato—new varieties of, sought by scientists 422
Poultry—special breeds of chickens for laboratory tests 396
Power Source—sea's varying salt content seen as 464
Radio
hints and kinks from the radio lab 476
mastering the radio code 442
wireless center in Berlin has radio museum 345
Radio, Aerial—homemade lead-in insulators 445
Radio, Apparatus
coupling for ganging condensers 473
plug-in coils for amateur transmitters 482
tone control for every radio set 481
wired wireless for the experimenter 478
Radio, Construction
drilling bakelite 481
machining aluminum radio panels 481
Radio, Receivers
building a midget a.c. receiver 472
building portable S-W transmitter 479
Radio, Tubes
experimenting with the pentode tube 482
quartz-crystal tube to eliminate interference 481
test your tubes often 478
using two-volt tubes in old sets 475
Razor Blades—get keen edge in improved sharpener 466
Roads—cement pumped under road to raise sunken
slabs 375
Robot—advertises movie film 461
Safety Devices and Measures—stripes on gas-electric
car help promote safety 375
Saws and Sawing—motor-driven pattern saw 401
Screws—brass receivers for 431
Shaving—folding brush fits into flat case 423
Signs—airport sign serves pilots 439
Skis—snow scooter on skis 397
Skyscraper—model of glass building proposed for
Berlin 418
Solder—that sticks to aluminum 375
Sprinkler—artificial rain cools decks and cabins of
tanker 391
Storage Bins—are portable and nest to save space 457
Street Cars—streamlined, have higher speed 423
Traffic—how many cars does it take to jam road? 461
Water—buried lake supplies water for English town 439
Windows—"fingers" of air grip glass places in big
window 421
X-Ray—improved, simplifies diagnosis of disease 397

AMATEUR MECHANICS

Advertising—removable sign on auto fender 487
Ashtray—clips matching cards suits hold on table 485
Automobiles, Accessories—amber glass on rear view
mirror prevents glare 497

Automobiles, Repairing
broken exhaust pipe easily repaired 488
increasing spark retard on model-A Fords 504
Boats and Boating
cooling system for motorcycle engine used on boat 488
fixed earlocks made removable 493
Bookcase—slide shelf for pamphlets 496
Boots—frame holds open for drying 502
Boxes—inside boxes you can make 489
Camera—safety catch prevents tripping of shutter 502
Concrete—mixer is run by auto wheel 486
Drain Pipes—keeping open 487
Drain Traps—kerosene used as anti-freeze in 498
Drawings—enlarging camera aids in making black and
white sketches 488
Drilling—holes through lamp standards 493
Foot Scrapers—unusual, easy to make 496
Furniture—Puritan candle stand 499
Games—the donkey race 503
Heating and Ventilating—hood on pipeless-furnace im-
proves radiation 495
Horse—making a stubborn, pull 487
Lamps—drilling holes through lamp standards 493
Latticework—hides refuse cans 509
Locks—pin locks self-closing door latch 498
Moving Pictures—"pinhole" goggles give stereoscopic
effect to 487
Nails—how to drive under water 485
Newspaper—handy holder for 505
Oilcan—makes good marking pen for addressing crates 498
Oven—to prevent burnt food in 497
Paints and Painting
removing varnish from hardware in the home 497
solution for making paint adhere to concrete floors 498
Photographs—accordion folder for 494
Photography
blocking out photographs 485
bottle makes good photographers' lamp 510
photos of falling snow taken with sheltered camera 496
wasted shots are prevented by special cover for lens 497
Picture Frame—wallpaper covers nail holes 509
Scooter—snowshoes for the 505
Scriber—multiple, divides board in equal widths 493
Soldering—grooves improve iron 498
Stenciling—to beautify your walls 507
Stovepipe—support for long spans of 509
Toys
automobile crossing gate and light for toy trains 510
balancing toys of many varieties 494
Tricks—this coin trick requires no equipment 502
Wheelbarrow—spring clip holds sideboards of 495
Windows—rubber apron protects frame 485

Cigarette dispenser 483
SHOP NOTES

Agricultural Implements—method of saving corn-plant-
of wire 520
Airplane—keeping grease off control cables 521
Automobiles, Accessories—cushion spring for starter
pull button 513
Automobiles, Repairing
gang valve lifter saves time 526
holes in bench aid assembly work 525
how to prevent squeaks in model-A Fords 515
model-A Ford pin bosses grooved for locking rings 524
test for leaky ignition condensers 520
Batteries—burning battery terminals 525
Beams—brace draws sagging beams in place 515
Bent Iron—for the home craftsman 516
Boats and Boating—turning a model yacht hull 526
Bolts—removing broken 525
Calliper—quick-adjusting for storeroom attendant 524
Carton—cardboard, cut to make display case 522
Chair—steel tubing used to make a shop chair 514
Dies—preserving cutting edge of 521
Dividers—attachments on, make large and small com-
pass 515
Doors—holder for repairing steel freight car doors 524
Drawing Instrument—metal strip reinforces T-Square 523
Garage—steel rails for column guards 513
Gasoline Engine—improving oiler on 522
Insulation—emery cloth for removing 522
Lead—transporting pot of hot lead 521
Micrometer—opening and closing quickly 521
Models—with the craftsman 528
Oil Can—hole in spout makes oil flow freely 521
Oil Stains—removing from tools and machines 523
Pliers—splicing, notch, and pin, increase usefulness of 525
Shoe Shining—paper guards to save socks 526
Staging—how to rig 523
Tractor—simple tools speed repair 514

Meyers Resolving 511

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Contents for March, 1931

No. 3

Special Features

On the Bridge of the "Leviathan"	370
The Dark Horse of the Rails	378
What Science Is Doing for You	386
A Fly to Save Nation's Peaches	399
On the Floor of the Sea	403
What Is a Typhoon?	413
Catching Plant Smugglers	419
The War on Noise	424
Thrilling Sled Dog Races of the North	434
Trapping Outlaws of the Fields	442
Exploring Europe's Torture Dungeons	450
Shooting a Crater Oil Well Fire	467

Fly to save peaches 399

Airplanes	
artist's sketch of big plane for Imperial Highways	394
British fight planes speed three miles a minute	390
helicopter with six blades	400
huge all-metal flying boat weighs ten tons	435
huge skeleton wing of "DO-X" resembles big bridge	464
Airships —mooring mast on top of bus for small	432
Archaeology —traces of supermen sought in Mexican wilderness	457
Automobiles —display window raised to drive out cars	465
Automobiles, Accessories	
electric oil warmer	469
supercharging air cleaner adds to motor efficiency	429
windshield cleared of ice by electric heater	464
windshield heater, cigar lighter and trouble lamp combined	448
windshield heater which fits under hood	418
Automobiles, Design —airplane lines in auto promise fuel saving	392
Aviation	
airway beacon throws beam seventy-five miles	398
curb gas hazards in flying by air and blood tests	466
farm animals act as guides for lost aviators	465
speed of plane is recorded by movie-telescope	433
Banks —polished-steel bank window foils bandit's bullets	471
Batteries —rubber battery filler fits any kind of bottle	422
Bed —adjustable, serves well or sick	430
Bible —that weighs half ton has three-foot pages	429
Bicycle —friction-drive cycle motor for the front wheel	433

Boats and Boating	
improvised compass on yacht saves the "Sham-rock"	430
inboard-motor drive helps to prevent skidding	456
Bridge —largest arch bridge nears completion in Sydney	422
Buildings —curved balconies in columns of German building	417
Bullets —with tracer lights aid sportsman hit mark	421
Caster —self-adjusting fits uneven floor	448
Chalk Line —spool holds chalk and line to save time	448
Concrete —mixers set in tandem speed job	464
Ditch Digger —does work of a thousand men	393
Doorknob —electric light in, illuminates keyhole	429
Drill —lightweight electric handdrill	417
Earthquake —caused by air is theory of scientists	430
Electric Heater —gives quick supply of hot water	449
Electric Wiring —improved clamp speeds work	457
Electricity —electric machine duplicated by students	470
Federal Reserve Banks —how Uncle Sam guards his millions in vaults of	458
Fire Fighting —fusee puts out chimney fire by gases	432
Foods —"taste thermometer" is aid in diet selection	423
Football —played indoors on eighty-yard floor	455
Fruit	
fresh frozen orange juice delivered with milk	391
round container saves space in shipping	398
Furnace —ash container for, eliminates dust	470
Garage —radio opens and closes doors of	391
Gas Heater —also moistens air, resembles radio	469
Glass —from natural gas	398

[Continued on Page 4]

Window display raised & drive out cars 465

Musee. Fire as linguistic has. Elbylene for history studies 432

STOP DRINKING DIRTY GERM LADEN WATER



new Invention Brings Agents Up to \$10 and \$20 a Day

JUST IMAGINE a device that purifies water instantly at the faucet. In just 10 minutes it removes enough dirt and filth from water to fill the bottom of a glass.

Attached to the faucet in an instant, it delivers pure sparkling water, clear as crystal, and free of all dirt and germ laden filth. Housewives marvel at its ability to purify. They immediately want one for themselves.

It's just like bringing a bubbling crystal spring right to your kitchen. The Automatic Water Filter uses the same principle as Mother Nature in passing the water through pure crystal silica sand. This delivers a sparkling stream of water, free of impurities, pleasing to the eye, and healthful to the body. Crystal spring water could be no more pure or healthful than water coming from the Automatic Filter.

Housewives everywhere use the filter as protection against sickness and disease. Scientists have proven that water filtration prevents such diseases as Typhoid Fever, Cholera, dysentery, pyaemia, septicaemia, and puerperal fever. It actually lowers the death rate from typhoid fever.

Is it any wonder folks are protecting themselves with this marvelous and inexpensive device, that means so much to health and happiness.

WRITE FOR FREE OFFER PLAN TODAY

We have arranged a plan that makes it possible for you to start immediately, making big money with the Automatic Filter. Good paying territory is still open. The agency for the Automatic Filter should prove a gold mine. Right in your territory there is hardly a housewife who would not let you take the filter off her faucet, after you showed her the amount of dirt the filter removes from the water. Here is an absolute necessity and a real health protector. Everybody drinks water—everybody is a prospect. The Filter sells itself, and every demonstration means a sale.

AGENTS AND SALESMEN

For interested workers we have arranged so their sample will cost them nothing. Write today for full FREE particulars.

MAIL THIS COUPON TODAY

Automatic Water Filter Co.
Dept. 148, 2621 N. 3rd St., Milwaukee, Wis.

Gentlemen: You may send me full particulars of your free offer and big money making proposition.

NAME

ADDRESS

CITY

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.

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 plumber 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!"



Send for
This Book

*Names and addresses given on request.

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 1,000 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.

Or remember that in our files—accessible on request—are thousands of letters from our Accountancy graduates reporting material increases—double, triple, quadruple—and even more—over their original earnings.

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?

LaSalle Extension University

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.....



YOU can be one of these Men!



raft Draftsmen
Salary, \$50 to
\$100 a week



Airport Managers
At \$100 to
\$150 a week



Airplane Salesmen
Make \$50 to \$100
a week and UP



Pilots
Earn \$3000 to
\$6000 a year



Aircraft Mechanics
Make \$50 to
\$100 a week

I'll show You how..

earn \$50 to \$100 a week in Aviation!

MEN who are sick of small and hard, grinding work—our chance! Edward Dick, my course and received an immediate offer of a fine job as Chief Draftsman and Assistant Manager. Paul connected with a big airplane manufacturer. Ira Bergen left his old job to become Chief Draftsman with a major aeronautical concern in Brooklyn—many more have turned their backs on low paid drudgery to take to the sky in Aviation.

All You Need Is Ambition

If you've got red blood and an ounce of grit in your make-up, then you'll like the fascinating, active, adventuresome life that Aviation offers. I'll train you for it—right in your own home. Don't give up your job! Don't go to a strange city! Stay right where you are: I'll bring the whole Aviation Industry to you. My course is written in easy, simple language—hundreds of photos and charts make everything clear. You don't need a high-school education; many of my most successful students never finished the grades—in Aviation you need *practical knowledge only!* I teach you practical facts

I Showed Mengel

"I am now working as a motor mechanic for the Wright Aeronautical Corp. I am sure that without the training your course gave me, it would be impossible for me to hold this job. The rich rewards go only to the man who uses his head and learns the theory on which the practice is based." Warren Mengel, 1301 N. 11th St., Reading, Pa.

I Showed Money-penny

"I'm mighty glad I tied up with Hinton. Your organization has always been ready to help me in every way. Before actually completing your course I was able to obtain and hold the responsible position of chief outboard with the Aircled people." C. H. Money-penny, Cedarville, Ohio.



Walter Hinton

Former Navy flier, first to pilot a plane across the Atlantic (The NC-4), first to use an airplane in exploration work, instructor of war-time fliers at Pensacola, Florida. His proven home study Course, endorsed by prominent fliers and aircraft manufacturers, prepares you for a real future in Aviation—as a Field Superintendent, Airport Manager, Plane Mechanic, Engine Mechanic, Air Traffic Manager, Pilot, Engine Expert, Airplane Assemblyman—or in any one of forty other highly paid jobs on the ground or in the air.

about airplanes, engines, airports, mechanical details and shop kinks that you can use right on the job.

Employment Service FREE of Extra Cost

Just as soon as you are trained, my Nationwide Employment Department will help you find the job you want. This service comes to you absolutely FREE of any extra cost. It's getting results, getting real jobs, for other ambitious men, and can for YOU.

Save \$50 to \$450 on Your Flying Time

I've arranged with flying schools all over the country to give special discounts to graduates of my ground school. Often these discounts save you much more than the whole cost of my course! You get a discount check worth actual CASH as soon as you graduate.

Get the Facts—FREE

Send for my big book of facts about YOUR OPPORTUNITY in Aviation TODAY. It's free—you don't obligate yourself in any way. This book has been the turning point to success for many other fellows—it will show YOU, too, the way to big success and big pay in Aviation. Just mail that coupon NOW!

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Please send me your FREE book, "WINGS OF OPPORTUNITY," showing how I can train at home for a place in Aviation. 301-X

Name _____
Please Print Your Name
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BE AN AUTO EXPERT

EARN up to \$5000 A YEAR



Learn Autos
the new easy/interesting
JOB-WAY



From
\$30
a Week
to
\$90
a
Week!

W. S. Yancy, Perla, Arkansas, was making only \$30 a week when he wrote for my Book. Today he's earning \$90 a week! You can get the same book FREE! Just clip the coupon — and mail it today!

Read My Money-Back Agreement!

Learn about the 14 "Job-Way" Features shown in my big Free Auto Book. Also about my Money-Back Agreement. Be sure to get the book and see how easily you can get in line for a Job paying up to \$100 a week!

Clip Coupon for Free Auto Book!

Say good-bye to low pay! Get into the Auto Business, where big pay — extra money — raises — come quick! A brilliant future awaits you in the World's Biggest Business.

LEARN AT HOME In Spare Time

If you're earning a cent less than \$50 a week, clip that coupon now. Learn how \$50 — \$75 — even \$100 a week is now possible for you. See how I train you, right at home, in every branch of Auto Work, quickly and easily. Find out about this Training which boosted Yancy's salary from \$30 a week to \$90 a week!

Experience, Education, Not Necessary!

All you need is common schooling — and it makes no difference if you never touched an auto before. Men from all walks of life who worked long, hard hours for low pay, are now becoming Garage Owners, Foremen and Superintendents. If you like autos, if you're between 15 and 55 — get the facts now! "Job-

Way" Training covers everything about Autos — Mechanical and Electrical — everything you need to get in line for a Big Pay Job as an Auto Expert! It's the trained man who gets the good jobs and "Job-Way" is complete Training, yet so simple and so easy that you get it quick.

3 Testing and Repair Outfits also included FREE of extra- cost — If You Act At Once!

Right now I am offering an Electrical Experimental Outfit, equipment for a Portable Electric Test Bench, and 381 Auto Wiring Diagram Charts to students. Send coupon now.

Auto Book FREE!

Send for this big new book. Take the first step to a Big Pay Job!



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Motor Institute Bldg., Dept. 4163, Evanston, Ill.

Send me your FREE Auto Book. Also proof that I can succeed in the Auto Business. Tell me about "Job-Way" Auto Training — about your Employment Department, and about your 3 Testing and Repair Outfits and Aviation Course Offer. No obligation on my part whatever.

Name.....

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Town..... State.....

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Get Full Particulars of AVIATION

Find out how my Employment Department **Course Offer** helps you get a Good Job — Raises in Pay — and Promotions. Get all the details of my offer of a complete, ground-school Aviation Course which I am making to men who enroll.

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"WE SET OUR GOAL AT \$5000 A YEAR"

"SIX YEARS AGO we sat down to figure what we wanted from life—Margaret and I. And to reach the comfortable scale of living we had set our hearts on, we found it would take \$5000 a year! That seemed impossible, it was so much more than I was making, but Margaret had faith that I could do it.

"I enrolled with the International Correspondence Schools and started studying at home. At once I gained a new and wider view of my job—did better work. After four months the boss asked what had happened to me, and I told him. That day I got the first of my promotions.

"We passed the \$5000 mark this year and we're going right on. Thanks to my I. C. S. training, I can give my family an attractive home, a good car, all the comforts they need. It means school and college for the boys, more leisure for Margaret, and vacation trips for all of us. Do you wonder we're boosters for the I. C. S.?"

Is your family budget cramped by your salary? In one hour a day of your spare time, the I. C. S. can help you to climb out of the rut and into a bigger, better-paying job. Set your own goal. We can help you reach it. *Today* take the first step.

MAIL THE COUPON FOR FREE BOOKLET

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"The Universal University"

Without cost or obligation on my part, please send me a copy of your 48-page booklet, "Who Wins and Why," and tell me how I can qualify for the position, or in the subject, before which I have marked an X:

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- Business Management
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- Traffic Management
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- Business Correspondence
- Show Card and Sign Lettering
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- Electric Car Running

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- Toolmaker
- Patternmaker
- Civil Engineer
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- Bridge Engineer
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- Automobile Work

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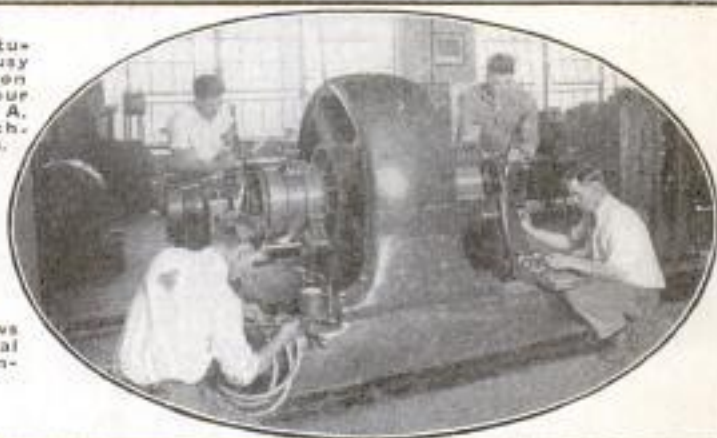
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If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada



Coyne Students busy at work on one of our modern A. C. switch-boards.

LEARN Without



This photo to the right shows several students getting actual experience on a large synchronous converter.



Here you see an Instructor explaining the operation of a modern airplane engine.

A general view of our great Alternating Current Department. These fellows are learning by actual, practical work.



These students are getting actual experience in armature winding and repair.

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Lessons In 90 Days

By Actual Work In the GREAT COYNE SHOPS

Dissatisfied with your present job? Not making enough money? Then come to Coyne in Chicago and learn Electricity in 90 days—NOT BY CORRESPONDENCE, but by actual electrical work—on huge motors and generators, power plants, substations, switchboards, auto and airplane engines, etc. You don't need advanced education or previous experience. I don't care if you are 16 years old or 46. It makes no difference! **I'll prepare you for a good-paying Electrical Job in 90 days!**

Learn to Earn \$60 to \$200 a Week

Good jobs are open paying \$60 a week and up—in Power Plant work, Armature Winding, Auto Ignition, House Wiring, Radio Service, Refrigeration, Welding, Aviation Electricity, etc. **You can prepare for one of these fascinating jobs in 90 days!** Coyne has been training ambitious fellows like you since 1899. **Let Coyne train you for a Big Pay Electrical Job!**

FREE EMPLOYMENT SERVICE

Earn As You Learn

Don't worry about a job! Coyne Training settles the job question for life. You get **free** lifetime employment service. **And if you need part-time work while at school to help pay expenses, we'll gladly help you get it.** Coyne has been placing men in good electrical jobs for over 30 years!

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500 S. Paulina Street
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FOR FREE BOOK 

\$75 a Week

"I am now in business for myself, averaging over \$75 a week. I owe it all to my Coyne Training."

GORDON SMITH,
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\$8,000 a Year

"The first of the year I am accepting position as Chief Electrician at \$8,000 a year—thanks to Coyne."

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\$300 a Month

"I am now Chief Engineer, drawing \$300 a month."

ELMER BASS,
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\$85 a Week

"Before going to Coyne I made \$30 a month. Now I am Service Station Manager, making \$85 a week."

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Gentlemen: Please send me your big Free Electrical Book with 151 illustrations. This does not obligate me.

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Address.....

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"Unaccustomed as I am—



"I . . . er, er . . . a
don't know just
what to say on the
subject."

"I wasn't expecting to
be called on to speak."

"Mr. Bell can tell you
more about the idea
than I can."

"Er . . . that is not
very clear, but that's
the best I can do."

...Yet 4 Weeks Later He Swept Them Off Their Feet!

IN a daze he slumped to his seat. Failure when a good impression before these men meant so much. Over the coffee, next morning, his wife noticed his gloomy, preoccupied air.

"What's the trouble, dear?"

"Oh, nothing. I just fumbled my big chance last night, that's all!"

"John! You don't mean that your big idea didn't go over!"

"I don't think so. But, Great Scott, I didn't know they were going to let me do the explaining. I outlined it to Bell—he's the public speaker of our company! I thought he was going to do the talking!"

"But, dear, that was so foolish. It was your idea—why let Bell take all the credit? They'll never recognize your ability if you sit back all the time. You really ought to learn how to speak in public!"

"Well, I'm too old to go to school now. And, besides, I haven't got the time!"

"Say, I've got the answer to that. Where's that magazine?"

"Here—read this. Here's an internationally known institute that offers a home study course in effective speaking. They offer a free book entitled *How to Work Wonders With Words*, which tells how any man can develop his natural speaking ability. Why not send for it?"

He did. And a few minutes' reading of this amazing book changed the entire course of John Harkness' business career.

It showed him how a simple and easy method, in 20 minutes a day would train him to dominate one man or thousands—convince one man or many how to talk at business meetings, lodges, banquets and social affairs. It banished all the mystery and magic of effective speaking and revealed the natural Laws of Conversation that distinguish the powerful-speaker from the man who never knows what to say.

Four weeks sped by quickly. His associates were mystified by the change in his attitude. He began for the first time to voice his opinions at business conferences. Fortunately, the opportunity to resubmit his plan occurred a few weeks later. But this time he was ready. "Go ahead with the plan," said the president, when Harkness had finished his talk. "I get your idea much more clearly now. And I'm creating a new place for you—there's room at the top in our organization for men who know how to talk!"

And his newly developed talent has created other advantages for him. He is a sought-after speaker for civic banquets and lodge affairs. Social leaders compete for his attendance at dinners because he is such an interesting talker. And he lays all the credit for his success to his wife's suggestion—and to the facts contained in this free book—*How to Work Wonders With Words*.

For fifteen years the North American Institute has been proving to men that ability to express one's self is the result of training, rather than a natural gift of a chosen few.

Any man with a grammar school education can absorb and apply quickly the natural Laws of Conversation. With these laws in mind the faults of timidity, self-consciousness, stage-fright and lack of poise disappear; repressed ideas and thoughts come forth in words of fire.

Send for This Amazing Book

Have you an open mind? Then send for this free book *How to Work Wonders With Words*. Over 65,000 men in all walks of life—including many bankers, lawyers, politicians and other prominent men—have found in this book a key that has opened a veritable floodgate of natural speaking ability. See for yourself how you can become a popular and dominating speaker! Your copy is waiting for you—free—simply for the mailing of the coupon.

North American Institute

Dept. 1353, 3601 Michigan Ave., Chicago, Ill.

Now
Sent
FREE



North American Institute, Dept. 1353,
3601 Michigan Ave., Chicago.

Please send me FREE and without obligation my copy of your inspiring booklet, *How to Work Wonders With Words*, and full information regarding your Course in Effective Speaking.

Name.....

Address.....

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

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Lesson and Job Ticket . . . Actually FREE!

Mightiest in Opportunities

Did you read about the \$500,000,000 "radio center" Rockefeller is building in New York? Do you realize that the home radio set business has hit the billion-dollar mark in 1930? Do you see right in your home town how every movie theatre has installed "talkie" equipment? Auto-radios—pictures by wireless—commercial wireless—the giant networks of broadcasting stations with their high-priced technical staffs—and soon, greatest of all—TELEVISION!

While you sit and read this—while you listen to your own radio—imagine the great army of experts and engineers, already employed to handle these great enterprises—and think of how many more trained men will be needed in the tremendous expansion programs of the near future. Investigate RADIO—get the facts—let us show you how you can increase your earnings—advance in position—get a job that's more interesting—and insure your future. Coupon brings everything—mail it today.



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Like the best resident schools and universities, the American School is an educational institution, and has never paid dividends or income tax. That means, we can and do give the highest quality of instruction at the lowest cost. That explains why employment service, when you're half way through and when you finish is a vital part of our agreement with every student. Among the authors of our instruction are the leading radio and electrical engineers of the country. Small monthly payments may be arranged.

American School

Dept. R-347, Drexel Ave. and 58th St.
Chicago, Ill.



Get ready for positions as operator or superintendent of broadcasting stations.



Positions paying \$50 to \$100 a week now open to install, operate and service talking movie equipment.



Soon there will be thousands of fine positions open in TELEVISION

See how easy to learn

—see how quickly you can get ready for a well-paid position in one of the fastest-growing and most prosperous industries on earth!

Just get this picture—three million radio sets manufactured this year on top of 13,000,000 already in use. Hollywood and the movie theatres of the U. S. all gone "talkie". Gigantic expansion of broadcasting—amazing demand for auto-radios—television just about ready to "break". Man! what a chance to get in on the ground floor, like 30 years ago in the auto game—or 50 years ago in electricity!

A FINE RADIO JOB

. . . when you're ready

To meet the growing demand from manufacturers, dealers, jobbers, broadcast studios, "talkie" theatres and other employers, for men with a knowledge of *Radio Engineering*—for inspectors, designers, broadcast operators, and superintendents—The American School offers you a *combined training and employment service*, which prepares you for these good jobs in your spare time, then helps you get one.

\$40 to \$75 a week . . . and more!

No waiting until you finish—we help you get a beginner's job when you're only half way through this course. And after you finish we guarantee to help you find a position, *satisfactory in salary*, or money refunded.

Amazing offer right now to office and factory workers, 20 to 35 years of age. Mail coupon for lesson, job ticket, and radio book—all free and without obligation.



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\$20.00 set analyzer and trouble-shooting job tickets a part of this training without extra charge.

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Please send without cost or obligation, free radio lesson and job ticket and radio bulletin.

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

St. No.....

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



ARTISTS EARN MORE

WHILE you are dreaming of making money . . . enjoying life . . . why not train your talent for drawing? A fortune may be at your finger tips if you train them now. Many people do not realize they have artistic ability. Through art, you may find the way to a famous name and a large income.

Artists are paid more today than ever before. Since the war, rates for art work have increased tremendously. Advertisers and publishers are paying millions of dollars annually to those who are trained in Modern Art.

Think of the money paid to artists for the illustrations in this magazine alone. Many successful students of the Federal School of Illustrating are now making from \$2500 to \$6000 a year and others are making even larger incomes.

More than fifty famous artists . . . earning big money themselves . . . have contributed their drawing secrets to the Federal Course. The Federal Course teaches you their methods of Illustrating, Cartooning, Lettering, Poster Designing, Window Card Illustrating, etc. Through this course you can learn at home during your spare time.

TEST YOUR TALENT FREE

Why be content with a small income at routine work when art training offers such possibilities? Write your name, age and address on the coupon and get the Free Book, "A Road To Bigger Things" illustrated below. It gives details about how famous artists of today started their careers and shows examples of our students' drawings. With it, you will receive our Free Vocational Art Test. Clip and sign this coupon now. It may be the beginning of an art career which will enable you to clip bond coupons and sign big checks later.

FEDERAL SCHOOL OF ILLUSTRATING

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Please send me free book "A Road to Bigger Things" and Standard Art Test.

Name _____ Age _____ Occupation _____
Address _____

When he speaks, they Jump

DID you notice how he cracked out that command? And did you see how quickly it was obeyed? You don't have to ask why, either.

Just take a look at those immense broad shoulders; that great chest; those shapely hips and slim, muscled waist. Get the swift, ready poise of those legs—the quick, vibrant power of those wrists. Here's a man you know can do things, not just talk about them. He's a human dynamo. Health, strength, speed, clear thinking are his. He's a leader in everything he does.

In Just 3 Months He Did It

He wasn't born with that superb body. Only 3 short months ago he was about as pitiful a specimen of manhood as ever walked the earth. He "couldn't lift a feather," and at the end of the day he was almost too tired to drag himself home. The men in his office used to laugh at his poor attempts to keep pace with them. But he learned the secret of scientific muscle-building—of gaining tremendous strength in a hurry—and look at him now. He's just one of the 100,000 men I have rebuilt in the last 19 years.

You Can Be Like Him

Folks call me the Muscle-Builder. For years I've been taking weak, worn-out men from all over the world and making them into forceful, aggressive leaders. Bankers, lawyers, plumbers or clerks—more than a hundred thousand of them have been turned out of my muscle factory with new health and strength to fight this world's battles.

15 Minutes a Day Is All I Ask

My system is simple and easy, but it certainly gets results. Just 15 minutes with me each day, and you'll begin to notice the difference in a week. And in just 30 days I guarantee to put one whole inch of real muscle on each of your arms, and two full inches across your chest. Remember, I guarantee it, not just promise it. If you follow directions, that muscle is bound to be there.

But that isn't all I do in 30 days. Your neck will begin to broaden—your legs grow shapely and strong. Inside and out you'll feel and act like a new man. Your eyes will regain that sparkle a healthy, happy boy has. You'll find it easier to think, and think clearly.

But stay with me just 60 days more, and then I'll be satisfied with the sort of man I am building up to fight his way through to health, success and happiness.

I'll Improve Your Appearance, Too

Just step up in front of your mirror at the end of those 90 days and take a good look at that handsome, erect figure before you. Was it worth while? I'll say it was. Stride down the street and notice the attention you get now. Remember how nobody even glanced at you before? Those great, muscled arms; those steel-like wrists; those broad shoulders and shapely waist—only the aggressive up-and-coming man can be like that.

Think what those 3 short months can mean to you. The right to enjoy life to the full—more friends—sweethearts—health—happiness—the difference between success and failure. Write today, let me show you what I have done for others, and what I can do for you.

Send For My New
64 Page Book

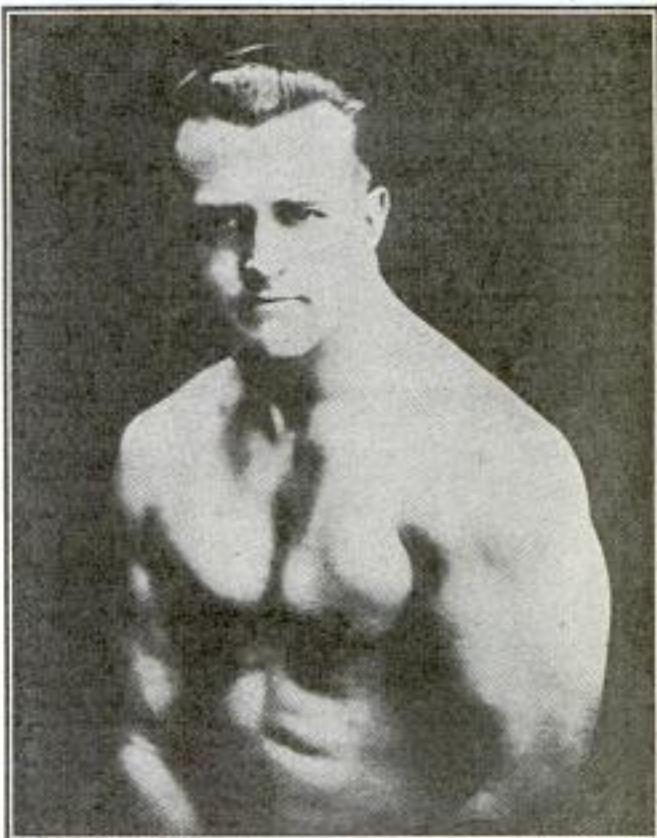
"Muscular Development"

IT IS FREE

Do you get that? It's free. I don't ask a cent. It's yours with my compliments. Take it and read it. It's the peppiest piece of literature you ever flashed your eyes on. And 48 full-page photos of myself and some of my numerous prize-winning pupils. This is the finest collection of strong men ever assembled into one book—look them over—doctors, lawyers, merchants, mechanics, and every line of trade you can think of. I swear you'll never let this book get out of your hands again. And just think—you're getting it for nothing. Don't hesitate—no strings attached to it. Grab it.

Take your pen or pencil and fill out the coupon, or even your name and address on a postal will do—do it now, before you turn this page.

EARLE LIEDERMAN
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Author of "Muscle Building," "Science of Wrestling and Jiu Jitsu," "Secrets of Strength," "Here's Health," "Endurance," Etc.

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Dear Sir:—Please send me absolutely free and without any obligation on my part whatsoever, a copy of your latest book, "Muscular Development." (Please write or print plainly.)

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

Street Address.....

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

Lee Bullard has found his friends

BULLARD lives in Columbus, Ga. He wanted to step out from the crowd—get ahead personally, socially, financially. Read how he has SUCCEEDED. He writes: "I have so many appointments and invitations that I can't fill them all; more friends than I can keep in good humor! Everyone wants me to play my *Hawaiian Guitar*—and I just haven't time to get around to all the places I am wanted. Although I have not kept accurate account—I know I have made \$500 with my playing. I wouldn't trade my Guitar and knowledge gained through your Course for \$1,000!"

and he
has made
\$500

YOU Can Learn to Play the HAWAIIAN GUITAR

Right at Home - 1 to 3 Months

Lee Bullard is one of many who have shot ahead to Success, with the amazing Hawaiian Guitar Course of The New York Academy of Music. No previous musical training is necessary; most of our students don't know one note from another when they start. Nothing monotonous or dull about our method, either. Clear lessons, unmistakable pictures, actual phonograph records—all combine to teach YOU this marvelous music-maker and money-maker in as short as 1 to 3 months.

Have More Friends, More Fun, More MONEY—Easy!

Bid good-bye to the days of being a wall-flower—saying nothing, doing nothing and having nothing! Be the bright spot in your crowd—the most popular and the most prosperous. Spare-time playing can mean \$15 to \$35 a week extra in your pocket. Full-time playing pays as high as \$75 a week and up.

Some play and pay for their Courses while still learning! TREMENDOUS DEMAND for Hawaiian Guitarists as entertainers, with orchestras, on Radio.

Rush the Coupon NOW for your copy of "The Hawaiian Way to Popularity and Big Pay"—the FREE Book that has started others toward top positions in the professional and social worlds.

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NEW YORK ACADEMY OF MUSIC,
100 Fifth Avenue, New York City.

I want to read "The Hawaiian Way to Popularity and Big Pay" without delay and without obligation. Rush my copy by return mail.

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Address.....

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Skilled Laborer	Typist
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Ozment Instruction Bureau, 111 Arcade Bldg., St. Louis, Mo.

Send no particulars about positions marked "X"; salaries, locations, opportunities, "How to Qualify", etc.

Name.....

Address.....

MEN TO WOMEN

AGE 18 TO 50



They Told Him Salesmen Were "Born" But Now He Makes \$10,000 a Year ...Thanks to This Little Book

IT was just a little free book that made the difference between Ed Pinkham and the rest of the men in our shop. Nobody ever imagined that Ed would land, even in the \$5,000-a-year class, let alone be making \$10,000 before he was thirty. Ed didn't know himself the abilities he had in him as a money-maker.

But one day, a strange occurrence changed his whole life. During his lunch hour Ed started to read a little book he had brought to work with him.

"It's a book called 'The Key To Master Salesmanship,' Bill," he told me. "It's the most amazing thing I ever read. I never dreamed there was so much in salesmanship. You ought to send for a copy yourself. It's free."

"Hub!" said Luke Jones. "Does that book tell you how to become a salesman?"

"It sure does," replied Ed, enthusiastically.

"Don't waste your time," advised Luke. "You can't learn how to be a salesman. A fellow has to be 'born' that way to be a good salesman."

Ed just smiled at that, but he said nothing. Soon afterward he quit the shop, and we forgot about him. And then last night, I met Ed again—driving a snappy new sedan and dressed like a million dollars.

"For Pete's sake," I said. "What are you doing nowadays, Ed?" He smiled. "City salesmanager for the Steel Castings Company," he told me. "What are you doing?"

"Still at the shop," I replied. "But what I want to know is, how do you come to be salesmanager for Steel Castings? They're one of the biggest firms in the business."

Ed smiled again. "Remember that book on Salesmanship that Luke Jones was kidding me about one day? Well, when I finished my Salesmanship training the Association I took it from gave me a choice of twenty-one jobs through their Free Employment Department. I got a wonderful job, and I had wonderful training, so I've had a pretty successful time of it. They made me City Sales Manager three months ago at ten thousand dollars a year."

"Good night!" I said. "And Luke and I are still punching the old time clock!"

Ed looked at me seriously. "See here, Bill," he said. "Are you sport enough to risk two cents that you can do as well as I

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"The radio," said Iris dejectedly, "that's out too, Tom. Father ordered a new set and it's already two days overdue. There goes all my visions of a good party up in smoke."

"Cheer up," I said, "I'll play the old school songs and a few dance numbers."

"I know you don't know one note from another," said Iris, "but please try and keep the party in good humor."

I started to open the piano. Before I even had a chance to sit down, the wise cracks began. "Hey! What are you going to do—tune the piano?" said one of the boys.

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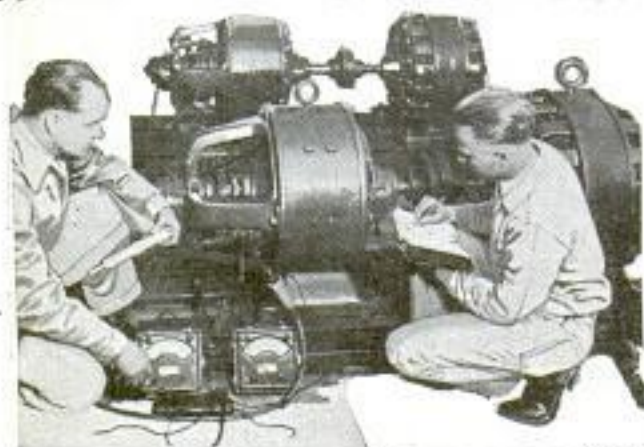
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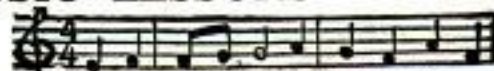
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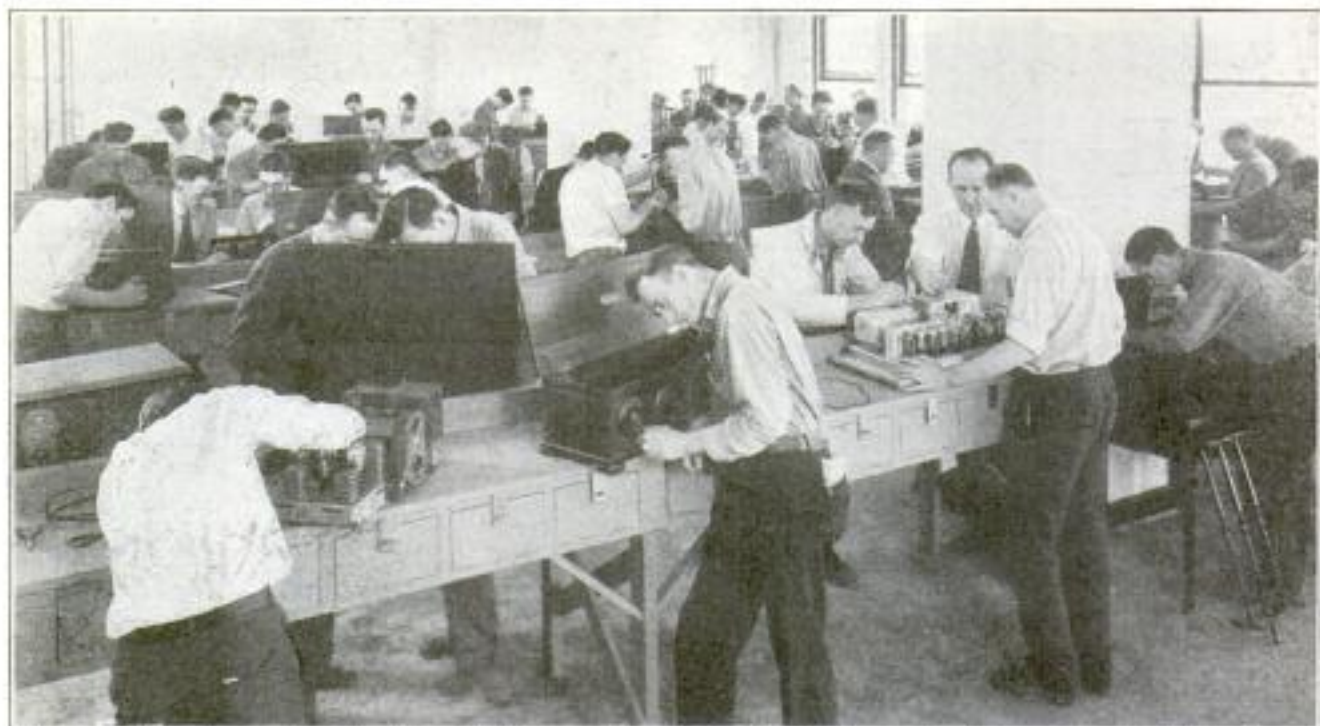
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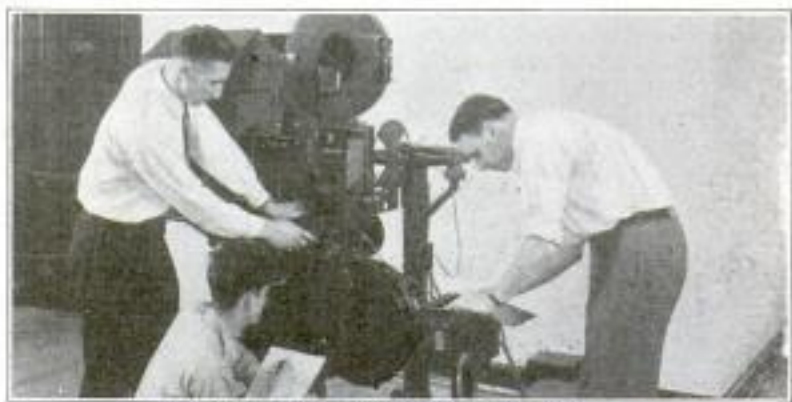
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| <input type="checkbox"/> Bridge and Building Foreman | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Gas Engines <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> Poultry Farming <input type="checkbox"/> Radio |
| <input type="checkbox"/> Aviation Engines | <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"/> Personnel Management | <input type="checkbox"/> Complete Commercial |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Civil Service <input type="checkbox"/> Mail Carrier |
| <input type="checkbox"/> Accountancy <input type="checkbox"/> Cost Accountant | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> C. P. Accountant | <input type="checkbox"/> Grade School Subjects |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Secretarial Work | <input type="checkbox"/> College Preparatory |
| <input type="checkbox"/> Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |
| <input type="checkbox"/> Salesmanship <input type="checkbox"/> Advertising | <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

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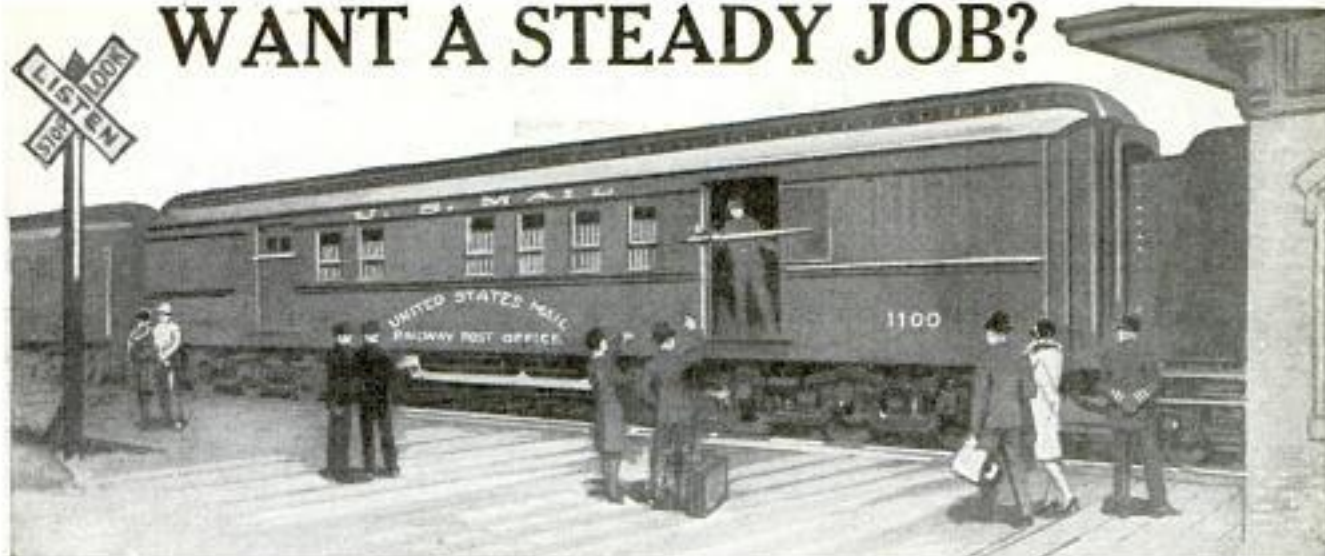
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City.....State.....

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Railway Postal Clerks, like all Government employees, are given a yearly vacation of 15 working days (about 18 days). When on runs they usually work 3 days and have 3 days off duty or in the same proportion. During this off duty and vacation, their pay continues just as though they were working. When they grow old, they are retired with a pension. As Railway Postal Clerks are continually traveling, they have an excellent chance to see the country.



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Clerks and Carriers get \$1700 the first year regular and automatically increase \$100 a year to \$2100 with further special increase to \$2300. They also have 15 days' vacation. City residence is unnecessary.

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Compare these conditions with your present or your prospective condition, perhaps changing positions frequently, kicking around from post to pillar, no chance in sight for PERMANENT employment; frequently out of a position and the year's average salary very low. **DO YOU EARN \$1900 EVERY YEAR? HAVE YOU ANY ASSURANCE THAT A FEW YEARS FROM NOW YOU WILL GET \$2700 OR MORE A YEAR, EVERY YEAR?**



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Name.....

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To qualify for these jobs men must know Radio as they know their A B Cs.

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But first these men must be trained, for no ordinary knowledge of Radio will do.

The Radio Industry, itself, has no time to train these men. It is growing so fast, and changing so fast, that its manufacturers and jobbers have all they can do to keep up with the trend of the times, by improving their methods of manufacture and distribution.

So the training of men for these jobs has become the task of the Radio and Television Institute, of Chicago.

As few men can afford to quit their work and get this Training at some University or Technical School, the Radio and Television Institute has been organized to train such men at home—no matter where they live—



**Offered by the World's
Fastest Growing Business**

in their spare time, and at a very nominal cost, for these better paying jobs in Radio, Talking Pictures and Television.

The Institute's Course of home-training was planned, written, and is actually supervised by an Advisory Board made up of prominent and highly paid engineers and executives, each of whom is actively connected with

some big Radio concern.

This means that your training will be right because these men, working with big Radio concerns, know exactly what the industry needs in the way of "trained" men, and exactly how you should be trained to meet that need. And this Advisory Board will have complete supervision over your training from the day that you become a student of this Institution.

For this reason, prominent Radio men, everywhere—and our country's largest and most important Radio Trades Associations—are unqualifiedly endorsing this home training, and recommending it to men whom they want to see make good in Radio work.

So if you are ambitious—if you are making a cent less than \$75 a week—investigate.

Find out for yourself all about this amazingly easy Course of home-training, and also all about the wonderful opportunities for "trained" men in this, the world's fastest growing industry. Everything is fully explained in the Radio and Television Institute's "Opportunity" book. Send today for your copy. It's free.

RADIO AND TELEVISION INSTITUTE, Dept. 13

2130 Lawrence Ave., Chicago

Without obligation of any kind please send me a copy of the Radio Opportunity Book. I am interested in your home-training and the opportunities, you say exist in the great field of Radio, for "trained" men.

NAME _____

ADDRESS _____



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Back in 1920, V. G. Powell of New York, was a young order clerk just out of the army—in 1924 he was directing sales and advertising—a year later he was general manager. In between were five years of capable, loyal service and two completed LaSalle training courses—Modern Business Correspondence and Business Management.

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What's to prevent your equalling Powell's records—setting new records of your own? You have the same twenty-four hours in the day—the same ambition to get ahead. Turn time into cash with the LaSalle salary-increasing plan. The coupon just below this text will bring you full particulars—without the slightest obligation. Whether you adopt the plan or not, the basic information it will place in your hands, without cost, is of very real and definite value.

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LA SALLE EXTENSION UNIVERSITY

The World's Largest Business Training Institution

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I should be glad to learn about your salary-increasing plan as applied to my advancement in the business field checked below.

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| <input type="checkbox"/> Business Management | <input type="checkbox"/> Effective Speaking |
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| <input type="checkbox"/> Modern Salesmanship | <input type="checkbox"/> Correspondence |
| <input type="checkbox"/> Law; Degree of LL.B. | |
| <input type="checkbox"/> Commercial Law | |
| <input type="checkbox"/> Industrial Management | |
| <input type="checkbox"/> Modern Foremanship | |
| <input type="checkbox"/> Personnel Management | |
| <input type="checkbox"/> Railway Accounting | |
| <input type="checkbox"/> Railway Station Management | |
| <input type="checkbox"/> Banking and Finance | |
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| <input type="checkbox"/> Expert Bookkeeping | |
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Name.....Age.....

Present Position.....

Address.....

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WOMEN universally detest the old-style can opener. Yet in every home in the land cans are being opened with it, often several times a day. Imagine how thankfully they welcome this new method—this automatic way of doing their most distasteful job. With the Speedo can opening machine you can just put the can in the machine, turn the handle, and almost instantly the job is done.

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You undoubtedly know what a nasty, dangerous job it is to open cans with the old-fashioned can opener. You have to hack your way along slowly—ripping a jagged furrow around the edge. Next thing you know, the can opener slips. Good night! You've torn a hole in your finger. As liable as not it will get infected and stay sore a long time. Perhaps even your life will be endangered from blood poisoning! You may be lucky enough to get the can open without cutting yourself. But there's still the fact to consider that the ragged edge of tin left around the top makes it almost impossible to pour out all of the food. Yet now, all this trouble, waste and danger is ended. No wonder salesmen everywhere are finding this invention a truly revolutionary money maker!

AGENTS!

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\$265
in a
Week

"Here is my record for first 30 days with Speedo:
June 13, 60 Speedos;
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I made \$265 in a week."
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"The first afternoon I received my Speedo outfit I made \$9."

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"I worked about three hours and took 25 orders. This brought me \$20 profit."
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New "Million Dollar" Can Opening Machine

The Speedo holds the can—opens it—flips up the lid so you can grab it—and gives you back the can without a drop spilled, without any rough edges

to snag your fingers—all in a couple of seconds! It's so easy even a 10-year-old child can do it in perfect safety! No wonder women—and men, too—simply go wild over it! No wonder Speedo salesmen have sold to every house in the block and have made up to \$8 in an hour.

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Frankly, men, I realize that the profit possibilities of this proposition as outlined briefly here may seem almost incredible to you. So I've worked out a plan by which you can examine the invention and test its profits without risking one penny.

Get my free test offer while the territory you want is still open—I'll hold it for you while you make the test. I'll send you all the facts about salesmen making up to \$100 and even more in a week. I'll also tell you about another fast selling item that brings you two profits. All you risk is a 2c stamp—so grab your pencil and shoot me the coupon right now.

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SPEEDO

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Address.....

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

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Builder of Men

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Will Make a Man of You

Men who were afflicted with all sorts of ailments—annoying, destroying weaknesses—men who were ashamed of their lack of stamina and muscular power—men who had well-nigh given up hope of ever being strong again—these men—

thousands of them—came to me and they were put on their feet, revitalized, restored to health and strength through my course in STRONGFORTISM, and became men who were proud of their physique and who feared no one.

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For over 27 years I have devoted myself to the development of men's bodies into fine specimens of manhood—restoring to them their natural, full physical powers and making them feel like real men. No one in history has done more in the way of body building and restoration.

You can get rid of Constipation, Catarrh, Nervousness, Rheumatism, Indigestion, Dyspepsia, Weak Back, Insomnia, Palpitation and a whole string of other ailments if you will take up Strongfortism in dead earnest. I want to help you—and I can help you if you will give me a chance—if you will write and tell me what troubles you.

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| .. Colds | .. Rheumatism | .. Lung Troubles |
| .. Asthma | .. Nervousness | .. Round Shoulders |
| .. Headache | .. Overweight | .. Stomach Disorders |
| .. Rupture | .. Weak Back | .. Increased Height |
| .. Thinness | .. Weak Eyes | .. Muscular |
| .. Pimples | .. Short Breath | .. Development |
| .. Insomnia | .. Weak Heart | .. Great Strength |

Other Ailments.....

Name.....

Age..... Occupation.....

Street.....

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

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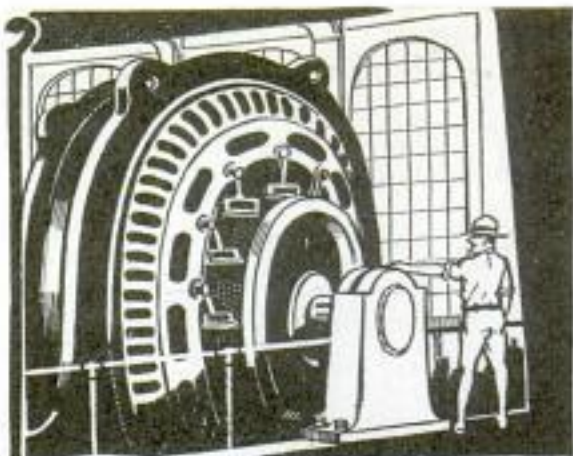
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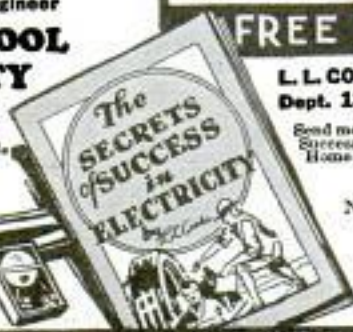
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SELL By mail successfully! I show you how. Handsome folder free; stamp appreciated. Busler, Box 203-A, Sta. A., Canton, Ohio.

BUY 250,000 Articles wholesale, Directory 10c. Arts, Box 1611-M, Denver.

NEW Service in great demand, needed in every home! Remarkable new machine applies wax automatically, polishes, and renews floors. Establish a profitable floor maintenance business of your own. Endorsement of satisfied customers secures new business for you. Write at once for particulars. Florida Corporation, Salem Ave., York, Pa.

CAPITAL—For copy, the "Promoters' Hand Book," a treatise on financing; an eye opener for capital seekers. Send \$1.00 to Amster Leonard, East Orange, N. J.

MAKE Money home. Four cent stamp brings literature describing over fifty ways. No peddling. Co-Operative, 469-A, Ansonia, Conn.

FREE Descriptives. Sell by mail. Small article in big demand. Cassett Supply Co., 112 East 23rd St., New York, N. Y.

EARN \$5-\$100, weekly operating novelty amusement machines, \$15 starts you. Rare opportunity. Write Empire Coin Machine Corp., 322b East 149th St., New York.

BUSINESS of your own. All or part time. We tell you how. Complete information \$1.00. Circular free. Miller Company, 845 Minnesota, Kansas City, Kan.

START Mail order business of your own. Make big money. We supply everything. Write Wineholt, Woodbine, 6, Penna.

SELL Books, printing and magazines by mail. Pruitt Publishers, Brookfield, Ill.

CANDY Home made is the only business "little fellow" has "big fellow" at a disadvantage. Turn your kitchen into candy shop—start making money from first day. Many now rich started with no capital. Costs 8c to 14c to make, sells 35c to 60c. Free illustrated booklet explains. Capitol Candy School, Dept. M-5941, Washington, D. C.

THE \$1,000. Secret never fails. Tells what sells by mail—how, when and where to advertise. Price 25c. Clayton Dawson, Box 392, Coshocton, Ohio.

"SCHEMER," 32p Monthly, prints big \$-getting schemes, opportunities, ideas, formulas. Subscriber reports \$10,000 from one copy; another \$25,000 from three. Try your luck! Three copies only 25c. Lewis Patterson, Pub., Alliance, Ohio.

CHEMICAL Expert will furnish formulas and trade secrets. All lines. Lists free. W. L. Cummings, Ph. D., 228 Gordon Ave., Syracuse, N. Y.

TIME Counts in applying for patents. See pages 126 and 127. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

START Your own business. Buying discarded old gold, silver and platinum jewelry. Most secret and profitable in the world. Particulars free. F. Polster, Box 81, Cicero, Ill.

ONLY 10c Brings copy system Way to Mail Order Success. Leads to system and concentration of action. Save time, money and disappointment. Al. B. Werthof, 1520 Vine St., Philadelphia, Pa.

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

LEARN The collection business. Good income, quick results. Interesting booklet, "Skillful Collecting" free. National Collectors Assn., Long St., Newark, Ohio.

BIG Steady profits operating chain of peanut, chewing gum, candy vending machines. Start small capital. Robbins Corp., Dodworth Street, Brooklyn, New York.

WE Start you in business, furnishing everything. Men and women, earn \$10 to \$100 weekly operating our original "New System Specialty Candy Factories." Begin home spare time. Unlimited opportunity. Valuable booklet free. W. Hilber Ragsdale, Drawer 4, East Orange, N. J.

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

SELL By mail! Start your own small business anywhere. Free folder tells how. No personal selling. Everything furnished. R. Heaton, 2046 Jefferson, St. Paul, Minn.

BIG Bunch mail. Year 15c. Money making opportunities. Pennell Standard, Cornington, Kentucky.

I MADE \$20 A week home. French breadmaking. 15 years' experience; free booklet tells. Ashbrook 67, Marango, Ohio.

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 decorations, garden furniture, statuary, flexible molds, particulars and illustrations free. Chris Mahler, Elmont, N. Y.

\$100.00 WEEKLY in "fixit" service. Complete 43 lesson instruction course \$1.00. Houlgate's "Fixit" Service, 1305 N. El Moline, Pasadena, California.

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

OPERATE Chain of vending and amusement machines. Be independent for life. Start small, grow big. P. Goodbody, 72 VanBergh, Rochester, N. Y.

AMATEUR Cartoonists—Earn \$25.00 week spare time, copying cartoons for Advertisers. 3-Em Syndicate, Argyle, Wis.

250,000 ARTICLES Wholesale—directory 10c. W. Patterson Co., 4111 University, Des Moines, Iowa.

SIGNS And showcards easily painted. If you use Letter Patterns. Write for free samples. John Rahn, B2120 Nova Ave., Chicago.

DELAWARE Charters; fees small; free forms. Chas. G. Geyer, Wilmington, Del.

FREE Booklet describes 67 plans for making \$20-\$100 weekly in home or office business of your own. **Elise Co., 84 Elizabeth St., New York.**

FREE Book. Start your own little business anywhere, selling novelties by mail. My beginner's outfit contains everything required, novelties, circulars, instructions, etc. Descriptive book free. **Hadwil, 33A-74 Cortlandt St., New York.**

SELL By mail. Books, novelties, bargain Large profits. Particulars free. **B. Effe, 525 S. Dearborn, Chicago.**

A BUSINESS of your own making—Sparkling Glass Name and Number plates, Checkboards, signs. Big book and sample free. **E. Palmer, 540, Wooster, Ohio.**

UNUSUAL—Uncommon specialties always sell best. Make these yourself from Miller's guaranteed formulas. Why work for others when others can be working for you? Latest eye-opening literature brings you many specialty propositions for you an independent business. **Miller Chemist, 706-K Chemical Bldg., Tampa, Fla.**

15,000 PROFIT Making formulas. Following and many others: Accidents and emergencies, agriculture, alloys and amalgams, artist's materials, beverages, cements, glues, pastes, mucillages, bleaching, renovating, coloring metals, dyeing glass, heat treatment of metals, household formulas, ice cream, confectionery, chewing gum, lapidary work, exterminating vermin, lubricants, paints, varnishes, photography, condiments, canning formulas, rubber, soap, candles, soldering, toilet preparations, perfumes, waterproofing, fireproofing, writing materials. Just write for "Scientific American Encyclopedia of Formulas." When postman hands you book pay \$5.50 and postal charges. **Popular Mechanics Press, Room 892, 290 E. Ontario St., Chicago, Ill.**

CHEMISTRY

BECOME Trained chemist. Thousands of opportunities—fascinating career. Learn at home. Complete experimental laboratory outfit given. Write for big free book. **Chemical Institute, 19 Park Place, Dept. P-331, New York.**

GET Fast selling articles by sending sample with \$5.00 for analysis. Consultation free. **Associated Chemists, Indianapolis, Indiana.**

YOUR Chemical problem solved and formula or process furnished for Five dollars. Write me. **W. Stedman Richards, Industrial Chemist, Box 2462, Boston, Mass.**

CHEMICAL Analysis, processes, technical information. **Robert Henderson, Laboratory, Madison, Maine.**

CATALOG listing 2,500 illustrations chemists' supplies, 5,000 chemical, 1,000 scientific books sent for 50c. **Laboratory Materials Company, 643 E. 71st St., Chicago, Ill.**

FORMULAS AND TRADE SECRETS

MAKE And sell your own products. We will furnish you any formulas. Write for our literature. **Chemical Institute, 19 Park Place, Dept. P-331, New York.**

THIRTY-FIVE Selected processes and formulas 50c. Any formula on request. **Vernon L. Frampton, Chemist, 1251 W. Vernon, Los Angeles, Calif.**

TATTOO Remover, painless, safe method, \$2. **Vestfold, Box 511, Haverford, Pa.**

SUCCEED With your own products. Make them yourself. Formulas, processes. Catalog free. **B. Thaxby Co., Washington, D. C.**

SUPERIOR Formula, complete manufacturing information for automobile batteries, particulars free. "Molab". **2433 N. Albany Ave., Chicago.**

MAKE Money with your own products. Formulas, recipes, processes. Lists free. **Industrial Institute, Dept. 203, 64 West Randolph, Chicago.**

LATEST High class tested formulas, some that we are now using. Write for price list. **Chas. W. Wala Chemical Co., 718 Berkeley Road, Columbus, Ohio.**

FREE Formula catalog. Describes all lines. **Western Chemical, Salem, Oregon.**

\$1 FOR 2800 (postpaid)—famous formulas, trade secrets, methods, all lines; compiled by Dr. Oliver. **Florida Service Bureau, Box 618, Tampa, Florida.**

2500 FORMULAS, Material source, \$1.00 prepaid. Automobile products course included. **Pacific Company, Sta-D, Portland, Oregon.**

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

NEWEST Formulas. Tested, guaranteed. Catalog free. **Imperial Laboratories, Edwardsville, Ill.**

FORMULAS, Chemical analysis, catalogue free. **Hertstein, Chemist, 46 Grand Ave., Grand Rapids, Mich.**

3,400 VALUABLE Formulas prepaid \$1.00 National Service, 3644 Tamarack, Cincinnati, Ohio.

FORMULAS All kinds. Catalog free. **Clover Laboratories (P), Park Ridge, Ill.**

FREE Formulas—Free materials making \$23.99 worth of guaranteed highest class specialty-necessities. Thirty-third unequalled anniversary offers explains all. **Miller, Chemist, 1707-G Jetton, Tampa, Fla.**

500 FORMULAS And big illustrated catalog 25c. **Ideal Book Shop, Park Ridge, Ill.**

AGENTS WANTED

NEW "Endless Chain" selling plan guarantees you amazing profits and many repeat sales with America's greatest printing line. 40%-55% profit on every order. 124-page catalog shows 1001 printing necessities for every business—Also line of personal stationery, pictorial parcel post and shipping stickers, collection sticker system, advertising tags, druggist labels, etc. All statements, letterheads, billheads, envelopes, etc., now furnished in white and 5 beautiful colors—a tremendous selling advantage. Thousands of sets furnished. Lowest prices. Highest quality work. Main or sideline. Experience unnecessary. This is biggest profit-maker of the year. Write quick for big new 1931 outfit. **Kaesser-Blair, Inc., Dept. 289, Cincinnati, Ohio.**

I START Men in a grocery business a new easy way. You use my money. Don't need to put up a penny of your own cash for stock. Expansion program now opens up many desirable opportunities also established trade. Hustlers make good money from the start increasing rapidly as they learn the business. Not a "chain" proposition but your own business. Buy on credit. Give credit if you wish. If honest and need more money write at once for application and details to **McConnon & Company, Room E-6663, Winsa, Minn.**

BRAND New product. Just out. Mechanical wall cleaner for homes. Banishes housecleaning drudgery. Big season now on. Simple, easy to use. Cleans wallpaper, painted walls, window shades, etc., like magic. No standing on chairs or dangerous stepladders necessary. Breathtaking demonstration. Whirlwind seller. Low prices, 179% profit. Also 47 other fast selling household specialties. Outfit free. Write quick. **Kelstee Manufacturing Co., 1433 Bar St., Akron, Ohio.**

WONDERFUL Opportunity to make big money with sensational new invention. Sells to housewives, autoists, garages, gas stations, etc. Large profits assured. Steady earnings. See page 71 this magazine, or write Gyro, Dept. CC14, Bloomfield, New Jersey.

SNAPPY New seller, repeats quick and often. Sell to women. Anywhere. Necessity. Your profit enormous. Get free details quick.—**Manager, American Silk Co., 414 Bessemer Bldg., Pittsburgh, Pa.**

WONDERFUL No-pin clothes line. Big Money. **John Dunn, Hempstead, N. Y.**

MARVELOUS New liquidized graphite saves 20% gas, 50% oil, doubles motor life. All cars. Sensational demonstration. 100% profit. **Pyroil Co., 165 Main, LaCrosse, Wis.**

STOP At good hotels. Pay bill with (Formula) to clean upholstery and carpets on the floor. Formulas with instructions, one dollar. **One 2 Three Products, Box 300, Savannah, Georgia.**

NO-TANGLE Ironing cord; cannot kink. Saves electricity. Tremendous profits. Sample free to workers. **Restever Co., 700 Irving Park Station, Chicago.**

THE Christensen Oval Double Cone—the dirt removing mop wringer, manufactured by **H. K. Christensen, Ft. Atkinson, Wis.**

AGENTS—Men, women, 400% profit selling needle threaders. Also have selfthreading and other needles. Write today for wholesale prices. **Miller Needle Co., 506 East 175th St., New York City.**

EARN More pay the Quaker way. Take easy orders, men's fine shirts, ties, underwear, hosiery. Remarkable values. Big commissions. Shirts to producers, ties, cash bonuses. We furnish everything, deliver and collect. Complete outfit free. Write, today, Dept. H3, Quaker, 1107 Broadway, New York.

HERE'S the biggest money-maker in years. Just show samples, collect big cash commissions. **Ererrone** buys Longwear's sensational values, work pants, dress pants, breeches, coveralls. Big selection. Free sales outfit. Write today. Dept. F3, Longwear Trousers Co., 489 Broome St., New York.

MAKE \$4.00 Cash, every \$18.75 order, besides big monthly bonus. Sell Leroy's fine tailored suits and topsuits, including all wool fabrics. Satisfaction guaranteed. Many re-orders and recommendations. Expensive outfit free. Write, today telling experience, etc. Dept. F-80, Leroy, 892 Broadway, New York.

TOY Airplane, 25c seller. Flies 300 ft. Sample 25c. **Derby, 2026 East Anabelm, Long Beach, Calif.**

DISTRIBUTORS—Crew managers 400% profit on Hot patented household necessity. Self-acting feature provides new sale 3 times yearly. Exclusive territory. Dept. E-3, 129 N. Halsted, Chicago.

HOLLOW—Ground for new type Gillette. Ten cent packages, easiest selling blades. Carded, sold everywhere. **Standard Safety Razor, Pittsburgh, Pa.**

MAGIC Gas equals gas 3c gallon. Harmless, guaranteed product. Used by largest bus companies. Circulars, labels, letterheads with agent's name furnished. Particulars and proof free. **P. A. Lefebvre & Co., Ltd., 42 Magic Gas Bldg., Alexandria, Ont.**

NEW, Profitable—Sell auto step mats. Quality rubber with owner's name molded white. Details free. **Ebonite Products, Dept. J-40, 893 Main, Akron, Ohio.**

TAILORING Firm, leading field has perfected new appeal; clinches 8 of 10 calls—defeats hard times. Stores liked. Suits, topsuits, union made, all \$19.95. Your commission \$5.00. Outfit free. **Mastercraft, Dept. G-300, 873 Broadway, New York.**

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

AGENTS—Simple demonstration sells amazing cloth. Cleans, polishes furniture without additions. Retail 25c; large profit; free sample. **Williams Corp., Dept. 414, Montclair, N. J.**

BIG Profits—Easy sales. World's best polishing cloth. Everybody buys. Sample free. **MazCloth, 3317 Summit, Kansas City, Mo.**

\$25.00 REWARD For any corn Great Christopher "Positive" Corn Cure cannot remove; relieves bunions; removes callouses, warts, moles; price 35c. Particulars free. **Reliable Specialty Corporation, Buffalo, New York.**

SELL Personal stationery, biggest commission, samples free, **Harold Smith Studio, Elencille, N. Y.**

WONDERFUL Discovery—Cleans hands instantly. Sample and particulars free. **Handy Specialties, Irvington, Nehr.**

IMPORT Your own goods. German export magazine published in English offers numerous bargains latest novelties; opportunity for obtaining profitable agencies. Copy 60c. **Square Deal Supply, P-246 Fifth Ave., New York.**

GENUINE Gold Leaf Letters anyone can put on store windows. Guaranteed to never tarnish. Large profits. Enormous demand. Free samples. Write today. **Metallie Letter Co., 438-D North Clark, Chicago.**

EVERY Motorist who smokes should have our latest combination cigarette dispenser and lighter. Agents wanted. Write for sample and big profit selling plan. **Webb Jay Products Inc., 37 Clementina Street, San Francisco, Calif.**

\$10 DAILY Easy selling cigars. **L. Wiss, 100 E. Broadway, Red Lion, Pa.**

GREATEST Soap discovery of the age! Made from South Sea Island plants. Produces 2 and 3 times more lather. Sensational seller. Good for \$10 profit a day. Wonderful reneater. Particulars free. **Albert Mills, 8971 Monmouth, Cincinnati, O.**

MAKE \$1.00 Cash, every \$18.75 order, besides big monthly bonus. Sell Leroy's fine tailored suits and topcoats, including all wool fabrics. Satisfaction guaranteed. Many re-orders and recommendations. Expensive outfit free. Write today telling experience, etc. Dept. F-100 Leroy, 893 Broadway, New York.

EARN More pay the Quaker way. Take easy orders, men's fine shirts, ties, underwear, hosiery. Remarkable values. Big commissions. Shirts to producers, ties, rash bonuses. We furnish everything, deliver and collect. Complete outfit free. Write, today, Dept. J3, Quaker, 1107 Broadway, New York.

BUILD A permanent repeat order business with Roseliff's high grade shirts, ties, underwear, hosiery. Guaranteed one full year. Cash commissions, extra rash bonuses, shirts to producers. We pay postage. Prompt service. Free sales outfit. Write Dept. K3, Roseliff, 1237 Broadway, N. Y.

AGENTS Buy direct guaranteed hosiery. Make 100% profit—Beat all competition. Men's latest fancy hose—doz. \$1.40-\$1.75. Ladies' silk hose, doz. \$3.50-\$6.00. Genuine full-fashioned hosiery—doz. \$4.00. Catalog free. Superior Knitting Company, Dept. 34, New Haven, Conn.

DON'T Choke Me! "Hot-Shot" new electrical wizard. Starts cars without choke. Saves gas, oil. Delivers 11,000 volts. \$1.50 each. Pays for self immediately. Hustlers goldmine. Reardon Mfg., Peoria, Ill., Dept. P-3.

MAKE Big money selling food products, prize motor and tractor oils, paints. Sure repeat orders. Write for free sample v-c-r. Lovetin & Browne, 1602-K So. State, Chicago.

BIG Money daily selling shirts, ties, underwear, Sox, pajamas, belts, professional uniforms, raincoats, coveralls, pants, children's play suits. Outfit free. Experience unnecessary. Nimrod Co., Dept. 65, 4922-28 Lincoln Ave., Chicago.

MAKE Up to \$2.00 every hour. Sell every home wonderful preparation: mends hosiery, clothing without sewing. Invisible. Send for free sample of work. Queens City Laboratories, PM-3, Cincinnati, Ohio.

TIME Counts in applying for patents. See pages 128 and 127. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

CASH Paid for butterflies, insects. See Special Display Advertisement on page 28.

KITCHEN Necessity: The new "20-in-1" used as a mixer, beater, whipper, egg separator, ladle, strainer, etc. 3 color circulars furnished. Retail 25c, costs you \$1 a dozen. Sample and sales plan 15c. Numethod Co., Desk P-3M-3, Numethod Bldg., Bradford, Pa.

ELECTRIC Water heater—New. Heats water instantly. Pocket size—retails \$3.75. Two minute demonstration makes you \$1.95 profit. Lux-Visel, Dept. 37, Elkhart, Ind.

100% PROFIT in new mystery cigar lighter. No flint or friction. What makes it light? No wind can blow it out. Retail 50c. Sample and sales plan 25c. New Method Manufacturing Co., Box PM-3, Bradford, Pa.

\$15-\$50 DAILY. Special advertising package quality toiletries \$1.00. Bought separately would cost \$5.00. Big repeats. Paris Laboratories, 2024 Olive, St. Louis.

FREE Trousers offer—\$15.00 daily writing orders for guaranteed tailored-to-fit trousers. Free outfit. Bigger commissions. World's greatest pants value at \$3.95. Dunlap Pants Company, Dept. 190, Cincinnati, Ohio.

STRANGE New ironing cord! Prevents scorching. Saves electricity. Cannot kink or snarl. For telephones also. Up to \$25 daily. Samples furnished. Neverknot, Dept. 3-A, 4563 Ravenswood, Chicago.

FREE Trousers offer—free outfit \$15.00 daily writing orders. Guaranteed greatest tailored-to-fit pants value; bigger commission; wonderful sideline. Dept. 470, Hutchins Pants Co., Cincinnati, Ohio.

AGENTS—Up to \$12 daily demonstrating men's, women's, children's finest hosiery. Definite wear unreturned or replaced. Amazingly low prices. 100 styles, colors. Auto and hosiery given producers. Write quick! Whitit Hosiery Co., 373 Midway, Greenfield, Ohio.

NEW Electric "Red Hot" machine streams frankfurters. Sells on street to roadside stands, lunchrooms, drug stores, etc. Badly needed—nothing like it on the market. Reasonably-priced. Big profits to you. Easy to make two or three sales a day. Write for proposition. Uretek Utilites Corp., 4531 Lexington St., Chicago, Ill.

REPLACE Brass worn-off automobile parts, reflectors, bath room fixtures, worn spoons, forks, etc., with pure silver. Look like new. Use U-Kan-Plate Polish. Positively no mercury; \$1.00 half pints. Postpaid. Satisfaction guaranteed. Agents wanted, Dept. A, U-Kan-Plate Co., Philadelphia.

SUCCEED With your own products. Make them yourself. Formulas, processes. Catalog free. B. Thaxly Co., Washington, D. C.

WANTED Agents—Sell manufactured, poultry lice collector patent. John Thompson, Rt 8ardis, B. C., Canada.

SALESMEN—Take orders for America's finest ties, shirts, hosiery, underwear. Generous commissions. Master sales outfit free. Write Public Service Mills, Dept. CC-17, West New York, New Jersey.

OH Hello! Why didn't I see this before. Christy's Iron Rust and Stain Remover sells like blazes. Write for free sample. Christy, Inc., 5067 Union, Newark, New York.

FREE Suit offer to hustlers. Opportunity to get suit besides \$45 a week and more. Take orders for our high-grade, all-wool suits. Prices slashed. Suits \$18.75 made-to-measure. Other amazing values. New style outfit free. Progress Tailoring Company, Dept. C-217, Chicago.

MIRRORS Resilvered at home. Costs near 5 cents per square foot; you charge 75 cents. Profitable business—plating auto parts, reflectors, tableware, stores refishing metal-ware etc. Outfits furnished. Details free. Write. Sprinkle, Plater, 125, Marion, Indiana.

AGENTS Everywhere making money with our line of kitchen specialties, demanded in all homes. Big earnings possible. Write today for details. P. Seed Filter Co., 331 Broadway, New York.

OUR New card of 5c aspirin sells fast to stores. Over 100% profit. DeVore Mfg. Co., Desk C, Columbus, Ohio.

LADIES Silk hose \$2.00 dozen, 40c vanilla \$1.50 dozen. Sell both 50c. Samples 50c. Little's, Abbott, Ark.

SALES Opportunity: Build your own business selling standard household necessities. For information, write, Box 1123, Wilmington, Del.

PORTRAIT Men—Big profit catalog. Guaranteed portraits, frames, medallions, photo pillows, household specialties, toilet preparations, food products, remedies, pictures, crucifixes. James Bailey Co., Station C-3, Chicago.

MAKE Money. Show mystery metal polishing cloth. Approved by good housekeeping. Send for free sample. Molder, Omaha, Minn.

A GOLD Mine for you. Make big money in a mail order business at home. Free circulars. Agrib Publishers, 1217P, Ave. F, Brooklyn, N. Y.

MEN Wanted. Teeth successful season now starting. Thousands enjoying big incomes, full time or spare hours, selling fine shirts, ties, underwear, guaranteed full year. Shirts, ties, rash bonuses to producers. Beautiful self-selling outfit free. Write Dept. L3, Roseliff, 1237 Broadway, New York.

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

RIG Preparation; no canvassing. Asco, Box 1081, Washington, D. C.

RIG Money easy, simply showing new Potty Wrench, 10 wrenches in one. Guaranteed fast seller. Sample furnished. Gellman Mfg. Co., Dept. 6-C, Rock Island, Ill.

FAST Selling automobile necessity, costs you 20c, sells easy for \$1.00. Enormous market—Big money maker. Sample free. Star Specialties, 1620 Villers, Dallas, Texas.

ARTICLES Of merit. Repeat sellers. Big profits. For information write Lightning Products Co., 616 W. Kinzie St., Chicago.

A FAST Seller—Simplex Brush-Pan. Wide market in homes, stores, hotels, barber shops. Gathers up anything from dust to broken china by one simple movement of brush handle. Strong—durable. Retail for \$2.25. Liberal Commission. No free samples. Write today, Simplex Specialty Mfg. Co., 1207 West Second, Cleveland, Ohio.

NEW Can opener making agents rich. Will surprise you. Quick orders from agents sample 25c. Allmeeds Mfg. Co., Box C-24, Oak Park, Ill.

WONDERFUL Opportunity. Saves customer \$2 to \$4 for every dollar cost. Sells everywhere. Big profits. Star Compound Co., Fond du Lac, Wis.

AGENTS Big money handling our specialties, 100% profit. Sample 25c. Webster, 852 Waveland, Chicago.

GENERAL Distributor "I-8-A-80" powdered hand soap; takes grease and dirt off quick, without injuring skin; sanitary; reusable; big money maker; exclusive territory; sample free. Cowell, 811 Central Exchange, Kansas City, Mo.

AGENTS—Improved lightweight Shampoo soap, 3 dozen trial order One Dollar. Gross \$1.25 prepaid. Hair Craft Laboratories, 438A, Centre, Chicago.

LARGE Importer of neckties offers exclusive agency and entirely new proposition. Enormous demand. No competition. Unlimited possibilities. La Romance, 590 Broadway, New York.

100% PROFIT Selling Mystery Gas Lighter. Retail 25c. Costs you \$1.00 doz. Sample free. Square Deal Mfg., Desk PM-17, Bradford, Pa.

WANT Distributing agent for handi-ek. Powdered Handsoap; removes anything from the hands without injury to skin; everybody a customer; great opportunity for hustler to get in business; sample free. Solar Products Co., J-2144 So. Troy, Chicago.

FREE—Picture man Friedman's new cut price 56 page catalog, portraits and frames. Lowest in years. Friedman, 169 West Austin Ave., Chicago.

SELL Changeable signs to stores, size 14x22, cost 30c, sells for \$1.50. Particulars free. National Sign System, St. Louis, Mo.

AGENTS—Mosco even and callous remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Mos. Company, 101 State Bldg., Rochester, N. Y.

WONDER Hot pad; heats itself. No hot water. No electricity. Stays hot 12 hours. Sells fast. Easily demonstrated. Outfit free to producers. Bestever Company, 803 Irving Park Station, Chicago.

FREE Formula catalogue. Hertzstein, Chemist, 46 Grand Ave., Grand Rapids, Mich.

SELL Pine cleaner. Every smoker wants one. Removes nicotine and deposits immediately. Send 15c for sample and particulars. Serex Machine Specialty Co., 7500 Susquehanna Street, Pittsburgh, Pa.

\$60-200 A WEEK. Genuine gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

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 samples. American Monogram Co., Dept. 40, East Orange, N. J.

GREATEST Opportunity; newest proposition. Build continually paying business in your own name. Household, industrial, brushes, brooms, mops, dusters, fully guaranteed. New catalog, all net prices, no discount to bother with. Make as high as 300 per cent and over. Write today. Wire Grip Sanitary Brush Corp., 41 East 11th St., New York.

BIG Money selling Diodor foot and body powder. Sample free. Diodor Co., 112 Fremont St., Lowell, Mass.

POLMET Polishing cloth—Removes tarnish from metal without the use of liquid, paste or powder. Agents say it sells like "hot cakes." Retail 25c. Sample free. Gale Co., Inc., 15 Edinboro St., Boston, Mass.

MAKE Money—Your own business. Valuable formulas. Free information sent. Arthur Terry, 1904 W. 7, Brooklyn, 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.

MAN In each town to plate auto parts, reflectors, bathroom fixtures, refresh 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.

MAKE \$28 Daily demonstrating automatic gaslighters, sample 25c. Gross \$3; box \$1. Rapid Mfg. 2772 Pitkin Ave., Brooklyn, N. Y.

SELL Men's neckwear—wonderful proposition. Astor-M, 39 East 28th, N. Y.

SELL JA Garage door holders, simple, automatic, quickly installed. Interests garage owners, builders, everybody. Exclusive territory proposition. Knowlson-Stevens Co., Ann Arbor, Mich.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name and address, 25c. Stamping outfit, Emblem checks, check-fobs, name plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

GET Our free sample case. Toilet articles, flavorings and specialties. Wonderfully profitable. LaDerma Co., Dept. 80, St. Louis, Mo.

250,000 ARTICLES Wholesale. Directory 16c. W. Patterson, 4111 University, Des Moines, Iowa.

FLAVORING Extracts—bottle yourself. Concentrated. Labels furnished. 600% profits. Whirlwind money-makers. Steady repeaters. Free offer. Thomas Manufacturing Company, Indianapolis, Indiana.

BIGGEST Surprise offer ever made. Be sure to answer this ad. My line of soaps, coffee, tea, spices, toilet articles, household specialties, pays you bigger profits. M. G. Roth, President, 2705 Dodier, St. Louis, Mo.

AGENTS—Can openers, new improved hand, wall, table models. Safety Products Co., 315 American Bank, Kansas City, Mo.

NEW Automatic clothes washer. Washes quickly and thoroughly. No rubbing. No electricity. Retail \$9.75. Guaranteed. Write Storm Royalty Co., 3601 Enright, St. Louis, Mo.

SELL Housewives something they want. They are bound to be interested. A signed guarantee to reduce gas bills 25%. No competition. 400% profit. Station C, Box 25E, San Diego, Calif.

BIG Profit putting our gold sign letters on store windows, without experience. Samples. Consolidated, 69-T West VanBuren, Chicago.

MANUFACTURER Wants distributor for new "Pocket Radio," only \$3.85. "Sells itself with music." Pays 100% profit. Spencer Radio, Akron, Ohio.

AGENTS—Engraved name plates, signs, number plates etc., easily sold with large profits. Brett Bros., Winthrop, Mass.

BIG Money applying gold initials on automobiles. Easiest thing today. No experience needed. \$1.45 profit every \$1.50 job. Free samples. "Ralco," X-1043 Washington, Boston, Mass.

OUR Luminous crucifix and new luminous St. Therese statue shine brilliantly in the dark. Sell on first demonstration. Write for prices. W. G. Hannon Co., 2543 So. State, Chicago.

NO Dull times selling food! People must eat. Federal distributors make big money; up to \$3,000 yearly or more. No capital or experience needed; unsold goods may be returned. We furnish free sample case, license and free samples for customers—sure repeat orders. Exclusive territory. Ask new. Federal Pure Food Co., A2307 Archer, Chicago.

NEW Line Counter Displays, Aspirin, Filant, Chewing Laxative, Breath Gum, No-tar, Silkstone, etc. Steady Repeaters. Over 100% Profit. Superba Co., W3, Baltimore, Md.

CHICAGO Expert valued \$3 stone at \$800. The diamond's only guaranteed rival. Great-est spare time, side-line article ever known! Amazing profits. \$5 pocket sample case free. Write quick. Mexican Gem Company, Dept. PM, Monterey, Calif.

FREE "Booklet of money making opportunities," new ideas, original plans, money making secrets and other valuable information. News require peddling or outfit. Elite Co., 84 Elizabeth St., New York.

SELL Stores 5c carded breathlets, etc. Lorraine Products, Albany, N. Y.

SELL Atlas household products. Outfit furnished free. Atlas, Brookfield, Ill.

AGENTS—Mosco corn and callous remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 304 Searle Bldg., Rochester, N. Y.

FREE Trousers offer—\$15.00 daily writing orders for guaranteed tailored-to-fit trousers. Free outfit. Bigger commissions. World's greatest pants value at \$3.95. Dunlap Pants Co., Dept. 193, Cincinnati, Ohio.

THIS Advertisement may make you thousands of dollars. If you write immediately for my "Eye-Opening" literature describing guaranteed formulas; valuable trade processes, money-making information how to easily make the world's best-selling specialties. All lines. Investment small. Profits immense! Start in your home, room or office. Make the good money you're entitled to. Dr. Liscombe Miller, Chemist, Tampa, Fla.

CALIFORNIA Perfumed beads selling like hot cakes. Agents coinng money. Big profits. Catalog free. Mission Factory P, 2328 W. Pico, Los Angeles, Calif.

A BUSINESS of your own—Making sparkling glass name and number plates, checkerboard signs. Big book and sample free. E. Palmer, 512, Wooster, Ohio.

WANTED: District manager to appoint agents. Unlimited opportunity. No canvassing. Mother Hubbard Products, 554U Congress, Chicago.

PHOTO Medallion men and women. The largest line of photo novelties in the world. Lowest prices, quickest service. Send for catalog showing over 200 money makers. Gibson Photo Jewelry Co., Inc., 823-827 Gravesend Ave., Brooklyn, N. Y.

AGENTS—Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marul Company, Tribune Bldg., New York, N. Y.

WE Start you without a dollar. Soaps, extracts, perfumes, toilet goods. Experience unnecessary. Carnation Co., 841, St. Louis, Mo.

AGENTS—Make a dollar an hour. Sell Mendels, a patented patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404, Amsterdam, N. Y.

HIGH-GRADE SALESMEN WANTED

NEW "Endless Chain" selling plan guarantees you amazing profits and many repeat sales with America's greatest printing line. 40%-55% profit on every order. 124-page catalog shows 1001 printing necessities for every business—Also line of personal stationery, pictorial parcel post and shipping stickers, collection sticker system, advertising tags, druggist labels, etc. All statements, letterheads, billheads, envelopes, etc., now furnished in white and 5 beautiful colors—a tremendous selling advantage. Thousands of cuts furnished. Lowest prices. Highest quality work. Main or sideline. Experience unnecessary. This is biggest profit-maker of the year. Write quick for big new 1931 outfit. Kaiser-Blair, Inc., Dept. 279, Cincinnati, Ohio.

STOP Working for small pay—start your own business on our capital; pays better than most occupations; hundreds average \$6,000 annual sales year after year; some established 30 years; many have acquired wealth, homes, farms, cars; we supply stocks, equipment, on credit; some 200 home and farm necessities; nearly 50 million sold 1930; selling experience unnecessary; wonderful opportunity to own pleasant, dignified, profitable business backed by \$17,000,000 world-wide industry; first send for complete information—then decide. Raleigh Co., Dept. C-N-PPM, Freeport, Ill.

NEW Household necessity within price reach of everybody has irresistible appeal. Enthusiastic acceptance everywhere. No competition. Quick cash profits. Sure income-doubler for travelling salesmen. Big business deal for distributors, crew managers, agents. Write for particulars, stating personal details. Alto Mfg. Co., 1647 Wolfgram Street, Dept. 9, Chicago, Illinois.

\$18 TO \$25 Daily; biggest selling line of men's suits. Meets present day conditions. Amazing values at \$11.95, \$14.50, \$16.97, \$18.95. Also raincoats, slickers, topcoats and boys' suits. Biggest commission paid in advance. Liberal bonus. Free outfit. State see and selling experience. "Joa" Foster, Inc., Dept. 23, 2250 South Spaulding Ave., Chicago.

MAKE Steady income selling double refined motor oils to farmers and auto owners on long credit. You receive 1/2 the profits—paid weekly. No investment, no experience necessary. Free selling outfit. All or your spare time. If income of \$35.00 to \$60.00 weekly interests you, write quick. Solar Products Co., Dept. 75, Cleveland, Ohio.

NEW And aptly different—Fast selling 5c-10c merchandise on attractive counter cards. 100% commission for you and dealers. Advertised by radio. No capital required. Catalog free. World's Products (Estab. 1921), 129 Central, Spencer, Ind.

MYSTERY Perpetual motion electric motor \$1. Cutting Sons, Campbell, Calif.

ONE \$5.75 Order daily means \$100 weekly from original and repeat commissions. A lifetime job. Free kit. Sales Stimulators, Dept. 8H, 341 Madison, Chicago.

100% PROFIT—For distributors and salesmen. Selling California Grape Concentrate in brick form. All flavors: Port, Sherry, Champagne, Burgandy, Orange, etc. One Brick makes one gallon juice. Every home, hospital, church, club a prospect. Write Vino Sano Co., 395 9th St., Dept. 8-163, San Francisco, Calif.

SALESMEN—At last! New feature sells punchboards everywhere—Dealers wild with joy—prosperity back again—profits enormous. Samples free. Puritan Novelty, 1407 Jackson Blvd., Chicago.

BUSINESS Stationery—Largest line—Highest quality. Quickest delivery. Biggest commissions. Liberal bonuses. Free copyrighted cuts every business. Experience unnecessary. Instructions and outfit free. David Lionel Press, 312 So. Hamilton, Dept. 201, Chicago.

ADVERTISING Pencils sell fast to every business. New, quick cash commission plan. Main or sideline. Free pocket outfit to real salesmen. Chicago Graphite Co., 130 So. Clinton, Chicago.

NEW, Largest color catalogue, punchboards, vending machines, produces quicker orders, big commissions. Free outfit. Lincoln Sales, 116 So. Wells, Chicago. Dept. D. Established 20 years.

NEW Specialty—sells every business and professional man. Four \$15 sales daily pay \$280 weekly. Foyer cleared \$1920 in three months. Write, F. E. Armstrong, President, Dent, PM, Mobile, Alabama.

POOL Shooters, new fascinating vending machine. Merchants everywhere buy! Sold-out sideline. Big profit maker! Free pocket outfit. Specialty Mfg. Co., M-617 W. Division, Chicago.

UNLIMITED Possibilities! Assist in sales of physical training systems. Special qualifications unnecessary. We direct mail. Rich field, Vitaculture, Box 461M, Columbus, Ohio.

ADVERTISING Novelty salesmen for new advertising specialty. Liberal Commission in advance. J. Glits Co., 5419 Chicago Ave., Chicago.

SELLING Like blazes. Beautiful toilet goods assortment at \$1.75 with 24 inch pearl necklace free to your customers. 100% profit. Davis Products Co., 238 North Ave., Dept. 930, Chicago.

SELLS On sight to billiard halls and confederates. Write for details. Table Golf Manufacturing Co., Cleveland, Ohio.

WANTED County salesmen with car, to demonstrate for large Ohio Manufacturer. First class job. Fyr-Fyter Co., 2157 Fyr-Fyter Building, Dayton, Ohio.

NATIONALLY Advertised line established territory. Liberal proposition. References required. Must have car. Write Superior Hat Co., St. Louis, Mo.

MAKE \$100 A week by taking just two orders daily, for my wonder-value, all-wool suits, tailored-to-measure. New low prices. Bigger commissions, paid daily. Generous bonus. Write now for big free outfit of large swatch samples. W. Z. Gibson, Inc., 550 Throop, Dept. C517, Chicago.

WONDERFUL Invention. Seals fifty envelopes minute. Sells on sight at \$2.75. Attractive trial offer. Square deal. Bank references. Kendall Sealer Co., Dept. C-28, Post Jaffrey, N. H.

SALESMEN—Wonderful sideline. 40% commission paid daily. Sell's all merchants. Pocket outfit free. Wilkens Co., Dept. 348, 2129 Gladys Ave., Chicago.

SALESMEN—Become independent. Own your business; experience unnecessary, selling our \$10,000 accidental death; \$50 accident; \$25 sick weekly benefits—\$10.00 yearly. Other amounts proportionate. Guaranteed steady income from renewals. \$250,000 deposited insurance department. Universal Policy, Dept. A, 716 Lefcourt Bldg., Newark, N. J.

FREE Trousers offer—Free outfit \$15.00 daily writing orders. Guaranteed greatest tailored-to-fit pants value; bigger commissions; wonderful sideline. Dept. 469, Hutchins Pants Co., Cincinnati, Ohio.

NAME Your own profits. New panel, portraits sell wherever shown. No competition. Free sample offer. Steady income from repeats. Craver, 2450 Jackson Blvd., Chicago.

SELL Nothing! \$170 weekly empty handed. \$500,000 punchboard firm announces new plan. No investment for anyone. Season starting. Hurry! K&S Sales, 4326 Ravenswood, Chicago.

ALTO Accessory salesman. Profitable repeat business; exclusive territory; full or part time; new super tire patch; 5000 mile guarantee; 200% to dealers; 40% cash commission to salesman. Mason-Ryckoff Rubber Co., 228 West 19th St., Chicago.

SALESMANAGERS With house to house salesmen or those capable of organizing. All territories. International Sales, Inc., 185 N. Wabash, Chicago.

ALL Merchants buy! 5c carded nuts, aspirin, etc. Steady repeats. Also low priced vending machines. Hobbin Products, 21 Dodworth St., Brooklyn, New York.

SALESMEN: Our men earning \$15-\$40 daily selling to stores. Savers Systems, Est. 1895, 2813 Sheffield, Chicago.

YOU Make 300% profit selling changeable signs to stores for \$1.50 each. Particulars free. National Sign System, St. Louis, Mo.

SALESBOARD Men; Whirlwind seller! \$15.00 profit every call. Repeat commissions. Best season. Hurry! Puritan Mfg. Co., 2037-P Charleston, Chicago.

STARTLING New punchboard plan! We furnish everything! No investment for you or your customer! Nothing to sell or carry! 50% profit! Unsaleable merchandise returnable! Full commissions on repeats. Write quick. AJ Novelty Co., 161 W. Washington, Chicago.

BIG Pay every day. Bonus every week. Adelite sells everywhere. New spectacular electric window display. Ever-changing colors, original posters, patented changeable letters defy imitation or competition. Special models for merchants, banks, etc. Instant seller. Big repeats, full commission. Write for thirty day demonstration offer. Display Products Co., 409A East 31st, Kansas City, Mo.

\$40-\$200 A WEEK. Genuine gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-A North Clark, Chicago.

SALESMEN—Easy selling Dia-U-Rat thru jobbers. 20% commission. Kills nothing but rats and mice. Rick Drug Co., Gallon, Ohio.

SELL Goodyear raincoats, \$2.95 up. Goodyear Rainwear, 682 Sixth Avenue, New York.

BIG Profit putting our gold sign letters on store windows, without experience. Samples. Consolidated, 69-V West Van Buren, Chicago.

WANTED District managers. Oldest organization of its kind in accident and health insurance. Write today for information. Dept. 18, Inter-State Business Men's Accident Ass'n, Des Moines, Iowa.

SALESMEN Sell tires and auto accessories to garages, tire stores, filling stations, etc. Established line repeats everywhere. Liberal commission. Write for particulars. Economy Rubber Prod. Co., 606 Burkhardt, Dayton, Ohio.

SIDELINE SALESMEN - WANTED

SIDE-LINE Or one line house to house salesmen who can stand prosperity and work hard. All territory. International Sales, Inc., 185 N. Wabash, Chicago.

HELP WANTED

CASH Paid for butterflies, insects. See Size-4r Display advertisement on page 28.

BE Your own boss! I'll show you how to make \$15 profit a day. Plan successfully operated by hundreds. No capital required. I furnish everything. Write for free particulars. Albert Mills, 8972 Monmouth, Cincinnati, O.

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LEARN "High-test" pipeline welding, \$7 weekly. Write quick. National Welding School, 713 Fairfax Airport, Kansas City, Kansas.

WANTED—Men, Women, 18-50, qualify for permanent Government positions, \$105-\$250 monthly; no Government experience required; Paid vacations; common education; Thousands appointed yearly. Write, Ozment Inst., 101, St. Louis, Mo.

FIREMEN, brakemen, baggagemen; colored train or sleeping car porters, \$150-\$250 monthly. Experience not necessary. 816 Railway Instruction Bureau, East St. Louis, Ill.

WORK For "Uncle Sam." Life jobs with U. S. Government. Steady work, \$105.00 to \$250.00 month. Men—women, 18 to 50. Many 1931 appointments. Common education usually sufficient. Experience usually unnecessary. We prepare you without leaving home. List positions and full particulars—free. Write today, Franklin Institute, Dept. A3, Rochester, N. Y.

LEARN Rapid figuring from "Higher Arithmetic." Correspondence courses now organized. Write for particulars. Frederick A. Smith, 608 South Dearborn St., Chicago.

SEAFARING For the inexperienced \$1.00 postpaid. D. Wolf, 2123 East 2nd St., Long Beach, Calif.

LEARN At home to make crowns, plates, bridgework, etc., for dentists. Uncrowded field. Big pay. Tools and material included with course. Write McCarrick School, 1342 S. Michigan Ave., Chicago, Ill.

DONT Prepare for any civil service examination without seeing our catalog. Free. Columbia Correspondence College, Washington, D. C.

BECOME A landscape architect. Uncrowded profession; wonderful opportunity for money-making. Easily mastered by mail. Earn while you learn. Est. 1916. Write for details. American Landscape School, 29A Plymouth Bldg., Des Moines, Iowa.

PHOTOPLAY Talking picture and magazine stories wanted for revision, development and copyright. Sell on commission. Established 1917. Booklet free. Universal Scenario Company, 406 Meyer Bldg., Western and Sierra Vista, Hollywood, Calif.

DOUBLE Entry bookkeeping 60 hours with 8 keys guaranteed. (Diplomas.) International Bookkeeping Inst., 8 Springfield, Mo.

U. S. GOVERNMENT Wants men, \$1,700-\$1,900 and up at start. Railway mail clerk examination coming. Let our expert (former government examiner) prepare you for this and also rural carrier, post office, customs, internal revenue, and other branches. Write today for free booklet. Dept. 8, Patterson School, Rochester, N. Y.

SHORT STORIES

SHORT Stories revised, typewritten and marketed. Details free. Hursh Service, Box P-1013, Harrisburg, Penna.

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TYPEWRITERS—All makes, guaranteed, \$8 to \$31. Catalog free. Typewriter Exchange, Ada, Okla.

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NEW \$3.50 Automatic Adding Machine. Circular free. Bassett 1458-A, Hollywood Avenue, Chicago.

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PUBLICATIONS, Circulars, folders. Unexcelled equipment, quality high, prices low. Battlefield Press, Gettysburg, Penna.

THREE-COLOR Business cards, \$2.95 thousand, postpaid. 326 N. Ervay, Dallas, Texas.

1,000 ATTRACTIVE Envelope slips, \$2.40; 5,000, \$5.00; 5,000 tinted envelope folders, \$12.75; 6x9 circulars, \$7.50. Samples. Goodprint, Harrisonburg, Va.

PRINTED Letterheads (8 1/2x11) and envelopes, 500 each for \$3.00 postpaid. Free samples. Universal Printing, 1111 Smith St., Bay City, Mich.

250 WHITEBOND Letterheads and envelopes, \$2.49. Webster's Press, Farmland, Indiana.

200 SHEETS, 100 Envelopes, 60c. Applebaum, 1238 Brook, New York.

100 OF Each, business cards, envelopes, letterheads, all three printed for \$2.25. Greene Printery, 215 Davis Ave., Dayton, Ohio.

PARTICULAR Stationery, cards, etc.—processes printed. Samples. Neagravuro (mbso), Knorr, Indiana.

LETTERHEADS, Envelopes, 500, \$1.10 1,000, \$2.00; 5,000, \$8.00, plus postage. Samples. Cyle & Kimballs, Newport, N. Y.

QUALITY Printing! Reasonable prices! Send for free standardized samples and prices. Folders. Circulars. Catalogs our specialty. Earnest Fantus, 325 South Dearborn, Chicago.

200 LETTERHEADS And 100 envelopes, \$1.00; 200 letterheads, 8 1/2x11, 150 envelopes, \$2.00; 250 cards, \$1.00. Hossler Print Shop, Portland, Ind.

DISTINCTIVELY Different printing service—proof and striking evidence, free. Battlefield Press, Gettysburg, Penna.

1000 BUSINESS Cards \$2.75 postpaid. Samples. Miller, Printer, Narberth, Pa.

WE Print stationery, booklets, catalogs, circulars, samples. Commercial Press, Batavia, Ohio.

PRINTING OUTFITS AND SUPPLIES

PRINT Your own cards, stationery, circulars, advertising, etc. Junior Press \$5.90. Job presses \$11 up, power \$149. Print for others, big profit. Easy rules furnished. Write for free catalog and full information. Kelsey Co., R-11, Meriden, Conn.

PRINTING Outfits—Presses, type supplies, type novelties. Send stamp for catalog. Model Press, York, Penna.

GUMMED LABELS

PROFITABLE Business producer! Colorful, gummed stickers. Harvey Wolf, 6618P Quinby, Cleveland, Ohio.

1,000 PRINTED: Name, business, address 50c. JBS Company, Box 93, Holyoke, Mass.

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"EXCELLAGRAPH" Rotary stencil duplicator \$28.00. "Two-Faced" film duplicator \$6.00. Booklet free. Pittsburgh Type-writer Supply, Dept. 601, Pittsburgh, Pa.

STENCIL Duplicator—Anyone can make. Particulars, samples free. Imperial Laboratories, Edwardsville, Ill.

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RUBBER Stamps, name, address 35c. Stamp Works, B22M, Auburn, Nebr.

NAME And address 35c. Newman & Son, 2208 O. Lincoln, Nebr.

3 INCHES Long, 1/4 inch type, 50 cents line. Additional lines 20 cents. Circular on request. Blomquist, New Albany, Ind.

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POOL Tables. For home use. Sizes 2 1/2, 3, 3 1/2. No toy, an ideal gift, \$35 and \$50.00. Send for catalogue. S. Mueller, Box 5, Arcadia, Mo.

CEDAR Chests only \$11.65—"Red-I-Kut" complete with rich copper trim—you assemble and save half—send for pictures. Kuempel Furniture Company, Guttenberg Iowa.

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.

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CLOCKS Electrified; outfits as low as \$3.95. Splendid opportunity for handy men. Breitinger the Clock Maker, 1675 Ruffer St., Phila.

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BINOCLARS, Field glasses, telescopes, microscopes. New used. All makes \$1 up. World's largest assortment. DuMaurier Importers, Dept. 293-A, Elmira, N. Y.

IMPORTED Eight mile binoculars, only \$7.50. Literature. M. Tarres, 4732 Grissom, Philadelphia.

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MAKE Strong, inexpensive wood vice. Simple plans 20c. Shop Specialties, Brookings, S. Dak.

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10,000 PREHISTORIC. Stone relics; arrows, discoidal, tomahawks, pipes, spears, etc. Circular free. Heike, Pontiac, Ill.

SEND 5c For fine new list Indian relics, antique firearms. F. E. Ellis, Webster Groves, Missouri.

INDIAN Relics. Coins, Curios, Beadwork. Catalogue free. Vernon Lemley, Osborne, Kansas.

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SONGWRITERS: Free examination of song-poems or complete songs. If unsuitable, returned immediately. Chester A. Escher, Music Publisher, 125 W. 45th St., New York City.

COMPOSERS—Verse or music. Brilliant opportunity. Write VanBuren, 2230 Me-Churg Bldg., Chicago.

FOR Sale—Old Stradivarius violin, Date 1770. John Szyrotyk, R. D. No. 6, North Street, Auburn, N. Y.

\$7,500 PAID For one song! More wanted! Particulars free. Greenstreet, Park Avenue, Kewanee, Ill.

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SATISFACTION Guaranteed. Write Sequela Songwriters Service, Sherman Branch, Los Angeles, Calif.

SONGWRITERS! Advance royalty payments, new talking picture song requirements, etc., fully explained in our free instruction booklet. Newcomer Associates, 1671-DD Broadway, New York.

SONG Poems commercialized. Write, Beaver, 1257 Elm, Green Bay, Wis.

SONGWRITERS—Real proposition. Submit songs. Brennan, 11618 Broadway, N. Y.

MELODY For your words one dollar. Frank Little, Nino, California.

WHEN The one you love, loves somebody else. Piano copy 50c. Bablon & Stillbro, Publishers, 209 Scotland Ave., Bridgeport, Conn.

SUBMIT Modern song poems. Valuable marketing assistance. Clifford Studios, 4562 Hollywood Blvd., Hollywood, Calif.

"BANJOS" Should interest all musicians on account of the popularity of the banjo, as it easily increases a player's income. Illus. catalog of 48 pages free. The Bacon Banjo Co., Inc., Groton, Conn., U. S. A.

SONGWRITERS Free criticism. Edward Madden, 113 Michaels, Syracuse, N. Y.

PLAY Piano by Ear. A sound system. Booklet free. Boscher's Harmony Studio, Ottawa, Can.

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

POETRY Wanted. Work guaranteed. We publish. Great Eastern Song Bureau, Dept. 27, Thomaston, Me.

SONG Writers. Send for our "Publishing Agreement." McKinley Music Printers, 1501 E. 55th St., Chicago.

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

"MUSIC Composed" to words. Bauer Bros. (formerly of Sousa's Band), Oshkosh, Wis.

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FREE Pamphlet—"Advise to song writers". Richard Broughton, Sioux Falls, S. D.

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CIGARETTE Machine manufacturers, 50 for 10 cents. For home use. Mentholated, non-programmed colored cigarettes. Ask illustrated folder. Introductory offer \$3.75. Hand Automatic Cigarette Machine Wks., 192 N. Clark St., Chicago.

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BUILD Phonograph radio. catalog mailed for 10c. American Phonograph Co., 3092 Wesley, Brynau, Ill.

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INVENTOR'S Universal Educator; contains 999 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 Dietrich Co., 602B Ouray Bldg., Washington, D. C.

LEARN Patent drafting \$1.00. Blanks, Supplies. Wade Service, 2274-G Brooklyn Station, Cleveland, Ohio.

INVENTIONS—Write for our free book "How to Obtain a Patent" and Record of Invention Blank. Send model or sketch of invention for inspection and instructions free. Terms reasonable. See advertisement on pages 128 and 129. Victor J. Evans & Co., 931 Ninth, 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 a royalty basis. Purchasing Agent, 241 Front St., New York, N. Y.

PROGRESSIVE Manufacturers now seeking better inventions owing to present industrial conditions. Information free. American Patent Corporation, Barrister Building, Washington, D. C.

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WANTED—Inventions—Will manufacture on royalty. Urbans Manufacturing Co., 561 Howard St., San Francisco, Calif.

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TIME Counts in applying for patents. See pages 126 and 127. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

NATION Wide search for best inventions now on. Write American Society of Inventors, Crosby Bldg., Buffalo.

WE Are interested in any new invention or improvement on locks, safes, electric protection or any device for the prevention of burglary daylight holdup or fire resisting protection of records or valuables. Do not send models unless asked for. Room "D", % Popular Mechanics Magazine, 200 E. Ontario St., Chicago, Ill.

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LOW Cost manufacturing. Large plant completely equipped for blanking, drawing, stamping and wire forming in any metal. Can save you money on your product. Our figures will convince. Eastern States Products, Box 721, New Haven, Conn.

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OUTRIGHT Or royalty—Patent No. 178203, fireproof extension scaffold, elevators and ladders easily and safely any height. For all types of interior and exterior construction work, saving labor and millions of dollars in lumber annually. Saves time and life. Insurance companies attention. Improvements pending. Inexpensive to manufacture. Anthony Hornath, 9 Spring St., Wallingford, Conn.

OUTRIGHT Or royalty, safety hammer. Something new, different. M. C. Bellman, 9981 Winston Ave., Chicago, Ill.

MY invention, clothesline bracket for sale. Best offer takes it. Philip Vetter, 13 Gordon Place, Freeport, N. Y.

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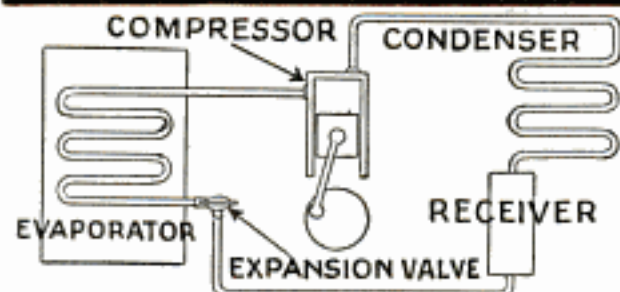
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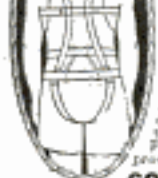
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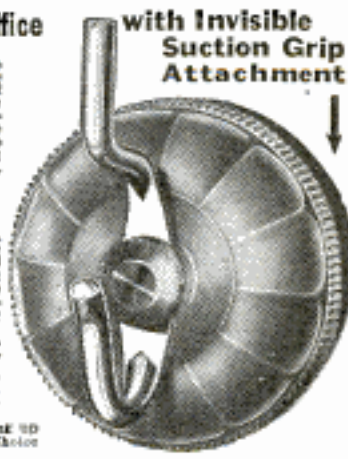
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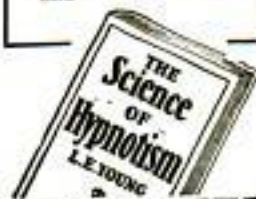
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Simply attach a Gy-ro Brush to an ordinary garden hose. Make no other preparations; don't even remove your coat. Turn on the water. Then brush the car with Gy-ro. Don't splash or spray. Just brush down the car as casually as though you were whisking away a fly!

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Gy-ro washes cars clean in less than half the usual time. In 15 minutes the car will be spotlessly clean. And, surprisingly, Gy-ro is just as handy for washing down walls, saving expensive painting jobs; for cleaning windows, screens, etc. It is an invaluable aid for every housewife.

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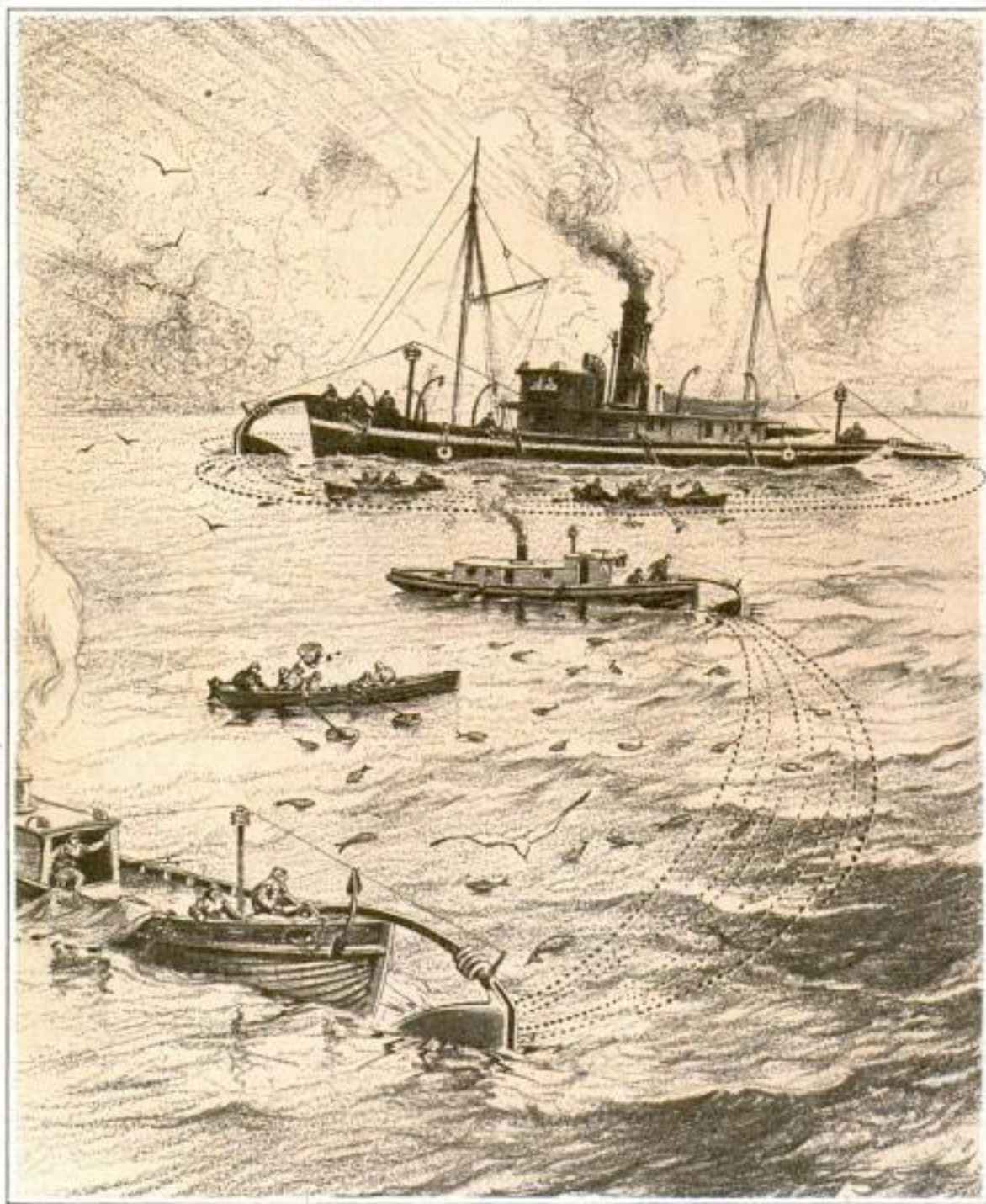
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2279

INVISIBLE "NETS" OF ELECTRICITY TO CATCH FISH



no further information

Courtesy The Illustrated London News

EXPERIMENTS in fishing with electricity were conducted in Germany and Sweden with considerable success before the war, and now Australian fishery authorities are conducting further research and tests with the method. As indicated in the drawing above, the "nets" consist of electrical currents, passing between electrodes adjusted to the boats by special projecting rigs. The fish are stunned by shock when they swim into the path of the current, rise to the surface and are gathered in. An advantage of the idea is that, since the fish are not killed, but merely numbed, they can be kept alive after they are caught or put back in the water if not wanted. The net can be established between two boats or between the bow and stern of a single vessel if it is large enough. Copper grids have been used with success as the electrodes. In the experiments, it was found that large fish were killed by strong current, although smaller ones slipped by unharmed. The current can be regulated to trap fish of a desired size. The method has been used with success both in deep sea and in inland fishing.

Popular Mechanics Magazine

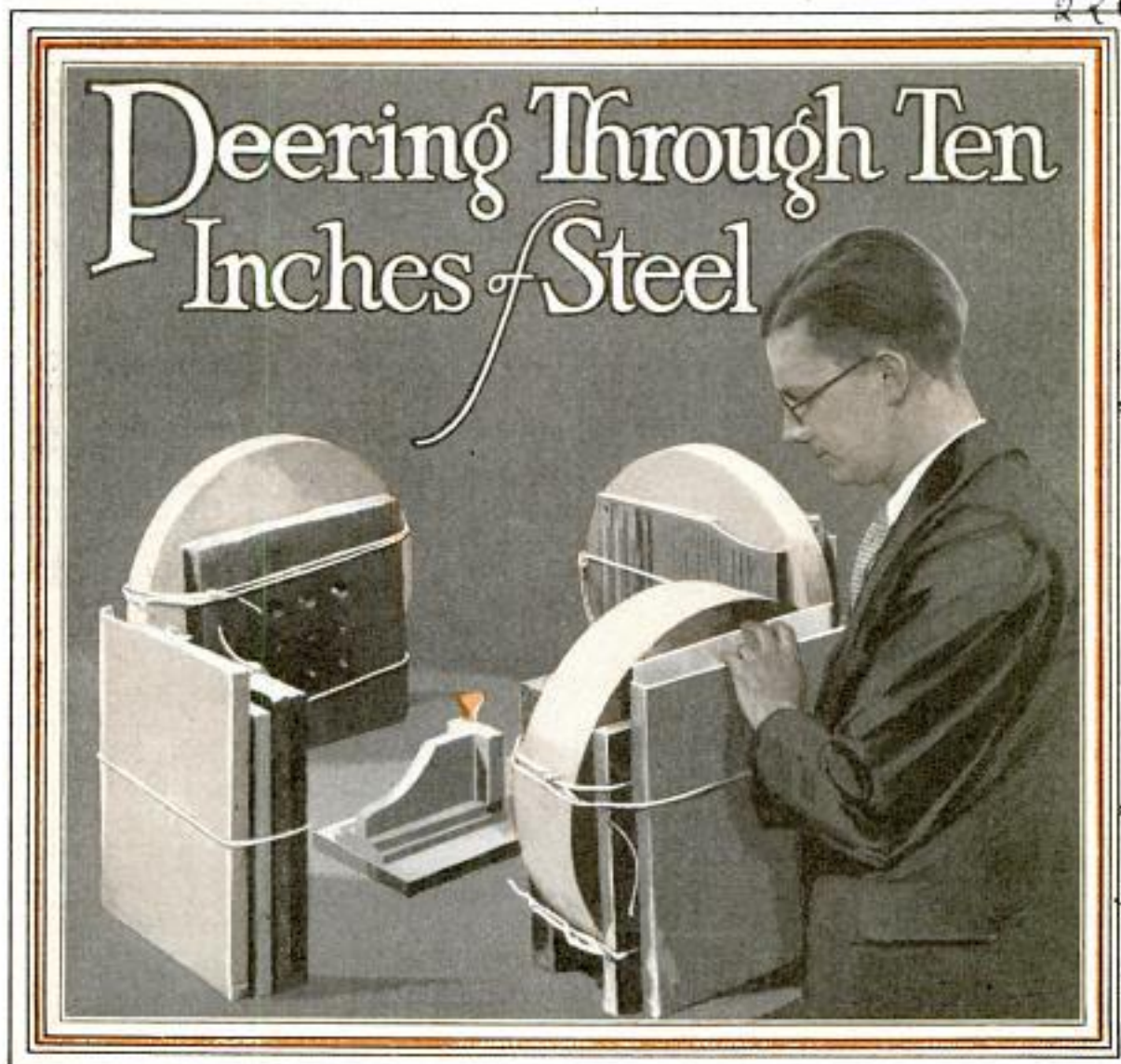
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WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 55

MARCH, 1931

No. 3



Making X-Ray Photographs of Four Pieces of Steel at One Time; the Radium Torch, Held in a Glass Container, Is Mounted in the Center

HAS science found a worthy rival to the powerful X-ray, whose all-seeing "eyes" have helped cure hundreds of ailments, told the true story of fraudulent paintings, besides revealing hitherto hidden defects in the structures of our bridges, culverts and locomotives, thereby saving the nation untold millions annually?

Officials of the U. S. navy think so. They point with pride to the amazing new radium torch just developed at the naval research laboratories. Sensational tests

recently completed with the torch indicate it to be even more powerful than the X-ray, easier to operate and considerably cheaper.

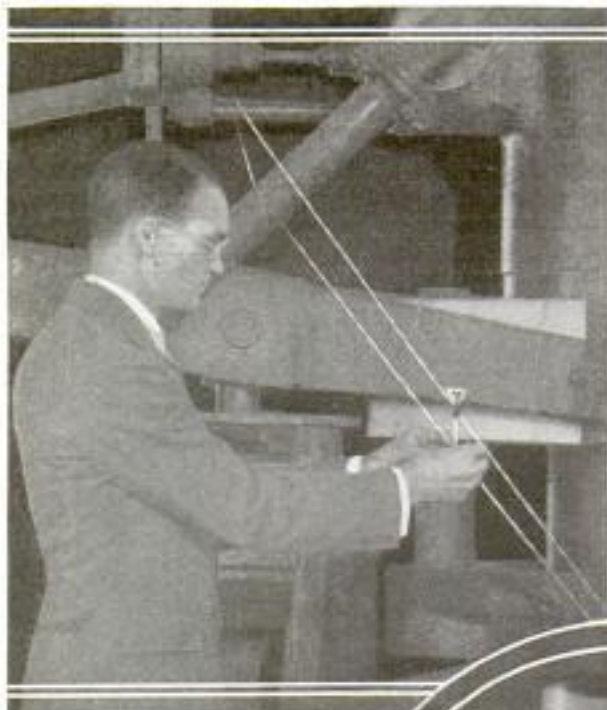
To three young scientists the world owes this brand-new science of "shadow-graphic photography": Dr. Robert E. Mehl, metallurgy expert, Charles S. Barrett, Dr. Mehl's assistant, and Dr. Gilbert E. Doan, of Lehigh University, Bethlehem

Pa. For well over a year these experts have been at work, but not until a few days ago were they able to accomplish their

naval Research Laboratories
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2269
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2264
354



crowning achievement—the penetration of ten inches of steel by the new torch. This is a feat never paralleled by the most elaborate X-ray equipment.

Doctor Mehl offers a graphic description of the new science: "Radium and other radioactive elements give off three types of rays; the 'alpha' rays, which are fast-flying helium atoms carrying two negative charges of electricity; 'beta' rays, which are fast-flying electrons with single charges of negative electricity, and 'gamma' rays, which are light rays, somewhat like ordinary X-rays, but of much shorter wavelength.

"The alpha and beta rays are used commercially in fluorescent paints, which contain a small quantity of radium and a substance which gives off light when struck by the gamma and beta rays. Already the gamma rays have been used by the medical profession for the treatment of cancer.

"It is these gamma rays we employ in the development of the new radium torch. Really, the simplicity of the thing is surprising. The observer merely sticks a tiny bit of radium into a brass container

less than an eighth of an inch in diameter, attaches a photographic plate to the object to be photographed near the radium, and a radium-ray or gamma-ray picture results, which, when developed, reveals structural defects, if any, in the object.

"By no means is it always necessary to use radium itself for such photographic work. That might be quite expensive, for radium sells for about \$60,000 a gram. Equally efficient is 'radium emanation,' which is a gas formed as a decomposition product of radium and which has all the radiating strength of that element. Fortunately we were able to borrow a bit of this emanation for our tests in the government laboratory. It comes in a tiny glass tube which, when used experimentally, is stuck into a glass funnel and mounted on a piece of wood."

Dr. Mehl goes on to point out that one big advantage of the new shadow-graphic apparatus is its portability and maneuverability. Often there are occasions when huge pieces of structural steel must be examined



Close View of Radium Torch, "Shadowgraph" of Valve and Preparing to "Gamma-Ray" Large Casting

for possible defects. At such times it would be extremely expensive and troublesome to attempt to transport a bulky X-ray apparatus to the scene of operation. Not so with the radium torch. It takes up only a few inches of space, weighs very little, and costs not a penny to move.

GROTESQUE FIGURE IS FAIRYTALE CHARACTER a-52

One of the figures described in the fairytales of Wilhelm Hauff has been perpetuated in stone in the city of Kalmbach, South Germany. The grotesque crouched figure is part of a fountain, and the fairytale man, known to the younger generation as "Dwarf-Nose," is represented in a kneeling position and mounted on top of a stone sphere from the sides of which water spurts from four spouts.



Grotesque Fairytale Figure, Known as "Dwarf-Nose," Carved in Stone as Part of a Fountain

Acme News Pictures



Horsecar at the Head of a Transportation Parade in Detroit; the Old Vehicle Has Been Used as a Shoe-Repair Shop

Wed World

HORSECAR USED AS SHOE SHOP HEADS CITY PARADE

"Old 73," famous horse-drawn street car that was in service for many years in Detroit but since has been used as a shoe-repair shop, rolled proudly on rails recently, at the head of a huge parade the city staged in celebration of the progress made in transportation. The oldest conductor and motorman ran the car.

UNDERGROUND LABORATORY AIDS OPTICAL RESEARCH a-60

To enable more accurate work in optical research, an underground laboratory has been established in Washington for this department of the bureau of standards. When lenses must be ground to within five or six-millionths of an inch, the temperature cannot be allowed to fluctuate over a wide range, vibrations are likely to result in error, and even dust flying about can play havoc with one of the millionths. The underground laboratory was found to be the best way to keep temperature constant and at the same time have a workroom free from vibration and dustless. A first-class telescope lens, for instance, must be ground so accurately that it concentrates every beam of light from a distant star within an area so small that, even when magnified 500 times, it appears as a point to the naked eye.

*Acme Service
5/11/20 1/18/21*

*Mr. C. A. Spennier
Chief of Optical Division*



Repairing Pillory at Coleshill, England, as an Attraction to Tourists; It Has Held no Prisoners in Years

Wide World

FAMOUS PILLORY IS RESTORED TO ATTRACT VISITORS

Warwickshire

Crowds used to congregate in front of persons placed in the stocks and the pillory, and now that these forms of punishment have been abolished, the ancient instruments still attract throngs of spectators wherever displayed. A pillory that had been on exhibit at Coleshill, England, but had fallen into disrepair, was restored recently where it continues to lure large numbers of sight-seers. The pillory was used as a means of

punishment in this country for many years and was not outlawed on the statute books until 1839. It was recognized in the state of Delaware as late as 1905.

INTERIOR OF STEAMER FUNNEL a-45 USED AS CLUB ROOM

Space inside the dummy funnel on the White Star liner "Britannic" is utilized as a smoking and club room for the engineers. The compartment is not unlike a penthouse. The roof slopes like a tent, there is a frosted skylight in the center, and the sides are paneled in wood. There is ample room for the engineers to sit at tables and play cards or read.

Shelton Ferry, 1/1931 P. 7

a-46 ELEVATORS IN CAVES

To enable tourists to visit the Carlsbad caverns more comfortably, it has been suggested that an elevator shaft, 750 feet deep, be sunk inside one of the largest caves. It would be used, according to present plans, only for taking persons back to the surface. If installed, it will rival those of some of the tallest skyscrapers, of which few are so long.

National Park Service

USED GOLF BALLS LACQUERED BY COIN-IN-SLOT MACHINE

a-12

Dirty and discolored golf balls can be made to look like new by dropping them in a slot machine which automatically paints them white and delivers them ready to use in less than two minutes. The apparatus, in the form of a huge golf ball,



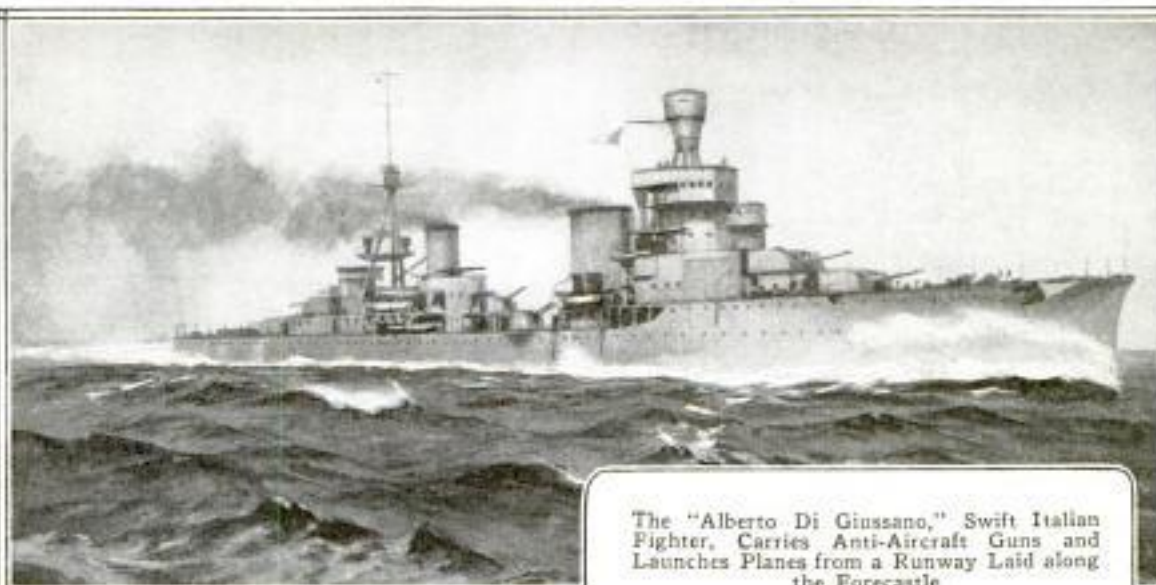
Slot Machine Which Lacquers and Dries Golf Ball When a Coin Is Deposited

stands on a pedestal on the course and is electrically operated. The mechanism, which is put into operation when the player deposits a coin and drops his ball, dips the ball into a solution of white lacquer, then raises it into the path of a strong air current which dries the lacquer coat in a few seconds.

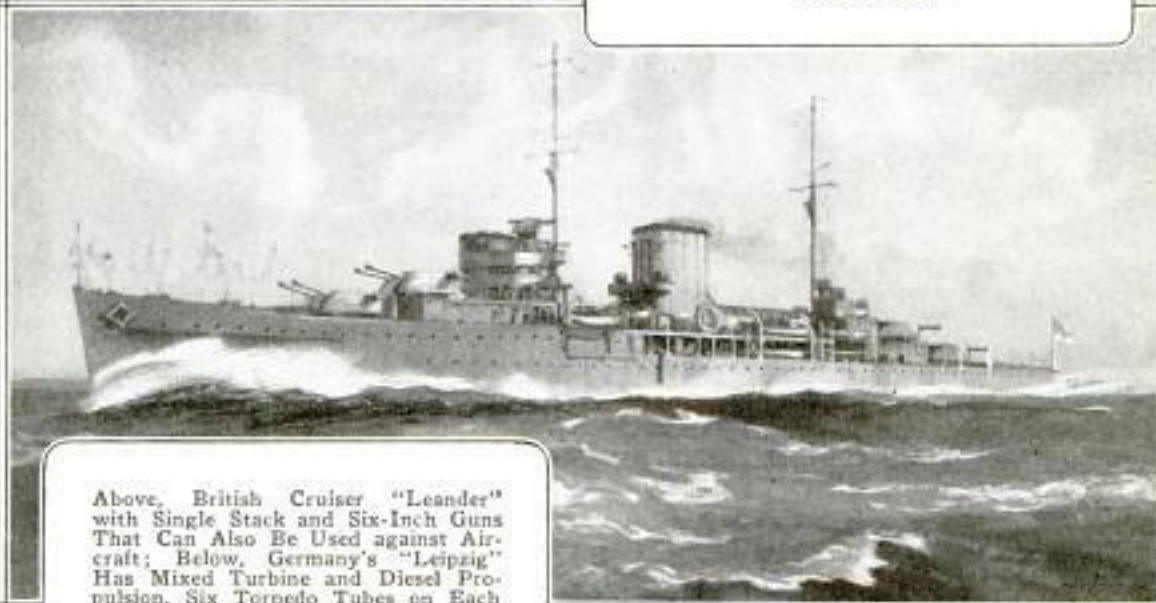
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London, S.W. Eng. 357

THE LATEST FIGHTING SHIPS OF THREE NATIONS.



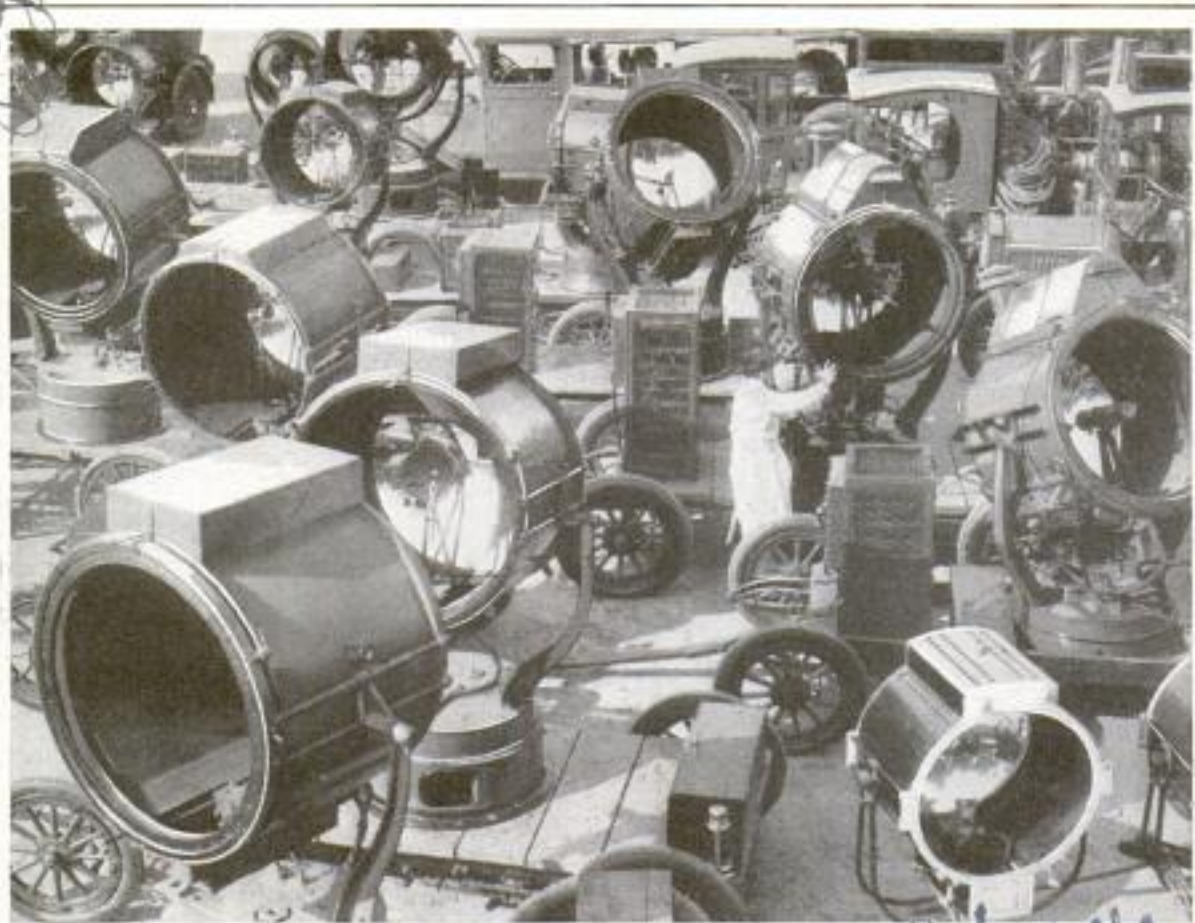
The "Alberto Di Giussano," Swift Italian Fighter, Carries Anti-Aircraft Guns and Launches Planes from a Runway Laid along the Forecastle



Above, British Cruiser "Leander" with Single Stack and Six-Inch Guns That Can Also Be Used against Aircraft; Below, Germany's "Leipzig" Has Mixed Turbine and Diesel Propulsion, Six Torpedo Tubes on Each Side and Nine Six-Inch Guns in Three Turrets; She Displaces 6,000 Tons and Has a Speed of Thirty-Two Knots



Assembled in Hollywood by
 Otto K. Allee in illumination
 a-21



Lights That Shine for the Movie Stars; Some of the Searchlights That Sweep the Skies of Hollywood When a New Movie Is Given a First Showing, or on Other Important Occasions

Wid. World

**BATTERY OF BIG SEARCHLIGHTS
HERALDS NEW MOVIES**

When there is the first showing of a new motion picture, or some other important event, in Hollywood, the sky is illuminated for miles around by huge searchlights. Some of the lamps used for the display are shown in the accompanying photograph. They represent more than five and one-half billion candlepower and include the latest and most efficient types of lights of this kind.

**WARNING BUZZER ON GLIDER
HELPS PREVENT STALLS**

a-15

To warn the glider flyer when the craft is about to stall, a buzzer device has been developed at an eastern club. As long as safe flying speed is maintained, the air pressure against a plate is sufficient to keep two contacts apart. When the glider slows down and approaches the stalling point, the reduced air pressure allows the

contacts to meet, sounding a buzzer. The alarm is given before the actual stall, so that the pilot still has time and speed to



Buzzer Is behind Pilot, and Diaphragm, Operated by the Wind, above Her Head

prevent trouble. The device has performed satisfactorily in a number of tests.

*Letter
retd*

*Standard Gliding Club,
Washington, U.S.*

*Wm. B. Vernon
Aeromaps
Alexandria, Va.*

Copyrighted material

Essex City, N.J.

2283

**A SELF-OPERATING
CLUTCH FOR GEAR
SHIFTING**

a 55

Eliminating the need for manual operation of the clutch pedal and gear-shifting lever, a self-operating clutch now is available for installation on most standard automobiles. All parts are of metal except the disk facings, and the mechanism requires no attention after installation, departing from the standard type of clutch design only in a very few small parts, none of which is likely to cause the unit to get out of order. Advantages claimed for the automatic clutch include great simplification in driving, and increased comfort for both the driver and passengers since jerky car motion is eliminated. There is also less wear on the car itself because of less stalled motors, gear noises and strain on parts. The driver needs only to steer and use the gasoline and brake controls and the car can be left in high gear except when reverse is needed. For drivers who like to have the standard clutch system at their service, a button in the dash converts the automatic control to the ordinary manual system.

**TELEPHONE USERS TOLD TIME
BY AUTOMATIC GONG**

a-56

So that telephone subscribers may obtain the correct time, an automatic gong answers a special number in one city. The ticking of the master clock is first heard, then it strikes the hour followed by two gong signals which are repeated to indicate the number of minutes past the hour. The time given is said to be correct within one minute.

Automatic Electric, Inc., 1033 W. Van Buren, Chicago



Ivo Puhony and Assistants Adjusting Strings and Other Apparatus for One of His Famous Marionette Shows

**PLAYS BY MARIONETTES PROVE
POPULAR IN GERMANY**

Fairytales, ancient and classical plays, enacted by marionettes under the skilled fingers of Ivo Puhony, were enthusiastically received by crowds attending guest performances in Berlin, Germany. Although modern ideas in lighting and stage designing have had some effect on the marionette theater, its technique remains practically the same as it was years ago, and no satisfactory substitute for the human hand and fingers has been found in any mechanical device to keep the figures moving.

Leaks in telephone cables are now detected by inflating them with nitrogen gas.

Com. Ray Blain,
Signal Office, Ft. Hayes,
Columbus O.

225

HOW TRICK SOUND EFFECTS ARE MADE IN RADIO



At Left, Toy Electric Locomotive, Operated inside Special Sound Chamber, Duplicates Noises of Real Train with Amazing Fidelity; This Device Was Constructed Especially for the Great Northern Railroad's "Empire Builders" Program

Above, Sounds of the Wind Are Faithfully Imitated by This Revolving Wheel, Turned at Varying Speeds by Electric Motor Control; at Left, Cords on Revolving Motor Disk Slap against Chamois Skin Stretched across End of Tube to Imitate Roar of Airplane; a Rheostat Permits Variation of Speed; Note Position of Microphone

At Right, Real Locomotive Bells and Whistles on Roof of National Broadcasting Company's Studio in Chicago; This Apparatus Is Used in the "Empire Builders" Hour

Merchandise Train

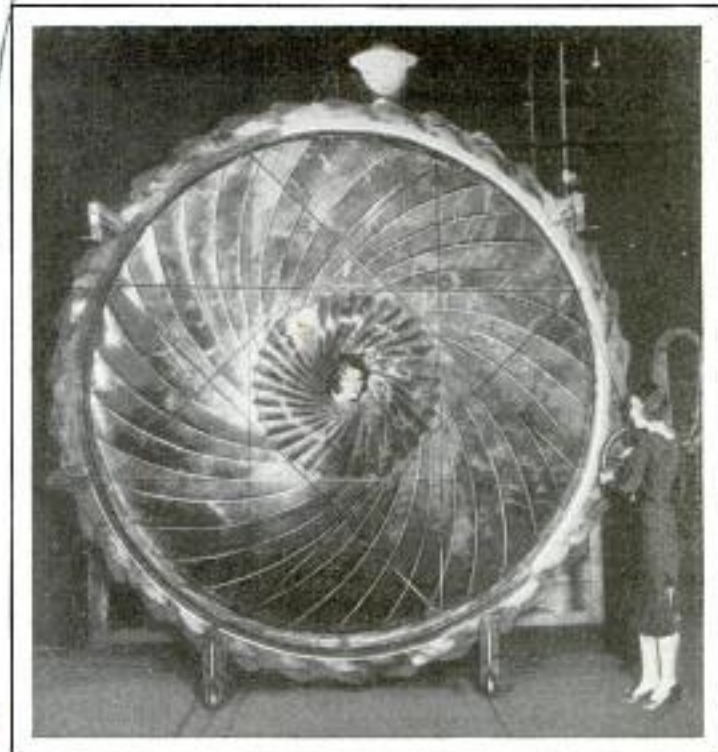
Verold Tribune 1/12/31

MOTORS TAKE THE PLACE OF CAMELS IN PARTS OF AFRICA a-80

Camels may soon be looking for new jobs in some remote sections of Africa as American automobiles have taken over their work. Department of commerce reports show that America last year exported automobiles valued at nearly \$11,000,000 to this country, and in such sections as Dahomey, Senegal and the Ivory Coast improved roads have increased the demand for cars. Modern highways are being built in the continent, and each road puts more camels out of business.

MUSIC INSTRUMENT CAN MIMIC SOUNDS OF OTHERS a-47

Capable of mimicking nearly every instrument in an orchestra, but having an individual tone of its own, an unusual device invented by a Frenchman uses a radio tube to develop the sound. The instrument resembles a spinet, but it produces sounds through vacuum-tube vibrations transmitted by means of a diffuser to what resembles a loud speaker. Some critics believe it is the forerunner of the musical instrument of the future in which vibrations through a vacuum tube will regulate tone, giving a much wider range than is possible today.



Huge Iris Diaphragm Used at General Electric Laboratories in Connection with Instruments That Show Power of Various Lamps

"EYE" NINE FEET IN DIAMETER HELPS TEST LIGHTS

One of the instruments used at the General Electric company's laboratories at Schenectady, N. Y., to measure the output of various lights is a double-leaf diaphragm, similar to the iris shutter on a camera. It is employed to cover a photometer which is said to be capable of gauging the intensity of almost any size of lamp, from the tail light on an automobile to a searchlight of one billion candlepower.

LONG-DISTANCE PHOTO SHOWS CURVATURE OF EARTH a-60

Visual evidence of the earth's curvature is contained in a picture taken by a camera which "saw" for 320 miles. The photograph was taken from an airplane in South America, showing level pampas stretching ahead nearly 300 miles and ending in a range of the Andes. The picture showed the distant horizon line of the pampas bending slightly downward, like a photograph of the curving edge of the moon. The camera's eye penetrated much farther than can that of a person, and the picture was made by using plates sensitive to rays of light invisible to man.



Prof Maurice Martenot

Musical Device Actuated by a Vacuum Tube, Which Can Mimic Any Instrument in an Orchestra

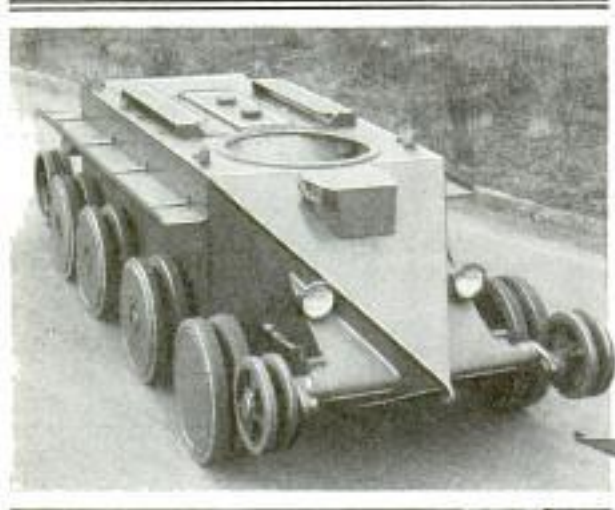
Prof Maurice Martenot

In Tribune 12/21/30

by Capt W. Stevens U.S.A.

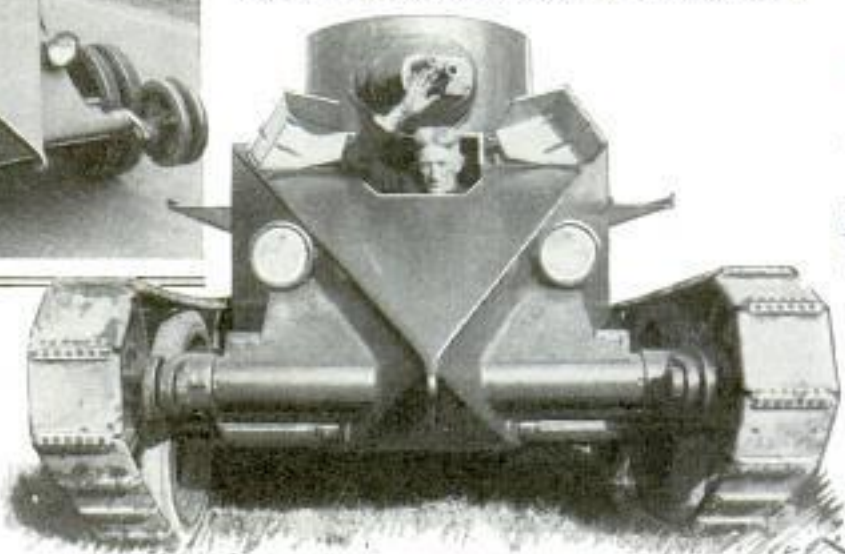
show before American Association for Advancement of Science

ARMORED WAR TANK HAS MILE-A-MINUTE SPEED



One of the most formidable of modern fighting machines is a high-speed war tank recently inspected by army officials at Washington. It runs on either wheels or an endless track, being transformed from one

type to the other by merely removing or attaching the tracks. On a smooth road and without the tracks, it has a speed of seventy-five miles an hour. It is covered with armor five-eighths of an inch thick, and carries both a cannon and machine guns with 2,100 rounds of ammunition.



High-Speed Armored Tank That Runs on Either Wheels or a Track, and Can Cover the Ground at a Seventy-Five Miles an Hour Clip

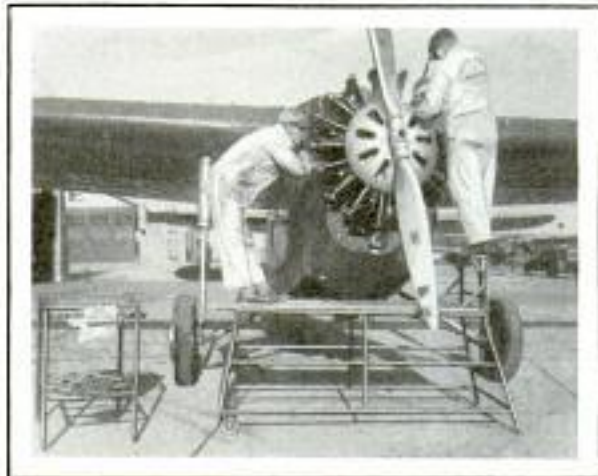
A "LAYER CAKE" TEMPLE FOUND AMONG AZTEC RUINS

Mexican archaeologists excavating at Calixtlahuaca have found a round temple of the Aztecs constructed like a layer cake, each of the succeeding five stories being smaller than the one under it. The temple has a grand stairway leading to the top story, and some of the layers have vertical sides, while others slope outward and downward. The building was enlarged by covering the original smaller structure with earth and rock, then refacing with stone and plaster, so the structure, as discovered, may actually represent three temples nesting like boxes piled one upon the other. The building is be-

lieved to have been sacred to a god of the wind or sky, and is similar to one that once stood on the site of Mexico City.

STAND FOR PLANE MECHANICS AIDS MOTOR REPAIRING

Designed especially for use on single-motor cabin planes, a rolling workstand enables the mechanics to get at all parts of the engine with little trouble. There is a broad platform for holding tools, and a separate stand is used as a rack for the cowling when detached. According to reports the stands reduce labor about fifty per cent and insure a degree of accuracy that is hard to obtain when a ladder or temporary support is used.



Mechanics at Work on Airplane Engine Have Little Trouble in Reaching All Parts from Roller Stand

Science Service News
Bulletin 5117
4/30/31

Profile of Chrysler American Airways
Universal Ltd. Lambert flying school

Used by American Airways, also
made for Universal. Licensed
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Heat from Cold



Units in an Electrical Refrigerator; Here Are Essentials for a Much Larger Outfit to Warm and Cool Homes and Offices.

By PAUL D. PADDOCK

WARMTH in winter, coolness in summer, both from a refrigerator and through the same set of pipes. Comfort all the year around, clean air, properly humidified at all times and no furnace to watch or fuel bins to replenish. Here is a system that actually furnishes more warmth than the heat equipment of the electric current put into it.

This suggests a house owner's Utopia. But it is not a dream. Such a plant could be built for you today although it would be too costly for the average home, largely due to losses from faulty insulation.

Although heating houses with a refrigerator is not yet an accomplished fact, it is an old idea. Lord Kelvin suggested it years ago. Small mechanical refrigerating units widely used today are, in a sense, heating systems as well as freezing ma-

chines for they take the heat out of the refrigerator, simply extracting the warmth from the area that is to be cooled and dissipating it into the room. A combination heating and cooling plant, as suggested, would utilize the heat instead of getting rid of it.

How such a system would operate is explained by L. W. Chubb, director of research for the Westinghouse Electric and Manufacturing company, where interesting experiments are being conducted on more efficient ways to use electricity in the home.

"The apparatus would consist chiefly of an electric motor, a compressor, a fan and the necessary pipe coils, inside and outside the house," he said. "By means of the compressor, heat would be extracted from the outside air by a suitable refrigerant such as sulphur dioxide. In fact, the heat energy that we would render useful would be several times the heat equivalent of the electricity that turned the motor. That would be quite different from a coal-burning furnace or the direct electric heater, for instance, which yield to the interior of the home only a fraction of the heat in the coal burned in the furnace or at the power station.

"As the heat is dissipated from the high-pressure coil, inside the house, an electric fan would blow it through ducts circulating it throughout the dwelling. The refrigerant would finally become a liquid. It would flow through expansion valves

2288



and into the pipe coils outside the house, where it would absorb heat from the air, become a gas once more and return to the system to repeat the process all over again.

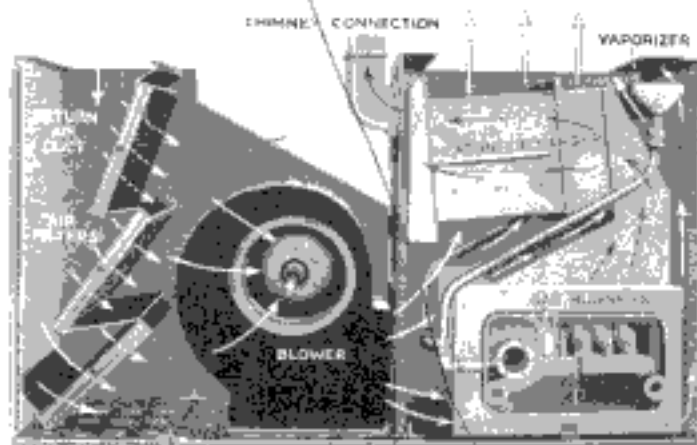
"That would be the procedure in winter. Now in summer, the function of the pipes and the direction of flow of the condensible refrigerant would be reversed. The outdoor coil would be the high-pressure side. Heat released there would be sent into the air, you would simply be heating the outdoors a bit, and, as a liquid, the refrigerant would flow back into the house coil, now the low-pressure side of the system. There it would boil and absorb heat from the air. The fan would blow the cooled air through the house just as it circulated the heat in winter. It would be possible to control the entire system by thermostats so that the home owner would not need to do any work in connection with it.

"While such an idea is theoretically plausible and a plant of this kind could be constructed, it would probably cost as much as the house, and the operating expenses would be high, especially where severe winters and hot summers are common. To make such a system thoroughly efficient, the house should be constructed especially for it, to eliminate losses.

"Your steam radiator has a heavy load under our present forms of heating. It must be kept at a relatively high temperature. Too much of the time, it is hotter than it need be, and its shape, size and material limit its usefulness. Incidentally,

radiators are really not radiators at all. Cooler air, circulating around them, carries away the heat and so warms the rest of the room. Radiation does not warm the air and it does warm solids and liquids.

"What will the heating plant of the future be like? Such a question cannot be answered definitely. There will be different systems for different localities just as there are today, but it is entirely



Dr. L. W. Chubb, and Diagram of a Carrier "Weathermaker," Using Gas; White Arrows Indicate Air Paths

probable that we shall develop, and soon put into practice, principles that will simplify the task of keeping comfortable in all seasons, reduce operation costs and promote greater health. We are learning how to insulate our walls, ceilings and floors better, how to control humidity and obtain proper air circulation—all important factors in the problem. We are recognizing that it is important to condition and process the air we breathe just as we cleanse and modify the water we use. Electricity promises solutions of practically all the problems confronting us."

TWO-CAR ELEVATOR SYSTEM SAVES BUILDING SPACE

Two cars run in the same elevator shaft of an eleven-story building of the Westinghouse Electric and Manufacturing company at East Pittsburgh, the first installation of its kind and one that promises interesting economies in building rentals. Instead of having two shafts, one for express and the other for local service,

a. 54

the two-car system uses only one shaft. Many difficulties had to be solved in developing the idea, and the installation would vary according to the height of the building, but the general method of operation is this: The express car starts at the street level, the local from the basement. In a twenty-story building, for instance, the express car would run without stops to the eleventh floor, where local service would begin. As soon as the express car is out of the way, the local would leave and run only to the tenth floor. Controls are so arranged that neither car can approach beyond a certain distance of the other, and the express car cannot run downward while the local is running up.

CABINET TAKES MOVIES OF YOU WHILE YOU WAIT a. 63

Motion pictures of a person are taken, developed and shown on a small screen in six minutes inside a cabinet recently introduced for amusement arcades and similar places. The subject simply presses a button and the pictures are taken. They are soon ready for display on the miniature screen, which becomes animated by holding the fingertips against the edge of the frame.



Posing in the Cabinet Which Will Prepare Motion Pictures of Subject in a Few Moments

Movie of U Corp
236 W. 42
New York



Spraying Auto Windshield with "Gun" Which Distributes Liquid Especially Effective in Removing Grease

SPRAY GUN FOR AUTO WINDOWS SIMPLIFIES CLEANING

Automobile windows, windshields and other glass surfaces are quickly cleaned with the aid of a small spray gun, which distributes a special fluid by operating a plunger. The gun takes up little space, saves time and reduces waste of the liquid which is claimed to be particularly effective for removing road grease.

MORE EFFICIENT SIX-INCH GUN FOR UNITED STATES NAVY

One of the latest additions to the fighting equipment of the United States navy is an improved six-inch gun which, according to the statement of Rear Admiral William D. Leahy, chief of ordnance, before the house naval committee, in his opinion is the best weapon of its kind in the world. This gun, he said, shoots farther and maintains a faster sustained rate of fire than similar ones now in use on American cruisers: in fact, the firing rate has been increased by not less than fifty per cent.

An electrical harpoon that kills a whale instantly, has undergone successful tests in the Antarctic.

83 E 35th St
Chicago

W. L. Freearay

Chicago Tribune
1/11/31

a-35



Trying to Draw Star by Looking into Mirror; It Sounds Easy but Is Surprisingly Difficult

DRAWING STAR FROM MIRROR TESTS EYE AND MIND

Nearly everyone can draw the pattern of a star on a piece of paper. The task becomes greatly complicated when you try to draw the design without looking at the paper itself but at its image and that of your hand and pencil in a mirror. Directions are reversed and everything else is confused at first. Two or more persons can entertain themselves in this way indefinitely by attempting other designs as well as stars. An eastern authority is reported to give the star test as a mind measure. If the subject is able to draw the star by looking only into the mirror, he is said to have a mind free from criminal traits.

Criminologist

SIREN SIGNAL MORE EFFICIENT THAN WHISTLE FOR BOATS

Large steam whistles on boats waste much energy, a twelve-inch whistle consuming as much as 400 horsepower and often wasting ninety-nine per cent of the energy supplied. These facts were revealed in government investigations to find a more efficient fog signal. The popular notion that sound travels farther in fog than in clear air was disproved, as fog has little effect either way, but wind and air eddies are of great importance. In

one test, a ten-inch whistle, using 200 horsepower, could be heard only three miles away in the face of an unfavorable wind, while a two-inch whistle, using two horsepower, could be heard for five miles with a favorable wind. Alternating layers of hot and cold air also are disturbing elements, as they refract sound and ruin signals. The siren type of signal is much more efficient than the whistle so far as audibility is concerned. Varying the sound in an irregular manner was found to introduce the element of surprise and improve audibility, and signals of 180 to 300 vibrations a second, corresponding to the middle range of the piano keyboard, are best heard.

DOGS TRAINED TO GUIDE BLIND IN GERMAN SCHOOL

Blind persons from all sections of Germany attend a unique school maintained at Oldenburg, where dogs are trained to guide their masters and the blind are trained to be led by their four-footed companions. After a period of careful training, these animals are turned over to the blind persons they are to aid, and in about two weeks accustom themselves to their masters, leading them safely across streets, past sidewalk hindrances and up and down stairs. The dogs also are taught the loca-

a-20



Dog Guiding His Blind Master Past a Sidewalk Obstruction at a Training School in Germany

tion of mail boxes and the retrieving of lost articles.

Report of Luis Thompson
U.S. Naval Academy Grounds
Annapolis, Md.

ANIMATED CIRCUS DRAWS ATTENTION OF CROWDS

hurry make set maker



Huge Animated Circus and Its Twenty-Five Foot Central Figure, Which Talks and Laughs

To amuse and mystify children, huge animated circuses, 165 feet in length and thirty-five feet high, were operated in some of the Pacific coast cities by an oil company. The big sets included animated nursery-rhyme characters, trains that ran, chimneys that smoked and a talking, smiling figure, twenty-feet high when seated. Six men were employed in operating the moving parts, two being stationed inside the huge figure. One had a pick-up microphone to hear the children talk and address them in a big booming voice created by a loud speaker. The other operator accompanied the comment by moving eyes and lips and causing the figure to smile.



heat through the carburetor flanges into the fuel chamber. This prevents the heat which vaporizes the gas from traveling downward through the metal of the manifold into the carburetor and causing the gasoline in the carburetor to boil.

GAS IS KEPT FROM BOILING BY HEAVY GASKET 2250

To prevent carburetors from overheating copper-asbestos gaskets now are obtainable. The asbestos is laminated to the copper to a thickness of nearly half an inch, stopping the direct passage of



Victor Mfg. Co. & Sackel Co.
5750 Roosevelt Road
Chicago 40

PARAFFIN GUARDS HENS' FEET IN WET WEATHER

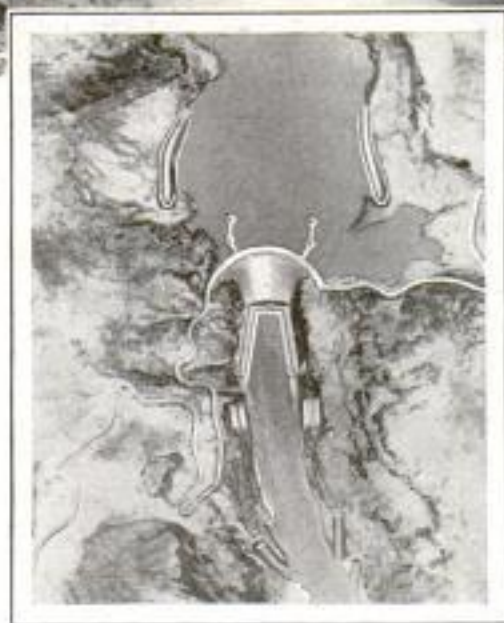
One poultry dealer applies waterproofing to the feet of his chickens to make them immune to wet weather. The feet are dipped into paraffin mixed with glycerine, and enough oil remains on the feet to insure dry toes for two weeks. A careful check on the hens showed no ill effects from the waxed preparation.

Herald Tribune
1/11/31

a-48
A GLIMPSE INTO THE FUTURE AT BOULDER DAM



Keystone
Construction work on a large scale is being started on Boulder dam, the greatest federal engineering project since the Panama canal. This \$165,000,000 development in the heart of the Great American desert, a few miles from Las Vegas, Nevada, will not only represent a great electric power plant, when completed, but also will assist in irrigation and flood control on a large scale. One of the first steps preparatory to the actual beginning of the work was to build a railroad over which to haul material, and a construction camp which actually is a small city. Aerial photographs of the mountain site, and the position in the Colorado river where the dam will stand, were made, and some idea of the dam itself is obtained from the aerial view with the dam drawn in, and

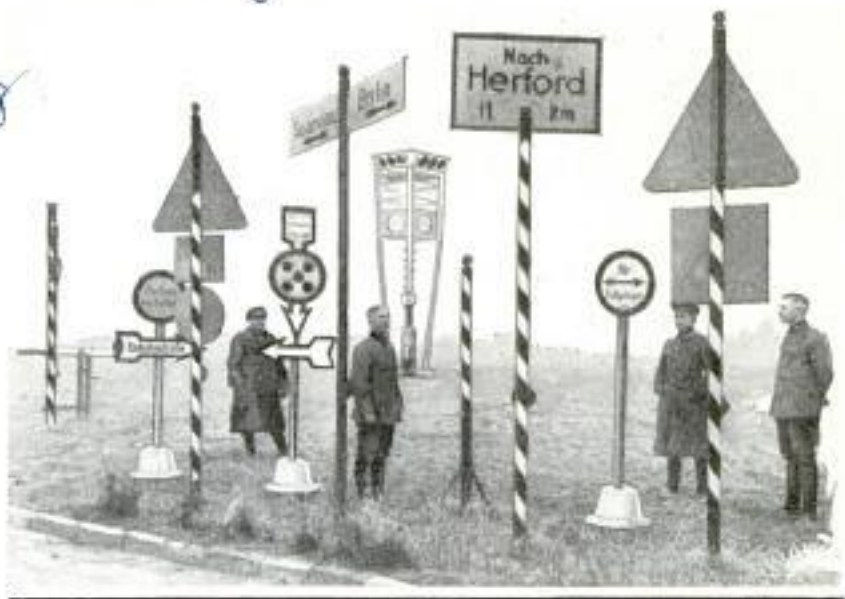


Above, Drawing Shows a View from Downstream of Boulder Dam as It Will Look When Completed; Below, Aerial Picture of the Site

from an architect's drawing of the dam as it will look when completed. In the aerial view a roadway is shown leading over the dam with the power house projecting below it. The intake towers are represented by the small circles above the barrier, and still farther above are the spillway weirs. The architect's drawing shows the dam as it will appear from downstream with the huge power house in the foreground. To the right, water is shown pouring from two needle-valve outlet houses intended for the discharge of water not passing through the power-house penstocks. The schedule of the engineers show most of the units, including tunnels, intake towers and cofferdam, will be started by 1933, with work on the power house set to begin in April, 1934, and finished Jan. 1, 1938.

Phila
BUILDING STONES
TURNED INTO
STATUES 2268

Faced with the problem of disposing of hundreds of tons of granite in demolishing several old office buildings and skyscrapers of an earlier period, one Philadelphia wrecking company which had trouble dumping the large blocks finally turned the stone into a source of profit. The blocks were broken with air hammers, squared by hand and used for paving blocks in surfacing Philadelphia's streets. Larger pieces were fashioned into street-corner arches and stone steps, while some particularly fine granite was converted into monuments and statues.



© P. & A.
Array of Standard Traffic and Stop Signs Set Up at Berlin's Training School for Traffic Policemen to Familiarize Officers with Them

**COLLECTION OF TRAFFIC SIGNS
USED BY BERLIN POLICE**

Berlin's central station and training school for traffic policemen has an imposing array of traffic and stop signs set up on the training grounds, to familiarize the student officers with the different forms of standard signals. The display, with the many confusing directions, would confound any motorist confronted by such an array of contrary orders.

a-2191
**RAINPROOF UNIFORM PROTECTS
MOTORCYCLE POLICEMAN**

London's motorcycle policemen recently have been outfitted with rainproof uniforms and helmets that, at first glance, present a grotesque appearance. The uniform consists of a slicker embodying both trousers and jacket in one piece, while the cap has a hood for the face in which goggles are set, giving the officer the appearance of wearing a gas mask.



Rainproof Uniform and Helmet Which Afford Complete Protection for London Motorcycle Officers

**SECRETS OF ANCIENT KINGS
2266 SOUGHT IN OLD TOMBS**

Ur of the Chaldees may yield its greatest treasure when the tombs of three generations of its kings are opened. Investigators for the British museum and the University of Pennsylvania have found the burial place of the great King Ur-Engur, who built the Ziggurat at Ur 4,300 years ago, and are hoping that they will find the grave undisturbed, although they consider it likely that this tomb together with others, has been robbed by enemies of Ur. C. Leonard Woolley, field director of the expedition, reports that the tombs are believed to be included within a complex brick structure long buried in the earth. Vaulted chambers and passages, stairways and deep brick-lined pits have been found. One of these lies beneath the floor of a high, paved room. At present, this pit is a center of interest.

*Science Service News
Bulletin 510
12/31/30*

1829

Comd. Levi Glassman
55 W. 86th St

New York

On the Bridge



Commodore H. A. Cunningham, Skipper of the "Leviathan," on the Bridge of the 907-Foot Giant of the Seas

By JAMES HOWARD

GIVEN fair weather, you can set your watch by the "Leviathan's" arrival off Ambrose channel light vessel. On Monday morning, just as the night mist condenses into a low-hanging cloud, she beats up the Jersey coast and bursts out of dripping fog—three plumes of smoke trailing astern, her red-white-and-blue funnels leaning at a rakish angle, the snowy superstructure riding swanlike atop the coal-black hull.

Her four propellers churn the foam into a seething lather that trails away for a full mile.

"What a steamer!" exclaims the landsman, watching the liner race up to Am-

brose at twenty-four and a half knots. "She's a boiler!" corrects a companion. "Watch that water boil."

The truth about the "Leviathan" is this: Sixteen years after launching, she still is the greatest engine of locomotion ever built. She displaces 59,957 tons—3,336 more than the "Majestic" and 9,957 more than the "Europa." When America's 907-foot flagship comes to a dead stop from high speed, the spectacle equals the jamming of brakes on a hundred railroad engines.

What man will the "Leviathan" halt for? None but her pilot. An hour before dawn, he paces the deck of the pilot boat, waiting for a gleam to announce his ship. Red and green navigation lights on the bridge are his first cue. Less boldly shine the chains of port-holes, sparkling necklaces, as the passengers are about to

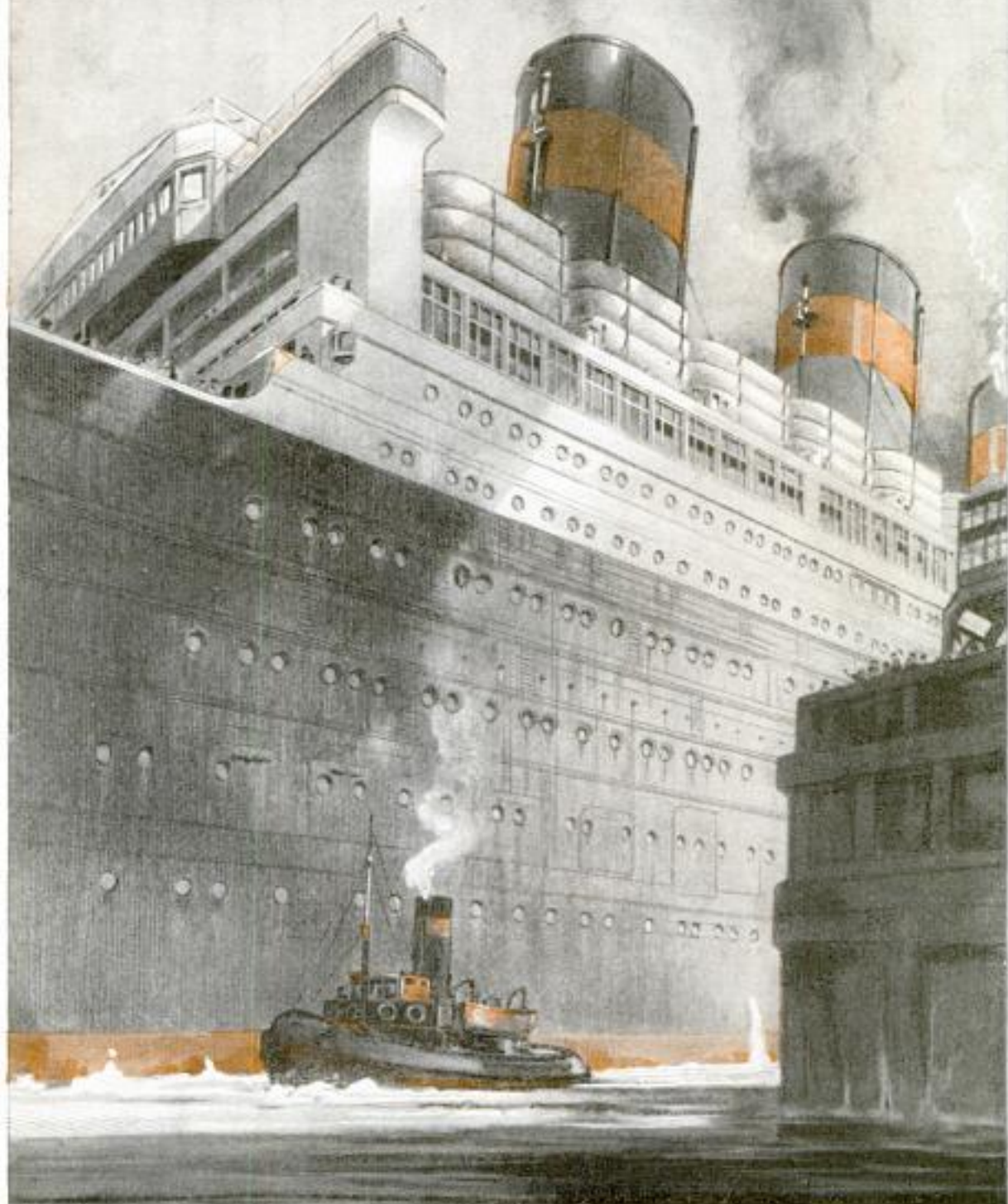
rise for an early breakfast.

After the incessant pounding of her pistons for six days, the greyhound lies passively on her back, her deck as steady as a sidewalk, and barely panting from recent exertion. Like some obedient animal she waits; huskies row the pilot to a suspended ladder. He scales the overhanging cliff and is greeted by Commodore H. A. Cunningham. Stewards and sailors throng the decks fore and aft. Hands strip the hatch coverings. Derricks are oiled. The idle engines chafe to be off.

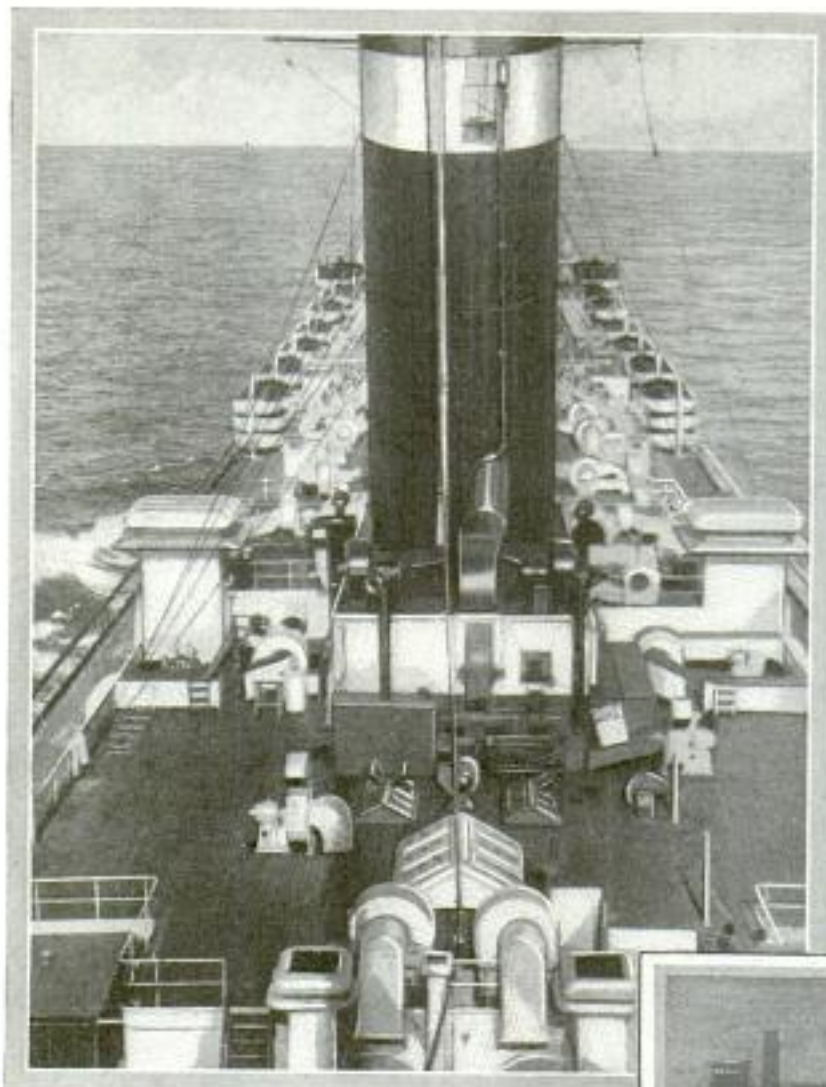
The pilot is swank and natty. There is nothing nautical about him, save the self-assurance and ease that seamen acquire after a long experience with ships. He is one who knows he knows. Mental images

1829

of the Leviathan



A Tug Alongside the "Leviathan"; These Little Craft, Looking Like Gnats from the Bridge of the Great Vessel, Push and Pull Her 59,957 Tons up the Hudson River to Her Pier



is just the latter figure.

With a full cargo and passenger list, the "Leviathan" is as sensitive as a fine watch balance. The pressure of one finger on her wheel will swing her off the charted course. Her keel may even skim a shallow trough through the silt in parts of the channel. What she needs is gentle coaxing and artful persuasion. She can be led like a docile lamb one moment, and in the very next run amuck, ramming barges and lighters and plowing into ferryboats.

From the flying bridge, I saw how the pilot and ship's officers manned the "Leviathan." The job of bringing her up is known in nautical parlance as "conning" the

of every submarine contour in the harbor are his equipment. He apprenticed ten years before he was allowed to issue orders from a bridge.

On small vessels, the pilot is the helmsman. Not so on vessels like the "Leviathan." Here he acts as expert adviser to the captain. He does not so much as remove a glove from his hand, nor touch a single piece of mechanism. As guest of honor, his job consists in seeing, thinking and speaking. He may consult with the skipper, but usually he depends upon his own observation.

Only headliners in the Sandy Hook pilots' association are allowed to bring the "Leviathan" in. Commodore Cunningham settled that point in 1923 when she grounded on a mudflat. No transatlantic vessel requires greater skill or knowledge of navigation than this one. She draws thirty-eight to forty and a half feet in a harbor whose low-water depth



Above, Full-Deck View of "Leviathan"; Below, the Pilot, Commodore and Officer on Watch

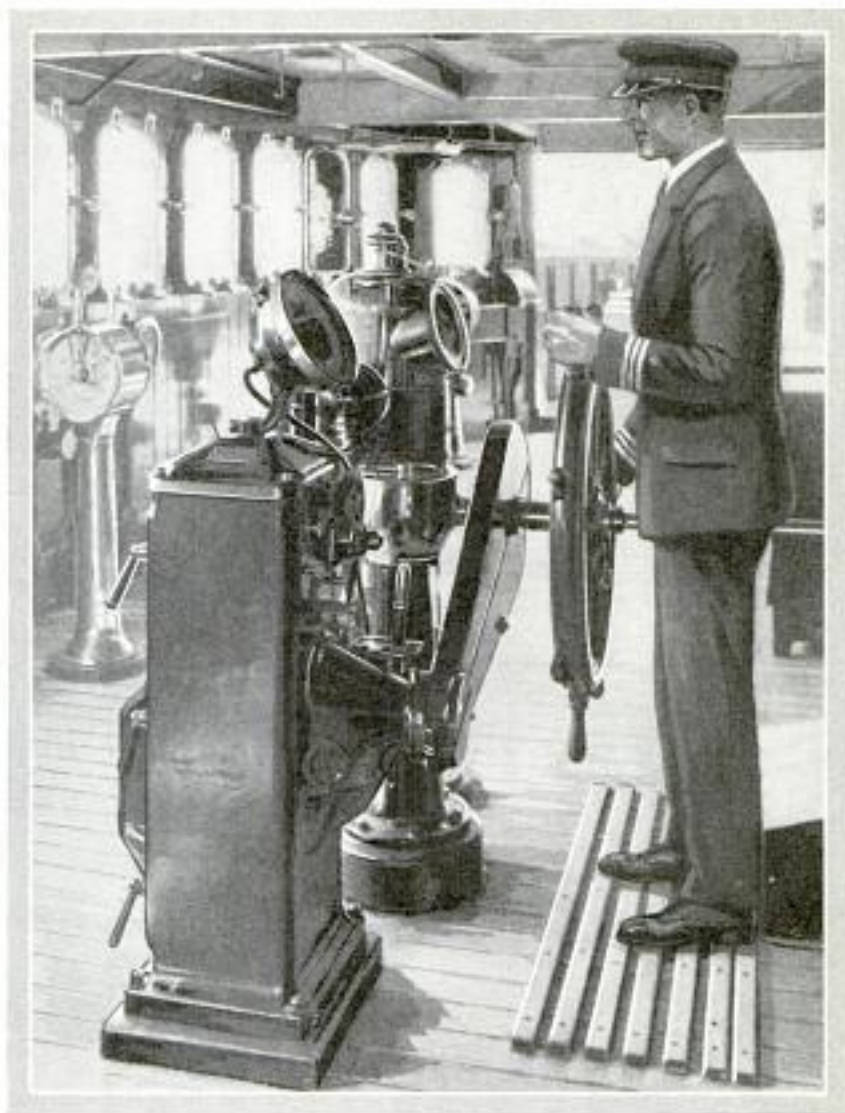
1829

ship. The commodore and pilot exchange words occasionally, but always their eyes are like wide-angle lenses. Half a dozen men listen for their commands and watch for a sign of their hands. At times the pilot is as casual and non-committal as a sightseeing passenger. He gazes to right and left, then squints through his glasses.

Around him are grouped the ship's officers, taut and tense, listening and watching. They relay commands to officers in the navigating room, where, by telephone and telegraph, every part of the ship keeps in touch with the commodore and pilot. There are seven telephones, six with direct connections, such as to the engine room and to the chief electrician. The other is a master phone that can be switched to any part of the ship.

No sooner is an order uttered and transmitted, than three different men write it down in logs and note the exact minute. The navigator is at hand to see that every order is properly repeated until it reaches the quartermaster at the wheel. A third officer stands beside the quartermaster and assures himself that commands are properly executed. A second officer takes charge of men at the telephones and telegraph. Another second officer is in charge of gangways. The chief officer stands at the bow, assisted by a third officer. Another commands the aft part of the ship. Cadet officers attend their seniors.

Both the pilot and commodore give orders, but usually the pilot. He talks in a more or less casual way, with slow deliberation, but what he says is heard and transmitted almost instantaneously. He might say, "Steady her at ten," which is relayed to the quartermaster who speaks



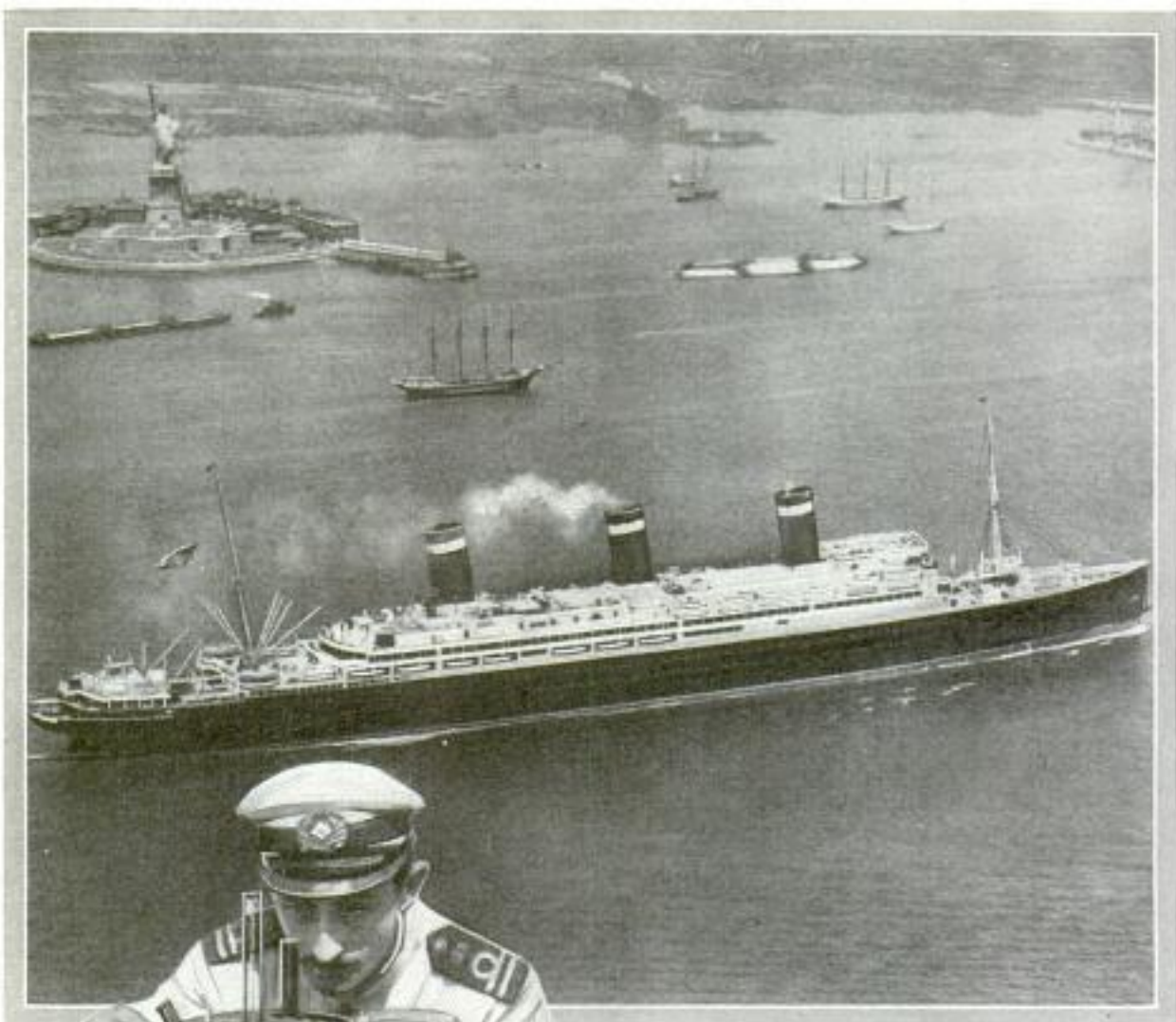
A View of the Sperry Single-Unit Gyro-Pilot, a Mechanical Aid to the Big Ship in Maintaining Its Proper Course

his wheel until the binnacle compass points to ten.

Then the pilot issues orders for speed. "Full ahead!" means forward at twenty-four knots; "half ahead," twelve knots; "Slow ahead," eight knots, and "Stop!" dead still.

When the "Leviathan" must give way to a coal barge, the pilot sings out his soft command, just as if saying the weather was nice, "Hard starboard—half ahead starboard—hold her steady."

Then he may command, "Slow ahead port." He takes a turn around the bridge. Harbor traffic grows heavier and heavier. The mouth of the Hudson froths scores of watercraft into the Upper Bay. "Dead slow ahead starboard," he adds. Then, "Half astern starboard," followed by, "Full ahead bow." And soon calms her down to "Dead slow ahead."



Passing Statue of Liberty; Left, Instrument Which Gives Ship's Position with Reference to Shore

One question about the piloting of a ship up the harbor still remains unsettled. Who is in supreme command? Opinion is divided between the pilot and skipper. When the pilot gives orders, he maintains the command is his. But the skipper holds that the pilot merely advises him.

In emergencies, he adds, the master assumes control at once, and also bears responsibility for what happens. The captain may overrule decisions the pilot makes, and thus sustains his supremacy.

A fleet of tugboats await the ship's arrival. Signals from the bridge direct their maneuvers. A series of short quick blasts means to push, pull or back with every ounce of steam. If the tugs are pushing, one blast warns them to slow down, and a second blast commands them to stop. When idling, one blast commands them to begin pushing.

About a quarter of a mile from the pier, the pilot orders the engines stopped. The "Leviathan" coasts upstream, dodged by river craft. Slower and slower she eases up the channel, now two points to starboard and now one point to port. Without halting once, she is gripped amidships

*Used on Minneapolis
and St. Paul
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by several tugs and held firm. "Heave a bowline!" rings out over the bridge. A tug grabs the rope and swings the bow starboard. Almost clipping the pier edge, she is swung into her berth. The dock superintendent begins ordering his twenty huskies about.

Hawsers are thrown off. Windlasses begin grinding. Gangways are held in readiness. She is being pushed into a tight slip by firm gentleness. Thousands of people wait on the pier. Foot by foot, she comes up to the very street curb. Too much pressure on the stern will spring hull plates or stove in the bow. But the 59,957 tons come to a precise halt. She is home!

Gangways are out, hawsers made fast. The pilot spreads his hands and arms wide, as about to release control of the ship with, "Hold everything!"



Gas-Electric Rail Car Painted in Stripes in Order to Be Visible at Greater Distances

SOLDER STICKS TO ALUMINUM MAKING REPAIRS EASY

297

For many years efforts to solder aluminum have met with failure because the metal oxidizes under heat to such an extent that solder would not adhere. Recently, however, a solder that will stick to this metal has been developed, and repairs to broken aluminum parts now can

STRIPES ON GAS-ELECTRIC CAR HELP PROMOTE SAFETY

Painted with black and white stripes in front, four gas-electric rail cars, recently placed in service on a western railroad, can be seen at a far greater distance than those painted in the usual colors, thereby reducing the danger of collision with automobiles or persons at crossings. The cars are seventy-five feet long, of all-steel construction and are operated by 400-horsepower gas-electric engines. Water heating plants, electric lights and musical horns, instead of the usual shrill whistles, are other features. The cars replace steam locomotives and can haul extra coaches.

Alumaweld Co. 710 E



Broken Aluminum Wheel and Aluminum-Solder Apparatus That Was Employed to Repair It

be made as quickly and easily as other metals are soldered, according to the claim of the inventors.

*Dr. R. W. Felini
and
H. J. Almar Holdem*

CEMENT PUMPED UNDER ROAD TO RAISE SUNKEN SLABS

2150

Sections of a concrete road in Iowa, which sunk below the level due to improper foundation, have been raised by boring holes in the surface and pumping in a mixture of cement and mud. The pressure of the mixture lifts the road sections and when the cement hardens, a strong foundation is provided. In some places, parts of road were lifted as high as thirteen inches. The process has been patented.

*Acume Service
news 507-03
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*Dr. John Poulter mechanic
Iles Inverness, Iowa
Iles Inverness, Iowa
Iles Inverness, Iowa*

Atlanta, Ga. yards of the Seaboard Air Line



Giving the Iron Horse a Shower Bath; Hot Water and Oil under Air Pressure Are Being Used

SHOWER BATH FOR IRON HORSE COMBINES OIL AND WATER

Railroad locomotives of one southern line are given a regular shower bath at the end of each run. A double hose is used for washing down the iron horse, hot water and oil being sprayed over the engine under heavy pressure. The process is completed in ten minutes, washing away all traces of grime from the journey.

ELECTRIC EYE CHECKS LABELS ON YEAST PACKAGES

Operated by a photo-electric cell, or electric eye, a yeast-sorting machine automatically separates labeled packages from



Sorting Machine Which Utilizes Electric Eye to Detect Packages of Yeast with Missing Labels

Westinghouse Research Laboratories, E. Pittsburgh

those without. Wrapped yeast packages move through the apparatus on a small belt. Unlabeled pieces are kicked off the belt by a small trip hammer whose action is governed by the photo-electric cell.

WIND RESISTANCE IS REDUCED WITH CAR TOP UP

There is less wind resistance in an open car with the top and windshield up than when they are down, tests at the bureau of standards disclose. The experiments were made with identical loads and with wind and other conditions the same. The findings are of especial interest at the present time when attention is being called to the new streamline designs in cars.

PISTONLIKE ROLLER BEARING INCREASES HORSEPOWER

Roller pistons which turn in an ellipse like roller bearings are expected to revolutionize motors and other machinery using them. These pistons suck from behind and push in front, giving a continuous action. Thus small motors, pumps and compressors can be made one-tenth of their present size with increased mechanical efficiency and longer life, it is claimed.



GIANT FLYING BOAT CAN CARRY TWO HUNDRED PASSENGERS

Secretly constructed in England, the world's largest flying boat recently was delivered to the Japanese navy, which will use it particularly to carry war explosives. The gigantic metal ship has a total lifting capacity of twenty tons and is understood to have the largest wing span of any aircraft. Compared with the "DO-X," the big German flying boat, the latest ship could easily carry 200 passengers, but it has been designed for a crew of six, as the hull is intended for carrying war material rather than human freight. The boat is driven by three large motors and is the first of several, of which the others probably will be built in Japan.

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Washington U.C. Revue Apts. Revue

James Lambert

at Balch Park
Tulare County

POPULAR MECHANICS
**MUSK PLANT OFFERS
MYSTERY IN LOSS
OF SCENT** a-1

Within the last three or four years, the musk plant, so common in houses and gardens, has lost the delightful scent for which it is famous, and naturalists are perplexed as to the cause, no reason thus far having been found. The director of the Kew gardens in London is reported to be searching the world for a specimen of the plant that still retains its perfume, and botanists of the University of Pennsylvania are also hunting for some of the plants with the scent. The director of the botanical gardens at the university recently obtained seeds which he hoped would develop into plants of the old type, but when the seed were grown there was absolutely no trace of odor.



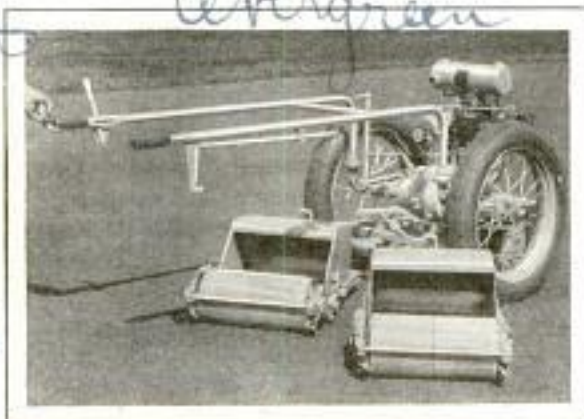
Giant Yellow Log in California Which Has Been Burned Out to Serve as Garage for a Tractor

**HOLLOW LOG USED AS GARAGE
FOR TRACTOR IN PARK**

Nature has fashioned the garage for a tractor employed in a park in Tulare county, California. At night, the tractor is driven into a huge hollow log with an opening in its end fifteen feet in diameter. The seventy-five-foot log has been burned out from one end to the other and many people have camped in it. Steps have been taken to preserve the fallen giant.

**RUBBER-TIRED GRASS MOWER
GUARDS GOLF COURSES** 2120

Cutting the grass on the putting greens of a golf course ordinarily is a job for hand mowers because power cutters mark the turf with wheel tracks. A power-operated mower, however, has been made specially for the cutting of greens. It is equipped with rubber tires and is so arranged that the weight of the power tractor is taken on a series of pliable pads and distributed over the surface of the green so that no



Power Mower for Golfing Greens Which Cuts the Grass without Leaving Any Wheel Tracks

marks or compacting effects result. It cuts a large green in about ten minutes.

**MINERAL THAT FEELS LIKE CORK
A-2 HELPS COMBAT NOISE**

Acoustic engineers, fighting noise in theaters, automobiles and elsewhere, have discovered a helpful ally in "zonolite," a mineral that feels like cork, looks like gold, will not burn and has the peculiar property of expanding to several times its normal bulk when exposed to heat during treatment after mining. It is now being used in theaters, as a muffler in autos, as insulation for bake ovens and kilns, and for many other purposes. It was found by accident, according to reports. A western miner was prospecting for molybdenum, when he set his candle against the wall of the shaft. The flame touched a projecting piece of ore that rapidly changed color and expanded under the heat. He took the sample home and from his chance discovery was developed the present use for the mineral. It is found in Colorado and other parts of the west.

Worthington Mower Co
Stroudsburg, Pa.

Zonolite Co.
Libby, Mont.

Chicago-517 S Laflin

Calif

Rayburn Lime and Alabastine
Canada Ltd. Toronto, Canada

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2112 Cmt. Elon Glassman
55 W. 86 St N. New York

The DARK HORSE



Three of Twenty-five New Iron Horses for the Boston and Maine Railroad;
Each Cost About \$100,000

RAILROADS appropriated a round billion dollars for improvements in 1930, and plan to spend more in the near future. On the other hand, passenger traffic slumped from 1,270,000,000, in 1920, to 779,000,000, in 1929.

The comparison between expenditures and the decline in passenger traffic might lead one to believe that railroad managers lack business sense. But our carriers manage to survive because only fourteen per cent of their total revenues derive from passengers; while freight tonnage has increased about nine per cent in the last decade.

Airplanes, busses, interurban street cars and river craft are competing with the iron horse on an alarming scale, offering one or a combination of the commodities which appeal most to the public: comfort, speed and economy.

How do the railroads answer? A billion for improvements in one year and more billions to come. As regards comfort, neither the airplane nor bus can compare with a Pullman. Speed? The airplane surpasses the iron horse, but at a higher fare. And as for economy of operation, railroads have only begun to realize how profits grow with improved service and equipment.

What the railroads needed was a healthy competition, and now that they have it the public profits. Rail transportation receives more solid thinking these days than ever before. All the amazing improvements in the last decade are petty in comparison with what the next few years will witness.

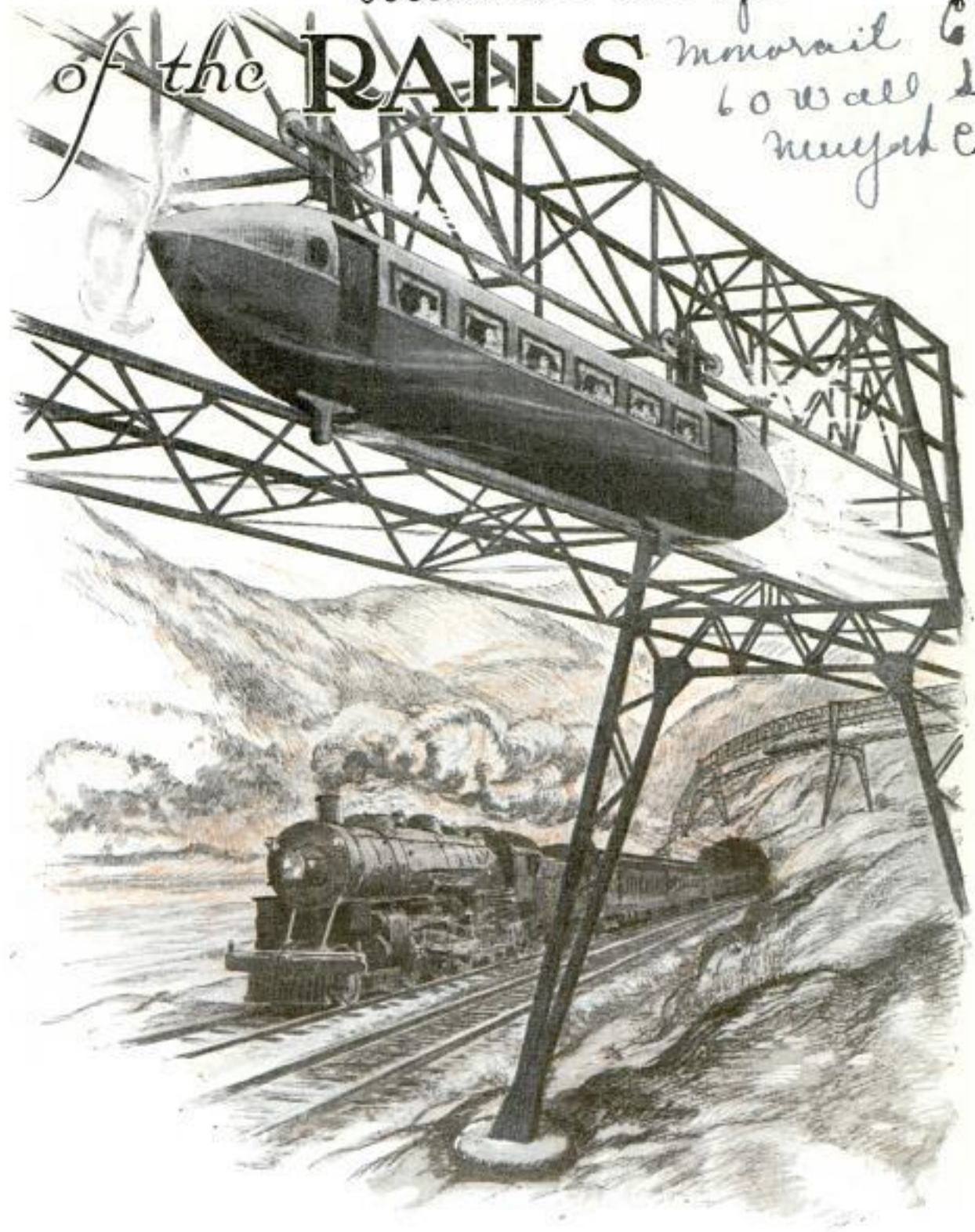
To hold the dwindling passenger traffic and attract new customers, half a dozen roads are engaged in mammoth electrification projects, the largest between New York and Washington on the Pennsylvania. This \$100,000,000 plan exceeds in magnitude and importance that of any other railroad in the world, both in miles of track to be electrified, in volume and density of passenger and freight traffic handled, in size and amount of equipment, in number of trains affected, and in terminal operations involved. That, in short, is what the Pennsylvania plans in preparation for a New York with a metropolitan population of 30,000,000.

Passenger locomotives for this system have a 2,500-horsepower rating. Three hundred locomotives will be in daily use when the project is completed, about 1935. The line between Trenton and Philadelphia has already been opened. The pres-

Frank Lyons, President,
Atlantic Suspended

of the **RAILS**

monorail Co
60 Wall St
New York City

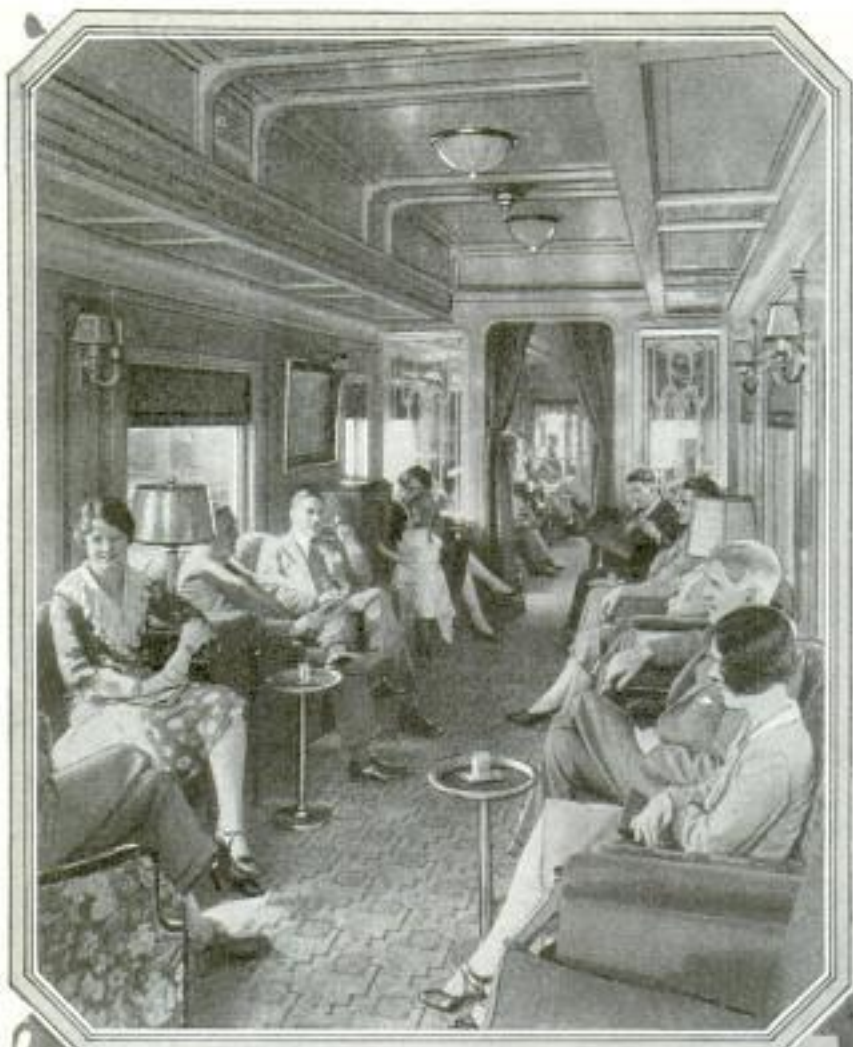


Drawing of Rail-Plane Line as It Would Appear near Railroad; Experiments with These Overhead, Propeller-Driven Cars Have Been Made Abroad and Promise Interesting Results

ent limited trains between Washington and New York make the 220 miles in 270 minutes. But the new electric express will probably make the same distance in ninety minutes less, which will compare favorably with airplane time.

Besides the Pennsylvania's, other electrification projects are under way or just completed. The Reading railroad is spending \$20,000,000 on 110 miles of track in the Philadelphia zone, and plans in the near future a \$32,000,000 appropriation

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380

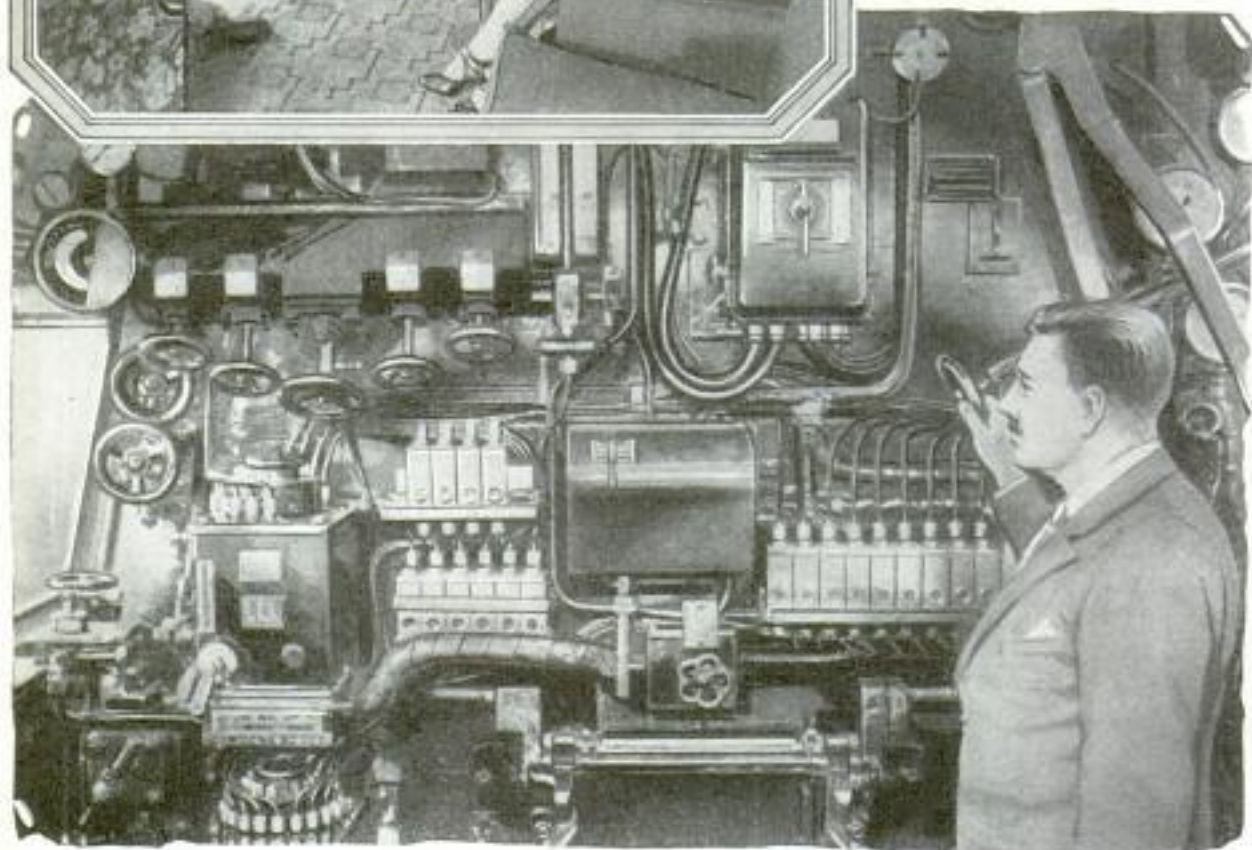


for lines in New Jersey.

The New York Central plans to electrify the 500 miles between New York and Buffalo at an estimated figure of \$75,000,000.

In the Cleveland Union Terminal, twenty-two 204-ton locomotives take care of trains in the local yards.

The Lackawanna railroad has just begun running trains over 155 miles of electrified track in New Jersey. It was the salient railroad improvement of 1930. Public interest in the new electrified units was so keen that 25,000 people came to see the first train. It was America's first adoption of 3,000-volt direct current for a rail in-



Inside a Luxurious Union Pacific Lounge Car, and Interior of High-Pressure Locomotive Built in Germany; This Is a View of the Control Board; Pressures as High as 1,700 Pounds to the Square Inch Are Developed in Some of These Engines

stallation, and also the first time mercury-arc rectifiers were used exclusively for supplying direct-current power. About 900 miles of wire and cable, weighing 3,220,000 pounds, were used on the job. And 4,000 tons of steel were necessary to carry this wiring system.

Electric motors enable the train to gather speed four times faster than steam trains. If an engineer should be taken suddenly ill and remove his hand from the control lever, "dead-man" operation becomes effective and brings the train to a smooth stop.

Must steam give way to electricity? Some railroad experts argue that steam engines are still in their infancy. One engineer holds that a steam locomotive with a 110-inch driving wheel and able to travel 125 miles per hour, could be built for \$110,000.



Lounge Cars Have Modern Conveniences Such as Vibrators and Like Equipment; Below, One of the Big Electric Locomotives That Haul Long Trains Into Cleveland's Terminal



Whatever the future of the iron horse, railroads are piling more steam into his joints and making him sprint across mountains and prairies as he never traveled before. Recently, the Canadian National railroad inaugurated the first two-way train telephone service in the world, enabling a passenger to phone South America or Italy while traveling seventy miles an hour. Simultaneously the company began operating its International Limited, between Montreal and Chicago, on a record-breaking schedule. It covers the distance between Montreal and Toronto, 334 miles, in six hours flat, an average of fifty-five and two-thirds miles per hour,

which makes it the fastest train in the world over a similar distance.

In 1923, the time between Chicago and Los Angeles was sixty-eight hours thirty-five minutes; it is now fifty-six hours. Over a similar period, train time between Washington and New York has been cut down thirty minutes; between New York to St. Louis, two hours ten minutes; between New York and Boston, twenty-five minutes; between New York and New Orleans, three hours thirty-five minutes; between New York and Miami, twelve hours; between Chicago and San Francisco, twelve hours twenty minutes; instead of one twenty-hour train between

New York and Chicago, we now have sixteen such running daily.

Although present train speed hardly approaches that of the airplane, it is plain that each year sees new reduction in time, and a sixty-mile-per-hour average in the next few years may be as common as fifty miles today.

While the future of steam still remains in doubt, experimenters are testing some sensational inventions in rail transportation. For one thing, the monorail system is being considered as a possible link to New York City in case steamship companies decide to land transatlantic passengers at Montauk Point, L. I., thus making possible a four-day voyage from Europe. From plans already drawn, monorail electric trains can be made to travel more than 100 miles an hour with safety.

In recent test at Hanover, Germany, Franz Kruckenberg tried out a new type of air-rail passenger car, whose motive power is a four-bladed propeller driven by a 400-horsepower airplane engine. The exterior resembles a cross between a Zeppelin gondola and a racing automobile, the streamline effect being carried out with precision.

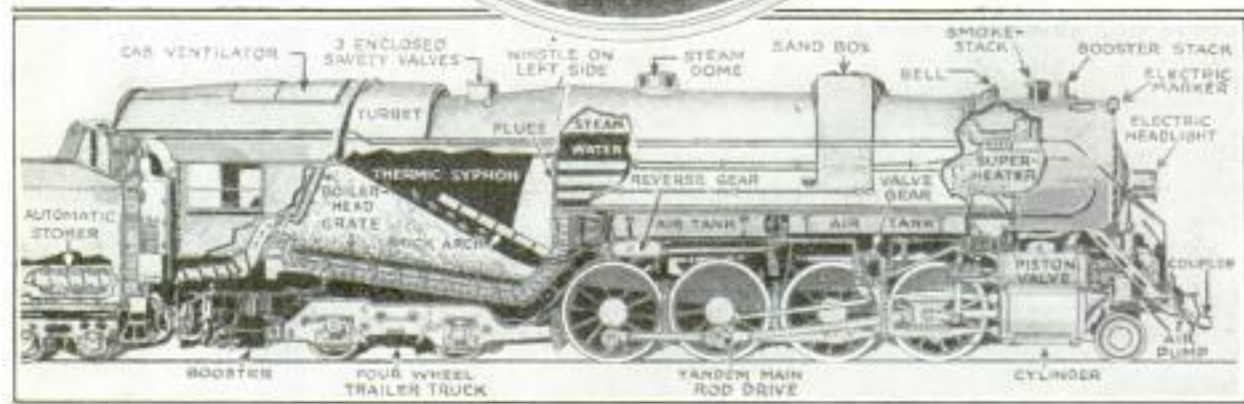
As for acceleration, Kruckenberg's car is peerless. Sixty seconds after starting from a dead halt, it was skimming over the rails at sixty miles

per hour. A few seconds later, it clipped 100 miles per hour, and in a secret trial it is said to have developed 114 miles per hour. Weighing twenty tons, the eighty-five-foot car accommodates forty passengers in parlor-car style. Railroad and automobile brakes bring it to a stop. This strange omnibus-Zeppelin may be an effective answer to bus competition.

Still another way to meet bus competition was demonstrated recently by the London, Midland and Scottish railway company. It operates a car equipped with two sets of retractable wheels, one set with flanges for travel on rails, and the other set with pneumatic tires for ordinary road travel. A gasoline engine provides power. Drive and controls are similar to those on busses. With special machinery, the driver can raise or lower either set of wheels.

Railroads have added countless minor refinements in the last few years. One innovation, ball bearings, has been adopted widely. A reduction in friction on

power equipment means economy in operation. Translated into dollars and cents, the strain and agony of a locomotive in getting under way is quite costly. Frictionless bearings have so reduced resistance that three women can walk off with a 200-ton engine, and three or four boys can pull



Propeller at Rear of German Zeppelin Rail Car, and Diagram of Late Steam Locomotive, Showing Refinements That Make It a Better Worker than the Old Locomotive

a full-grown Pullman car. And a standard Pacific-type locomotive can handle a twenty-one-car train equipped with roller bearings as easily as a twelve-car-train equipped with the old friction bearings.

Since speed looms as a great factor in rail transportation, engineers have studied everything pertaining to it. Their attention is naturally focused on rails and roadbeds. For you cannot get high velocity out of a lightweight steam or electric locomotive. Foundries are now turning out 800,000-pound iron horses, and the crushing weight of these engines traveling at high speed necessitates a high-grade roadbed.

The Pere Marquette railroad has developed a new type of concrete roadbed that calls for



Listening to Radio Program in Observation Car of Canadian National Railways, and No 9,000, King of Oil-Electric Locomotives, Built under the Supervision of the Westinghouse Electric Company

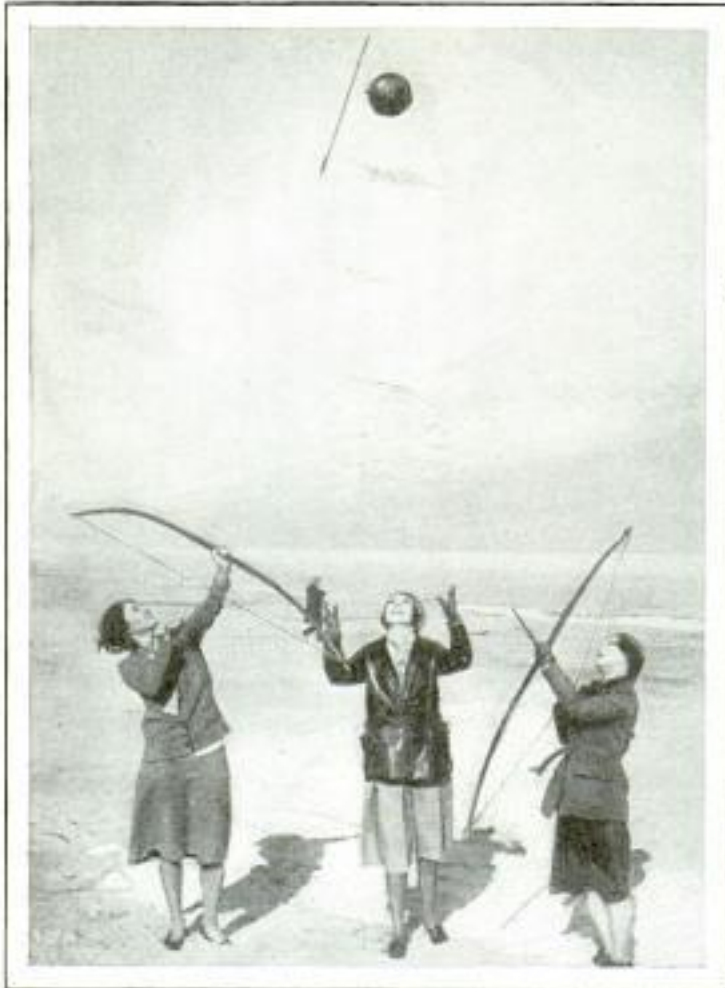
earnest consideration. After exposing the test section to a two-year trial, the experimenters report some real advantages: Expansion and contraction are confined to each rail as a unit. Settlement has been slight. The possibility of rail fracture is

greatly reduced. Labor in track laying and service is reduced eighty per cent; saving in maintenance of track \$2,000 per mile per year; higher speed, less fuel. The initial cost of such a road is high, but the ultimate cost favors concrete.

2243

Ed. E. Martin Dept. of Economic Entology, Univ. of Wisconsin

Cavalier Beach Club



Girl Archers Shooting at a Rubber Ball Tossed Into the Air, the Target Providing a Difficult Mark

AERIAL TARGET FOR ARCHERS MAKES DIFFICULT SHOT

Girl archers at Virginia Beach, Va., who became so proficient that sticking arrows into a stationary bull's-eye was tame sport, decided to add to their prowess by shooting at a moving aerial target. This target is a large rubber ball which is tossed high into the air. The archers try to puncture it as the sphere rises or descends, a difficult feat even at close range.

PISTOL-GRIP METAL CHIPPER AIDS ACCURATE WORK

Operated by compressed air, a chipper, for working in metal, stone and other materials, has a pistol grip which helps reduce fatigue and also promotes greater accuracy. It re-



places the hammer and chisel on many jobs and is easy to use in almost any position. Chisels of different size and shapes are quickly inserted in the barrel.

GRASSHOPPERS FOUND BURIED IN GLACIER

Grasshopper glacier, lying at an altitude of more than 12,000 feet northeast of Yellowstone Park has been visited by an expedition from the University of Wisconsin searching for grasshopper remains buried in the ice ages ago. The rock crevices on all sides were found filled with the grasshoppers, layers several feet thick in near-by stream beds indicating the tremendous number of insects once imbedded. Most of the material consisted of the hard, scaly parts, but almost whole insects also were found.

FOUNTAIN-PEN FILLER SUPPLIES INK ONLY TO PROPER LEVEL

Providing a ready supply of clean, fresh ink, a fountain-pen filler operates in such a manner that the supply can be replenished without soiling either fingers or pen holder. It consists of a glass container with a recess in the bottom in which rests a hard rubber cap. To the bottom of the cup is attached a handle that extends through the rubber top of the holder. In filling the pen, the cup is raised by the rubber knob until it rests beneath the openings in the top, which are of various sizes to fit different pens. The pen is inserted in the proper opening and rests there with slight pressure to hold the cup in place, while the filling device of the pen is operated. When the pen is withdrawn, the top closes automatically.



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Madison-Kuff Corp 20 Waukesha St. Madison Wis

**MAGNETISM AIDS
REGROWTH OF
FLATWORMS** 222

That magnetism has an effect upon living tissue is indicated by experiments performed at the University of Detroit with flatworms and seeds. The worms have the peculiar property of being able to grow again after pieces are cut off. When exposed to a strong electromagnetic field for five minutes a day, the worms regenerated themselves in eleven days, while similar worms, not so exposed, required fourteen days for regeneration. Magnetism also seemed to have an effect upon the life processes of seeds. Pea and bean seeds were exposed to the same magnetic fields, and the carbon dioxide produced in their respiration measured and compared with that of seeds not exposed to the magnetic field. At sixty volts, magnetized seeds breathed seven per cent faster, while at eighty volts the respiration rate was about the same in both kinds.

Science Service 509 C. U. 12/24/30



Berlin's "Radio City": Huge Building Which Contains Broadcasting Studios and a Large Radio Museum, Displaying Pioneer Equipment

**WIRELESS CENTER IN BERLIN
HAS RADIO MUSEUM**

One of the first radio museums, in which will be displayed inventions pertinent to radio progress from the earliest crystal sets to television apparatus, is being installed in a huge broadcasting center in Berlin, Germany. Besides the museum, there will be studios and laboratories for radio research. The building anticipates the proposed "Radio City" to be constructed in New York City.

**BILLIARD-TABLE GOLF COURSE
COMBINES TWO SPORTS** 2135

Taking a cue from miniature golf, an Englishman has made a miniature nine-hole golf course on a billiard table, and shoots the ball from one cup to another with a cue. The table is equipped with numerous hazards.

see see - 1930. 876



Nine-Hole Miniature Golf Course with Many Hazards Laid Out on a Billiard Table; the Ball Is Shot with a Cue

**SOUND FILTERS FOR TALKIES
IMPROVE TONE QUALITY** 2222

Sound filters which remove certain overtones without changing the pitch of the human voice recently have been developed for the talking pictures, and may also be used in radio broadcasting. They are said to eliminate certain objectionable nasal qualities, enrich thin male voices and improve good voices.

Science Service 509 C. U. 12/22/30

Butterflies taste with their legs, which are 1,600 times as sensitive as the human tongue.

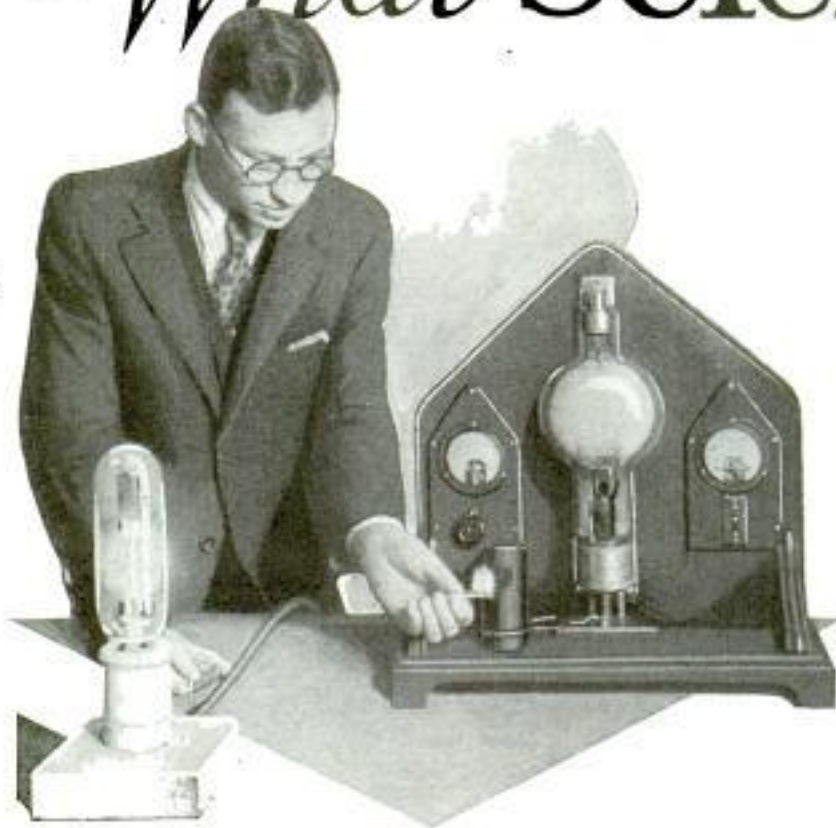
Melbourne cinema Prof. Milton Metfess
St. Louis, Southern Calif.
100 Angeles, Calif. - 0

Com. Leon Klossman,
55 W. 86 St. New York

125

What Science is

General Electric



Lighting an Incandescent Lamp Indirectly by Means of a Match Demonstrates a Principle That Has Useful Applications

engine, shown for the first time, produces power cheaper than it can be purchased. Crude oil sells for five cents per gallon; this Diesel develops 300 horsepower, and burns only two-fifths of a pound of fuel per horsepower-hour. Hence, it delivers one horsepower for one hour for one-eighth of one cent. With such economy, small manufacturers can reduce overhead.

What happens in one year that thousands of automotive experts and classes from thirty universities come to the exposition? Under one roof, the American Society of Mechanical Engineers brings together myriad devices pertaining

EVERY agricultural worker in America commands potential strength equivalent to 4.71 horsepower and produces a crop worth \$910. Twenty-five years ago ninety per cent of our population depended directly upon agriculture for a livelihood. Today only twenty-four per cent are so dependent.

Contrast this with a foreign country. In Italy, for example, each agriculturist commands only .19 horsepower and produces only \$45 worth of crop annually.

Power machinery makes the difference, and because America makes widespread application of electromotive forces, she has the greatest efficiency per individual.

Sooner or later every country must crown power her King. Each year, as inventors and manufacturers assemble their wares at the National Exposition of Power and Mechanical Engineering, held in Grand Central Palace, New York, America becomes conscious of greater strength.

The country most ingenious in making power cheap can hold the economic balance in its favor. A 10,000-pound Diesel

ing to networks of millions of miles of wire and cable. Members demonstrate how an understanding of materials and forces enables them to eliminate billions in waste. No manufacturer can neglect the cost of power, for with the exception of the ice and aluminum industries, it costs from one-half a cent to six cents per dollar's worth of product.

A new light bulb, using such rare gases as krypton, argon, helium, neon and mercury, was demonstrated for the first time. Its great advantage is that a small current generates an amazingly high candlepower, and, if reflected with mirrors, the rays can be thrown farther than heretofore.

Red neon rays are being developed for airports, where they are said to aid in penetrating fog. The krypton tube throws a green light; the argon, violet; helium, a strange peach glow, and mercury a greenish white.

An optical company has developed a powerful aid to industry in the form of an alloy analyzer. An impurity of one-millionth of one per cent can now be

F. P. Morris + Co. Inc. Bausch + Lomb
Vergine, Ohio, Richmond, Pa. Rochester, N.Y. (2)
and Norris, Phila. Copyrighted material

Doing for You



This Steel Ball Burst under Heavy Pressure, but the Break Did Not Occur at the Welded Spots, Indicating the Efficiency of Modern Welding Methods

detected in any alloy. The instrument is a photographic spectroscope which pictures a series of wavelength lines produced by the alloy when a high-tension spark is passed through it.

Manufactured weather is a phase of mechanical engineering which now engages a large number of inventors. Having experienced the pleasure of washed air in theaters, the public has encouraged manufacturers in the production of home weather plants. The last few months were marked by the production of machines which give the city home an atmosphere washed free of germs, dust and other impurities. In addition to this sterilization, the air is humidified to the proper degree and heated as one pleases. The hottest day can be made perfectly comfortable for indoor dwellers, with every window locked.

At present at least, several machines are necessary to give the home an atmosphere that is as healthful as that in open country. But within the year, a combination device that will automatically condition the air in any weather will be marketed. In winter, this machine will charge the home with heat and water vapor. In sum-

mer, it will control the humidity so that at no time will the air feel oppressive, and in addition it will chill air. The weather machine can be installed in the home basement, but it requires no special attendant. The control is in some room of the house. The temperature or humidity can be adjusted simply by moving an indicator device, which maintains constant supervision over the room's weather.

Doctors have long recognized that the home atmosphere is responsible for ailments such as asthma, head colds, grip and hay fever. Impurities in air, especially from coal, also breed poor health. Soot deposits in the lungs as a black film. To make air perfectly palatable, a special filter was designed. It contains a mass of fine wire, like steel wool, pressed into a two-inch thickness. No dirt or dust can pass. Aside from making the home healthful, artificial weather reduces housecleaning. Draperies, bed covers and carpets are preserved.

Builders are making extensive use of an insulating material made of rock but having the consistency of wool. It has a low thermal conductivity, high sound-absorbing properties and resistance to

*Carnier Corporation, 248 Archinghousen
Newark, N.J.*

General Insulating Supply Co

POPULAR MECHANICS

Alexandria, Ind.

2/25 388

Syntron Motorless Electric Hammer, 400 lbs. weight on a single hammer, General Insulating Supply Co, Alexandria, Ind.



G. E. Platzner, of the General Electric Company, Demonstrating Electric Micrometer, and Scientist Burning a Gas Flame under Water

of your hand is sufficient to set it in action. This thermo-regulator is necessary for industrial plants where explosives are in danger of being overheated, and in other industries where close temperature control is necessary.

For measuring machine parts, a manufacturer is now

chemical change. To make "wool" out of rock, the latter is fused at a temperature of 3,000 degrees Fahrenheit. Then a high-pressure steam hose is turned on it. The spray which flies off hardens into tough fibers, resembling cotton. This rock wool can be compressed into bricks or granulated. But the greatest advantage of this insulating material is the fact that it is non-inflammable.

To take the swing out of hammering, the electric hammer was marketed only a few years ago. Then we saw the air hammer and steam hammer. But now comes one more simple than any other. It is the magnetic hammer, with one moving part, a piston. Delivering 3,600 battering blows each minute, each true to the aim, the magnetic hammer can bite through concrete, brick, marble or masonry. The hammer piston is pulled back and forth by a set of magnets around the barrel. This machine has no motor, gears or connecting rods.

A new automatic radiator control may be adjusted so that the temperature in one room of your house will be maintained independent of that in other rooms. Thus a bedroom may be kept at forty-five degrees and the living room at sixty-five.

A new type of thermostat is so sensitive that it becomes excited over a change of one-tenth of a degree. Indeed, the heat

marketing an electrical gauging device which registers dimensions to one one-hundred-thousandth of an inch. It is operated by a set of magnets.

To measure the water level in tanks on top of apartments and industrial buildings, a new electrical device has been invented. At all times, it is possible to read an indicator and know how much water is contained on the roof.

As a side show to the great exposition, magicians from the "House of Magic" at Schenectady appeared with a bag of tricks to amuse and perplex experts. First they undertook to pop corn by radio. In the high-frequency generating equipment set up, the electrodes consisted of ice cubes floating in salt water. In two minutes the corn began to steam and pop. The popping energy came by radio to the electrodes on a wavelength of about six meters. This is the same wave used in the machines made to induce artificial fever in people.

The world's classical liar, Baron Mun-

Radiatherm American Radiator Co. 40 W. 40th St. N.Y.C.

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chausen, who started the story about freezing sound, was completely dwarfed by an actual demonstration of frozen light. The magicians did not care to transport cathode-ray apparatus to the show, so they devised a method for demonstrating the luminous effects produced on various substances by these rays. First a fluorescent screen material was given a cathode-ray bombardment in the Schenectady laboratory, then placed in a vacuum bottle, containing liquid air, and carried to New York.

When the screen was removed before spectators, it could not be seen in a dark room. But gradually as it began to warm, it developed a pale yellow glow, then royal purple. When it acquired room temperature, waves of gorgeous color swept across the screen.

Their next trick was to demonstrate the properties of liquid air at room temperature. Liquefied air occupies less volume than the gas. If placed in an open vacuum bottle, the liquid gradually boils off. A cork was put into the neck of the bottle, and as the liquid-air steam acquired pressure, it pushed against the cork, which flew out with a reverberating pop.

An atom owns a voice. Five thousand atoms per gram of uranium break down each second; the activity of a handful of

uranium will be only half gone in five billion years.

Now, how make these escaping atoms talk? The alpha particles, as they are called, enter an air chamber through an aluminum window and are ionized. The explosion of the atom in the electrically charged air is detected and amplified so that it issues from a loud speaker as a "click."

When you go to the movies you see how easily man changes light into sound, and vice versa. The magicians made a laboratory demonstration of this by bringing in a phonograph with an electrical pick-up. When the record began rotating, the loud speaker did not give forth any sound. Instead of sound, we saw a neon lamp glow red. The demonstrator walked



toward it with a photo-electric cell held at the end of his wand. Then music blared out from a near-by loud speaker. As he brought the wand closer to the neon lamp, the music grew louder. Simply by covering the neon bulb with his finger, he managed to control the volume of sound.

Huge Bolt Displayed at New York Power Show, and Popping Corn Indirectly by Radio

*General Electric Co.
Schenectady, N.Y.*

2125
390

R. E. McLachlan
Research Engineer
General Electric Co Pittsfield
LIGHTNING AS MAN'S
SERVANT PRODUCES
2234 NITROGEN *mass*



Making Sound Visible and Light Audible, Two Scientific "Tricks" That Have Wide Usefulness in Talking Pictures

Then a reproducer photographed the light of a burning match and converted it into sound. At the striking of the match, we heard the crackle of chemical combustion. But the burning wood produced weak sounds.

The photo-electric cell is quicker than any eye by a hundred thousand times. With this magic lamp one can prove that moving pictures are made up of a series of "stills" flashed on the screen at sixteen per second. A photo-cell can easily detect the pulsation in ordinary alternating current. But when it reproduces direct current, the sound is in a single pitch.

The thyatron, prince of the power-tube family, was brought forth to show how it can act as an automatic control for heavy currents. Filled with mercury vapor, it has no moving parts, but possesses extreme sensitivity and can control enormous amounts of power. The demonstrator lighted a match and held it in front of a photo-cell. The fluctuation in current caused by this light was sufficient to influence the thyatron. Instantly, it switched on a 1,000-watt incandescent lamp.

With a similar arrangement, a thyatron, sensitive to a current fluctuation of one ten-millionth of a watt, can control a maximum of 10,000 watts.

While lightning often causes damage and death, it is also a benefactor for it produces, free of charge, huge quantities of nitrogen to enrich the earth. It is estimated that 100,000,000 tons of fixed nitrogen are produced annually during electrical storms. Lightning, shooting through the air, breaks down its chemical constituency, about four-fifths nitrogen and one-fifth oxygen, and deposits the fixed nitrogen on the soil, all without cost to the farmer. The process is not unlike that employed in the commercial plants that manufacture nitrogen except that nature produces, through lightning, a spark 2,000 or more feet long.

BRITISH FIGHT PLANES SPEED
209 THREE MILES A MINUTE

Great Britain has some of the fastest military planes in the world and among her speediest craft are a number of Hawker "Furies," single-seat fighters that normally develop a speed of more than 200 miles an hour. Powerful engines and effectively streamlined fuselages, as well as accurately designed wings, give these planes their remarkable powers.



Hawker "Fury," Single-Seat British Fighting Plane, in the Air; It Develops a Speed of More Than 200 Miles an Hour

Dr. S. C. Lind, Director

School of Chemistry
POPULAR MECHANICS
University of Minnesota

2033

SEE SYNTHETIC OIL
CLUE TO MYSTERY
OF PETROLEUM

By heat and pressure, or by bombardment with rays from radioactive substances, it is now possible to obtain a synthetic petroleum from a single simple hydrocarbon, investigators have found. This is considered a step toward the solution of the mystery of oil in the earth's crust, but it does not settle the question as to whether the processes of nature manufacture petroleum from a vegetable, animal or mineral source. According to Dr. S. C. Lind, of the University of Minnesota, the experiments lend indirect support to the old idea that oil was formed from one or a few hydrocarbon gases such as might be produced by the action of water on metallic carbides in the earth's interior. The discovery does not preclude the animal or vegetable origin of oil, but suggests that the primary material, whatever it may have been, was probably later subjected to heat or other agents which produced the complex oils.



Sprinkler System Supplies Artificial Rain to Cool Deck and Cabins of British Oil Tanker in Tropical Waters

ARTIFICIAL RAIN COOLS DECKS
AND CABINS OF TANKER

Artificial showers from a deck sprinkler system are employed to cool the decks and cabins of the new British motor tanker "Cheyenne." The vessel is one of the largest single-screw motor tankers afloat, and has a capacity of 3,450,000 gallons. It can discharge its full cargo of oil or gasoline in less than twenty-four hours.

RADIO OPENS GARAGE DOORS
AND ALSO CLOSES THEM

Radio-controlled garage doors that open as the owner approaches in his car and pulls a knob on the instrument panel now can be obtained. Electrically operated mechanical locks keep the doors secure, and no other radio-equipped car can open them. If it is night and the car lights are on, the door operator also turns on garage lights. When inside, a second turn of the dash knob causes the doors to close, but leaves the garage lights on, so the owner can find his way about after leaving the car.



FRESH FROZEN ORANGE JUICE
DELIVERED WITH MILK

Orange juice, frozen in Florida and transported in this form, soon may be delivered for breakfast at the back door with the morning's milk. Officials of the department of agriculture who have been experimenting with fruits frozen when picked and kept in solid form until prepared for the table, are enthusiastic over the possibilities, and believe the day is not far distant when groceries and drug stores will dispense frozen fruits and vegetables. Frozen berries can hardly be distinguished from fresh ones when used for pies and shortcake, experimenters claim.

Science Service 509. 74 12/27/30

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Barber Colman Co

229 La Salle, Stockford, Ill.

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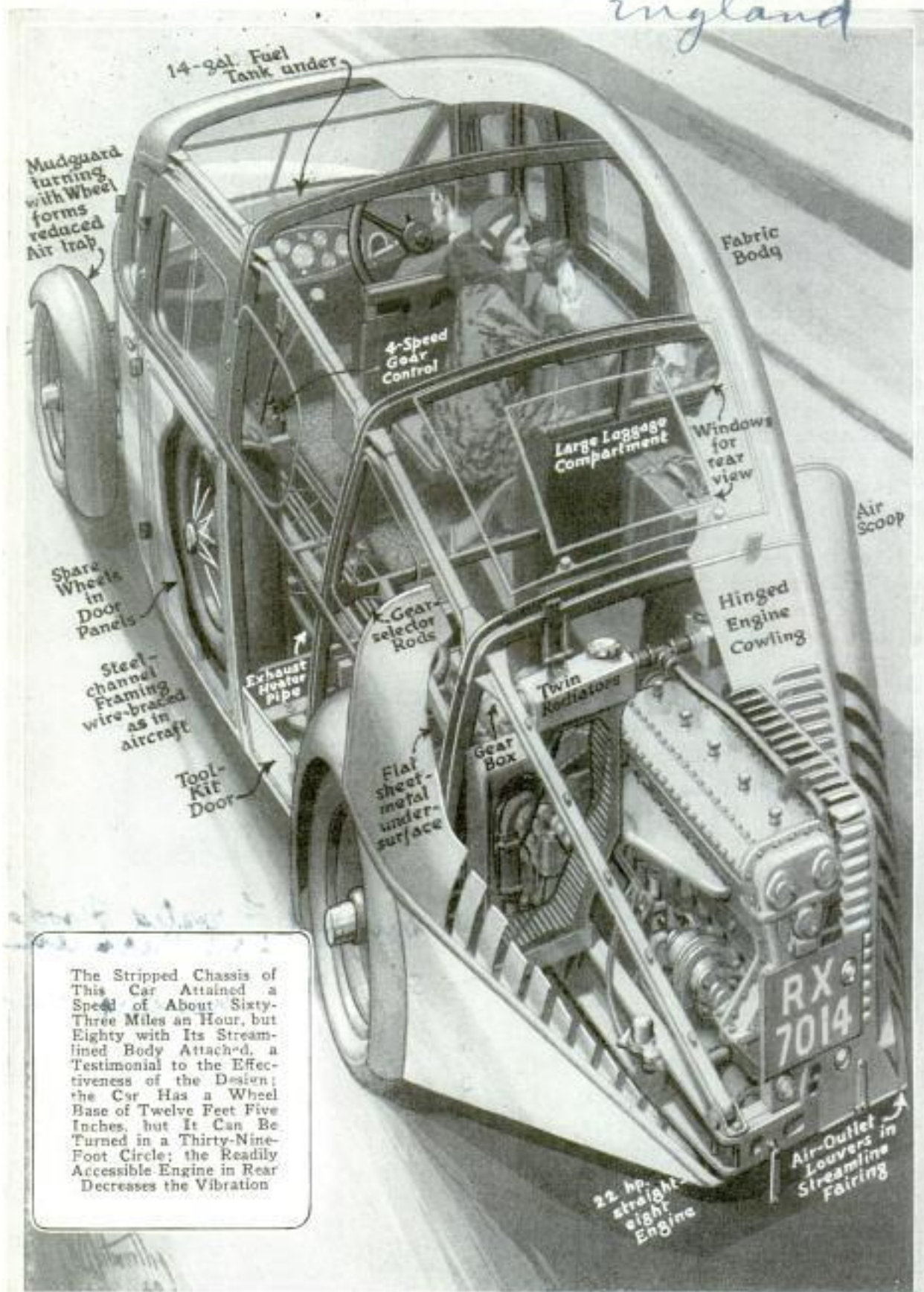
Wide World

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Suggested / I roasted goods due
250 Park Ave
New York
2241
Dr. William A. Taylor,
Chief Bureau of Plant Industry

1946
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Com. C.W. Clatworthy Esq
54 Rubblesdale Road
Streatcham London S.W.16
England

POPULAR MECHANICS
AIRPLANE LINES IN AUTO PROMISE FUEL SAVING



The Stripped Chassis of This Car Attained a Speed of About Sixty-Three Miles an Hour, but Eighty with Its Streamlined Body Attached, a Testimonial to the Effectiveness of the Design; the Car Has a Wheel Base of Twelve Feet Five Inches, but It Can Be Turned in a Thirty-Nine-Foot Circle; the Readily Accessible Engine in Rear Decreases the Vibration

Drawing of Seven-Seater "Airplane" Car Designed by Commander Sir Charles Dennistoun Burney, Producer of the Successful Airship "R-100"

© Popular Mechanics

Washington, D.C.

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POPULAR MECHANICS

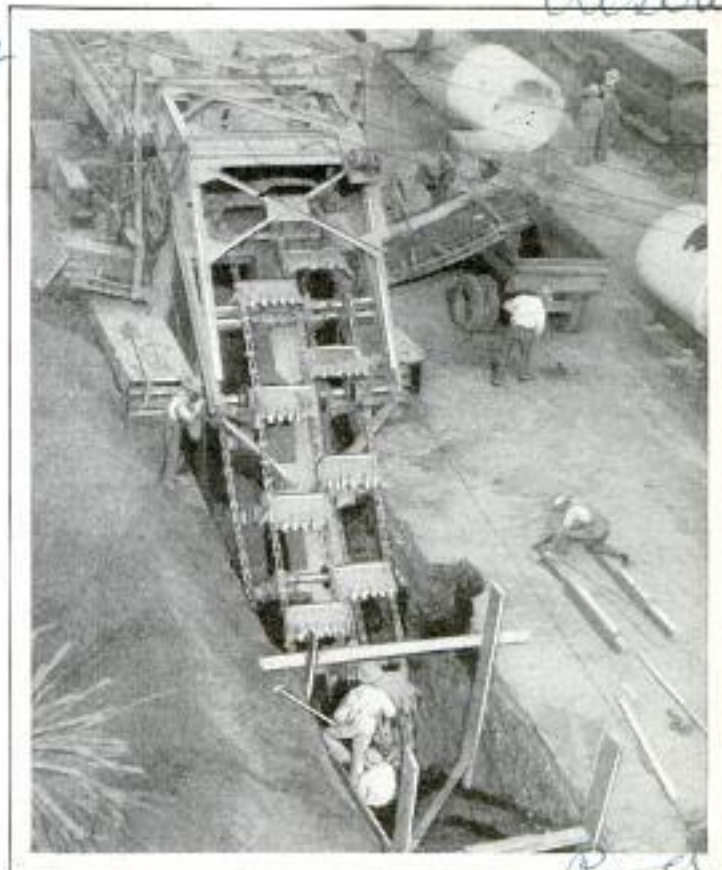
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"GHOST" PHOTO OF INSECT WINGS LAID TO THE ACTION OF GAS 2222

That dead butterflies can take photographs of themselves has long been known, but the exact reason for the phenomenon has never been clearly understood. It has been supposed that some form of radiation from the substances on the wings was responsible, but Austin H. Clark of the National Museum, placed the wings on a burnished silver plate instead of on a photographic surface. In twenty-four hours, a faint but definite image resulted. As a result of these tests, Mr. Clark is of the opinion that the "ghost" photographs are caused by a gas, containing sulphur which is formed from the wings.

MOVIES WITH DEPTH ARE PRODUCED BY DOUBLE PICTURE 2196

Moving pictures are given the illusion of depth with a camera which takes two pictures side by side on the same film. The pictures are from slightly different angles, and when merged on the screen, give an impression of the third dimension in the reproduction.



Huge Ditch Digger Which Removes Four Cubic Yards of Earth Each Thirty-Five Seconds, Keeping Forty Trucks Busy

BIG DITCH DIGGER DOES WORK OF A THOUSAND MEN

Doing the work of 1,000 men, a huge ditch digger was employed to cut a wide, deep path through a section of Los Angeles for a giant pipe line. The digger is capable of removing four cubic yards of earth every thirty-five seconds with the result that forty large trucks are kept busy hauling it away.

STOVE OF FRANKLIN IS MODEL FOR INDEPENDENCE HALL 2212

Difficulty was encountered in reproducing the heating methods of colonial days when two rooms in Independence Hall were being fitted to look just as they did when the Declaration of Independence was signed. Finally five little models of stoves, made by Benjamin Franklin himself were found in the archives of the American Philosophical society in Philadelphia, and from one of these models, two full-size stoves were constructed, accurate as to detail and scale.

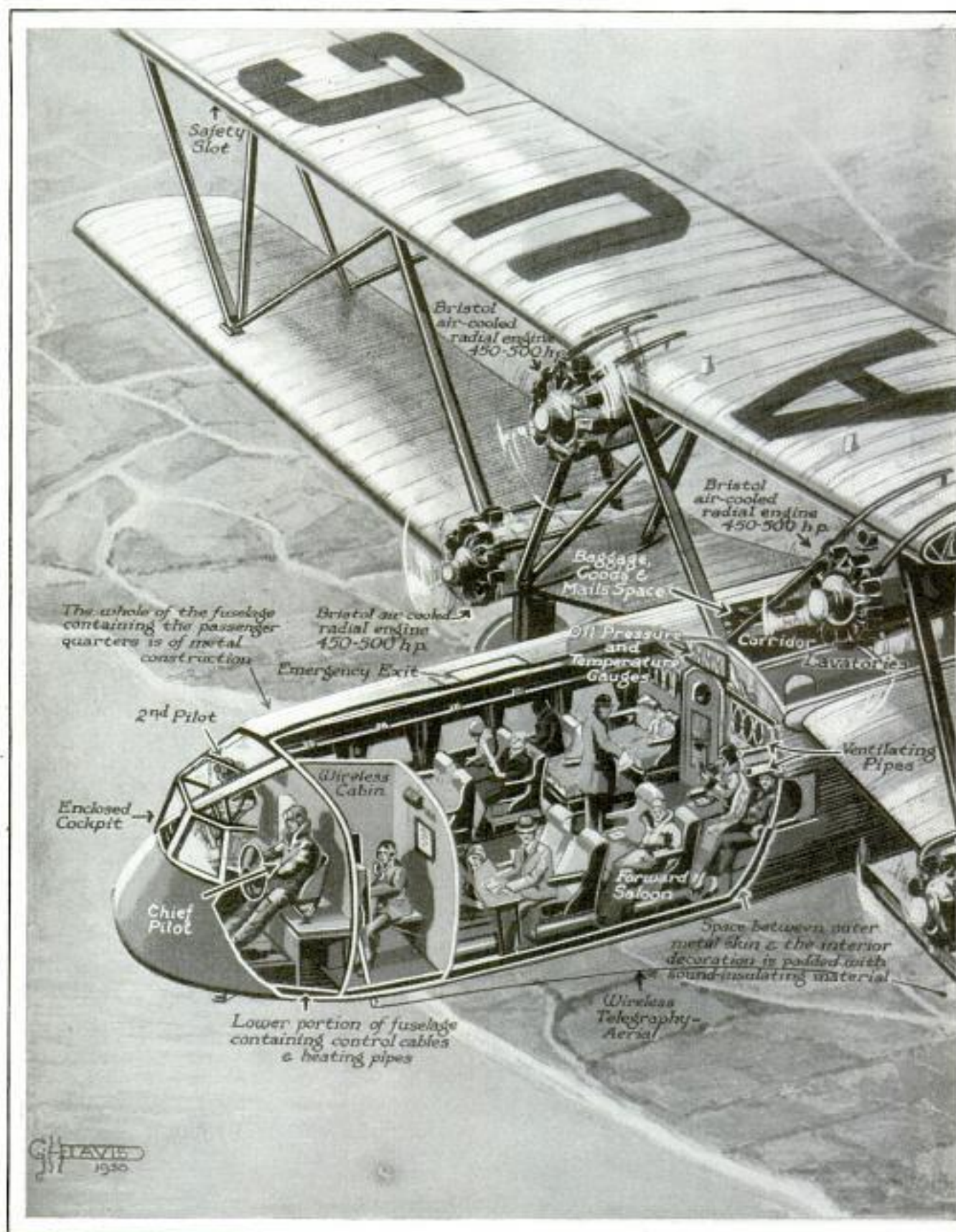


Movie Camera Which Takes Two Pictures from Different Angles to Give Illusion of Depth

Dr. W. Elwin Peterson
940 Orange Street
Hollywood, Calif.

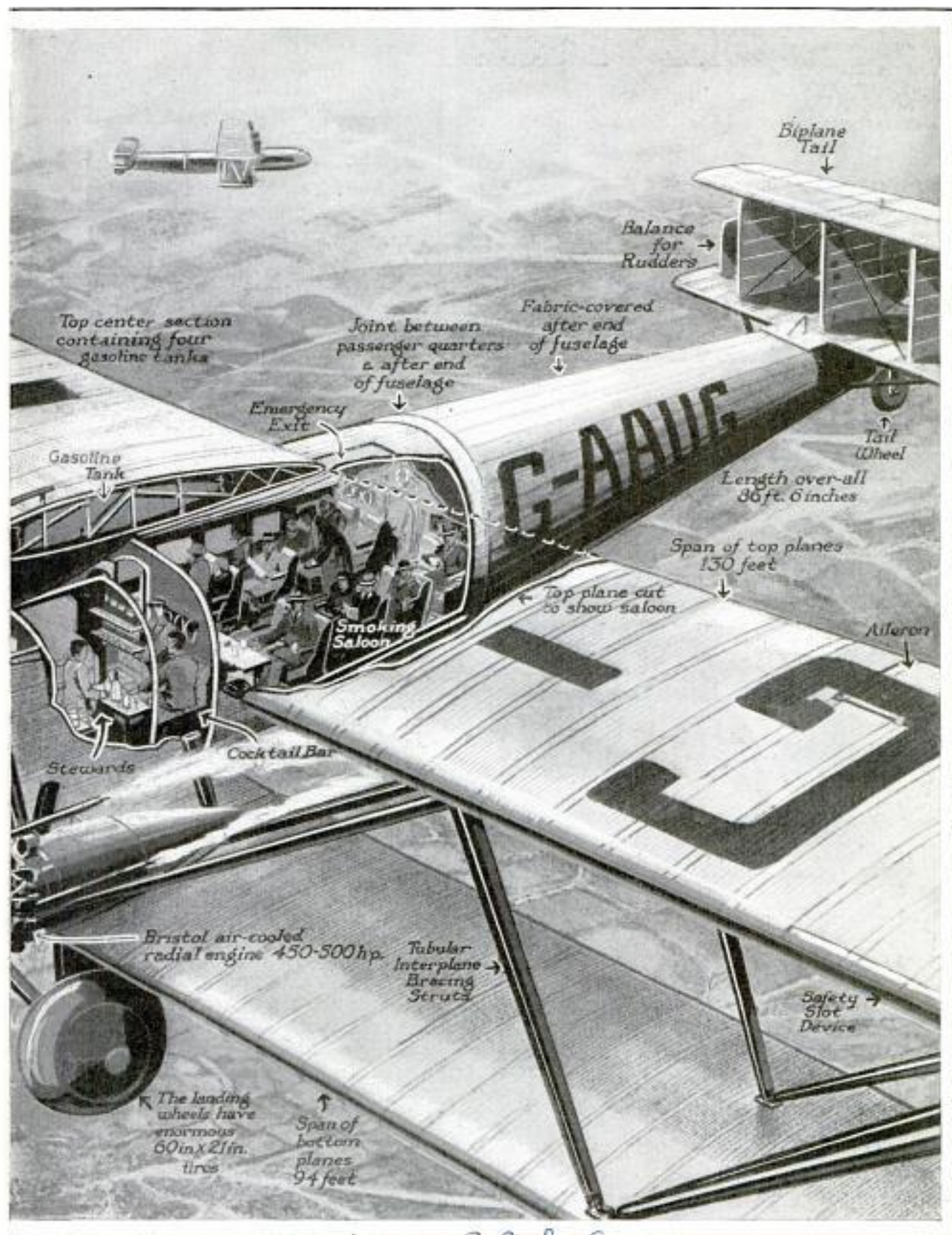
Am. Soc. H. Eckhardt
4528 Walnut
Phila.

THE WORLD'S LARGEST AIRPLANE PROVIDES ALL



Courtesy The
 Artist's Sketch of Big Plane for Imperial Airways; a Fleet of These Large Air Liners Is Being Built and One Already Has Been Given a Test Flight

MODERN LUXURIES FOR FORTY PASSENGERS



Illustrated London News

11/22/30 P. 928-9

These Planes Will Have an Estimated Cruising Speed of 100 Miles an Hour with Four Radial Air-Cooled Engines, Each of 450 to 500 Horsepower

2201
 NEW GOLF BALL WILL HELP IMPROVE YOUR GAME


Spraying Balls with Paint and Measuring Them in Gauge to Test Resiliency before the Covers Are Put On

What will the new-size golf ball do to my game? Golfers everywhere in the United States are asking the question for on January 1, for the first time in the history of the sport, a standard ball was adopted. Manufacturers have promised not to make any other size and the United States Golf association has agreed to keep "outlaw" balls out of the country. The new ball is one and sixty-eight-hundredths inches in diameter and one and fifty-five-hundredths ounces in weight. The old ball was usually one and sixty-two-hundredths inches in diameter and one and sixty-two-hundredths ounces in weight, the new one thus is six-hundredths of an inch larger in diameter and seven-hundredths of an ounce lighter. These are not sensationally great differences, but they are sufficient to have a marked effect on playing. According to "Chick" Evans, the new ball will afford better lies where-

er it may be. It sets up better and is easier to play in the wind. It is in the quartering wind that the real test will come. "This standard ball will be better for the poor player and just as good for the good one," declares Evans, "and may result in the use of fewer clubs." Last year, more than 1,600,000 dozen golf balls were made in this country, and the estimate for this year is well over 2,000,000 dozen. The total number of clubs made will probably be in excess of 3,000,000. A few hundredths of an inch or a fraction of an ounce change in the diameter and weight of a golf ball thus causes quite an upset in the manufacturing world, and will have an interesting effect on the entire golfing public. There are more than 5,800 outdoor courses in the United States. A family of more than 2,000,000 players use them, and the value of the clubs' plant equipment is conservatively placed at more than \$850,000,000. Engineers, chemists, experts and skilled craftsmen, working with delicate machinery, are required to make

the balls. It takes about two weeks to finish one. "The new ball is not sufficiently large to demand any change in the size of the hole and I doubt if it will affect 'miniature' golf", declares Evans. "This, by the way, is becoming an important department of the sport. Conservative estimates show that there are some 25,000 courses of the miniature variety in the United States with a playing family of eight hundred thousand."

 222
 SPECIAL BREEDS OF CHICKENS FOR LABORATORY TESTS

Special breeds of chickens, whose lives will be spent in the laboratory as the subjects for physiological experiments, are being raised by a scientist of the Maine agricultural experiment station. When dieticians want to find out something about a drug or food combination they try

Charles Evans, Jr.
 11 S La Salle
 Chicago

Dr. W. Franklin Case

it on animal or fowl, but chance-bred animals may not react evenly to the conditions under which they are placed, because they may have inborn differences that would blur a record which would be clear and sharp if all were alike. Hence the laboratory chickens are being bred so that they will be as much alike as possible. Some strains always grow fat, others always grow slowly, some always get big, others always stay small, and one strain always develops an abnormal skeleton. With chickens reacting similarly, it is possible to experiment with assurance of dependable results.

SNOW SCOOTER ON SKIS GIVES HEALTHFUL SPORT TO YOUNG

2188

Tandem skis with strongly braced upright handles and a spring connection in front, have been introduced to give young children the sport and healthful exercise found in safe skiing. The front spring takes up the shock in case of collision, and, with the aid of the handle supports, the child can coast, scoot or do fancy stunts after little practice.

pat pend



Coasting on the Tandem Skis; They Can Also Be Used as a "Scooter"



New X-Ray Apparatus Used to Photograph Interior of Body; It Is Expected to Increase Greatly the Usefulness of X-Rays

IMPROVED X-RAY SIMPLIFIES DIAGNOSIS OF DISEASE

Various diseases can now be diagnosed and their presence in the body located with greater ease and accuracy through the aid of an improved X-ray tube developed by Dr. George L. Clark of the University of Illinois. In explaining it recently, he said that it utilized the principle of light diffraction in some such way as that phenomenon is employed by the astronomer in studying the distant stars. Light coming from stars many millions of miles from the earth is broken up and examined in the spectrograph so that the scientist can tell much as to the elements that make up the star. The new X-ray tube, making use of this phenomenon of light diffraction, reveals the difference between diseased and normal human tissues, can indicate whether a particular tendon, for instance, is at rest or under tension and can show other important data.

Our Bureau of Information is for your benefit. Use it as often as you please.

The Sko Mfg. Co. Inc.
384 S. Wabasha St. Paul, Minn.

Demonstrated at annual meeting
Radiological Society.

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Crouse-Hinds Co.
+ Syracuse, N.Y.
POPULAR MECHANICS

of Industrial Research
University of
Pittsburgh, Pa.

Chicago, 407 S. Dearborn
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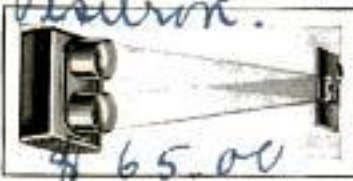
Airway Beacon of Recently Developed Type for Line between San Diego and Fort Worth, Texas

AIRWAY BEACON THROWS BEAM SEVENTY-FIVE MILES

Improved beacons have been devised for illuminating 1,500 miles of airway between San Diego and Fort Worth, Tex. The big lamps project a beam of white light that can be seen for seventy-five miles. One hundred and fifty of the beacons have been contracted for by the department of commerce, and 120 of them will be installed on the Fort Worth-San Diego route to make it one of the most brilliantly lighted airways in the world.

ELECTRIC EYE AND RELAY SET COMBINED IN CABINET

Inclosed in a compact steel case, a photo-electric cell and relay that may be operated from any 110-volt sixty-cycle lighting socket, has been introduced. In this form, the electric eye is much simpler to use, it is said, in performing a number of tasks, such as operating counting devices, turning machines on or off, and controlling the timing of opera-



counting devices, turning machines on or off, and controlling the timing of opera-

tions. Light from an upper lens is reflected from a mirror to a lower lens, where it is received by the photo-electric cell. Any interruption of the beam causes the relay contacts to close, thereby operating a counter, power switch, signal or other device.

GLASS FROM NATURAL GAS

Glass has been made from natural gas by the Mellon Institute. The material is called vinylite and looks like glass, but has properties which ordinary glass lacks. It is not fragile and does not stop the ultraviolet rays of the sun. Scientists believe it has commercial possibilities as acid-protective lining for metal containers, and as a plating or coating for other materials.

ROUND FRUIT CONTAINER SAVES SPACE IN SHIPPING

Packing, shipping and marketing of fruits all are simplified by a cylindrical knockdown container that is used instead of flat boxes, particularly for citrus fruits. The round crate has no nails, the slats forming the sides being attached to strap iron by cylinders which are part of the iron

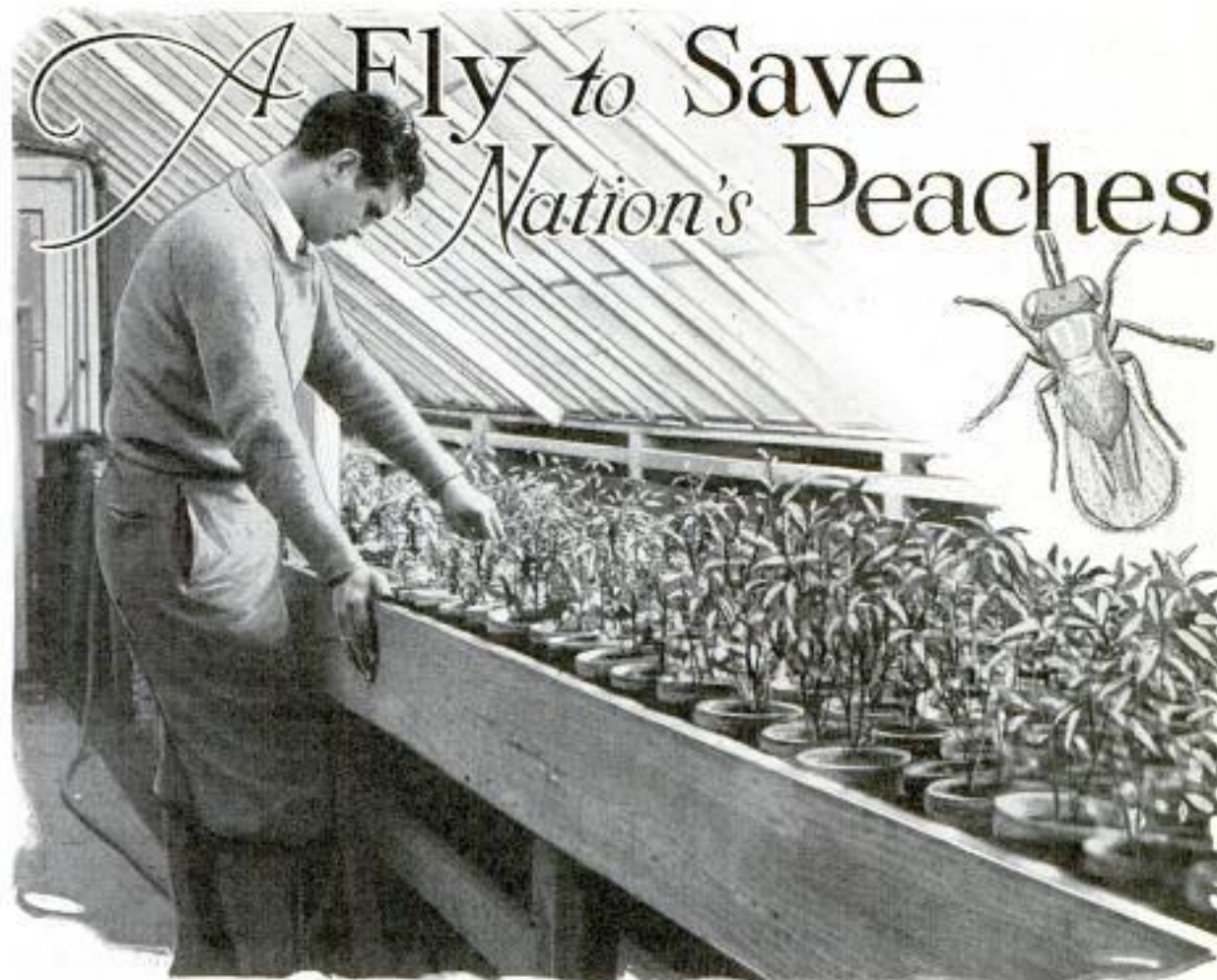


Cylindrical Crates of Knockdown Variety Which Save Space and Labor in Handling Fruits

bands, while cotterpins hold top and bottom to the sides when the case is assembled in cylindrical form. It is claimed that more crates can be loaded in a box car than is possible with the ordinary kind, that better ventilation is assured for the fruit in the car, display of fruits in the market is facilitated, and that gravity loading is made possible when the filled crates are being handled. Cost of production is less than for the box crates.

Is. In Laboratories, Florida Citrus Exchange
Israce & Ravenswood Tampa, Fla. Exchange
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made by Shell and Empire Corp.
H. B. ...
made by Pontiac Machine Works



Cultivating Orchard of Tiny Peach Trees That Stay Green All Winter under Glass; and, at Right, the Trichogramma Minuta Fly, Arch-enemy of the Oriental Peach Moth

By JOHN F. COGGSWELL,

16 Edgemoor Road, Belchertown, Mass
 have ready to turn loose on the countryside next April, a tremendous swarm of flies.

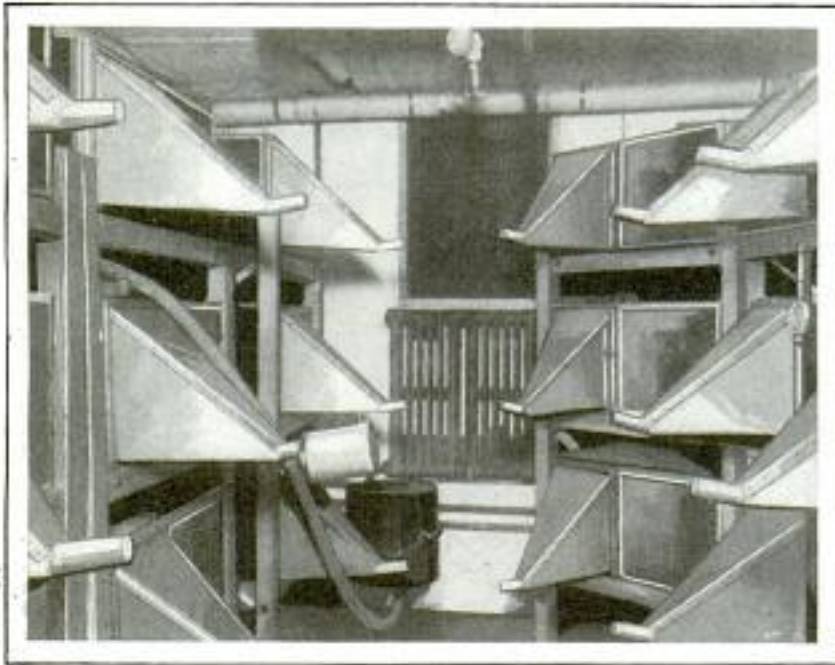
ALONG the Atlantic seaboard, preparations are being hurried for one of the greatest wars that the world has ever witnessed. During the last year, the first skirmishes were fought, and for the entire summer of 1931 the campaign will be carried on ruthlessly. The forces friendly to the United States will battle to save the peach orchards of the nation from the onslaughts of an invader from the other side of the world.

To make ready for the great conflict, agricultural scientists in Connecticut have created tropic conditions in winter, then turned around and, in that realm of torrid heat, created one cold-weather belt. In addition, they have grown a small orchard that will stay green all winter; fomented whirlwinds; rigged up most ingenious mechanical devices, and in general have taken all sorts of liberties with nature, to just one end—that they may

These flies, however, are not of the variety that health authorities urge us to swat without mercy. In fact, they hold little resemblance to the household species. They look more like small editions of the domestic honey bee. Nevertheless, they are flies. They are known as Trichogramma minuta and are the traditional and deadly enemies of the oriental peach moth.

No one knows the exact point of origin of the oriental moth. They arrived in this country in a shipment of flowering cherries from Japan and threatened to become a destructive pest comparable with the European corn borer and the codling moth. From the shipment of cherries, they spread to peach orchards in New Jersey. Once thoroughly established, they bred rapidly in an ever widening circle,

Connecticut Agricultural Experiment Station, New Haven, Conn. ³⁹⁹



Moth-Breeding Pens, with a Meshed Bottom, Can Attached to Funnel, and Air Hose in Place Ready to Blow Out Moths and Eggs

until orchards throughout the eastern United States, from the Atlantic coast to the Mississippi and from Canada to the Gulf were infested.

As they traveled, they left in their wake thousands of blighted peach trees and rotting fruit. In the summer of 1930, the loss they visited upon the orchardists of the country was well over \$2,000,000. In 1929, the loss in Connecticut alone was nearly a quarter of a million dollars. Last summer, the experts, with the aid of a small importation of the *Trichogramma minuta* flies, reduced the loss considerably.

Now the scientists, with the knowledge they gained in last summer's campaign, have set to work in earnest to raise enough of the parasitic flies to chase the oriental moths out of the state and as far beyond that as possible. Realizing the need of haste, they are not awaiting the natural breeding time of the warmer season, but are producing flies by the hundred thousand throughout the winter, ready to turn loose in the spring.

The *Trichogramma* fly is a parasite, which owes its very life to the peach moth and to certain other insects. Where it came from is just as much of a mystery as the origin of the moth. It appeared in New Jersey orchards a few years after the pest began inroads on the peach crop. Investigators soon learned that the fly laid its eggs in the eggs of the moth.

That's what makes the *Trichogramma* such a valuable aid against the oriental invader. On the inside of the moth egg, which is only about the size of a pinhead, the fly egg develops into a tiny white larva with a black head. By the time it is ready to spin a cocoon for itself, preparatory to emergence as a fly, it has consumed the moth egg, wholly and entirely. Neither the fly grub nor the insect itself damages a single item of the fruit or vegetable crop.

In order to rear the parasitic flies, the scientists had to assure a bountiful supply of acceptable insect eggs for the flies to breed upon. Obviously, they didn't care to increase the hordes of moths that they were laboring to exterminate. In the middle west, they found, in the grain moth, a pest whose eggs were acceptable to the *Trichogramma* and yet held little menace to New England crops, for a grain moth infests only grain crops.

To insure success in breeding throughout the winter, they had to simulate summer conditions during the entire bleak New England season. That was easy—a steam-heating plant in a large basement insured constant high temperature. The problem of caring for literally millions of flies was a greater one. However, the scientists knew that both eggs and larvæ lay dormant in cold weather. Obviously, the answer was to take the fly eggs as soon as they had been deposited in the grain-moth eggs and place them in a temperature constantly cold enough to insure dormancy. It did not take them long to establish a cold-weather zone in the torrid basement. They simply installed a large electric refrigerator.

The grain upon which the grain moths were to breed was placed in trays in a series of tin containers, and the grain moths went to work laying eggs with great abandon. To get the eggs after they were laid was still another problem. One of the technicians solved that. He sol-

dered funnels to the ends of the breeding containers and installed a small air compressor with a long blower hose.

Cans with meshed bottoms were placed over the funnel ends and, by a blast from the air hose, moths, eggs and all were blown out into the cans. Then the eggs were sifted out through the meshed bottoms, just as one pours salt from a shaker, and the moths were returned to the breeding trays to lay more eggs.

A great number of cardboard disks, about two inches in diameter, were covered with thin shellac. Upon these, the moth eggs are shaken out. Each disk receives about 8,000 eggs. The disks are then deposited in a large cheesecloth inclosure, in which thousands of Trichogramma flies are living. They go merrily to work laying eggs inside the moth eggs. When this is accomplished, the disks are removed and placed in the refrigerator, where the eggs lie dormant indefinitely. Fly grubs that develop in the cages are also placed in the refrigerator.

Thousands of the impregnated disks are stored away in the cold receptacle. As soon as spring arrives, they will be distributed to peach growers throughout the infested districts. The orchardists will hang them in their orchards, where the grubs will hatch out during the first warm days, and develop into flies, which will war on the moths.

SOUND RECORDS EASILY MADE ON PORTABLE PHONOGRAPH

Records can be made and played from a portable unit that simplifies the task of preserving the voice, music and other sounds. Square plates are employed for recording.



Adjusting Recording Needle to Square Record in Portable Outfit That Plays and Registers Music Too



Saw in Two Positions, Illustrating the Type of Work It Does and How Easily It Is Guided

MOTOR-DRIVEN PATTERN SAW SAVES CARPENTER'S TIME

Better patterns than can be made by hand are formed with a marked saving of time by using a combination motor-driven saw and dadoing unit. The outfit makes a pattern in one continuous piece instead of in parts that must be spliced as is usually the way. The machine will cut patterns from one to fourteen inches in diameter and is moved on the work by a small reversible motor. All the operator has to do is to move the pattern for a new cut and then throw a switch to stop, start or reverse the motor.

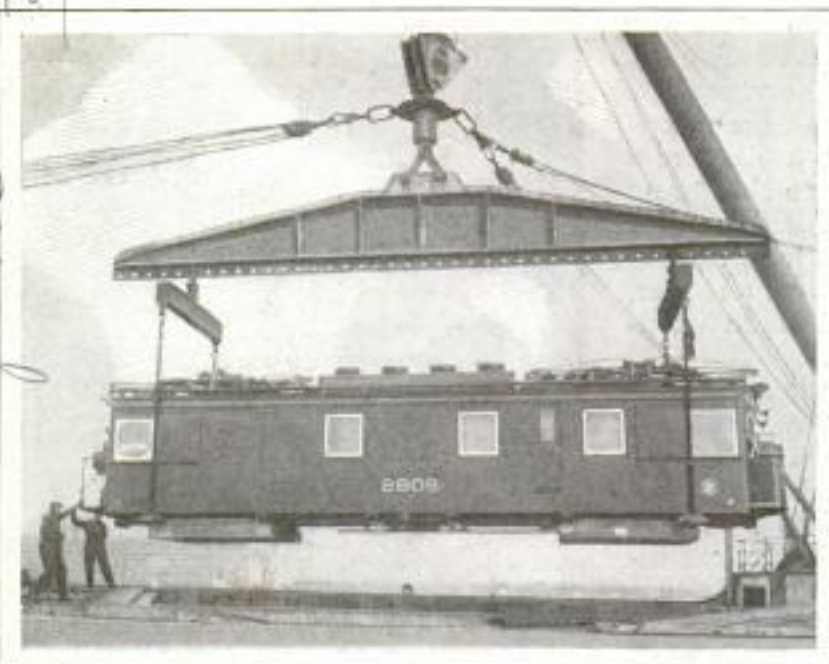
WONDER-WOOD WALL PANELS ADD TO HOUSE COMFORT

Panels of a woodlike substance that will not crack, peel or warp, and that duplicates the grain and finish of costly hardwoods so faithfully that only experts can tell the difference, have been introduced for home and office decoration. A thin surface of the material is mounted on wall-board and then set in place like ordinary paneling. The panels can be washed with soap and water, are not damaged by cleaning agents and, because of their insulating qualities, make the rooms warmer in winter and cooler in summer. Besides natural-wood finishes, the material is also available in a wide variety of colors, tapestry effects, marble and other designs.

Mr. J. A. McPeay, Harold Herbert

Mr. Harold Herbert, Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
Hotel Wyndham, 42 W. 48 St., New York

Shipped from Baldwin Locomotive Plant at Eddystone



Electric Locomotive Being Swung Aboard Steamer for Shipment to Chile; This and Three Other Engines Were Ordered by Telephone

ELECTRIC ENGINES FOR CHILE ORDERED BY TELEPHONE

Four electric locomotives were sent by steamer to Chile recently after completion at the plant of the Westinghouse Electric and Manufacturing company in East Pittsburgh. The half-million-dollar order was received by telephone from the South American country shortly after wire service was established. The engines weigh about 130 tons each and are for service over the broad-gauge lines in mountain territory. One man can operate them, and the controls are not much more difficult to handle than those of a street car.

CAUSE OF SPOTTED TEETH TRACED TO WATER

Drinking water seems to be the cause of spots on the enamel of teeth of persons in some localities, according to physicians of the public-health service, but the exact reason for the connection remains a mystery. The condition is a defect of the enamel coating of the teeth. All the inhabitants of one village may have it, while neighbors in the next town are entirely free from it. Investigators found that children in an Arkansas town who used water from a certain deep well, were afflicted during the age period of

Dental Service 571-B 1/6/31

enamel formation. Children, who were beyond this age before the well was dug, did not have the defect. Others, young enough to be affected but who used water from other wells, were free from the trouble. The composition of the water did not shed any light on the mystery. Before the well was dug, water from shallow wells and springs had been used and no cases of spotted teeth had been found.

CARBON IS STAFF OF LIFE

Carbon in its various forms, lampblack, soot, pencil leads and diamonds, may be considered as the actual staff of life because the carbon atom alone enables other atoms to combine in groups from which all kinds of substances are formed. By themselves the atoms of oxygen, hydrogen or nitrogen can produce little, but when carbon is added their combination become amazing, and the results are gasoline, oil, medicines, bread and meat. All kinds of living things owe their existence to the carbon atom, although the atom itself differs from others only in having one electron more or less than the latter possess.

Fit Bit

ELECTRIC CLOCK FOR AUTO FITS ON STEERING COLUMN



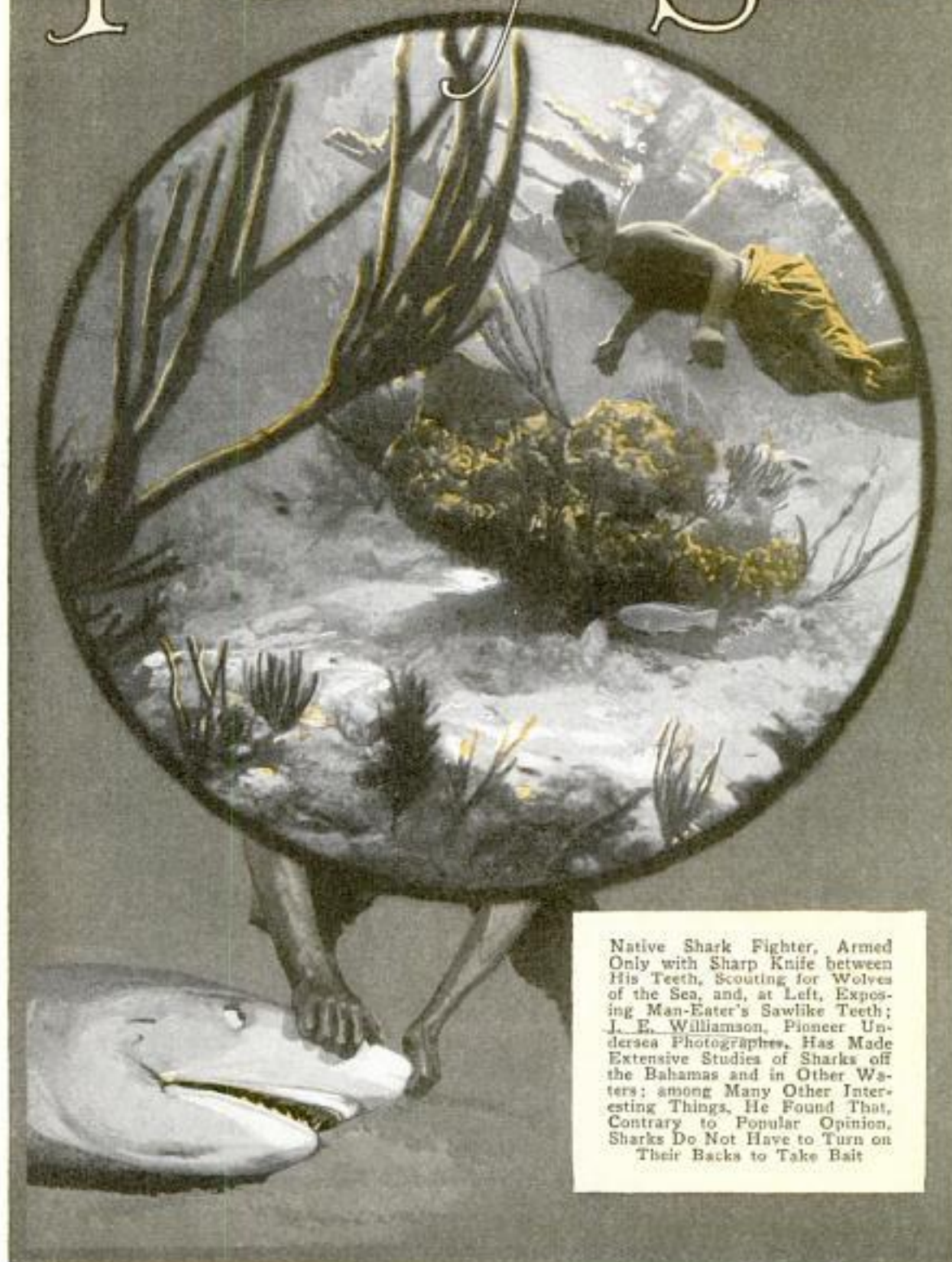
Requiring no attention after it is installed, an electric clock for the automobile is quickly attached to the steering column and is as easily removed for placing in another car. The timepiece operates from the car battery and is placed where it is most convenient for the driver to see it.

*Mrs. Isrover A. Kemp
Frederick S. McKay*

*Bristol Auto Clock Co
Bristol, Conn*

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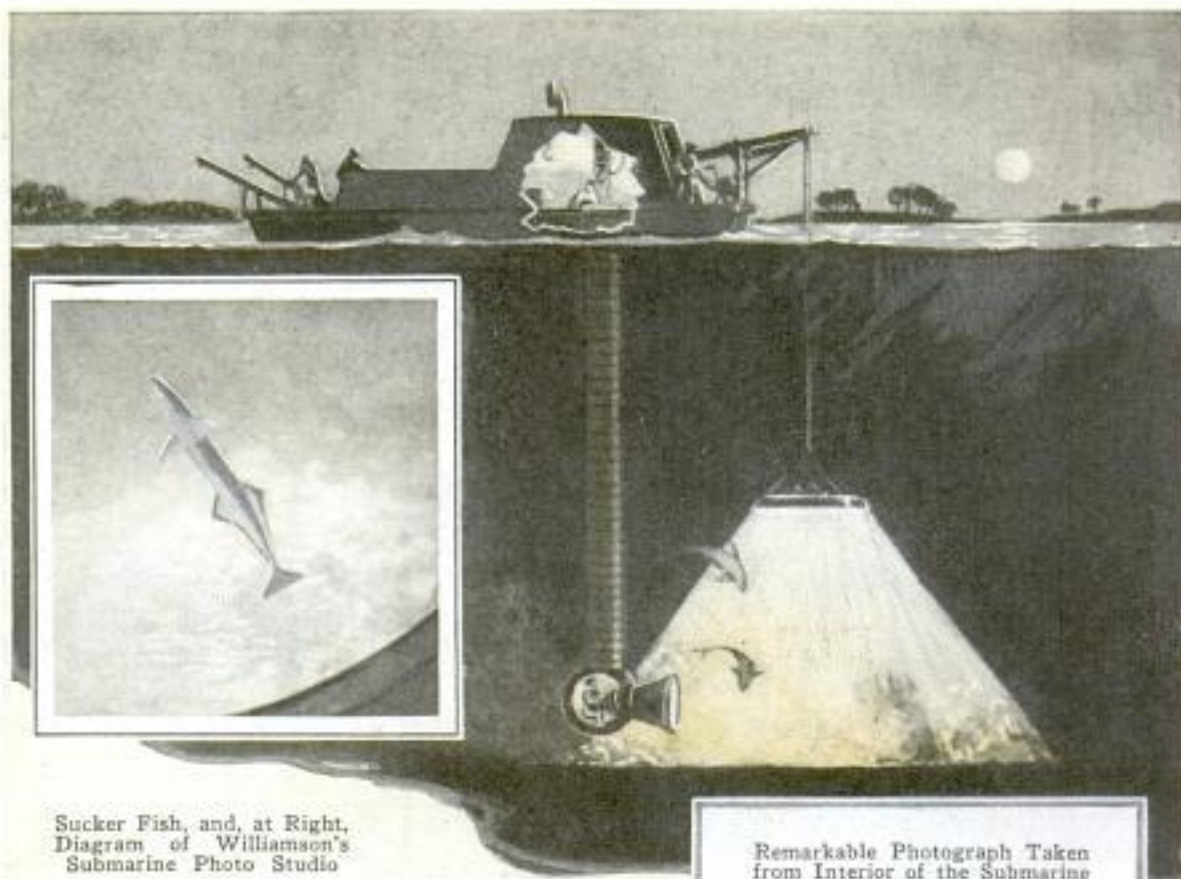
ON THE FLOOR of the SEA



Native Shark Fighter, Armed Only with Sharp Knife between His Teeth, Scouting for Wolves of the Sea, and, at Left, Exposing Man-Eater's Sawlike Teeth; J. E. Williamson, Pioneer Undersea Photographer, Has Made Extensive Studies of Sharks off the Bahamas and in Other Waters; among Many Other Interesting Things, He Found That, Contrary to Popular Opinion, Sharks Do Not Have to Turn on Their Backs to Take Bait

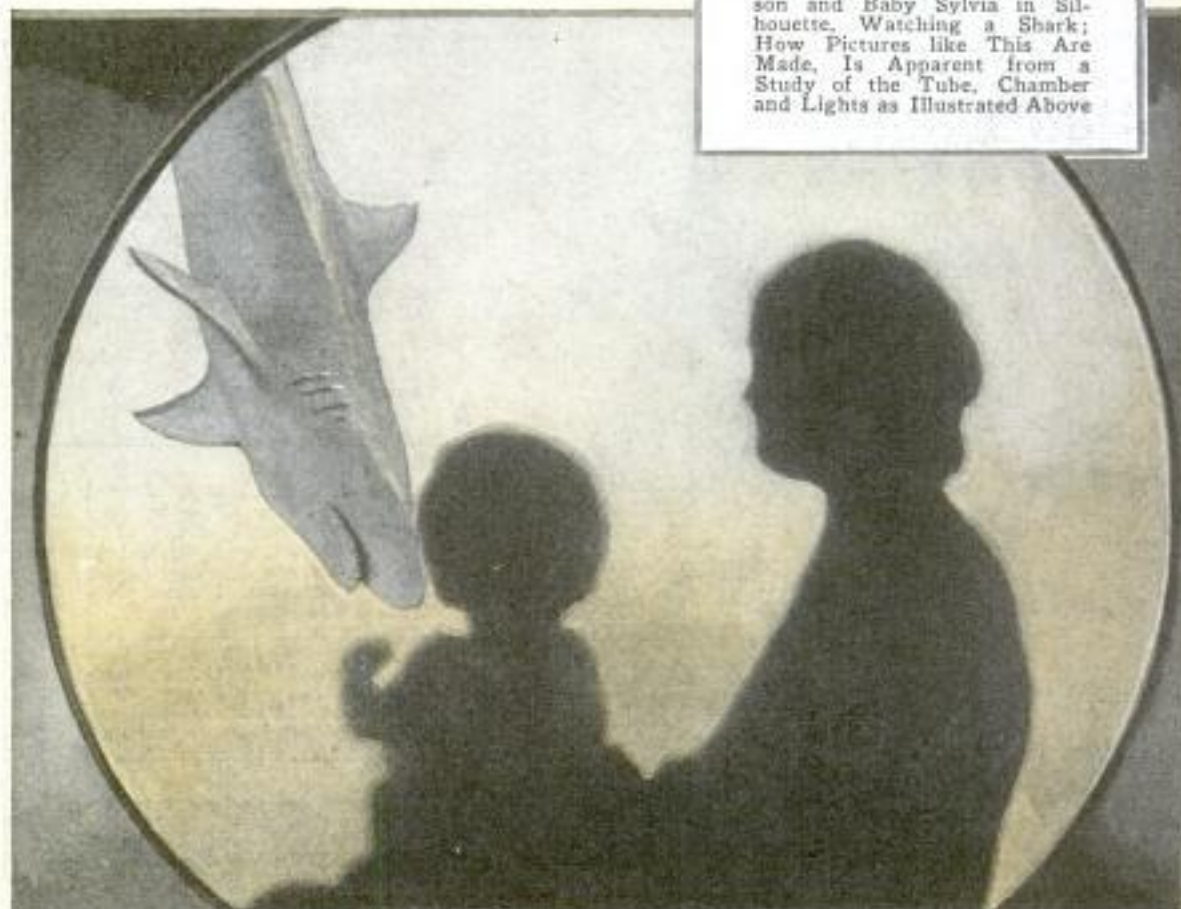
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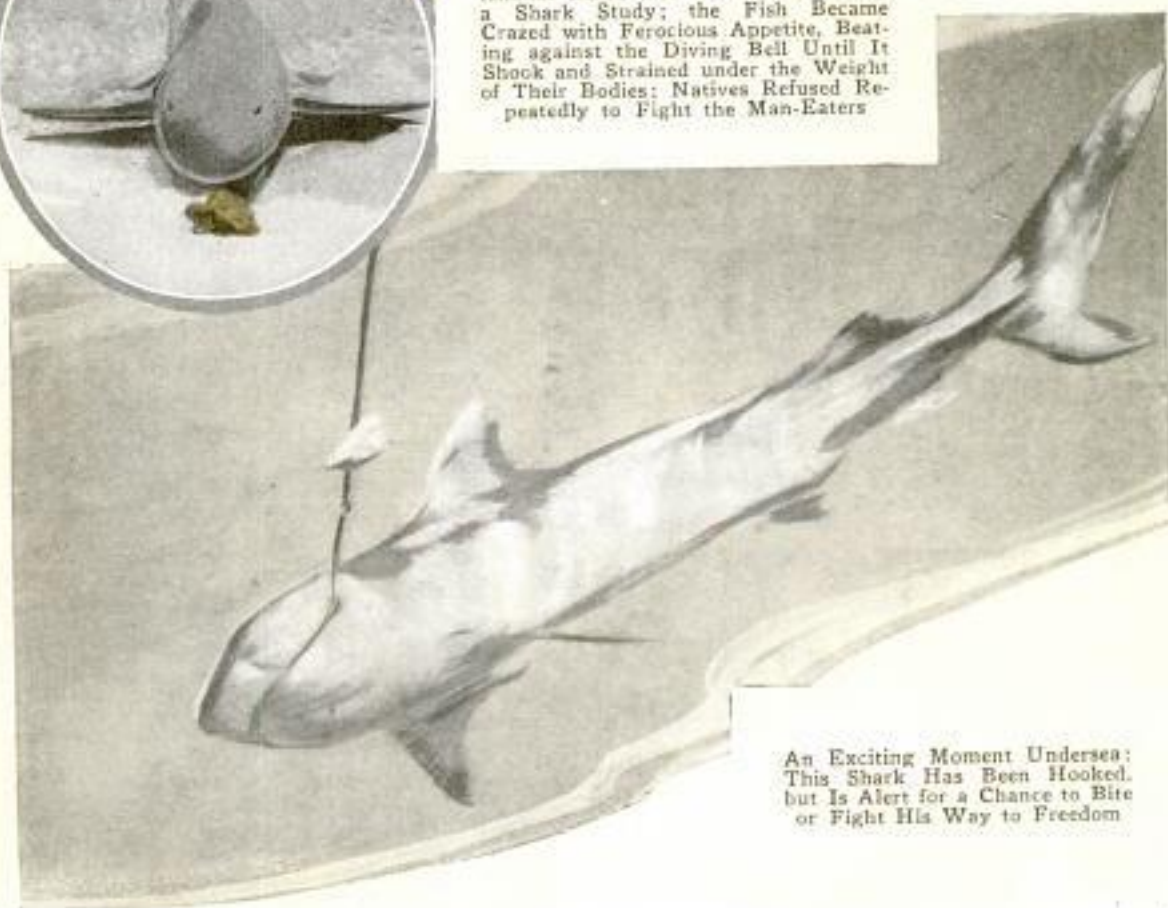
Sucker Fish, and, at Right, Diagram of Williamson's Submarine Photo Studio

Remarkable Photograph Taken from Interior of the Submarine Studio, Showing Mrs. Williamson and Baby Sylvia in Silhouette, Watching a Shark; How Pictures like This Are Made, is Apparent from a Study of the Tube, Chamber and Lights as Illustrated Above





Natives Making Hooks and Other Tackle Ready for a Catch, and, at Left, Shark on Ocean Floor; Williamson Dumped a Large Quantity of Animal Blood into the Waters during a Shark Study; the Fish Became Crazy with Ferocious Appetite, Beating against the Diving Bell Until It Shock and Strained under the Weight of Their Bodies; Natives Refused Repeatedly to Fight the Man-Eaters



An Exciting Moment Undersea: This Shark Has Been Hooked, but Is Alert for a Chance to Bite or Fight His Way to Freedom

Cavalry school at Hanover

406

22

Germany for Reichwehr officers



German Motorcycle Unit Up for Inspection at Military School Giving Drills in Motor Tactics

GERMAN CAVALRY ON WHEELS PASSES RIGID TESTS

Motorcycle units of specially trained and drilled cadets are required to pass severe tests at a German officers' training school, one of the finest military institutions in the country. The training given is intended to be of special help to the men in civil duties and as army officers.

BABIES ARE FILMED IN TALKIES TO SHOW MENTAL GROWTH

Babies have entered the talkies. Infants of ages ranging from six weeks to one year have been making talking or sound films at Yale University although they have not been aware of the fact, and their freedom from self-consciousness has given a critical audience of scientists interesting information concerning child psychology and other phenomena. A special setting was made for the picture taking, which was done at intervals of four weeks, so that the growth and mental development of the young actors and actresses would

be more noticeable. The tests were performed around a specially designed crib, without interference from outside diversions. Dr. Arnold Gessell, director of the clinic, reported after the tests that "individual differences in capacity, emotional characteristics, personality traits and body type declare themselves early and these differences are comparable in kind and degree to those observed later in life."

NATIONAL PARK AREA DOUBLED

Bryce Canyon, in Utah, one of the newest national parks, recently has been doubled in area, and now comprises more than 30,000 acres. The newly acquired lands were transferred from the Powell national forest, and the added territory includes several superbly colored canyons.

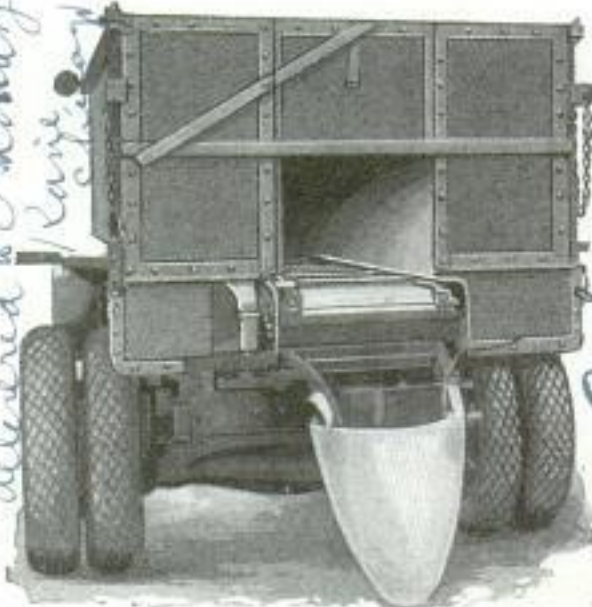
Science Service 511-B 1/6/31

TRUCK WITH CONVEYOR BELT UNLOADS ITSELF

2236

For handling coal, sand or other similar material, a truck with a conveyor belt built into the body unloads its contents quickly when the conveyor, running lengthwise, is operated from the engine. The truck can be converted into a box-type body by placing hopper boards over the belt, and it has a tailgate that can be entirely opened or raised only a trifle, so that coal can be bagged or run directly into wheelbarrows. It is claimed the truck unloads faster than the gravity type.

delivered to Chicago



James O. Seaver Co Patana, Ill.

Truck with Conveyor Belt in the Bottom, Which Operates from the Engine in Unloading

Science Service 511-B

2-32

1/6/31

Chime of Child Development

James O. Seaver Co Patana, Ill.

Dr. Vachet.
Paris. France

Webb Mfg Co. 245

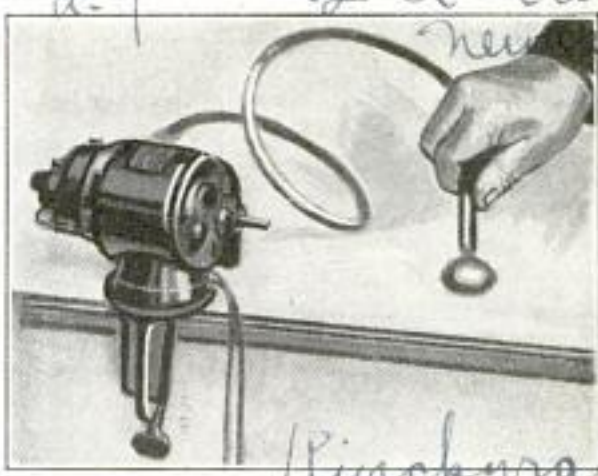
POPULAR MECHANICS

RR 407
newly
mg

Draw P.O. Cheatham and Dept. of Agriculture
Washington D.C.

PHONOGRAPH RECORDS ARE AID
IN SIMPLE ILLNESSES

Phonograph records are being used in Paris to treat certain simple and common ailments. The records, made by an artist with a soothing bedside voice, rely on the power of suggestion to aid the patient, and in some instances, the record contains music intended to be soothing. There is a proposal to extend the system by making records containing talks on the symptoms and cures of some of the more common kinds of ills with the idea that homes can possess a medical library of records for reference.



Motor-Driven Eraser Which Runs at Comparatively Low Speed and Does Not Tear the Paper

MESH POTATO SACK DISPLAYS
CONTENTS TO BUYER

To allow shoppers to judge the quality of potatoes they are purchasing when buying them in sacks, a bag with a visible front section now is being produced.



The sack is woven of low-grade cotton, one half of it being a wide-meshed net through which the tubers may be seen. A special machine has also been made for the manufacture of the meshed sacking material.

MOTOR-DRIVEN ERASER SAVES
DRAFTSMAN TIME

Designed especially for architects, draftsmen and designers, a motor-driven eraser now on the market is said to run at such a speed that cutting or rubbing through the drawing is prevented. The motor is mounted on a swivel, a handle aids the user, and a clamp fastens it to the edge of a table.

MOTOR WHEEL FOR ICE SLED
SPEEDS UP WINTER SPORT

One of the speedy winter sports has been made still faster by a New York inventor who has attached a motor wheel to the rear of an ice sled, to make what he calls an ice scooter. The gasoline-driven wheel sends the sled and its rider over ice or snow at a thirty or forty-mile an hour clip.

PROTECTION FOR STEEL POLES
FITS AROUND BASES

Tubular steel poles installed without ground collars, which become corroded or pitted at the grade line, are being reclaimed by the use of protection shields which fit about the base of the poles. These shields are assembled from two ribbed, malleable-iron duplicate castings with a tongue-and-groove joint, and can be applied directly to the installed poles without slipping the sleeve over the top of the poles or removing any attachments. The concrete is removed from about the base of the pole and one half of the sleeve is placed in position; then the other half is slipped over the joint into place, and the space between the pole and shield is filled with cement.



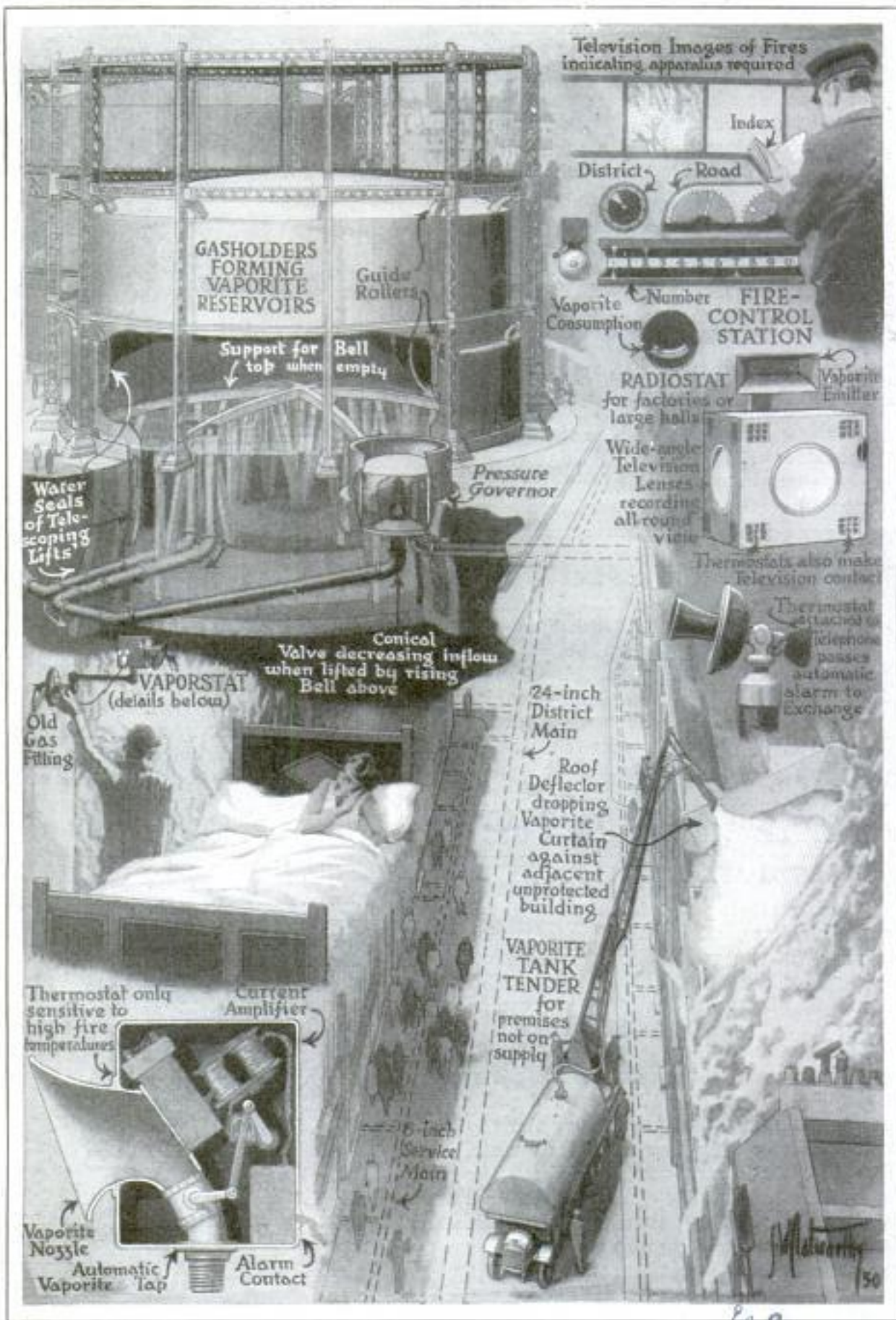
Ice Sled Propelled by a Gasoline-Driven Motor Wheel Adds Speed to This Winter Sport

Dr. Sydney Wilburton
New Edo Park NY

Electric Railway
Equipment Co. 290 6 Corman Ave
Cincinnati Ohio

2233

FIRE-EXTINGUISHING GAS PUMPED THROUGH PIPES



Drawn by S. W. Catworthy, © Popular Mechanics

54, Ribblesdale Road, London, W. 14

SMOTHERING FIRES BY GAS PIPED INTO HOMES

Tanks, mains and pipes now used for illuminating gas could be converted into an effective system for protecting the home and office from fire, W. W. Wiles, a British engineer, told insurance societies in London recently. Under his idea, a fire-smothering vapor would be supplied to dwellings and office buildings through the pipes now used for illuminating gas. In case of a fire, the extinguishing vapor could be turned on automatically through a thermostat control if desired, and the gas would be forced out of the jets and quickly spread through a fire-threatened room.



Small and Speedy Armored Tank Employed in German Army Maneuvers; Note the Cupola for Gunners and the Shield over Radiator

SMALL TANK INCREASES SPEED OF WAR MANEUVERS

For traveling rough ground with a winter coating of ice or snow, Germany's Black Uhlans are employing a small armored tank that is able to make fast time in exciting war maneuvers. This tank is mounted on a frame no larger than that of an ordinary passenger car. It is entirely inclosed in a metal shield, and at the rear has a small turret for a machine gun or other weapons.

AUTO WHEEL ABSORBS SHOCKS THROUGH INNER PAD



Fitted with a balloon tire, a shock-absorbing auto wheel has an inner pneumatic pad at the hub, which is said to carry a five-ton load with an air pressure of only four pounds. The shock absorber is designed to cushion the initial thrust and to take up rebound as well.

ion the initial thrust and to take up rebound as well.

NUMBER OF LEAVES GOVERN QUALITY OF GRAPES

Scientists have discovered that there exists a relation between the size and quality of grapes, and the number of leaves on the vines. Thinning of leaves, up to a certain point, brings about an increase in the weight as well as in the sugar and acid content of the grapes.

FLEXIBLE HACKSAW BLADE FOR METALS THAT BIND

For use on jobs that strain or twist the cutting implement, a semi-flexible hacksaw blade is now being offered. This blade cuts pipe, angle iron, wire cable and electrical conduits, sawing through soft or thin metals that are likely to bend or bind. It is made of tungsten steel and carefully tempered, to prevent the teeth from breaking off.

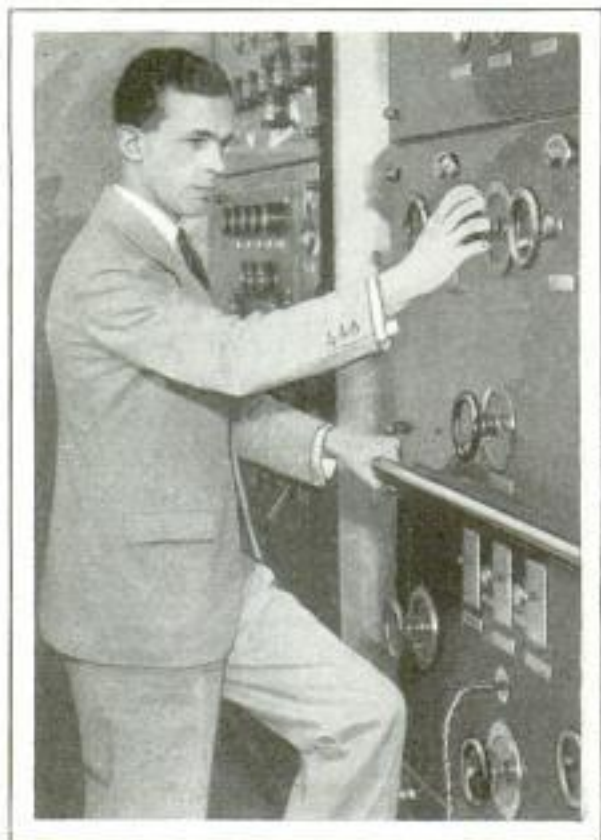


*Baltimore
Hatfield Resisting Wheel
2335
336 22ndfordle*

*Dr. A. J. Wenker
University of California
Berkeley, Calif*

*L. S. Starrett
Co. Athol
Copyrighted material
Mass*

RADIO TELEPHONE NOW SAILS AROUND THE WORLD



Passengers on a palatial ocean liner sailing around the world now, have the pleasure of talking directly to their friends in North and South America and in Europe—on the telephone. They speak from a booth on the deck of the liner, their voices crossing oceans and continents and arriving as clearly as though they were speaking across lots in the same city. Suppose you wish to talk from your home to a friend on the round-the-world cruiser. You need only lift the receiver from the hook and say to the operator, "I want to talk to Mrs. John Jones on the 'Belgenland,' which is somewhere on the Pacific ocean."

"Thank you. We will give you 'ship service,'" the operator will reply. "We will call you when the 'Belgenland' is on the line."

Soon the operator reports: "Here is the 'Belgenland,' sir. Your party is on the line."

Whether the ship is in the Yellow sea, the Gulf of Siam, the Straits of Sunda, the Indian ocean, the Gulf of Arabia, the Red

sea, the Mediterranean or the Adriatic, you may talk with it by phone from your office or home. So efficient has the "round the world radio telephone service" proved that it now promises to cut deeply into the use of radio, since communication by voice eliminates the mechanics of writing messages to be sent in code. Although the "Belgenland" is the only world cruiser equipped with radiophone through which passengers may talk around the world.



Telephoning from the "Belgenland," and Partial View of the Transmitter; the Vessel's Radiophones Operate through Land Stations

other ships soon will be carrying it. The "Belgenland" from any part of the world can work two stations, one at Deal Beach, near New York, and the other at Rugby, England. American and Canadian messages go through the air and over wires through Deal Beach and European messages through Rugby. Voices of passengers aboard the ship go onto the air through a transmitter housed in the forward part of the upper deck, while their friends' voices come to them through a receiver placed aft on the same deck. The shore stations, however, have their trans-

mitters and receivers as far apart as possible. For instance, the transmitting station at Rugby is about forty-five miles distant from the receivers at Baldock. The sending station in the United States is at Netcong, in the middle of New Jersey, and the receiving station is located at Deal Beach, sixty-two miles distant.



Eight-Wheeled Armored Tank Equipped with Wireless; Two of the Wheels Are Spares and Are Used Only in Traveling over Rough Ground

PALM OIL IS MADE INTO MARGARIN

a. 34

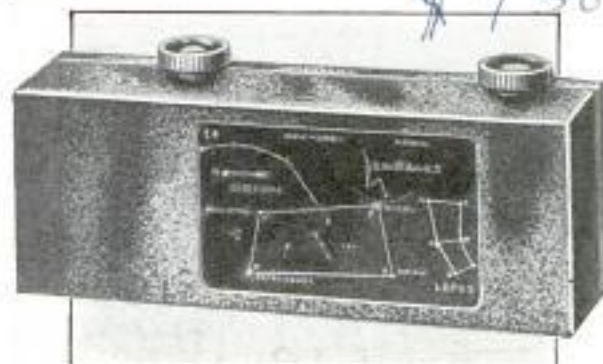
Margarin makers have succeeded in refining palm oil to a point where it does not give a peculiar taste to this product, making this oil available for a butter substitute. The palm-oil margarin has a natural yellow color so that artificial coloring is not required.

Science Service 5/11/31

POCKET-SIZE PLANETARIUM IS AID TO STAR STUDY

a. 7

Resembling a roll-film camera, a pocket-size planetarium has been introduced as a guide to the major stars, planets and constellations. On a strip of celluloid film are printed a series of panels depicting stars in their proper magnitude. Winding the film back and forth by means of two projecting knobs, the user can select any panel desired. There are twenty-four plates and the objects illustrated include thirty-six constellations. A flashlight bulb, operated by a small battery is part of the device.



\$ 7.50

Pocket Planetarium with Rolls of Film Printed in Panels to Represent Position of Stars

*W. M. Welch Mfg. Co.
1515 Sedgwick
Chicago*

EIGHT-WHEELED ARMORED CAR EQUIPPED WITH WIRELESS

Provided with wireless equipment so it can keep in touch with its base by radio, an eight-wheeled armored tank has been added to the fighting equipment of the British army. This steel fortress on wheels is able to negotiate almost any kind of rough ground. Ordinarily it is a six-wheel-drive car, but is equipped with two spares that can be brought into service for very rough country.

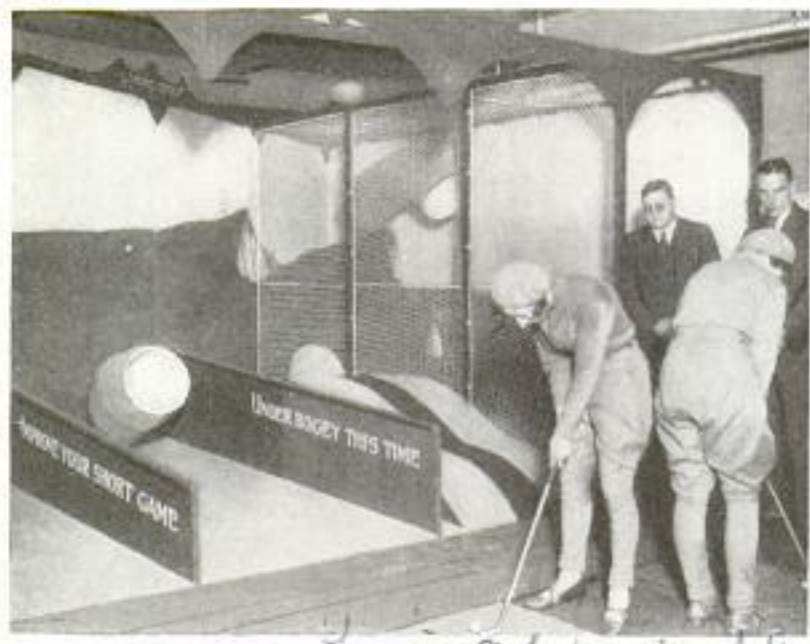
COST OF WASTE EVERY YEAR IS EIGHT BILLIONS

a. 39

Waste costs American industry and business between \$8,000,000,000 and \$10,000,000,000 annually, commerce department experts estimate. They also believe waste is responsible for an annual toll of more than 30,000 lives. Progress has been made in recent years in eliminating some of this waste, much of which is due to faulty distribution methods, although failure to utilize by-products accounts for some of it. Many millions have been saved by standardizing machinery and parts, and fire losses are also being attacked. Production has gone far in solving its waste problem, but the distributing end still offers room for vast improvement. The lives lost were from motor and industrial accidents.

Asst Secretary Julius Klein

Chicago Daily News 1/8/31



Indoor Golf Course Where Players Can Take a Full Swing, Due to the Angle of Shot and Distance from Which Stroke Is Made

GOLFER CAN TAKE FULL SWING ON THIS INDOOR COURSE

Most miniature golf courses have provision only for putting, but one indoor course in London is so constructed that players can take healthy swings at the ball just as though playing on full-size outdoor links. The ball must be hit into receptacles, and the various angles at which these are set, coupled with the distances from which strokes must be made, join to offer the golfer an opportunity to combine a full swing and accuracy within restricted limits.

VACUUM TUBES MAY PRODUCE THIRTY MILLION VOLTS

Possibility that the powerful radiations hitherto produced only by nature may be duplicated in the laboratory is expressed by three physicists of the Carnegie Institution, whose experiments already have led to the making of vacuum tubes operating reliably at potentials up to 2,000,000 volts. Within the realm of possibility for the future is the production of voltages of from 20,000,000 to 30,-

000,000. The 2,000,000-volt potential gives the most powerful radiations yet made by man, the artificial "beta" rays which are high-speed electrons, and the artificial "gamma" rays which are very penetrating X-rays. Thus two of the three radiations from radium have been duplicated. Dr. M. A. Tuve, one of these physicists, and his associates now are at work on a new method of building up electrical voltages of the extreme potentials mentioned—the most powerful projectiles ever developed and resembling

the "alpha" rays from radium. What will happen if such great energy is freed is a matter for conjecture, some scientists holding that there might be a liberation of the immense internal energy of the atoms with a gigantic explosion that might wipe out the world, which others believe that the artificial radiations will be extremely helpful in probing deeper into the fundamental structure of matter.

LIMOUSINE-TYPE FIRE ENGINE HELPS GUARD FIREMEN

2284 Members of a Berlin fire brigade ride to a conflagration in comfort although the weather may be stormy, as the fire engine is of the limousine type with inclosed compartments for the men. The closed car helps keep the firemen off the sick lists as it shields them from exposure.



Inclosed Fire Wagon Used in Berlin; It Shields the Men from the Weather on the Way to and from Fires

Installed in Burton House.
 Paper won \$6,000 prize of American Association for Advancement of Science

Dr. M. A. Tuve
 221 L. R. Halstead
 and add Stahl

What is a Typhoon?



Here Is What Happens When a Typhoon Strikes an Inhabited Coast; the View Shows the Waterfront at Taihoku, Formosa, After the Disastrous Storm There Several Years Ago

By CALVIN FRAZER

THE TYPHOONS of which we read in press despatches from the Philippines, or the China coast or elsewhere in the Far East are always severe storms. The dictionaries tell us that the word "typhoon" means "big wind" in Chinese and is the name of a violent tempest. Meteorologists, however, use this word in a somewhat different way.

A typhoon, according to their definition, is any tropical cyclone of the western North Pacific, and is similar in its characteristics to the tropical cyclones of other parts of the world. This means that it is a traveling system of winds, blowing spirally around a center of low barometric pressure. Typhoons, like other tropical cyclones, occur in various degrees of intensity. Some are terrific storms, some are moderate gales, and many are so gentle that they are incapable of doing any harm on land or sea.

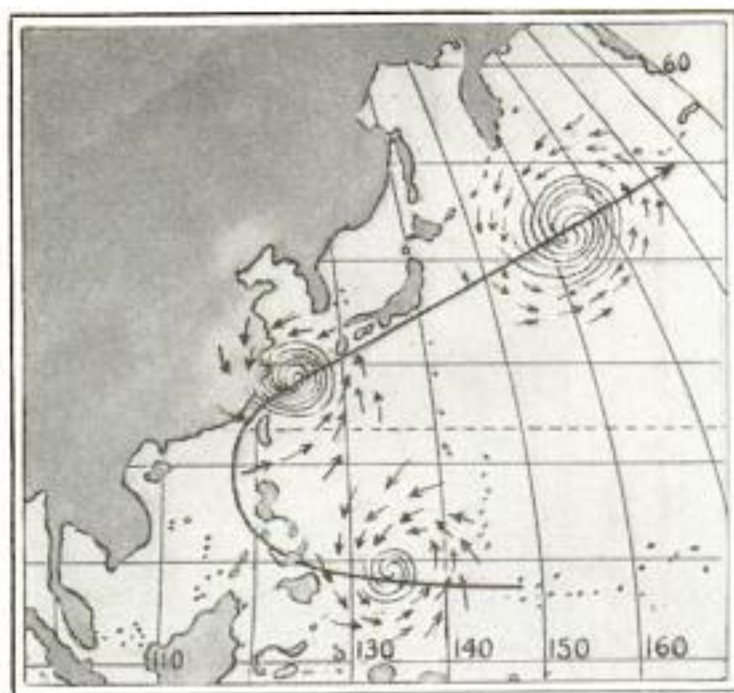
These mild typhoons are, in fact, a great blessing to the regions they visit, and this

is also true of the milder cyclones of the West Indies and the southeastern shores of the United States, because they usually bring rains beneficial to agriculture.

Statistics show that, in an average year, nearly sixty typhoons occur on the seas and shores of eastern Asia and among the outlying islands, but that only one in six is severe enough to rank as a full-fledged hurricane. Fully half are accompanied by no strong winds, except, in some cases, by local thunder squalls.

Though violent typhoons are exceptional, they are more than three times as numerous as the severe cyclones of the Caribbean region known as West India hurricanes. The former average ten a year and the latter three. Moreover, individual typhoons have often been attended by much greater loss of life than ever was caused by a Caribbean storm.

The typhoon figures in oriental mythology as a dragon, or living monster of the deep, and has been the terror of the



Above, Wind Directions of Typhoon at Three Points along a Typical Path off Asiatic Coast; Right, Typhoon Signals Displayed on Harbor Front at Shanghai

eastern seas from remote antiquity. The most momentous of all typhoon disasters took place in the year 1281. In July of that year, the Mongol emperor of China, Kublai Khan, dispatched an army of 100,000 men, embarked in 3,500 ships, for the conquest of Japan. This mighty armada never reached its destination. While anchored off Kiushu island, it was annihilated by a typhoon, and of its human host only three men returned to China alive.

In modern times all the Far Eastern countries have been terribly ravaged by these storms. During the night of Aug. 2-3, 1922, a typhoon sent a huge tidal wave over the town of Swatow, China. Out of a population of 65,000, 50,000 perished, it was estimated. There was great loss of life on the near-by waters, where multitudes of people spend their whole lives in boats, and after the storm, the coastal waters as far north as Amoy carried a ghastly freight of dead bodies.

It is interesting to compare this disaster with the deadliest West India hurricane of recent times, the one that played havoc at Galveston in 1900. In this case, also, the town was overwhelmed by a tidal wave, due to the storm, but only about 6,000 lives were lost. The terrible Japanese earthquake of Sept. 1, 1923, occurred while a typhoon was blowing. The flames



of the many fires started by the wrecking of buildings were rapidly spread by the storm winds, which were therefore responsible for a very large percentage of the loss of life, amounting to upward of 100,000. Hence this disaster has been described as "one-third earthquake and two-thirds typhoon."

Though typhoons may occur at any season, the great majority prevail during the four months from July to October, inclusive, with a maximum frequency in September. Thus the typhoon "season" coincides with that of West India hurricanes. The typical paths of the oriental cyclones are also very similar in shape and direction to those followed by the cyclones of the Caribbean region.

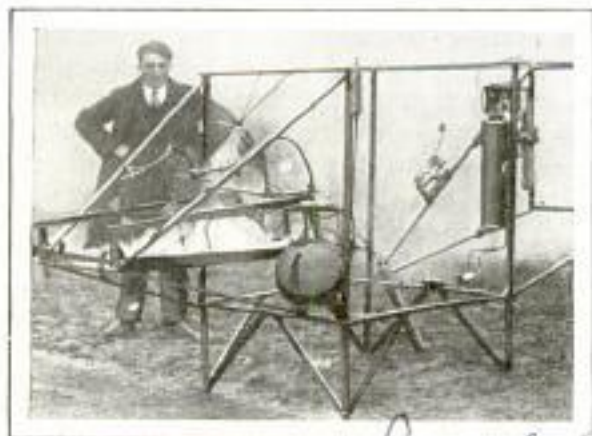
While the winds of a violent typhoon blow around the center with a velocity

often exceeding a hundred miles an hour, the storm as a whole travels along its course at a moderate pace. At the center of an intense typhoon, the barometer reads two inches or more below normal, and within an area a dozen miles or so in diameter complete calm prevails, so that, in many cases, there is not wind enough to blow out a candle.

In recent years a storm-warning service has been developed in the Far East that is hardly surpassed in efficiency anywhere in the world. The warnings are based on reports from scores of stations. Manila is especially well situated for getting early information of typhoons, as it takes one of these storms at least two or three days to cross the China sea to the coast of Asia, while, if the storm track curves to the northeast, many more days elapse before the storm reaches Japan, and warnings issued from Manila observatory have been of the utmost value to the Chinese and Japanese coasts.

AUTOMATIC FIREMAN ON PLANE AIDS FLYING SAFETY 226

To afford increased protection against fires while flying, an extinguisher, developed in France, automatically releases chemicals intended to put out the fire when the heat becomes too intense. The installation is designed especially for the engine unit where backfiring and other troubles sometimes cause serious fires. Most planes are equipped with extinguishers that flood the engine with chemicals, but the release is accomplished by the pilot. The French invention is intended to work independently of him.



Testing the Automatic Fire Extinguisher for Planes;
Chemical About to Be Released

*Administered at Orly
Field, France*

© Acme—P. & A.



Life-Size Model of Head of Prehistoric Monster Made
from Fossils Found in South Dakota

HEAD OF PREHISTORIC MONSTER MILLIONS OF YEARS OLD

Fossils collected over a period of several years have been employed in constructing a life-size model of the head of a prehistoric monster, called the "titanotherium," believed to have existed some 3,000,000 years ago in the White river "bad lands" of South Dakota. The model of the head, and a small one of the full figure, are in the American Museum of Natural History, and indicate the animal was about seven and one-half feet high and at least fifteen feet long. The head bears some resemblance to that of the rhinoceros.

QUAKE MADE WITH DYNAMITE TO STUDY EARTH 9-13

Science now is planning to create an artificial earthquake which it is hoped will aid in studying the structure of the earth's layers. Dynamite is to be employed to make the tremors under the direction of Dr. L. Don Leet, in charge of the Harvard seismograph station, and the shocks will be measured by portable seismographs. Geologists long have believed that the continents are underlaid with granite, but their only means of determining the thickness of such layers is to measure the velocity with which earthquake tremors travel through them. Little knowledge now exists about the speed of vibrations in granite, but if they can be determined, such knowledge will aid science in finding the thickness of the foundation layer, or may help prove it is not granite at all.

*Chicago Daily News
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Chicago-Thomas &
Propriet, 513 N.
Maywood Ill



Auxiliary Landing Wheels Which Prevent a Plane Nosing Over if Tail Is Elevated Too Much

EXTRA WHEELS ON AIRPLANE PREVENT NOSING OVER

One of the latest safety devices for airplanes is a set of auxiliary landing wheels, demonstrated recently at an air-safety exhibit in Paris. The extra wheels fit in front and above the regular landing wheels and keep the plane from nosing over. If the ship's tail is elevated too high, the spare wheels are brought into contact with the ground, preventing the plane from turning on end.

HUNTING CAR OF INDIAN PRINCE LIKE A HOTEL ON WHEELS

Big-game hunting in the jungles of India, a sport usually fraught with hardship, has been surrounded with many of the comforts and luxuries of civilization by the Maharajah of Kodhpur. A special motor coach has been constructed for the



Hunting Car Built for an Indian Prince; the Top Can Be Rolled Back and Windows Lowered

Indian prince and his guests on hunting trips. It has space for thirty passengers and is equipped with containers for guns and ammunition, a refrigerator for food, an oven, and a washbasin with running water. The top can be rolled back and windows lowered into the body to provide more room and an unhampered view for the hunters.

GARDEN-HOSE NOZZLE HOLDER HAS FLEXIBLE NECK

2251

Sprinkling with an ordinary garden hose and nozzle is possible without employing a special sprinkler head by using a flexible holder which is attached between the hose and its nozzle. The holder is made of brass and flexible steel tubing, which is packed with asbestos roping to assure water-tight joints. The holder rests on a metal base, and the nozzle can be adjusted to deliver any volume of water and directed at any angle. It can be used in the hand or placed on the ground as convenient and can be pulled from one location to another without turning off the water.



CHILD INTELLECT DEPENDENT ON DIET TESTS REVEAL

2240

Intelligence among children depends to a great extent on diet, according to experiments conducted by the Illinois department of public health. A diet deficient in vitamin B has a tremendous effect in retarding a child's learning ability, and wheat germ or its equivalent must be fed to bring the child to the maximum intelligence level. Experiments with animals showed that those fed on a well-balanced diet learned about twice as readily as those whose diet was deficient in vitamin B. Hence, parents may possibly bring up bright children by proper feeding.

(Nearly 20,000,000 houses, about seventy per cent of all the homes in the United States, are now wired for electricity.

U.S. Daily 1/6/31

Science Service 509 G. 12/22/30

R. Wash. H. D. Slaker
Materials Lab
POPULAR MECHANICS

CHEMICAL MAY REPLACE LIVER AS CURE FOR ANEMIA 2228

Medical science is offering to sufferers from pernicious anemia the possibility that their liver diet may eventually be replaced by a simple and cheap chemical. Doctors of Columbia University recently have tried to find the constituent in liver that makes it effective for anemia, and believe that part of the riddle has been solved. They isolated a crystalline salt containing two chemicals, which most probably are fragments of the active material. They have yet to determine how these are combined in liver, and whether other substances are combined with them, but it is possible that the synthesis of the active principle may eventually be effected. When this is accomplished, manufacture of a relatively cheap product may be expected.

LIGHT ELECTRIC DRILL BORES WOOD, METAL OR STONE

Boring with equal facility in wood, metal or masonry, an electric handdrill is equipped with both twist and hammer attachments. It is light in weight and, in addition to operating as a hammer drill, is highly efficient as a rotary drill with enough power to provide proper speed over the entire range of drill sizes up to three-eighths inch in metal and one-half inch in wood. It is also a good tool for grinding, scratching or buffing, and permits the operator to sharpen tools and bits on the job. The drill has a metal carrying case, and different attachments can be obtained, as well as a stand to convert it into an auxiliary drill press or bench grinder. The drill itself weighs twelve pounds and the entire kit twenty.



Lightweight Electric Handdrill, Which Is Equipped with Both Twist and Hammer Attachments

Wodack Electric Tool Corp
4627 W. Huron, Chicago



Curved Balconies of German Building, Which Resemble Niches Cut in Semicircular Columns

CURVED BALCONIES IN COLUMNS OF GERMAN BUILDING

Germany, which has been trying many novel architectural effects, now has an apartment building near Berlin with curved balconies. The unusual treatment gives the appearance of semicircular columns with niches taken out at each story.

GREENNESS OF PLANT SHOWS PRESENCE OF VITAMIN 222

That there is a relationship between the greenness of a plant and the presence of vitamin A, has been indicated by experiments performed at Michigan State College. These tests suggest that possibly the vitamin is the same substance as chlorophyll, the material that gives the plant its green color. Asparagus sprouts were grown under various types of colored glass, so adjusted that the plants developed all shades of colors from complete pallor to complete greenness. The asparagus was then fed to white rats which were given no other food containing vitamin A. The investigators found that the vitamin-A response of the animals was proportionate to the greenness of the sprouts.

Dr. John L. Crist
and Dr. Marie Lyle

with 8 inch long, 1/2 inch diameter, 1/2 inch diameter, 1/2 inch diameter
Science Service 509 G. 12/22/30

at Limerick
a meeting of
American Society of Plant Pathologists

2145 Cont. John L County, 714
Jefferson St. N.W.
Washington, D.C.

Catching Plant Smugglers



Passengers, Mail and Baggage Just Disembarked at Miami, Fla., from a Transport Plane from the West Indies; a Federal Employee Is Gathering Up the Baggage for Inspection

PLANT smugglers! Plants that hide in their leaves and upon their stems and twigs, insects or their larvæ dangerous to the fruits, flowers and plants of the United States and smuggle them in by the airplane route, the latest method of international communication, are an object of intensive searching and watching on the part of the plant quarantine and control administration of the department of agriculture.

Of course the plants and fruits that bring into this country dangerous insects do not do so physically, like human smugglers, who, hiding about their person and elsewhere contraband, bring it in unlawfully. But there is no way of knowing whether the dangerous insect pests are present on the plants except by rigid inspection.

Recently a plane landed at Miami, Fla., from a West Indian field. As its whirring propeller came to a rest with a final swish, a woman, her face wreathed in smiles and waving gaily a bouquet of jessamine flowers to some friends, stepped lightly from the cabin.

"Pardon me," said an official whose headgear betokened the service of Uncle Sam, "may I see that bouquet of flowers?"

"Why—er—yes," stammered the lady, as she handed it over.

That was the last she ever saw of her bouquet. The inspector informed her that foreign jessamines were on the forbidden entry list, and that the leaves and stems of this particular bouquet were covered with scale insects.

To date, plant inspectors of the quarantine administration and of the state of Florida have intercepted at Miami from the south, via the air, oranges, tangerines and sapodilla, fruit of the tropical tree that yields chicle gum, infested with scale insects; roses infested with the red spider and the black spot; green coffee, limes and citrus leaves infested with scale insects.

In addition, careful watch is kept on mangoes from the West Indies which are likely to be infested with the West Indian fruit fly. So far this fly has been successfully kept out, but, officials say, just one mango or citrus fruit infected with mag-

2145-420



gots of this fly, thrown carelessly on Florida soil, might start a dangerous infestation there, as the larvæ would find tropical conditions similar to those in their original habitat.

From Mexico, mangoes, oranges, grapefruit, peaches, plums and many other fruits are inspected for the Mexican fruit fly, and avocados for the avocado weevil. Shrubs and plants are inspected for numerous insect and plant-disease pests. Sugar-cane plants and cuttings from the tropics are inspected for root-borer, leaf-hopper, and frog-hopper infestation, and certain insects injurious to sugar cane.

Constantly growing travel by airplanes and continued development and expansion of foreign air-transportation lines have greatly increased the problem of the plant quarantine in providing safeguards against the introduction of such pests. This is evidenced by the fact that inspectors and collaborators of the administration inspected more than twice the number of foreign planes last year than in 1929. Approximately 4,500 planes were

inspected during the fiscal year 1930. Out of these, 400 interceptions of contraband plant material were made. Inspections of these planes were made at Brownsville, Eagle Pass, El Paso and Laredo, Tex., Miami, Fla., San Diego, Calif., and San Juan, Porto Rico. Further, by mutual arrangement with airplane-company officials and the Mexican government, seventy-six airplanes were also inspected at Aguascalientes, Mexico, prior to their crossing the border into the United States.

Passengers and luggage on airplanes are subjected to the same scrutiny as those on incoming liners. Custom officials cooperate with plant-quarantine officials in ferreting out and excluding from entry

such flowers, plants, shrubs and vegetables as fall in the banned category. And not only are the passengers and their baggage subject to investigation, but the plane as well and the mail brought in by it. For one plant insect pest or disease



At Top, Inspecting Fruit from Cuba; Center, Searching Interior of Plane, and Bottom, Airplane Baggage Ready for Inspection

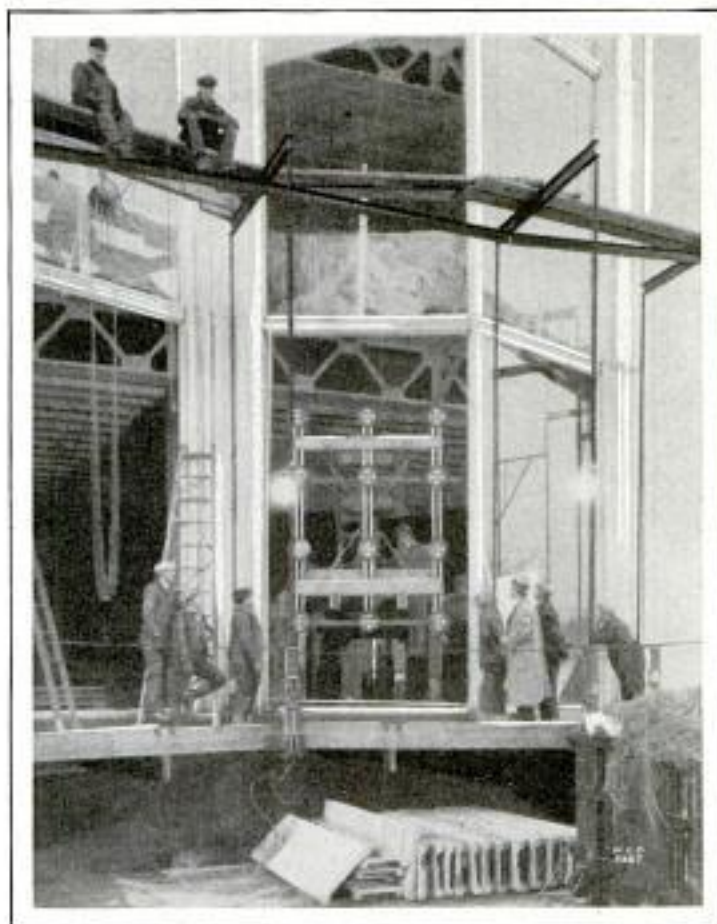
brought into the United States may mean millions of dollars' loss annually to growers throughout the southern fruit belt which extends from Florida around the Gulf coast to California.

Officials of the plant quarantine and control administration are frank to admit that the advent of the airplane and the ocean-spanning dirigible threaten greater danger from disease and insect-pest plants than ever dreamed before. With the advent of the proposed transatlantic airline for both heavier and lighter-than-aircraft the problem appears almost insurmountable. Already they have had a taste of the labor and trouble transoceanic travel and commerce by air is going to bring them. They got it from the "Graf Zeppelin." When the "Graf" landed at Lakehurst, on August 4, 1929, at Los Angeles, on August 26, and again at Lakehurst on May 31, last year, it was inspected for plant quarantine material. And plant material was intercepted on the August 4 inspection that harbored twenty species of insects, six of which were not known to occur in the United States. Oranges from Brazil and potatoes from Germany, both of which are not permitted to enter the United States, were intercepted on the arrival of the "Graf" at Lakehurst, on the last day of May.

The problem of excluding insect and disease pests, it is hoped, will be facilitated greatly by international co-operation and enforcement of quarantine regulations. Growth of international trade and universal knowledge of the economic losses caused by the spread of these plant diseases and pests are driving the nations of the world to develop complex systems of plant quarantines and regulations.

"FINGERS" OF AIR GRIP GLASS PLACED IN BIG WINDOW

The suction of twelve tenacious "fingers" against an 800-pound sheet of plate glass held the big pane securely while it was being adjusted in an aluminum frame



Big Plate-Glass Window in Place; the Twelve Suction Grips Can Be Seen as Patterns Back of the Pane.

in a Milwaukee factory. Engineers devised this method when it was found that the location of the window and other factors made it extremely difficult to install the huge glass in the usual manner. Gripped tightly by the vacuum produced through exhausting the air in the "cups" or fingers against the glass, the heavy pane was easily moved to its upper position by means of a special carriage operated from within. The carriage was on rollers and an adjustable mounting for the window-glass support permitted accurate aiming so that the pane could be installed without danger of breaking.

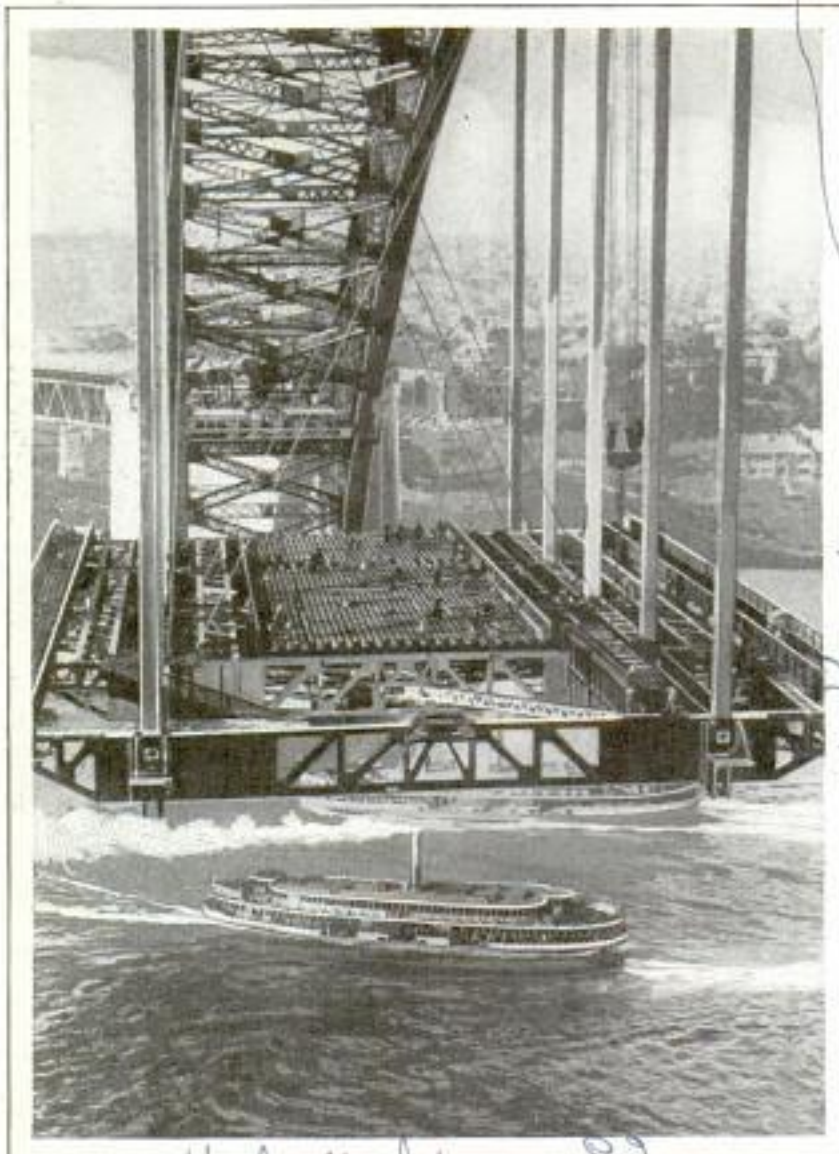
BULLETS WITH TRACER LIGHTS AID SPORTSMAN HIT MARK

English sportsmen shooting at clay targets are using bullets with tracer lights to aid them in correcting errors in aiming. A tiny bright light is emitted on discharge of the bullet, which shows the path of the pellet for a distance of about seventy-five yards.

2082
Aluminum Company
Parsippany, N.J.
Bldg. Pittsburgh, Pa.

Imperial Chemical
Industries, Ltd.
London, S.W.1, Eng.

R.M. Bailey Bureau of Plant Industry



Laying the Decking on the Huge Bridge in Sydney Harbor, Australia; with a 1,650-Foot Span, It Will Be the Largest Arch Bridge

LARGEST ARCH BRIDGE NEARS COMPLETION IN SYDNEY

With a span of 1,650 feet, the world's largest arch bridge is nearing completion in the harbor at Sydney, Australia. The bridge was built out from each side in halves, and so accurate was the plan of the engineers that the two sections, when ready to be locked together, fitted within a fraction of an inch. Recently the decking was laid, this work being done from the center outward, two creeper cranes carrying the hangers and decking into position along the top of the arch. The total length of the structure is 3,370 feet, and its traffic accommodations are such that 168 electric trains, 40,000 pedestrians and 6,000 vehicles can cross it hourly.

NEW VARIETIES OF POTATO SOUGHT BY SCIENTISTS

2226
Varieties of potatoes that are earlier, better shaped and heavier yielding than existing kinds are being sought by workers of the department of agriculture and the Minnesota agricultural experiment station. In spite of the fact that the standard varieties are far from ideal, little has been done to propagate new kinds, partly because it is difficult to cross potato flowers and raise seed from them. Potatoes are usually grown by planting the tubers, and as a result the flowers produce little good pollen and usually drop off too early to mature. Investigators therefore selected potatoes of non-commercial varieties and patiently bred them year after year, selecting plants for good flowers and good pollen. After this they worked for good qualities in the tubers, and now have several

new kinds that mature earlier, have little tendency to produce knotty tubers, and promise greater yield.

RUBBER BATTERY FILLER FITS ANY KIND OF BOTTLE



To prevent the spilling of water in filling batteries, a rubber bottle cap that has a finger tip control now is available. The cap, equipped with a hollow tube, fits over the neck of any bottle made for a crown

*R. J. Lovick & Co.
Baltimore, Md.*

*2226
varieties
since 509. d. 12/22/30*

Chicago, Ill. motor pump

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Cmt. Dennis Angewine.

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Syracuse, NY 2199*

cap. A button on the cap controls the flow of water, which is stopped when it is depressed and started when pressure is removed.

"TASTE THERMOMETER" IS AID IN DIET SELECTION

To help tell how various foods affect the mood and digestion, a "taste thermometer" has been designed at Colgate University. It registers a rating of foods according to their sweetness, saltiness or sourness. Those having an intensity of taste so strong that it cannot be perceptibly stronger, are charted at the 100 point, while those having only a faint taste are placed at zero. Others are graded between the two extremes. The thermometer is used in experiments to determine the degree to which various foods affect a person's mood and digestive processes, and to find out whether or not the taste of foods is as reliable a guide to healthful eating as knowledge of the chemical composition.

*2219
Hamilton, NY*

Psychological Lab.

FOLDING SHAVING BRUSH FITS INTO FLAT CASE

Occupying a minimum of space, a compact shaving outfit that fits in a flat container can be slipped into the vest pocket like a cigaret case. One of the features is a folding brush having four hinged flat sections, each with its group of bristles. When in use, the brush sections come together to form a square, rather than a round brush, but with just as much body. When laid out flat, the bristles dry quickly and the brush fits in the bottom of the flat case, which also holds a safety razor, blades and shaving-cream container.

2066



Shaving Outfit Which Slips in Vest Pocket; Note the Brush Which Folds Flat



Streamlined Street Car Used in Germany to Attain Greater Speed; It Is Only Seven Feet Wide

STREAMLINED STREET CARS HAVE HIGHER SPEED

In an effort to meet highway competition, the street railways of Dresden, Germany, have built a number of streamlined street cars to afford higher speeds. The cars are equipped with three separate braking systems, an electric emergency brake, an electromagnetic brake and an oil-pressure brake, to insure safety at all speeds. Windows are of special glass that admits ultraviolet rays, and an improved ventilating system in the roof increases the comfort of the passengers. This protection is further carried out by having only the upper half of the windows capable of being opened. The cars are under fifty feet long and seven feet wide. There are seats for thirty-six persons and room for as many standing passengers. The motors are powerful enough to haul two trailers at high speed.

(Those wishing further information on anything described in the editorial pages can obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago.)

*Cmt. Charles Layning, 5204
Worcester Blvd, Chicago*

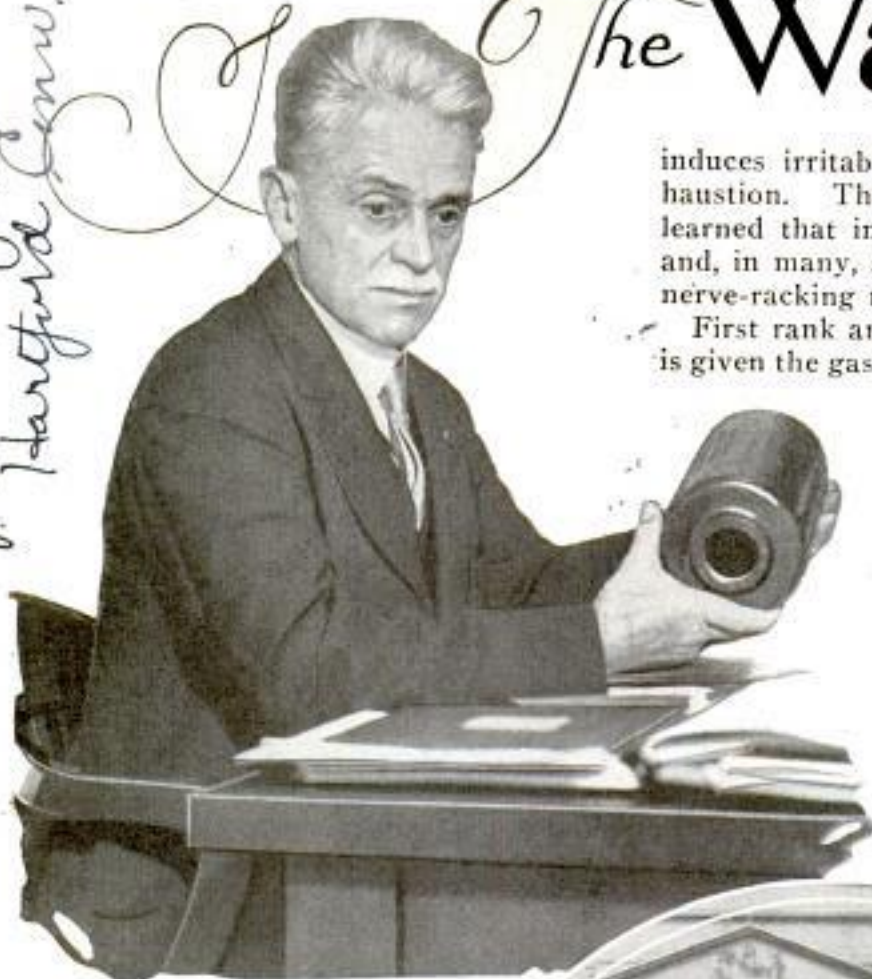
*Ald Colony Distributing Co,
665 Atlantic Ave Boston, Mass*

2123
Cent. John F. Coggeswell
16, Edgerwood Road, Belmont, Mass.

The War On ^{noise}

induces irritability and causes nerve exhaustion. These same engineers have learned that in most cities fifty per cent and, in many, sixty-five per cent of these nerve-racking noises come out of pipes.

First rank among makers of city noises is given the gas-motored vehicle—pleasure cars, trucks and busses. The exhaust of the first has been stifled pretty well, but at a distinct loss of power, while the mufflers of trucks and busses are far from effective. Add to the noise of the vehicles the steam exhausts from large office buildings and factories, the explosions of gas engines of various kinds, the groaning intakes of



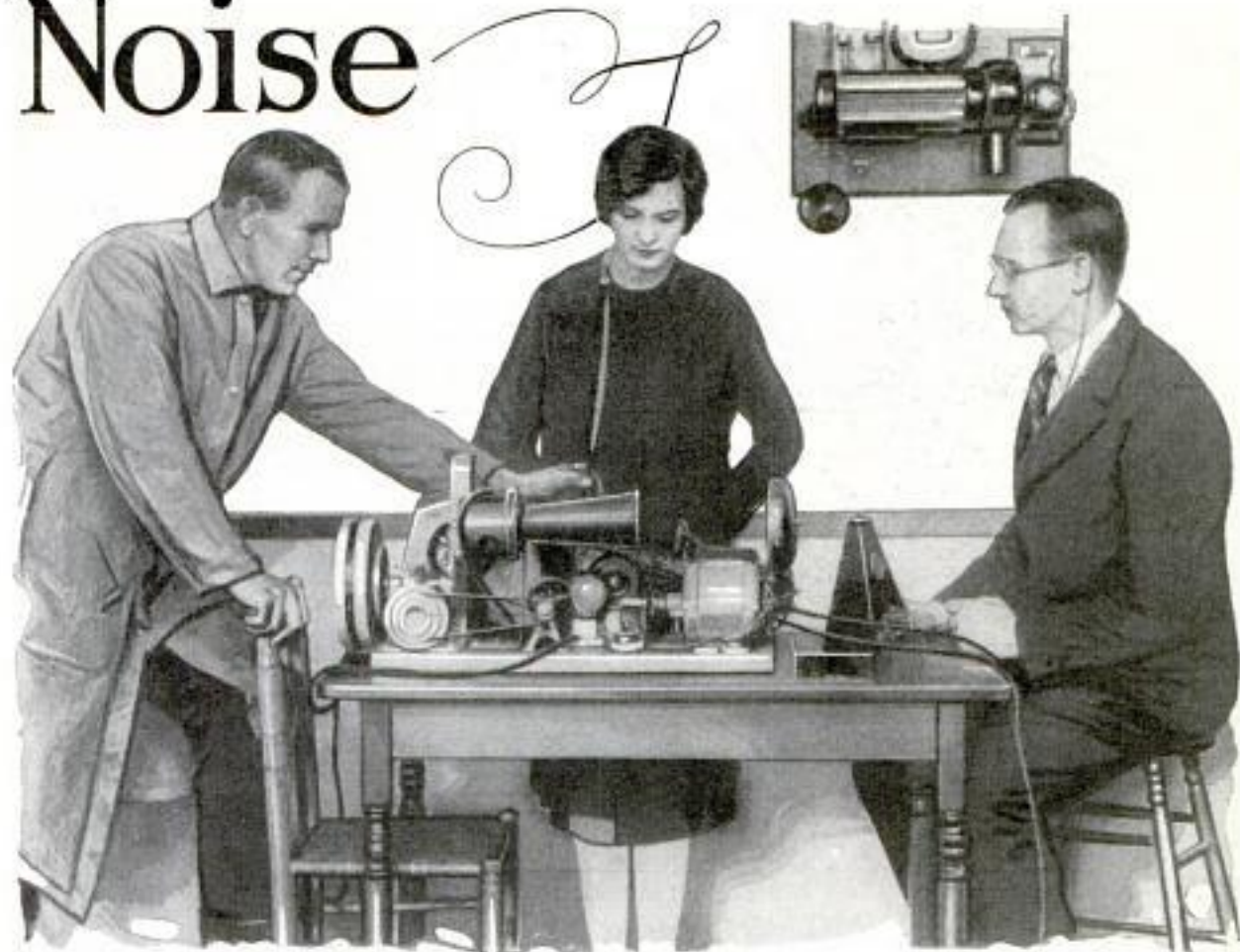
maxim
"ABSOLUTELY any noise that comes out of a pipe can be silenced effectively and economically and without setting up back pressure that will reduce the efficiency of the machine that causes the sound," declared Hiram P. Maxim, the world's leading noise-abatement engineer.

A most significant statement this, just now when noise is under heavy indictment. Trained sound engineers are sifting out and classifying city noises, studying their causes and effects. Noise, they insist, leads to diminished efficiency, increases excitability, promotes discord,



Hiram P. Maxim, Noise-Abatement Engineer, with Silencer for Motorboat Engines, and Measuring Noise in Front of National Capitol

Noise



Apparatus for Creating Continuous Succession of Sounds of Same Intensity and Frequency. Used by Prof. Donald A. Laird of Colgate University in Studying Effects of Noise on Nervous System

air compressors, the whine of rotary blowers, the hiss of steam from safety valves, the noise of airplanes and a score of other sounds that fray the nerves.

All of these noises come out of pipes and many in each class have been silenced effectively, except the exhausts of airplanes. This is a problem to which Mr. Maxim is giving most of his time at present, and he promises that in the very near future we shall see airplanes—even those of high speed—shooting through the atmosphere giving out little more sound than does a bird in flight, as far as the motor exhaust is concerned.

Not very long ago, a big gas and electric plant was opened in Tucson, Ariz. A thirty-eight-inch exhaust emitted noises that furnished Mr. Maxim with the biggest job of noise abatement in his career. The sound of that giant exhaust could be heard plainly for a distance of fourteen miles. The cure called for the installation of the largest silencer ever built. It weighs twenty-two tons. Once more the

people of Tucson pursue their tranquil ways. The exhaust is barely audible two blocks away. Even at close quarters, it has died to a low wheeze.

The noise from such a large exhaust is a low-frequency sound. So is the "snoring" of the intake of a large air compressor. The sharp staccato pops of high-speed gas engines and the drone of turbines are high-frequency noises. The hiss of steam from a safety valve is a disordered jumble of high frequencies. All require different treatment.

To make clear the manner in which noises of both high and low frequencies are abated, Mr. Maxim asked the writer to forget sound waves for a few moments and consider the waves of the ocean. The frequency of a sound or water wave, he pointed out, is determined by the rate of arrival at any given point.

"Obviously," the sound engineer stated, "the highest-frequency waves of the ocean are the small surface ripples and the fast moving low billows. On the



other hand, the sluggish ground swells are of low frequency. Of even lower frequency is the tide. That wave arrives but once every twelve hours.

"Consider both the fast waves and the tide coming into a narrow estuary from the sea. Both run up it unhindered. But place several staggered rows of piles across the entrance, and the fast-moving waves will beat themselves out against the barrier, leaving the water inside calm.

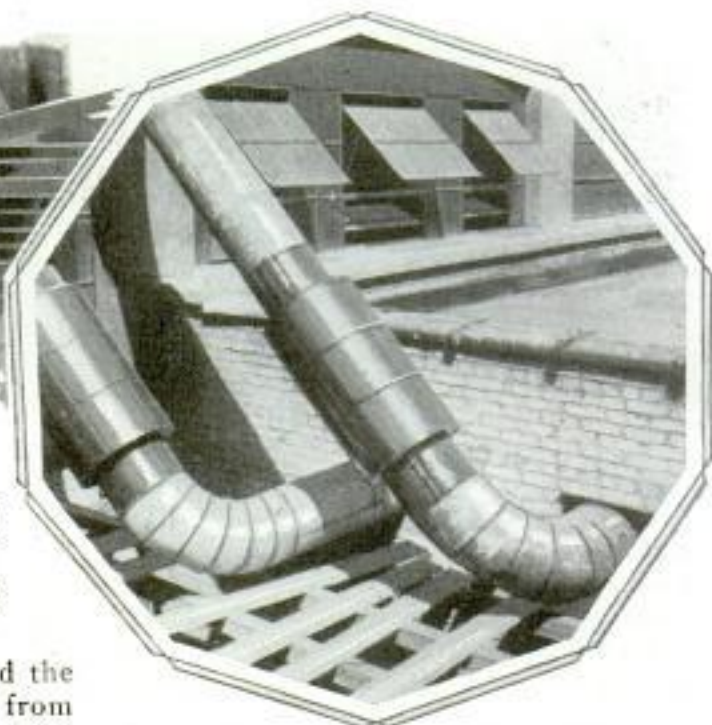
"Those rows of piles, however, would have no influence on the height of the tide. It would flow gently between them and the rise would be as great inside as outside. But if we dredge out a large basin, with a small entrance, far back in the estuary, the rise in that basin will be much less than outside.

"Noises are quelled in the same manner. The high-frequency sounds are made to beat themselves out, by repeated reflections from the walls of curved channels, just as the waves exhaust their energy against the piles. Low-frequency sounds

are expanded, just as the tide waters are in entering the dredged basin, and then subdued when their intensity has been reduced by the expansion."

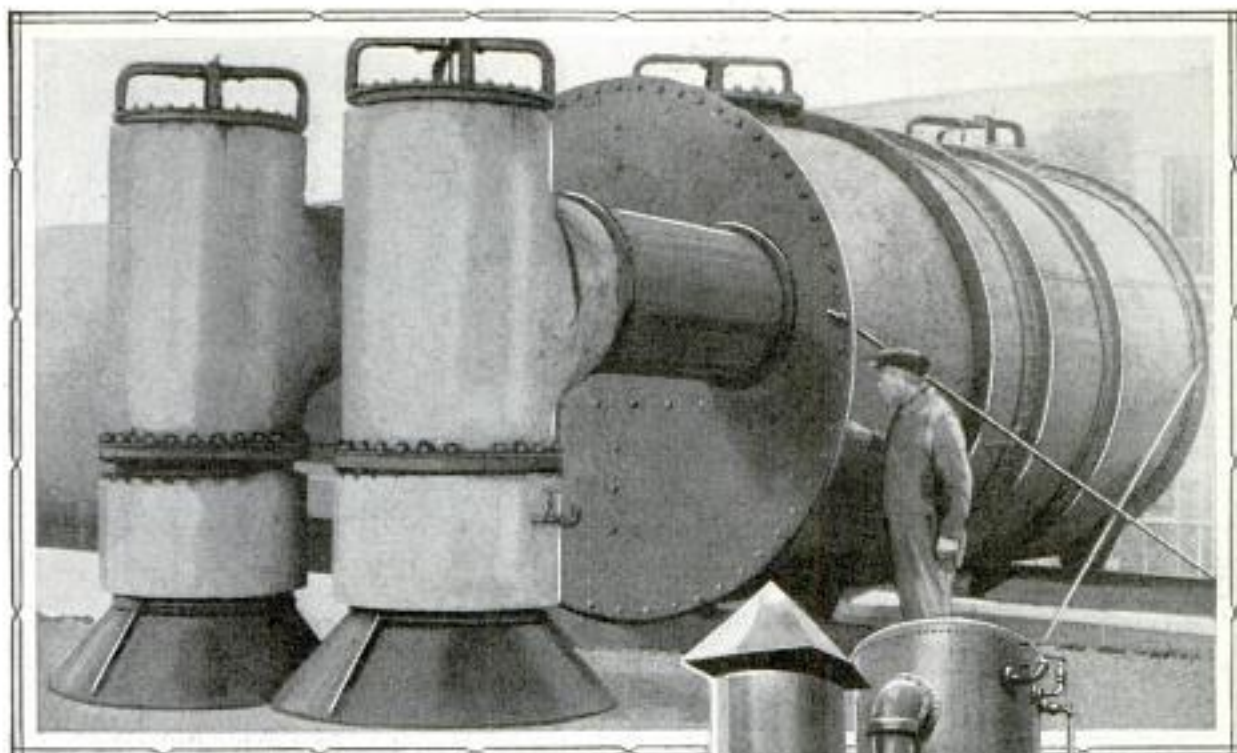
In explaining how noises are made to beat themselves out, Mr. Maxim harked back to his first silencer, that with which he astonished the world by stilling the discharge of a rifle. By the way, Mr. Maxim ceased to authorize the manufacture of that silencer more than five years ago—it was becoming too great an aid to criminals.

The problem was to give the bullet an absolutely unimpaired passage and yet



Huge Silencer for Engine Exhaust, and Silencers on Fan Blowers in Michigan Factory

check gas at 10,000 pounds pressure per square inch. The escaping gas was given a whirling motion and passed out through curved lanes just as easily as it would through a straight opening. Not so, the sound waves. A sound wave is determined to travel in a straight line if that is at all possible; instead of following the curved walls of the silencer lanes, it traverses it in a series of chords, hitting a wall in one spot and reflecting off to hit it again farther on. As the walls are made of materials which are poor reflectors of sound, it is obvious that at each reflection the sound wave loses some of its intensity and, when it has been bounced about suffi-



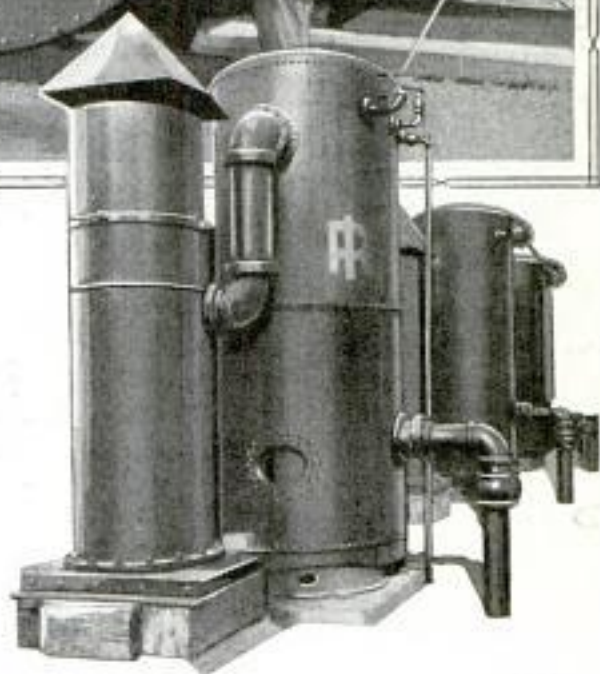
Above, Huge Silencer on Large Gasoline Engine in Ford Factory, and Silencers on Air Compressors

ciently, there is no sound left. Silencers vary in size from the mammoth one installed in Tucson to little affairs that can be held in one hand, designed to slip over the exhausts of small motorboats.

Tenants of an office building complained of the noise created by a large air compressor within the structure. A compressor has no noisy exhaust, but it breathes in enormous volumes of air with a snoring sound just as offensive as the explosions of a gas engine. A silencer at the intake cured the trouble.

Again, a visitor to a manufacturing plant wanted to know what had become of an extremely annoying compressor, whose noise had frayed his nerves during a former visit. "You're leaning against it," the factory manager informed him. "It's going full tilt, but you can't hear it. We have had it silenced since you were last here."

Extremely large air compressors tear chunks out of the atmosphere close to the intake. The sounds created by the process are too low-pitched to be heard by human ears, but they make themselves known as pulsations and vibrations. A subway contractor had installed his compressors in an old brick building, quite remote from other structures, so that the



noise element was of no account. However, he found that the pulsations of the machines were threatening to shake the building to pieces. A modified silencer at the intake gave relief.

"Noises that come out of pipes are especially wearing on the nerves of those who have to remain near them continuously," Mr. Maxim says. "Such sounds are usually continuous and of unvaried frequency and pitch. The human nervous system is so constructed that it repels sameness. Continual dropping of water on the forehead will drive a person insane. We cannot drink the same liquid nor eat the same food day in and day out.

"Nor can we listen to the same noise, without being driven into nerve exhaustion. In fact, such noises cause insanity

Investigators Analyzing Noises at Busy Intersection in New York City with the Noise Meter



endure continuous silence than it will continuous noise. Call the statement an anomaly, if you will, but in an absolutely silent room, one would be driven frantic by noise. The unvarying sound of his own heart thump and the wheeze of his respiratory organs would be plainly audible and more nerve-racking than any pipe noise."

MIDGET-GOLF TOY FOR DESK SHOWS PROPER STROKES

Intended primarily as a toy, a miniature golf player for desk or table demonstrates the correct arm and body movements while making various strokes. Paper tees and small balls are used, and the tiny figure is made to perform a realistic drive or putt, simply by twisting a small holder in the back. Each player would have one of the toys, and the object would be to send the balls into the hole in the fewest possible strokes from varying distances.



Operating Toy Golfer with Handle; It Can Be Made to Imitate the Stroke of a Real Player

and even death. Even those who think they become so used to a noise that they don't notice it, are revealed by tests to lose a great measure of their efficiency on account of that noise.

"Ordinary street noises—the passing of trolley cars, the rattle of traffic, the dash and clang of the fire apparatus, the roar of elevated trains—are in such variety that the wear and tear upon our nerves from them are but a small fraction of that from the noises that come out of pipes.

"However, too much of these is a strain upon us. That was the reason for the construction of my latest silencing device which shuts out street sounds. But this is not nearly so efficient a device as some of the accounts have made it out to be. It simply allows ventilation of a room without increasing the disturbance from the outside sounds over what it would be with the windows tightly closed. I should like to have it stated that installation of this window silencer does not, by some secret magic, make a room absolutely silent.

"An absolutely silent room would send a person into insanity even quicker than a continuous Bedlam of nerve-fraying noises. Our nervous system will no more

Maxim Silencer Corp.
Bareford, Conn.

2139
Western Toy Factory
583-4th St.
Oakland, Cal.

FARMER HAS THE BETTER HEALTH

Health favors the American farmer in early middle life, because he is less subject to degenerative diseases than workers in other occupations. This is the conclusion reached from a study made by the research division of the Milbank Memorial fund, of New York City. This study was based on the examination of 100,000 men engaged in agriculture, professions, business and skilled trades. The farmers' worst showing was in diseases of the teeth and gums, and after the age of forty-five, valvular heart lesions became prevalent.



Bible Weighing More Than Half a Ton, and Hand-Stamping Machine Which Was Used to Print It

Wide World

BIBLE THAT WEIGHS HALF TON HAS THREE-FOOT PAGES

Working at his task for two years, a Los Angeles carpenter has recently completed what is probably the largest Bible in the world. Using a hand-stamping machine, which he also made himself, this man imprinted onto the three-foot pages of the giant book every separate letter, symbol and punctuation mark, employing his family Bible as a pattern. The book contains 8,048 pages and weighs 1,094 pounds. The pages are bound with metal, the entire volume being separated into thirty-two sections.

Trust Wayna

ELECTRIC LIGHT IN DOORKNOB ILLUMINATES KEYHOLE

Fumbling in the dark for the keyhole is unnecessary when the doorknob is equipped with an automatic electric light. The bulb is inside the knob fixture, and turning the knob counterclockwise lights it. The light issues from a slit under the knob and illuminates the keyhole. Turning the knob in the usual manner toward the right does not operate the light.

2122



Chas. W. J. & Luce, Closet Equipment Co., Brazil, Ind

SUPERCHARGING AIR CLEANER ADDS TO MOTOR EFFICIENCY

Dirt, dust, water and abrasives are eliminated from the carburization of airplane and automobile motors by a supercharger and air cleaner which also gets rid of much carbon by removing the dirt, corrosives and other matter that cause it to form. It has no moving parts and is without screens or felts requiring cleaning. The supercharging effect is incorporated on the intake itself, thereby providing better acceleration, smoother power and a decrease in fuel consumption. The cleaner takes the fan blast at the radiator, and through a system of whirls, delivers clean, cool air to the carburetor intake far in excess of the suction required. Because there is no collection of oil or grease on the cleaner itself, fire hazard is reduced.

2162

Prices vary



60.00. 77.00

Chicago

Better sets 1/8/35

Our Bureau of Information will answer all questions regarding articles appearing in this magazine.

Aero Moto Sales Co., 9 Calif. 440-6th St, San Diego, Calif

2133



"Jury" Compass and Lamp That Guided "Shamrock V" after Its Compass Was Lost

IMPROVISED COMPASS ON YACHT SAVES THE "SHAMROCK"

Through the aid of an improvised compass and a little lamp lashed to it, the crew of ten men on the "Shamrock V" were able to win a seventeen-day fight with the Atlantic when the boat encountered terrific storms on its trip back from America after its unsuccessful attempt to capture the America cup. After the compass and binnacle of Sir Thomas Lipton's boat had been swept away, members of the crew made a makeshift compass boxed in an ordinary packing case, to which was lashed an improvised light by which to read it. Guided by this device, Capt. Irving Johnson, mate of the craft, was able to bring the boat into harbor at Southampton although the yacht was virtually a wreck before reaching port.

World

no H. S. and L. man

crust. The difference in barometric pressure as highs and lows move across the continent is believed to account for the mysterious tremblings sometimes recorded by seismographs. This theory is held by P. E. Johnson, meteorologist in charge of the weather bureau at the University of Chicago. Such disturbances are not actual earthquake shocks, because they are harmonic in nature, rising and dying away gradually every few seconds. While the interval is like that of the shocks of an earthquake, the graph is entirely different. Other scientists hold the disturbances due to slips and faults in rock formations, or to the effect of Atlantic and Pacific storms pounding on the rocks especially in the winter. There are slips almost daily in California, and in the southern part of Illinois is an area where these occurrences are common.

ADJUSTABLE BED SERVES WELL OR SICK

Sick, convalescent or well persons enjoy added comfort and convenience in an adjustable bed a German firm has introduced. Simply pressing a lever changes the arrangement of the bed spring and mattress at both ends for the most comfortable position for reading, writing or resting. The occupant of the bed can make the adjustments himself without aid from anyone else, and there is a combination tray and table also attached to the bed for books or food. This, too, can be adjusted to different angles.



Bed Adjusted for Reading; the Book Support Can Also Be Converted into a Table

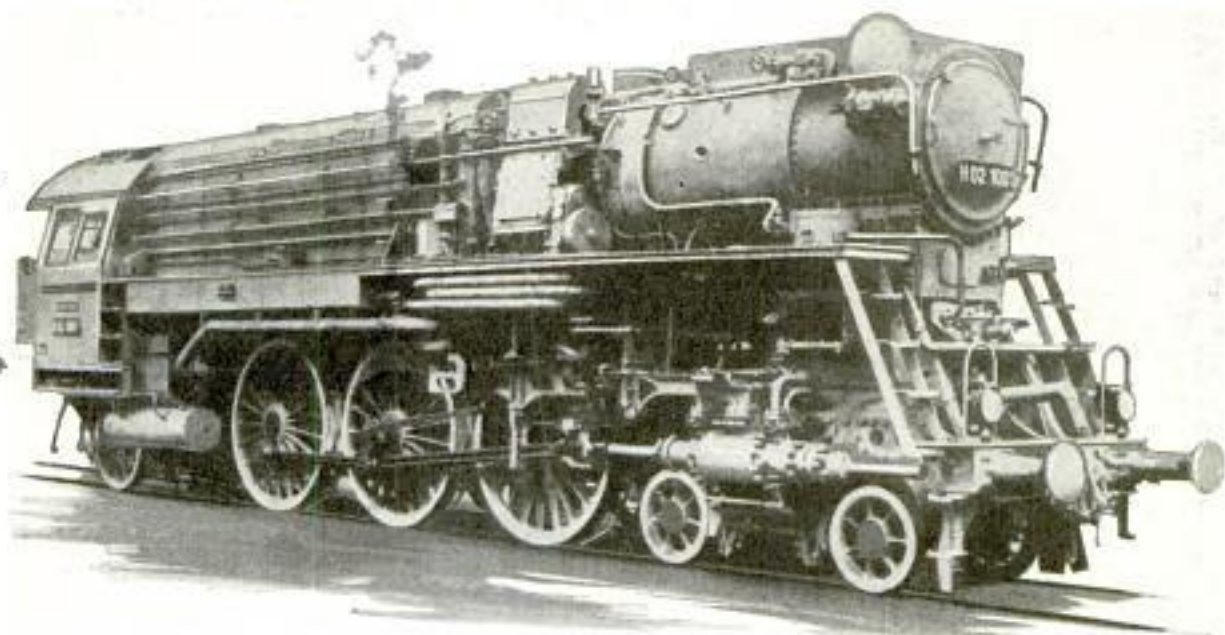
EARTHQUAKES CAUSED BY AIR IS THEORY OF SCIENTISTS

Air, one of the lightest substances, has been suggested by scientists as a great weight capable of shaking the earth's

218

Holtkamp Comp
Luisenstrasse 46 Berlin
Esmerman

LATEST GIANT OF RAILS USES HIGH PRESSURE



One of the Latest Locomotives Built for the German State Railways; It Develops Steam Pressure of 1,700 Pounds, Weighs 110 Tons and Is About Sixty Feet Long

Generating steam at a pressure of 1,700 pounds, a locomotive recently tested on the German state railways has attracted wide attention because of its unusual features. The high pressure is attained in a special evaporator, indirectly heated by the firebox, and is used in outside cylinders less than nine inches in diameter. When it is exhausted from these cylinders, it is specially treated and again used in a low-pressure cylinder under the locomotive. Steam from an outside source is used to prime the boiler when it is cold. Advocates of high-pressure locomotives believe that units of this type hold the future of the steam-engine development on railroads.

or raked, one treatment sufficing for four or five years. In old lawns where the grubs have attacked, but not killed the turf, the preparation is applied as a top dressing at the rate of one-half pound for each 100 square feet, and for this purpose can be mixed with fifteen times its weight of good top soil. This treatment is repeated annually for three years.

GRUBS THAT RUIN LAWN KILLED BY CHEMICAL 2211

Experiments of department-of-agriculture scientists with acid lead arsenate have shown it is an effective poison for use against insect grubs that ruin lawns and golf greens, particularly the Japanese beetle and the oriental garden beetle. When the soil is being prepared for a new lawn, the poison is broadcast uniformly at the rate of about three and one-half pounds per 100 square feet. To get a uniform distribution, it can be mixed with moist soil. The ground is then cultivated

SCREW HOLES MADE OF BRASS ARE PERMANENT 2040

Brass receivers for screws now are available for use in any kind of material in which screws are used. They are known as "screw holes," and are pounded into the material in which the screws are to be driven with the aid of a head which is inserted in them. The head is then withdrawn and the screws driven home. The screws can be removed easily without mutilating the woodwork, as the "holes" are permanent and always remain uniform in size.

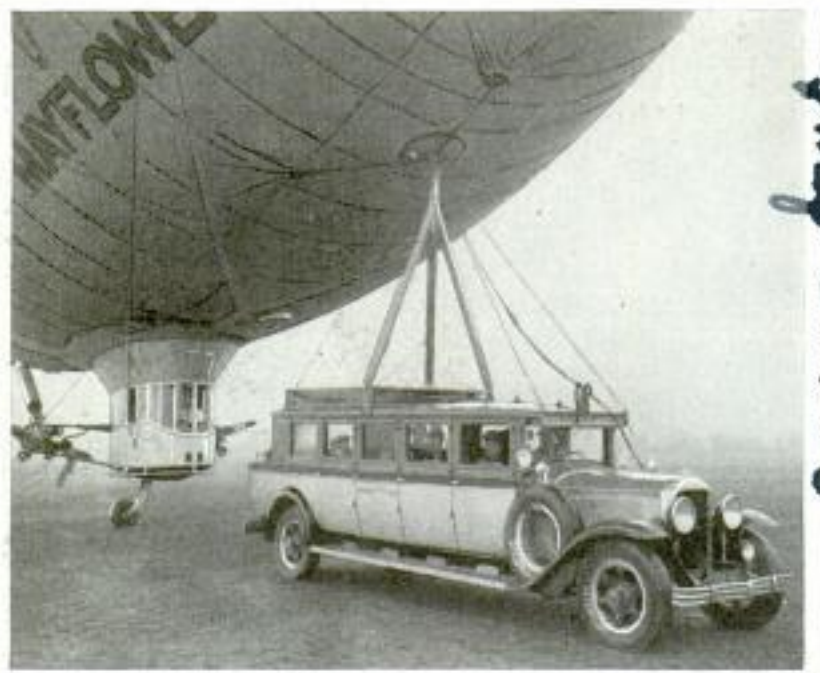


Chicago agent

Emb. John L. County
c/o Mrs. J. L. County
Inniscree, Ill

Star Screw Holes Co.
Jacksonville, Fla

2042



Mooring Mast for Small Dirigible on Top of Bus, Enabling Ship to Land Anywhere the Motor Coach and Landing Crew Can Go

MOORING MAST ON TOP OF BUS FOR SMALL AIRSHIP

Small airships now can be moored to the top of a motor bus equipped with a mast resembling a large camera tripod. The bus is used to transport the ground crew needed for landing or launching small airships, and upon reaching their destination the crew can tether the ship to the vehicle. When not in use, the mast is folded down against the bus top. An adjustable mast-head enables the ship to be moored from fourteen and one-half to seventeen and one-half feet high. The coach weighs about three and one-half tons empty, providing a substantial anchor for a small ship. A small dirigible can be attached to the mast within a minute after being walked into position, and, once fastened, the ship, resting on a single wheel below the cabin, can swing about like a wind vane, the wheel being swiveled to make possible this performance. The principal advantage of the mobile mast is that the ship can land anywhere a bus can go.

POISON FOR UNDESIRED BUSHES INJECTED AROUND ROOTS

Poison ivy, European barberry and other troublesome bushes can be killed quickly with ethylene oxide, chemically

related to ethylene chloride, which has been found effective in hastening the ripening of fruits and vegetables. The oxide, which clears out of the soil quickly when its work is finished, is dissolved in water and injected in holes that are prepared for it in the soil at the roots.

FUSEE PUTS OUT CHIMNEY FIRE BY GASES

For extinguishing difficult chimney fires and blazes in other restricted areas not readily accessible, a fusee is being produced which generates a mixture of gases in which fire cannot exist. The fusee resembles those used by railroads for signal purposes. It consists of a paper tube, a foot long, filled with a powdered chemical mixture. It has a wooden handle at one end and a friction cap at the other, and is operated by tearing off the ignition cap and scratching it on the end of the tube. After burning red for a few seconds, the extinguisher generates a combination of gases for about five minutes. As long as there is a draft up the chimney, the gases are drawn upward and smother the flames without doing any damage.



Fusee Which Generates Gases That Quickly Smother Chimney Fires or Other Inaccessible Blazes

Carbide & Carbon Chemicals Co. 198 41st, New York

Central Railway Signal Co. 272 Center St.

Central Co. Newton, Mass

Science Bulletin 509-A-12/22/30

Minnesota

American Journal of Plant Physiology

2199

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CITIES FOUND TO HAVE VOICES WITH INDIVIDUAL TONES

Cities have voices as individual and as easily identified as those of human beings. Chicago, for instance, sings in bass, London in baritone and New York in tenor. Dr. William Braid White, director of research in acoustics for a steel company, has succeeded in recording the sound tones characterizing various cities' activities by using an instrument known as an "osico" which reveals many more things about sound than the human ear can detect. He also photographed the city sounds. London's voice, or ground tone, is a wave shaped like the lower part of a rope necklace, New York's looks like a necklace hung with fossil teeth, and the sound vibrates at sixty cycles a second. Chicago's voice vibrates at twenty cycles and the wave looks like saw teeth. The pitch of London's voice is low "C," New York's sounds like the singing of a wire carrying a sixty-cycle alternating current, and Chicago's tone is like the hum of an automobile running smoothly. Up about fifteen stories, the sound recorder picks up the characteristic sound tone of a city as all the noises are blended there. The tone depends on such things as the shape of buildings, the presence of trolley wires and tracks, and even the number and size of lamp-posts. The study of city noises is being made to sort out those that are unpleasant.

Chicago Tribune 12/29/30

Chicago The Post - Sears Roebuck

2220

FRICITION-DRIVE CYCLE MOTOR FOR THE FRONT WHEEL

Capable of transforming any bicycle into a self-propelled vehicle a gasoline motor with friction drive transmits its power to the front wheel instead of the rear one. The motor is clamped to the front-wheel frame shaft and rests just ahead of the handlebars so that it turns with the wheel. The pedals can be used in conjunction with the motor, or the motor alone can be employed.



Muncie Gear Co
Muncie, Ind



Ground Instrument Which Records an Airplane's Speed, Altitude and Climbing Ability

SPEED OF PLANE IS RECORDED BY MOVIE-TELESCOPE

Accurate measurements of the speed and height of an airplane in flight now can be obtained on the ground with a German invention, called "a cine-theodolite," which combines a moving-picture camera, a telescope and an electric clock. This instrument gives a complete record of a plane's climbing, landing and turning powers and its behavior in air currents. The combination of movie cameras and theodolites is kept in step and timed by electric sparks from a central station, three such instruments being used for ordinary measurements. The observer focuses the telescope on a ship, and the image is projected onto a movie film running across a disk, the rate of exposure being controlled by a revolving screen in front of the disk. At the same time the camera records the angle of height and the angle of the plane in relation to horizon and zenith, and there is also photographed on the film the dial of a clockwork device which gives the exact time at which observations are being made. This clockwork also keeps the ground stations in step.

(U.S.) American Askani Corp. 622 Marine Bldg. Houston, Texas

Chicago Herald Ex-aminer
Chicago Tribune
Chicago Post

Askani
% O. S. Karlawa Esq. Victoria, B.C.

2232

Thrilling Sled Dog



Tud Kent, Famous Western Musher, with a Few Trophies Won in Dog Derbies

By JOHN BRADY

Boston Sunday Post, Boston Mass

DOWN the Grand Allee in old Quebec city, through a snow-covered lane flanked by cheering thousands, raced a sled-dog team.

The driver was that wing-footed Apollo of mushers, St. Godard, from The Pas, Manitoba, and he was finishing the third and final day's run of the last International Sled-Dog Derby.

He had run much to relieve his dogs of pulling his weight on the sled in crossing the historic wind-swept Plains of Abraham where Wolfe and Montcalm battled and died so heroically long ago, and now, on the homestretch to the finish line in his desperate fight to regain lost sporting

laurels, he was gallantly running again, but on his nerve.

His face plainly reflected the agony from tired, protesting muscles; his eyes revealed his mental anxiety, and his dogs showed unmistakable signs of having burned up about all of their reserve energy. After he flashed across the finish line, it was announced that he had beaten by five minutes the record for

this classic of the snows set up the year previous by his most formidable rival, Leonhard Seppala.

Seppala had beaten him on the first day of the current race by a margin of five minutes twenty-eight seconds, but St. Godard had cut this down to twenty-eight seconds at the end of the second day. It was the closest margin that has ever separated the leading and second teams at the beginning of the final leg of a contest for the sled-dog driving championship of the world.

Having been defeated twice by St. Godard in two out of three of these inter-

Races of the North

national derbies, Seppala took no comfort out of such a slight lead. St. Godard, on the other hand, realized that to overcome it, small as it was, and win back his lost throne from the man who thrice won the All-Alaskan Sweepstakes, hardest sled-dog competition ever held, would be a Herculean task.

So both drove for all they were worth on the last leg of the race. In fact, St. Godard, with youth on his side—he is only half the age of the fifty-two-year-old Seppala—drove himself and his dogs harder than he ever did before. And he not only made the forty-one miles more than five minutes faster than his Alaskan rival, but established a phenomenal new record of eleven hours, one minute, twenty-seven seconds, for the 123 miles covered in three days of racing.

how, year after year, the speed records for the sport are being broken, though the real purpose of these races, which is to encourage the best all-around type of dog for transportation service in northern latitudes where he is still indispensable in the winter time, is still being achieved.

Sled-dog racing began in Alaska. Men who had come to appreciate the help given them so faithfully by four-footed partners during the gold rush, naturally bragged about their speed, endurance and pulling powers. Crude tests of these husky qualities inevitably resulted in the organization of the Nome Kennel Club by "Lawyer" Albert Fink, and sled-dog racing became officially the sport of Alaska.



Drawing of Seppala in Quebec Race, and "Mountie," Famous Dog of the Royal Canadian Mounted Police

That shows you how thrillingly close the finish of a sled-dog race can be, and





While it flourished there from 1938 to 1917, when the war stopped it, great races were held which attracted the attention of the entire outside world. But the greatest of them all was the All-Alaskan Sweepstakes over a difficult, hazardous course of 408 miles from Nome to Candle and return. The prize was a valuable cup filled with \$10,000 in gold, and it went to the man who finished the distance in the least time. Hundreds of thousands of dollars were wagered on these races and the record in them was seventy-four hours and some odd minutes made by "Iron Man" John Johnson.

Sled-dog racing was too good a sport to be confined to Alaska for long, and even before it terminated there, it had been introduced at The Pas, a mining and trapping region of big snows that was greatly dependent on dogs. The man who did most of it there was Walter Goyne, who had learned the game in Alaska, and

he finally sacrificed his life for it. On a training trip he disappeared, and a searching expedition from The Pas found him frozen in the ice with his dogs, all stretched out in harness as though they had tried to pull him out of the water. The Pas developed a 200-mile non-stop race that in turn became the greatest on the continent and produced new heroic figures in the sport, such as Grayson and "Shorty" Russick, and later, Brydges and Emile St. Godard.

The first sled-dog race of an international character, however, was held at Berlin, N. H., in 1922. It was organized by W. R. Brown, a great lover of animals and one of the most noted breeders of Arab horses in the world, and Arthur T. Walden,

lately chief dog driver of the Byrd Antarctic Expedition, and his great leader "Chinook" became famous overnight as a result of their victory in that first Eastern International Derby. Although a comparatively new sport in the States and even in Canada,



Seppala, "Whistling Lyd" Hutchinson, and Emile St. Godard, World's Champion Dog Driver

sled-dog racing has become the greatest of all outdoor sporting attractions at winter-vacation resorts on both sides of the border within the last few years, but the real classic of them all is the Eastern International Derby, held annually at Quebec, since 1923. No other race on either side of the border equals it in respect to the number of great American and Canadian mushers who compete, and the crowds it draws. As a result, the winner is recognized as the world's champion musher. This title is now held by St. Godard because of his record-smashing victory last February over Seppala.

New zest is being added to the New England and Quebec races this season, for dogs which rendered valuable service to Admiral Byrd on his expedition to the south pole, and dogs from the wilds of Siberia, which searched for and located the bodies of Ben Eielson and Earl Borland, after their plane had crashed in trying to

reach the steamer "Nanuck," when it was frozen fast in the arctic ice fields, are competing.

Two teams of these south-pole dogs, some of which were born at Little America, will be driven by Edward Goodale and Norman Vaughn, who got plenty of hard dog-driving experience with the Byrd expedition, and the dogs from Siberia will be driven by Mrs. Elizabeth M. Ricker, of Poland Springs, Me., the country's most famous woman dog driver.

Demand for more and more speed every year as the price of victory in the big professional sled-dog races, has caused those most vitally concerned to make many breeding experiments in an effort to produce dogs that will not only be faster, but will possess the necessary strength, courage and endurance as well, to travel the required long distance in the shortest time.

It is generally agreed, however, that the first requisite of a good



Head of Typical Husky Dog, and Mushing near Banff, Alberta; the Driver Is Ike Mills, One of Canada's Greatest Mushers; Snow-Covered Frozen Rivers Make Good Trails



St. Godard, Champion Musher in Action, Winning the New England Point-to-Point Handicap Derby on Elapsed Time Last Winter While an Interested Crowd Looks On

racing husky, is a strain of wolf blood, so it has been used as the foundation of all breeding experiments, though various other strains, either straight or mixed, have been combined with it. The favorite new breeds used in combination with the husky have been Great Danes, German shepherds, greyhounds, wolfhounds and setters. As an example of how these new scientific methods of breeding have produced fleetier and fleetier sled dogs from year to year, the winning team in the first eastern international derby averaged eight miles an hour for the 123-mile course, as compared with the speed of better than eleven miles an hour which St. Godard averaged in this event last year. Other contributing factors in producing this constantly increasing speed have been improved methods of harnessing the dogs, more careful training and feeding, and lighter sleds.

Funny things and serious accidents occasionally happen in these races, and the outcome of them frequently depends on what followers of the sport call "trail luck." Seppala tells of how a buzzard that flew just ahead of his dogs for some distance caused them to pick up enough speed

to win a race in Alaska. But Mrs. Ricker's chances of winning a race at Poland Springs, Me., were blasted when a skunk crossed the trail just ahead of her huskies. They immediately started to chase the skunk into the woods, but she managed to stop them by swinging her sled around a stump. The delay in straightening out her team and getting back on the trail, however, put her out of the running.

In one of the New England point-to-point races, Earl Brydges found a freight train that was being unloaded blocking his progress. There was no way of getting around it, and it would have taken him precious minutes to run to the head of the train and ask the engineer to "pull his freight" off the crossing, but Brydges was equal to the emergency. He unhitched his dogs from the sled and let them run under a car between the trucks, then he boosted his sled over a coupling between two cars, climbed over himself, hitched up again and went on his way. On finishing, he didn't claim any time allowance for the delay, but when the judges heard of the incident, they gave him one.

Gamblers, who had bet against "Scotty" Allan in one Alaskan Sweepstakes race,

tried to defeat him by shifting the stakes from the proper trail to one that would have taken him miles out of his way. The trick fooled Scotty, but with uncanny sagacity his leader refused to go the wrong way and stuck to the right course.

REGISTER FOR PARCEL POST SPEEDS HANDLING MAIL 2213

To save time and reduce postage-stamp losses, a meter machine for parcel post has been introduced and approved by the post office department. It resembles a small cash register and differs from ordinary mail-metering devices in that it can print, in one operation, a single impression of any value from one-half cent to \$9.99½. After the package has been weighed, the operator presses a key on the meter register to record the zone to which the package is going, its weight and the postage required. A gummed stamp, bearing



this information together with the date, the name of the city where the parcel is mailed, the number of the meter and of the stamp, is issued by pressing a lever. The stamp is then affixed to the package.

TALKIES' MAGIC LAMP TELLS TEMPERATURE OF STARS 2239

With the aid of the photo-electric cell, an essential to television and talking pictures, scientists are now able to tell the temperature of the distant stars. It has been found that there is a connection between the color of the star and its temperature. For instance, the hotter it is, the bluer is its light. Through the photo-electric cell, which converts light into electricity, accurate measure is made of the brightness of the star's light. By using blue and yellow filters and comparing the brightness of the star's light through each, an index is obtained as to its color and therefore its temperature. Blue stars, for instance, will be brighter when seen through the blue filter.

Mr. Joel Stephens
 Univ. of Wisconsin



The Row of Pipes Leads to an Underground Lake Supplying an English Town with Water

BURIED LAKE SUPPLIES WATER FOR ENGLISH TOWN

Faced almost annually with a shortage of water, one English town has solved this problem by constructing an artificial lake, and then burying it. The underground lake, costing \$50,000 when completed, has a capacity of 1,000,000 gallons, sufficient to meet all the needs of the town, which two years ago relied on one spring along the main street for its water when all other sources dried up.

AIRPORT SIGN SERVES PILOTS AND ATTRACTS VISITORS 2206

Set at an angle, a roller sign installed at the airport in Visalia, Calif., is visible both to pilots in the air and to persons on the ground. The signs are printed on a canvas curtain which is pulled with a rope. A metal hood holds the roller, and also serves as a housing for a reflector and light bulbs to illuminate the sign. Several different signals may be used on the roll.



Airport Sign at Angle Is Visible to Pilots from the Air and to Persons on the Ground

Built by G.A. Clark
 Director of Division of Aeronautics
 Visalia Chamber of Commerce

Chicago 323 Michigan
 Buena Service 509.7
 12/27/30

Castle Blomington
 Leicestershire, England

2069
Emil Schneider
3455 15th St
Omaha



Holding Spread-Wing Duck Decoy and How It Appears on Water; Note Resemblance to Flying Bird

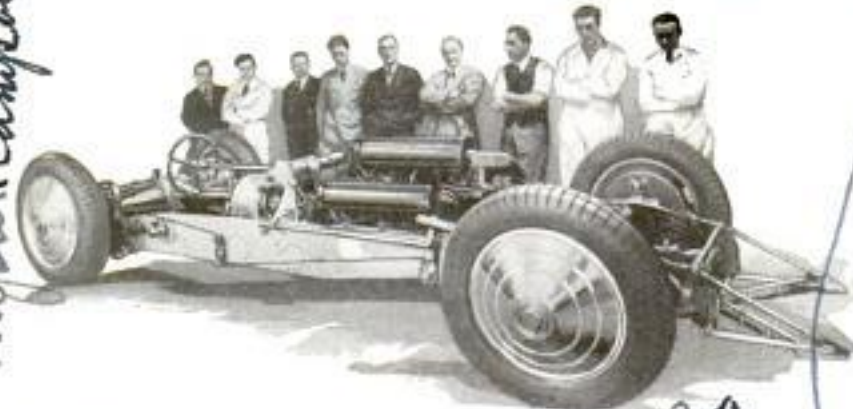
SPREAD WINGS OF FLAT DECOY HELP LURE DUCKS

Flat decoys with spread wings have been devised by an Omaha sportsman as an improvement over the usual lure for ducks. They operate on a pivot attached to a standard and may be adjusted above or below the floating decoys in a blind. The real birds have a plainer view of the profile decoys, and the realistic pose is intended to prove an added attraction.

BRITISH RACING CAR TO ATTACK WORLD'S SPEED RECORD

Hoping to travel faster in an automobile than anyone ever has done before, Capt. Malcolm Campbell, British auto racer, has had constructed to his specifications a new "Bluebird" car in which he will try to set a world's record of four miles a minute or more. The present record of 231 miles was established in 1929 at Daytona Beach, Fla. The new racer

Built at Brooklands, Eng.
Capt. Campbell



Partly Completed Racing Car in Which Capt. Malcolm Campbell Will Try to Better the Speed Record of 231 Miles an Hour Set in 1929

embodies many features intended to increase safety as well.

AUTOMATIC TOOL FOR GLAZIERS' POINTS

Glaziers' points and brads can be driven into picture frames and window sashes to hold the glass in place with an automatic tool which does this task much more quickly and efficiently



than a hammer. The diamond-shaped points come in blocks and are placed in a magazine in the tool and then fed automatically into a mechanism by a spring which presses down a U-shaped rod to drive the points home. It can be operated in any position merely by grasping the handle and pressing the lever up until the driving spring is released.

THE MOON AFFECTS CLOCKS

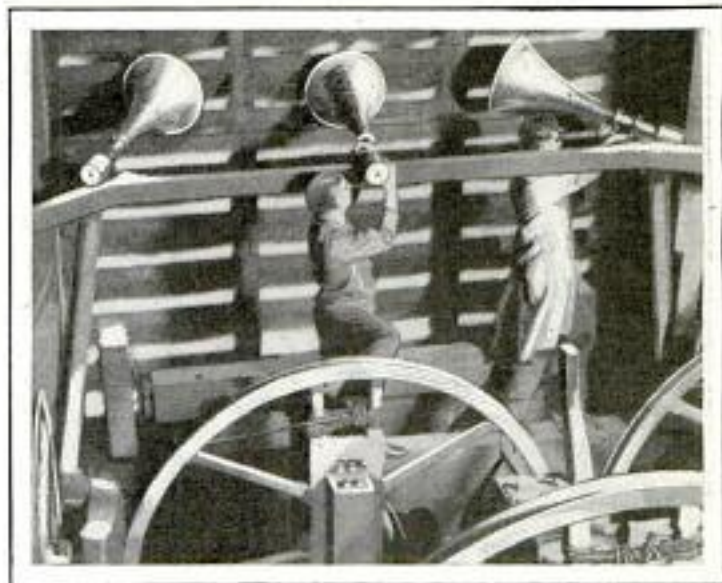
After several months of experiment, two Yale University scientists have concluded that both the moon and altitude affect the accuracy of clocks in homes. The moon, it has been found, may slightly slow down or speed up the timepiece, and elevation, or distance from the center of the earth, also affects the clock. If it were raised or lowered successively every effect of the change in the earth's attraction on the pendulum could be detected in a month's observations. The results were obtained after experiments with a chronograph, a device for comparing the variation registered by different clocks within one-thousandth of a second.

Prof. E. W. Brown and Dirk Brower

223
Landon P. Smith Co. Dayton, O.
11/31

**COTTON STALKS YIELD
RAYON BY CHEAP
PROCESS** a-8

Utilizing the entire cotton plant, except the roots, in the production of rayon is the purpose of experiments now being carried on which may greatly reduce the cost of making this material. Heretofore cotton lint has been used in making rayon, but Dr. Frank K. Cameron, of the University of North Carolina, has found the entire plant can be used. He proposes to substitute the same operations now generally used in raising wheat and hay, thus eliminating the laborious picking by harvesting the cotton with a mowing machine. Cotton has an extremely high content of cellulose, the basic material of rayon, but heretofore the cost of growing it, as compared with wood pulp, favored the latter.



© P. & A.
Adjusting Amplifying Horns for Playing Records at London's Famous Bow Bells from Steeple of Old Church

**PHONOGRAPH RECORD OF BELLS
AIDS ENGLISH CHURCH**

Silent for five years, the famous bells of St. Mary-le-Bow, in the heart of London, will be heard again from phonograph records, amplified and played from the steeple. The concert was devised to aid a campaign for funds to repair the steeple and bell installation, so that the famous chimes may ring again.

**CLOCK GOVERNED BY CRYSTAL
KEEPS ACCURATE TIME** 2256

One of the world's most accurate time-keepers is an electric clock controlled by a vibrating crystal, a product of the Bell Telephone laboratories of New York. The clock has an error ratio of only one second in every 100 days, or less than four seconds in a year. The crystal on top of the instrument acts in the capacity of the balance wheel in an ordinary clock, and is set to vibrate accurately by electricity.



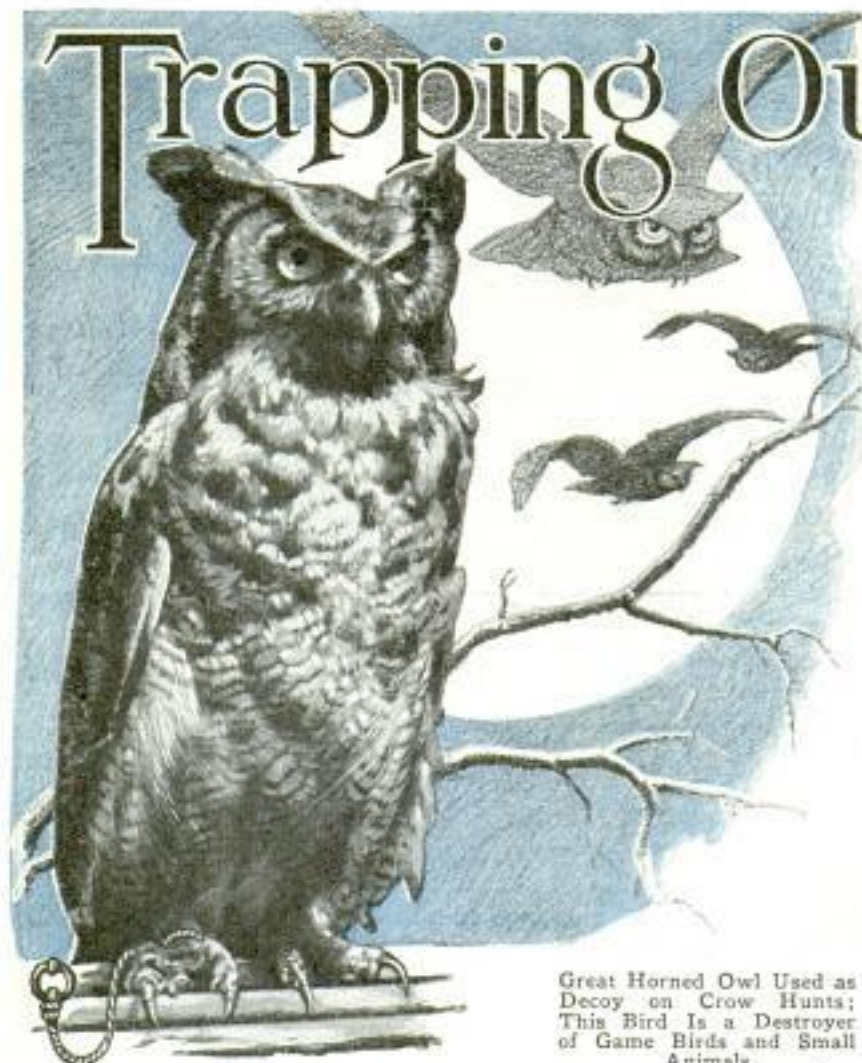
© Acme—P. & A. J. H. Colleman
Clock Controlled by Vibrating Crystal Which Has Error Ratio of One Second in 100 Days

**TRAIN-SICKNESS CAUSE FOUND
IN EARS INSTEAD OF EYES** 2275

Recent studies of car sickness, the affection of the stomach felt by some persons when riding on trains or in automobiles, indicate that its cause lies in the ears instead of in the eyes, as generally believed. To determine whether the constant movement of the eyes in watching passing scenery upset the stomach, a Chicago physician brought about the to and fro movement of the eyes by having persons watch a revolving drum on which stripes were painted. Stomach movements were checked by having the subjects swallow small balloons connected with manometers which served as pressure gauges. His conclusion was that the eye movements did not cause nausea. Cold water then was run about the ear and into the external canal. Those susceptible to car sickness, thereupon showed evidences of nausea.

*Source of source
5-10-6 1/2/31
Dr. J. L. Levinsohn*

Trapping Outlaws



Great Horned Owl Used as Decoy on Crow Hunts; This Bird Is a Destroyer of Game Birds and Small Animals

The scientist speaks of them as predators. Some of these predators kill for the sheer lust of killing, such as the weasel or a family of minks. Others kill for food. Some are egg eaters, like the skunk and the crow. Others will kill both adult and young birds, tirelessly hunting for their prey.

It is a fascinating study, this probing into the lives of the pirates of the air and the sneaking killers on the ground, and one that goes with efforts to increase our bird population. Let's look at the predators which must be kept in check if the landowner wants a large number of useful birds on his property. Here are some thumbnail sketches of raiders:

Tribune, Chicago
 By **BOB BECKER**
Chicago
2300, 12 E. Lake
THERE are feathered and furred killers. Some are gangsters who swoop down upon their victims with gangland tactics. Others are lone pirates, ruthless in their stealthy killing. In the fields, meadows and forests are hundreds of these killers, waging a constant war against our song and game birds.

Today, the bird enthusiast, intent upon increasing the bird population on his farm, estate or suburban home, as well as the professional game breeder who raises thousands of game birds on a scientific farm, recognize the presence of predatory animals and birds which prey upon the desirable feathered species.

Roughly speaking, he calls these killers—the horned owls, house-cats-gone-wild, goshawks, Cooper's hawk, the cunning weasel, bloodthirsty crows, etc.—vermin.

Chicago
Crow. Here is the crow. He is a notorious egg eater and destroyer of young birds.

Cooper's hawk. This powerful killer is commonly called chicken hawk. He will destroy poultry as well as song and game birds.

Goshawk. Another predatory species; swift, ruthless.

Great horned owl. This, the largest of our owls, is a veritable old tiger of the woods. Size and appetite make him a ruthless enemy of song and game birds.

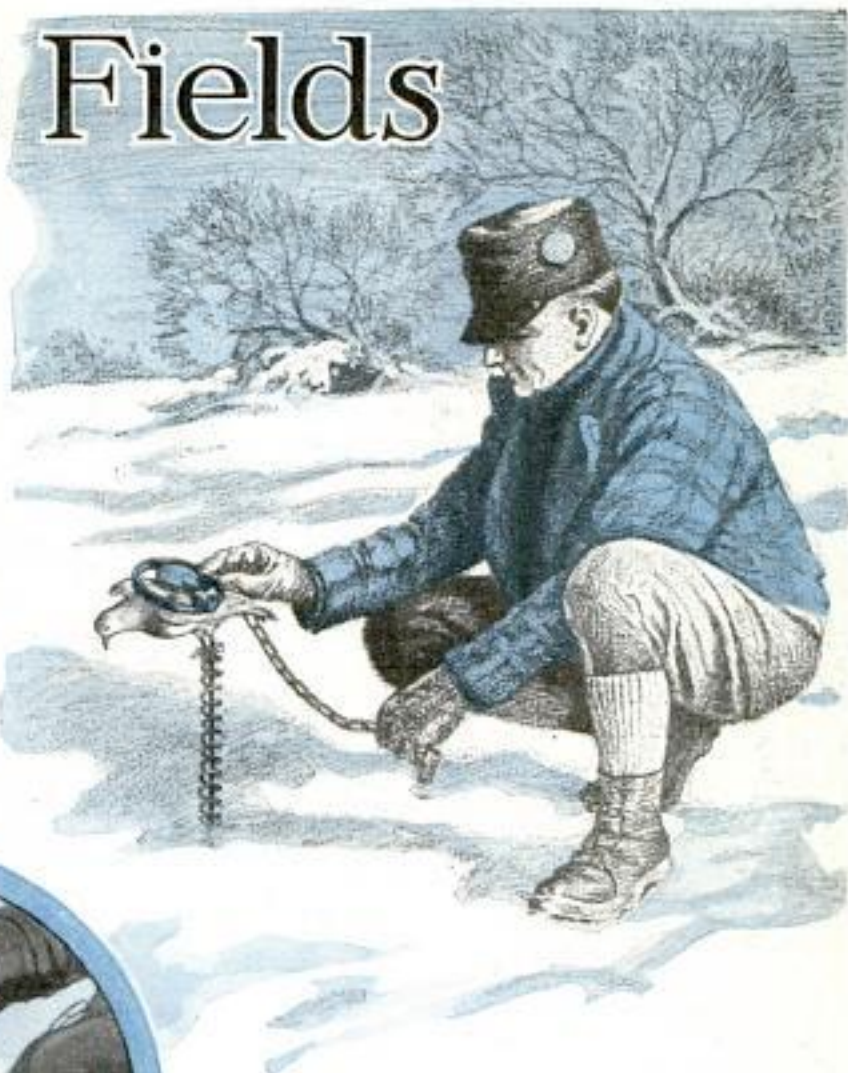
House cat. The roving pet "gone wild" has been studied for years by game breeders, and their condemnation of the sly pussy is unreserved.

On the ground, we have a number of hunters which must be kept in check. The weasel, mink, skunk and opossum are the commonest of the furred predators. If

of the Fields

they are taken at the right time of year, they can be made to yield a revenue because of their valuable pelts. Sometimes the raccoon does his bit in taking a toll of the birds. In the big timber country, coyotes and wolves come into the vermin class because they prey on deer and other game.

Last, but not least, the common English sparrow must be reckoned with—although not as a killer. However, because he



With a Stuffed Pigeon as a Decoy, a Trap Is Set in the Snow

is noisy, pestiferous and drives away desirable species of song birds, control of the sparrow is regarded as a recognized necessity.

Many and ingenious are the tricks which the bird lovers have invented to fool the predators and to reduce their numbers. In dealing with the crow, a widely distributed egg stealer, either organized crow-hunting expeditions, trapping, or poisoning have been successfully used.

To attract crows within range, it is a good idea to use either a stuffed or live owl (preferably a horned owl), and a crow call is needed. The hunter, or hunters, conceal themselves under vegetation or in a crudely constructed blind at an open place in the woods, where crows are known to gather. In the winter when the birds have flocked together and fly back and forth to roosts, I choose a location on their flight line. Then the owl is set out where it can be easily seen.

A few blasts on the call (quick sharp notes, as if a crow were yelling for help) usually brings an inquisitive fellow to the scene. Upon seeing the owl, the crow becomes very excited and calls for help from every crow within hearing distance of its raucous caws.

The shotgun is a fairly effective weapon against crows, but there is the danger of frightening other birds. There is another, and probably more effective weapon, the poisoned egg.

2/83
444



Tall Pole Trap, and Cross Section of Cat Trap Recommended by the U. S. Biological Survey

Every spring, the crows raid nests as soon as the pheasants, quail, meadowlarks and other ground-nesting game and song birds set up housekeeping and lay clutches of eggs. The damage that a few of the black pirates can do is surprising.

Here is the way to foil the crow with poisoned eggs:

It is the time-honored method that old-country gamekeepers use. They take straw and make a number of rough nests. These are placed around a pond, small lake, or in a marsh where the crows are searching for waterfowl nests. At first, good eggs are set out. Then the poisoned eggs replace the good ones. Treat them in this way: Make a small hole in each egg and insert strychnine to the amount that can be held on the blade of a small penknife. Stir the contents of the egg with a small stick and then seal it with white tape or a piece of courtplaster. Winter is the best time to trap crows. Wire-netting traps may be used but the best method is to set out small-sized steel traps (No. 0) with eggs or poison for bait. Place them in the open fields where the birds can see them easily.

More powerful than the crow and much more destructive is the Cooper's hawk, sometimes called the "chicken hawk" or "blue darter." Every possible means to destroy this fellow should be taken. He eats poultry and game birds and small game as well as song birds. He can be shot, of course, but the most effective weapon is the pole trap. A small steel trap is chained to the top of a twenty-five or thirty-foot pole. The pole may be erected in an open place in the woods or—so that it is the highest available perch—near a poultry yard.

Now we come to the goshawk and the sharp-shinned hawk. Pole traps, decoy traps and shotguns may be utilized against them. The same trap that will capture or kill the goshawk and his friends will sometimes condemn the larger fellow, the great horned owl. He is, besides being a fearless killer of birds, a great eater of small mammals. With, or without, a decoy, a No. 0 or No. 1 steel trap on the top of a pole, or on the stub of a dead tree, will utilize the family habit of landing and looking over the ground first for his destruction.

For wild cats, the government recommends an effective trap. Make a sort of wooden trough by taking a twelve by twenty-eight-inch plank and placing it flat on the ground. Erect sides a foot high and leave the ends and top open. Now take a ten by ten by twenty-four-inch box, closed at the ends and with one open face. Open side down, place the box inside the trough, hinged at



Setting Pole Trap in Game Refuge, and Trap for Hawks and Owls; Rabbits Are Used for Decoys

one end and lifted and propped up at the other. A string runs from the top of the prop to the high side of a treadle on the plank floor. On the wall, and visible from the entrance, is a fish or bird for bait.

The cat approaches the opening and looks inside. If he is really a harmless, well-behaved pet, he will go on about his business. If he is a killer, he is lured in-

side and steps on the treadle. His weight pulls the string, jerks out the prop, and the box falls over the entrance. The cat has been tried, condemned and imprisoned. It remains for the owner of the trap to pronounce sentence.

The furred destroyers of song and game birds and small animals include the mink, weasel, opossum, skunk, fox, wolf, raccoon and coyote. It would be a mistake to exterminate these species. For instance, foxes live, partly, on mice. Many sportsmen do not begrudge this wise, sly fellow his occasional quail and frequent rabbit. The horned owl is a skunk killer. And the skunk may destroy game nests, but he eats countless June bugs. The mink is probably the most vicious and able killer for size of any animal in the world. On land and in the water, he is active all day and all night, too, although mainly at night. Yet he eats rats and

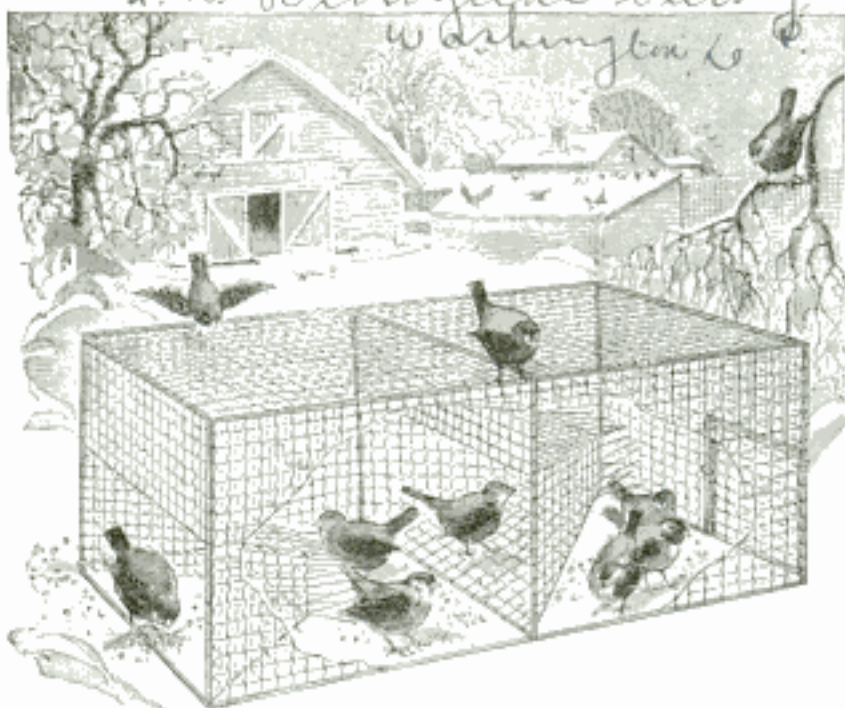
mice and insects and snakes, as well as birds, birds' eggs, rabbits, chipmunks, squirrels, fish, etc. And his fur is valuable.

Trapping is the most effective method of getting rid of these pests. Their pelts are valuable and they should be taken in the winter when a financial return will reward the trapper. There is not space here to record the myriad and compli-

Complete details in Leaflet 6!

POPULAR MECHANICS

U. S. Biological Survey
Washington, D. C.



Serviceable Sparrow Trap of Wire Netting; It Is Easy to Make and Catches the Birds Painlessly as Shown

an antechamber, and are induced, by feed, to pass on through a second funnel into the rear compartment. They may be removed from here by means of a small door. The entire trap is made of woven wire poultry netting of three-fourth-inch mesh, which should be reinforced around the open end and around the sides by strong wire. The trap should be at least three feet long, a foot and one-half wide, and a foot high. It can be made for about one dollar.

OLD BRAKE LINING RESTORED WITH SOLUTION

2249

Automobile brake linings

icated methods of trapping the fur bearers. Every effort should be made, however, to use the most humane types of traps. There are several varieties on the market which will either hold the animal without causing unnecessary pain, or kill it instantly.

The common English sparrow needs no formal introduction to anyone interested in birds. There is nothing quite so exasperating as this noisy and energetic little bird. He is mainly a vegetarian and, while he does eat some weed seeds, he gets most of his food from gardens.

This is the way to declare war on the pesky sparrow:

First, remove all conditions which may attract him, feed him, or make his living easy.

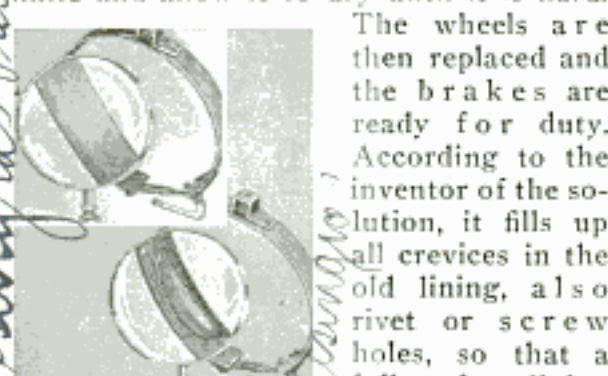
Second, at regular intervals during the breeding season, destroy his nests and eggs.

Third, go after him with a small shotgun.

Fourth, there are a number of easily constructed traps which will catch sparrows. The funnel is probably the best of the self-operating bait traps.

The essentials of the trap are: Birds are decoyed through bait scattered in front of a large, rectangular, wire-covered box. They walk up the half funnel leading into

ings that have become glazed or partly worn out may be reconditioned for effective service by using a special solution which has recently been introduced. To apply it, all that is necessary is to remove the wheels, roughen the lining with a file or a bit of emery cloth, and then spread the solution on the lining with a brush or knife and allow it to dry until it is hard.



The wheels are then replaced and the brakes are ready for duty. According to the inventor of the solution, it fills up all crevices in the old lining, also rivet or screw holes, so that a full-surface lining is obtained with no indentations to form water bags. Another advantage in restoring the old lining is that it usually fits the drum better than a new one does at first. The inventor has driven 34,000 miles with his original set of brake linings which have had two treatments with the solution during that time. The photo shows, at bottom, the worn lining and, in the inset, the same lining resurfaced.

Peelers Belting Co.
Boardville, N.Y.

W. T. Lyote, 124 Washington
St. Wabegan, D.C.
Were sparrow trap
at home made

2/19/34 446

Livingston Bros. & Co.
New York

Peelers Belting Co.

Copyrighted material

**VOICE'S POWER MERE FRACTION
THAT OF ELECTRIC LIGHT** 2265

Although singing and speaking voices may "fill" large auditoriums, their power, in electrical terms, is insignificant. Dr. Harvey Fletcher, of the Bell Telephone laboratories, who has been making extensive studies of the human voice in connection with talking-movie and telephone research, declares that a powerful singer is using only about one four-hundred-thousandth as much power as that required to light a single forty-watt electric lamp. About one-tenth as much is used in ordinary conversation. The power used in expressing individual words varies greatly from the average, he points out. For instance, the sound of the long "o" requires several hundred times the power needed for "th." In making his studies, Doctor Fletcher prepared a graphic record of the sentence, "Joe took his father's shoe bench out," to illustrate the difference in speech sounds. This sentence has a wide variety of sounds. When translated into a graphic record on a fast-running film, it resembled flashes of lightning fused into one connected run.



One of the Ancient Windmills in Holland Still Used in Preference to Electric Power

**HOLLAND CLINGS TO WINDMILL
DESPITE ELECTRIC POWER**

Although electrical power is available in parts of Holland, many farmers still retain their age-old windmills. Junking the old equipment would mean more than simply buying current, as new machinery would have to be purchased, and, in many cases, the volume of work that has to be done does not justify the expense of such a change.

2238
**ARMORED ARSENAL ON WHEELS
FOR BANK COLLECTIONS**

In making collections from its branches and transporting large sums in currency and securities, one Los Angeles bank employs an armored truck that is virtually an impregnable fortress on wheels. In the roof of the low steel body is a cupola with small protected windows from which a lookout has a good view in all directions. If necessary, the lookout can stop the car and lock the wheels from his perch. Rifles, riot guns and pistols can be operated from a series of loopholes, and the money box is locked electrically.



Armored Truck for Transporting Money and Securities; Note the Cupola That Serves as a Lookout

**TREES MILLIONS OF YEARS OLD
IN CALIFORNIA FOSSILS** 2274

That black oaks grew in the forests of California 40,000,000 years ago, is the testimony of recently identified fossils found in a gold mine. Imprints of the leaves were plainly seen and the markings were declared to be those of the black oak by Dr. R. W. Chaney, of the University of California. The finds mark the first discovery of this forest although tropical palms and giant sequoias were known to grow side by side 60,000,000 years ago on the great continent of Holarctica which extended from the present site of western North America as far west as Eurasia. Vegetation similar to that found today in Central America, covered this vast territory as far north as Alaska.

Merchant National
Trust & Savings Bank
Los Angeles, Calif.

Paleobotanist

Science Service 510-2
1/3/31

448
2244



Japanese Gardeners Putting Coverings of Straw over Plants in the Grounds of the Premier's Residence

STRAW JACKETS FOR SHRUBS PREVENT FREEZING

Japanese gardeners are noted for their skill, and some of the most expert men in the profession are hired to keep the grounds of the premier's residence in order. Special care is taken in preparing for the cold season, when bushes and shrubs that would be damaged by the frost are swathed in straw jackets.

SPOOL HOLDS CHALK AND LINE TO SAVE TIME

Cakes of carpenters' chalk are held in each end of a line spool now on the market, and there is a spring clip to fasten the line when it is not in use, and also to hold the spool from swinging. The arrangement saves time and trouble, keeps the line



Handy Spool Co
Orlando, Ind

from becoming knotted, and the strong metal spool is not damaged when in the tool box.

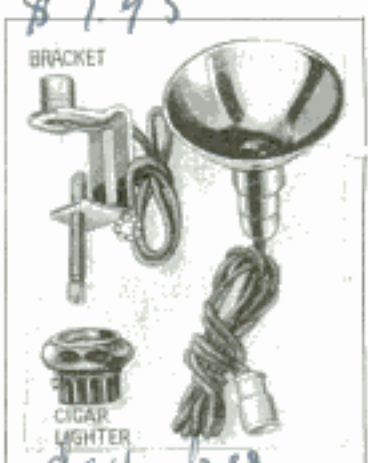
Crewey, England.

SELF-ADJUSTING CASTER FITS UNEVEN FLOOR

2127 Providing automatic stability for furniture, a self-adjusting caster fits itself to any uneven floor surface. The caster contains a gas chamber and a cylinder filled with liquid connected by a ball valve. The weight of the furniture forces a plunger slowly into the cylinder as fluid oozes into the gas chamber. The gas and a spring are compressed by this movement until a state of equilibrium is reached. When the weight is reduced, the process is reversed so that expansion maintains contact with the floor.

WINDSHIELD HEATER IS ALSO CIGAR LIGHTER AND TROUBLE LAMP

2192 Windshield heater, cigar lighter and trouble lamp are combined in one small accessory for the auto, which clamps to the dash or steering post. The heater consists of an electric element set in a reflector. When placed close to the windshield, the glass is heated by the current of warm air from the heater, and thus kept free of ice and snow. When the warmer is not in use, the cigar lighter fits the dash-attachment bracket or the device can quickly be transformed into a trouble lamp by replacing the heating unit with a bulb, thus making it serviceable both in the summer and in the winter.



More than 70,000 farms were electrified in 1930, bringing the total to about 700,000.

Curio Engineering Corp. Meriden, Conn.

Premier Hamaguchi

DISEASE OF ONIONS CONQUERED BY RESEARCH WORKERS

Yellow dwarf, a virus disease of onions, which appeared in Iowa in 1927, has been brought under control by research workers of the plant pathology department of the state college. This disease is characterized by a dwarfing of the plant and a yellowing and dropping of the stems. It is carried from season to season in the bulbs and is transmitted from diseased to healthy plants by an unknown agent. The blight was conquered by indexing onion sets and mother bulbs and growing them in greenhouse beds. The percentage of infection for each group was recorded, and growers with a high percentage of infected plants were advised not to use them, but to grow sets in a district free from infection. The disease is not carried in the seeds, and consequently this method is entirely feasible.

Science Service 509.9 12/16/30

Chicago 230 N. Michigan



Laying a Section of Pipe That Has Been Welded under Improved Process That Saves Time

BETTER METHOD OF WELDING CUTS PIPE-LINE COSTS

Stronger welds in pipe lines are made with speed and economy, according to reports, by means of an improved welding process which introduces a new method of blowpipe manipulation and a new welding rod. The consumption of oxygen and acetylene is also said to be reduced, and the welds are made in thirty to sixty per cent less time, depending upon the size of the conduit. Further developments are expected to lead to its application in many other operations.

Science Service 509.9 12/15/30

ELECTRIC HEATER GIVES QUICK SUPPLY OF HOT WATER

Water can be warmed quickly and conveniently by an electric heater which is submerged in the liquid, thus applying the heat directly to the water. The device consists of a waterproof rubber cord to which is attached an aluminum frame containing the non-corrosive heating element. It is operated by plugging into either direct or alternating current, and dropping the heater into the water, allowing it to remain until the required temperature is reached.

3.75



Small Electric Heater Which Warms Water and Other Liquids by Being Submerged in Them

BANANAS SAVED BY PARAFFIN

Bananas can be saved from early decay by anointing the cut end of the stalk with paraffin. Molds grow where the stalk is cut and cause rot. To prevent this, research workers at Cambridge University treated the stalks with various fungicides, but all were unsuccessful. Excellent results were obtained, however, with substances which blocked the ends mechanically. The rotting was stopped when the stalks were dipped in paraffin and much reduced by treating them with vaseline.

217

Lux. Vissel Co., Elkhart Ind

and Mrs. R. M. Wodman School of Agr. and Dr. J. J. Thompson, Low Temperature Station

Linde Air Products Co. 308.4 2nd St New York

Linde 2117

process

2-2/5



Exploring



Castle of the Counts of Ghent, Belgium. Noted for Its Torture Chambers and a Pillory

By HAROLD T. WILKINS, *esp.*
29. Bean Olwad, Colomene

CHANCE blows of the picks and shovels of building workers are, today, laying bare the strange and terrible secrets of ancient European torture dungeons, whose very existence is unsuspected by the modern inhabitants of the cities in which they are discovered. A short time ago, in the province of Castile in Old Spain, workers were knocking down an old wall, when the points of their picks struck into a hole, which appeared to be a window, filled up and concealed ages back.

Men were lowered by ropes to the bottom of the cavity, and found themselves standing in what was an old-time dungeon, measuring eighteen by twenty-one feet. The light of an electric torch flashed into the deep shadows of a mildewed wall, revealing many skeletons and mummified bodies. They had been buried alive during the Middle Ages.

Some of the torture dungeons were arranged with diabolical ingenuity by spacing unequally the steps leading from them. The first step might be, say ten inches high; the next six inches; the third eleven inches; the fourth three inches, and so on.

Berley Heath, ne.
London Eng.

Europe's Torture Dungeons

A victim would be allowed to "escape" from the clutches of the hangman. He would race up the steps with the regular lifts of each foot naturally given by the rhythm of his body, balanced by his ear and brain as when a modern airman is "flying blind." The idea was that he should stumble and fall backward into the hands of the executioners at his heels!

The tourist who, today, goes round the strange dungeons under the old Rathaus, or Castle,



of Nuremberg will see there the stocks, called the "Fiddle" on account of the wailing heard when the hangman screwed the thumbs and fingers, or clapped a collar of spikes on the neck of a captive.

Then there are the "Fass"—a "cradle" cushioned with steel spikes and with an unpleasantly inclined back, on and against which

captives were laid and rocked; the "spiked hare," or wooden roller covered with spikes and used to smash the prisoner's limbs, the "wheel" in which the victim was bound to a wooden bed, when the wheel—of iron and heavy and with a big steel shaft—whirled over him and pressed him down with such force as to break every bone in his body. Criminals are known to have made desperate efforts to commit suicide to escape the "torture chair," seemingly a harmless instrument but really terrible in its operation. Some



How Obscene Talkers, Loud Night Revelers and Quarrelsome Women Were Punished in Germany

22/5



spikes of steel, and dropped the corpse into a subterranean culvert "to feed the fishes," as the secret society of the Nuremberg senators facetiously phrased it. The clockwork mechanics, for which old Nuremberg was noted, had ingeniously prepared machines to make away with victims so that the dead told no tales.

The guide today leads the visitor into a labyrinth of stone passages, crossing and recrossing these shadowy castle dungeons. He shows you where one passage led to the secret prison of the sinister "Vehmgericht"—the secret society of old-time Germany whose judges wore masks with holes only for ventilation, so that the judge could not see the prisoner, nor the hooded prisoner his judge.

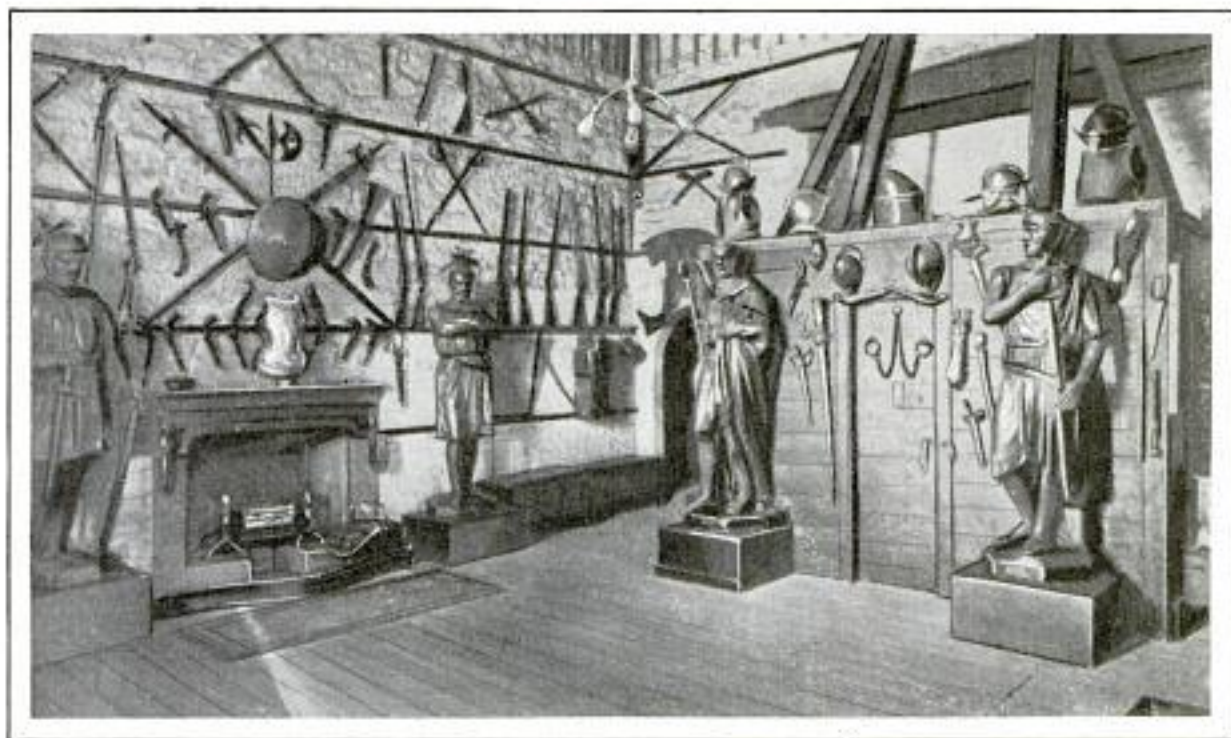
There are other torture dungeons on

of these chairs were shown in London some years ago. They were of various shapes, and studded on the back, seat and foot-rest with wooden spikes, so that no matter what attitude the tortured captive assumed, the pain soon became unbearable. Besides these instruments, there was also the "Spanish Donkey," a plank of wood set upright with the top planed to a point, astride which the captive was placed with weights attached to his legs, until the point cut through his body.

Finally, for political prisoners, there was, in a secret recess of a great bastion of the town wall, called the "Frog's Tower," approached by hidden passages cut through solid rock, the infamous "Iron Virgin," or "Eiserne Jungfrau," which embraced an unwilling victim, cut him to pieces with revolving knives, after transfixing his body, eyes and brain with



At the Top, Illustration of Proverb, "He Maketh Music in the Pillory," and, Below, How Bakers Who Gave Short Weight Were Punished in Old Nuremberg



Corner of Museum in England, Showing Torture Implements Used Years Ago; the Cell at the Right Held Condemned Prisoners; They Walked to the Gallows through a Window

the confines of eastern Europe, in the Near East. A veritable armory of torture machines is to be found in the little-known and ancient castle of Valitza, located in the lonely Black mountains of Armenia. At one time the fortress of an Oriental bandit, it is today the monastery of a brotherhood of Gray Friars and has a library containing hundreds of volumes and ancient documents relating to old-time tortures and torture machines.

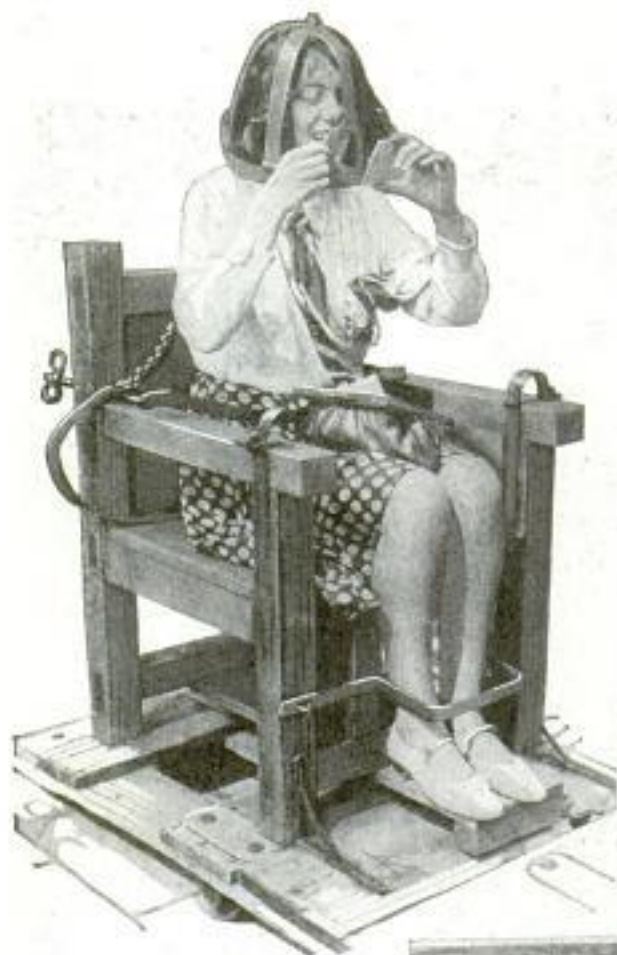
The monks keep under lock and key the secret torture dungeons deep below the foundations of the castle. On the blackened moldering walls, the sputtering torches show the shuddering sight-seer, today, rings with the bones of human hands and arms still dangling from them. Many are the unfortunate men and women who have been tortured to death in these dungeons, while the flames of the red furnace lit up its stone walls, and the robber baron's executioners sought to make helpless folk reveal where they had hidden their money and jewels. In these horrible vaults may still be seen large, open iron chests studded on the inside with numerous long rust-corroded spikes. There is, also, a chair of iron, in whose hollow was lit a fire over which the captive was made to sit. In an inner chamber of the dungeons, is the "Iron Horse" with funnel and

pail, once used for the torture of the "question."

Another macabre torture chamber, shown to the modern tourist, is located at the Hague, Netherlands, and is named the "Gevangenpoort." The guide shows you around many cells. In one is a stone hollowed out by drops of water that splashed from the prisoner's head, on which, like the old Chinese torture, they were timed to fall at intervals of a few seconds. After some hours, the torture inevitably ended in madness and death. Racks, branding irons and thumbscrews abound, and there is a block retaining the cuts made by the executioner's ax crashing on the victim's neck.

At one spot on the famous Grand Canal of Venice, in the days of the notorious Council of Ten, it was death for fishermen to cast their nets. Into these waters were thrown sacks containing the bodies of strangled prisoners, taken at midnight from the Piombi, the leaden cells of the Punishment Dungeons, and thrown into the canal by masked boatmen who rowed on as swiftly and silently as they had emerged from the infamous postern gates.

Among the instruments of torture in vogue in the prison of the Doges of Venice were two iron helmets, with sidepieces made to close up tight and smooth upon



the heads of living prisoners, and fastened to each was a small knob or anvil, on which the executioner-spy could lean his elbow and listen to the confessions and groans of the walled-up victims within.

Old-time Italy also enjoyed evil fame for the ingenuity of torture engines, among which was the "Sofa." Today, on a hill of vines and olives, fronting the Adriatic, stand the turreted battlements of the ancient ivy-clad castle of Villalta, where one Count Lucio delle Torre decoyed guests to their doom. The modern caretaker's wife points out to the tourist the place where the infamous sofa of the count stood.

"It was in that embrasure, Signor," she whispers; "there stood the infamous sofa on which the wicked Count Lucio made those guests sit whom he wished to kill. When the unsuspecting victim was seated, a secret spring was released, the sofa suddenly turned upside down, and the guest

was flung through a trapdoor onto rows of knives and spikes."

Old torture dungeons and engines of torment are, today, scattered all over Great Britain, and London itself has an armory of instruments of torture in the Tower. Some old English villages in the shires still preserve, on quaint and ancient stone bridges, a "cage," or round wooden case turning on a pivot, in which, 300 years or less ago, a victim was inclosed and whirled round at terrific speed till he lost consciousness. At Halifax, is the ancestor of the guillotine which, in modern France, is used to decapitate murderers. So stern was the justice meted out in Halifax, that it gave rise to the

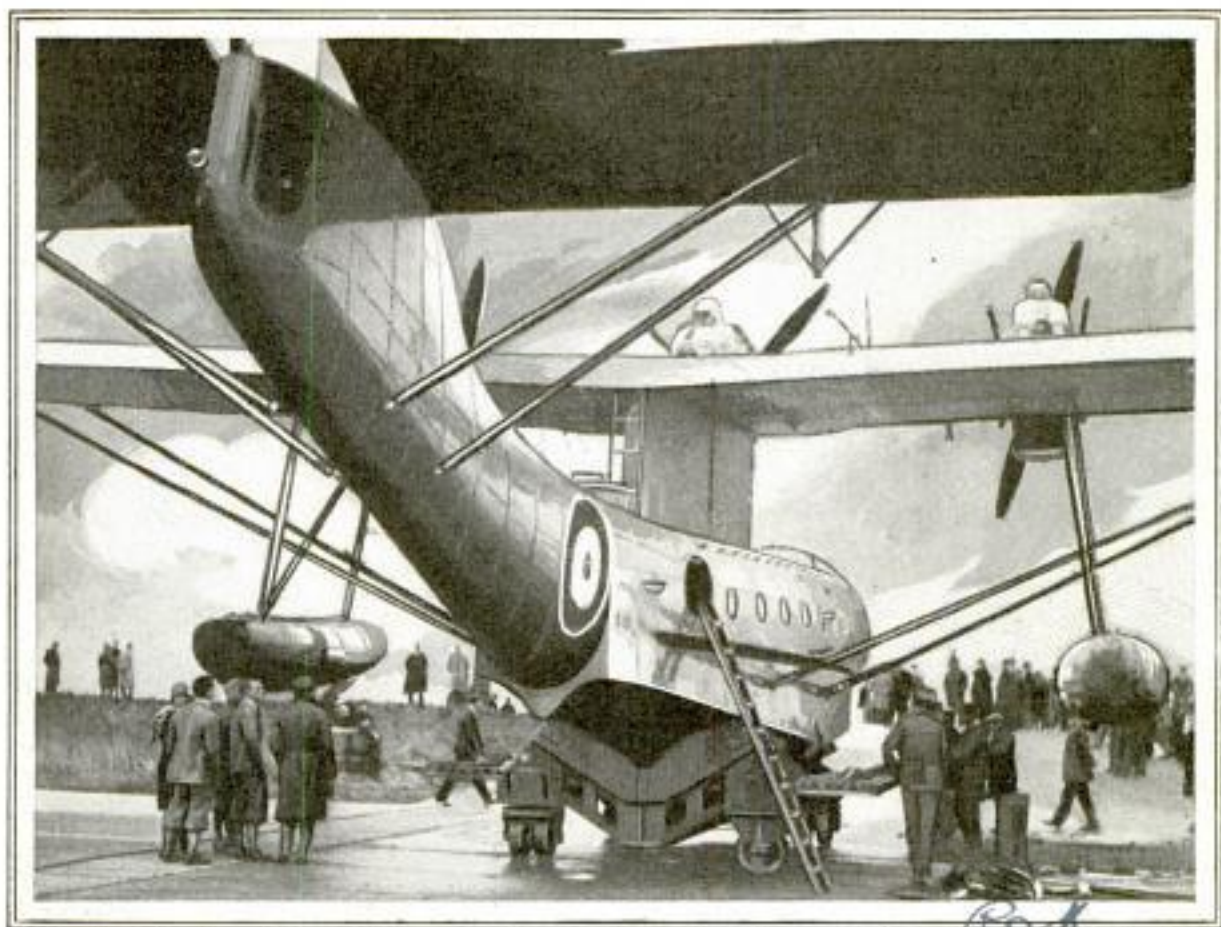


Courtesy Madame Toussaud's
Modern Girl in Ducking Chair and Wearing Witch's Bridle and Actor in Stocks, a Familiar Torture Device Early Used in This Country

proverb, "From Hell, Hull and Halifax, Good Lord deliver us!" A thief caught in the act of stealing sheep, horses or oxen, was haled to the scaffold, and the animal he had stolen was made to be his executioner. This was the method: The ax was drawn up by a pulley and fastened with a pin to the side of the scaffold, while the beast stolen was tied by a cord to the pin. At a signal the bailiff whipped the beast. It drew out the pin, and the ax fell on the victim's neck.

Old "ducking stools" for scolds and witches can, today, be seen on the banks of river Stour, near Canterbury, Kent, and a whole arsenal of witches' bridles, that cut the tongues of unfortunate women accused of witchcraft.

HUGE ALL-METAL FLYING BOAT WEIGHS TEN TONS



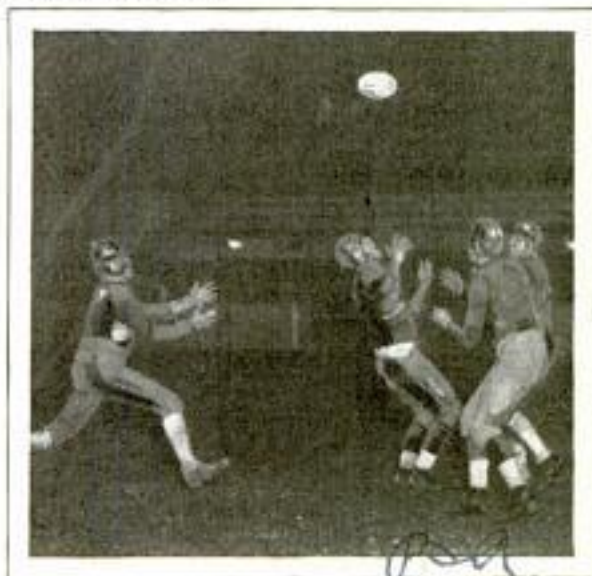
View from the Rear of England's Latest All-Metal Military Flying Boat; the Huge Monoplane Weighs Ten Tons and Its Triple Engines Drive It at 120 Miles an Hour

One of the latest types of fighting craft placed in service in England is a huge all-metal military flying boat. This big monoplane and its fighting equipment weigh ten tons, and its triple engines drive the ship at a speed of 120 miles an hour.

ball and interpreting the special rules. Football practice under roofs is given at several colleges, but this is said to have been the first major football game ever played indoors.

PRO FOOTBALL PLAYED INDOORS ON EIGHTY-YARD FLOOR

Football temporarily became an indoor sport not long ago, when two professional teams waged a contest in the interest of charity in the Chicago Stadium, an inclosed arena. A layer of dirt was spread over the floor, and a field eighty yards long was available. To compensate for the shorter length, special rules governing penalties and other features of the game were drawn. The height of the stadium roof made punts practical, and absence of wind was an advantage to both teams, but many of the 10,000 spectators said they had difficulty in following the



Football Game Being Played in Chicago Stadium

also 169 N. La Brea St Portland Ore



Mirror behind which are light bulbs and a reflector that illuminate objects in front of it

MIRROR SET IN CIRCLE OF LIGHT ELIMINATES SHADOWS

Intended to eliminate all shadows from the reflected object, a mirror set in a circle of electric light now is being offered in portable or stationary form for the bathroom or dressing table. The mirror is round and attached on a tilting horizontal axle in front of an aluminum reflector. Behind the mirror are two electric lights. The reflector passes this light around the edges of the mirror and to the object before it. The mirror itself is kept in shadow, the reflection of light from the object being conveyed to the glass, thus affording a clear, shadowless image.

KEY TO PLANT LIFE MYSTERY FOUND IN ELECTRICITY

Life, death and old age in plants may be the direct result of electrical phenomena, experiments conducted at the University of Arizona indicate. Dr. H. L. Van De Sande, Bakhuizen, professor of plant physiology, from a study of plant cells has found that the life material in them is divided into two portions which display a difference in electrical charge.

In some root cells, for instance, this difference exists on one side of the cell but not on the other, with the result that the cell acts as a suction and pressure pump forcing water up the stem and to the various parts. While the plant is young, the difference in the electrical charge is slight, it increases with maturity, but with old age, the tension diminishes, causing the plant to lose its power to retain or draw up moisture, and hence die.

INBOARD-MOTOR DRIVE HELPS TO PREVENT SKIDDING

With an improved drive arrangement recently introduced, inboard motorboats can be sharply turned with less danger of skidding, less loss of power, and are made more easily maneuverable under practically all conditions. The engine is mounted on an exact horizontal at the extreme stern of the boat, affording more room with no widely separated passenger cockpits, and the position allows more efficient lubrication as it is level. As in the latest outboard units, the vertical assembly is free to swing upward and astern when forced by shoaling or impact with an obstacle, and there is a grip and latch for holding the propeller out of the water when the boat is beached intentionally. The vertical assembly and propeller also turn with the wheel, thus allowing sharper turns and faster alteration of direction, as propeller efficiency is not reduced and there is less tendency to skid on a turn.



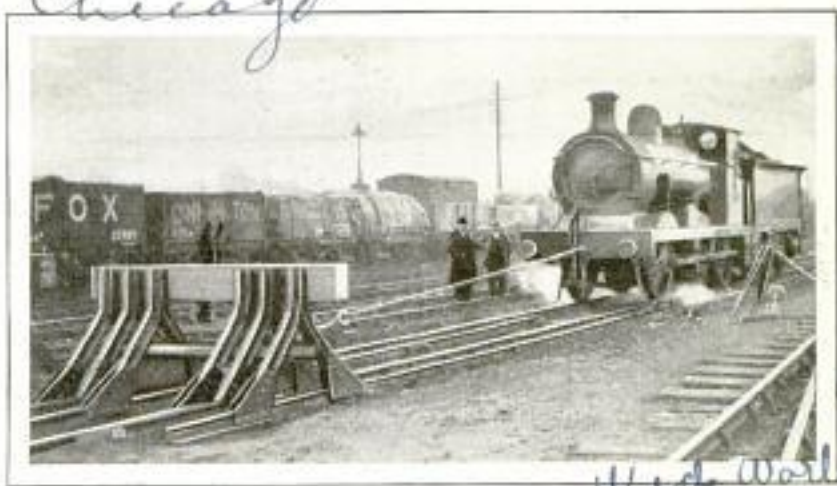
Inboard Drive Attachment Tilted to Clear Propeller, and View of Performance on Sharp Curve

Johnson Motor Co
Clayton St. and the Lake
Waukegan, Ill.

IMPROVED CLAMP FOR ELECTRICIAN SPEEDS WORK

Electric wiring is simplified with the aid of an improved clamp, used as a substitute for the usual porcelain knobs about which the wire is tied. The clamp is simply a grooved-sleeve arrangement that slips on the wire without damaging it. A wedge-shaped fastener, easily made tight, squeezes the wire and holds it securely. A ring on the wedge slips over a hook fastened to the wall or other place for supporting the cable. This is the type of clamp used for dead ends, as when a drop wire terminates on a building. For intermediate service, another type of clamp is simply pinched shut over the wire with a pair of pliers. With the aid of the clamp, one man can easily adjust and install the wire, and better results are claimed, as the clamp equalizes the strain between the wires within the cable, something difficult to do with ordinary knob supports.

2129



Buffer Which Utilizes the Roadbed as a Brake When Struck, Being Pulled Back into Position After a Train Crashed into It

EARTH ACTS AS BRAKE TO STOP ROLLING LOCOMOTIVE

Great strength is combined with sufficient resilience to stop an engine and train without derailing it in an improved type of locomotive buffer recently tested in England. The heavy steel buffer rests on auxiliary rails inside and outside the main line. The metal parts are loosely connected so that, when the train strikes, the sleepers are pulled along, piling up the soil which acts as a brake. In the tests, a locomotive and train weighing 600 tons hit the buffer at eight miles an hour. It was moved back a distance of less than five feet but neither engine nor rolling stock was derailed or damaged.

STORAGE BINS ARE PORTABLE AND NEST TO SAVE SPACE

Storage bins that nest together to economize space and that may easily be carried about, have been introduced to save time in assembly work and other tasks. They are furnished in various sizes, have wide and accessible mouths and are strongly constructed. In addition they save time in taking inventory on certain articles as the bins can easily be placed on the scales with their contents and weighed, eliminating the more laborious counting.



4 sizes

2079

TRACES OF SUPERMEN SOUGHT IN MEXICAN WILDERNESS

Following the route traveled centuries ago by Coronado and his Spanish conquistadores, a group of modern scientists is seeking traces of a prehistoric race of supermen in the Mexican wilderness. Like the Spaniards, the scientists are directed by Indians and traveling afoot and on horseback. Gold prospectors found three large skeletons on the banks of the Yaqui river, and their discovery lent credence to Indian legends of a former race of giants and sent the archaeologists on their quest. The skeletons were those of a man and two women, the man's figure being more than eight feet tall.

2160

led by J. L. Coher,
 Director of the
 University of Arizona

Dean Byron M. Cummings, University of Arizona.

Simplex Tool Co
 Copyrighted by Woodstock Rd.

Southern Railway at
 Hither Green Sidings

2085
458

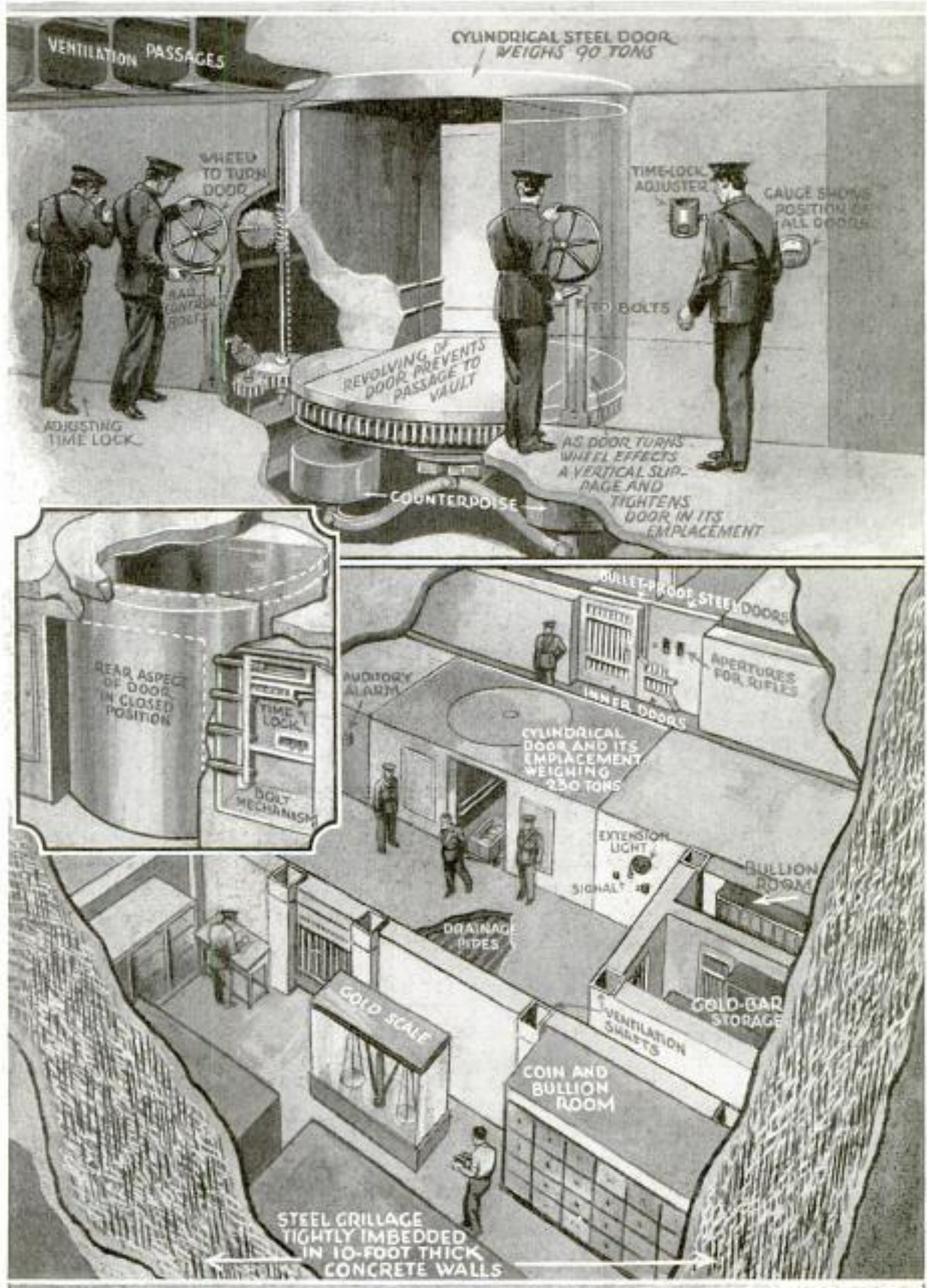
POPULAR MECHANICS

HOW UNCLE SAM GUARDS HIS MILLIONS



Loading Platform at a Reserve Bank Showing Cage for Guards; Inset, Statues That Move Back to Expose Machine Guns and Vault with Twenty-Five-Ton Door and Floor That Rises and Sinks

IN VAULTS OF FEDERAL RESERVE BANKS



Details of Revolving Cylindrical Door That Guards Vaults, and General View Showing Gold-Storage Rooms; Note Thickness of the Outer Walls

HELICOPTER WITH SIX BLADES SUCCEEDS IN TESTS

2198



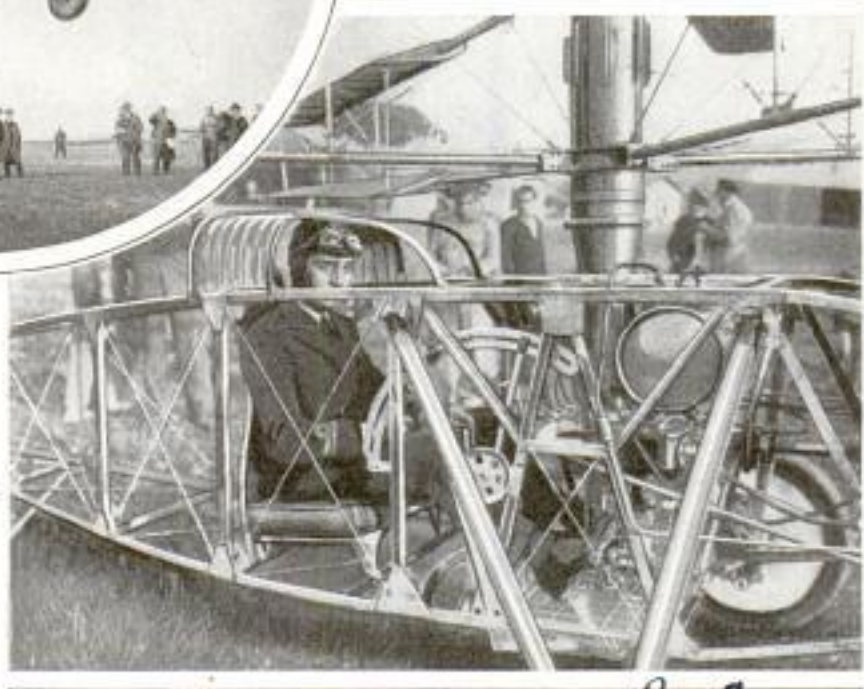
Interest in vertical flight has been aroused anew by the performance of a six-bladed helicopter at Barcelona, Spain. The craft's flight was pronounced successful by experts who gathered to watch the demonstration, with Barrera, a famous Spanish airman, at the controls. The machine is equipped with a powerful engine, and the blades are double-paddled and set in such a way that they are said to be possessed of greater lifting efficiency than has been possible to obtain in other designs of helicopters. Landing wheels and supporting pontoons on either end of a skeletonized fuselage are the chief features of the body of the craft, which is mainly an upright mast with whirling blades.

HELIUM FROM SAND 2198

Monazite sand, which has been worked for its high content of thorium, used for impregnation of incandescent gas mantles, has also been found to yield a considerable quantity of helium gas by a new proc-

Illustrierte Technik
12/4/20

ess. Subjected to a heat of 1,000 degrees centigrade, it produces about one quart of gas for each two pounds of sand treated. The helium gas is carried by a stream of carbonic acid to a separator where the admixture of hydrogen and carbon monoxide is destroyed by absorption with copper oxide. Nitrogen is absorbed by metallic magnesium and other foreign matter by metallic calcium. After this process, the cooled monazite can be treated for thorium as usual. English interests contemplate ex-



Helicopter in Flight and Close View of the Body Mechanism; Note the Head Compartment for Pilot to Break Wind

ploitation of the method to make that country independent of the United States for its supply of helium.

LIGHTHOUSE TO TALK AND SING THROUGH ELECTRIC CELL 2169

Lighthouses of the future may send out vocal announcements, music and other audible signals as well as light beams, in the opinion of O. H. Caldwell, former member of the federal radio commission. He explains that photo-electric cells could be adjusted to operate telephones and reproduce in sound the voice vibrations transmitted as pulses of light and darkness in the light stream. If this system

*Editor, Electronics and
Radio Relaying*
Copyrighted material

2163

*Built by Bert Longworth 461-
Burbank, Calif*

were successfully arranged, various light-houses along the coasts might be given characteristic melodies or "theme songs," so that they could quickly be identified without having to interpret a code call.

SILENT FILM BECOMES TALKIE WITH "MIKE" FOR SPEECH

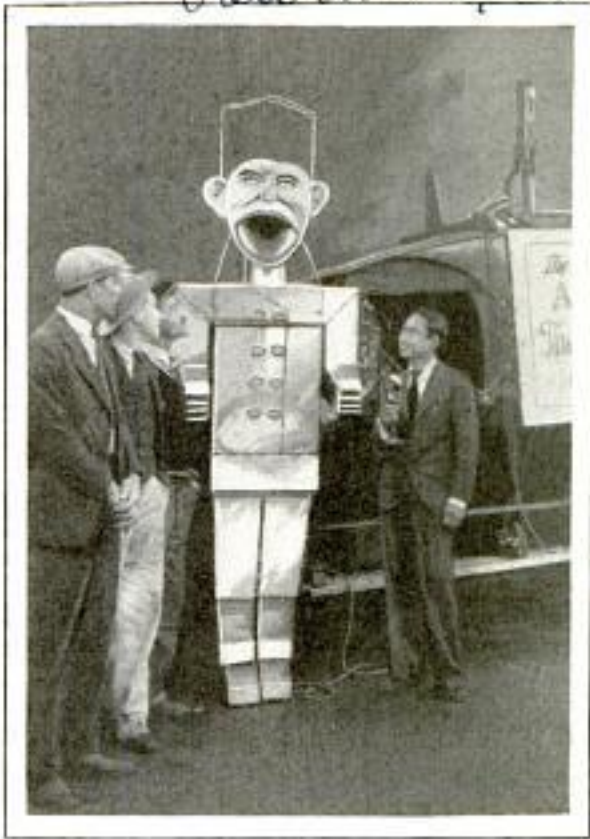
2137

By adding a microphone to a portable talking-picture projection outfit, a way has been provided for the operator to cut in at any time on the picture voice or to speak throughout the showing of a silent film, thus making a talkie without previous sound recording. The outfit uses sixteen-millimeter film, the familiar home size, and the regular sound records are on disks, synchronized to turn in time with the film. At any time, the operator may throw off the regular record voice and use his own to amplify a description or inject other remarks. The outfit is especially helpful to salesmen and has unlimited possibilities for entertainment, since a character filmed on the screen could speak in person through the mike, as his image flickered on the screen. The entire outfit weighs less than ninety pounds, is simple to operate, and the voice is amplified with sufficient volume through the microphone to meet the needs of a large audience.

2 microphone



Operator Using Microphone to Explain Film and Close View of Projector and Sound-Producing Unit



Mechanical Man Used to Announce Latest Movies; It Can Be Operated by a Person Inside

WALKING AND TALKING ROBOT ADVERTISES MOVIE FILM

Talking movies are advertised by a robot in San Francisco. The mechanical man is eight feet tall, has a loud speaker for vocal organs and can walk about and is operated by a person hidden inside.

HOW MANY CARS DOES IT TAKE TO JAM ROAD? 2161

Two-lane automobile highways are practically free from congestion up to 1,000 vehicles per hour, while a three-lane road remains reasonably open up to 1,600 per hour and is not congested more than one-fifth of the time up to 1,900 per hour. These are the findings of Dr. A. N. Johnson, dean of engineering of the University of Maryland, who has been studying the question for the national research council. As would be expected, congestion increases at a more rapid rate on a two-lane road than on a three-lane, although, when four-fifths of the traffic is moving one way on a two-lane road, congestion is not manifest up to 1,300 vehicles per hour and 2,300 on a three-lane highway.

*Bell & Howell Co
180 3 Larchmont, Chicago*

*Chicago Daily News
12/12/35
Copyrighted material*

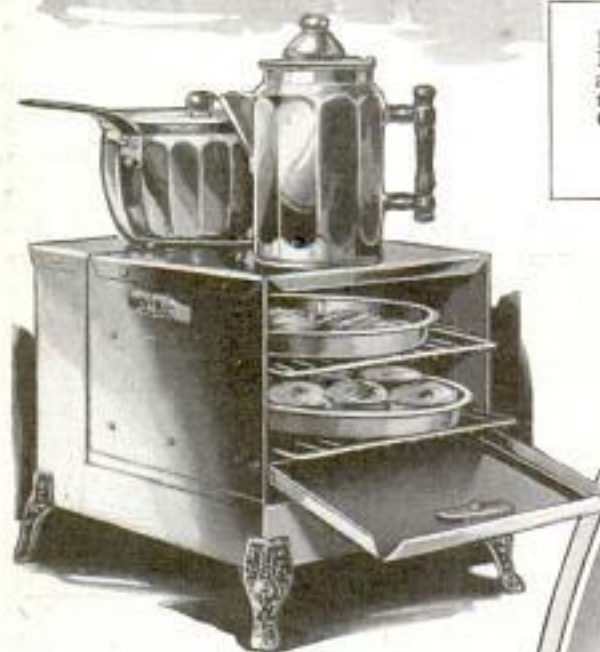
Making Home Tasks



At Left, an Electric Corn Popper That May Also Be Used as a Double Boiler or Table Stove for Cooking Many Articles.



Above, Handy Sieve for Crushing Out Lumps in Food; Especially Helpful in Preparing Infants' or Invalids' Meals



Above, This Compact Portable Stove Cooks, Bakes, Roasts and Toasts and May Be Had with Electric or Alcohol Heat; the Oven Part Is Removable, Leaving Burners or Plate Exposed; Whole Outfit May Be Placed on the Table

Right, Flusher for Drain Pipes Combines Faucet and Squeezing Pressure of the Plunger to Remove Obstructions; Saves Time and Plumbing Bills



a Pleasure



Efficient Unit for Dry-Cleaning Clothes at Home; It Rests on Rocker So That It Can Easily Be Tipped Back and Forth to Speed Cleaning; Corrugated Bottom Also Aids the Cleaning Operation

Inside This Spoon-Shaped Bowl Is a Refrigerant Which Is Frozen in Ice Box or in Ice and Salt to Give an Ice-Cold Surface in Treating the Skin; Contents Will Last Indefinitely

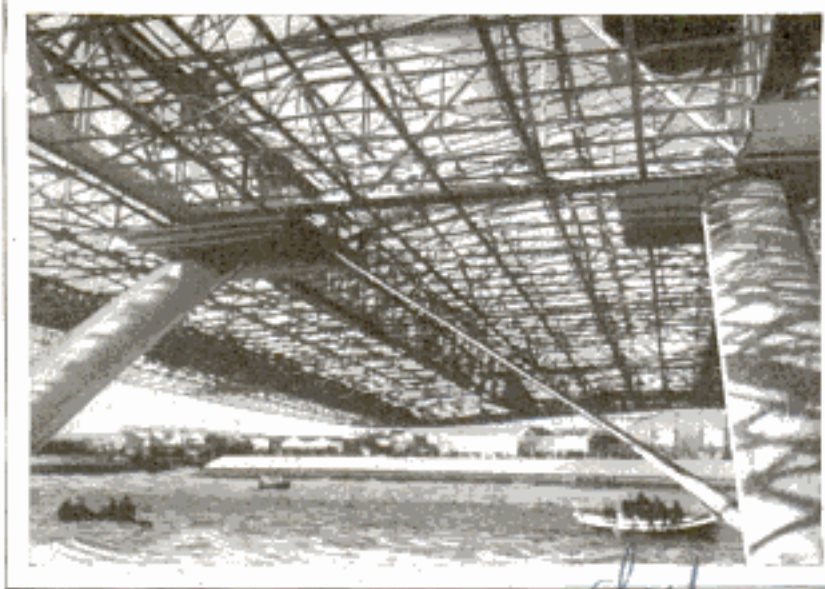


Finger Pad to Aid in Treating Infant's Gums; at Left, Jacket to Protect Nursing Bottle and Make It Easier to Hold; Right, Combination Chair and Trousers Press; Crease Is Formed as Occupant Sits in Chair; Garments Are Easily Removed as Shown



2 146

*Jaich Bros
77 W.
Washington
Chicago
CONCRETE MIXERS
SET IN TANDEM
SPEED JOB*



Looking under the Skeleton Wing of the "DO-X," After a Fire Had Destroyed the Covering, Leaving Inner Structure Exposed

HUGE SKELETON WING OF "DO-X" RESEMBLES BIG BRIDGE

Few persons think of a bridge and an airplane wing as closely allied, but they are, in a sense, architectural brothers with somewhat the same functions. As a bridge, an airplane wing is supported by air and air forces instead of piers or cables and carries its load as does a cantilever bridge. When fire partly destroyed the huge wing of the flying boat "DO-X," just before a proposed flight to America, the bridgelike structure of the wing was fully revealed. The wings have a span from tip to tip of 150 feet—an intricate web of ribs and spars.

one mixer, stirred for a little more than half a minute, then dumped into the second, the first mixer being recharged as the second completed the task and was emptied. The average time for a batch was thus reduced to about fifty seconds, and fifty per cent more concrete was laid per hour with a labor increase of only ten per cent.

WINDSHIELD CLEARED OF ICE BY ELECTRIC HEATER

Affording clear vision for the motorist in winter, a defroster which, in effect, is an electric heater for the windshield, keeps the glass free of ice, snow and sleet, and also prevents condensation of vapor on the inside of the windshield within the area covered by the attachment. The defroster consists of



a piece of plate glass incased in a metal frame to which is molded a rubber flange, a coil heating element being attached to one side of the frame. Rubber suction cups attach the device to the windshield. Installation requires but a few minutes, the electrical connection assembly being concealed by clamping it under the dash.

SEA'S VARYING SALT CONTENT SEEN AS POWER SOURCE

By utilizing the difference in pressure between sea waters of varying salt content, engineers suggest a way for harnessing the ocean somewhat after the manner pursued by Georges Claude, famous French scientist, who employed differences in temperature between the surface and deeper waters to generate electrical power. According to a recent report to the French Academy of Sciences, large volumes of fresh water are found immediately in contact with salt water near the mouths of rivers, and it is considered possible to utilize the difference in pressure to do useful work.

also general motor's Bldg Detroit Mich

991 Liberty, New York

2109

Power. Dec. 9/1930

*Casco Products Corp.
Bridgeport, Conn.*

FARM ANIMALS ACT AS GUIDES FOR LOST AVIATORS *2126*

Pilots of regular air routes depend on the actions of farm animals to keep them on their course when other means fail. If animals pay no attention to the noise of the plane, it is an indication that they are used to the roar and the flyer is probably on his course, but when his passage creates a disturbance among them, the pilot knows the cattle are not used to the noise. Pilots forced by bad weather to detour from their regular routes first noticed this circumstance. Now, if their instruments go wrong, some flyers find their way home by following a route where cattle pay no attention to them.

GOLF BALL DRIVEN IN TUNNEL IN INDOOR PRACTICE *2158*

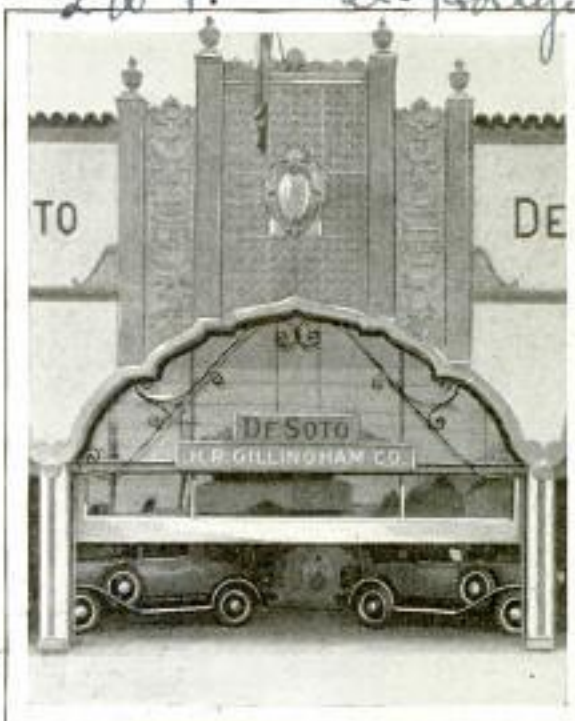
Golfers who enjoy indoor practice in the winter now can hit the ball with the same force they would apply for a 300-yard drive by using a cage that is set up in the living room in front of a tee. The ball is driven into a tunnel, the opening of which is about two feet in diameter. This tunnel rises upward as it proceeds, and if an accurate shot has been made, with



Tunnel for Indoor Golf Permits Player to Practice 300-Yard Drive

proper lift on the ball, the pellet will travel upward and about a spiral course which curves around nine times, thus expending the ball's energy.

☐The human eye can see stars five times as faint as the dimmest the photo-electric cell will detect.



Display Window for Auto Salesroom; It Can Be Raised to Drive Cars In and Out

AUTO-DISPLAY WINDOW RAISED TO DRIVE OUT CARS

One California automobile-display window is so arranged that it can be raised or lowered by an electric motor. This enables the dealer to drive cars directly from the window into the street, and in good weather the window is kept raised as an invitation to spectators to step in and view the display at close range without bothering to go to the salesroom door.

HOT SPARK BALL ON MOTOR HELPS SAVE FUEL *2118*

Internal-combustion engines are said to operate more economically and more efficiently with the aid of an attachment that supplies a hotter spark to the firing points. The device is easily adjusted to any type of engine and is inclosed in glass so that the condition of the electrical system can be seen when the engine is running. Blue sparks indicate that the system is functioning properly, while red ones show a short circuit or some other fault. The hotter spark is supplied by breaking the circuit between firing points of manganese, a metal of high resistance, to increase the voltage. From a six-volt battery, 11,000-volt sparks are obtained.

Reasoning Co. Peoria, Ill.

CURB GAS HAZARDS IN FLYING
 BY AIR AND BLOOD TESTS

2068



Making Blood Test on Flyer after Trip in Plane, and
 Taking Sample of Air from Cockpit

To what extent is carbon monoxide a hazard to a pilot while flying, and how can the danger be eliminated? To answer these questions, the navy has been conducting a series of tests with different types of planes and with various flyers. The results showed that carbon monoxide can exist in deadly amounts below the normal breathing level of a plane's cockpit and that, in several types of planes, the exhaust leads should be changed so that fumes from the engine will not blow back in the direction of the cockpit chamber as the plane rushes through the air. During the tests, the ships were put through practically every possible maneuver, and more than thirty men were used as subjects. Medical-corps doctors rode with the pilot and passengers wherever possible, and each flight was of about four hours' duration, considerably longer than the average hop. By taking samples of the air in the cockpits before and after

the flight, and by testing the blood of the men under observation, data were obtained as to the presence of the gas and its effects. Blood samples were checked against laboratory standards that show the normal amount of carbon monoxide in the blood. Some of the subjects, under normal flight conditions, manifested a fifteen-per-cent carbon-monoxide absorption, a sufficient quantity to cause disturbing headaches and other troubles.

AGE OF WORLD IS REVEALED
 BY BIT OF METAL

How old is the world? The question probably cannot be answered definitely, but a bit of uraninite, a radioactive mineral from Russia, tells Dr. Alois Kovarik, professor of physics at Yale University, that the globe is at least 1,852 million years old. Uraninite is constantly changing its condition. By its own activity it becomes successively uranium, ionium, radium, polonium and, finally, a form of lead. Laboratory tests enable Doctor Kovarik to determine the rate at which the change is progressing and thus to tell the age of the piece of uraninite. Obviously, the world must be at least as old.

RAZOR BLADES GET KEEN EDGE
 IN IMPROVED SHARPENER

Adaptable to practically all kinds of safety-razor blades of the thin, flat type, an improved sharpener, now on the market, gives a keen edge by means of an abrasive-impregnated strop. This is considered an advance over a strop of ordinary leather, which merely smooths the rough edges of the razor without actually grinding a new bevel, as is said to be done in this sharpener. A few seconds' operation of the device which strokes the blade against the impregnated strop at an angle, leaves a sharp durable edge, increasing the blade's length of life.



The Keener Razor Sharpener Co. 3242 Mumma St. Toledo, Ohio.

ed Anacosta, 20. C

Shooting A Crater Oil Well Fire

ms By A. D. NUNN, 70 ~~Jackson St.~~
~~Amarillo, Texas~~

WHEN Tex Thornton, nationally known oil-well fire shooter, reached Refugio, Tex., one night last fall, the excitement there might have been likened to that in the vicinity of an active volcano.

In the residence district was a raging oil-well fire that was consuming 2,500 barrels of oil per day, and 85,000,000 cubic feet of gas. It was issuing from a crater, 130 feet deep and 170 feet across the top, which was widening on all sides, like some superhuman monster reaching for its helpless victims.

Three weeks before, this well, at that time a "gasser" only, had gone wild, and all efforts to cap it proved futile. The situation was growing rapidly worse. In a few days every water well in town was drained by the gasser, and drinking water had to be shipped in. Over a radius of three miles, the air became heavier with sand and gravel blown from the crater. The gas fumes were almost overpowering. The roar was deafening. The vibration was like that of a continuous earthquake, shaking houses and rattling doors and windows as though they were hanging loose. Through it all, was the fear that the gasser would catch fire—friction of pebbles against the casing, sooner or later, was bound to cause a spark.

Then it came! An explosion that rocked the town and sent mad flames skyward. After a few hours, the suction of the flames brought a heavy flow of oil into the well, greatly increasing the strength of the fire, which hung like a huge blazing blanket over the town. During the twenty-four hours that Thornton was on his way to Refugio, five houses had been burned and others were threatened.

There have been several big crater wells in south Texas, and one or two in Arkansas. They are peculiar to oil districts where the land is sandy with no lime formation to make solid ground. A deep well with high rock pressure blows out, tearing off the casing, piece by piece, and



Geyser of Flame from Burning Oil Well in the Santa Fe Springs Field near Los Angeles

gradually the mouth of the well is lowered into the ground. As this takes place, the gas goes upward and outward, like a mighty hurricane escaping from the large end of a funnel. The derrick and machinery go down into the crater, where they are broken and twisted and hurled into the air. The crater gets deeper and wider all the time. Meantime, the well may catch fire.

Thornton has extinguished five of these crater fires. Years ago, before his time, such a fire, near Corpus Christi, burned for six months. It was finally extinguished



by water from the bay, that was drawn into the well by suction of the fire.

There is only one way in which a crater fire can be put out, and that is by nitroglycerin. Steam is of no avail.

"If you had every boiler in the country going full blast," says Thornton, "the steam could only circle around the top of the crater, never actually touching the fire. There is too much pressure."

The preliminaries to the actual shooting of the fire at Refugio were gigantic and, in order to save the town, had to be accomplished with all possible speed. All the available men, about 100 in all, were hired, and, after accident policies had been written for them, put to work. An army of trucks was recruited. Pumps for drawing water up from the bay, a mile distant, were installed; water pipes were laid; a reservoir for storing water for the protection of the town was dug; houses were wrecked—eight, which had from five to seven rooms each—to make a clean gap between the well and the main part of town.

Three of the pumps, the largest made,

were placed at the bay and with two others at the well kept a continuous flow of water, through six and eight-inch pipes, pouring into the crater, which had to be cooled before the shooting could be done, or the hot ground would have caused the gas to re-ignite after the fire was out.

The mud was one of the most appalling phenomena connected with the burning well. It came up in chunks of all sizes, some of them weighing hundreds of pounds. "It was just too bad for anybody or anything that this mud happened to land on," said Mr. Thornton; "for it was exactly like molten plaster of Paris. To remove it from the body meant taking skin and flesh, too. Several times it penetrated my asbestos suit.



Tex Thornton and His Gun of Nitro near Oil-Well Fire, and, Below, Clad in Asbestos Suits, Preparing to "Shoot" a Crater Fire

"On account of the eruptions of mud, it was eleven hours before we could stay at the well long enough to do any effective work. We would time the flow and, when we knew it was rising, would dash to a sheet-iron protector."

Much of Thornton's work had to be done at the rim of the crater. This rim

Econohet Co, W. 455
122 S. Michigan
Chicago

POPULAR MECHANICS

#69.50

was a ten-foot embankment of hot alkali mud in which he would bog down to the top of his asbestos boots. To make the going easier, he blasted the rim in several places; but even so the going was pretty tough.

Before the water was deep in the crater, Thornton selected the place where he would slide the shots in. To find a smooth enough route—one that was free from the benches formed by gas pressure—he actually went down into the crater, a roaring furnace of flames. He accomplished this almost incredible feat by keeping a stream of water between him and the fire.

When all was in readiness for the shooting, thirty-six hours after he came to Refugio, Thornton blasted a path through the rim. Then with his explosive in two thirty-five-quart shells, which were kept cool by water from three hose lines, he made his way to the brink of the crater and slid the shots to the bottom of it. Then he ran. He was at a safe distance when the explosion came.

Since it was dark when the fire was extinguished, the well could not be capped until morning. Thornton watched all night to see how the oil flow was going to behave. If it started to spray, his intention was to fire the well again, otherwise the town would be soaked in oil and, in case the well had caught fire later would have burst into instant flames. But nothing untoward occurred during the night, and the next day the well was capped.

This was done by extending pipe down to the other casing, and then filling the crater with cement which set around the casing and prevented gas from pressing up around it. Two car loads of cement were used.

GAS HEATER RESEMBLING RADIO ALSO MOISTENS AIR 210

210

Resembling a radio cabinet in appearance, a small gas space heater that moistens and purifies the air as it warms it, now is on the market. The gas is burned at about 1,650 degrees Fahrenheit so that combustion is complete and no vent is needed. Air is drawn into it and dust and germs are consumed while the moisture in the gas is turned into vapor to

Passed by American Gas Association



Gas Heater Shaped Like a Radio Cabinet, Which Warms and Humidifies Air at the Same Time

humidify the air. Instead of heating by radiation, it warms by bringing cool air into direct contact with the hot flame, with the result that the outside of the cabinet remains cool except where the warm air escapes.

ELECTRIC OIL WARMER IN CAR SOLVES WINTER PROBLEM 2138

2138

Easily installed, an electric coil that rests in the motor oil, quickly warms the lubricant at the turn of a switch, reducing the trouble of starting in cold weather and saving the damage that results to the engine when running with oil in improper condition.

Kunch Peak



Pat # 1,507,301

may be left in all the time as it functions only when the switch is on.

Specially Sales Co
301 Badger Row Bldg

Chicago, Ill.

1264 219th St
2109 Sheboygan Wis



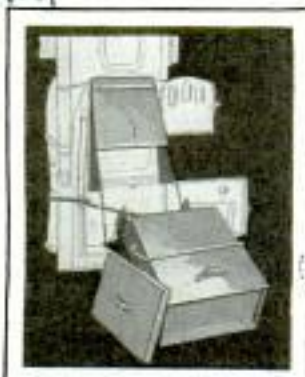
Golf Course for the Parlor Floor; by Changing Shape of Frame or Position of Hazards, Many Different Shots Are Possible

GOLF COURSE FOR THE PARLOR IN ADJUSTABLE FRAME

Eighteen holes of golf are combined in one unit in a miniature course for the parlor floor, intended to offer closer imitation of the real game by means of an adjustable frame which can be arranged in various shapes to represent different holes, hazards and playing conditions. As soon as one hole is played, the appearance of the course can be changed by altering the position of the cup or the shape of the course itself.

ASH CONTAINER FOR FURNACE ELIMINATES DUST

2121



Dust and dirt from the removal of ashes are practically eliminated with an ash container which can be adjusted to any size or type of furnace with thumbscrews. It consists of a tight metal pan into

which the ashes come from the furnace, no shovel being used to remove them. The container, which also eliminates fire hazard from smoldering ashes, is provided with cover and handles and is operated by opening both ash pit and fire door. Air from the basement is caught and carried to the center where crosscurrents create a draft.

ELECTRIC MACHINE DUPLICATED BY STUDENTS

2114

In his early experiments with electricity, Benjamin Franklin constructed what is probably one of the earliest pieces of apparatus made expressly for the purpose of

generating electricity, and which may be considered the parent of all the huge electric generating machines in use today. Crude as it was, this device was capable of giving off sparks when a large wheel was revolved. The machine is in the possession of the Franklin Institute of Philadelphia and has always been in wide demand for exhibition wherever electrical apparatus is displayed. At first the original was sent to such exhibitions, but it was often damaged, and recently a replica was made of it by students of a trade school. Exact sketches and drawings were made by students of design and drafting, those in the woodworking department finished the wood parts, patterns were made in the pattern shop and castings in the foundry. This replica is now to be used for exhibition purposes, while the original will remain in the institute.



New Advance Machy Co
Van Wert, Ohio

Spring Garden
Copyrighted material
Philadelphia

Novustown, Pa.
**TINTED ASBESTOS PIPE COVER
 IS EASILY CLEANED** *2144*

Instead of the old muslin or canvas surface for asbestos covering for steam pipes, the present-day desire to convert the basement into an extra room for the house has resulted in the production of a tinted asbestos for this purpose. This insulation comes in convenient lengths finished in a glossy colored surface that does not catch dust and can be wiped with a damp cloth. The finish is not a paint but is worked into the asbestos itself.

Thermo Lux
**GLASS PASSES HEALTH RAYS
 SPEEDING PLANT GROWTH** *2086*

Window glass of unusual strength, luster and whiteness, which has the peculiar property of transmitting a substantial amount of healthful ultraviolet rays excluded by ordinary window glass, has been introduced recently for homes, greenhouses and many other purposes. Its unusual characteristics are apparent even at sight. Hold ordinary glass edge-wise and a deep-green color is seen. This new glass is "white," or practically colorless, from the edge perspective. Special materials and methods of manufacture give the glass its ray-transmitting and other improved features. It is drawn off in flat sheets instead of being rolled in cylinders, it is given a fire finish to increase its strength, and an acid bath insures a thorough cleaning and makes the material impervious to fading or staining after exposure. The accompanying illustration shows interesting results with the glass in raising plants. The shoots were all raised under identical conditions as to temperature, soil and other factors, the only difference being in the various samples of glass. The new glass has been tested at the bureau of standards.



Front View of the Steel-Paneled Cage Window and Diagram Showing Position of Plates

**POLISHED-STEEL BANK WINDOW
 FOILS BANDITS' BULLETS**

To protect bank tellers against bandits' bullets, an Omaha man has introduced a window consisting of a series of highly polished steel plates, set diagonally so that persons can see each other from opposite sides of the cage, but acting as a shield against bullets. A shot fired at the man inside the cage would strike one of the plates, be deflected against another and drop before it could reach the interior. The openings permit conversation and also allow for ventilation. According to reports, tests have proved the success of the arrangement and its suitability for a teller's cage or a complete inclosure.

Lushness

	ULTRA VIOLET GLASS	GLASS No.2	GLASS No.3	GLASS No.4
TOMATO				
ROMAINE LETTUCE				
ICEBERG LETTUCE				

Results in Growing Different Vegetables under Special Glass, Compared with Other Kinds

Chicago - 120 S Michigan
 American Window Glass Co.
 1600 Farmers Bank Bldg Pittsburgh

2697
471
P. O. Derleby, Omaha
820 3 N. 25 St.

Empire Co. Sintonberg, Iowa

Building A Midget A.C. Receiver

By F. L. Brittin
and J. O. Barnes



gram, on this page, is especially designed to take advantage of the high amplification possibilities of the screen-grid tube, and provides a means of untuned r.f. amplification that does away with the necessity for a number of coils and ganged tuning condensers in the r.f. stages. This permits the use of a circuit that is simpler, more compact, and certainly less costly than the usual tuned r.f. design. This r.f. amplifier requires tuning only in antenna circuit, which could be done with a single inductance and a condenser, but in this case a simple band-pass filter was used to obtain better selectivity, a feature found only in large receivers.

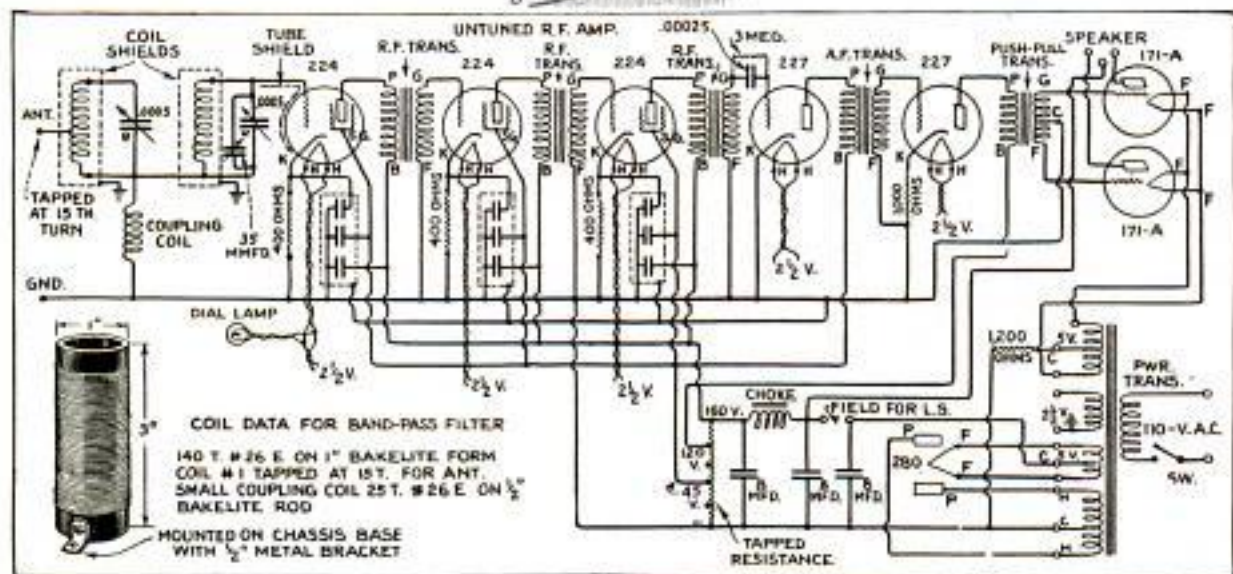
THE popularity of the midget, or so-called "mantel-type," radio receiver is easily understood, as it takes up little space, is economical and gives satisfactory result on local and distant stations within reasonable limits. The set described here, which has been designed to take advantage of several late circuit developments, contains no special parts that the builder cannot purchase or make himself.

The new form of iron-core r.f. transformer, shown above the schematic dia-



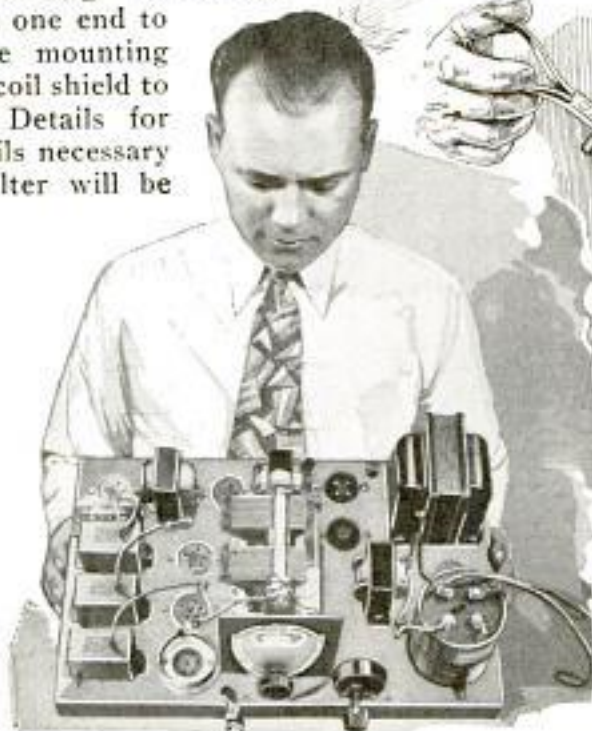
The coils for this filter are hand-wound, and the two ganged tuning condensers for them are mounted on top of the coil-shielding cans to save space. The circuit consists of the band-pass filter, three untuned r.f. stages employing type-224 screen-grid tubes, a 227

Plywood and ornaments

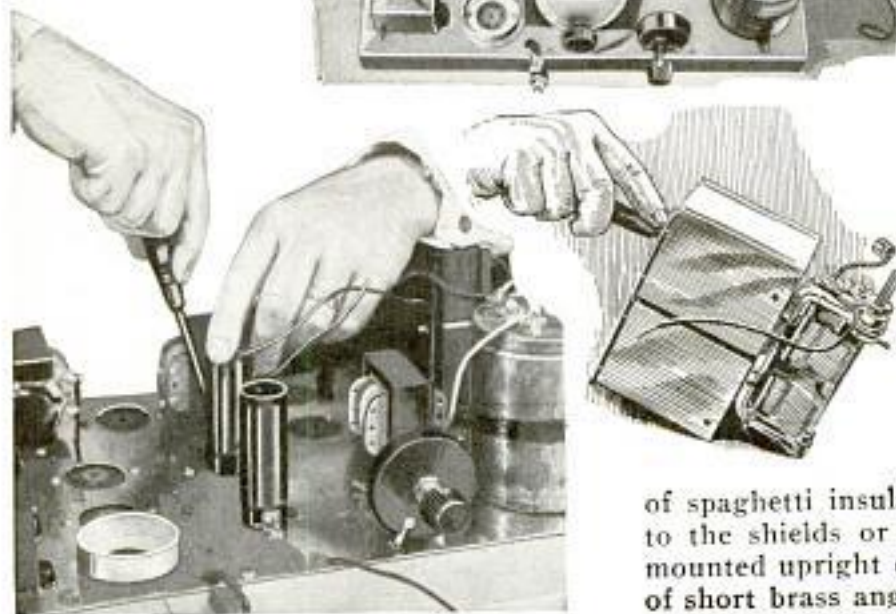


detector, a 227 for the first audio and two 171-A power tubes in push-pull.

The fixed-condenser blocks, shown within the dotted lines in the schematic diagram and with the terminals numbered 1, 2, 3 and 4 in the simplified wiring diagram on page 474, each consists of three .25-mfd. metal-cased condensers, or units of similar capacity can be used. These units may be seen in the under-panel photo at the upper left-hand corner of the same page. The location of the small coupling coil for the band-pass filter is also pointed out in this photo. The coil, indicated in dotted lines on the simplified diagram, is wound on a bakelite rod $\frac{1}{2}$ in. in diameter and $1\frac{1}{8}$ in. long. The rod is drilled and tapped at one end to fit onto one of the mounting screws that hold the coil shield to the metal chassis. Details for winding the three coils necessary for the band-pass filter will be found at the left of the schematic diagram. Note that one end of the coupling coil is grounded on the chassis, the other end being led to a soldering lug mounted on the end of the bakelite rod. The lower ends of the other two coils



at B are led down through holes in the chassis near the base of each coil and also terminate at the same lug. Enough wire must be left at each end of the coils for these connections; the top lead of these larger coils is brought out through a hole in the side of each coil shield and connected to the stator of its respective tuning condenser. All of these leads should be covered



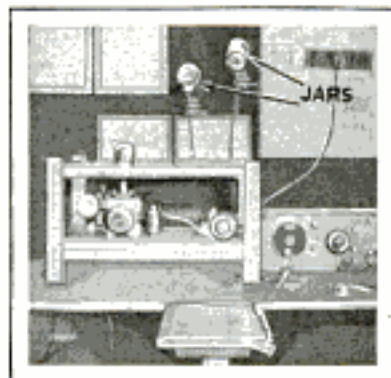
with a good grade of spaghetti insulation to prevent shorts to the shields or chassis. The coils are mounted upright on the chassis by means of short brass angles screwed to the bot-

without charge. Further circuit data with complete details for the construction of the cabinet shown at the head will appear in the April issue.

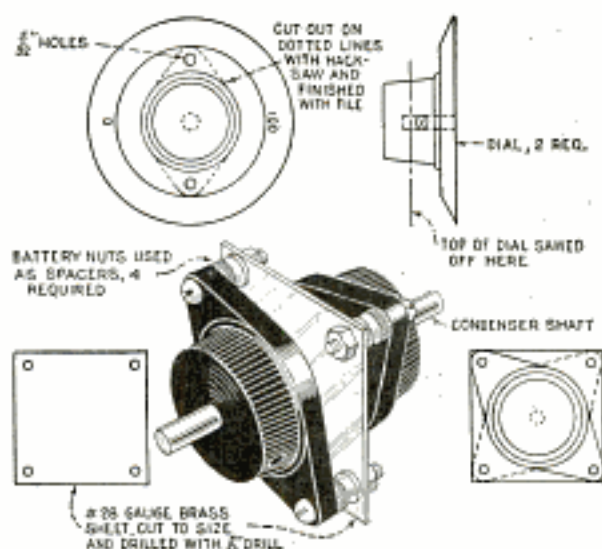
Homemade Lead-In Insulators

A good antenna installation does not merely mean a well-insulated wire elevated above the roof. The lead-in wire must be just as carefully insulated. This applies to both receiving and transmitting antenna, but in the latter case greater attention must be paid to detail in order to save energy as far as possible. The best method of bringing in a lead-in wire or a pair of antenna feeders is to drill the window glass at points at least 6 in. from the sash to receive threaded brass rods supported by glass-jar insulators as shown. The same type of lead-in insulator can be used through wooden partitions as shown at the left. In this case a hole much larger than the diameter of the brass rod is required so that the rod will clear the wood by at least $\frac{1}{2}$ in. This method, however, is only practical for the outdoor radio shack and is not as efficient as the other. The holes in the jars may be drilled in the following manner. Drive a 10-penny nail into the workbench so that the head is nearly flush with the bench and place the glass over it, right side up, making sure that the head of the nail just touches the bottom of the glass. Pour a little turpentine into the glass and drill with a hand drill directly above the point where the nail touches the glass. When the drill comes through the glass, proceed slowly and turn the drill back and forth a few times until the hole is smooth. The assembly is quite simple, the rubber washers used being cut from an old inner tube. — Robert I. Crowell, Boston, Mass.

Ⓢ No damage to the receiver can result if the ground wire happens to be attached to the antenna connection.



Right, Details for Insulator Assembly; Left, Homemade Lead-In Insulators Installed in the Writer's Radio Shack



Diagrams Showing Constructional Details of Homemade Coupling Unit, and Completed Assembly

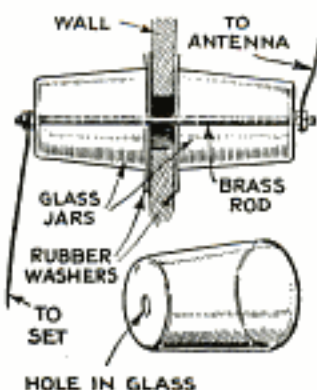
Coupling for Ganging Condensers Made from Odds and Ends

An insulated coupling for connecting the shafts of two or more variable condensers so that they can be controlled together may be made from two old tuning dials and a few odds and ends. Such a coupling also may be used for a variety of other purposes by the radio experimenter.

Using Two-Volt Tubes in Old Sets

The high efficiency of the new type-30 and 31 two-volt tubes makes them particularly attractive for use in the older models of battery-operated receivers. Although of very low current drain and designed for operation with dry cells, they can also be used with the old 6-volt storage battery, provided a suitable filament-control device is used to reduce the applied voltage to 2 volts and keep it within close limits.

Amperites Nos. 630 and 631 will serve this purpose. This arrangement provides four times as many hours of radio entertainment for a single charge of the battery as the standard 5-volt $\frac{1}{4}$ -amp. tubes.



Thordarson Mfg Co, 500 W. Huron
Chicago

Hints and Kinks



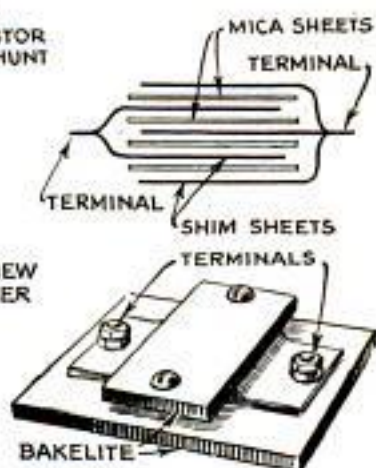
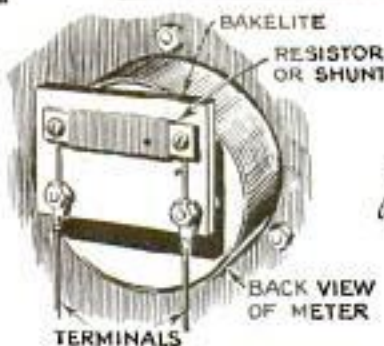
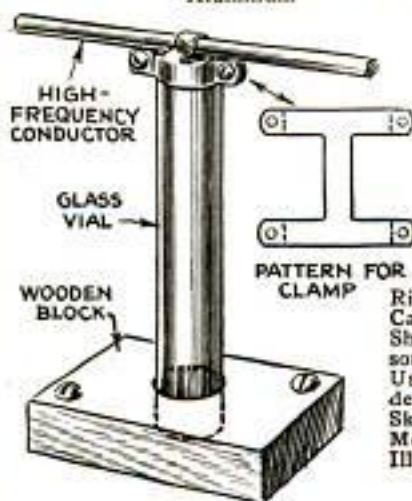
Large Porcelain Insulators Prevent Leakage across Terminals of High Voltage Power Transformers

Below, Hum Caused by Defective 227-Tube Can Be Quickly Detected by Touching the R. F. Tube and the Detector Simultaneously



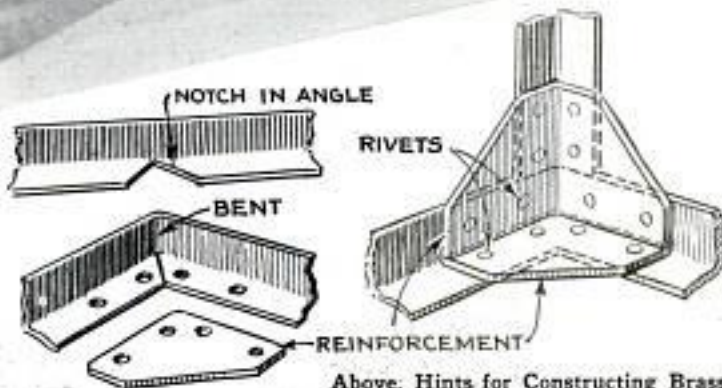
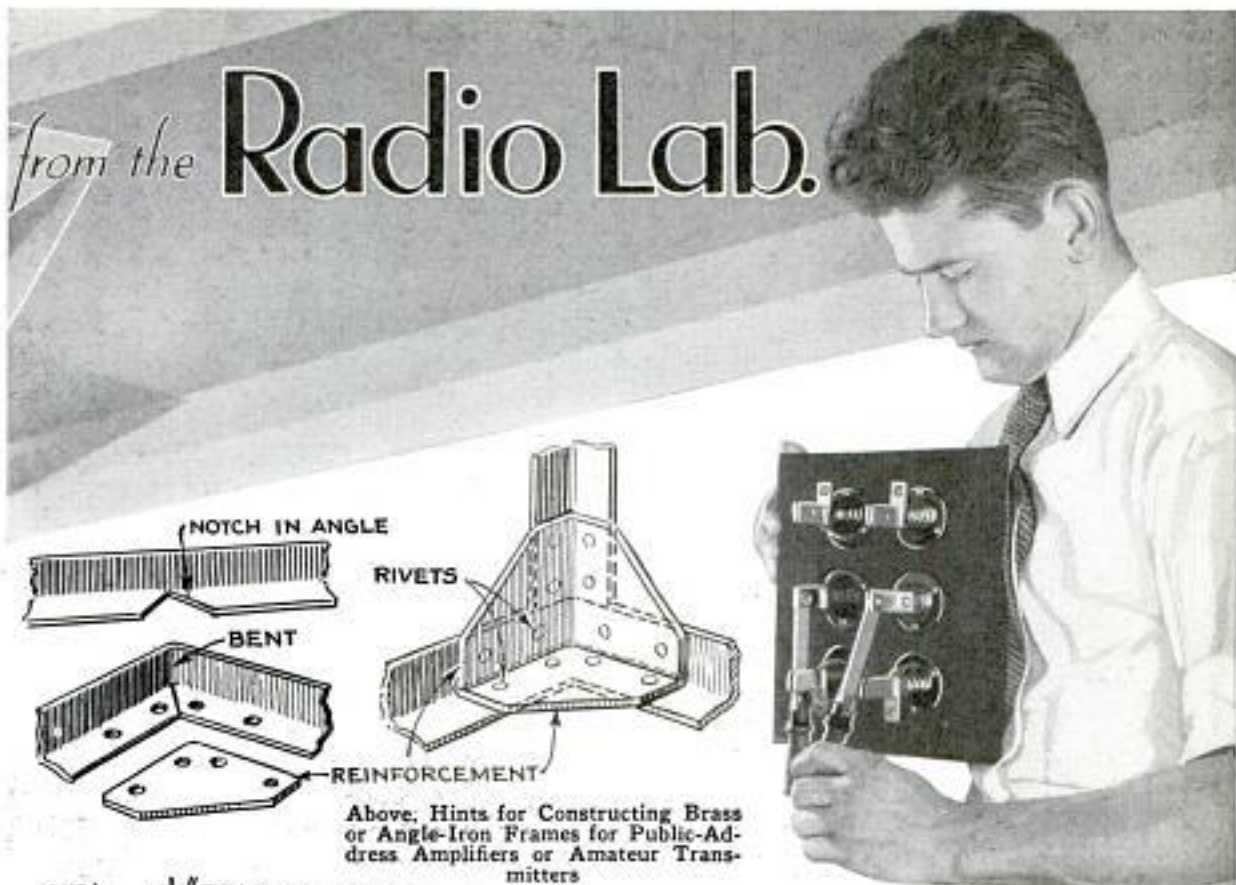
Lower Right, a Convenient Method of Mounting Shunt, or Multiplier Resistor on Meters in Test Kits and Other Radio Equipment; the Unit, Fastened Directly to the Back of the Meter, Does Away with Complicated Wiring and Makes a Compact Assembly

Below, a Stand-Off Insulator Made from a Glass Vial; the Clamp Is Cut from Light Sheet Brass or Aluminum

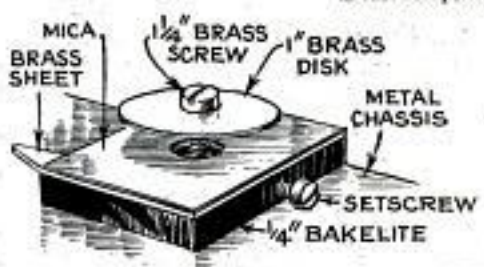


Right, Homemade Fixed Condensers Can Be Made from Ordinary Brass-Shim Stock Available at Auto-Accessory Stores; Thin Sheet Mica Is Used for the Dielectric; the Condenser Is Made by Piling Up Alternating Sheets, as Shown in the Upper Sketch, Until the Desired Number of Metal Plates Are Obtained; Connect Metal Sheets as Shown and Clamp between Bakelite for Mounting, as Illustrated Below; If Desired, the Condenser May Be Impregnated with Paraffin to Exclude Moisture

from the Radio Lab.



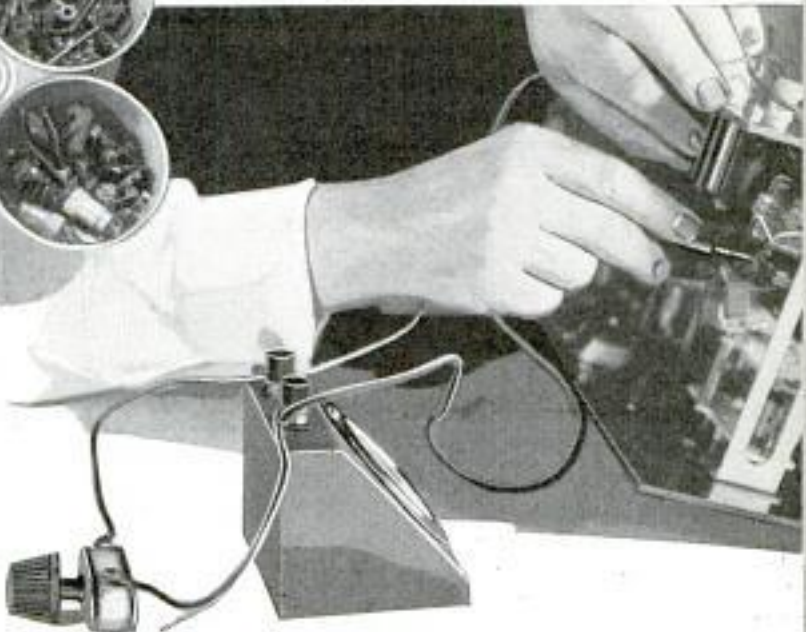
Above, Hints for Constructing Brass or Angle-Iron Frames for Public-Address Amplifiers or Amateur Transmitters



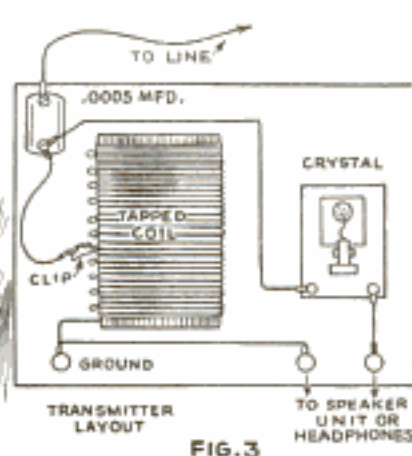
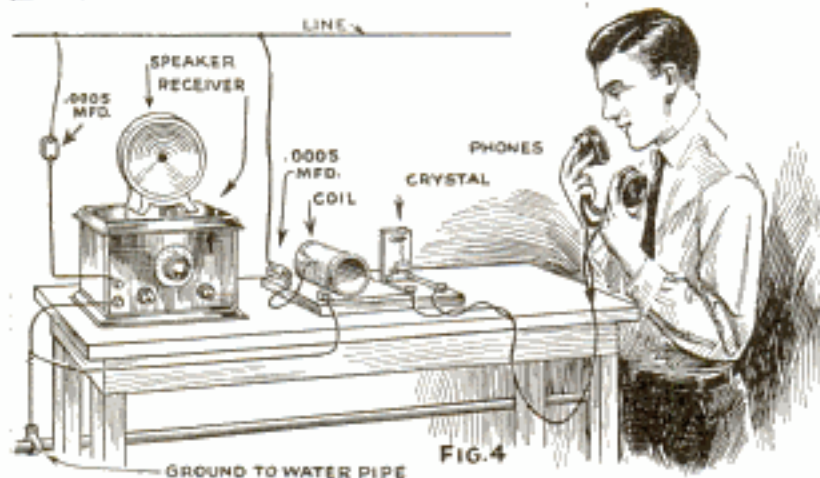
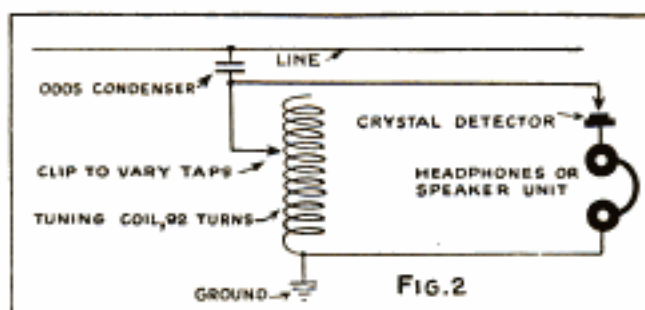
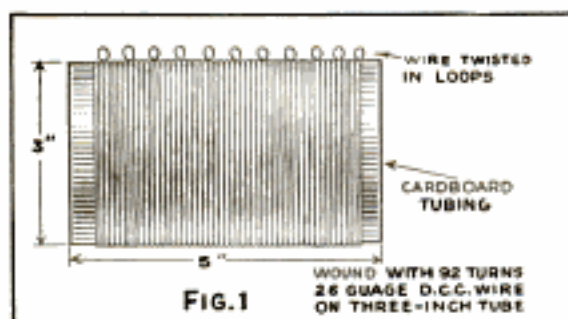
Above, Porcelain Stand-Off Insulators Used to Mount Change-Over Switches Where High-Frequency Currents Are to Be Handled with a Minimum of Loss; Left, a Handy Trimmer Condenser for Alining Ganged Condensers; a Hole Is Drilled in Metal Chassis at Mounting Point and Tapped to Take the Brass Screw Carrying the Upper Disk; the Mica and Brass Sheets Are Shellacked to the Bakelite, and Setscrew Locks Assembly When Adjusted; Screw in Chassis Is Grounded Terminal and Lug Goes to Gang Stator



Left, Muffin Pans Make an Ideal Receptacle for Screws, Nuts and Small Radio Parts That Are in Constant Demand at the Workbench



Right, Rheostat Used as a Variable Shunt for a Milliammeter Protects Meter from Damage Likely to Occur from Unexpected Current Surges and Is Also Handy for Adjusting a Low-Reading Meter to Read One-Half or Less of Minimum Load; Then, When It Is Placed in Series with Maximum Load, the Experimenter Can Multiply the Reading by Any Desired Ratio for Total Current Reading



Wired Wireless for the Experimenter

How would you like to talk to your friend across the way or down the street? This may be easily done by those who are experimentally inclined, and the results are very fascinating. The connecting wire may be strung according to the usual methods employed by boys for years past to hook up back-yard telegraph and telephone lines, care being taken not to approach any lighting or power lines. The parts used are those owned by the average radio fan. A crystal set is used as the transmitter in connection with any three-tube receiver of the regenerative type. The crystal set, Fig. 3, consists of a homemade tuning coil, wound as in Fig. 1, and a crystal detector, connected as shown in Fig. 2. A good set of headphones and a speaker are also required. The connections from the receiver and crystal transmitter are both taken directly to the line, as shown in Fig. 4. When transmission is started, the regenerative receiver is made to oscillate, then, listening in on the crystal set, the latter is adjusted to the oscillating wave emitted by the receiver. Now, by speaking into the headphones connected to the crystal set, the voice will be heard at the remote receiver. The voice

will come through fairly loud and can be heard from the loud speaker. To answer, the same procedure is followed at the other end of the line. A second loud speaker can be used as a microphone instead of the headphones if desired. A transmission schedule may be arranged, or a bell system for signaling on the same line can be installed and operated with dry cells. No one can listen in on your conversation unless they are provided with the same equipment, and no radio amateur license is required for this type of transmitter.—D. A. Brown, Marion, Ohio.

Test Your Tubes Often

In the days of the old tungsten-filament tubes they were used until they failed to light, but present-day tubes employing oxide-coated filaments and heaters, will continue to light long after they have ceased to be useful. It is obvious, therefore, that the only way to ascertain if a modern tube is functioning properly is to test it, or have it tested, at frequent intervals.

For further information on any radio construction article write to the radio department; this service is free.

Building Portable S-W Transmitter

By GILSON V. WILLETS Part 2

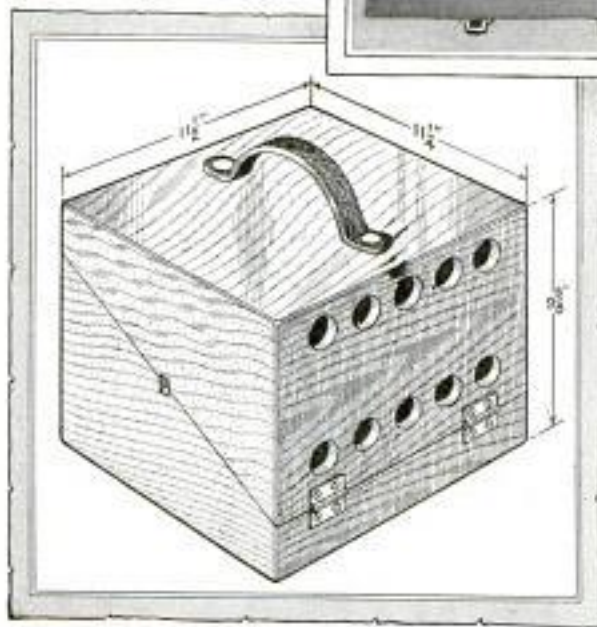
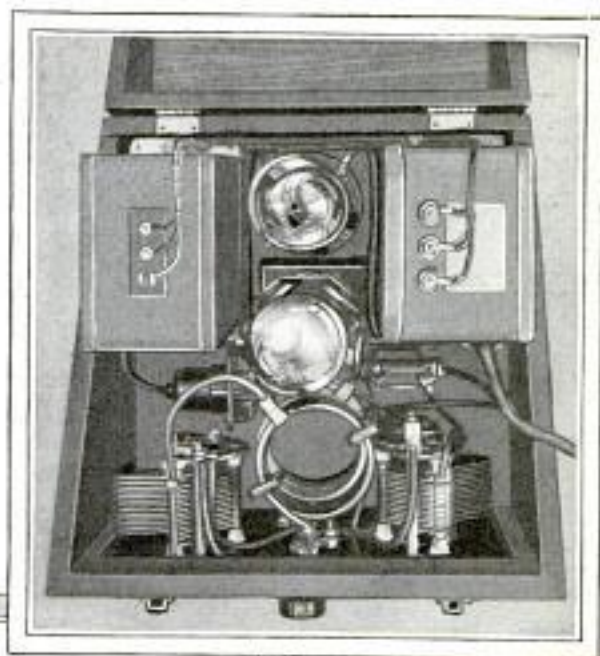
THE assembly and wiring of the two units composing this transmitter and described in Part 1, being completed, we will now take up the construction of a suitable carrying case together with antenna details and optional power supplies. The male plug used in the transmitter is permanently mounted in the oscillator unit and is used in conjunction with a short flexible cable connected to the half-wave power unit. This assembly may be used at any location where a 110-volt 60-cycle supply is available.

The carrying case is shown in the rear view sketch and photo. It is constructed from $\frac{1}{2}$ -in. material and the inside dimensions are $10\frac{1}{4}$ in. wide, $10\frac{1}{2}$ in. long by $8\frac{1}{4}$ in. high. The outside measurements are given in the sketch on this page. These dimensions apply to the case shown in the photo on page 480, which happened to be a discarded battery-eliminator box and may be varied to suit the builder. When the transmitter is to be used at the home station, full-wave rectification may be easily obtained by the use of an outside source of current. A conventional diagram for a power supply of this type appears at the lower right on that page.

Note that the leads are all brought out to an additional female plug numbered to correspond with the numbers on the male plugs in the oscillator unit. Enlarged diagrams of all circuit layouts are available.

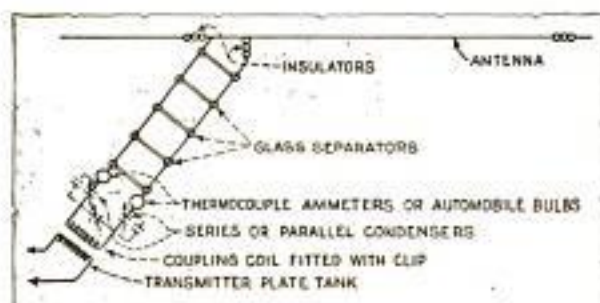
A third female plug may be used when operating the transmitter with batteries at points where an a.c. supply is not available; this diagram is shown at the left.

Eight 45-volt No. 486 Eveready batteries, or their equivalent, are used for the B-



power. The A-supply is a 4-cell 8-volt battery of the type used in talking motion-picture installations. If such a battery is not available, an ordinary 6-volt A-battery with an extra cell may be used. In either case, the 5-ohm fixed resistor is necessary in the filament circuit to regulate the volt-

age; a complete material list of all parts may be obtained upon application.



APPROXIMATE LENGTH OF EACH WIRE	1750 K.C. 165 M.	3500 K.C. 80 M.	7000 K.C. 40 M.
120	SER.	PAR.	PAR.
90	PAR.	SER.	SER.
60	PAR.	SER.	PAR.
40	---	PAR.	SER.
30	---	---	SER.
15	---	---	PAR.

With these three plugs, it will be observed that the manual operation of the transmitter is exactly the same, even to the switch for controlling the power supply that is mounted on the front panel. The key should be mounted on a portable base and connected by a flexible cord to a single-circuit plug. This fits into the jack on the front panel. If a Morse key is used, the bar may be closed when tuning the transmitter, and, if desired, the key may be mounted on the top of the transmitter box.

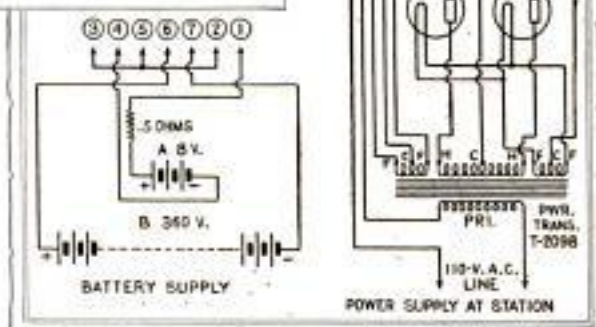
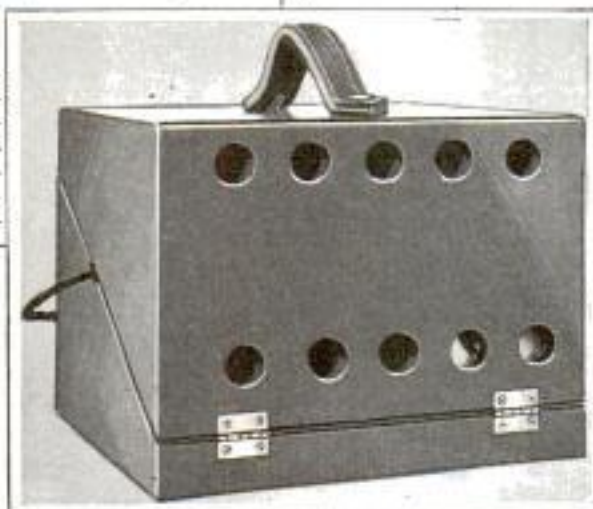
The dependable range of this transmitter is about 250 miles day or night with a properly tuned antenna circuit. During tests this transmitter, W6EEZ, reached from San Francisco to Australia, and on one occasion, a two-hour key conversation was effected at that distance.

A standard Zeppelin-type antenna should be used for best results, but a simple inverted-L antenna and ground may be used if desired. In either case, connections are made with midget plugs in the midget jacks J₁ and J₂ on the front panel (see Part 1).

As the set is designed to operate throughout the 40-meter band, a frequency indicator, tuned and locked to the center of that band, should be carried by the operator. He may also carry two 0-to-1 amp. thermocoupled r.f. ammeters to assist in obtaining maximum radiation. One should be mounted in each antenna feeder, as shown in sketch at the top of

this page. If desired, these ammeters may be screwed to the top of the box and connected with flexible leads to the front panel jacks. Lacking these radiation meters, the operator may use small flashlight lamps.

The sketch of the Zeppelin antenna shows the method of tuning the feeders either in series or parallel, the choice depending on the length of the feeders as shown in the chart. As we



are dealing with the 40-meter band, feeders either 15, 60 or 120 ft. long are used, parallel tuning is recommended and only the tuning condenser connected across the antenna coil in the set is required. The extra variable condenser of the same capacity is required when the length of the feeders is such that series tuning is necessary.

The best length of the horizontal wire is 66 ft. The separators for the feeders are 10 in. long and may be glass rods or light wood strips that have been boiled in paraffin to drive out all moisture. Note that one feeder is dead and terminates in an insulator fastened to the horizontal portion of the antenna. These feeders must be drawn taut to prevent swaying in high winds.

The Zeppelin antenna, of course, may be made to be coiled up and transported with the set.

Drilling Bakelite

Drills dull quickly when used on bakelite and similar materials, but their cutting edge will last much longer if the end of the drill is run through a cake of soap at intervals. Lubricated in this way, the work is not messed up, but the drill cuts a clean polished hole through the material. A flat piece of hardwood should be placed under the bakelite panel while drilling so that the hole will have a clean edge on the underside.—Ross J. Plaisted, Brecksville, Ohio.

is brought firmly against it and spun rapidly, thus removing the shiny aluminum surface in a circle as large as the end of the stick. The process is repeated until the entire panel is covered with these overlapping circles.—Charles Felstead, Los Angeles, Calif.



Tone Control for Every Radio Set

One of the outstanding features of the receivers offered to the public during the past year has been a means of tone control. This feature has now been made available for all radio sets irrespective of type or age. The device is shown in the accompanying illustration and is connected to the radio set by slipping small connector disks over the prongs of both power tubes in push-pull installations, or

over the prongs of the power tube, and connecting the other lead with the ground binding post. The control is made with a felt bottom,

for use on any table or on top of the receiver cabinet. No tools are required for installation.



Machining Aluminum Radio Panels

A pleasing machine finish can be given to aluminum radio panels with a round piece of wood and a drill. A piece of broom handle or dowel stock, about 3 in. long, may be used. A large nail, with the head cut off so that it will fit the drill chuck, is driven into the center at one end and a piece of fine emery paper is fastened to the other, where it is held by a rubber band. A hand drill can be used, but a small electric drill is preferable. The panel is placed on a flat table and clamped down. The emery-covered end of the tool

Quartz-Crystal Tube to Eliminate Interference

The photo shows a quartz-crystal tube, invented by Dr. James Robinson of England, and used in a new circuit for the transmission and reception of broadcast signals without sidebands. This means that the new device would permit complete separation of all broadcasting stations without the necessity of the 10-kilocycle spacing now in force. Claims have been made that 1 kilocycle or even less would be practical. The quartz-crystal is used instead of a number of sharply tuned r.f. stages in order to obtain high selectivity. The band passed by this crystal circuit is only about 50 cycles wide, therefore any interference on a frequency different from that of the desired station by more than 50 cycles would not be heard. This "Stenode Radiostat system," according to the inventor, will not only be a means of eliminating interference but will make more channels available for broadcasting and will also be useful in advancing the art of television.



Chicago - L. W. Cushing, 9 S. Clinton

Arthur W. Lynch Co. 13 Broadway New York 57 St Ave +

Clarostat Mfg. Co. 285 N. 6th, Brooklyn NY

Experimenting with the Pentode Tube

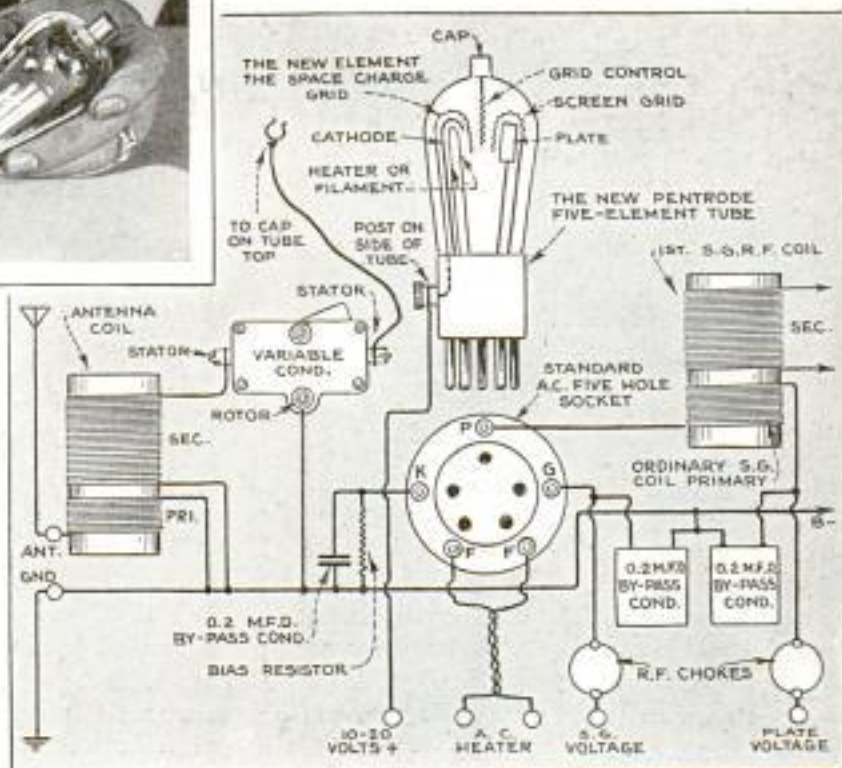


For those who like to do a little experimenting with new tubes the "pentode," or five-element tube, offers an interesting subject. The photo at upper left shows one of these new tubes and the location of the tap on the side of the base for the new element, the space-charge grid. The simplified wiring diagram shows how the new tube is used, and the experimenter can work out a number of interesting circuits, using this diagram as a guide together with the characteristic data that comes with the tube. The chokes and by-pass condensers must be used for maximum sensitivity and stability.—Henry Laraby, New Haven, Conn.

Mastering the Radio Code

Many radio beginners with only a slight knowledge of the code attempt to send and receive on practice buzzers as rapidly as possible, but this is a mistake. To learn the code thoroughly requires time together with a gradually increasing rate of speed. Another common practice to be avoided is that of mastering the code alphabetically; that is, to repeat the letters A, B, C, and so on, in alphabetical order. This is confusing and actually requires more time than the new method of teaching code. This is quite simple. The letters are arranged in groups of four or five characters, which have the same general characteristics; for example, the characters made up of dots only, are first mastered as a group, then those made up

of dashes, and later the letters combining dots and dashes are grouped and practiced. If this system is followed, speed in sending and receiving is acquired in much less



time. The sound method of instruction trains the beginner so that, upon hearing a character, he translates it immediately and instinctively.

Plug-In Coils for Amateur Transmitters

Plug-in coils can now be used for high-power amateur transmitters. The plugs are designed to carry up to 75 amp. with safety. Heavy aluminum rod is used for the self-supporting coil. The spacing bar is made of special insulating material, and porcelain insulators of the stand-off type serve for mounting. The curved bars under the coil



under the coil are electrostatic shields to keep strain out of the insulators. These coils are available for the following amateur bands:

9.6 to 27 meters, 14.2 to 43 meters and 31.8 to 90.3 meters.

New Products, Inc.
4611 Ravenswood
Chicago

AMATEUR MECHANICS

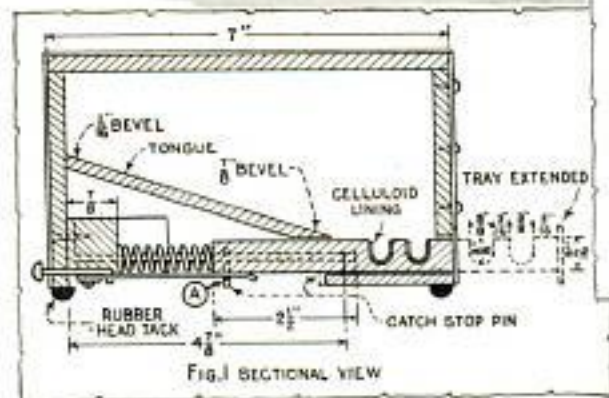
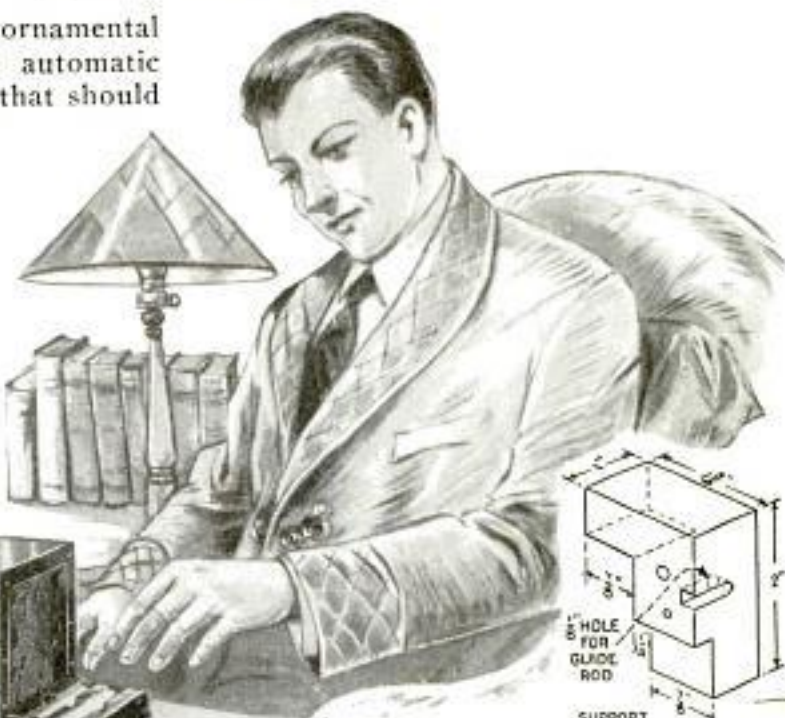


Etched-Brass Cigaret Dispenser

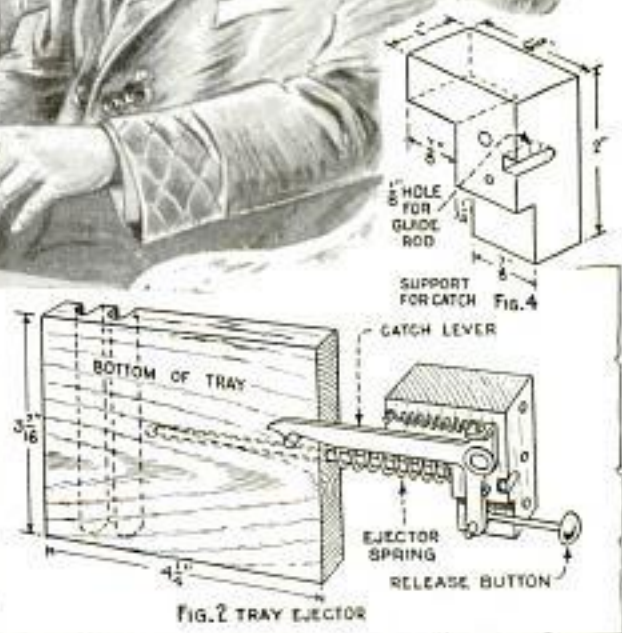
By FRANK L. FISH

POSSESSING a distinctive ornamental charm, this etched-brass automatic cigarette dispenser is an article that should have a strong appeal to every home craftsman.

The dimensions of the two sides are 4 by 7 in., while the top is $3\frac{1}{2}$ by 7 in., and the back end $3\frac{3}{4}$ by $3\frac{1}{2}$ in. In laying out the front end, allowance must be made for the tray opening, which makes its dimensions $2\frac{7}{8}$ by $3\frac{1}{2}$ in. The bottom



edge of this end should be slightly rounded on the inside. The slanting tongue, as shown in Fig. 1, supplies the ejecting tray with cigarettes by gravity. It measures 5 by $3\frac{1}{2}$ in., has a $\frac{1}{16}$ -in. bevel on the up-



per end and a $\frac{7}{8}$ -in. bevel on the lower end, which is in contact with the tray. The support for the latter is $2\frac{1}{2}$ by $3\frac{1}{2}$ in., and its top, sides and ends are made from the $\frac{1}{4}$ -in. stock.

The ejecting mechanism is so simple and sturdy that by a light tap of the finger on the release one is instantly served two

cigaretts, a process which will repeat itself as long as the supply lasts. The support for



the mechanism should be shaped as shown in Fig. 4, where all dimensions are given. Drill a $\frac{1}{4}$ -in. hole as indicated, and cut a groove in the back, $\frac{1}{8}$ in. wide and $\frac{1}{8}$ in. deep, to hold the end of the guide rod. Three metal parts constitute the mechanism. First is the guide rod, made of $\frac{1}{8}$ -in. iron wire, $\frac{5}{8}$ in. long. One end is rounded, while the other is bent at right angles $\frac{1}{4}$ in. from the end. The catch is cut from No. 20 gauge sheet brass. Follow carefully the shape shown in Fig. 2, as the catch is an important part of the mechanism. Tension on the catch is supplied by a small coil spring, of the contraction type. It is approximately $\frac{3}{16}$ in. in diameter and $\frac{3}{4}$ in. long. The ejector coil spring is of the compression type, and should be rather loosely coiled, that is, with just enough strength to push out a loaded tray easily. The tray is made of hardwood, $\frac{5}{16}$ in. thick. It is $3\frac{7}{16}$ in. wide and $4\frac{1}{4}$ in. long, with two $\frac{5}{16}$ -in. grooves cut and spaced as shown in Fig. 1. Sand smooth with fine sandpaper, then drill a $\frac{3}{16}$ -in. hole, $2\frac{1}{2}$ in. deep, exactly centered in the back of tray as shown in Figs. 1 and 2. Stain the tray black, and glue two pieces of thin white celluloid, 1 by $3\frac{7}{16}$ in. in dimensions, in the grooves.

Any suitable design or monogram can be used. The one shown in Fig. 3 is rather attractive. The design is laid out on a paper pattern to size, after which it

is traced on the brass with carbon paper, keeping the metal surface entirely free from grease. Cover all parts not to be etched with asphaltum paint thinned with turpentine until it flows from the brush. Allow the paint to dry overnight. Then immerse the plate in a solution consisting of nitric acid, 1 part, and water, 2 parts. Be sure to pour the acid into the water otherwise the mixture will sputter violently and serious burns may result. Rock the pan gently to agitate the solution as it etches much faster when in motion. If gas fumes are very noticeable, or the solution turns to a greenish-yellow color, with excessive bubbling, add a little water. Look at the plates frequently to note the progress of the work. Wear rubber gloves to protect your hands against acid burns.

After etching to the desired depth, which takes from 45 minutes to 3 hours, wash the plates in clear water and rub them with a strong solution of butter of antimony, which oxidizes the etched portions of the plate and sets off the raised parts in sharp relief. Remove the asphaltum paint with gasoline or turpentine and polish with a soft rag. Finish with a coat or two of clear metal lacquer. When finished trim the pieces to size and attach them with round-head brass brads.

Strip of Rubber Prolongs Life of Window Shade

To prevent tearing a shade from the roller, which is often done when the shade



is pulled down quickly, get a strip of thin rubber, sew one edge to the top of the shade and tack the other to the roller as shown. A 3-in. strip of rubber attached in this way will stretch enough to eliminate the risk of pulling the curtain off.

☛ A couple of boxes of lime, set under ears of seed corn, hasten drying.

Blocking-Out Photographs

Much of the time required in blocking out portions of photographic negatives with liquid opaque may be saved by a simple method that does not injure the surface of the film. Get a tube of ordinary tire cement, or if large quantities are to be used, make up the cement by dissolving uncured rubber in benzine. Sheets of smooth black paper, such as is used to pack films and plates, are fastened to a flat board with thumbtacks and coated with cement. Make a tracing on this paper, held over the negative, to show the parts that are to be blocked out. Place the tracing over one of the rubber-coated sheets and cut out the parts to be printed. It is a simple matter to stick the black paper, rubber-coated side down, to the negative. The paper can easily be peeled off when finished, leaving the negative in the same condition as before.

Rubber Apron Protects Window Frame

To prevent coal from marring a basement window frame, a sheet of rubber, cut from an old inner tube and tacked to the top of the frame, will be found effective. The sill, which receives the brunt of the burden, should also be protected. For a permanent installation, the entire frame can be covered with galvanized sheet iron, as this can be washed after the coal has been delivered and will not detract from the neat appearance of the window.



Basement-Window Frame Protected against Damage from Coal by Using Piece of Old Inner Tube



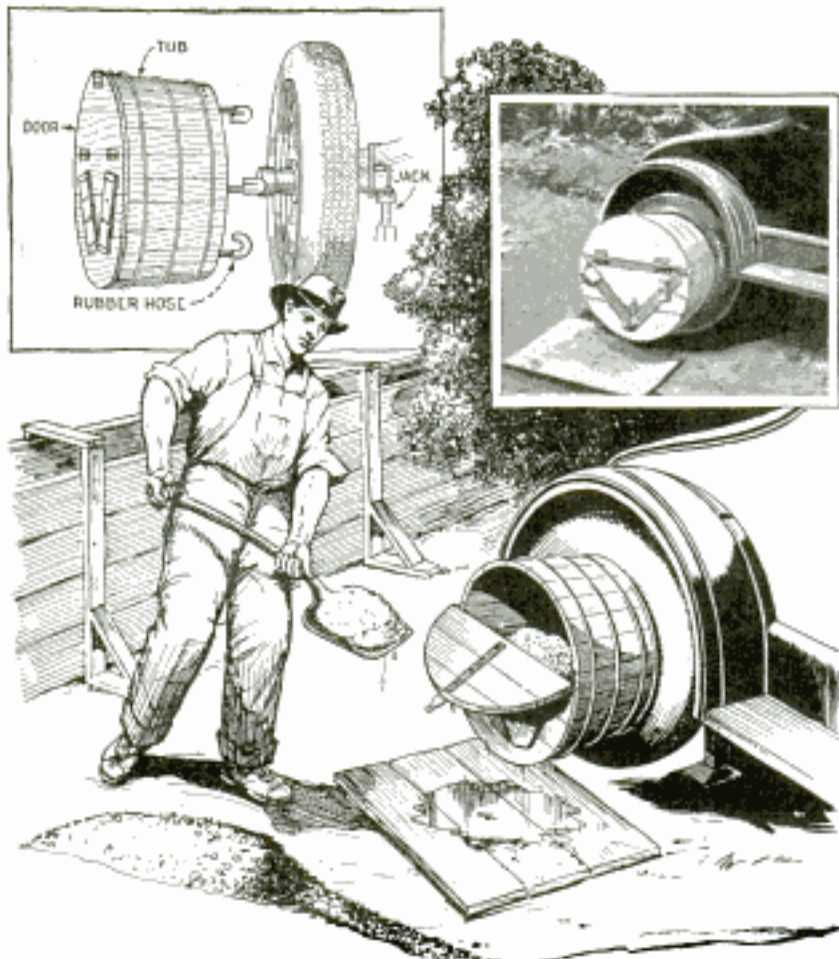
Matching the Card Suits, These Clips Hold the Ashtrays to the Table Securely

Clips Matching Card Suits Hold Ashtrays on Table

Besides serving to hold ashtrays on a card table, the clips shown, which are made to match the card suits, will prove a fitting ornament. They are cut from sheet metal and bent as indicated, the feet being drilled to receive screws. Two clips are used for each tray, the tops being bent down just enough to hold the tray in place securely, yet permitting the removal of the tray when necessary.—Harvey W. Reed, Bruce, Miss.

How to Drive Nails under Water

When driving nails under water use a pipe of suitable length and steel rod about 12 in. longer than the pipe. The rod should be a sliding fit in the pipe, and one end should be roughened to give it purchase on the object below the surface. The pipe is placed in position, a nail dropped into it and the rod is then driven down against it with a hammer. It is impossible to miss the nail and there will be no splashing. This method has been found useful in repairing dams or boat hulls, and in many other submarine jobs.—Bert Russell, Spokane, Wash.



When a Concrete Mixer Is Not Available, One Can Be Improvised on the Rear Wheel of an Automobile

Concrete Mixer Is Run by Auto Wheel

During the process of building a concrete wall, a mixing machine was not available, and doing the work by hand was found slow and laborious. A power-driven mixer was quickly made by attaching a wooden tub to the rear wheel of an automobile. U-bolts or other hooks are used to attach the tub to the wheel, as shown in the drawing. A strong wooden cover in two sections, which are hinged together is fitted on the tub. One part is stationary and is clamped on securely, while the other has a strong catch, so that it can be opened or closed, permitting the ingredients for the concrete to be thrown in, or dumped after being mixed. In use, the sand, stone and cement are shoveled into the tub, after which water is added. The car is thrown in gear so that the tub is rotated at any desired speed.

☛ Spirits of turpentine is the best lubricant for drilling tempered steel.

Faults in Cigar Lighters Are Easily Cured

Cigar lighters are apt to develop all sorts of trouble, and the user invariably discards them for the old-fashioned match. However, with a little care and attention, any lighter can be made to operate satisfactorily most of the time. The troublesome parts of a lighter are the flint, the wick and the fuel. Occasionally a piece of flint is encountered having a hard, glazed spot, which prevents it from sparking properly. Sometimes a flint is a trifle irregular in shape or slightly smaller in diameter than it should be. Such a flint will not fit correctly in the holder but will work against the sparking wheel at the wrong angle, and in so doing cause the sparks to fly over

or to one side of the wick. In either case, a fresh flint of normal size and shape is the remedy. Every lighter is packed inside with cotton to absorb the fuel. The wick should extend down through the cotton to the bottom. Occasionally a lighter has been carelessly packed, and the wick has been crowded up against the top where it will not absorb the necessary amount of fuel. To remedy this condition, remove the cotton with a small wire hook and rearrange the wick in the proper position. As much of it as possible should be exposed to the spark. If the wick is new, fray the exposed end, and after fueling the lighter, let the wick burn until it becomes blackened and sooty.—Arthur E. Sharpe, Willimantic, Conn.

"Pinhole" Goggles Give Stereoscopic Effect to Movies

When viewing a movie, especially one in color, stereoscopic effect can be obtained by using the "pinhole" goggles

described in this article. From a piece of black paper, cut out a mask to fit over the eyes, punching two small holes to come directly in front of the pupils. A good-sized needle should be used for punching the holes and ragged edges carefully trimmed off with the point of a razor blade. The distance between the holes can not be given as it varies with each individual, but the average distance is about $2\frac{3}{8}$ in. The stereoscopic illusion is produced by the increase in the depth of focus given the eyes by stopping down the light entering through the mask. If you sit in the front part of the theater, this reduction of light will not be objectionable. Larger holes in the mask will allow more light to enter, but will sacrifice the completeness of the illusion.—Chas. N. Shaw, Chattanooga, Tenn.

Removable Sign on Auto Fender

When an ordinary automobile is used for delivery purposes, or if, for any reason, it is desired to carry a sign on the car temporarily, the neat and convenient method indicated in the drawing will be found very satisfactory. A piece of wall-board, or of galvanized sheet iron, the latter being washable and more durable than the former, is cut to fit over the edge of the rear fender as indicated. Holes are drilled in both fender and sign to receive bolts and wingnuts. This method of attachment permits the user to remove the sign in a few moments. For announcing



Painted Sheet-Metal Signs, Attached to Rear Fenders of Automobiles. Prove Good Advertising Medium

refusing to
 Creston L. O. Brown
 % Palmer Mfg Co 2857
 Los Angeles, Calif.

club and school entertainments, and other social functions, these signs will prove a good advertising medium.—Bernard McManus, East Moline, Ill.

Making a Stubborn Horse Pull

When a stubborn horse refuses to pull, get a length of strong twine, wet the twine



Balky Horse Will Pull if a Cord Is Slipped over One Ear and Drawn Tight

and pass the ends through the loop twice, then slip the loop over the horse's ear and pull tight. Let him stand for a minute or two until he begins pawing and shaking his head a few times, after which he will be willing to go. This method has been tried a number of times and was never known to fail.—J. E. James, Chicago.

Keeping Drain Pipes Open

In mild and changeable weather, melting snow often freezes in the bottom of the conductor pipe and then gradually fills up the entire pipe. This can be prevented by removing the lower elbow on the pipe, before the ice has formed more than a distance of 8 ft. above the ground, and pouring hot water slowly over the outside of the pipe. This will cause the column of ice to drop to the ground. Chop off the exposed portion so that the rest of the column will drop, which can then be disposed of in the same way.—Wm. Seifert, Schenectady, N. Y.

J. L. Brandes
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 Los Angeles, Calif.



By Using an Enlarging Camera, Any Amateur Can Easily Make Good Sketches in Black and White, or He May Use Colored Pencils

Enlarging Camera Aids in Making Black-and-White Sketches

Any amateur can make good drawings by making use of an enlarging camera as shown in the drawing. The negative to be reproduced is inserted in the camera and enlarged to the desired size on the drawing board, which is set vertically, although it may be laid horizontally if the camera is suspended above the board. After the image has been properly focused on the paper and correctly placed, begin with the eyes in the case of a portrait. The parts which show up white or very light on the paper should be heavily shaded, while the dark portions are not touched, and the half tones between the light and dark are shaded lightly. Follow the lines of the face as carefully as possible. It is advisable to examine the work as it progresses by turning on the room light. You will be surprised how easily you can make good sketches in this way. Clothing and large shadows can best be worked out with a cross-hatch effect.

Cooling System for Motorcycle Engine Used on Boat

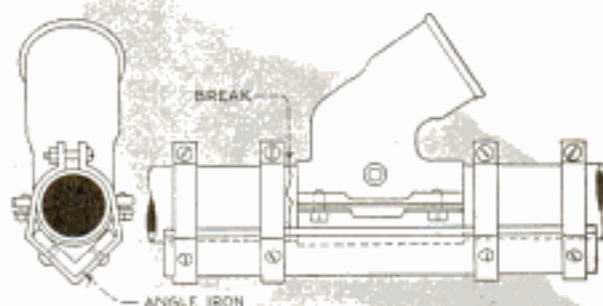
For cooling the cylinders of a motorcycle engine used on a boat, the following method has been found highly satisfactory: Copper tubing of $\frac{3}{8}$ -in. diameter was wrapped around the cylinders and carefully tapped into the space between the fins with a hammer to fit tightly against the cylinder heads. The ends of the tubing were led out of and underneath the boat, one end pointing toward the front and the other toward the rear, so that, when the boat was in motion, the water was caught by the front pipe and passed

out at the rear. The flow is aided by a certain amount of suction created at the rear opening by the forward motion of the boat. The tubing should be one continuous length. After being wound around the cylinders, it is passed over the side of the boat to the keel, along the side of which it is securely

fastened. It was found that by soldering a small funnel in each end of the tubing, the circulation was materially increased, and the motor never overheated no matter how fast it was run.—W. J. Murrow, Macon, Ga.

Broken Exhaust Pipe Easily Repaired

As an emergency repair for a broken exhaust pipe, get a length of angle iron and four strips of strap iron, long enough to be brought around the pipe and angle iron as shown. The strap-iron clamps are tightened by means of screws and nuts. A piece of asbestos cord and some asbestos furnace cement should be stuffed into the angular openings at the ends and



A Length of Angle Iron and Four Clamps Make Rigid Repair for Broken Exhaust Pipe

along the edges of the angle iron to prevent leakage of exhaust gases. It takes only a short time to make such a repair, and the improvised clamps hold the pipe rigidly against movement in any direction.—Paul Leo, Elizabeth, N. J.

☐ Mildew can be removed from brickwork by applying melted paraffin with a brush and working it in with a blowtorch; this treatment also will prevent formation of mildew.

Inlaid Boxes YOU CAN MAKE

by W. Clyde Lammey

GLOVE boxes of rare woods with fancy inlays can easily be made where a power saw is available, although the work can also be done by hand. One of the two shown in Fig. 1 is made of $\frac{1}{4}$ -in. oriental walnut decorated with an inlaid initial, and the other of white holly with a ready-made marquetry inlay. Select attractively grained pieces for the front and top, and be particular to rip and cut off to exact dimensions. First glue the front and back to the ends and clamp. The front and back are flush at the top, but project $\frac{1}{4}$ in. at the bottom. Glue the bottom in place and draw tight with C-clamps. Be sure that the box is square before allowing it to dry, after which the top can be glued in place.

The diamond-shaped inlay in the top may be either white holly with a black letter or ebony with a white letter, and should not be less than $\frac{1}{8}$ in. thick. Saw out the piece slightly larger than its finished size, as given in Fig. 1. Plane all four edges true and with a slight bevel. Then place it on the top of the box and clamp both together in the vise, placing several thicknesses of paper between the vise jaws and the wood to avoid marring. Scribe around it with a sharp steel scriber as shown in Fig. 8, and carefully follow the line with a small butt chisel to a depth of slightly less than $\frac{1}{8}$ in. The waste is trimmed out by using either a sharp skew chisel and an electric routing machine, as shown in Fig. 2, or a hand router, as indicated in Fig. 5. Spread glue over the bot-

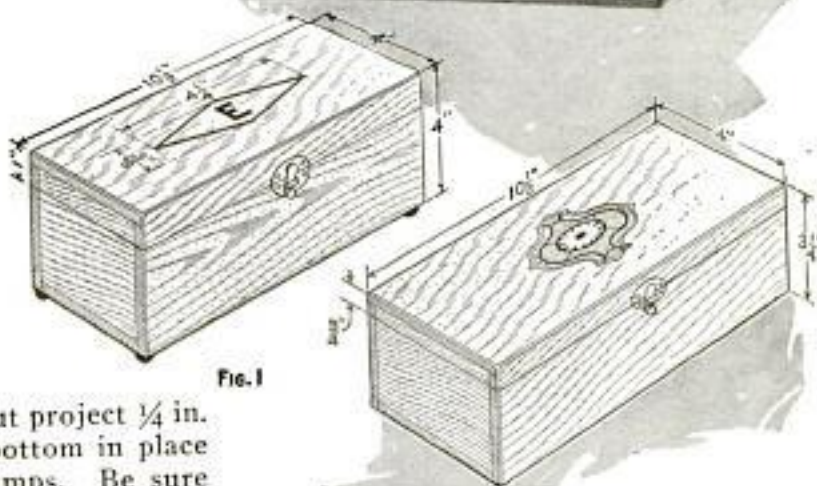


Fig. 1



Fig. 2

Marquetry Corp.
One Park Ave
New York

R. L. Carter Co
New Britain, Conn.
R. 4

*Kueimpel Co. - Cruttenberg, Iowa.
73 05 - Vignettes of Chicago
166 W. 74th, Chicago
Inlay, banding.
Craftsman Wood Service.*

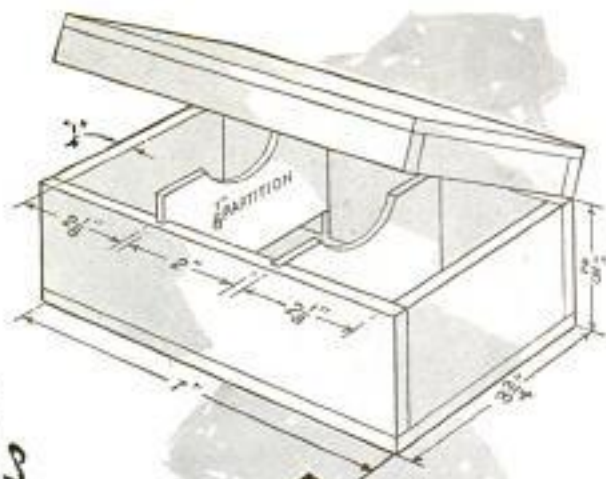
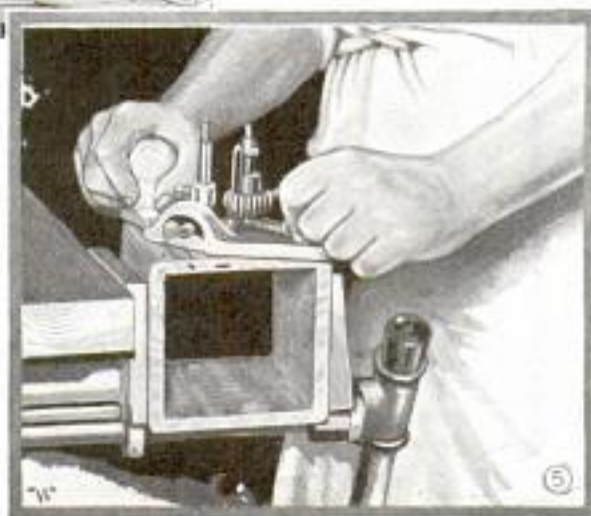


FIG. 3



tom of the recess, set the inlay in place with a sheet of paper over it, and on this place a small block of wood. Clamp the inlay tight into the recess. When dry, rout for the initial, which can be cut from ordinary white or colored celluloid, $\frac{1}{16}$ in. thick,



obtainable at any art-goods store. Bevel the sides slightly and glue in place in the manner just described. After the letter has been allowed to dry thoroughly, sand the inlay down nearly flush with the surface of the box and then finish with a sharp cabinet scraper. It is impossible to finish a contrasting inlay of this sort by hand sanding alone, as the black dust of the ebony will be ground into the holly. Unless the sandpaper can be driven at a high speed, as with the small belt sander shown in Fig. 10, the inlaid surface must always be finished with a scraper.

In the case of a commercial marquetry inlay consisting of a number of contrasting woods, as shown in Fig. 3, and the inlay in the second box, Fig. 1, which are matched and glued to a thickness of heavy paper, the recess is cut to fit the inlay and the latter glued in place, paper side up. The paper is removed by sanding and a level surface obtained by scraping. Should there be any open space between the inlay and the shoulders of the recess, fill before scraping with suitably colored stick shellac melted in with a soldering iron.

The photo above Fig. 1 shows a cigaret box made of zebrawood. The top is decorated with a marquetry inlay. The sides are grooved to take $\frac{1}{8}$ -in. partitions, as shown in Fig. 3, and the bottom overlaps the sides. Use $\frac{1}{4}$ -in. stock for all parts except the partitions, which are left out until the box is finished. Another beautiful wood for this box is Brazilian amaranth, which is a very hard wood of a deep, rich, red color.

A commercial band inlay, as shown on the box above Fig. 10, is easily applied by using either an electric router to cut the grooves, or by scoring the lines with a marking gauge, having the pin sharpened as in Fig. 6, and then removing the waste between the lines. Band inlays of various patterns and

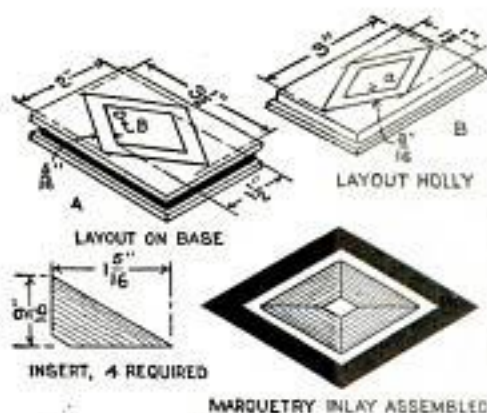


Fig. 7



Fig. 8

widths may be purchased.

After the box has been finished to this stage, the top or lid is sawed off on a circular saw as shown in Fig. 4, by setting the rip fence and placing the bottom of the box against the fence. Saw through and then reverse the box to cut through the remaining half. Sand off all saw marks. Attach small butt hinges with brads, and if desired, a brass jewel-box catch or lock at the front. The partitions of the box are cut to fit after the lid has been removed.

If you cannot obtain the marquetry inlays, follow the method of making them, as shown in Fig. 7, to get a three-color effect. A piece of $\frac{1}{8}$ -in. ebony is glued between two squares of cardboard and the design A is laid out on one side and the $\frac{1}{4}$ -in. hole B is drilled. Follow the outer line with a jigsaw, then insert the blade through the hole and saw out the inner design. Next cut a

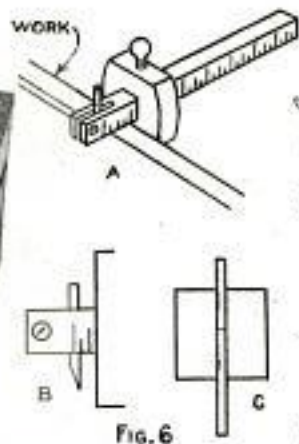


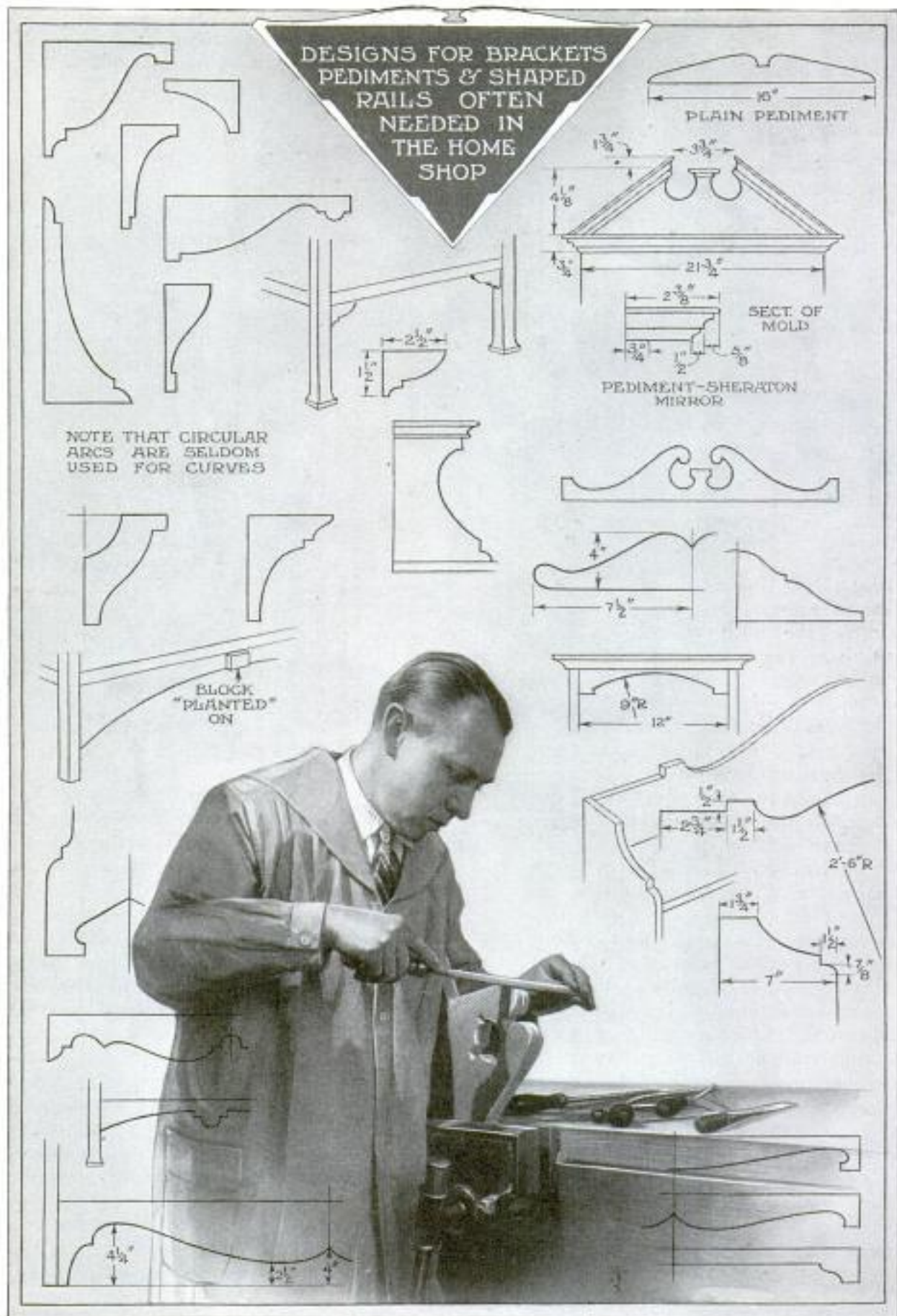
Fig. 6



Fig. 9

piece of white holly, $\frac{1}{8}$ in. thick, to the size indicated in detail B, set the base over it and trace the outline of the opening. Inside of this line trace the line "a," $\frac{3}{16}$ in. from the first. It is best to glue a piece of heavy cardboard to the side opposite the marks. Follow the line "a" first with the jigsaw blade and finally saw out the figure outside of the line with the blade in the waste. Trim this piece to fit the opening in the base. Cut four triangular pieces from $\frac{1}{8}$ -in. Brazilian amaranth, and notch the right-angled corner of each with a sharp chisel. Fit these pieces into the opening cut in the holly insert, and plug the square opening remaining with a $\frac{1}{4}$ -in. insert of holly. Glue the whole to a piece of heavy wrapping paper, and the inlay is ready for use. The fancy woods mentioned are only a few of the many now obtainable. Lacewood, kingwood, benin, striped ebony, avodire, padouk, yoma and many others are sold in thicknesses from $\frac{1}{8}$ to $\frac{3}{4}$ inch.

*Porter-Cable Co.,
Bellevue, Pa.
Bellevue - Delta
Specialty Co.,
Milwaukee Park - a Park Co. Syracuse, N.Y.*



NOTE THAT CIRCULAR ARCS ARE SELDOM USED FOR CURVES

BLOCK "PLANTED" ON

By Following These Artistic and Properly Proportioned Curve Designs You Can Save Much Time

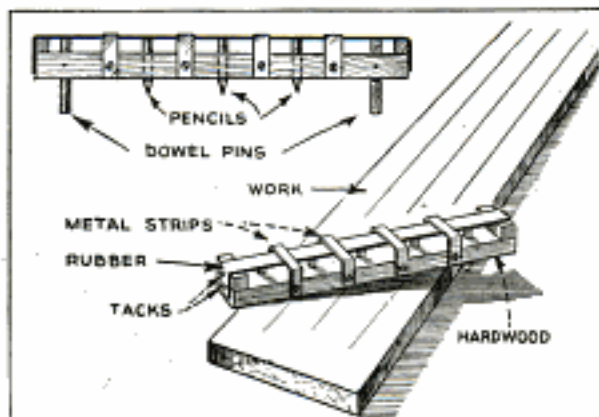
Use. Columbian Vise & Mfg. Co.
 9021 Bessemer in Cleveland
 Ohio

"Ironing" Handkerchiefs without Heat

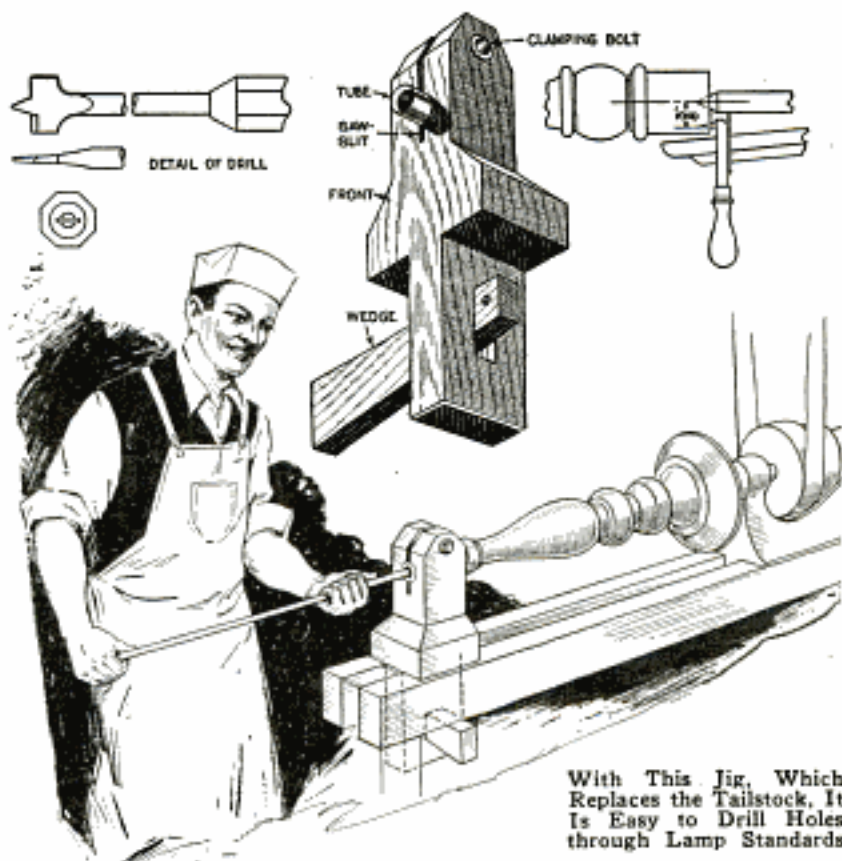
When it is necessary to wash out your handkerchiefs and no electric iron is available, spread them, while quite wet, on a piece of glass. The mirror of a dresser can be used for this purpose. Spread the handkerchiefs so that they lie perfectly smooth on the glass without any air bubbles underneath. When dry, remove them and fold as usual.—Rodney Methow, Portland, Ore.

Multiple Scriber Divides Board in Equal Widths

When it is necessary to divide a board into a certain number of equal widths, the multiple scriber, shown in the drawing, will be found handy. It consists of a hardwood block drilled at equal intervals to receive short pencils. Make these a sliding fit in the holes and screw a cleat at each end of the block. Stretch a wide rubber band across the cleats and tack it down to come directly over the tops of the pencils, exerting a light pressure on them so that the points will project just beyond the bottom to insure touching the work. A number of metal strips, bent to a U-shape, are screwed to the sides of the block and fit over the rubber band to hold it in place over the pencils. Lengths of dowel rod, the same diameter as that of the pencils but longer so that they project $\frac{1}{2}$ in. below the block, are driven into the end holes, forming stops which are held against the sides of the work. Blocks with sets of holes to divide the work into any number of parts can be made.



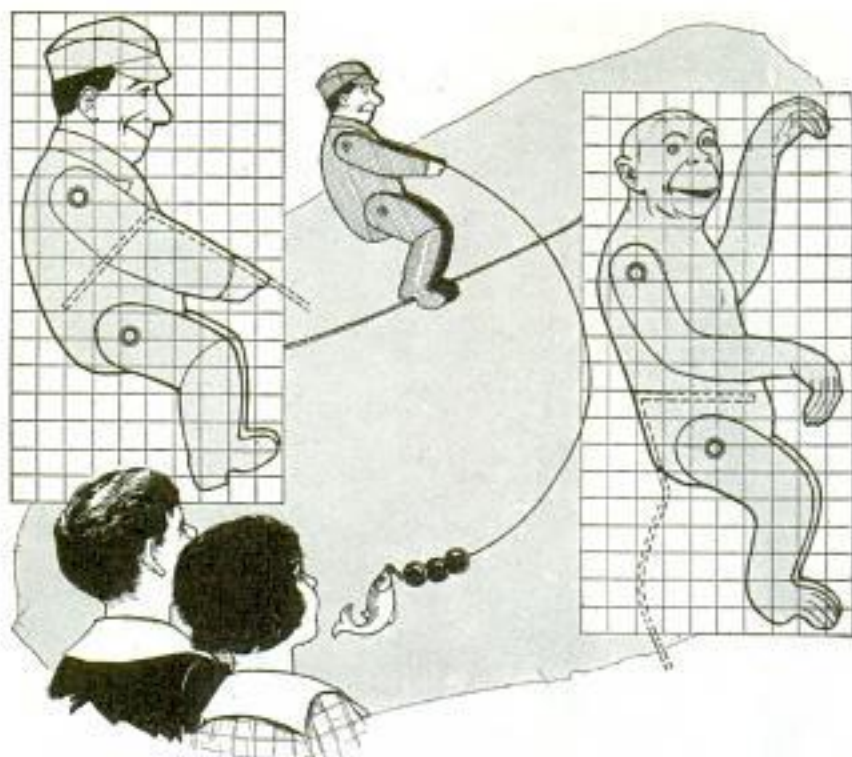
This Multiple Scriber Is a Quick and Handy Tool for Marking Boards into Equal Widths



With This Jig, Which Replaces the Tailstock, It Is Easy to Drill Holes through Lamp Standards

Drilling Holes through Lamp Standards

Holes through lamp standards for electric cord, and into the ends of table legs, etc., for doweling, can be drilled accurately with the jig shown in the drawing. It consists of a block of wood sawed to the shape indicated, with a slot cut down from the top and a wedge provided for clamping it to the lathe bed. The lower end of the slot terminates in a hole to take a sharpened steel tube, the center of which must be in line with the lathe centers. The tool is held in place with a clamping bolt. The inside diameter of the tube must be a trifle larger than that of the drill to be used. After the stock has been turned in the usual way, a V-shaped ring is cut in the tailstock end to receive the end of the tube. The jig is then substituted for the tailstock, and a suitable drill inserted into the tube, which will guide the drill through the work.



Balancing Toys of Attractive and Ludicrous Designs, Which Anyone Can Make, Furnish Amusement

Balancing Toys of Many Varieties

Balancing toys are always amusing. An infinite variety of subjects can be used, such as ludicrous birds, squirrels, kangaroos, a golfer with a long club or an old lady with a long broom, an angler catching a fish, etc. The figures can be decorated with suitable costumes and hats made of cloth or paper, and can be provided with leather ears, glass eyes, woolen "fur" and real whiskers. They will rock on a slender wire, a length of cord or on the end of a stick. The lower the balancing weight is placed, the steadier the figure will be, but the movement will be correspondingly restricted. The bodies of the figures can be cut from $\frac{3}{4}$ -in., and the arms and legs from $\frac{1}{2}$ -in. wood. The latter are attached with screws so that they can be moved about to the best position, after which they are permanently tacked in place. A hole is drilled into the body to receive the end of a length of spring wire, which

is bent just outside of the hole, tacked onto the body with staples, and is then extended downward in a semicircle. The weights, which normally should reach 12 in. below the center of the figure, are No. 10 or 12-gauge shotgun balls, or round, split sinkers used by anglers. Three of the No. 10 or four of the No. 12-gauge balls are used for the purpose, although more may be needed, depending on the size and weight of the figure, which you can make to suit your own taste. The dimensions of the angler and monkey are indicated in the layout, each division representing $\frac{1}{2}$ -in. square.

The balls are drilled to slip on the end of the wire although the lead sinkers can be merely squeezed together over the wire with a pair of pliers. In the case of the angler, a fish is made of $\frac{1}{2}$ -in. stock, about 3 in. long, with a screw eye driven into its mouth for attachment to the wire. The monkey can be painted dark brown with reddish brown in the circle of the face and palms of the hands.—Harry W. Poor, Topsfield, Mass.

Accordion Folder for Photos

Adhesive backing cloth for photos can be used to give amateur photos a professional touch. A number of prints of the same size are placed on the cloth after it is dipped in water. When dry, the strip is trimmed down and folded, as shown in the illustration. Backed with this cloth, single prints, especially large ones, will stand much more wear than unmounted ones.—Walter E. Burton, Akron, Ohio.



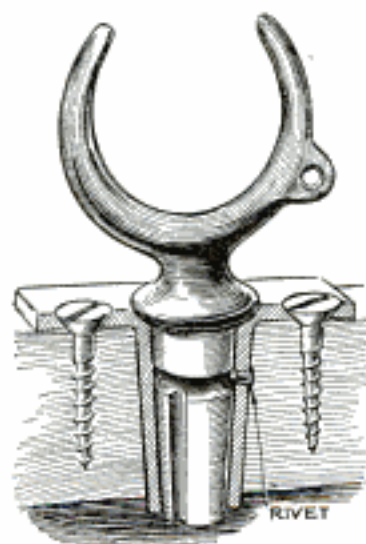
Series of Photos Mounted on Adhesive-Surfaced Cloth Makes a Strong and Convenient Folder

Getting a Drink from a Melting Snow Bank

Satisfying one's thirst by eating snow is a rather awkward and tiresome procedure as the volume of snow is about ten times as great as the amount of water it produces when melted. However, when the temperature is above freezing and the snow is melting, one can easily obtain drinking water by making a small vertical hole near the edge of a snow bank. The water from the melting snow oozes into the hole from all sides, filling it within a few moments, and the water can then be dipped out with a cup.—Ivan E. Houk, Denver, Colo.

Fixed Oarlocks Made Removable

By making a small change in one of your oarlocks, if they are of the fixed type, you can easily prevent strangers from "borrowing" your boat. All that is necessary is to cut a groove lengthwise on the end of the oarlock so that it can be removed from the frame in which it is housed. Of course, this will not prevent theft of the boat, but if you belong to a club or your boat is kept with a group of others, it will be passed up for one more convenient. It is sufficient to alter one oarlock.—George Ecklund, Stratford, Conn.



Hood on Pipeless-Furnace Register Improves Radiation

When our pipeless furnace was in use, all the heat seemed to go right up to the ceiling, leaving the lower part of the room comparatively cold. To remedy this condition, a piece of sheet iron was obtained and two opposite edges were snugly bent over lengths of heavy wire projecting a

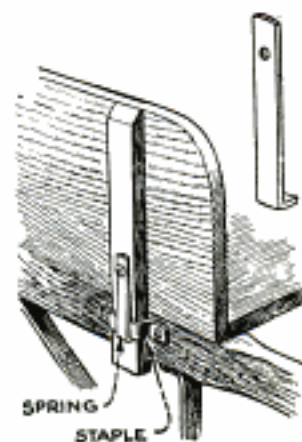


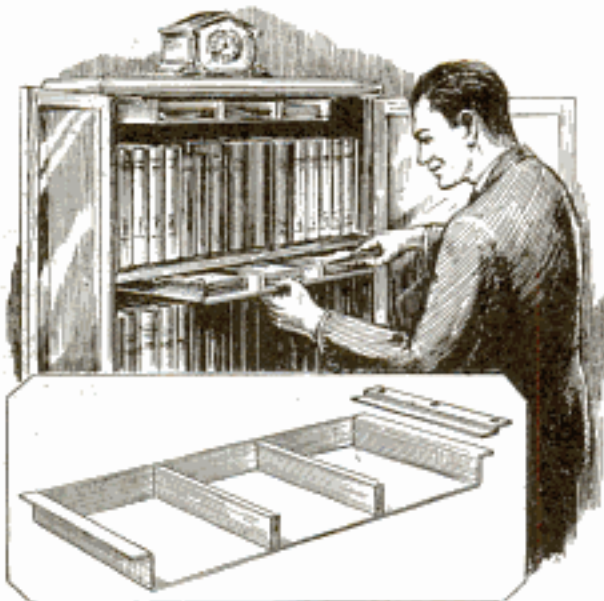
Heat of Pipeless Furnace Can Be Distributed More Evenly by a Sheet-Metal Hood

few inches at the ends. The sheet metal thus formed a semicircular hood, as shown in the drawing, and the projecting ends of the wire frame were stuck into the openings of the register. This hood, which was 13 in. high in the center, heated the lower part of the room very quickly.—G. Hagen, Seattle, Wash.

Spring Clip Holds Sideboards of Wheelbarrow

Garden wheelbarrows with loose sideboards can be made solid, yet easily detachable, by providing spring clips as shown in the illustration. Either spring brass or spring steel can be used to make the clips, which should be about 4 in. long, $\frac{3}{4}$ in. wide and $\frac{1}{16}$ in. thick, and have one end turned up to form a hook, a hole for a screw being drilled at the other end. The clip is screwed to the cleat on the sideboard so that it engages with the staple as shown. The clips eliminate the trouble experienced with loose sideboards as they hold the latter securely.





Sheet-Metal Shelf for Holding Pamphlets Fits in Waste Space above Books

Slide Shelf for Pamphlets Is Handy Addition to Bookcase

In many bookcases, especially those not having adjustable shelves, some space is wasted above each row of books. This space can be profitably used for storing pamphlets if a sliding shelf is provided. Strips of metal, bent as indicated, are screwed to the underside of the shelf above, and a sheet-metal tray is made to fit the slides. If desired, compartments can be added.—L. P. Young, Culver, Ind.

Good Photos of Falling Snow Flakes Taken with Sheltered Camera

Many amateur photographers have found it difficult to get good photographs of falling snow. By simply providing a shelter or hood over the camera for some distance directly in front of it, much better results can be obtained, as this method prevents the flakes that pass in front of the lens from blurring the picture. Snapshots taken on



One of These Unusual Foot Scrapers Will Add a Finishing Touch to Your Doorstep

porches and under trees usually turn out good for the same reason. An umbrella held over the camera will be satisfactory. This method, however, does not apply to time exposures.—Wm. P. Mack, Chicago.

Bird and Animal Foot Scrapers Are Easy to Make

Unusual foot scrapers tend to lend distinction to the home doorstep. Anyone can cut out suitable patterns of sheet iron, which should be about $\frac{3}{16}$ in. thick. The only tools necessary are an anvil, a hammer, cold chisel, hacksaw and file, a vise being used to hold the work. After the scraper has been cut, filed down and painted, it is ready to be set in concrete, either in a new walk or in a separate block that is buried in the ground next to the walk. Bird and animal outlines are admirable for the purpose, a few examples of which are shown in the drawing. One of the simplest is that of a squirrel. In this case only bulk outline is required. A rivet forms the eye on each side and the straight back quickly scrapes the mud off shoe soles. While there is an outline of the front paw, the entire body can be buried in concrete, or, if desired, two long prongs can be left so that the scraper can be pushed into the ground. If a concrete base is used, it is poured into a small wooden box of suitable dimensions. A more elaborate design is that of the cat. There is a little more cutting to do in this case as all the feet show. The figure is welded to a metal base of the same stock



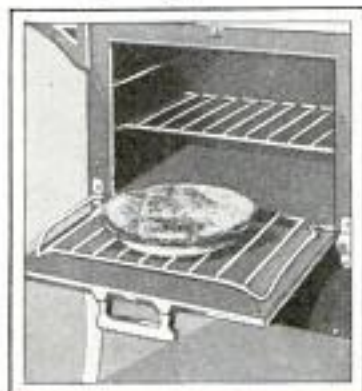
and holes are drilled in the base to receive screws or bolts, which are pushed into the concrete while it is still soft. Black is the most appropriate color for the scrapers, although other colors may be used if desired.—Dale R. Van Horn, Lincoln, Nebraska.

Ammonia and Alcohol Solution Removes Varnish from Home Hardware

For removing varnish from hardware in the home, which is often advisable, as a varnish job, especially when done by an amateur, usually results in considerable spotting of the hardware, a solution of equal parts of ammonia and alcohol, will be found particularly effective. It is applied with a wad of cheesecloth, care being taken not to get it on the varnished woodwork. Of course, all this work can be eliminated by merely loosening the hardware before a varnishing job is done, which takes less time, and removing the surplus varnish afterward.—L. H. Georger, Buffalo, N. Y.

To Prevent Burnt Food in Oven

Most gas stoves are fitted with only two shelves. Food placed on the lower shelf will not cook quickly enough in some cases, and, on the other hand, if the food is placed directly on the bottom of the oven to hasten cooking, it will often burn. Take the lower shelf and bend the corners down to form feet, as shown. The shelf can now be placed on the bottom of the oven, and food placed on it will cook quickly, and without risk of burning.



When turned so that the feet are up, the shelf can be slid into its grooves and used as before, when necessary.—Frank Moore, Hamilton, Ontario.

Wasted Shots Are Prevented by Special Cover for Lens

Many a user of small movie cameras has probably missed some rare shots and wasted a strip of film because he forgot to remove the lens cap. One movie-camera enthusiast cut a strip of soft kid leather, attached one end of it to the lens cap and provided a snapeye at the other end to fit on a button attached to the side of the focusing tube as shown. When

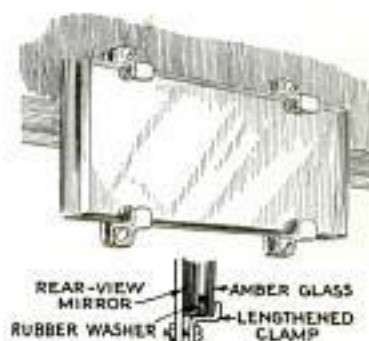


Leather Strap over Focusing Tube Tells Movie Operator That Lens Is Covered

the lens cap is on the lens, the strap comes over the end of the focusing tube and it is then impossible to make the mistake of shooting the picture with the cap on, as the obstruction over the focusing tube warns the operator the moment he raises the camera to his eye.—John Edwin Hoag, Alhambra, Calif.

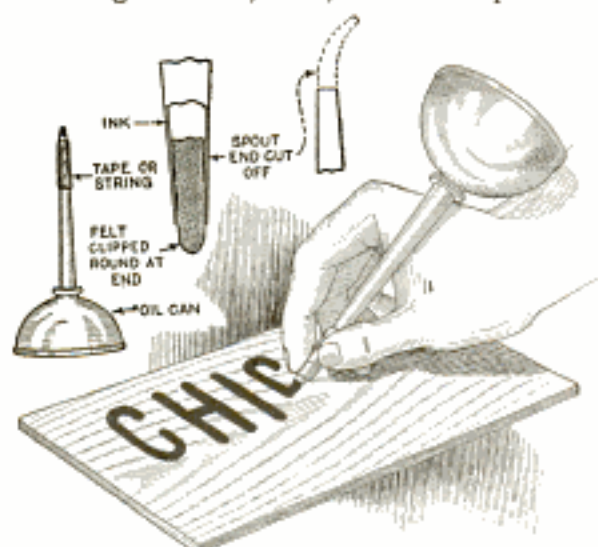
Amber Glass on Rear-View Mirror Prevents Glare

Rear-view mirrors cause more or less annoyance at night by reflecting the glare of cars behind. This trouble can be overcome by attaching a piece of amber-colored glass, the same size as that of the mirror, over the latter by means of four clamps as shown. The clamps holding the mirror are too short to hold the additional piece of glass and therefore longer clamps must be substituted. A rubber washer inserted between the two glasses at the corners will prevent the glass from breaking when the clamps are tightened.—G. A. Luers, Washington, District of Columbia.



Oilcan Makes Good Marking Pen for Addressing Crates

For addressing crates, boxes and for marking lumber, etc., a useful pen can



Handy Marking Pen Made by Inserting Felt in End of Oilcan, Which Is Then Filled with Ink

be made from a large oilcan. The end of the spout is cut off so that the hole is about $\frac{1}{4}$ in. in diameter, and a piece of hard felt—from an old hat, for instance—is inserted to serve as a writing point. Cut off a piece, about 1 in. wide and long enough to make a tight fit in the spout when rolled up. It should be inserted through the large end and shoved through the small end until it projects about $\frac{1}{4}$ in. The oilcan is filled with stenciling ink, which will readily soak through the felt. Liquid stove polish, thinned with gasoline, makes a fast-drying, waterproof ink. To make it easier to hold the can, wrap the spout with friction tape or string.—Robert J. Williams, Chicago.

Grooves Improve Soldering Iron



Grooves cut across the nose of a soldering iron, as shown, will greatly increase its utility. With a three-cornered file cut one groove across one side and the other lengthwise on the other side of the iron. A depth of $\frac{3}{16}$ in. is sufficient.

Electricians will find it easy to tin splices

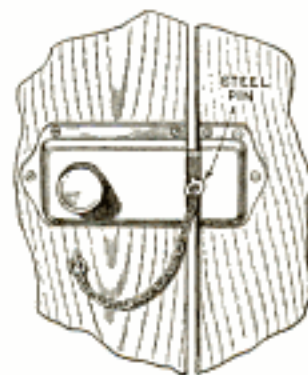
by running the splices through it. A $\frac{1}{4}$ -in. hole, about $\frac{5}{8}$ in. deep, may be drilled in the side for tinning the ends of wires.—R. C. Demary, Akron, Ohio.

Kerosene Used as Anti-Freeze in Drain Traps

In houses left unoccupied during cold weather, the water supply is generally cut off so that there will be no freezing up of the pipe lines. Turning off the water, however, does not empty the drain traps and in the case of bathroom fixtures this may result in serious damage. The trouble can be prevented by pouring a quantity of light oil or kerosene into the drain traps, which will take the place of the water. Kerosene will not freeze and at the same time is just as effective as water for closing the traps against the entrance of sewer gas.—L. H. Georger, Buffalo, New York.

Pin Locks Self-Closing Door Latch

When it is desired to lock a door latch from the inside, and the latch is not fitted with a catch for this purpose, try the simple method shown in the illustration. Drill a small hole in the bolt, as indicated, to accommodate a steel pin or cotter key, which is tied to a length of cord or chain attached to the door so that the pin will not be lost.—G. Schrader, St. Jean, Can.



Solution for Making Paint Adhere to Concrete Floors

To make paint adhere to concrete floors, a solution of zinc sulphate should be applied as a preliminary neutralizing coat. The solution is made by dissolving from 2 to 3 lb. of zinc-sulphate crystals in 1 gal. of water. A liberal coat should be applied with a brush, and it should be allowed to dry for 48 hours. The surface may then be dusted off and painted in the usual way.

510

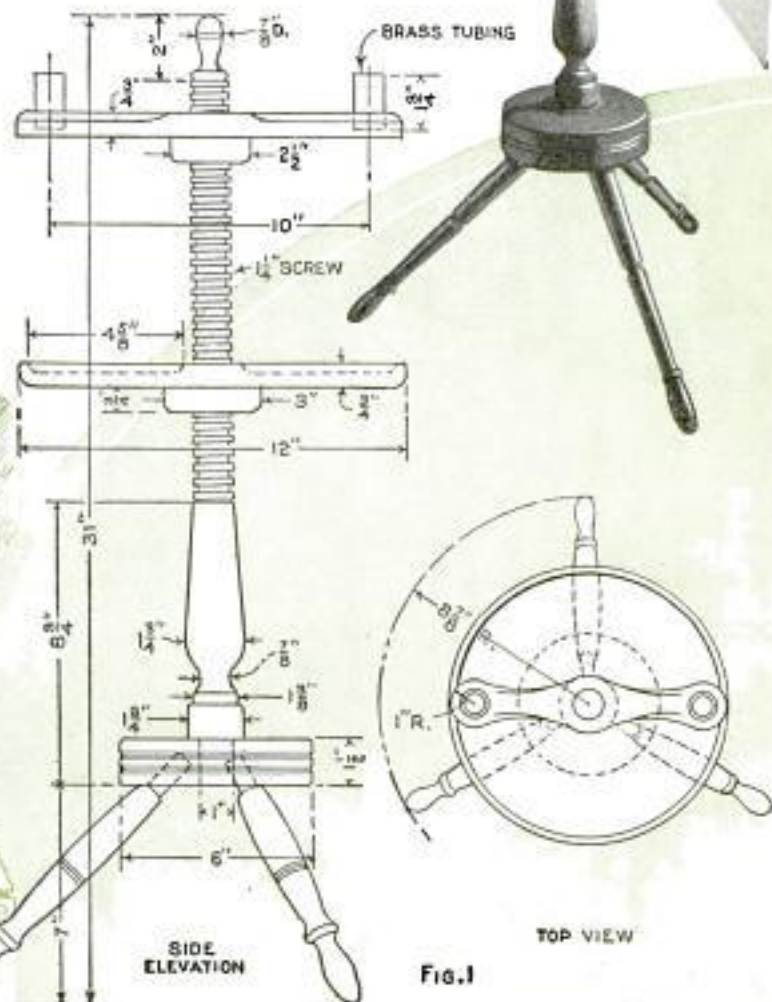
PURITAN CANDLE STAND MAKES HANDSOME PIECE

By R.O. Buck

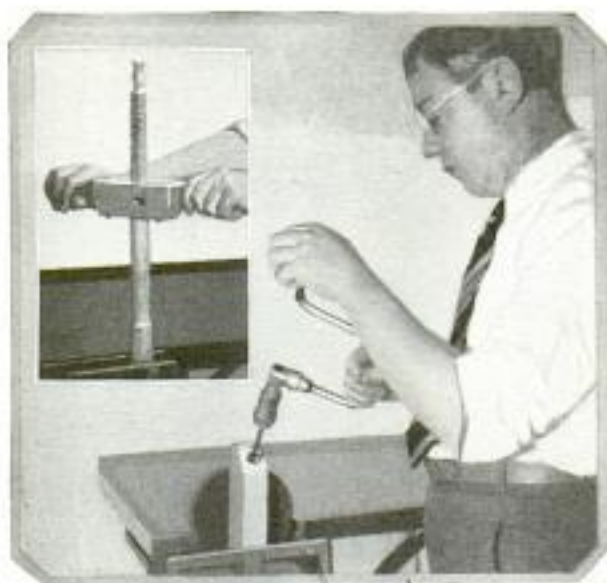


IN THE EARLY Colonial days, candles were the only source of illumination, and considerable ingenuity was expended in the design of holders that would shed light where it was most needed. The quaint old candle stand illustrated is a copy of a genuine antique in the possession of a private collector and is a splendid example of well-designed furniture. The splay or rake of the legs gives great stability. A stand which might be easily tipped over would be a fire hazard, a point the designer no doubt had in mind. The post is threaded so that both tray and candle arm can be raised or lowered at will. Aside from its ornamental value, this attractive little piece of furniture may be used as a convenient smoking stand or chair-side table.

The finer candle stands were made in walnut or mahogany, as well as maple, but as the latter is so popular and is the wood of which the original was



Above, Photo of Finished Candle Stand; Center, Assembly Drawing, and, Left, Threading the Post with the Screw Box before Finishing



How the Jig Is Used to Bore the Holes for the Legs

made, it is suggested that you use maple. This wood has the added advantage that threads can be cut on it with much less danger of chipping. It is essential that certain of the operations be carried out in a predetermined order. For this reason it is suggested that the order in which the operations are described be followed closely.

After the stock has been roughed out, the post piece should be mounted in the lathe and turned down to the size given in Fig. 1. Do not attempt to work out the design at this stage, but leave the bulb portion cylindrical so that it can be held in a vise without damage. Size the part to be threaded to a diameter of full $1\frac{1}{4}$ in. Do not sandpaper the stock yet, as the grit will dull your threading tool.

The threading is done with a $1\frac{1}{4}$ -in. screw box and tap. Your furniture-repair place will likely have this tool or it may be purchased from a dealer in furniture hardware. Mount the roughly turned post in the vise without removing the ends or waste with the marks of the lathe centers on them, so that you can remount the

work in the lathe to finish the turning after the threads are cut. The screw box must be started straight and turned slowly and evenly to cut smooth threads. A bit of laundry soap rubbed on the work will tend to ease the tool, but if it cuts very hard after it is well started, the diameter of your blank is probably too large or your cutter is dull.

Replace the work in the lathe and finish the bulb, knob and dowel. When finishing these parts care must be taken not to sand away much of the threads or they will not fit the tapped holes properly.

The base is turned on a faceplate, and the hole for the post drilled after the piece is turned; it must be perfectly true. If you use a drill chuck on your lathe, you will be sure to get this hole true. Fig. 3 shows the jig for drilling the holes for the legs.

With the pin of the jig inserted in the center hole of the base and the jig held firmly with a hand-screw, bore each of the slanted leg holes successively, running them into the center hole.

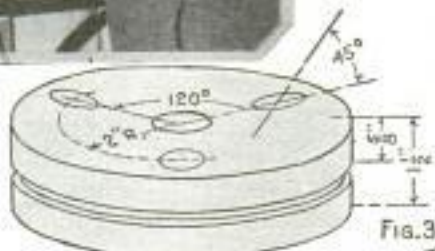
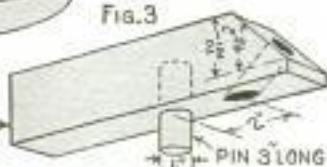


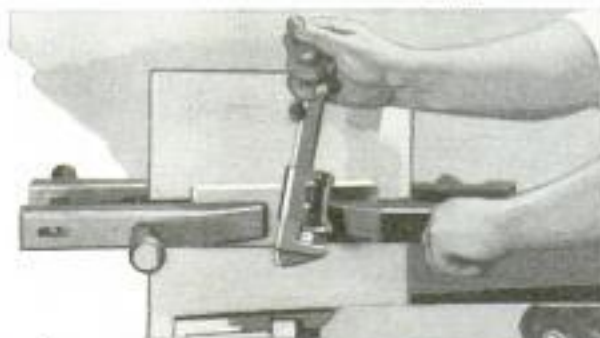
FIG. 3

FIG. 2

2" x 3" x 12" STOCK



PIN 3" LONG



Turning the Tray on the End of the Headstock

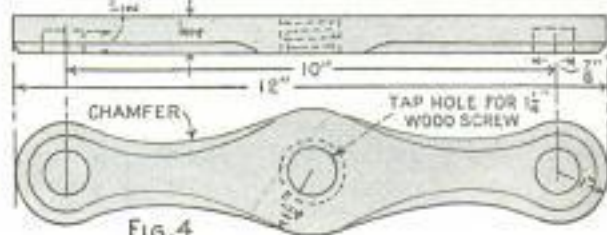


FIG. 4

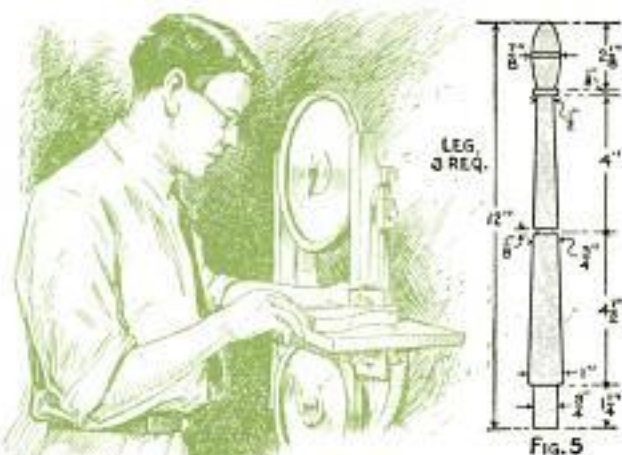
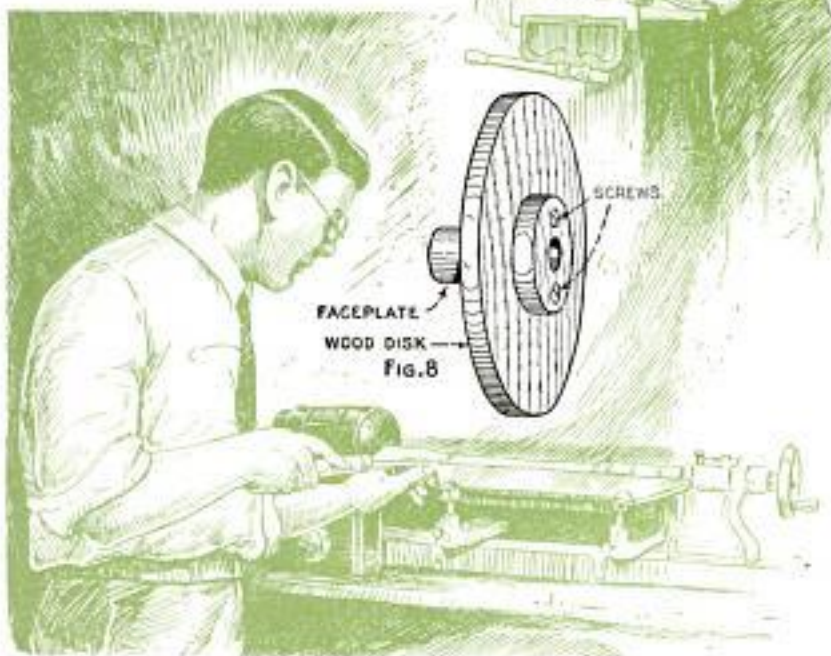
about \$6.00
Krempel Co
Luttenberg, Iowa.

The tray is made from a piece of stock 12 in. square, so it may require the jointing and gluing of two pieces, in which case care must be taken to match the grain of the wood. The hole in the center is bored and threaded before the piece is turned round, but in order to center it properly later, the faceplate should be screwed on, its position marked, then removed and the threading started.

The threading is done with a steel tap which is a mate to the screw box. A hole, the size of the lead collar on the tap, should be drilled first. As a coarse tap such as this would tear the surface of the wood badly, it is necessary to clamp a block in front and back of the stock to be threaded, then run the tap through the three pieces, as shown in the photo below Fig. 3.

The tray is larger in diameter than the swing of most small lathes and therefore must be mounted on the outside end of the headstock and an improvised toolrest used.

Below, Turning the Legs, Using a Long Toolrest



Above, Sawing the Candle Arm to Shape on the Bandsaw

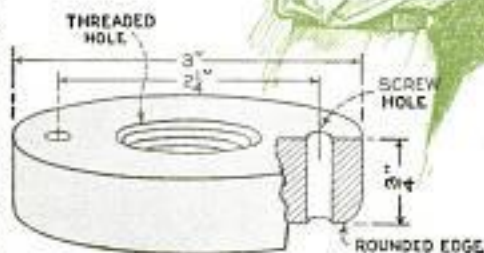


FIG. 6

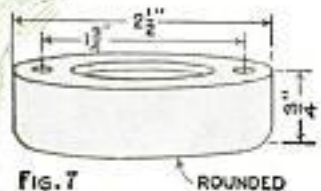


FIG. 7

you may have to use your sanding disk for a faceplate by boring suitable holes for screws. Be sure to saw the stock as nearly round as possible, as so large a piece has considerable throw if out of round and might tear loose or damage the bearings of your lathe. The top face of the tray is hollowed out to a depth of $\frac{3}{16}$ in., and the outer edge is formed as shown in Fig. 1.

The candle arm is sawed from a piece of $\frac{3}{4}$ -in. stock, as shown in Fig. 4. A compass and straightedge may be used to lay out the shape of the piece directly on the stock according to the dimensions given. Note that all of the upper edge, with the exception of the center portion, is rounded. Holes are bored at each end to receive pieces of brass tubing, $\frac{3}{4}$ in. in inside diameter. They should be a snug fit as they hold the candles. Through the center of the candle arm, a hole is drilled and threaded in a manner similar to that in the center of the tray.

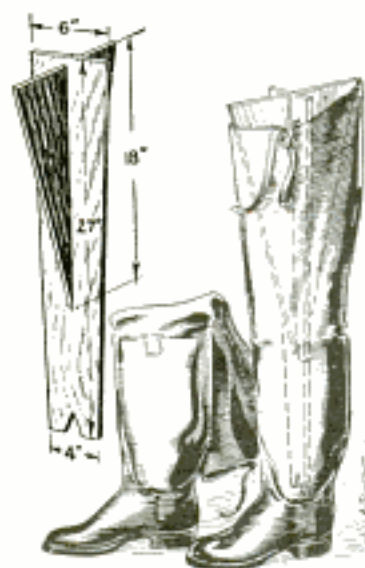
In order to take up any

play or backlash in the thread, two wood rings are turned up and threaded as shown in Figs. 6 and 7. The threads should be cut in these pieces before they are turned round, to lessen the danger of splitting. They are mounted on a wood faceplate with screws, as shown in Figure 8. The same screw holes are used to fasten the rings in place on the bottom of the tray and candle arm.

The legs are turned to the simple but attractive pattern shown in Fig. 5, and the only problem involved is to make the three alike. Fig. 13 shows how the legs are turned, and Fig. 14 gives the dimensions for them.

The assembly of the candle stand is

Frame Holds Boots Open for Drying



of the boots from rotting. Besides, these frames will hold the boots upright when stored away, thus preventing the rubber from cracking at the point where it folds.

This Coin Trick Requires No Equipment

Here is a coin trick that you can play on your friends any time and anywhere without any special equipment. All that is needed is a couple of coins such as a nickel and a penny. Request your friend to place the coins on a table before him and to follow your instructions, which are to be given to him from an adjoining room, or with your back toward him. Tell him to raise one hand above his head

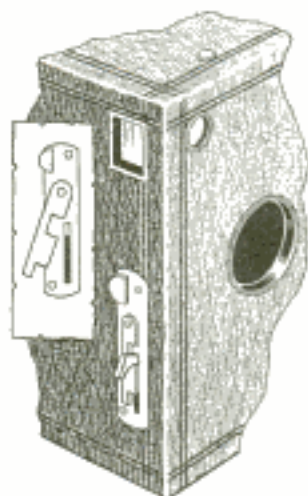
and to place the other one on his hip. After a few moments direct him to remove the hand from his hip and place it over the nickel, after which the other hand must be placed over the penny. You then look at his hands and tell which one covers the nickel. A mere glance tells the whole story, as the hand which was held over his head is noticeably paler than the other.

The finish will depend on the wood used and is largely a matter of preference, but should have an antique appearance.

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Safety Catch Prevents Tripping of Camera Shutter

On the ordinary type box camera the shutter-tripping lever projects and is apt to be pushed over exposing a section of the film uselessly. In order to prevent this, the safety catch shown in the drawing will be found effective. It consists of a narrow strip of sheet metal, pivoted to the side of the camera directly above the shutter trip. Two slots cut in one side of the catch engage with the extending part of the trip lever, so that the latter is held securely in either its upper or lower position. When a photo has been taken, the safety catch is slipped back so that the trip lever can be moved.



The Donkey Race

by H. C. McKay



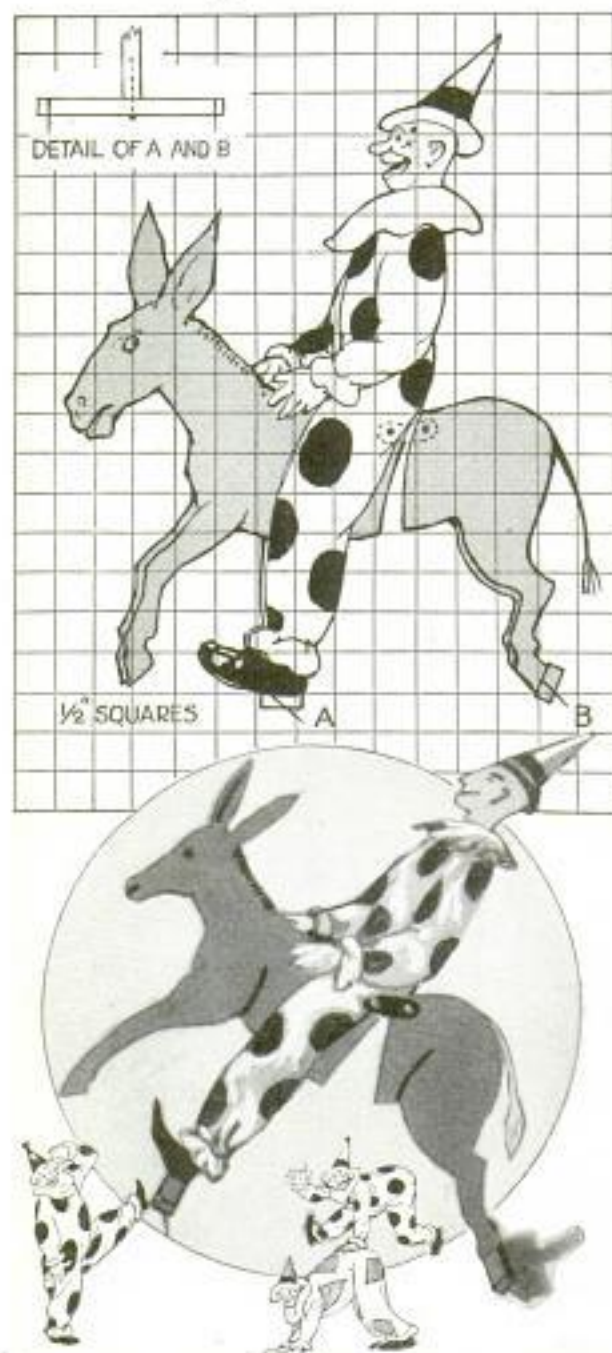
THIS donkey race provides young and old with plenty of fun, as it depends entirely upon the skill of each operator. After some practice, a clever manipulator can urge his donkey along at a remarkable speed, while those who have had less experience will find their mounts rearing, bucking and plunging without making much headway. All operators have full control of their animals with a thread, which is payed out as they remain at the starting point. Those who get too anxious will only upset their donkeys or turn them from their paths. While any number of donkeys can be used, from four to six are sufficient for the space usually available. A room-size rug will be found a convenient race

course. Although the drawing shows a clown rider, any other kind can be devised. In fact, the racers also need not be restricted to donkeys, although this animal is a suitable type due to its tendency to be erratic. A variety of color, crepe-paper costumes and other devices

are employed to ornament riders and beasts.

With a fretsaw the donkeys are cut from any thin material, such as $\frac{1}{4}$ or $\frac{3}{8}$ -in. three-ply veneer. Donkey and rider form one unit. The drawing gives the outline, the size being indicated by the $\frac{1}{2}$ -in. squares. After making the drawing it can be transferred to the wood with carbon paper. It will be noticed that the donkey is split by a vertical cut just behind the rider. This cut is the secret of its action, and should be made just as indicated. Two small pieces of thin sheet brass

or other metal, are cut to the shape shown in the drawing to serve as links between



This Donkey Gallops, Walks, Bucks and Tumbles, Depending on Your Skill in Driving It

the parts. A hole is drilled in each end of these pieces, and they are then bolted in place. The bolt through the hindquarters should be drawn up tight, while the forward one is left loose to provide a swinging joint. Small 2-56 bolts can be used for the purpose. Two crossbars, about $\frac{1}{8}$ by $\frac{1}{4}$ by 2 in., are cut. One is nailed and glued to the donkey's hind feet, as shown at B, and the other to the rider's feet as at A. Both ends of each bar are

drilled obliquely, and phonograph needles are inserted in the holes so that the points project. When this has been done, the donkey and the rider will stand on the four needle points, which extend backward. To complete the toy, drill a small hole in the top of the hat and tie a long thread to it.

Place the donkey on a rug or other surface that provides sufficient traction for the needles. To operate, pull the thread. The needles of the rear feet will catch and hold, the joint in the donkey's body will open and the rider will tip backward. Then release the thread, which is the tricky part of driving the donkey. If the donkey is lowered slowly it will rest in the open position, but if allowed to drop, the momentum will carry the rider forward, first lifting the hind feet and then dropping them for another foothold. With just the right degree of pull and drop, the donkey will gallop forward, but without the proper touch it will creep forward only a fraction of an inch at a time, or it will stand still and "buck." If, after some experimenting, the donkey fails to go forward properly, loosen the rear bolt in the coupling, push the hindquarters upward or down a little and tighten the bolt again. This slight adjustment will be found to greatly affect the performance of the donkey, making it a good racer or a chronic bucker. In case such a bucker is included in a group, it is, of course, advisable to choose the animals by lot.

Hard-drying enamel should be used for painting. If desired, a cardboard or metal saddle may be added, which will cover the joint and make the working of the beasts less noticeable.

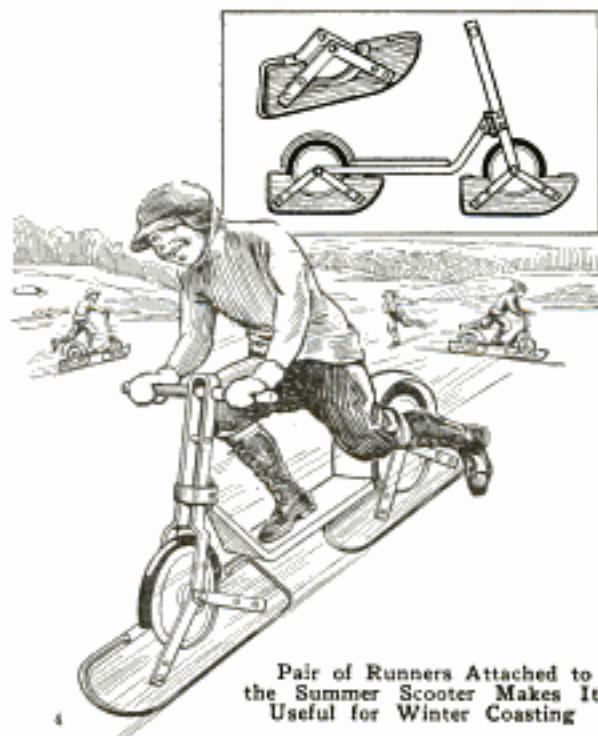
Increasing Spark Retard on Model-A Fords

Many model-A Ford motors must be started by the hand crank at times, especially during cold weather. Occasionally they will kick back when cranked by hand, as it is impossible to turn the motor over fast enough to get past dead center before the spark occurs. To offset this trouble, a simple change can be made, which will allow the spark to be retarded more than is ordinarily the case. With a round file,

a notch is made in the breaker case to allow the spark-advance arm to move about $\frac{1}{4}$ in. more than usual in retarding the spark. Cut off the upper half of the stop at the upper end of the spark quadrant on the steering column, with a hacksaw. By pulling up on the spark lever against the spring on the rod at the dash, the lever will move up over the stop and allow the advance arm on the breaker to go into the notch filed for it. In 1930-model Fords the stop for the spark lever differs from that of earlier models, and a notch must be made with a round file instead of sawing off the upper part of the spark quadrant.

Snowshoes for the Scooter

Instead of putting the summer scooter away for the winter, make a pair of runners to fit the wheels, as shown in the drawing. Pieces of hardwood of suitable size are sawed out and grooved to take the wheels, and some half-round iron is screwed on the lower edge. Lengths of flat iron are bent and screwed to the sides to serve as braces, holes being drilled to receive the ends of the hub shafts. First remove the shaft nuts, slip the shaft through the braces and then replace the nuts. When assembled in this way, the runner will be rigidly attached, and the scooter can be used all winter.



Pair of Runners Attached to the Summer Scooter Makes It Useful for Winter Coasting



Old Umbrella, with Covering and Braces Removed, Makes Convenient Holder for Sunday Editions

Handy Holder for Sunday Editions

Sunday editions of newspapers, which come in a number of sections and are therefore rather awkward to handle, can be kept in order by arranging them on a holder made from an old umbrella. The covering and braces of the umbrella are removed, leaving enough ribs to accommodate the various sections of the paper. The ribs are held together at the lower end by means of the leather washer near the handle, holes being punched through it to receive the knobbed ends. Or, if desired, the loose ends of the ribs can be merely tied together with a length of string or wire. Each rib holds one section and in this way the paper can be kept together in proper sequence.—Ruth Henderson, Lake Mills, Iowa.

Calcium Carbonate for Cleaning

Sometimes, in framing a choice picture, it is desired to get the glass, particularly the side next to the picture, absolutely clean. It has been found that calcium carbonate will do the job to perfection. A little powder is applied to a dampened cloth, which is then rubbed over the glass. The moisture evaporates quickly leaving a fine coating of powder. Remove this by rubbing with a clean, dry cloth.



STENCILLING *to*

by Berton Elliot

IN WALL decoration, there is often a certain need for border or band decoration, as well as medallion and other unit designs for panel ornamentation and similar requirements. For painted walls, this need is met by stenciling, an ornamentation produced by pouncing color directly onto the painted wall surface through a cut-out stencil design. It may be used over plain color effects, or over any of the various stippled, mottled or blended wall treatments now so popular.

Very often a simple band applied over an otherwise uninteresting surface will change the entire effect, and provide a last finishing touch of beauty. In many cases a colorful border will break the monotony of a too plain or too drab effect, and enliven the whole room. In other cases, the principal colors of a room may be gathered together in purer and stronger tone in a stencil border, to provide a center of interest well up in the room, so that furniture and rugs will be less prominent. Beautiful architectural lines also frequently may be emphasized by the proper use of stencils. In other cases, where there is too great a contrast in color between walls and ceiling—as, for instance, a beam ceiling and heavy cornice in dark stain, with light-colored walls—a stencil border will break the hard line and form a bridge between the light and dark colors. Panel treatment, also, may sometimes most effectively be executed by stenciling.

The use of the stencil is simple—surprisingly simple. Very little trouble need be experienced in getting good results, if a few easy rules are followed.

To start with, it might be explained that stencils are generally cut in thin, but very tough and durable, oiled paper, a grade of manila paper known as “tag board” being most commonly used for the purpose, and raw linseed oil, or a combination of linseed oil and mineral oil, used to render the surface non-absorbent. An almost



Applying the First Stencil Color of a Two-Part Stencil Border on a Wall

endless variety of designs and sizes is made by various stencil manufacturers, which may be obtained from progressive paint stores in every locality, or will be ordered for you from a catalog of designs if not on hand. Stencils may also be cut by the home decorator to express his own individual decorative ideas, the cutting generally being done with a safety-razor

BEAUTIFY *your* WALLS



blade with a piece of glass under the paper.

Stenciling is usually done with painters' oil colors or special stencil colors made for the purpose. These colors can be purchased in tubes or small cans, as only a very small amount is needed. The colors are thinned for use either with turpentine or special glazing liquid or stencil medium sold for the purpose. The color is usually applied with a regular stencil brush, a stubby type of brush with short bristles, as shown in the illustrations.

The first step is to determine the exact placing or location of the stencil. With a border design, the stenciling generally follows some established architectural lines, such as ceiling, molding, cornice, chair rail, etc. It is important to have the design just the right distance from the line being followed. A half inch or inch, more or less, may mean the difference between an effect that is just right and one that is decidedly unbalanced. Unless one is experienced in stencil decoration, it will be found a good idea to mark off a small section of the design on the wall with charcoal or chalk, which can be easily dusted off. When the proper location has been determined, the stencil paper should be trimmed, so that the edge of the paper can be placed right up to the guide line in stenciling, being careful that the trimmed edge runs true and parallel to the center line of the design.

Having determined the location of the stencil, mix your colors to a suitable working consistency, making sure not to have them too thin, or they will run under the edges of the stencil. This done, place



Applying the Second Color: Below. Notice How the Brush Is Held and Pounced against the Stencil

the stencil in position. If desired, it may be tacked in place, but care should be taken, in removing the tacks, not to pull off any of the plaster. The best place to commence is back of a door or other inconspicuous part of the room, so that any slight defects at the start will not be prominent.

Dip your brush into the stencil color, and commence pouncing the color through the stencil design. Do not dip your brush clear in, but barely moisten the tip with the color. If the brush is too full, the excess paint will run under the edges and blot the design. It will be found better, on this account, to have your color in a saucer or shallow receptacle rather than in a deep can. Hold the brush at right angles to the wall, and pounce straight against your work. If held slanting, the bristles will slip under and produce a rough uneven



edge rather than a clean, sharp print.

Do the complete design at one setting, taking care that no small dots or marks are left out. Then move the stencil along, one length, and repeat. Most stencils are provided with guide holes, or are so cut that the pattern exactly repeats at each end, so that the lengths are bound to fit together and follow along in unbroken continuity. At the corners, the stencil can be bent carefully, so that the thin, delicate parts do not break. Some decorators, however, prefer to skip the corners and do them last, thus keeping the stencil perfectly flat so it will be sure to fit up tight against the wall until the four sides of the room are done.

When beginning the last wall, the intervening space should be measured off with the stencil, to see how the two ends will come together. You may luckily hit it just right, but if not, "steal" a little from each setting; that is, if you have 4 in. difference and eight settings, move your stencil along $\frac{1}{2}$ in. each setting, to shorten or lengthen the design, as the case may be.

Between settings, the back of the stencil should be wiped over with a cloth moistened with gasoline, turpentine or naphtha, to clean off any color that may have run under the edges and avoid any possibility of smearing the wall when the stencil is replaced for the next setting. Care should be taken not to break the stencil, the best method being to lay it flat against a level surface while cleaning. If the design has any tips or sharp points, always wipe with, never against them. Any smudges or faulty markings that may be made on the wall can also be wiped off with the gasoline or turpentine.

Some stencils are single-part stencils,

others made in two, three, four or more parts, each part to be done in a different color. In doing stencils of two or more parts, one part should be finished clear around the room at a time. The different parts in the set are provided with guide lines, so there will be no difficulty

in registering the different colors in their proper places. The brush should always be cleaned thoroughly after each color. Sometimes two or more colors are used on one-part stencils, in which case different brushes should be used for each color, and all colors applied at the same setting of the stencil.

While most stencil designs look well in solid color, those with natural art ability often like to shade certain parts of the design

with the brush, or to wipe or pick out high lights and shadows through the stencil openings with a cloth.

There are a few simple rules in the selection of stencil designs which will help greatly in obtaining good results. Simplicity is the keynote of effective stencil decoration. Overornamentation is to be avoided, and especially the use of a too elaborate border in a very simply decorated and furnished room. On the other hand, a more elaborate border will be entirely fitting in a room that is to be decorated and furnished in a richer style. The character of the design should be appropriate for the room being decorated. For instance, a fruit pattern might be quite suitable for the dining room, but out of place in a living room or hall. Water lilies, quite the thing in a bathroom, would not be desirable for a dining room. Conventional designs may, of course, be used practically anywhere, but are especially adapted for rooms constructed and furnished along severe lines, while the more



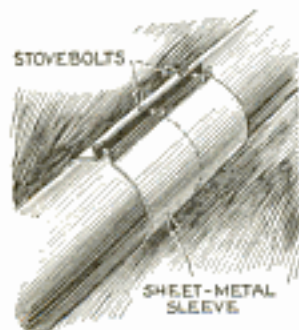
Wiping Off the Back of the Stencil between Settings, to Prevent Smearing the Wall

floral patterns are best in rooms where the architecture and furnishings are along more graceful lines and of a more delicate nature. The size of the design should correspond with the size of the room.

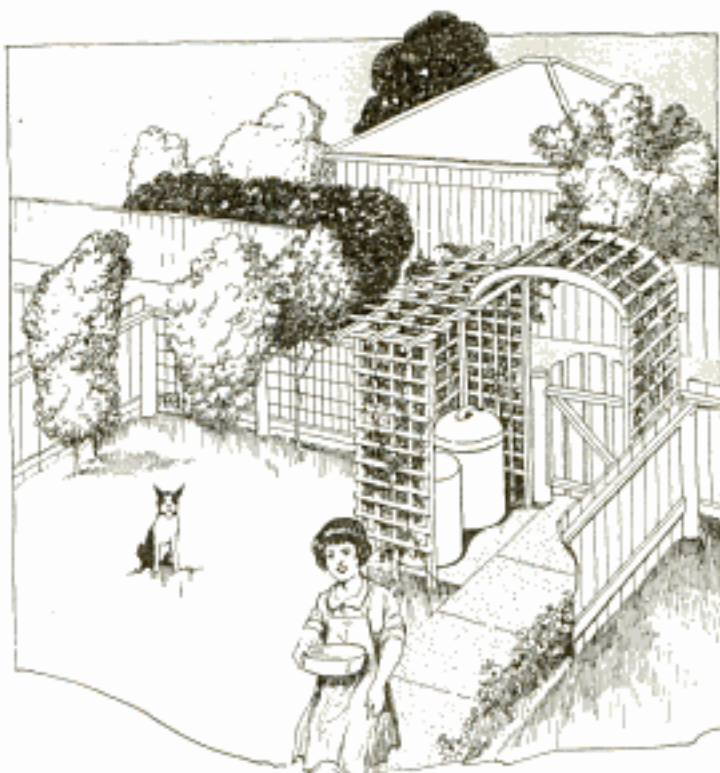
As to color treatment, there are likewise a few fundamental principles which have everything to do with the appearance of stencil decoration. Use colors which will be harmonious with the wall decoration. Slightly deepened tones of some of the wall colors will always look well. Tastefully contrasting colors also look well but are harder to choose properly. As a rule, use stronger and brighter colors with smaller stencil designs, and more subdued tones with the larger designs. Use natural or seminatural colors for designs taken from nature motifs, as, for instance, green or autumn tints for foliage, brown for stems, native fruit colors for fruit, etc.

In conclusion, it may be pointed out that stenciling offers the home craftsman an unlimited opportunity for individuality in wall decoration.

Support for Long Spans of Stovepipe



Long horizontal stovepipes often need support at the joints in order to prevent them from sagging and eventually coming apart. Instead of using wire attached to the ceiling, the required rigidity can be obtained by using sleeves made of galvanized sheet iron to clamp the ends of adjoining pipes together as shown in the drawing, which virtually makes one solid length. Bend the edges of the sheet iron at right angles and drill a number of holes through the bent edges to receive stovebolts. When the latter are turned tight, the sleeve should be a snug fit around the pipe.—Horace Lemaster, Maryville, Mo.



Garbage Cans near the Rear Gate Can Be Hidden from View by Means of This Lattice-work Inclosure

Lattice-work Hides Refuse Cans

For concealing refuse cans from view in the back yard, make a lattice-work inclosure adjoining the rear gate as shown. An offset is provided to accommodate them. If desired, an arch of suitable width can be built and creeping vines planted to cover the lattice. Thus the collector has easy access to the cans and the yard is greatly improved in appearance.

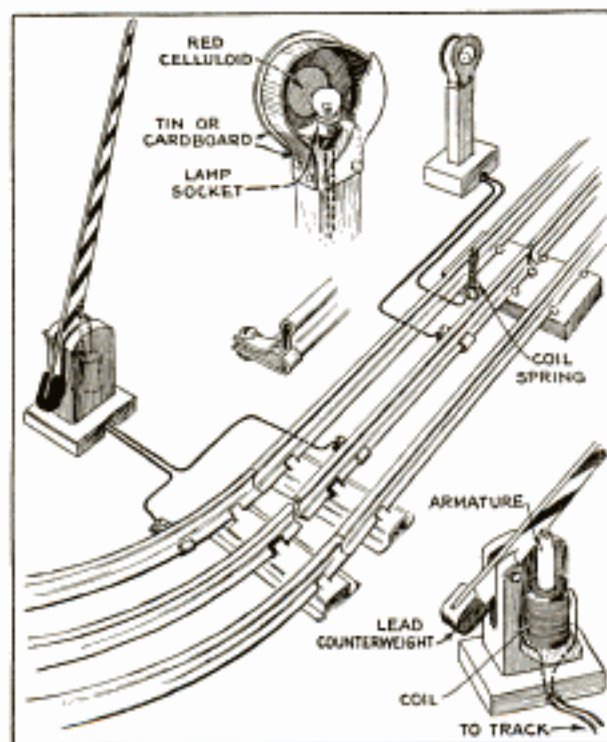
Wallpaper Covers Picture Nail Holes

When hanging a picture on a nail in the wall, make an inverted V-shaped cut in the wallpaper and pull it down as shown in the drawing so that the nail can be driven in the bare space. When the picture and nail are removed later, the turned-down piece of paper is pasted and pressed back in its place to hide the nail hole. Those who have a habit of moving their pictures about frequently, will find this a valuable kink in preserving the appearance of the wall.



Automatic Crossing Gate and Light for Toy Trains

It is a comparatively simple matter to make an automatic crossing gate and lamp



Automatic Gate Crossing and Signal Lamp Increases Realistic Effect of Toy Trains

for your toy train. The details of the illustration show both. The solenoid that operates the gate is made by wrapping approximately 500 turns of very fine wire, taken from an old telephone transformer, on a flattened cardboard tube. A small piece of galvanized iron is bent over to double thickness to form an armature for the solenoid and must be of such size that it will slip up and down in the tube without binding. The corners should be rounded to prevent it from sticking. A hole is drilled through one end for attachment to the gate, pins being used to make the connections, which must work freely in order to let the armature remain in a vertical position when the gate opens and closes. A counterweight of lead is used on the end of the gate, as indicated, so that the moment the current energizing the solenoid is cut off, the gate will rise. The two ends of the coil winding are left about 2 ft. long and a neat case is made to hold the gate-operating mechanism. The light is still easier to make. A piece of tin tacked to the top of the post is

drilled so that an ordinary flashlight lamp can be screwed in, and two leads are extended from the lamp-post. A section of the center track is insulated at each end from the rest, and is also insulated from the ties. This section should be located a few feet from the actual crossing so that the gate will go down before the train reaches the crossing, although in the drawing this section of track is shown at the crossing. One of the leads from the gate is connected to the insulated section of track and the other to the side rail. One lead from the lamp is similarly connected to the insulated section, while the other connects to a small coil spring mounted vertically on a block of wood between the tracks. The spring should extend just high enough so that the axles of the coaches will touch it. As each axle touches the spring, the lamp lights, and in this way an intermittent flashing effect is obtained. The spring should be installed at the crossing so that the light will not go out until the last coach has passed.—C. W. MacElroy, Philadelphia, Pa.

Bottle Makes Good Photographers' Lamp

For the darkroom, a cheap and serviceable lamp can be made from a wide-mouthed brown bottle, which will fit a lampshade holder. Get a candle-type lamp of not more than 15 cp. The hue of light produced is just right for all kinds of contact paper. With a piece of dark orange or yellow paper pasted around the bottle, the light will be safe to use on all bromide papers, and with red paper around it, all ordinary film may be developed safely.



☛ Paraffin is useful for cleaning grease from the wringer roller, sewing machine, etc.; warm it until it becomes soft, then rub or roll it over the greasy surface.

SHOP NOTES



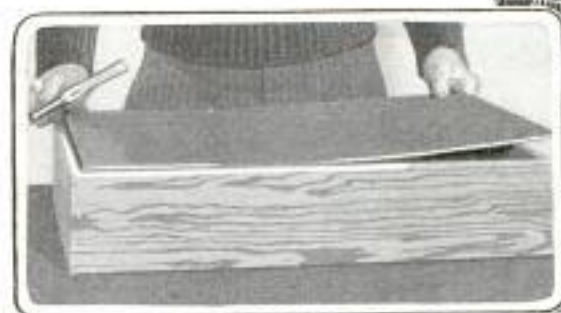
Mirrors Are Easy to Resilver

By KENNETH MURRAY

CONTRARY to the general impression silvering glass is a simple procedure and requires no expert knowledge or expensive equipment. To make a good job of silvering, a heating table is necessary. It should be larger than the largest glass to be silvered. For average work, a table about 15 by 20 in. has been found a convenient size. To make the table, nail together a wooden frame, using 1 by 4-in. stock. Screw four porcelain light sockets on the inside of the frame, one on each side, and fit a 25-watt lamp into each. Connect the sockets in parallel with ordinary lampcord or No. 14 wire, which should terminate in a 10-ft. extension cord fitted with a plug for attachments to an electric outlet. Place the frame on a sturdy table or bench, and on the top fit a piece of sheet iron. This completes the heating table, except that it must be made perfectly level by means of wooden wedges. After the lamps have been turned on for 15 minutes, the sheet iron

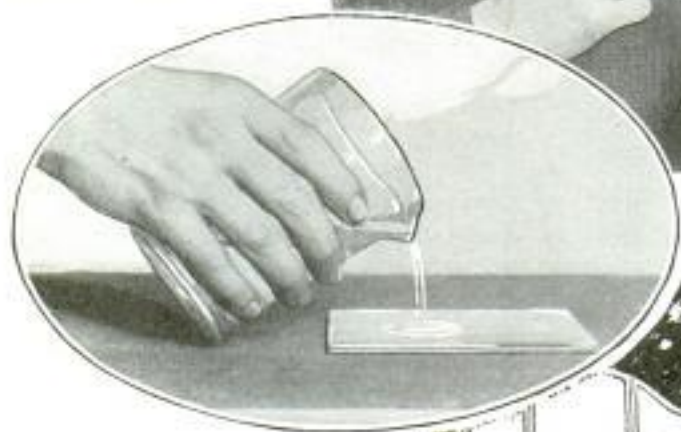
should have a temperature of from 115 to 120° F. If it is warmer, one of the lamps should be unscrewed.

There is a number of different kinds of silvering solutions, some using grape sugar and some formaldehyde to precipitate the silver onto the glass. The formula



The First Step in Silvering Is to Make a Heating Table, Consisting of a Frame Which Contains Four Lamps and Is Covered with a Piece of Sheet Iron

used by the writer is slow and uniform in action and will coat the glass with a thin or heavy film of silver, as desired. This formula calls for two stock solutions, referred to as A and B, which will keep for some time. Only distilled water is to be used in making them up. For stock solution A, use a clean graduate or glass and dissolve 1 oz. of silver nitrate in 6 oz. of distilled water. Into this



pour 2 or 3 oz. of ammonia water. The solution will then become brown and turbid. Continue adding more ammonia with an eye dropper until the solution gradually clears up. Be sure to stop adding ammonia when the solution appears almost clear in looking through it toward the light, and brown by reflected light. Stock solution B consists of 10 oz. of distilled water and $\frac{1}{4}$ oz. Rochelle salt. Just before silvering, both solutions are mixed and diluted as follows: 1 oz. of each is mixed with 20 oz. of distilled water, or any other quantities of exactly the same proportions. Silvering solutions are affected by light and it is therefore necessary to keep them in a dark, cool place.

That cleanliness is an important factor in silvering, will be evident if an attempt

is made to do it without cleaning the glass thoroughly. If the glass is not clean, both visually and chemically, the result will be a series of "islands" in the mirror where the silver refuses to take hold. Place the glass on a flat surface and, with a soft cloth and some whiting or good grade of glass-polishing powder, such as is used for cleaning windows, scour the surface thoroughly. Then rinse with clean water. Wrap cotton on the end of a stick, dip it in strong nitric acid and scrub the glass a second time. Leave the acid on the glass for a few minutes, after which it is washed off with distilled water, care being

taken not touch the surface with anything except a piece of clean cotton. Flow more distilled water on the glass until you are ready to silver it. From the time the glass is cleaned until it is silvered, the slightest touch of the finger on the surface will leave an invisible spot that will show up plainly later. Drain the glass, holding it by the edges only, and place it on the heating table, which has been warmed to the correct temperature and is set perfectly level. The silvering solution can be prepared for use while the glass is warming, and it is then poured

on the glass quickly and evenly. Skillful pouring can be acquired in a short time by experimenting with water. Pour the solution into the center of the glass so that it immediately spreads out to the edges. More solution is added to the center until the entire glass is covered with a film, about $\frac{1}{8}$ in. thick. The solution will build up slightly at the edges due to capillary attraction, but if the table is level, it will not run over. Silver will be



deposited on the glass immediately in a fine-grained film, which is at first invisible. When the glass has been silvered sufficiently, it is drained, allowed to dry, and finally given a coat of asphalt varnish with the best quality camel's-hair or sable brush.

Making mirrors and renewing old ones is not the only use of the silvering process. Many household ornaments of glass and glazed porcelain can be made highly attractive by silvering part or all of them, as for instance glass jars and vases. Similarly, electric lamps can be made to reflect more light by silvering the upper portion. The tip should be silvered if the lamp is to be used in an inverted position, as is the case with many table lamps, so that the light will be thrown downward. By silvering the lower half of an automobile-headlight lamp, the glaring effect will be eliminated and the road light increased. If, when silvering, a very thick coating of silver is desired, the process should be repeated a number of times, but each time the glass is drained, the used solution should be thrown away.

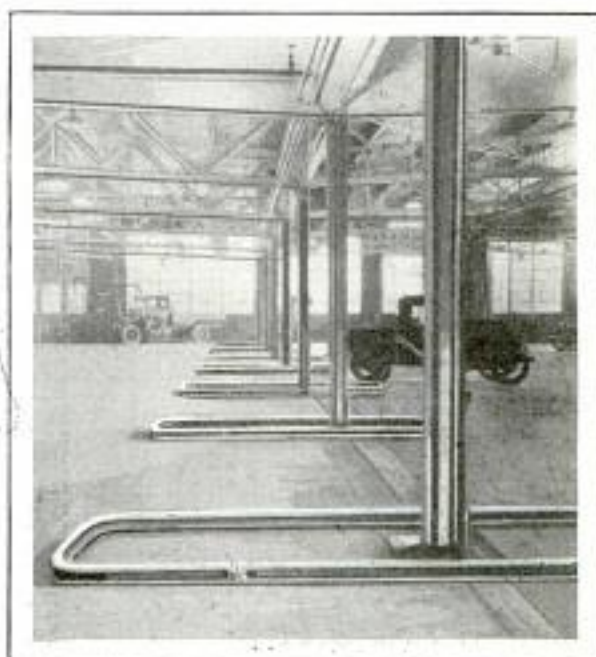
Making a mirror with a thin film deserves special mention. The process is essentially the same, except that the heating lamps are turned off. Rinse off the solution after the glass has a thin film deposited on it. Dry the surface thoroughly and then coat it with a good transparent varnish. A mirror, having such a thin coating, is practically transparent when looking through it from one side, but resembles any other mirror on the other side. If desired, a thin piece of glass may be fitted directly over the varnished sur-



Accuracy in Mixing the Ingredients for the Silvering Solution Is Important

face, to protect the silver film, if such a mirror is used for window or door panel.

Steel Rail for Column Guards



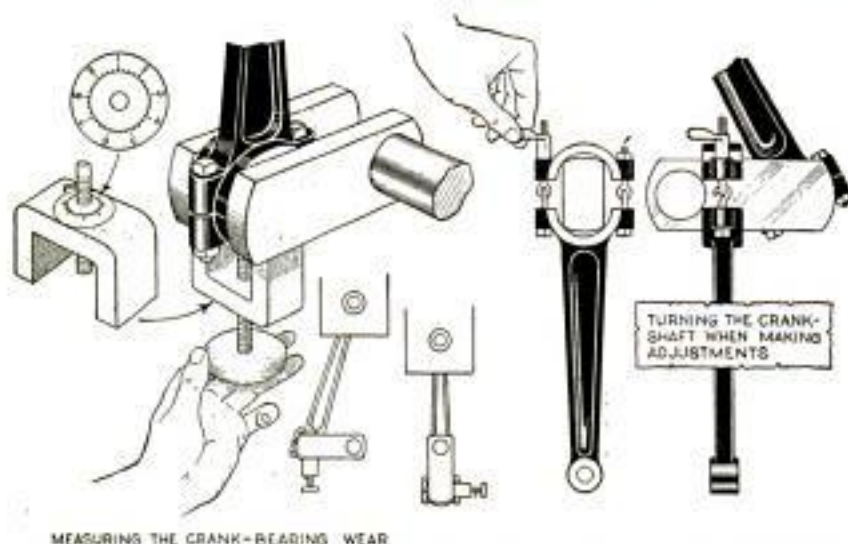
Old Steel Rails Make Useful Bumpers for Protecting Columns and Walls in Parking Garage

Heavy steel rails, bent to form a loop and bolted together at the ends, as shown in the photo, make excellent guards for columns of buildings in which automobiles are stored. Similarly, a steel rail laid along the wall, about 3 ft. from it, prevents cars from backing up against it in parking.—*Jos. C. Coyle, Englewood, Colo.*

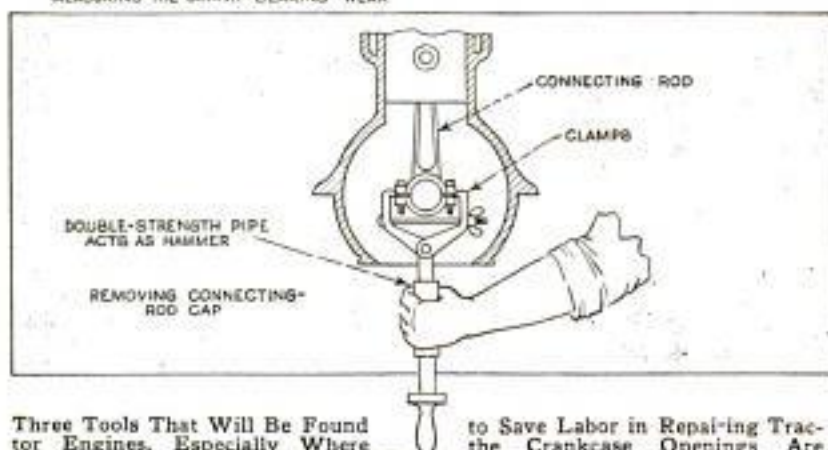
Cushion Spring for Starter Pull Button

Steering-column starter controls for the model-A Ford are hard to set so that the spring inside of the starter switch is not partly compressed at all times. This means that, with the flexible motor mountings, a severe bump might close the switch momentarily. A light coil spring of the compression type should be placed on the pull rod above the guide for it on the steering column. This gives the starter pull rod more room for motion and also brings the pull button higher on the steering column, where it is easy to reach.—*E. T. Gunderson Jr., Humboldt, Iowa.*

☞ To protect a wood pattern from moisture, it will be found that the use of clear lacquer is much better than shellac.



MEASURING THE CRANK-BEARING WEAR



Three Tools That Will Be Found to Save Labor in Repairing Tractor Engines, Especially Where the Crankcase Openings Are Narrow, and the Bearings Hard to Get At

Simple Tools Speed Tractor Repair

Here are two simple tools that will be found to speed tractor repairs. To measure the crankpin-bearing wear, the tool shown at the upper left is used. The body is made of $\frac{1}{2}$ by 1-in. flat steel, bent to a U-shape, with the legs $1\frac{1}{2}$ in. long and wide enough to rest on the crank webs, clearing the connecting rod. This is drilled and tapped $\frac{3}{8}$ in., 25 threads per inch, and a snug screw fitted as shown. On the underside of the "U," a dial scale is fastened, marked off into 20 divisions, and a pointer is driven into the side of the screw. The crank is placed at half stroke as indicated, then turned so that the thrust of the crankpin will be against the connecting rod. The tool is then applied and the screw turned until it touches the connecting-rod cap, when the reading of the pointer is noted. Now the screw is turned again until it presses the connecting-rod cap against the crankpin, still holding the legs of the tool against the

crank webs, and the reading again noted. Each division of the dial represents .002 in., which is the thickness of the shims ordinarily used, so that it can be seen at once how many shims must be removed to restore the fit. To turn the crankshaft when making adjustments, the tool shown at the right will be found a good time-saver. As may be seen, this consists of an old connecting rod fitted with eyebolts. One of the bolts has a hook to facilitate placing the tool over the web, and the other has a lever nut to tighten it quickly. By means of this tool the shaft can be turned as much or as little as required, without having to struggle to reach into a narrow crankcase opening. The tool shown at the bottom is used to remove connecting-rod caps, and its construction is evident from the drawing. The bolt draws the points of the toggles into the gap between rod and cap, and then a smart blow downward with the self-contained hammer will bring the cap off in a hurry.

Steel Tubing Used to Make Shop Chair



By using an acetylene torch and a steel welding rod, it is an easy matter to make a light and rigid shop chair from scraps of steel tubing. Except for the cushion, the entire chair is made

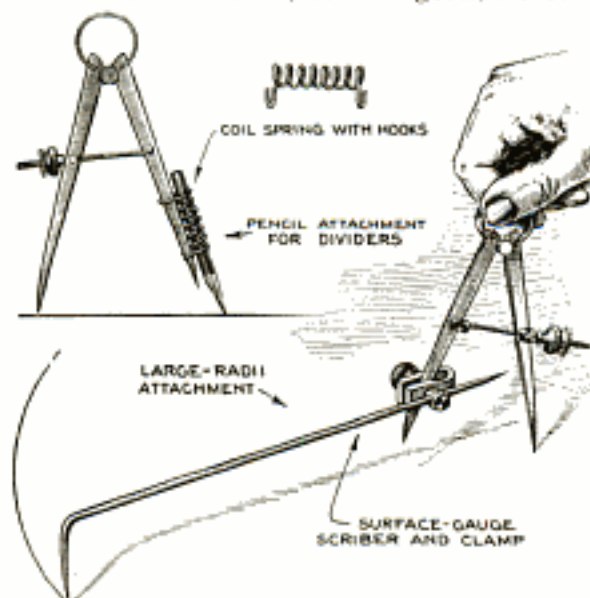
of steel, all metal joints being welded. Two circular sheets, with a bolt through the center, form the top of the legs and the bottom of the seat. A circular groove milled in the surface of each plate holds a number of ball bearings, which, with an occasional drop of oil, make the chair easy to turn. Light steel tubing is used for making the web of the chair back.

Milk Used for Photographing Cut Glass

When photographing cut glass or any highly polished object, reflections and high lights can be prevented and more detail obtained by coating the object with ordinary milk. First wash and dry it and then dip it in milk. If too bulky to dip, use a sponge to apply the milk. When thoroughly dry, the object is photographed.

Attachments on Machinists' Dividers Make Large and Small Compass

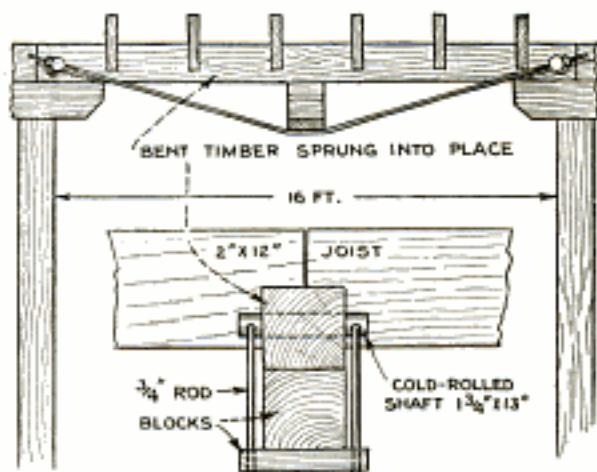
Emergency methods for making small compasses out of a pair of ordinary machinists' dividers and providing a large radius attachment, are shown in the illustration. Get or make a small coil spring that will hold a pencil snugly and bend the ends of the spring to form hooks to be slipped over one of the divider legs. For a large radius attachment, use a surface-gauge scriber and clamp, which is attached to one of the legs as shown in the lower detail.—G. A. Luers, Washington, D. C.



Two Methods of Making a Small and Large Compass Out of a Pair of Dividers

Brace Draws Sagging Beams in Place

Some badly bent beams in our factory had to be straightened without the in-



Brace Made of Rods Draws Sagging Ceiling Beams Back to Their Normal Position

stallation of pillars. The method indicated in the illustration was found highly successful in springing them back into their normal position. At each end of the beams a hole was drilled for a length of 1 3/4-in. cold-rolled shafting, which was in turn drilled at each end for a 3/4-in. rod. After the pieces of shafting had been slipped through the beam, two lengths of 3/4-in. rod, threaded at both ends, were pushed through the holes in the shafting or anchor pieces, and nuts were screwed on the projecting ends. A suitable block of hardwood was placed at the center of the beam, and the rods led under it as indicated, after which they were pulled tight by drawing down the nuts.—William Madison, Oshkosh, Wis.

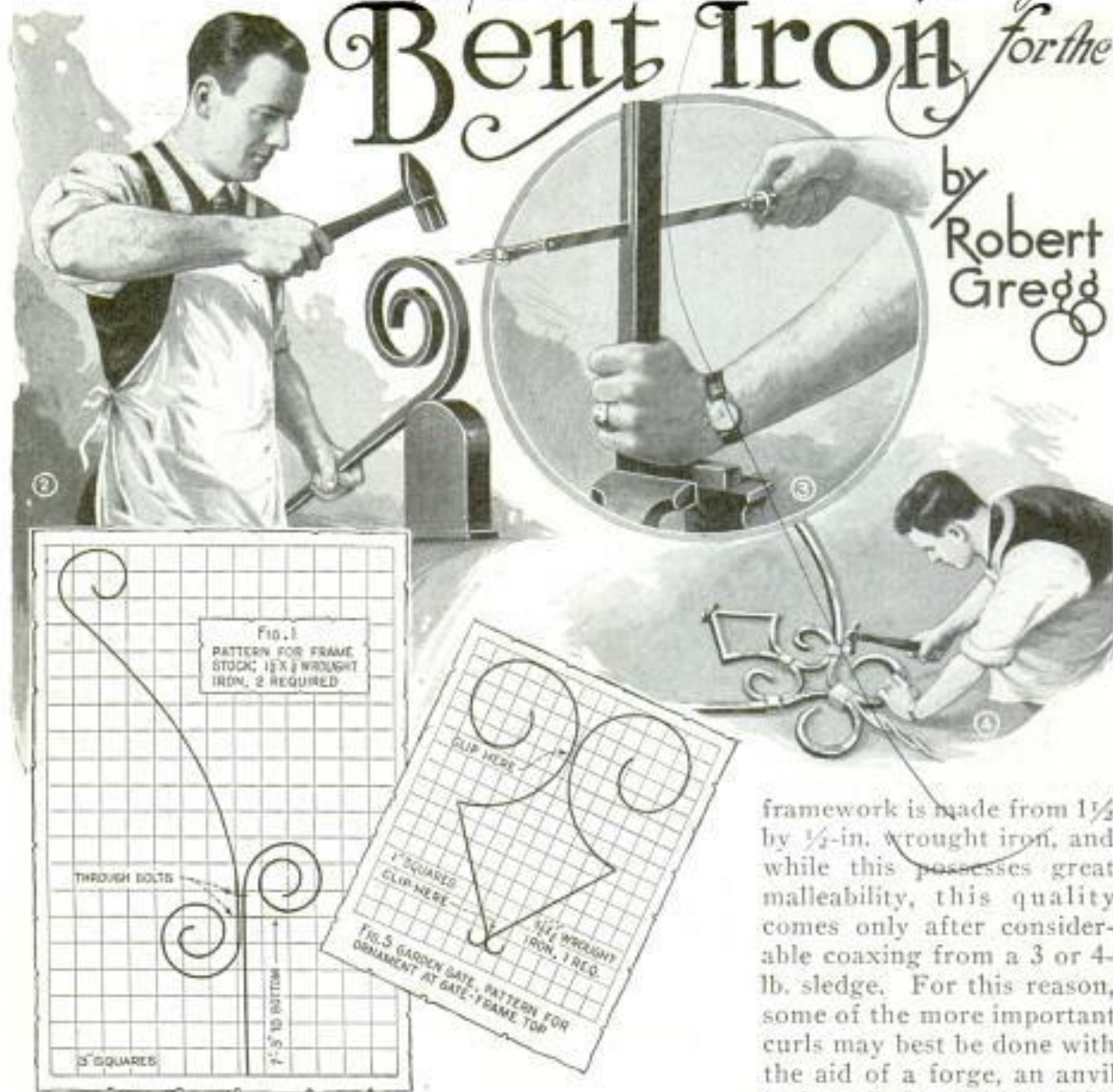
How to Prevent Squeaks in Model-A Fords

Rubber brake seals, made for use on the model-A Ford brakes, often squeak when first put on. To prevent this, tire mica should be dusted into the groove in them before they are installed. If any of the drums are off center or the front-wheel bearings are too loose, other noises will be produced at times. These faults should be corrected, as they will interfere with braking, whether seals are used or not. The edge of the brake drum, which is turned over, often cuts through the rubber seal. It is best to file off the edge and also to round the corners.

Swedish wrought iron -
 Swedish American Steel Corp
 429 Kent Ave Brooklyn N.Y.

Bent Iron for the

by
 Robert
 Gregg



PART III

STONE and iron have long been a traditional combination, but here is a gate in bent iron which preserves its graceful lines when used in combination not only with stone, but also with either wood or wire fencing. Moreover, its uses are quite varied. In the two examples shown, the gate has been used in connection with a surrounding wall of stone, but it can be located in the entrance to a summer house, built in along the rear fence which many a modest home owner has erected to hide an unattractive alley, erected as a grill over an outside doorway, or used in any other of a score of variations peculiar to different homes and localities.

The greater portion of the structural

framework is made from $1\frac{1}{2}$ by $\frac{1}{2}$ -in. wrought iron, and while this possesses great malleability, this quality comes only after considerable coaxing from a 3 or 4-lb. sledge. For this reason, some of the more important curls may best be done with the aid of a forge, an anvil and a little outside help.

However, the curves required are not many and the proper arcs can be hammered cold, which, although a violation of the ethics governing blacksmithing, is nevertheless quite possible.

Starting out to build the gate, one of two possible plans must be adopted. You must build the gate to fit the opening in the fence, or you must build the fence to fit the gate. If the fence is of wood or the newer woven wire, it can readily be cut to any suitable opening, and, in this case, it would be wise to follow as closely as possible the dimensions given in this article, thus making the proportions exactly as they should be. However, if the fence or other opening is fixed, the gate will, of course, be made wider or narrower to suit. Up to 48 in., it will look well and

Home Craftsman



FIG. 7 U-FRAME FOR GATE, $1\frac{1}{2}$ " WROUGHT IRON, ONE REQUIRED



be practical in a single width; wider than this, it should be made double and from slightly heavier iron stock, as pictured in the driveway gate shown in Fig. 18.

Presuming that the size of the gate is of no consideration, you will start by making the four pieces which form the actual framework. These are fashioned from $1\frac{1}{2}$ by $\frac{1}{2}$ -in. wrought iron, to the dimensions shown in Fig. 1. The long curve on the top section can be put in by hand by gripping alternate ends of the piece in a vise and pulling strongly with a pipe wrench on the other, but the shorter bends which form the curls must be hammered, preferably though not necessarily, while hot. These are most easily worked from the smaller twist out, that is, you should start at the inside of the curl and gradually work around to the outside instead of bending the outside and then trying to work to the inside. You can readily see that, while the latter method is well suited to lighter iron, it becomes imprac-

tical in the heavier stock where every inch of the way must be hammered. Any kinks resulting from the initial roughing-in of the curls can be straight-

ened out and made smooth with a lighter hammer, as shown in Fig. 2. Because the blunt end of such heavy stock appears ungraceful, the end of the iron which forms the curl should be forged down thin, or cut off on a long bevel with a hacksaw, as in Fig. 3, before the hammering of the piece is commenced. This also permits a more accurate shaping of the inner curve of the piece, which would, ordinarily, be the most difficult.

The sidepieces and the arched top sections are held together with four suitable bolts, two to each joint, as can be seen in Fig. 1 and the photographs of the finished gate. At the top, the curls at the end of the arches are held together with a clip cut from soft sheet iron or brass, as shown in Fig. 4. Clips are likewise used to secure the ornamental centerpiece



which is fitted to the arch top. This centerpiece is fashioned from two lengths of slightly lighter stock, to the shape and dimensions shown in Fig. 5, and is clamped with one large clip at the point shown in Fig. 6, as well as a smaller clip at the lower joint; then it is clipped to the frame proper. Notice that the ends of this stock are also beveled to take away the blunt appearance and to aid in hammering. A "spire," cut from a tapered piece of flat stock, about 12 in. long by 2 in. at one end by 1 in. at the other, is twisted to suit, and then clipped between the two curved portions of the frame while assembling, as may be seen in Fig. 4.

So much for the framework. Naturally enough, suitable holes must be drilled in order to fasten the frame in place, and hinges must be provided, but these two items are best left until the gate itself is finished.

Commencing on the gate proper, you will fasten a U-shaped piece to the dimensions given in Fig. 7, hammering the corners down as nearly square as the iron will allow. The crossbar of this frame is drilled with a series of round holes, spaced as shown in Fig. 7, which are then filed square to a tight fit for the $\frac{1}{2}$ -in. square pieces which form the gate uprights. Each upright is hammered into place,

Fig. 9, then spread with a punch where it comes through flush with the piece and slightly calked on the other side with a cold chisel to make a firm joint. The two curved pieces, which form the top of the gate and carry out the oval effect when used in combination with the framework, are likewise drilled with holes to take the uprights. As can be seen in the photographs, the upper curve is drilled for but three uprights, the other three extending up to the inner bar only. Both curved pieces are bent to an arc of 17 in., and the inner one may be made of slightly lighter material than the outer. Since the tops of the uprights will extend through these curves, they should not

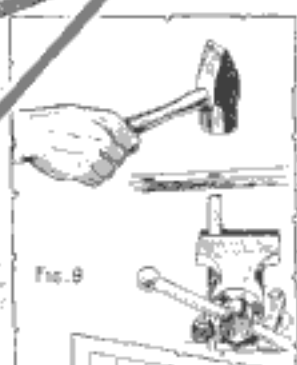


FIG. 9

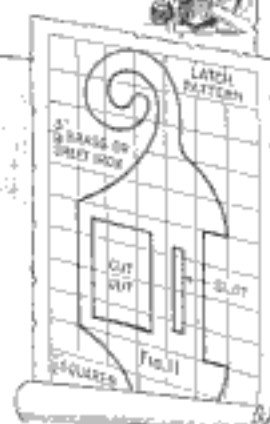


FIG. 11

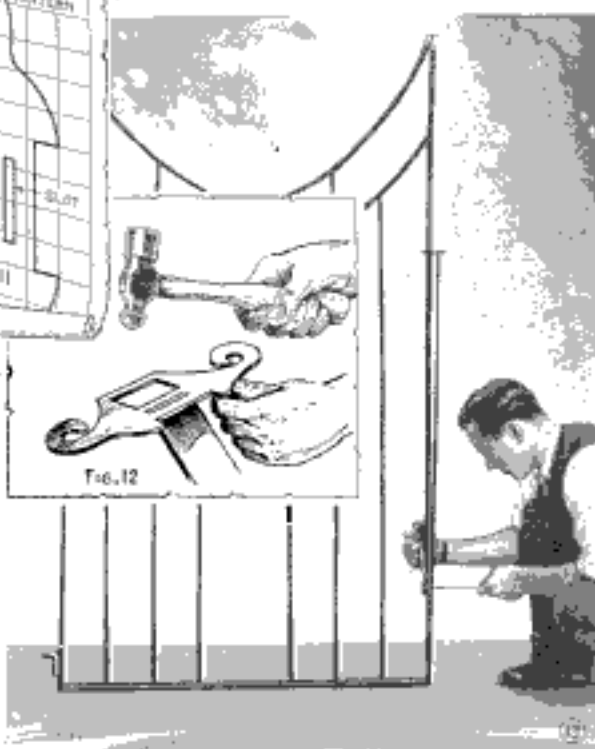


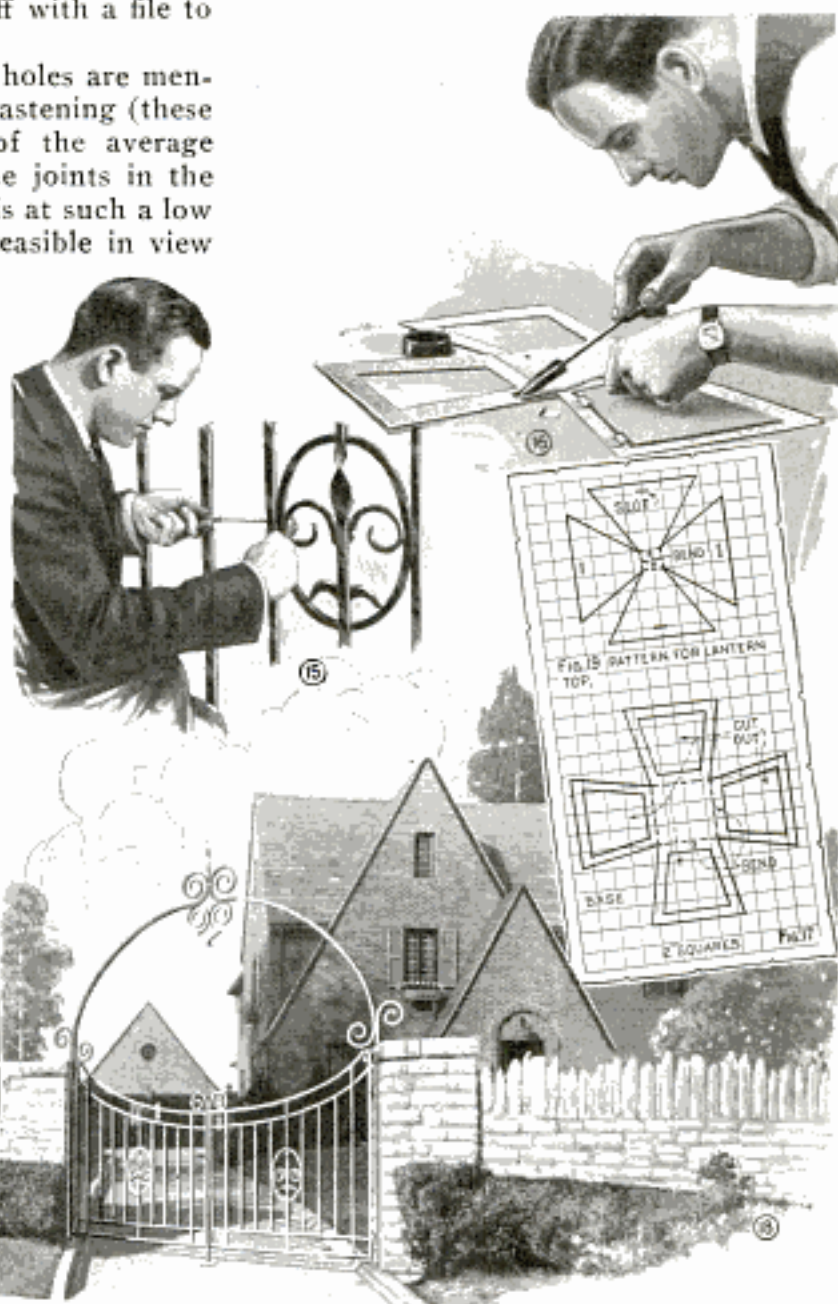
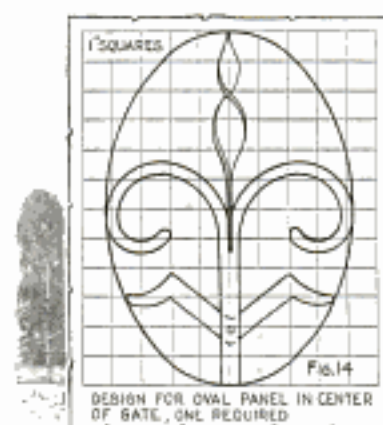
FIG. 12

be punched or roughened in any way, but the holes should be countersunk with a file, the pieces riveted in and then filed so that, when painted, they will be invisible. The holes through the curved pieces must be cut on more or less of a bevel, as can easily be seen, and for that reason it is best to fasten the curves only temporarily to the U-frame with bolts, as shown in Fig. 12. These can be removed when the uprights are all in and true, and rivets substituted, after which the top

joint should be rounded off with a file to present a neat appearance.

While rivets and drilled holes are mentioned here as a means of fastening (these being within the range of the average home workshop) all of the joints in the gate can be welded and this at such a low cost as to make it quite feasible in view of the considerable amount of labor required in drilling and squaring the necessary holes to permit the assembly of the pieces.

At any rate, the permanent fastenings should not be made until the latch is fitted, since the latch proper must be slipped over the end of the U-frame. The man-

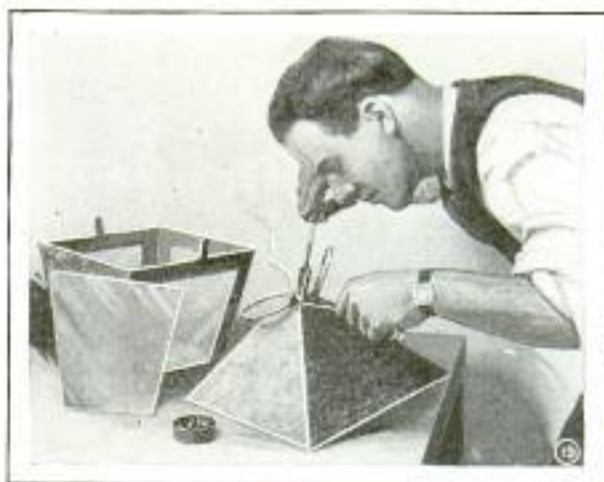


ner of working is fairly obvious. A piece of sheet metal, cut to the shape shown in Fig. 11, is slotted to take a long piece of spring steel (not wrought iron) which is riveted to it as shown in Fig. 12. The unit is then slipped over one of the outside uprights of the gate and held in place with bolts or rivets or welded into place at the approximate position shown in Fig. 13. Notice in this picture that the hinges are in place. These are merely short angles of the gate stock, riveted or welded to the main frame of the gate and drilled with holes to take the pins which slip through and into corresponding brackets fastened to the gate frame.

The oval design for the center of the gate is diagrammed to scale in Fig. 14. As can be seen in this sketch and in the photographs, this oval is fastened to the center upright which extends upward through the bottom of the oval, then is split and curved. Any blacksmith will hammer the twist on this piece, or the upright can be split, bent and the twist cut from sheet stock and welded in place. Welding should be resorted to throughout in assembling the oval, as a neat effect is almost impossible otherwise. However, rivets or bolts may be substituted for some of the joints, as shown in Fig. 15. These should be countersunk, riveted flat, filed

as smooth as possible and then painted to form a perfect surface.

The whole gate, when finished, should be hung with suitable bolts fitted through the hinges. Any corrections apparent in the hang or lines should be attended to, after which the iron should be given a base coat of red lead, well thinned with oil, followed with two or three coats of Japan black. Or, the whole gate may be treated with the burning-off process described before in this series to assume a deep blue-black appearance. The ornamental lantern which completes the unit is made from medium-weight galvanized iron; one piece, shaped as shown in Fig. 17 and bent on the dotted lines, serves for the bottom and sides, while a second piece, cut to the shape shown in Fig. 19, forms the top.



Both pieces are held to shape, after being bent, with solder.

The two pieces are held together by means of four tabs soldered to the sides, which are fitted through the slots cut in the top and then turned over. Small clips are soldered to the inside of each side opening, as shown in Fig. 16, to take suitable panes of "antique" or colored glass. Two harness rings are

attached to the top of the lantern, as in Fig. 19, the rings being so spaced as to fit neatly over the short projections at the top of the gate. Like the gate, the lantern is treated with three or four coats of paint. The lantern does not light, being a purely ornamental feature, although it can readily be provided with a standard socket and wired if power lines are conveniently near at hand.

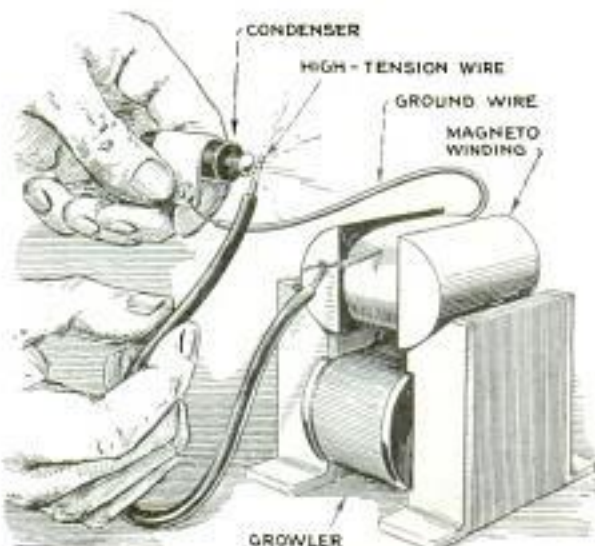
Method of Saving Corn-Planter Check Wire

Corn-planter check wire is usually attached to the anchor by hooking it to the front side of the button. By so doing, the wire is bent each time the planter comes to the end of the field, which causes premature breakage at the hook. To prevent this, set the hook of the anchor between the loops of the button, and let the hook rest against the rear of the button. This forms a complete hinge at the anchor hook, allowing the wire to work freely and completely eliminating breakage.

Test for Leaky Condensers

Here is a simple and effective method of making a test on auto-ignition condensers to determine whether or not they are leaky. The apparatus necessary consists of an ordinary growler, or armature tester, and a high-tension magneto winding. The latter is placed on the growler in the usual manner, leads are taken from the high-tension and ground sides of the

winding and these are touched very quickly to the condenser terminals to be tested. If there is the slightest leak in the condenser, it will immediately become shorted permanently, and if the condenser does not show a short after a quick application of the high voltage, it can be replaced in the ignition system.



Effective Method of Testing Auto-Ignition Condensers for Leaks

Preserving Cutting Edge of Dies

When one is using hand dies with a hammer for punching out washers or other parts, the die is invariably laid down between operations with its cutting edge on the hard surface of the block, which causes the tool to become dull much more quickly than it would if laid on a soft surface. Get a cigar box and put into it sawdust or soft wood shavings to a depth of about 2 in. When not using the die, place it on the sawdust. This will not dull the cutting edge, and many more cuts can be made without resharpening the edge of the die.—Charles R. Whitehouse, Boston, Mass.

Hole in Spout Makes Oil Flow Freely

Gas-station attendants, selling motor oil from quart bottles having a spout attached, can save time by drilling a hole in the spout as shown. This will help



especially during winter when oil becomes thick and runs slowly. The hole admits air into the bottle as a vacuum is formed by the outgoing oil. No oil will flow out of the hole because of the inrushing air

if the bottle is held so that the hole is above the oil.—Kenneth Keith, Chicago.

Keep Grease Off Airplane Control Cables

Owners and operators of aircraft have found that the greasing of control cables at points where they rub against outside guides, may increase the wear rather than prevent it, owing to the tendency of the grease to pick up dust. In many localities where abrasive dust is found, this wear is so pronounced that care is taken to keep all traces of grease off the cables.—Joseph S. Edgerton, Washington, D. C.



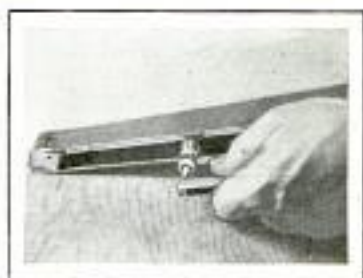
Double Harness Snap Suspended from Body of Truck Holds the Hot Pot Safely and Securely

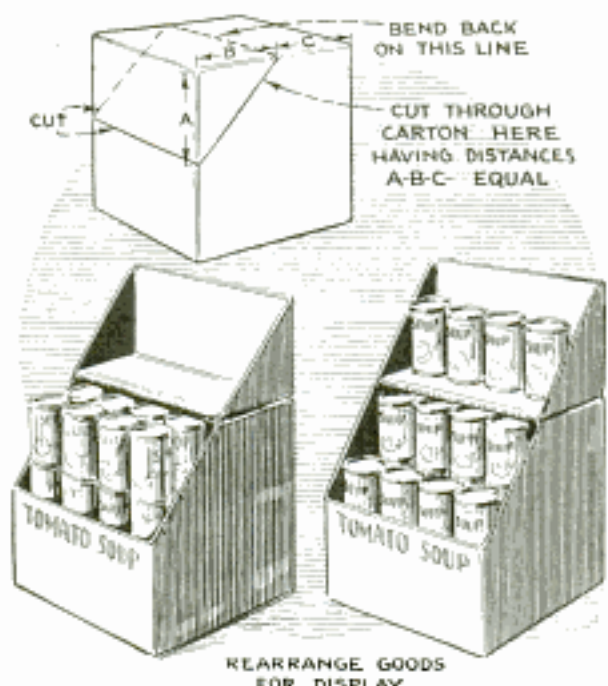
Transporting Pot of Hot Lead

The problem of safely transporting a pot of hot lead, solder or similar material from place to place on a motor truck, was solved by the device shown in the photo. A loop of wire was fastened to one of the rear corners of the truck body and a double harness snap used to suspend the pot from the loop.

Opening and Closing Micrometer Quickly

Inspectors, storeroom attendants, and others who use mikes for testing, know that much time is consumed opening and closing the tool. To do this quickly, get a strip of felt, about 2 ft. in length, and nail the ends to a piece of wood as shown. The piece of wood is in turn attached to the bench or counter. In use, the felt is grasped with the forefinger between the two sides, and the micrometer spindle is then rolled up and down, against the top in one direction and on the bottom in the other. In this way there is no lost motion, and in two strokes, that is two down and two up, the spindle will open or close about an inch.



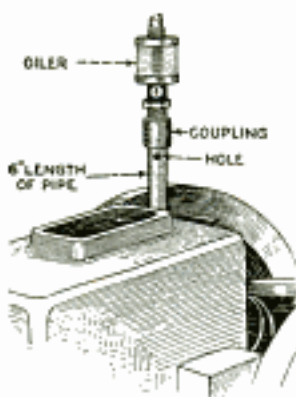


Cardboard Cartons Cut to Make Neat Display Case for Canned Goods and Soap

Carton Cut to Make Display Case

An ordinary cardboard carton can be used as a display case for the goods it contains. One corner is cut, as shown in the upper detail, and then bent back to form a shelf. The contents now can be arranged as indicated, making a very neat display. Usually there is some lettering on the carton indicating the nature and brand of the goods in it. This method of display is particularly applicable to canned goods, soap, bottled stock, and similar staple goods.

Improving Oiler on Gasoline Engine



While using an old gasoline engine, it was noticed that when the engine was pulling, the oil was not dripping from the oiler. Upon examination, the oiler was found to be in good working condition, but the piston rings were so worn that some of the exhaust gases escaped through the oiler, holding the oil back. Although there is a small pipe in most oilers to prevent such trouble, this one

was not effective. A 6-in. pipe nipple and a coupling were obtained, and a $\frac{1}{4}$ -in. hole was drilled through the pipe near the coupling as shown. The hole permits the escaping gas to pass through without interfering with the oiler, insuring good lubrication as long as there is an oil supply, whether the engine is pulling or not.—Melvin Kennard, Gasport, N. Y.

Chip Off Flywheel Teeth before Turning

Many light cars, and some of the larger ones, are equipped with a flywheel that has teeth for the starter gear. High compression and early sparks cause backfires that often shear off some of the teeth, rendering the starter useless until the flywheel has been repaired or replaced. A repair consists in turning down the wheel and shrinking a steel gear band on it. When doing this work, it is best to break off the remaining teeth with a hammer and chisel before turning the flywheel down. This not only saves quite a bit of time in turning, but, what is more important, it also saves the lathe, as turning down teeth is one of the most abusive forms of service to which a lathe can be put.—Merrill Brown, New Albany, Ind.

Emery Cloth for Removing Insulation

For removing insulation, rubber or enamel, from wire use a piece of fairly coarse emery cloth and fold it as shown, taking care

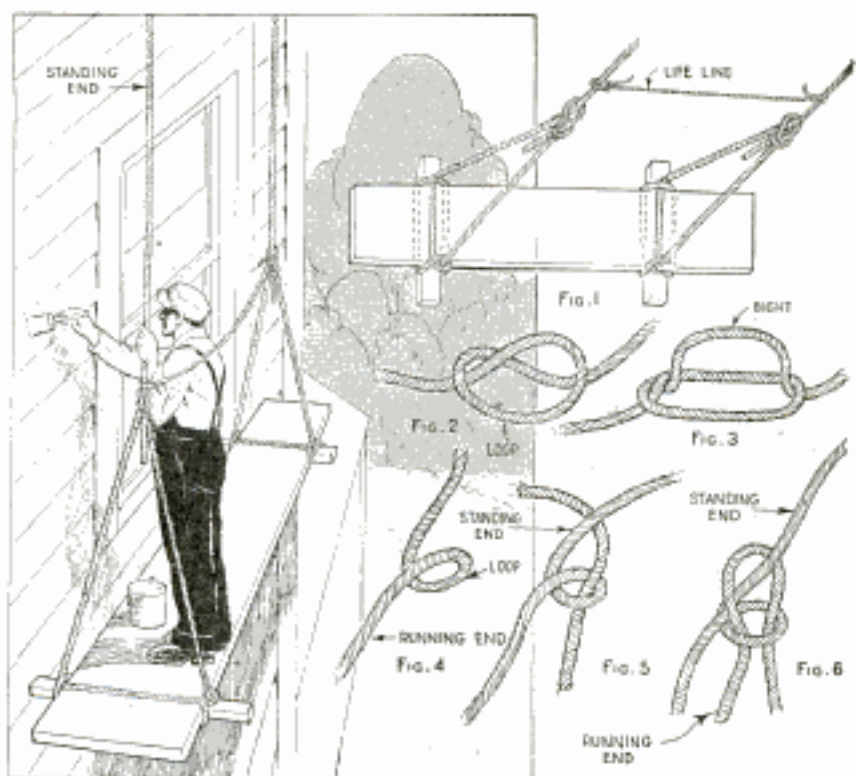


not to crease it. Hold the end of the wire to be skinned between the folds, press the emery cloth tightly against the wire and, with a rotating motion, pull outward. This will remove all the covering cleanly.—Charles R. Whitehouse, Boston, Mass.

☛ New hose dipped in a lukewarm solution of alum and water, just strong enough to notice the alum when touching the solution with the tongue, will toughen the fabric and lessen the chance of runs.

How to Rig Stagings

The illustrations show how a staging for the side of a boat or building should be rigged. The plank is 2-by-12, with a couple of 2 by 4-in. pieces nailed on the underside, about 18 in. from each end, to keep the plank away from the building and to make a more secure rig. To make the stage hitch, make a loop in the rope about 6 or 8 ft. from one end as in Fig. 2, then pull the bight through the loop as in Fig. 3. Keeping the rope in this form, slip the bight over the end of the plank, with the doubled part underneath, then slip it over the crosspiece, as shown in Fig. 1, and draw tight. Now, taking both parts of the rope in the hand, make a loop in the standing end (the end that is to go to the top of the building) as shown in Fig. 4, and pass the running end through the loop, around the standing end and back through the loop, as shown in Figs. 5 and 6, thus making a bowline knot.



Here Is the Way in Which a Seaman Would Rig a Staging to Paint a Ship; It Is Equally Valuable for Shoregoing Painters

Work the end through until both sides are of the same length and draw tight. The resulting bridle will not slip. Treat the other end of the stage in exactly the same way. If desired, a life line of light rope can be tied across the standing ends, to prevent the danger of falling backward.

—C. Newkirk, Chicago, Ill.

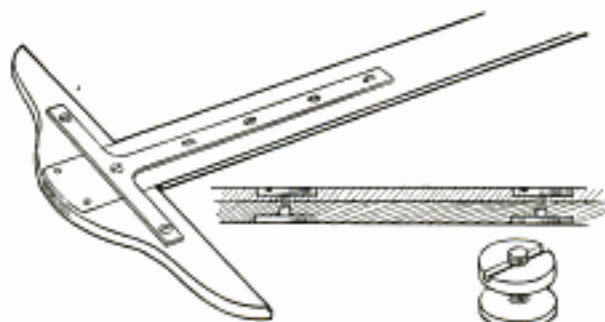
Removing Old Oil Stains from Tools and Machines

For removing oil stains from steel, a solution consisting of equal parts of benzol and pure paraffin has been found effective. The paraffin is cut into shavings and stirred into the benzol to make a fairly thick solution. Use a paint brush for applying it. Small tools can be completely immersed. After half an hour, wipe off with an old rag. No scrubbing is necessary, as the most stubborn stain will rub off easily. Wash the cleaned surface with gasoline as the stain-

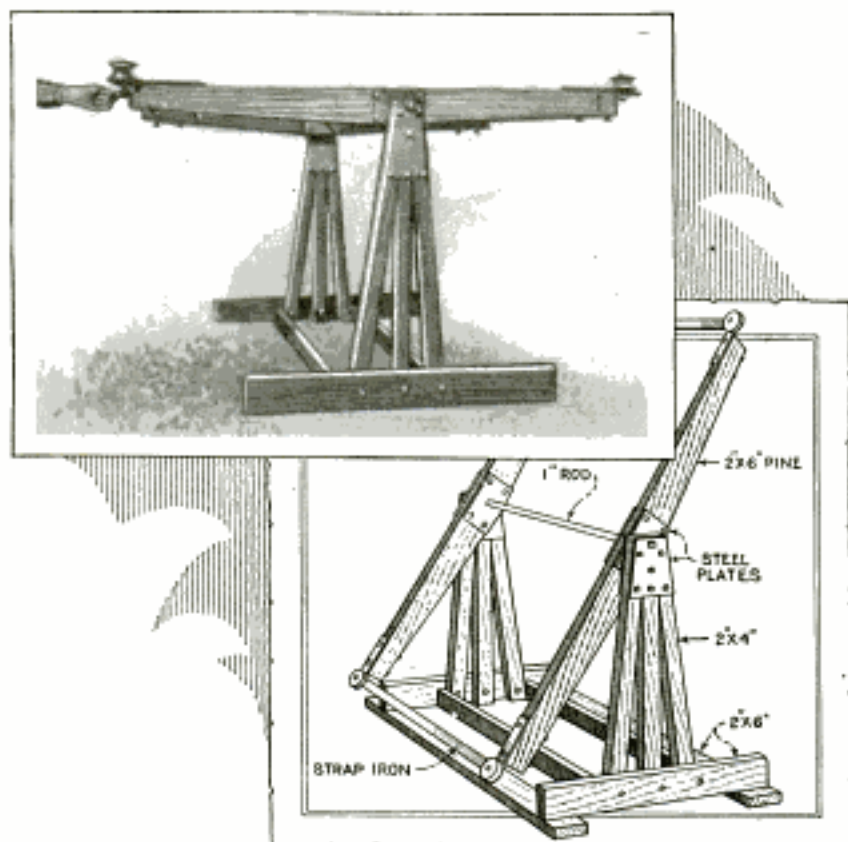
removing solution will cause rust if any traces of it are left. Be sure to keep the cleaning solution away from flame.

Metal Strip Reinforces T-Square

Reinforcing your T-square with a strip of metal will more than double its life, besides insuring accuracy which is often missing in wooden T-squares after long use. The screws holding the two pieces together may get loose and tightening only enlarges the holes, but the attachment of a brace to both members has been found a permanent cure.



Metal Strip Screwed to Both Members of Your T-Square Doubles Its Life and Insures Accuracy



Those Who Repair Large Doors Will Immediately Appreciate the Advantages of This Door Holder

Holder for Repairing Steel Freight Car Doors

For handling steel freight-car doors while riveting so that the workers can stand on the floor to do the job with as little wasted effort as possible, the pivoted holder shown in the illustration was devised and found highly satisfactory. The rack is made almost entirely of 2-by-4 and 2-by-6-in. pine, and the details of construction are clearly shown. A 1-in. rod serves as a pivot; steel plates are used for bearings and for holding the assembly together rigidly. Lengths of flat iron are screwed or bolted to the ends of the movable member, and pulleys are provided at the ends.—W. S. Nelson, Marshall, Mich.

Model-A Ford Pin Bosses Grooved for Locking Rings

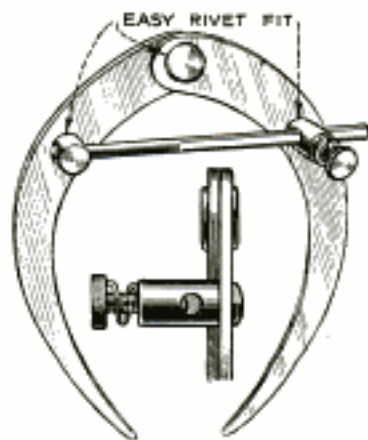
In model-A Fords the piston-pin locking ring, in the center of the rod is a trouble maker, regardless of special tools that may be available for fitting the pin. On your next job of this kind, take the pistons to a machinist and have him turn a groove inside of the pin boss, about $\frac{1}{16}$

in. from the end. Into the groove a locking ring is fitted, such as is used in full-floating assemblies. These rings, in both ends of the bosses, hold the pin in place, and the center locking ring is thereby eliminated. If no short pins are available, standard pins can be used, by grinding the ends until the length measures slightly less than the distance between the grooves.—Merrill Brown, New Albany, Ind.

Quick-Adjusting Caliper for Storeroom Attendant

Storeroom attendants and others who use calipers merely to measure the size of work and not to machine it, will appreciate the quick-adjusting calipers shown here.

Ordinarily, stiff-jointed calipers must be tapped back and forth to set them, as they spring somewhat, but these calipers have an easy-working joint. Each leg is fitted with a post, riveted so that it will turn. These posts carry a rod that is a driven fit in one and slides in the other, and has a flat filed on it with a slight taper toward the end. The post through which it slides is fitted with a setscrew and a coil spring with the ends fitting holes in post and screw. In use, the calipers are opened to approximate size and pushed over the work. As the legs open, the post slides along the rod which, by reason of the taper flat, allows the screw to be turned by the spring to hold the legs of the calipers at the correct setting.

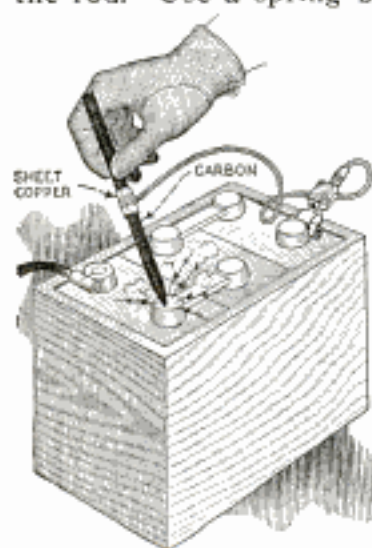


Removing Broken Bolts and Studs

When a bolt has twisted off so short that it cannot be taken hold of with a wrench, nor turned by means of a hammer and cold chisel, the following method will be found useful. Place a jam nut on the bolt and then, with a $\frac{1}{8}$ -in. welding rod, arc-weld the nut to the top of the screw and fill the hole in the bolt. After the weld has cooled, it is a comparatively easy matter to remove the bolt in the ordinary way.—C. D. Youngs, San Leandro, Calif.

Burning Battery Terminals

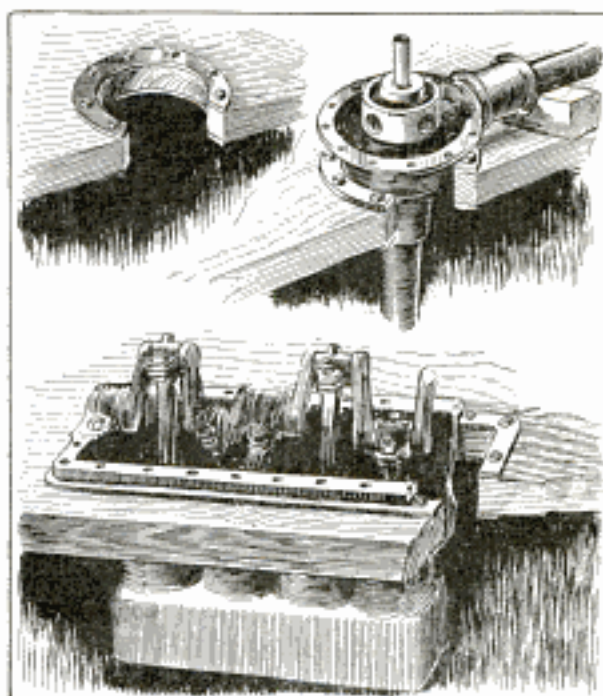
To burn on a loose terminal on a storage battery, take an old piece of carbon rod and file it to a point as shown. Connect it to one post of a battery with No. 8 wire, wrapping a piece of sheet copper or brass tightly around the carbon and soldering the end of the wire to it. This will insure better conductivity than merely wrapping the bare end of the wire around the rod. Use a spring battery clamp for



attaching the wire to the battery post. When the carbon is held against the post to be burned, sufficient heat is produced to melt the lead and restore connection.—R. C. Demary, Akron, Ohio.

Holes in Bench Aid Assembly Work in Auto-Repair Shop

For holding heavy parts, such as motor blocks and rear ends, cut-out sections of the bench top will be found a great help. In the illustration, the upper detail shows a circular hole cut in near the edge, and lined on both sides with strips of flat iron for reinforcement. Slip the rear end into this notch, which will hold it in a convenient position for assembling. Below is



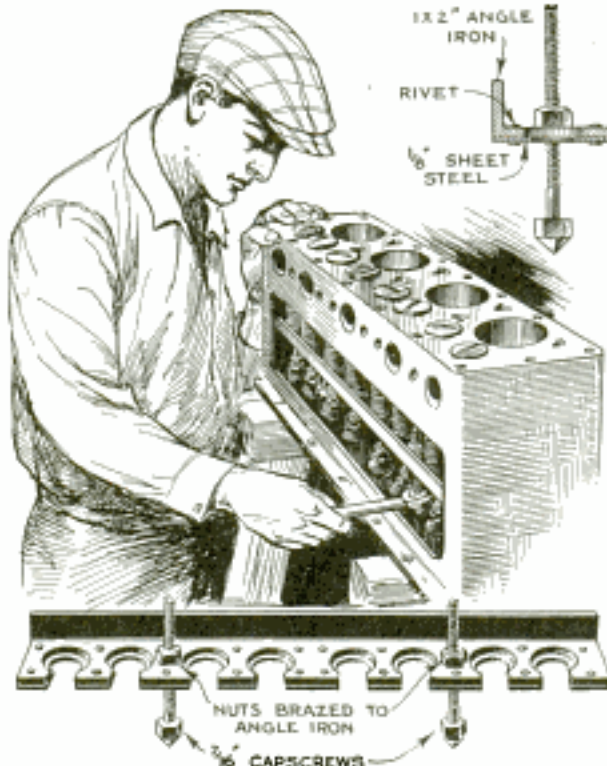
Bench Notches Hold Motor Blocks and Rear Ends in Handy Position for Assembling

shown a similar cut-out for a motor block. If the bench is strong enough, the cut-out need only be three-sided so that it will be comparatively easy to slip the block in place.—G. A. Luers, Washington, District of Columbia.

Notch and Pin Increase Usefulness of Electrician's Splicing Pliers

Wire-cutting pliers can be made more useful by cutting a notch at the end of each handle, and drilling a hole in which a small pin is inserted, as shown in the illustration. The hole for the pin should be about $\frac{1}{8}$ in. from the notch and the pin should project about $\frac{1}{4}$ or $\frac{3}{8}$ in. The exact size of the pins and notches depends on the size of the particular pair of pliers for which they are to be used. Although the notches are required in both handles, only one pin is necessary.





Made of Angle Iron, This Gang Valve Lifter Has Been Found Highly Useful in a Garage

Gang Valve Lifter Saves Time

In any garage or service station, a gang valve lifter will be found a great timesaver. The construction is indicated, but the design must be such as to suit the valve arrangement on different motors. Sometimes webbing in the casting permits the use of only a four-valve gang, where on some six-cylinder cars it is possible to lift all twelve valves with a single tool. The lifter is made of 1 by 2-in. angle iron. On the 2-in. face the required number of holes are laid out with their centers in exact line with the center line of the valve stems. The holes should be large enough to allow the lower valve spring washer to enter freely. Rivet a strip of $\frac{1}{8}$ -in. iron to the bottom of the angle iron and drill holes through this, concentric with the other holes but $\frac{1}{4}$ in. smaller. This makes a narrow edge for the valve-spring washer to rest on. Cut a slot from each hole to allow passage for the valve stems. At the two most convenient and accessible points, usually between the first and second, and also between the third and fourth cylinders, drill and tap holes for $\frac{3}{16}$ -in. U. S. standard cap screws. As only a few threads will be cut in the angle iron it is well to braze two $\frac{3}{16}$ -in. nuts to the iron to in-

crease the thread surface. Get two cap screws to fit and of the proper length, and thread them close up to the head. Also make blunt centers on the heads. The drawing shows clearly the method of using the gang lifter. As the cap screws are driven down against the crankcase or cylinder-block base, the lifter raises and compresses all the valve springs. The valve-stem locking keys or pins can then be removed so that the valves are free. The lifter is left in place while the valves are ground. Afterward it is equally simple to replace the locking pins and lower the gang lifter.

Turning a Model Yacht Hull

A good method of turning a model yacht hull is as follows: Get two pieces of wood, preferably pine of the correct dimensions, and glue them together face to face, putting a piece of paper between them when gluing. Center the block and turn the hull. A chisel carefully driven into the glued joint will separate the two halves neatly. The most important point to consider is that the block must be centered accurately.—Henry Martin, Scranton, Pa.

Bootblack Uses Paper Guards to Save Socks

Pieces of heavy brown wrapping paper, cut to the shape shown in the detail, were used by a bootblack to protect his customers' socks from blacking, which might be inadvertently brushed against them. With the use of these guards it is possible to shine the shoes much more quickly than usual, effecting a saving of time that is often quite important to the bootblack. Also, these guards please the customers.



A Home for Lean Purses



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Plan No. 4-B-20

SUPPOSE you take a rectangle twenty-five by thirty-five feet in dimensions, and divide it as many ways as you can get spaces for rooms. Most of the ways you work out will not be satisfactory for several reasons. Some of them will be too costly—any way that is more costly than the minimum is too costly—and some will waste space or not be convenient. These will be extravagant, too.

We will not say that there is only one way to do it, but we do say that there are not many. This one is satisfactory from the construction angle because it has just one main line of interior supports. This brings not only maximum economy, but because it frames and braces the house, the upkeep will be correspondingly lower.

It is also satisfactory from the planning side, for here you get living room, dining alcove and kitchen in line, so arranged that the living room is really more than twenty-two feet long. And the bedroom and bath portion are separated from the other as they should be.

While stucco is used on the house illustrated, almost any other type of expensive finish may be adopted. The roof is of enduring tile and there is an attractive porch of liberal size.

Note how much this house offers for little money—an open or inclosed porch, a living-room extension, a dining alcove in the kitchen, a combined basement and kitchen entrance at grade, two bedrooms and bath, four closets and a fireplace.

Besides it is pretty—a charming little home, good enough for anybody. The alternate plan is more generous to dining space—take your choice.



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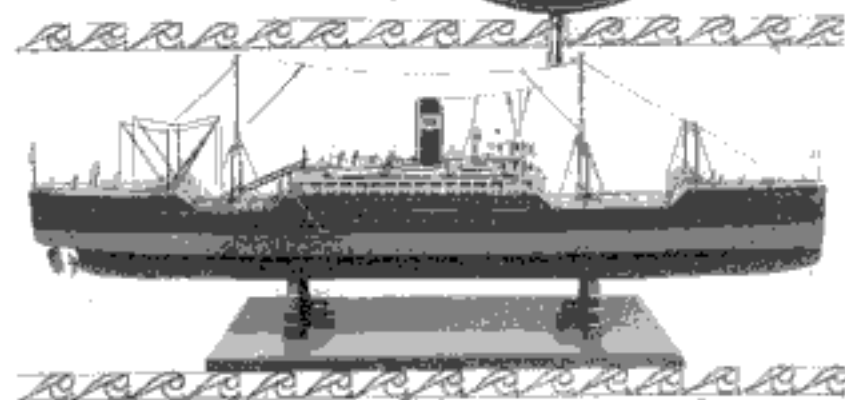
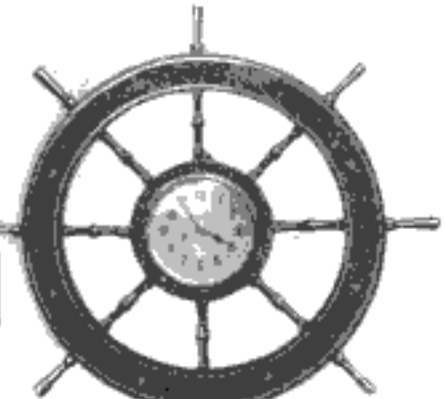
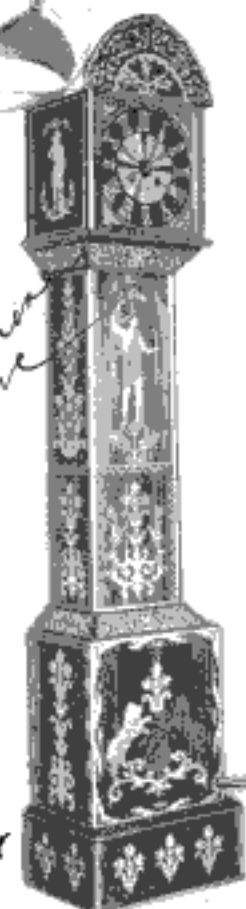
With the Craftsman

Scroll patterns for clock. Part from George Wilde,
 Balance worked out by Weller 510 E 11th St. New York



ing to know that the case contains over 3,000 pieces, and is mainly of rosewood, inlaid with curly maple, padouk, mahogany, satinwood, ebony and white holly. The borders and face are of birch, walnut, striped satinwood, primavera, benin, oriental walnut, tulip, olive, lacewood, amaranth, maple and holly. The clock stands 94 in. high.

"I am still operating my dockyard, which is kept 'shipshape and Bristol-fashion' at all times," writes Doctor S. T. Millard, of Topeka, Kans. "I am now building a model of a destroyer, and expect to model the battleship 'Kansas' after that. I am sending you some photos of late work, an inlaid ship's bell clock and an out-board profile of my model of the 'American Merchant,' a U. S. shipping board steamer. The model is 4 ft. 7 7/8 in. long, and is built to 1/8-in. scale." These two fine pieces of work are shown in the photos below.



The fine model of "Nuestra Senora de Rosario" shown above is the work of Mr. A. J. Benner, of Elgin, Ill. He writes: "Some thirty months ago I started this ship from the cover on your magazine, and, although this cover showed only a partial view, I built the whole ship from the illustration. The model stands 3 1/2 ft. high, and is approximately 29 in. long. It took approximately two and a half years to build, and has proved an interesting hobby and a very enjoyable pastime."

The builder of the beautifully inlaid clock at the right is Mr. S. T. Weller, a civil engineer of Denver. It is interest-

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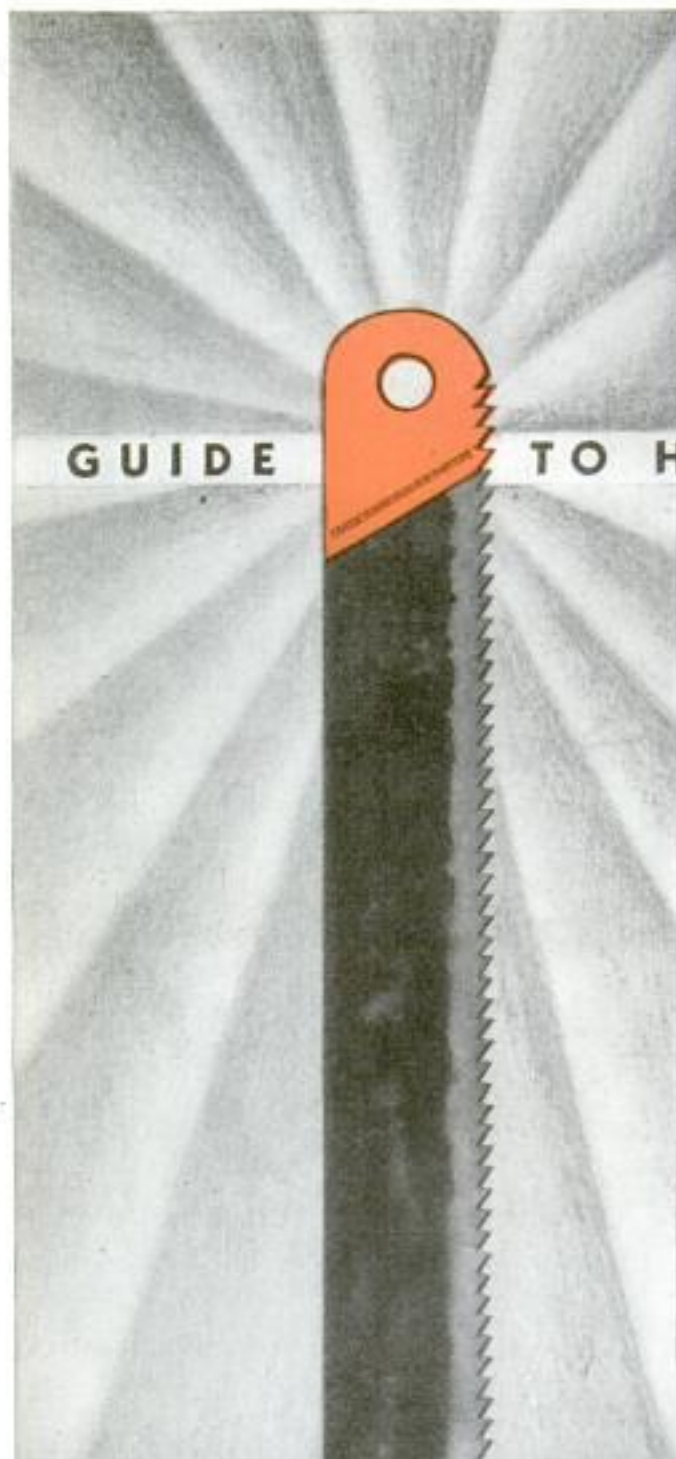


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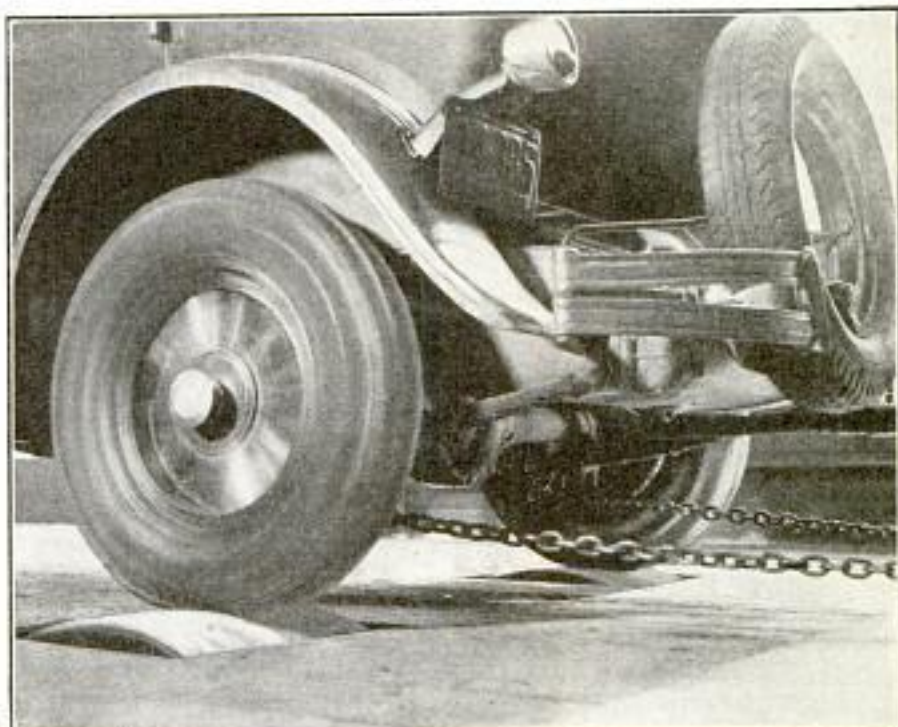
If it Climbs this HILL it will climb anything

GOOD, ordinary gasoline is in the tank, and yet the engine is "knocking" as if it were on one of the steepest hills in the world. It is.

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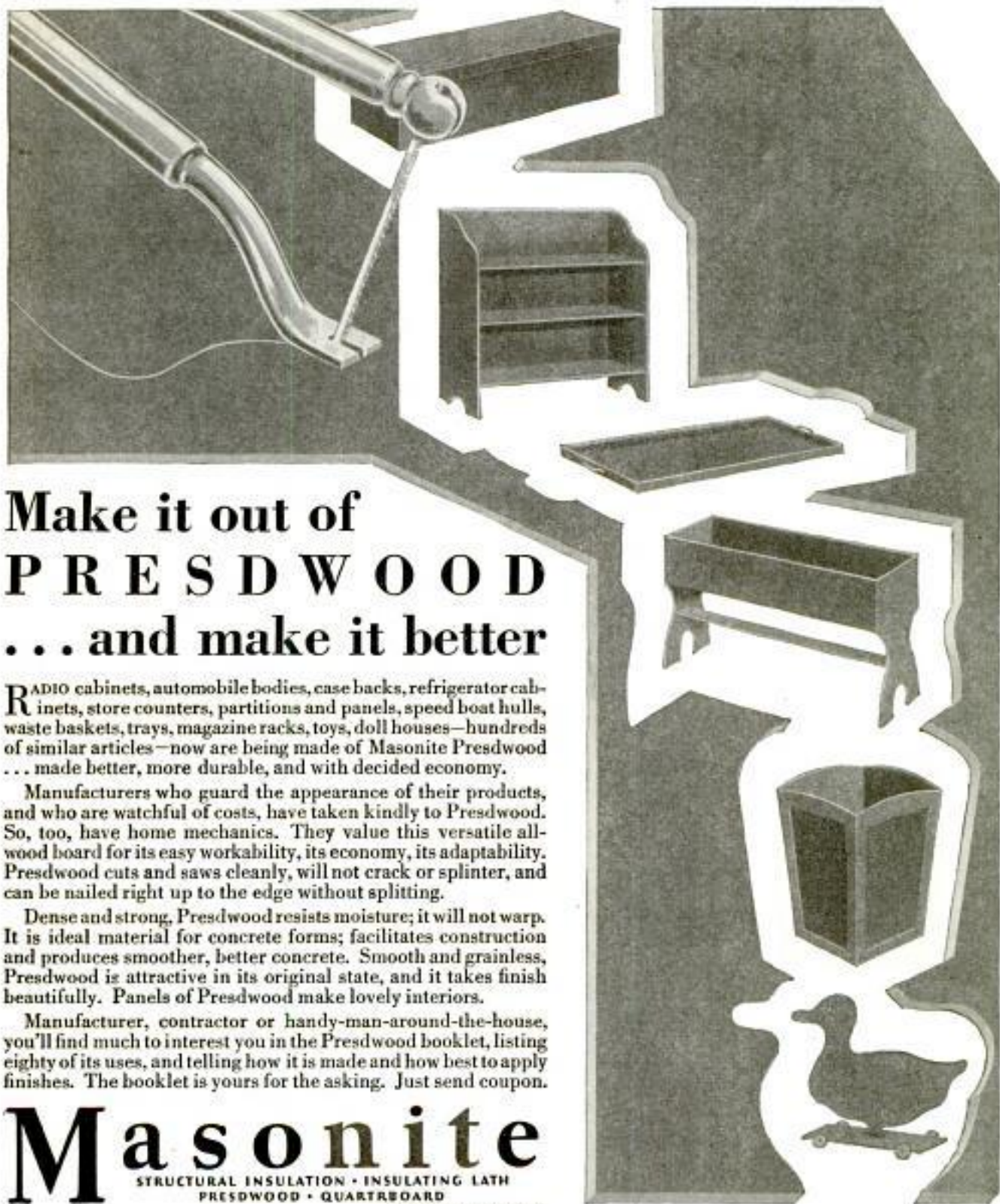
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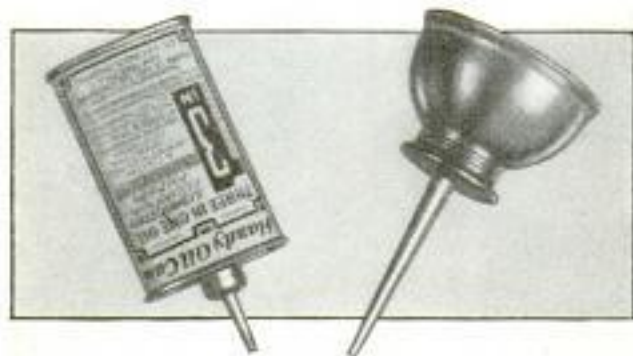
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*George,
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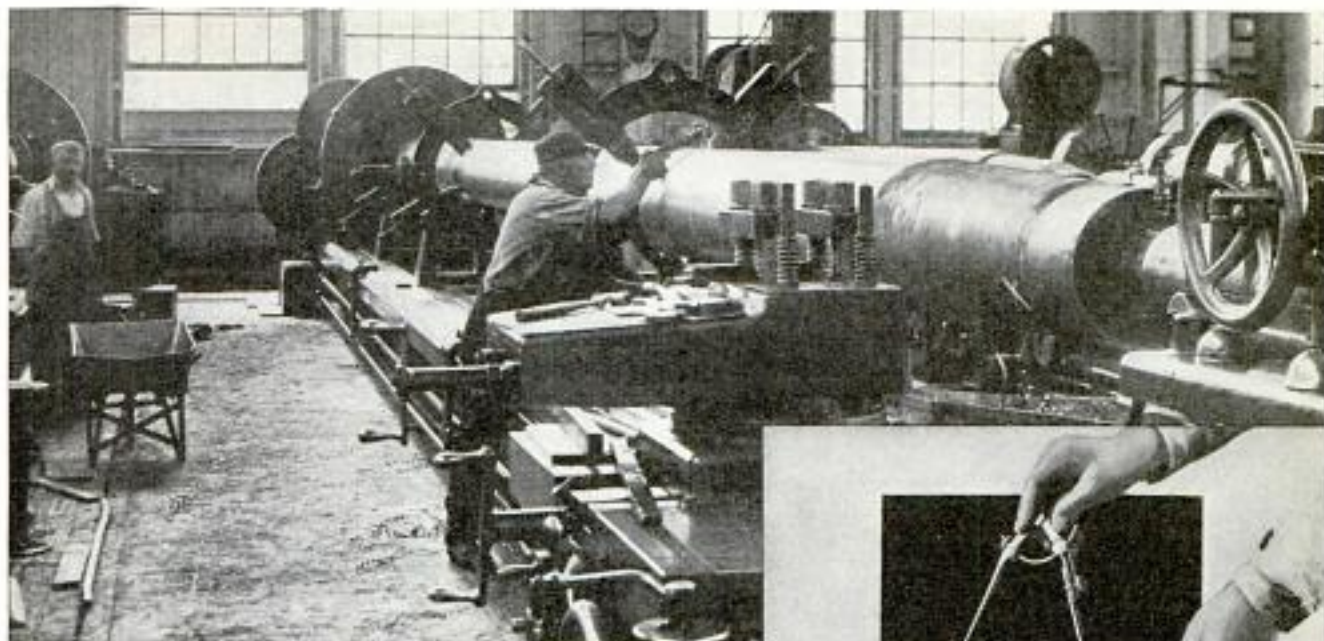
Takes the dirt,
but leaves
the skin

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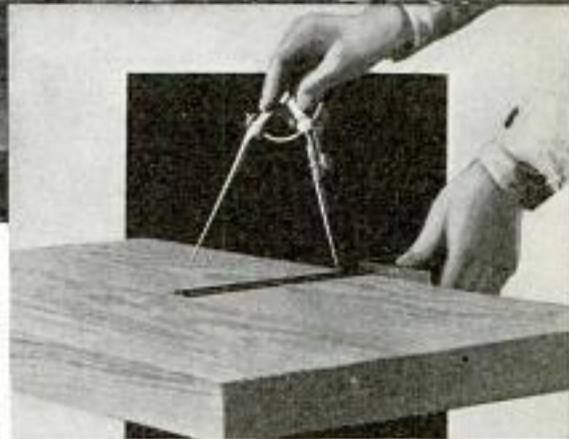


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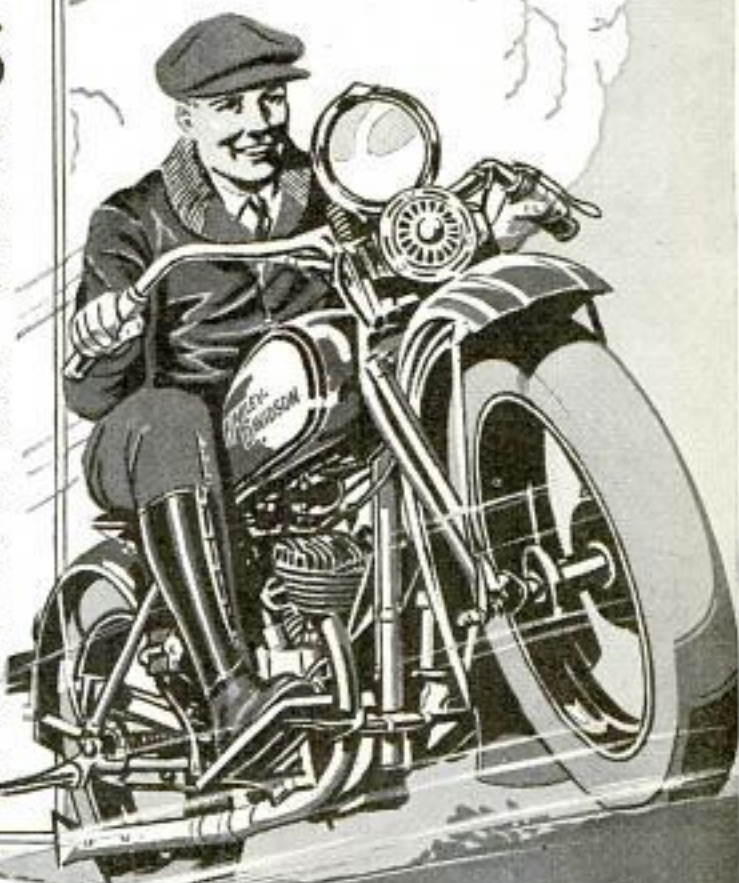
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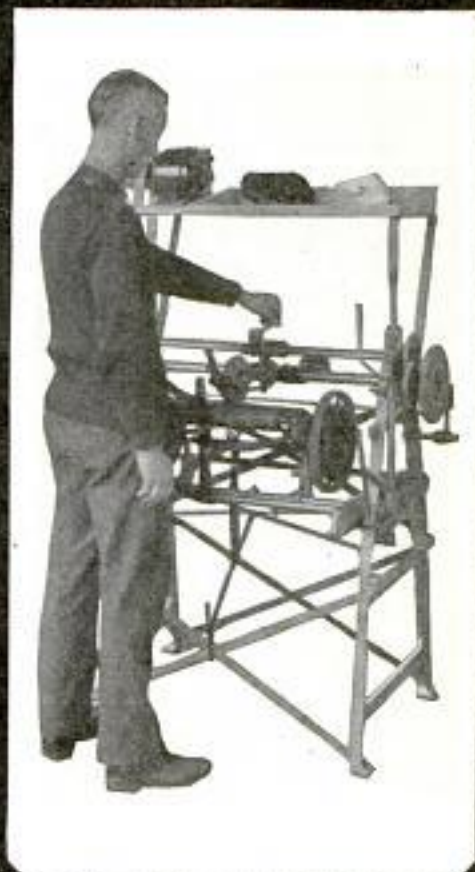
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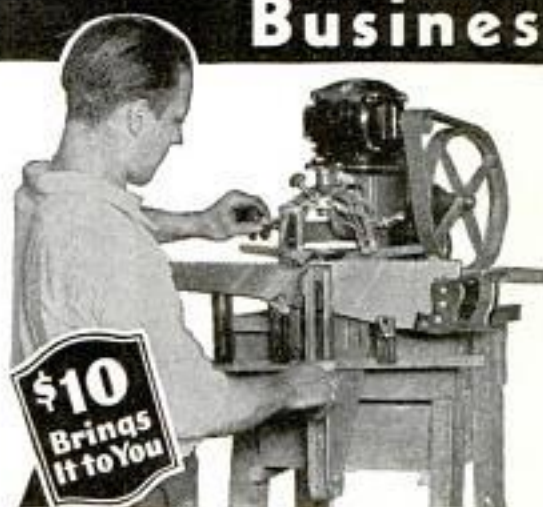
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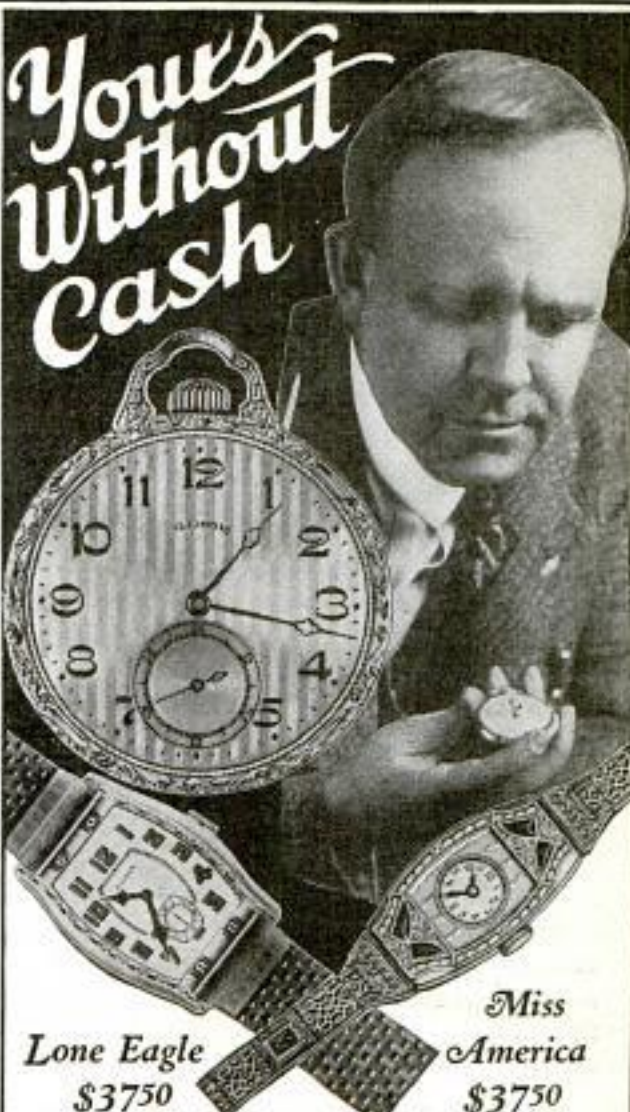
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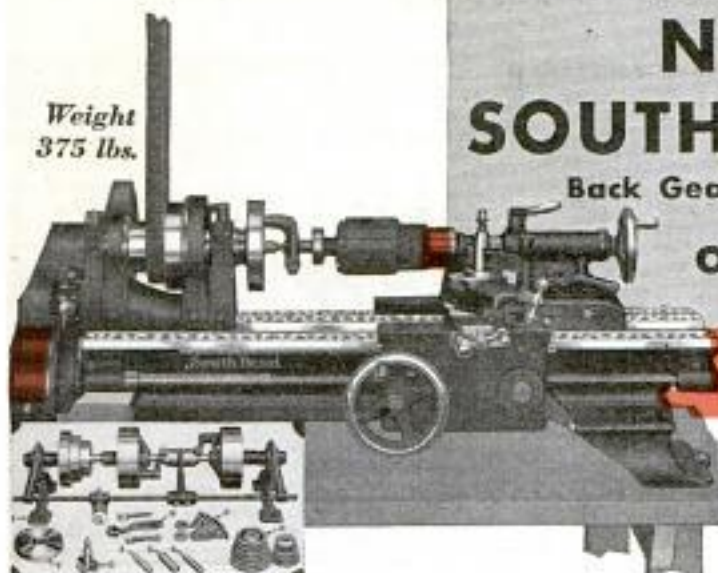
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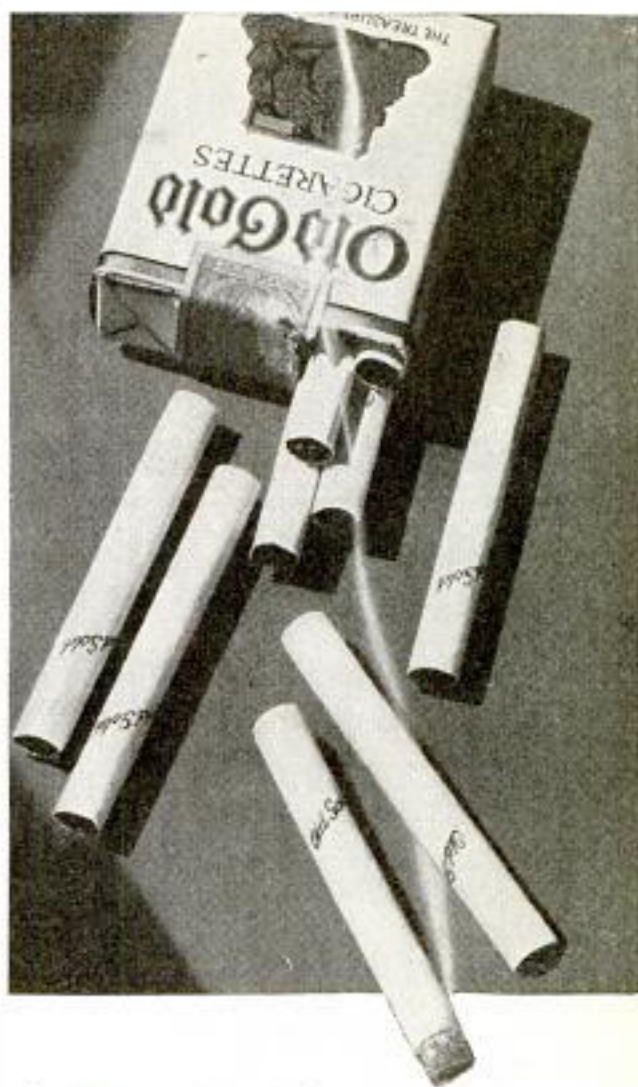
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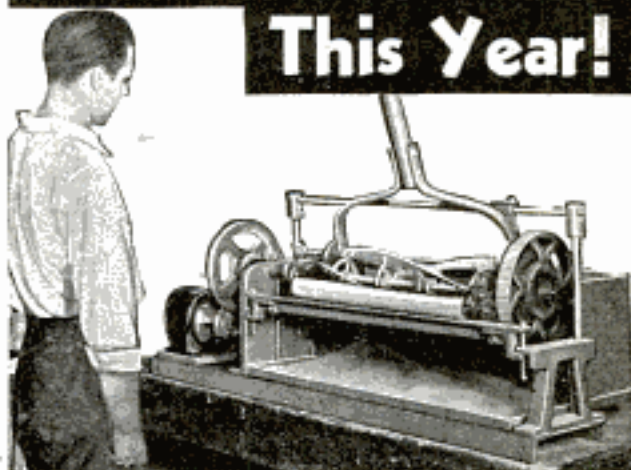


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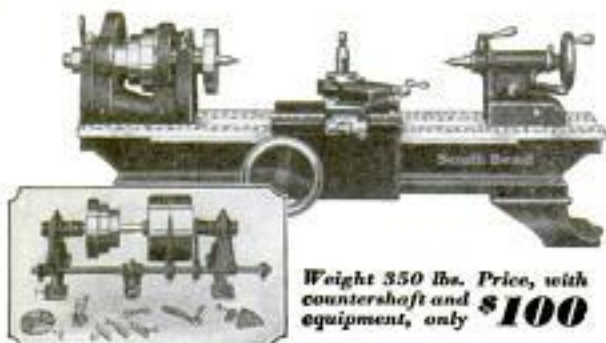
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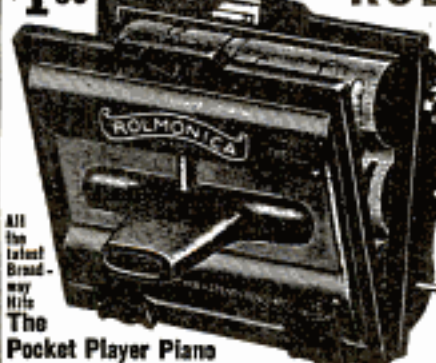
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Stories of Stars who were not "born" but "made." No. 10

This three-letter man couldn't make his high school team

Five years ago, in high school, he was an athletic "failure." He went out regularly for every sport. Just as regularly he was dropped from every squad.

After high school, he went to a college that had over a thousand students. Here athletic competition was much keener. And yet, last year, his third year there, he was playing varsity end on the football team, first base in baseball and left guard in basketball!

He made himself a star be-

cause he *trained* to become a star.

In any sport you've got to know how to *handle yourself well*.

Few fellows are born with this ability; anyone can acquire it. And it's the secret of all athletic success. The key to it is footwork. Watch the "dubs" in any sport. They are the ones who trip and stumble and get all tangled up in their feet whenever they have a hard play to make.

Train yourself in footwork. Star players do. And here's something they've discovered:

there's just one best shoe for developing footwork—the Shoe of Champions—Keds.

Keds have specially-compounded safety soles that make possible sudden stops and quick turns. Keds' strong canvas tops give you sure support and Keds' famous insoles keep your feet cool and comfortable. The best shoe dealers in your town carry Keds.

Ask for Keds by name. Only genuine Keds have the name "Keds" on the shoe.



Keds "Spring-Step"

A splendid basketball Shoe made on a new orthopedic last. Has heel cushion, arch cushion, and a shaped, felt-lined tongue. Comes in white or suntan.

United States  Rubber Company

Keds

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THE SHOE OF CHAMPIONS

Keds sell for \$1.00, \$1.25, \$1.50, \$1.75 and up to \$4.00. The more you pay, the more you get—but full value whatever you spend.



Keds "Sprinter"

A medium-priced Keds with a tan and black mottled molded sole. In suntan duck with tan trimmings and a white toe strip to offset scuffing.

"A coupon gave me this raise!"



"That's a fact! I'd been working on this job three years without a raise. And it looked as if I wasn't going to get one. The boss never called me in to talk about anything. I was just another cog in the machine.

"I decided to do something about it! I determined to make myself more valuable. So I enrolled for a course with the International Correspondence Schools. The training helped me from the start — and here's a raise! The boss says there will be others, too, provided I keep up the good work."

Marking and mailing a coupon—just like the one here—has changed the lives of thousands of men. It has started them on careers of success. It will do the same for you! You can turn your spare time into dollars!

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| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Steam Engineer |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Steam Electric Engineer |
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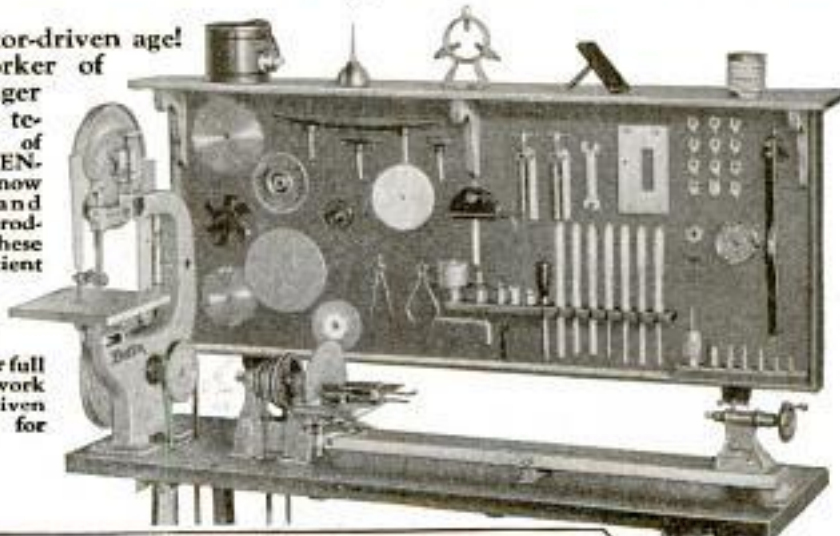
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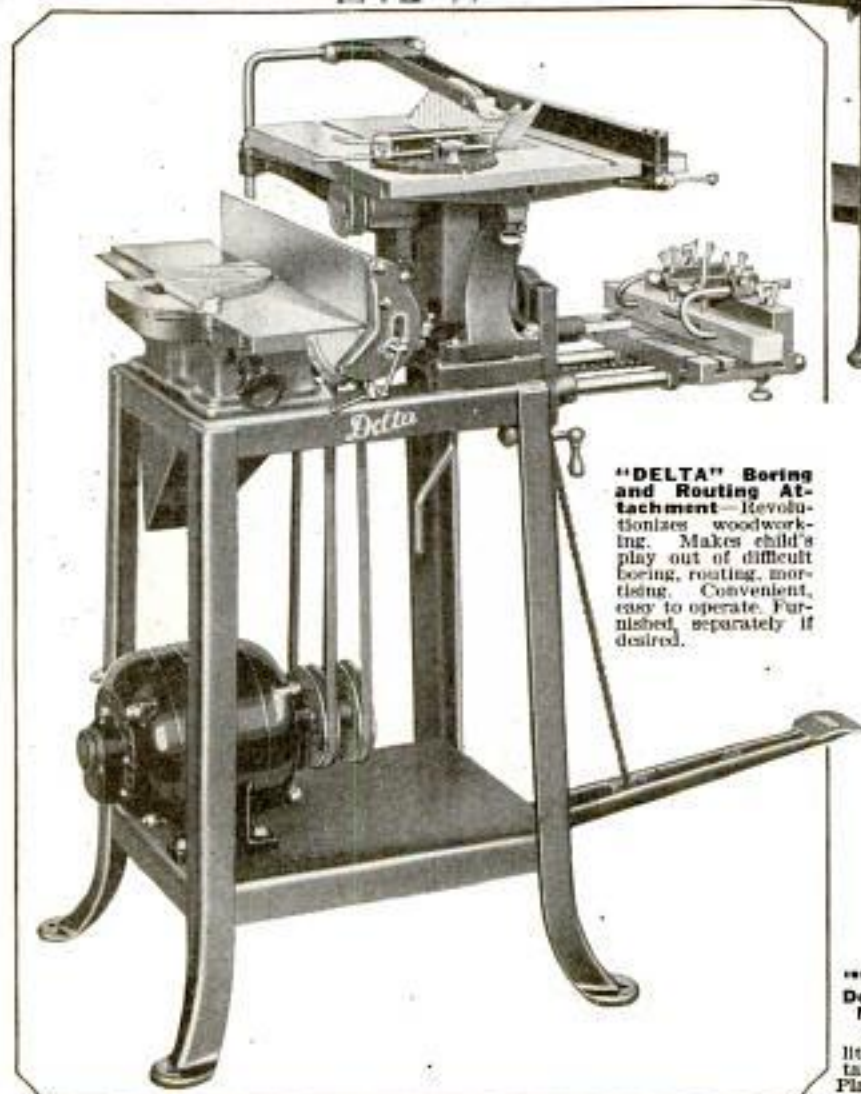
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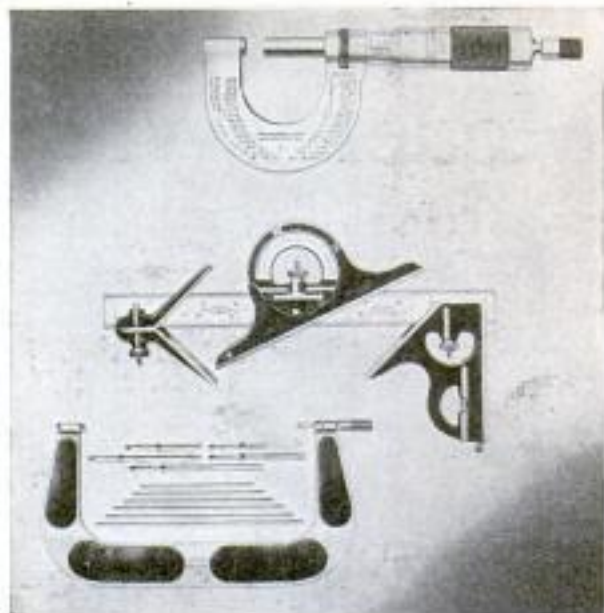
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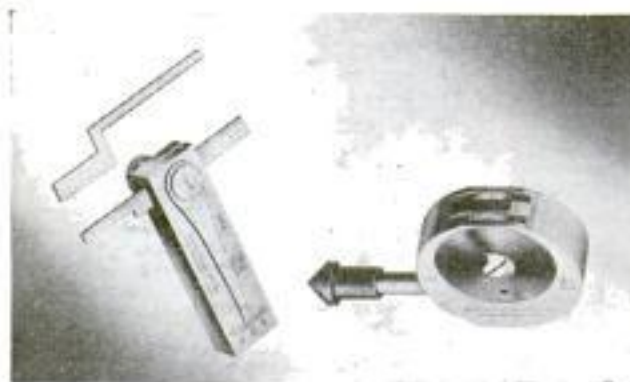
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