

# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REGD TRADE MARK GREAT BRITAIN No. 410425

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SEE PAGE 370



# GENUINE MODEL T CORONA

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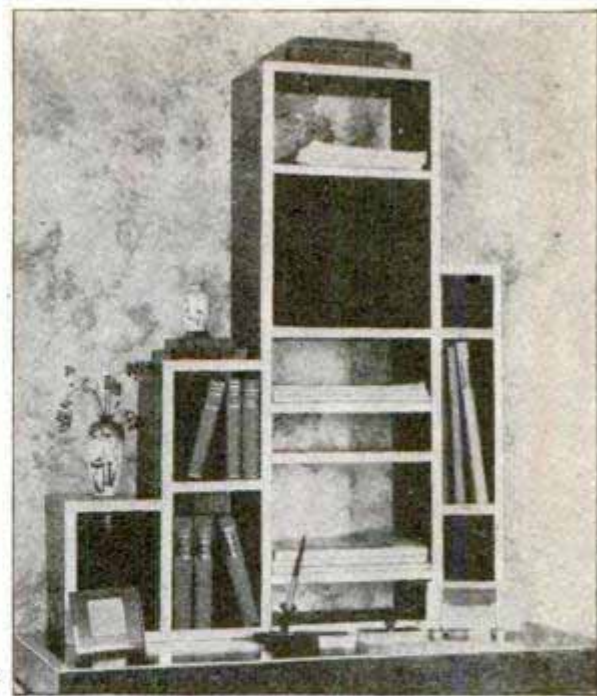
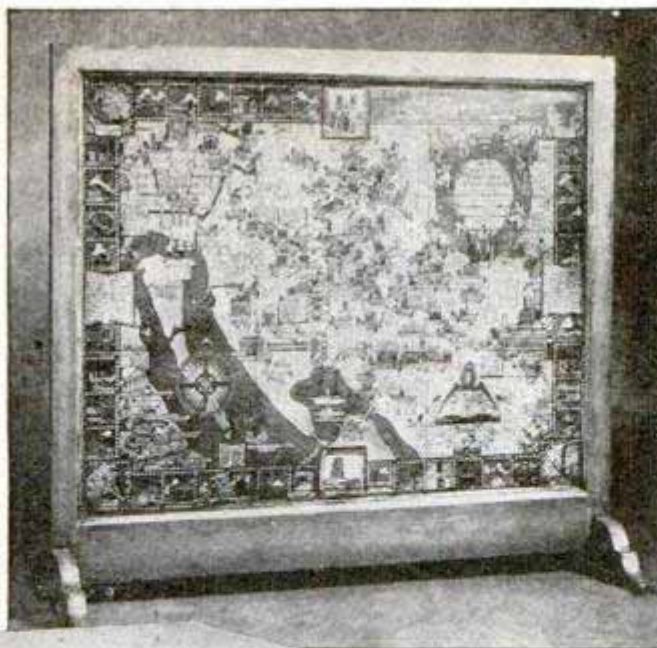


**Modernistic Fire Screen**

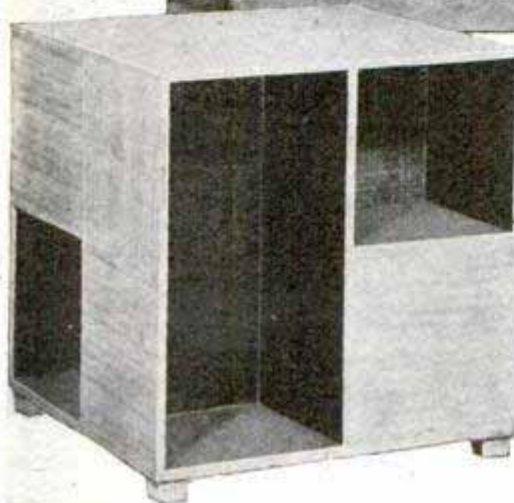
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**Modernistic Table**

See LePage's Book, page 11



**Modernistic Book Shelves**  
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# Now You Can Make Your Own Modernistic Furniture

At a Fraction of Store Prices

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- |                                  |                                |
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LePage's latest book, "The Third Home Work Shop Book," contains complete directions for making 20 attractive pieces of household furniture, 5 of which are modernistic in design, so popular today. These include the 3 shown above, and in addition, a Modernistic Desk and Modernistic Folding Screen. Or, if you prefer, you can make reproductions of 5 famous old Colonial pieces—Cape Cod Chest of Drawers, Alexandria Nest of Tables, Old Salem Ship's Cupboard, Plymouth Built-In China Closet and Lady Washington Sewing Cabinet.

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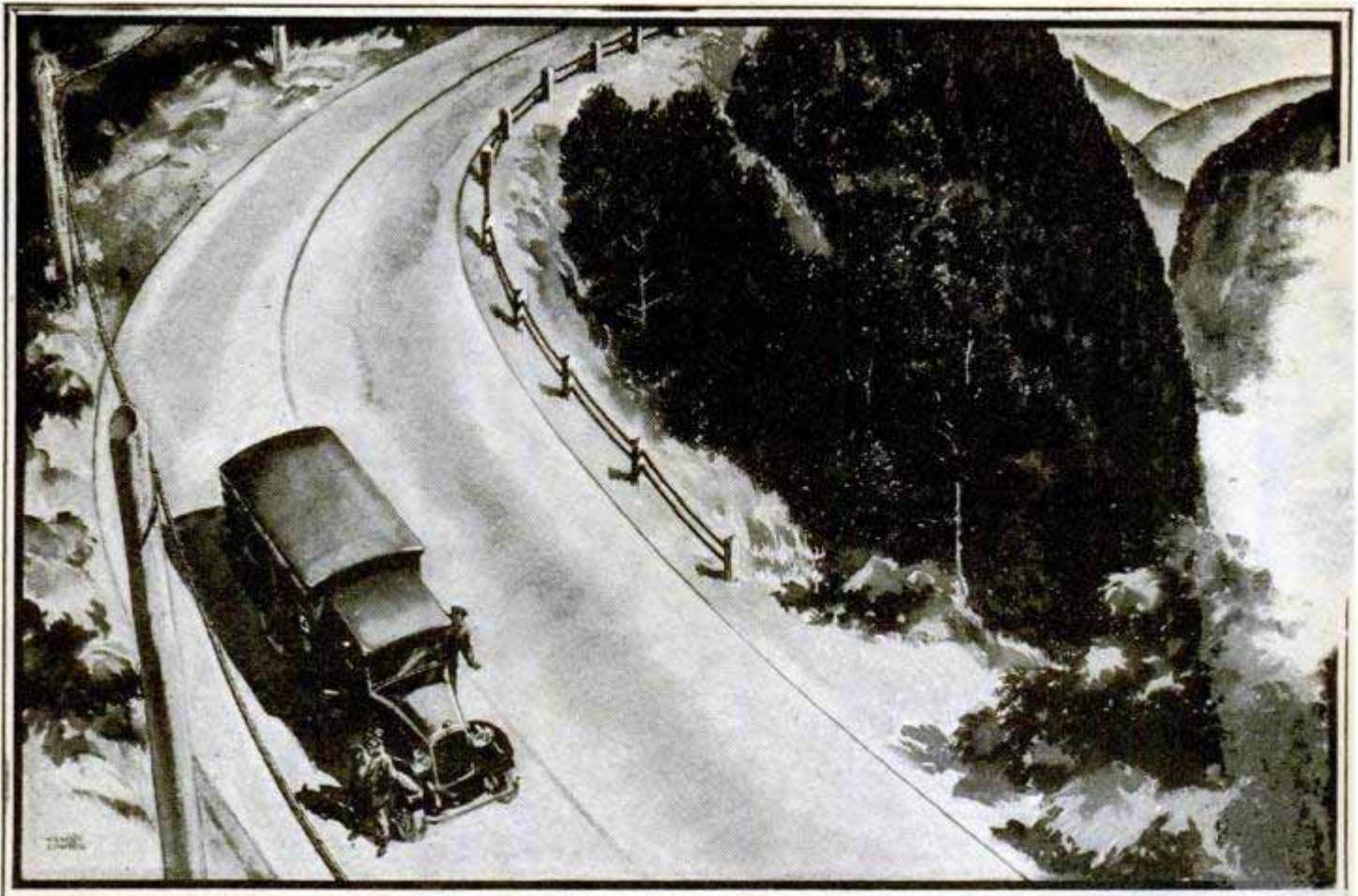
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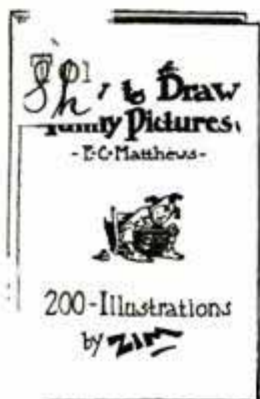
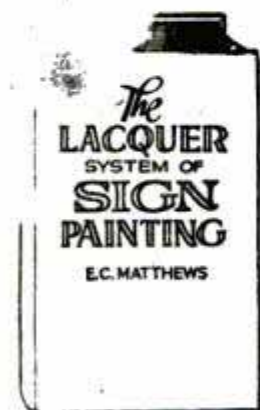
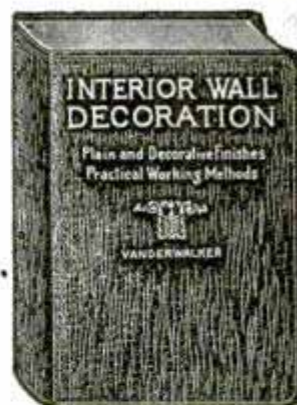
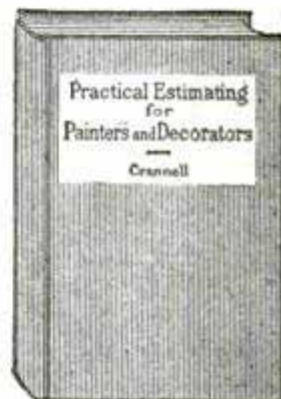
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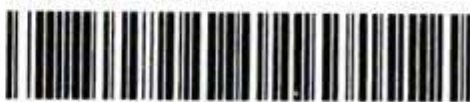
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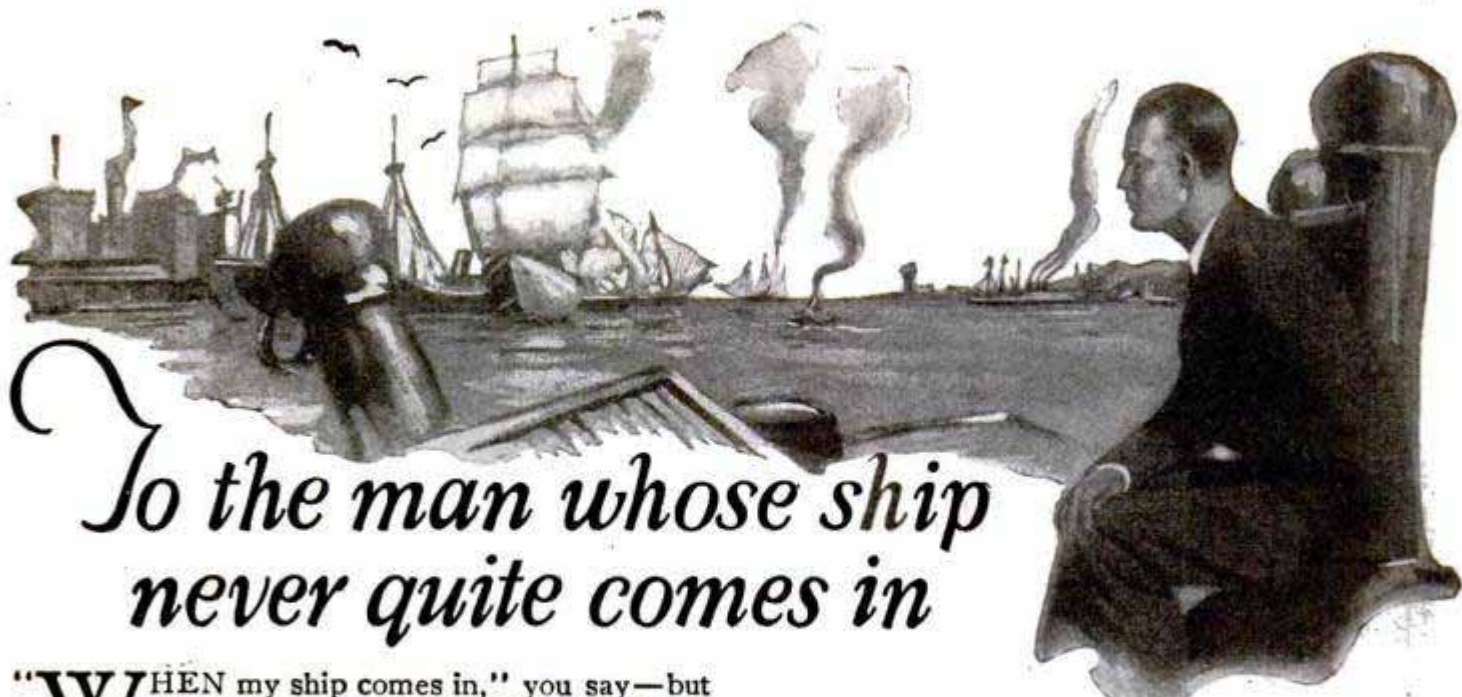
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## To the man whose ship never quite comes in

"WHEN my ship comes in," you say—but your smile cannot hide the worry gnawing at your heart—

A fine sea-going vessel you had thought that ship of yours when you launched it on the business ocean—

Yet the days and months and years slip by—and though others see their ships ride triumphantly to harbor, still you scan the horizon anxiously for a ship that never quite makes port.

No one's fault, perhaps—but what a misfortune that so many business ships should founder on a hidden reef or a treacherous shoal, when the channels to Success are plainly charted and a chart for every channel is available to every thinking man!

### How the Right "Chart" Increased E. T. Orcutt's Income 500%

Certainly *my* ship-of-fortune seems far off its course, said E. T. Orcutt, in effect, when as railroad clerk at \$20 a week he enrolled with LaSalle for home-study training in Traffic Management.

Before he had completed the training, however, came an opportunity with Hitchings & Co., Elizabeth, N. J., one of the largest manufacturers of greenhouses in the world.

Training had set his "ship" on the right course. Later, as sales manager, he kept on training with LaSalle—in Business Management.

Since taking his first course, his salary has increased more than 500 per cent.

Recently he has organized his own company, capitalized at \$100,000, of which he is president.

### How G. W. Clason Placed His "Ship" on the Right Course

No bands were playing when G. W. Clason launched his "ship" on the business ocean.

Clason had left school at 14, and at 19 his job was to take care of the horses in the barn of a laundry.

"Never mind," said G. W. Clason, "I'll make my opportunity right where I am!"

So he learned the laundry business, and at 28 was operating his own plant. When fire wiped his business out, he started again. Unable to finance properly—through lack of business understanding, as he testifies—he sold out and became superintendent of the Ideal Laundry Company, Spokane.

Right then he made up his mind to remedy his lack—and enrolled with LaSalle for training in Business Management.

Today, at 47, he is vice-president and a director of this successful company, and commands an income several times as large as when he started with LaSalle five years ago.

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# Speechless...When a Few Words Would Have Made Me!

*But now I can face the largest audience without a trace of stage fright*

**T**HE annual banquet of our Association—the biggest men in the industry present—and without a word of warning the Chairman called on me to speak—and my mind went blank!

I half rose from my seat, bowed awkwardly and mumbled, "I'm afraid you'll have to excuse me today," and dropped back in my chair.

Speechless—when a few words would have made me! The opportunity I had been waiting for all my life—and I had thrown it away! If I could have made a simple little speech—giving my opinion of trade conditions in a concise, witty, interesting way, I know I would have been made for life!

Always I have been a victim of paralyzing stage fright. Because of my timidity, my diffidence, I was just a nobody, with no knack of impressing others—of putting myself across. No matter how hard I worked, it all went for nothing—I could never win the big positions, the important offices, simply because I was tongue-tied in public.

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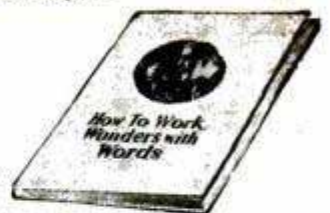
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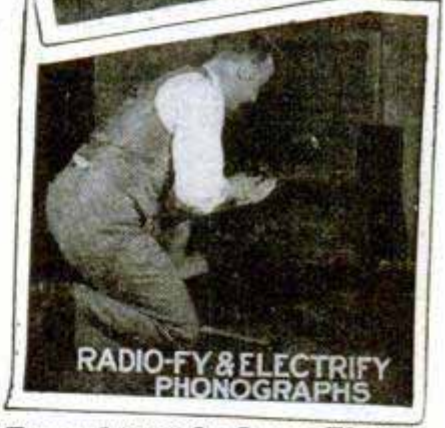
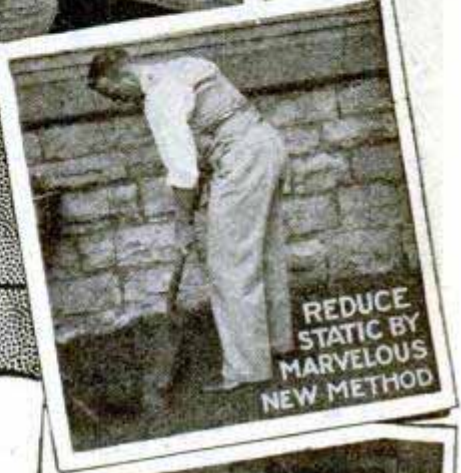
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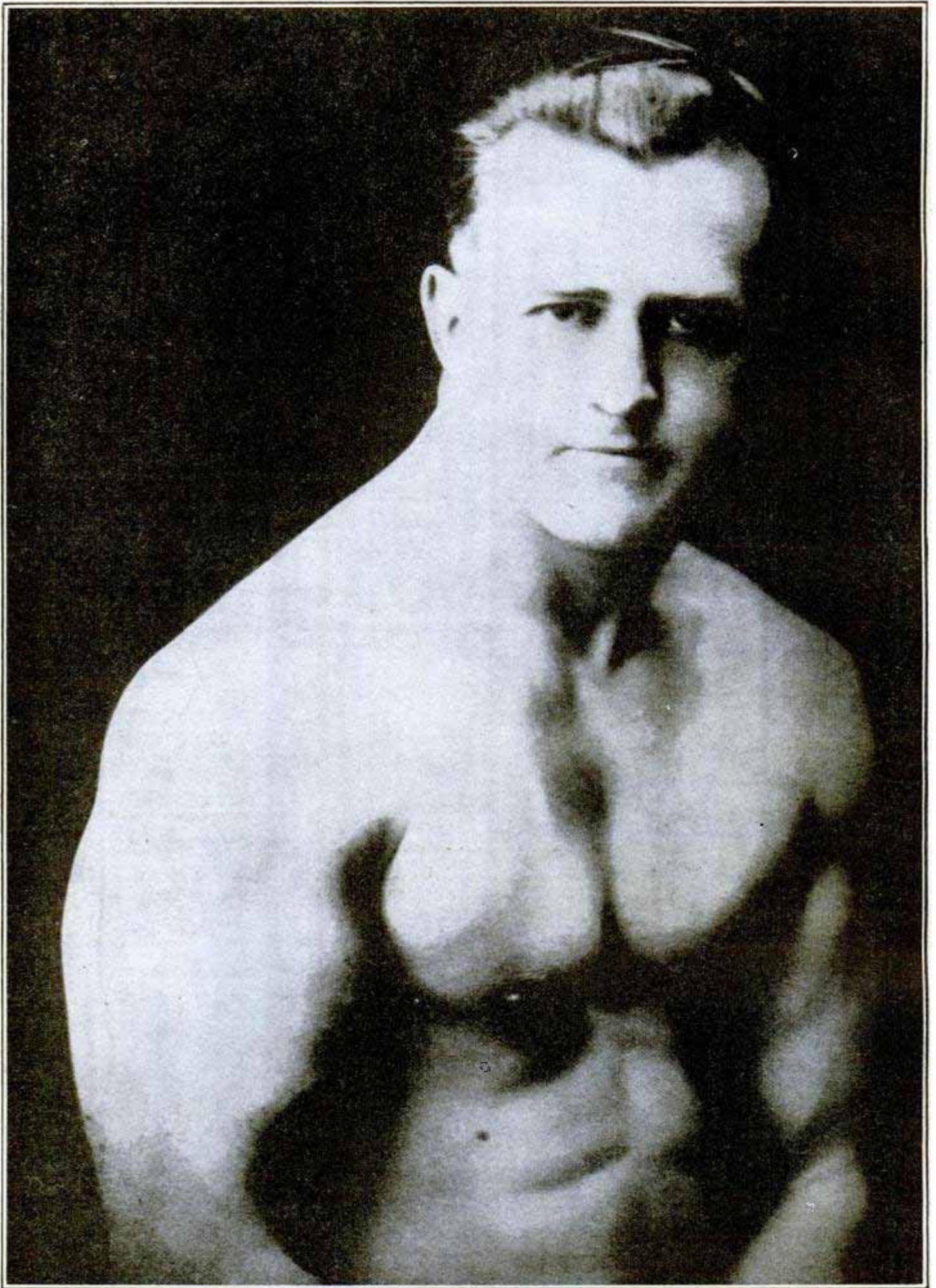
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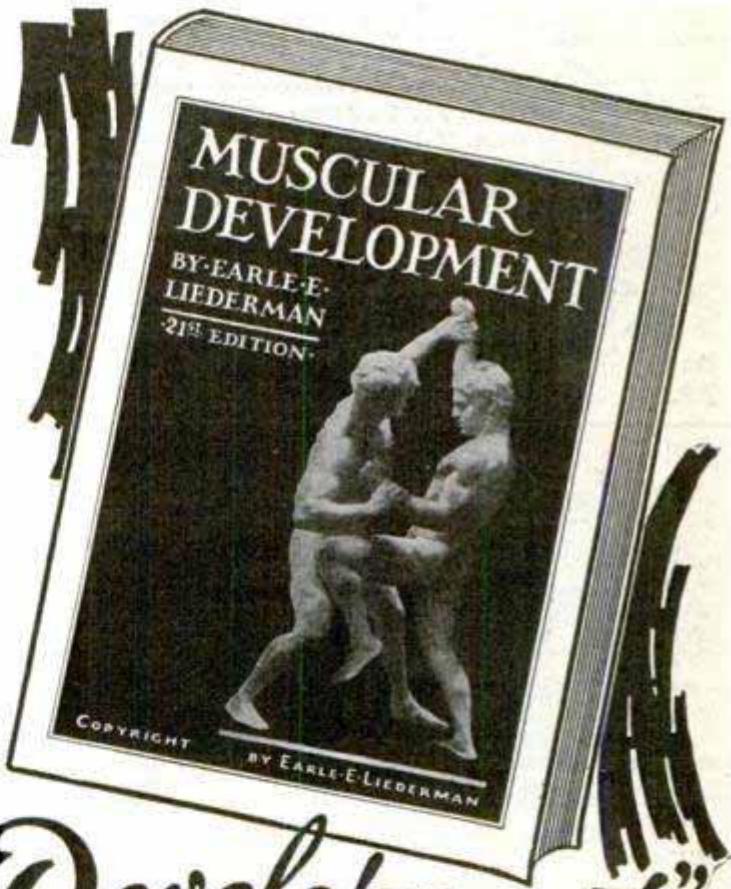
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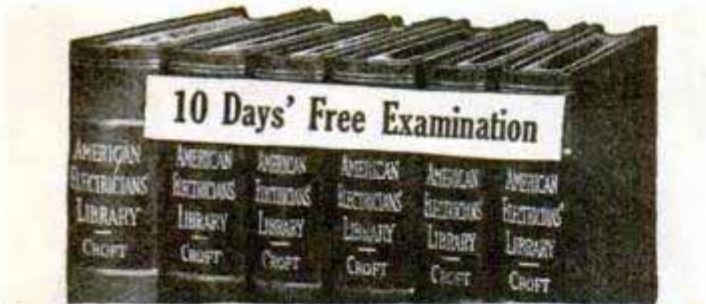
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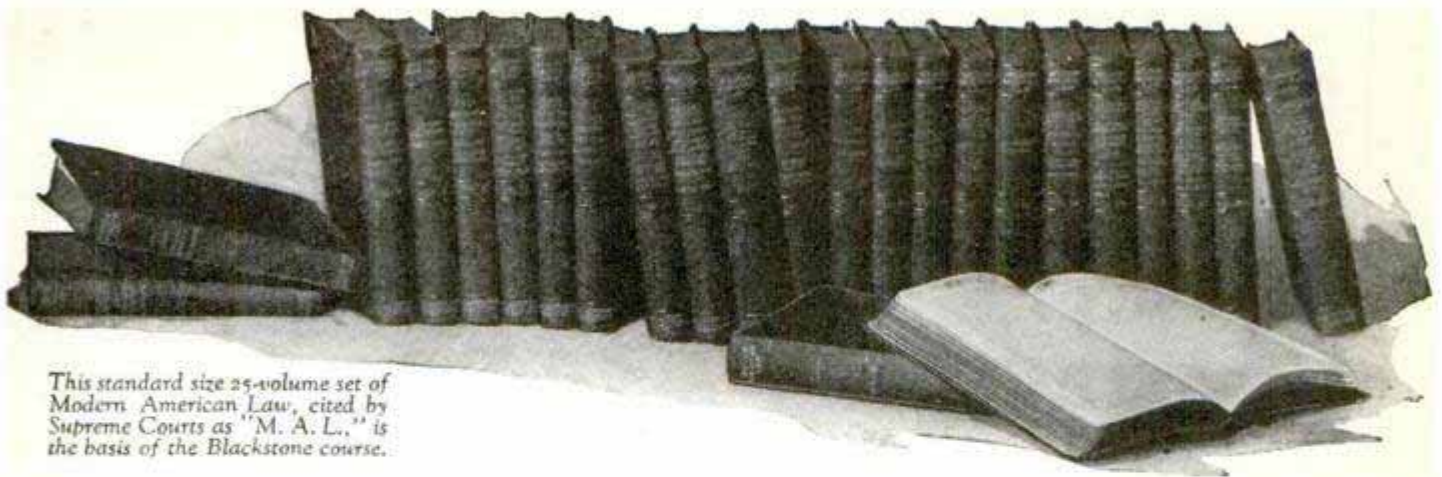
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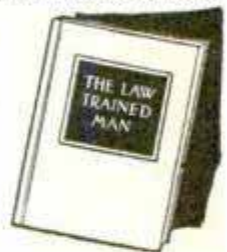
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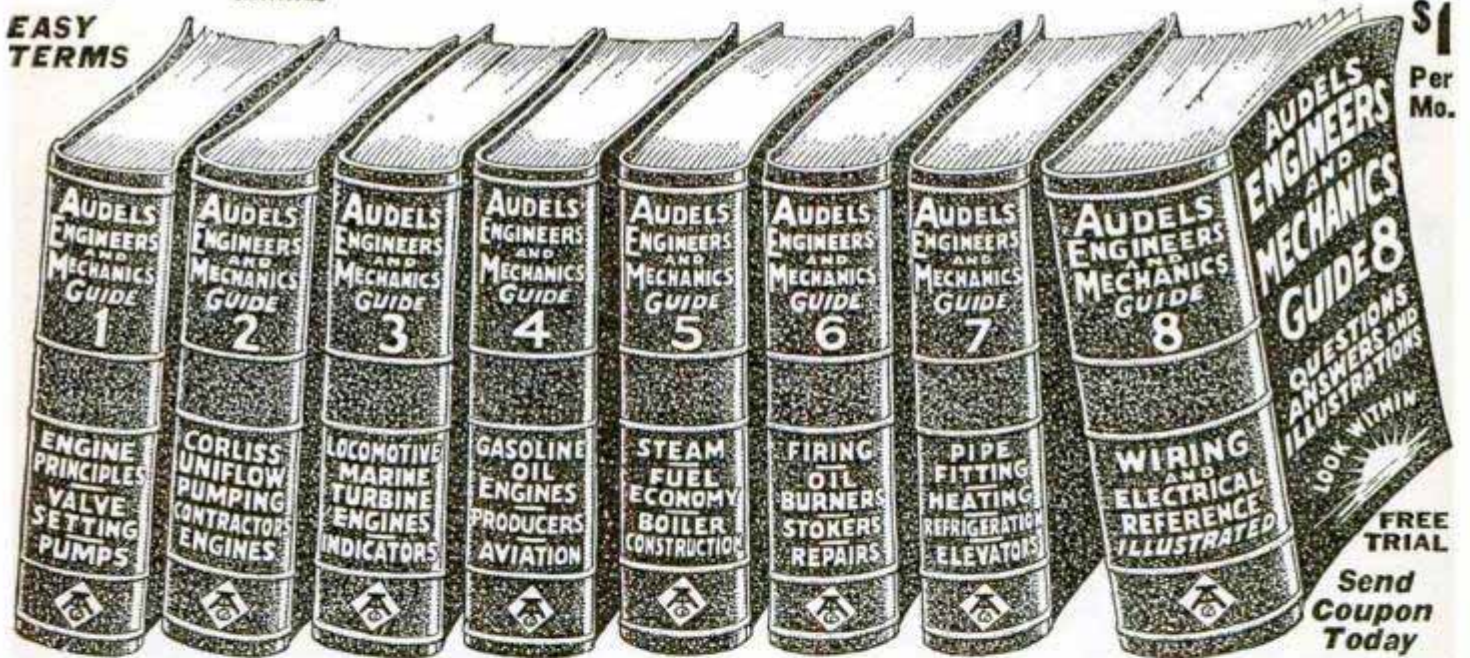
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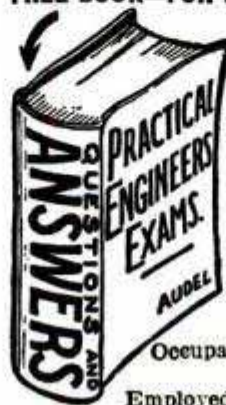


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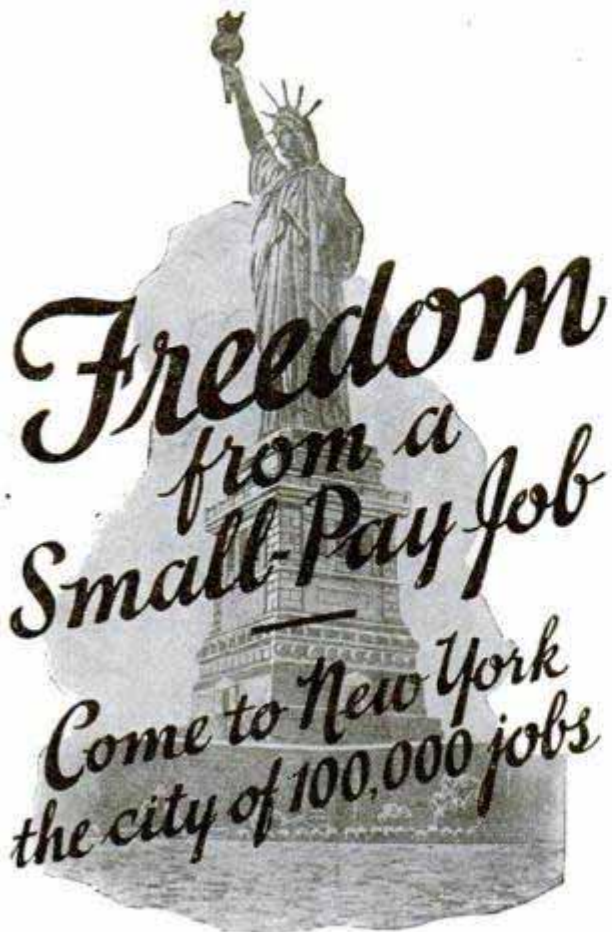
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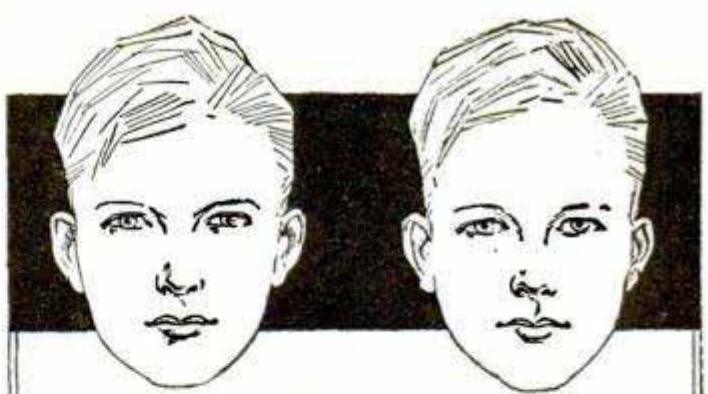
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# "What? Learn Music by Mail?" they laughed



## "Yes," I cried, "and I'll bet money I can do it!"

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"Why so quiet, Joe," some one called to me. "Just reading an ad," I replied, "about a new way to learn music by mail. Says here any one can learn to play in a few months at home, without a teacher. Sounds easy."

"Ha, ha," laughed Fred Lawrence, "do you suppose they would say it was *hard*?"

"Perhaps not," I came back, a bit peeved, "but it sounds so reasonable I thought I'd write them for their booklet."

Well, maybe I didn't get a razzing then! Fred Lawrence sneered: "The poor fellow *really* believes he can learn music by mail!"

"Yes, and I'll bet money I can do it!" I cried. But the crowd only laughed harder than ever.

During the few months that followed, Fred Lawrence never missed a chance to give me a sly dig about my bet. And the boys always got a good laugh, too. But I never said a word. I was waiting patiently for a chance to get the *last* laugh *myself*.

### My Chance Arrives

Then came the office outing at Pine Grove. After lunch it rained, and we had to sit around inside. Suddenly some one spied a piano in the corner. Fred Lawrence saw a fine chance to have some fun at my expense.

"Ladies and gentlemen," he cried, "our friend Joe, the music-master, has consented to give us a recital."

That gave the boys a good laugh. Some of them got on either side of me and with mock dignity started to escort me to the piano.

"Play 'The Varsity Drag,'" shouted Fred, thinking to embarrass me further. I heard a girl say, "Oh, let the poor fellow alone; can't you see he's mortified to death?"

### The Last Laugh

I smiled to myself. This was certainly a wonderful setting for my little surprise party. Assuming a scared look, I began fumbling the keys, and then . . . with a wonderful feeling of cool confidence . . . I broke right into the very selection Fred asked for. There was a sudden hush in the room as I made that old piano talk. But in a few minutes a fellow jumped to his feet and shouted, "Believe me, the boy is *there!* Let's dance!"

Tables and chairs were pushed aside, and soon the whole crowd was having a whale of a time. I played one peppy selection after another until I finished with "Crazy Rhythm" and the crowd stopped dancing and singing to applaud me. As I turned around to thank them, there was Fred holding a ten-spot right under my nose.

"Folks," he said, "I want to apologize to Joe. I bet him he couldn't learn to play by mail, and believe me, he sure deserves to win the money!"

"Learn to play by mail!" exclaimed a dozen people. "That sounds impossible! Tell us how you did it!"

I was only too glad to tell them how I'd always wanted to play but couldn't afford a teacher, and couldn't think of spending years in practice. I described how I had read the U.S. School of Music ad, and how Fred bet me I couldn't learn to play by mail.

"Folks," I continued, "it was the biggest surprise of my life when I got the first

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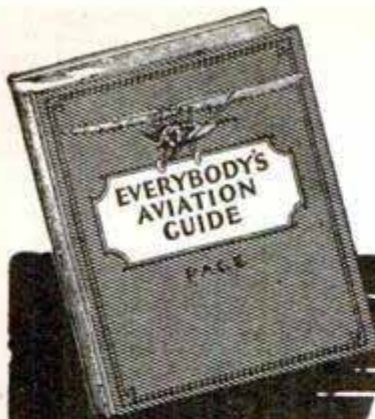
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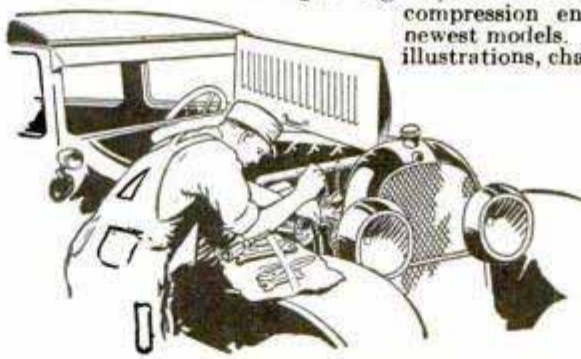
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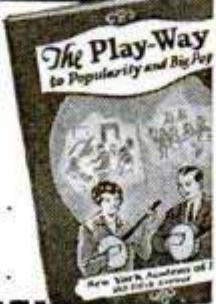
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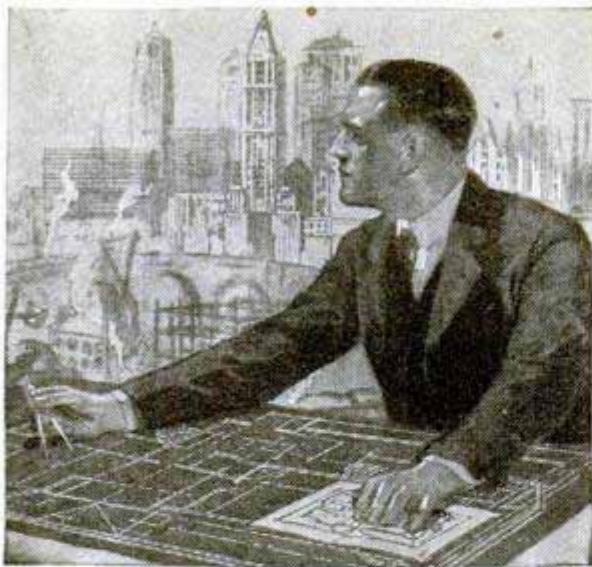
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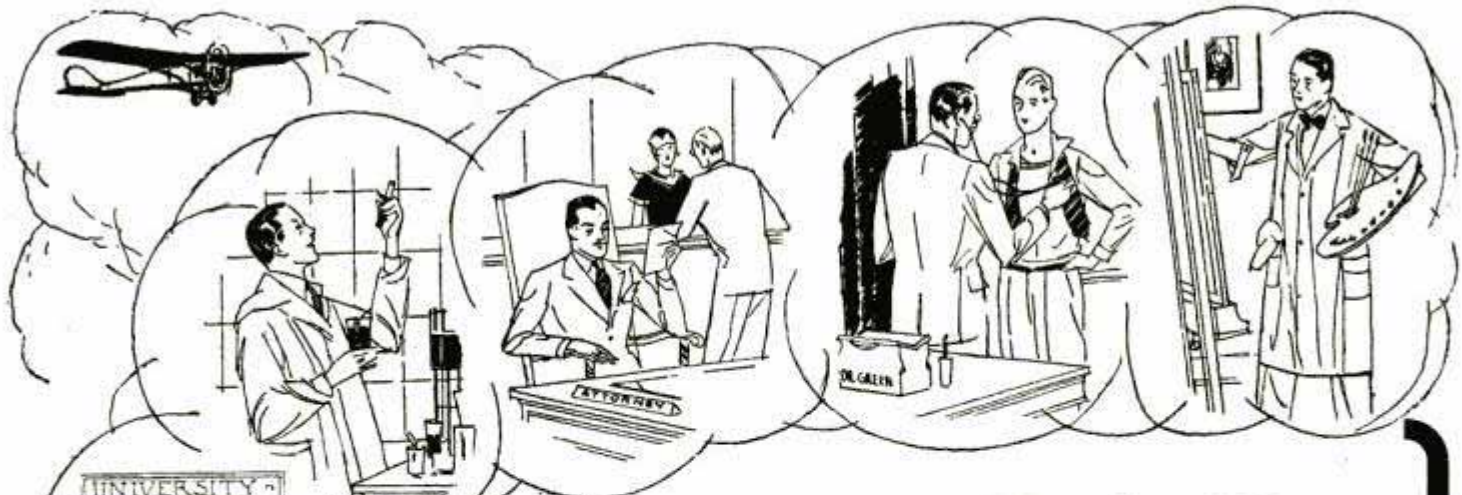


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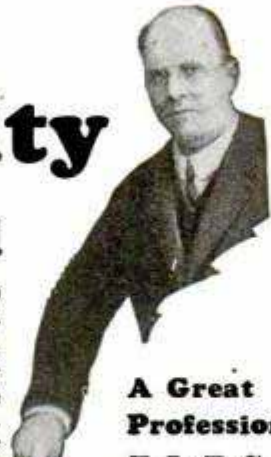


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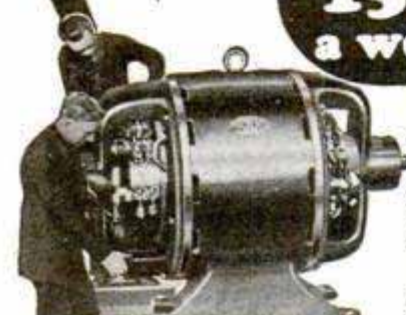
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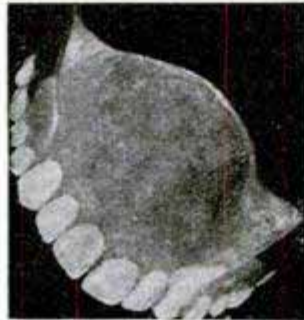
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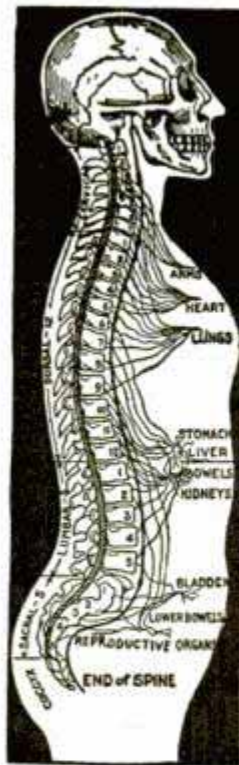
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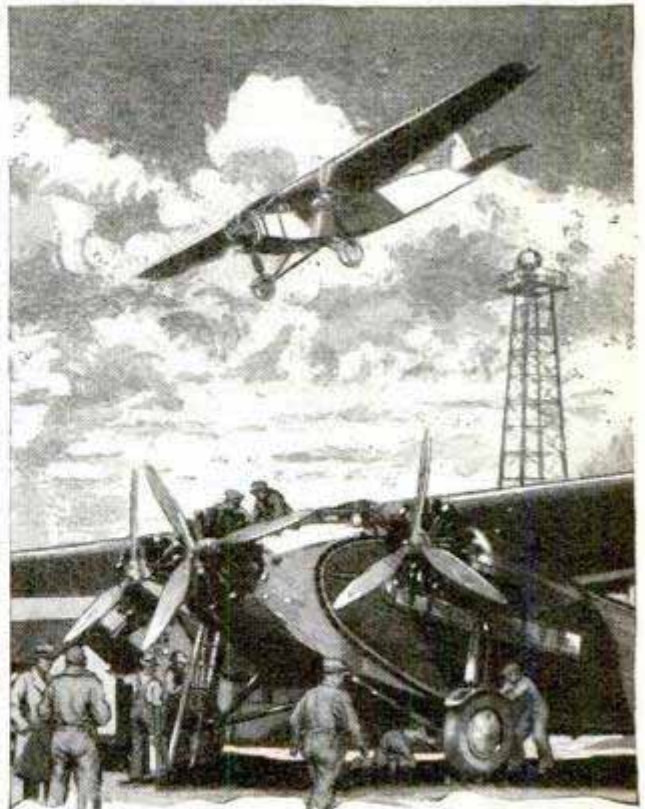
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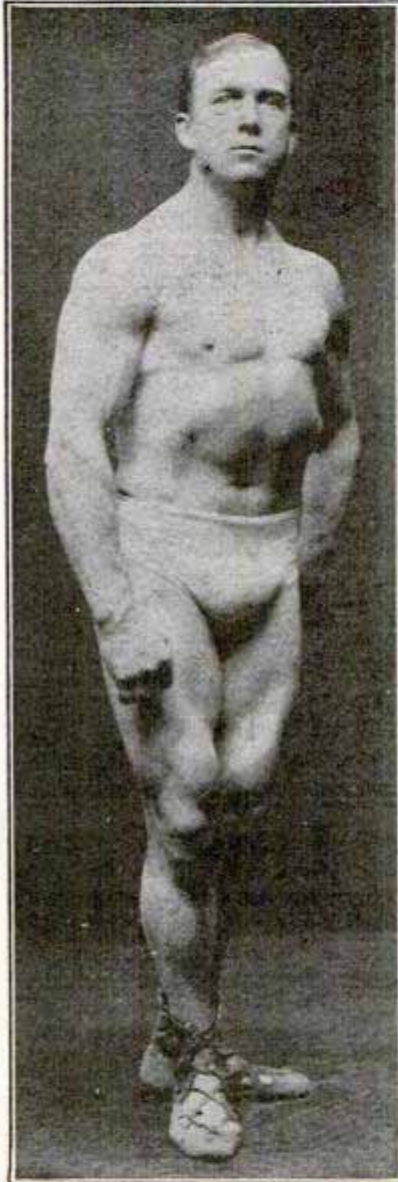


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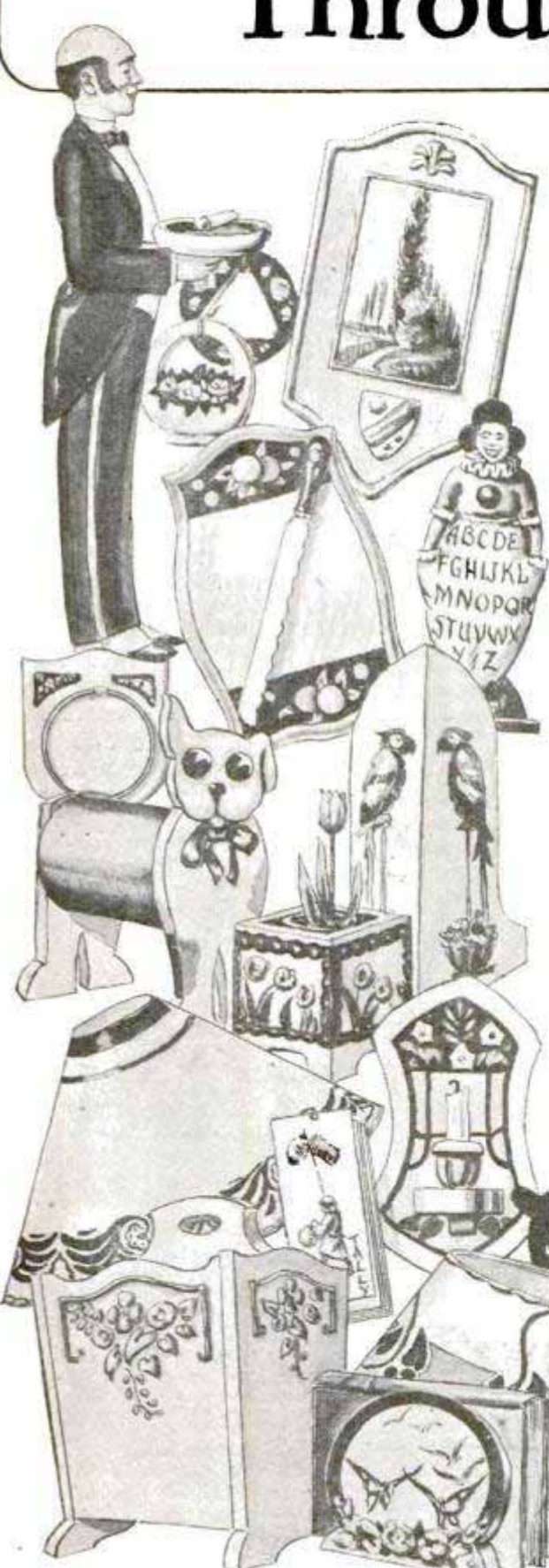
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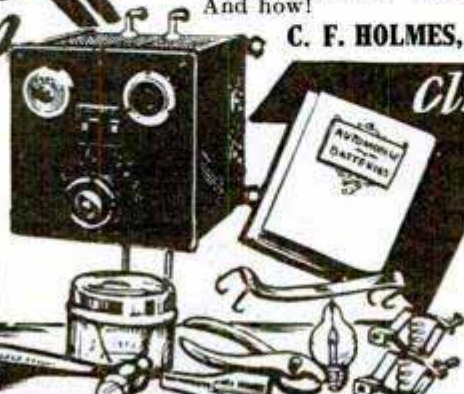
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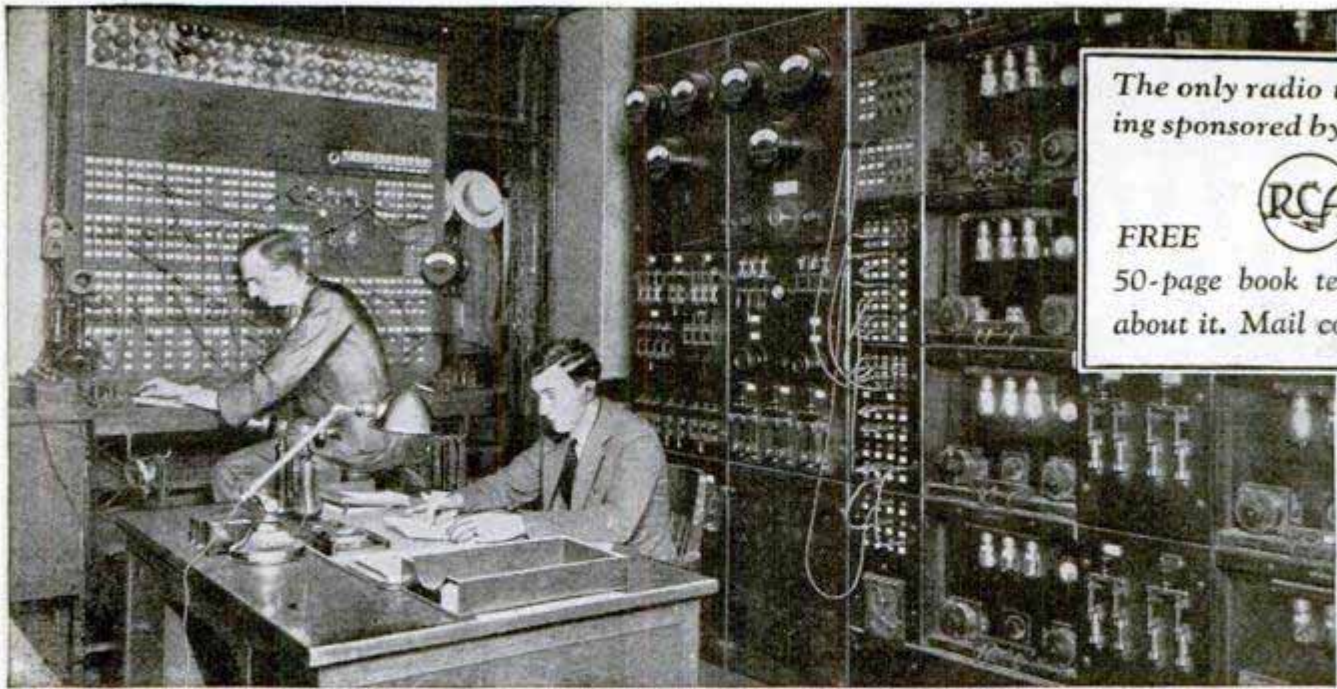
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By Frank Halloran

I got hungry to get into Radio when I learned about the big money it was bringing my next door neighbor.

He owned a fine car, dressed in expensive clothes, took week-ends off to go hunting and fishing, and was one of the most popular fellows in town!

“Charlie,” I asked him one day, “how did you become a radio expert?”

“A cinch,” he smiled. “I took it up in my spare time at home.”

“What?” I asked in surprise, “you actually took a radio course by mail?”

“No,” he shot back. “Not just a mail order course, but the only technical home-laboratory training conducted under the auspices of the Radio Corporation of America. Believe me, this ‘big-league’ organization not only knows what’s what in Radio, but it knows how to teach it!”

## A Great Piece of Luck

Taking Charlie’s advice was the luckiest thing I’ve ever done. It’s bringing me more money in a week than I’ve often earned in a month! I never dreamed that learning Radio at home was so easy and so fascinating. I didn’t know the first thing about it when I started, yet before many months I was able to solve

scores of problems which now help me command big money. The lessons took me step by step through trouble-finding, repairing, ship and shore broadcasting, photoradiograms, television, beam transmission, radio salesmanship, store operation and executive work. What a course!

## Success—In Spare Time!

I didn’t have to give up my regular job. I learned at home in spare time. And I learned by doing! With the course came an outlay of the finest standard apparatus. With this I was able to build radio circuits and sets of almost every description . . . yet it cost me absolutely nothing extra.

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Today, my income is more than doubled . . . and I’ve only just started! I’m certainly happy that I found this short cut to success!

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Frank Halloran’s achievement is just another typical example of the success which the Radio Institute is bringing to hundreds of men everywhere through its wonderful home-laboratory training . . . the only offi-

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Tobacco Steals from You the Pleasures, Comforts, Luxuries of Life

## Tobacco Habit Banished Let Us Help You

### Quick Results

Trying to quit the tobacco habit unaided is often a losing fight against heavy odds, and may mean a serious shock to your nervous system. So don't try it! Make the tobacco habit quit you. It will quit you if you will just take **Tobacco Redeemer** according to directions.

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**Tobacco Redeemer** contains no habit-forming drugs of any kind and is marvelously quick, scientific and thoroughly reliable.

### Not a Substitute

**Tobacco Redeemer** is in no sense a substitute for tobacco, but is a radical, efficient treatment. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It helps to quiet the nerves, and will make you feel better in every way. If you really want to quit the tobacco habit—get rid of it so completely that when you see others using it, it will not awaken the slightest desire in you—you should at once begin a course of **Tobacco Redeemer** treatment for the habit.

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A single trial will convince the most skeptical. Our legal, binding, money-back guarantee goes with each full treatment. If **Tobacco Redeemer** fails to banish the tobacco habit when taken according to the plain and easy directions, your money will be cheerfully refunded upon demand.

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**Newell Pharmacal Company**  
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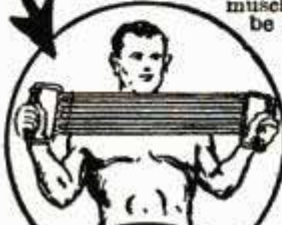
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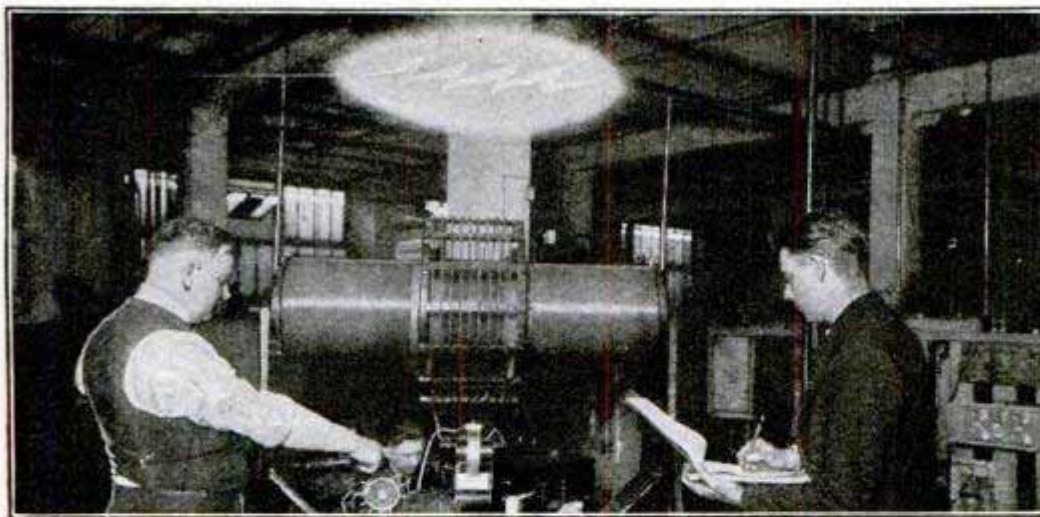
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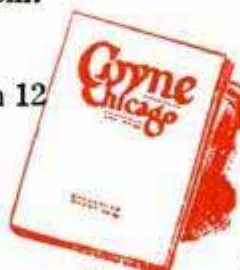
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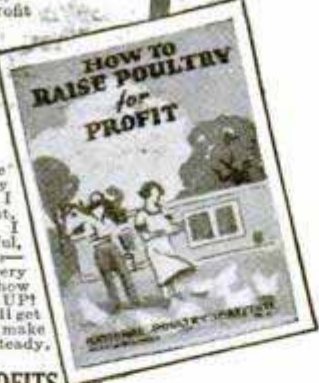
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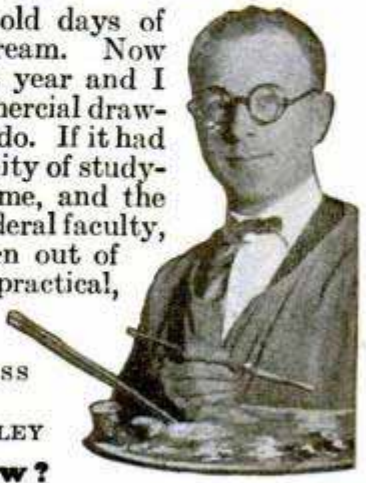
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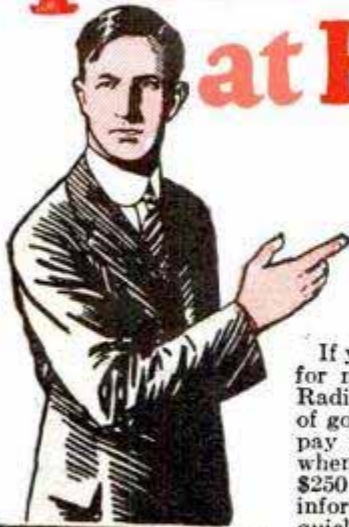
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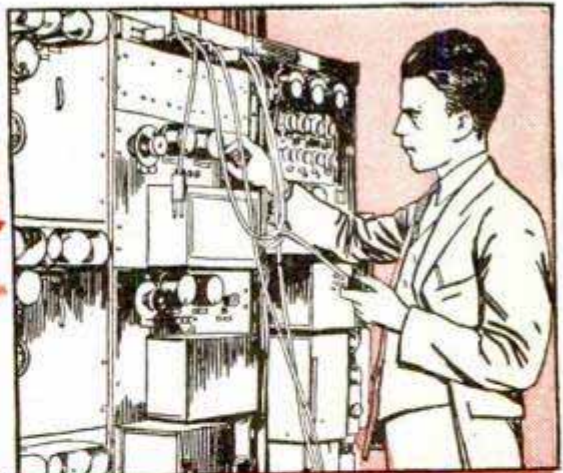
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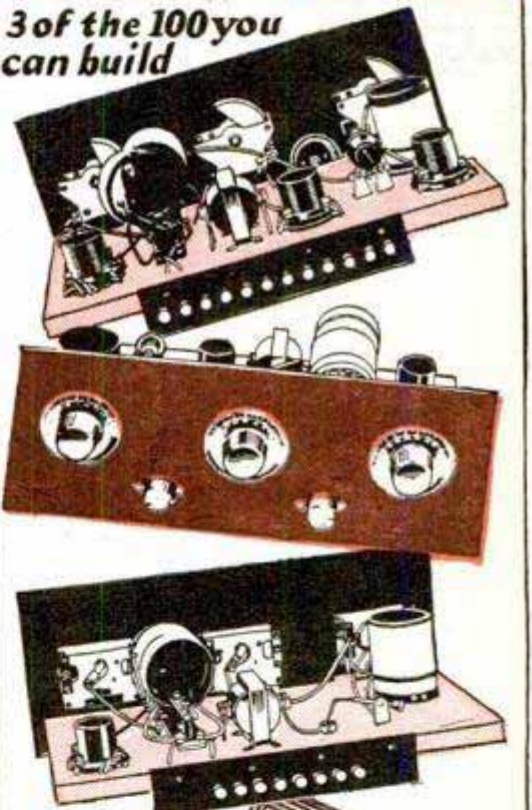
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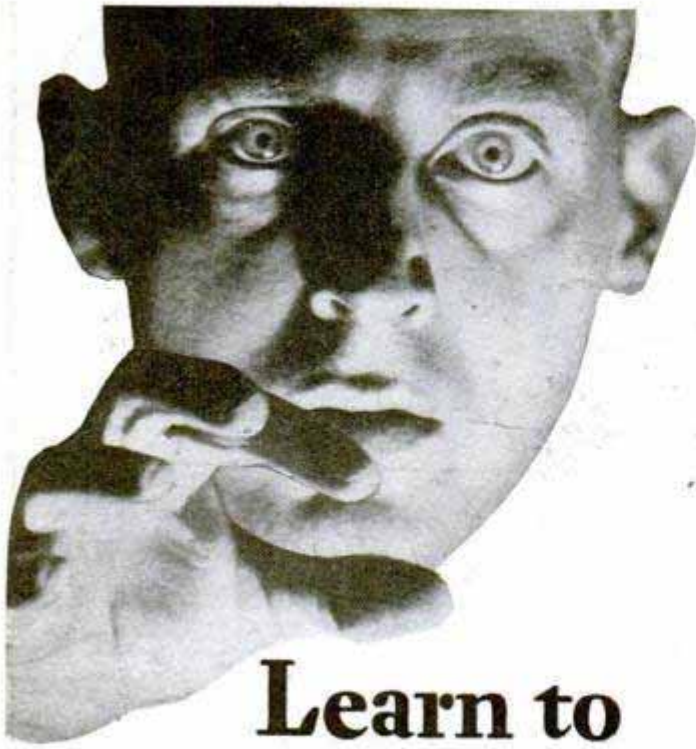
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Railway Postal Clerks now get \$1900 the first year regular, being paid on the first and fifteenth of each month. \$79.16 each pay day. Their pay is increased \$100 and \$150 a year. The maximum is \$2700 a year. \$112.50 each pay day. They get extra allowance for hotel expenses when away from home.

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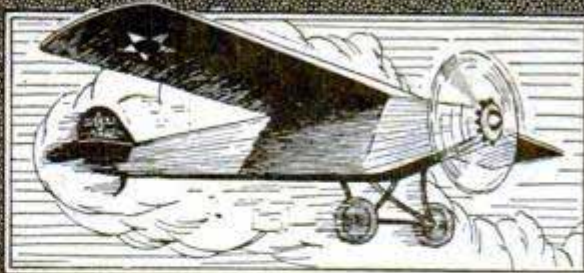
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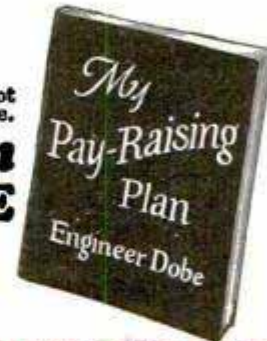
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*One Full Ampoule of my amazing hair fluid which I discovered myself and which grew hair on my head.*

This Ampoule is absolutely free. Don't send any money. There is no C. O. D. No charge whatsoever. All I want is an opportunity to show you how easily I grew hair on my own and hundreds of other men's heads. Merely mail the coupon below for Free Ampoule.

**Here is How I Used to Look**

I was just as bald as this picture. It is a true photograph without any tampering or retouching. It is exactly like I used to look. Then look at the full head of hair I have in the picture on the left!

As I have stated so often, I don't know whether I am the first man who discovered this great secret, but I do know I have it, that I grew my own hair and that I am growing hair on the heads of other men all the time.



**Bald Men Grow Hair Quick!**

I grew my own hair just as it shows here.

I will prove to you **FREE** that I can grow hair, quick.



**Here is Brennan**  
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And Brennan after Vreeland grew his hair. Write and I will tell you Brennan's story and give you his address.



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Wiseman was bald like this.



But Wiseman grew this head of hair with my wonderful hair growing fluid. All about Wiseman and how he did it, if you write. You'll get his address too.

What I accomplished on my own head and on other heads I can do for you, provided you are under 45 years of age and loss of hair was not caused by burns or scars. Anyhow, I must succeed or you pay nothing. No apparatus. My home treatment is simple, quick, inexpensive.

**Mail this FREE Coupon**

Mail the coupon today—Right Now—I will send you, immediately, one full Ampoule of my marvelous fluid which I discovered, of which I hold the secret and which grew my own hair on my own bald head. Besides the Free Ampoule of Fluid, I will send photographs, names and addresses of men and women who successfully used my Wonder Fluid for Dandruff, Falling Hair and particularly for Baldness.

**VREELAND** 13-53 Euclid-Windsor Bldg. CLEVELAND, OHIO

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And you will not be satisfied unless you earn steady promotion. But are you prepared for the job ahead of you? Do you measure up to the standard that insures success? For a more responsible position a fairly good education is necessary. To write a sensible business letter, to prepare estimates, to figure cost and to compute interest, you must have a certain amount of preparation. All this you must be able to do before you will earn promotion. Many business houses hire no men whose general knowledge is not equal to a high school course. Why? Because big business refuses to burden itself with men who are barred from promotion by the lack of elementary education.

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We have a plan whereby you can. We can give you a complete but simplified high school course in two years, giving you all the essentials that form the foundation of practical business. It will prepare you to hold your own where competition is keen and exacting. Do not doubt your ability, but make up your mind to it and you will soon have the requirements that will bring you success and big money. **YOU CAN DO IT.**

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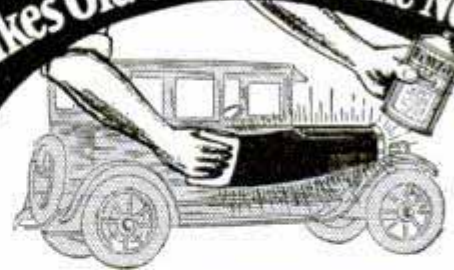
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| ....Automobile Engineer     | ....Machine Shop Practice |
| ....Automobile Repairman    | ....Mechanical Engineer   |
| ....Civil Engineer          | ....Shop Superintendent   |
| ....Structural Engineer     | ....Employment Manager    |
| ....Business Manager        | ....Steam Engineer        |
| ....Cert. Public Accountant | ....Foremanship           |
| ....Accountant and Auditor  | ....Sanitary Engineer     |
| ....Bookkeeper              | ....Surveyor (& Mapping)  |
| ....Draftsman and Designer  | ....Telephone Engineer    |
| ....Electrical Engineer     | ....Telegraph Engineer    |
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# Prizes for Boys

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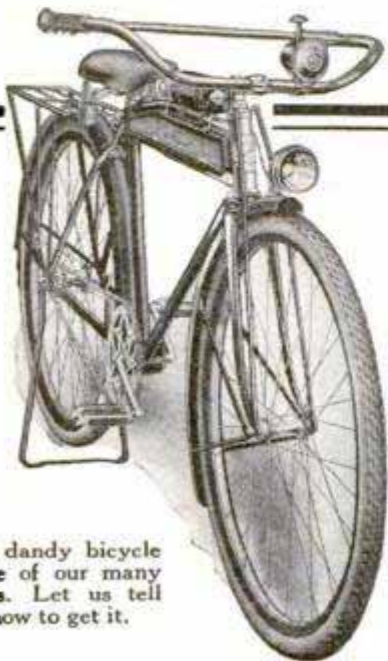
### Mail the Coupon

Hi! Buddy! How would you like to have a pair of boxing gloves, bicycle, wrist watch or baseball equipment?

These are the kind of prizes Crowell Juniors are given. They are regular fellows like yourself—full of pep and ambition. In their spare time they deliver to regular customers *The American Magazine*, *Woman's Home Companion* and *Collier's*, *The National Weekly*.

You need no experience to start. We will show you how to find readers of these well-known magazines. This work will in no way interfere with your school or your fun.

If you act at once you can be the boy selected from your part of town. It's your chance to get in with this group of fellows who always have the things they want and their own spending money. Don't delay another minute. Send your name and address on the coupon now.



This dandy bicycle is one of our many prizes. Let us tell you how to get it.

Every month many of our boys are getting bikes like this one. Are you going to be the next? Your name and address mailed on the coupon is the first step. Do it now.

Mr. Jim Thayer, Dept. 84,  
The Crowell Publishing Company,  
Springfield, Ohio.

Dear Jim: I want to get started toward prizes.  
Please start me off as a salesman.

My Name.....

Address.....

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

**Clip and mail  
coupon at once**



# “E”very 3,000 Miles Device Buys Me a

“**The** money I save on gasoline more than keeps me in new tires. Figure it out . . . I was using gas at a rate that cost me \$46 to drive 3,000 miles. Now I’m getting better than 26 miles per gallon. It saves \$23 to \$25 every 3,000 miles—more than the price of a new tire.”

No matter what make of car you drive, the Stransky Vaporizer is unconditionally guaranteed to give you more miles per gallon or it costs you nothing. As a matter of fact, it is not uncommon for the Stransky Vaporizer to greatly increase gasoline mileage!

## Note These Records

Forty-three miles per gallon from a Chevrolet, reported by F. S. Carroll. He also reports 40 miles a gallon in a Ford. Forty miles per gallon in a Dodge from Brownsville, Tex., to Tampico, Mex., reported by T. L. Brown.

## Three Million Owners

Records like these are reported in every mail for every make and model car . . . from 72 different countries . . . the world over. More than three million Stransky Vaporizers have been installed.

## Easily Installed

No bigger than a dollar coin—no more expensive than a good wrench—no more trouble to attach than a fan



### 43.8 Miles Per Gallon

Mr. M. E. Miller, Kansas City, writes: “I have subjected the Vaporizer to a severe and thorough test. After installing one on a Chevrolet, I found I was obtaining 43.8 miles to a gallon. The actual test surpasses your claim.”

### \$4 an Hour for Salesmen, Agents and Spare Time Workers

Men are making wonderful earnings showing the Stransky Vaporizer to car owners in spare time and full time. Sells fast under our guarantee. Foster made \$357 in two weeks. G. F. Fuller earned \$114 in 5 days. Eberlein sold 23 Vaporizers in 35 minutes! J. W. Cronk actually earned \$51 in an hour. You should be able to earn at least \$3 every hour you put in. We offer demonstrators one Vaporizer FREE, under our unusual offer. Get full details. Simply mail coupon at once.



# This Amazing Little New Tire...**FREE**"



belt! Attaches to the intake manifold of any car in five minutes. Any one can do it.

## Less Gasoline—More Power

The Vaporizer mixes air with your gasoline after it leaves the carburetor. Vaporizes the gasoline more thoroughly. Under this ideal condition you get more compression out of less gasoline and a more complete explosion. Starting is not interfered with as the Vaporizer automatically shuts itself off when the motor is idle.

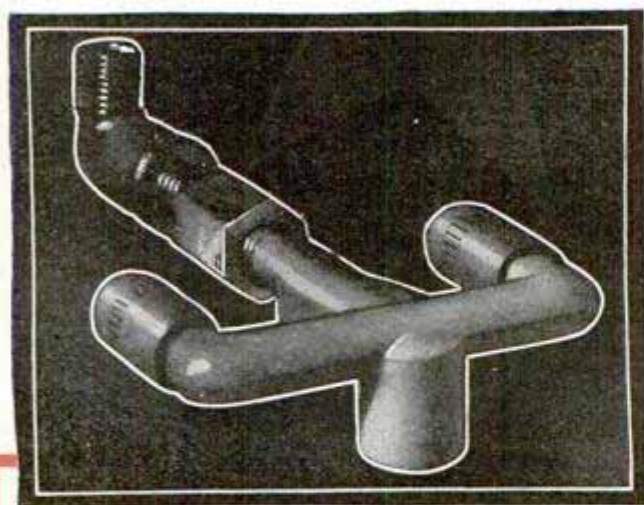
## Make This Test

Test the Stransky Vaporizer on your car—and expect results that will amaze you! Increase your mileage—forget carbon trouble, sluggish motor and fouled spark plugs from over-rich mixture—and save enough on your gasoline to more than keep you in tires. These results are guaranteed or the test costs you nothing.

Mail the coupon below for full details, guarantee, and amazing trial offer, which is even more remarkable than we can tell you here. There is no obligation whatever.

## J. A. STRANSKY MFG. CO.

C-10 Stransky Block,  
PUKWANA, SOUTH DAKOTA



### Fits Any Car in 5 Minutes

Any one can install this device in 5 minutes. Simply loosen one connection to the intake manifold with a wrench. You can do the rest with your fingers.

J. A. Stransky Mfg. Co., C-10, Stransky Block,  
Pukwana, S. Dakota.

Without obligation send me full details of your free trial offer.

Name.....

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

Check here for Distributor's Sample Offer and the selling plan.



# DON'T

—enroll for home-study training of any kind until you see what L. L. Cooke has to offer, in Practical Electricity or Engineering Drafting.

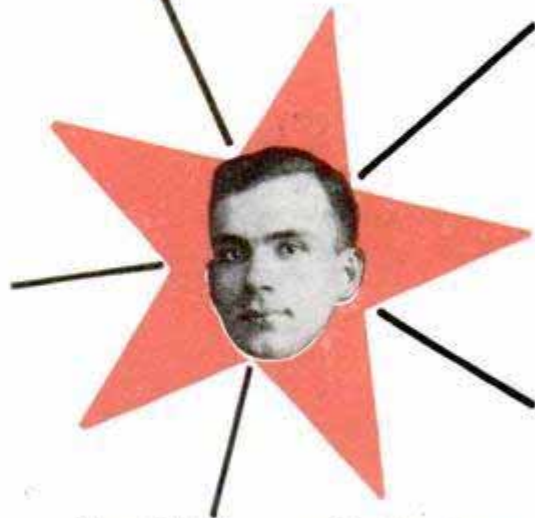
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There is a reason.

Investigate! Find out why this is so.

Get particulars now by mailing coupon below.

L. L. Cooke.



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Mr. Cooke:  
When I started with you I earned only \$16.50 a week; but with my course finished I was promoted to foreman and now have my own electrical business and make more than \$16.50 in a day. Your training did it.

CHARLES FINCH  
8 Maryland Avenue,  
Middletown, N. Y.

## From \$12.50 Job to Senior Engineer

Dear Chief:

Not long ago I was earning \$12.50 a week, at that time I enrolled as a Cooke student, today I am the Senior Engineer of a large Corporation. This advancement was due to the training I received from you.

OTIS D. ALLEN, A-21227  
2509 Prospect Street,  
Indianapolis, Indiana.



## Gets Job As Chief Electrician

Dear Mr. Cooke:

Without your help I would not have been able to hold the fine position paying me \$75 per week, which I am now giving up for an even better one as Chief Electrician for B. F. Keith's Fordham Theatre. Thanks to you and your course.

SIDNEY KALINER, B-7033,  
2473 Valentine Avenue,  
Bronx, N. Y. City, N. Y.

L. L. Cooke, Chief Engineer,  
L. L. Cooke Schools, Dept. 13,  
2132-2158 Lawrence Ave., Chicago.

Please send me complete information about your home study training in the line I have checked. I understand this request does not obligate me in any way. (Please check only one subject.)

Practical Electricity.

Engineering Drafting.

Name.....

Address.....

City.....

State.....

**MAIL THIS COUPON for  
FULL INFORMATION**



# Classified Advertisements

## WORLD'S BEST WANT AD MEDIUM

Advertisements in this section, 30 cents per word, each insertion, minimum 10 words, payable in advance. To be inserted under proper classification in April issue, copy should be in our office February 18th

### ADVERTISING AGENCIES

**ADVERTISE** In 24 Big Sunday News-papers, 24 words \$15.00. Excellent for securing agents, salesmen and business opportunities. Catalog listing 1,000 leading dailies, weeklies, mail order magazines. Everything. Free. Wade Advertising, Baltimore Bldg., Chicago.

**BEFORE** Advertising get our catalog. No charge. 25 years in business. The largest classified agency in the world. Ankrum Advertising Agency, 100 No. LaSalle St., Chicago, Ill.

**GET** Into advertising. Learn quickly at home. Experience unnecessary. New easy plan. No text books used. Practical work. Old established school. Send name and address for interesting free booklet. Page-Davis School of Advertising, Dept. 3431, 3501 Michigan, Chicago.

**FREE**—New 1929 Advertisers Rate Guide, 44 pages. Includes everything. Lowest rates. E. H. Brown Advertising Agency, 140 S. Dearborn, Chicago.

**ADVERTISE** 50 Magazines 5c word; \$4.00 Inch. 5,000 country weeklies 1c line, per paper; lists free. Evans King Co., 672P, Wilmington, Del.

**20 WORDS**, 50 Pulling magazines \$1.00; three \$2.00. "Maywood Advertiser," P-921 Broadway, New York.

**ADVERTISING**: 24 Words 8 newspapers \$5; ten farm papers \$15. List free. M. Le-Grand Agency, 150 Nassau St., New York.

**TIME** Counts in applying for patents. See pages 154 and 155. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

**INCH** Display 50 Monthlies Thrice \$8.00. Meyer Agency, 4112M Hartford, St. Louis, Mo.

### FOR ADVERTISERS

**ADVERTISE**, 25 Words 50 monthlies 100 weeklies \$5.00. Lists free. Allen, 234 Bound Brook, N. J.

**ADVERTISE** 300 Country newspapers, 28 words, \$10. Business getter. Lists free. Keator, Hartford Bldg., Chicago.

**ADVERTISER'S** Manual, 1929 edition, Postpaid 25c. Owl, Times Bldg., New York.

**40 WORDS** Insert 50 magazines \$2.00. Empire Agency, Shawano, Wis.

### SALES PROMOTION

**\$50 TO \$50,000** Daily Sales Developed during 28 years for clients by our direct mail plans, copy, campaigns. One product, 1923, an idea; this year \$100,000 orders booked. Fifty year old concern desired 50 national representatives in 1925; we produced 40 in three months. 700 dealers in 10 months at \$3 each, for another. Ten years Sales Promotion Manager Larkin Co. Submit sales problems for free diagnosis. James C. Johnson, 118A Woodbridge Ave., Buffalo.

**DON'T** Experiment! Dollar-doubling letters, circulars, literature, campaigns. Long, successful experience. Moderate charges. Finkel-Advertising, 131-P, Glenwood, Jersey City, N. J.

**MARKET** Analysis of your product and sales program. Formerly with Crosley Radio. George Banning, Times Bldg., Watertown, N. Y.

### BUSINESS ADDRESSES

**CHICAGO**—8 No. Michigan Ave. A real address. Write Russell Albin.

### LETTER SPECIALISTS

**"THE** Master Letter Writer." Including 500 successful letters, by Ad-Man Davison, world-famous letter expert; 704 pages, \$3. Circular sent. Opportunity Press, Westport, Conn.

**DISTINCTIVE**, Modern, sales letters. George C. Banning, Times Bldg., Watertown, N. Y.

**AD-Man** Davison writes letters, folders, booklets; success by mail; send your literature for Free Suggestions. Ad-Man Davison, Westport, Conn.

**SALES** Creating letters written. G. Anderson, P. O. Box 1244, Phoenix, Ariz.

### AUTOMOBILES

**TIME** Counts in applying for patents. See pages 154 and 155. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

### AUTOMOBILE SUPPLIES

**SAVE** Money on auto and truck repairs. Gears, axles, bearings, motor and transmission parts at 50 to 75% off factory list prices. Satisfactory parts guaranteed. Prompt service. Price lists free. Century Parts Co., 1712 Lafayette Ave., St. Louis, Mo.

**AUTO** Parts new and used. Lowest prices. Bankrupt supplies, motors, wheels, radiators, transmissions, generators, gears, carburetors, touring tops complete \$15. Brakelining 50% off. Brightman, 2065 Main St., Hartford, Conn.

**RADIATORS** At wholesale prices. All standard makes. Satisfaction guaranteed. Send for prices, stating make and model. Independent Radiator Co., 1119 S. Wabash Ave., Chicago.

**MECHANICS** Get out of the grease, travel, and make real money selling our electrical tools to garages and mechanics, easy sales, very liberal commissions. Barker Specialty Co., Girard, Pa.

**ASK** For our booklet "Drive a Good Looking Automobile." Tells how and why. Jewell Polish Company, 15 State St., Pasadena, Calif.

**FOR** Sale—Used auto parts for all makes and models. J. Trockman & Sons, Inc., Evansville, Ind.

**KOO-KOO**—Newest sound novelty, for all cars, independent, \$2.50. Koo-Koo Mfg. Co., Box 323, Hollywood, Calif.

**42 MILES** On 1 gallon. Wonderful moisture gas saver. All autos, 1 free. Critchlow, 01-805, Wheaton, Ill.

**SEND** One dollar for secret formula of "Hopped Up" gasoline used by leading race drivers. Menzie, 11530 Woodmont, Detroit.

### AUTOMOBILE SERVICE EQUIPMENT

**USED** Constant potential outfit—120 amperes fully equipped. Guaranteed like new, overhauled and repainted. A wonderful bargain. Will ship on trial and allow plenty of time. E. M. Connor, Box M-394, Troy, Ohio.

**YOU** Are wanted to resilver mirrors at home. Immense profits plating autoparts, tableware, etc. Write for information. Sprinkle, Plater, 77, Marion, Ind.

**BARGAINS** In repossessed battery chargers, rectifiers of all kinds and a few constant potential 8-hour chargers, several of them practically new. Lowest prices, terms if wanted, 30 days' trial. Write today to I. C. Helmick, Box M-395, Troy, Ohio.

**GLOVER'S** Seal-tite puncture patch, your ad on each can, wholesale distributors wanted. Glover Rubber Co., Rome, Ga.

**SAVE** Money—Garage equipment reconditioned and guaranteed like new. Unusual bargains in test stands, car washers, battery chargers, air compressors, etc. Shipped on trial, easy terms. What do you need to complete your equipment? E. C. Galbreath, Box M-396, Troy, Ohio.

### FOR FORD OWNERS

**LEARN** The secrets of Model A engineering. Get this new book "The Model A Ford Car." Scores of question-answering diagrams. Every page lays bare the engineering secrets of the new Ford. Price \$1.00 postpaid. Trade Press Publishing Co., Montgomery Bldg., Milwaukee, Wis.

**42 MILES** On 1 gallon. Wonderful moisture gas saver. All autos, 1 free. Critchlow, 02-805, Wheaton, Ill.

**FORD** A and T high speed oversize carburetor with down draft manifold \$16.00. Formula racing fuel \$1.00, stops preignition. Racing cars, boats, motors, speed specialties. Catalog 10c. Green Motor Works, Dayton, Ohio.

**AURORA** Understung parts and 3.1 racing gears, speedster bodies, headlights, hi compression head. See Sport Factories ad, page 144.

### MOTORCYCLES, BICYCLES AND SUPPLIES

**MOTORCYCLES** \$25 To \$50. Easy terms. Tires \$2.50, frames \$3, forks \$3, tanks \$5, wheels \$4, chains \$2, saddles \$5, handle bars \$5, engines \$15, side cars \$25, transmissions \$12, belts \$6, airplane engines \$15, airplane wheels \$5, bicycle tires \$1.25, velocipedes \$7.50, bicycles \$9.50, new auto tires \$3, used auto tires \$2.50. Send 50c for catalogs. Price Cutter Deninger, Rochester, N. Y.

**SPECIALIZED** Harley-Davidson service depot. Harley-Davidson parts, accessories, oil. Send us your motors and parts and we will rebuild them like new. Let us overhaul your motorcycle. All work guaranteed. Send 25c in stamps for our flat rate repair costs and parts and accessories book. Knuth's Harley-Davidson Agency, 2525 Fond Du Lac Ave., Milwaukee, Wis.

**PRICES** Slashed! Send for catalog showing bargains in genuine rebuilt Harley-Davidson motorcycles. Some as low as \$50.00. Fully guaranteed to look, act and last like new. Special easy-payment plan. These bargains won't last long. Write today. Heinz Motor Company, 609 West North Ave., Baltimore, Md. (Authorized Harley-Davidson Distributors).

**FINE** Harley-Davidson bargains, \$50.00 and up. Order your motorcycle now for spring delivery. Send for our new catalog, "Money-Saving Motorcycle Bargains." Knuth's Harley-Davidson Agency, 2525 Fond Du Lac Ave., Milwaukee, Wis.

**USED** Motorcycles, all makes, lowest prices; price list free; used parts half price and less. Rochester Harley Davidson Corp., 129 West Main St., Rochester, N. Y.

**BARGAINS** in used motorcycle parts for all makes. No Catalogs. J. B. Dahl, 3661 Archer Ave., Chicago, Ill.

### AVIATION

**HOME** Study aviation course by pioneer school at new low price. Covers motors, meteorology, nomenclature, aviation, design, flying and 100 other fascinating subjects. Endorsed by experts. Diploma given. Free employment service. Complete details sent free. National Aviation Training, Dept. 114, 1031 So. Broadway, Los Angeles, Calif.

**AIRPLANE**, Boat, motors, propellers, fuselages, wings, parts. Free Aircraft Wks., Richmond, Ind.

**FOR** Sale: Light parasol monoplane suitable for Henderson or other light motor. First \$300.00 takes it. Chas. Fasig, Moundsville, W. Va.

**CURTISS** O. X. 5 aviation engines, excellent condition, \$275.00 and up. Specht's Automotive Service, 117 S. 1st St., W. Cedar Rapids, Iowa.

**AVIATION'S** Greatest invention makes flying safe. Get into business yourself. Send 10 cents for booklet. Tell how. Gyropter, Blueash, Ohio.

**THE** Plane with the \$10,000 performance. Heath super parasol, America's most popular sport plane. Build it for \$199. Send 10c for large 1929 booklet just off the press. Heath Airplane Co., 1727 Sedgwick St., Chicago, Ill.

**FOR** That aerial driven sled or boat—a Heath propeller will give performance you never dreamed of. Send 4c for propeller booklet. Heath Airplane Co., 1727 Sedgwick St., Chicago, Ill.

**JUST** Out—Booklet and blue prints on construction of sportplane. Contains also flight instruction, motors to use, etc. All for one dollar. Russell Aero Company, Box 455, Toledo, Ohio.

**EAGLE** Model airplanes. Ready-to-fly. Knocked down. Best models obtainable. Real low prices. Catalogs 5c coin. Eagle Model Airplane Co., Box 152, North Haven, Conn.



**MODEL** Airplanes, supplies. Send stamp for price list. Junkers "Bremen" blueprint 25c. Hawthorne Model Aero Co., Hawthorne, N. J.

**BUILD** A whizbang monoplane and fly with Ford motor. Blue prints \$5. Plane, motor and propeller circulars 10c. Storms Aviation Co., Spartansburg, S. C.

**PROPELLERS**—4', \$8.75; 5', \$13.25; 6', \$16.50; Special Henderson propeller, \$15.00; Aerodrive boat or sled blueprints, 50c each. Engines, fuselages, helmets, \$3.00; goggles, \$3.00; both only \$5.00. Ostergaard Aircraft, 4303 North Narragansett, Chicago.

**BLUE** Print for building ice sled, 60-75 M.P.H. with motorcycle engine, \$1.00. Sensesich Bros., Littitz, Pa.

**AVIATORS'** Wing pins, silver \$1.00; gold, \$1.50. Genuine airplane propellers 8' long, \$5.00. Air Transport, Garden City, N. Y.

**CLINTON** Airplanes—The best performing and most true to life models obtainable. All types; send dime for catalog of ready-to-fly models and construction outfits. The Clinton Toy Corp., North Haven, Conn.

**FOR** Sale—L. S. 5 standard airplane without motor. Also 3 place Travelair, like new. A. J. Simpson, P. O. Box 583, We-woka, Okla.

**JOIN** A flying organization. Send \$2.00 for silver wings and membership card. Associated Aviation Clubs of America, 315 East Kingsbridge, New York City.

**MODEL** Airplanes, supplies of high quality. List 10c coin. Cleveland Model & Supply Co., 1866PM West 57th St., Cleveland, Ohio.

**MODEL** Airplane supply. August Schaefer, 45 North Ave., New Rochelle, N. Y. Send for free catalog.

**FOR** Sale, new Monocoupe, perfect condition, never been flown. We are taking on new line of planes. \$2,100 our field. Wonderful bargain. Chesapeake Aircraft Co., 1309 N. Charles St., Baltimore, Md.

**FOSTER'S** Model Airplane & Supply Co. Send 5 cents for manual. Teaches building and flying. Full stock parts, plans, Bass, Balsa, Reed, Fresh Para Rubber Ideal Construction sets. Prompt shipments. 5503 Hudson Boulevard, North Bergen, N. J.

**NEW** Type scale model aeroplanes. Motor and rubber driven 3 and 4 1/2 foot. Send 10 cents for catalog. K. A. Pouch, 83 Low Terrace, New Brighton, N. Y.

**BOYS**—Get an Eagle model airplane. Eagle racer flies 500 feet, only \$1.00 prepaid. Catalog 5c coin. Eagle Model Airplane Co., Box 152, North Haven, Conn.

**YOUNG** Fellows, write! I can help you to get your plane. Al Hiller, Box 396, Bridgeton, N. J.

**STUDENTS** and commercial flyers write for catalog on flying togs and equipment. The Detroit Aero Motors Co., 5055-59 Townsend Ave., Detroit, Mich.

**THE** American School of Aviation announces a new correspondence course in mechanics of aviation. A thorough training in practical aeronautics. American School of Aviation, Dept. 1872, 3601 Michigan Ave., Chicago, Ill.

**PROPELLERS**, Toothpick high speed. For snow and ice sleds, small airplanes. Blueprints for aero sleds \$1.00. Crawford Propeller Manufactory, Seal Beach, Calif.

**BOYS!** Build model Zeppelins. Blue prints of 4 foot Graff, 75c. Los Angeles, 50c. Both \$1.00. No stamps. Otto E. Balke, 1421 No. Washington Ave., Dallas, Tex.

**9"** PROPELLER Correctly carved to the proper degree and angle. This is truly a miniature propeller. 55c each. Rubber tire disc wheels, 2 1/2" in. dia., 50c per pair. Will shortly announce complete list. Advance Aircraft, 114 Oliver Ave., Yonkers, N. Y.

**TIME** Counts in applying for patents. See pages 154 and 155. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

**BLUEPRINTS**, For light two place cabin monoplane. Easy to build. Plans \$5.00. Circular 10 cents. Roland Aircraft Company, 921 Baltimore, Kansas City, Mo.

**SIMPLEX** Air Model Co., Auburn, Mass. Send five cents for supply booklet.

**VARIOUS** Sizes wood, reeds, bamboo, rubber band, wheels, propeller, onion skin covering and other supplies. Big bundle for 25c, five for \$1.00. No stamps. Will also send circular on free three foot model. Aero Shop, 3050 Huribut Ave., Detroit, Mich.

**BUILD** Your own glider. Complete plans \$7.50. Special price list 25c. J. P. Schroeter, 445 Milwaukee St., Milwaukee, Wis.

**BIGGEST**, Best Catalog Model Airplanes, Parts, Supplies; 5c postpaid. Ideal Company, 19 West 18th Street, New York.

**"SKYWARD** Ho!" Wonder book on aviation—32 pages, 150 illustrations. Shows you complete training for flying career, fame, fortune! Sent free. Write today! Parks Air College, 213 Mo. Theatre Bldg., St. Louis, Mo.

**BYRD'S** Antarctic plane scale model construction outfit, quarter, postpaid. Casson-Craft, Framingham, Mass.

**BUILD** Our wonderful one-place monoplane adapted to motorcycle or other small aircooled motors. Detailed blueprints \$2.00. Literature dime. Hawley Aircraft, Box 121, Sta. C., San Diego, Calif.

#### BOOKS AND PERIODICALS

**SECRET** Society rituals—"Handbook of Free Masonry" shows how to open and close lodge and conduct meetings. Reveals every detail of conferring entered apprentice, fellowcraft and master Mason degrees. Tells and shows every action and word including signs, grips, pass-words, etc. 284 pages, 85 illustrations. Pay postman \$2.35 upon delivery; or send \$2.00 cash. Franklin Publishing Company, 800 No. Clark St., Dept. 172, Chicago.

**4TH EDITION**, revised "Radio Theory and Operating," by Mary Texanna Loomis. The standard radio text and reference book of America. 992 pages, 800 illustrations, flexible binding. Price \$3.50 postage paid. For sale by hundreds of book dealers throughout America and many foreign countries. Or may be purchased direct from the publishers. Send check or money order to Loomis Publishing Company, Dept. 18, Washington, D. C.

**"CARTOONING** For Profit." Illustrated, contains selling plans, cartoon pointers, shortcuts, syndicate work, commercial cartooning, getting the professional touch, best markets, syndicates, cartoon contests, etc., \$1. postpaid. Smith's Service, PK1194, Wenatchee, Wash.

**HYPNOTISM** Easily learned. Lessons guaranteed. Postpaid, \$1.10. Smith Pub. Co., Dept. 3, Springfield, Mass.

**INDUSTRIAL** Alcohol. Wright's book. Full directions for making, fully illustrated. \$2.50. Spon & Chamberlain, 120 P.M. Liberty Street, New York, N. Y.

**CURIOUS** Books, unique novelties, stunning pictures. Samples, 10 cents prepaid. Linds, 214 W. 34th St., New York.

#### PICTURES AND POSTCARDS

**FREE** Book—"What men know about women?" Humorous and interesting. Kind men like. 10 snappy cards. Red hot pocket novelty. Copy America's greatest illustrated cartoon book. All for 25c. White Mule, Beaver Dam, Wis.

**BEAUTIFUL** Colored views of southern California, Los Angeles, Hollywood, etc. Sample package assorted 25 cents. Lists for stamp. Charlesad-Smith, Box 1108, Los Angeles.

**ART** Pictures—220 all different. 160 samples \$1.00. Particulars 10c. Howard Sales Co., Dept. 15, Box 529, San Francisco, Calif.

#### MAGIC TRICKS, BOOKS AND JOKER NOVELTIES

**"THE** Book of 1,000 Wonders" will be sent postpaid for 10c. Explains many mystifying tricks with coins, cards, handkerchiefs, etc., you can do. Also, contains complete catalog of magic tricks, jokes, puzzles, books, escapes, mindreading acts, spiritualistic effects, illusion plans, curios and imported novelties from many foreign lands. Large assortment, lowest prices. You will amaze and mystify your friends! Send 10c today. Lyle Douglas, Station A-5, Dallas, Tex.

**FREE** With \$25 order die box. Send 20c for our large catalog of tricks, wigs, sensational escapes. Oaks Magical Co., Dept. 548, Oshkosh, Wis.

**LATEST** French model pocket mirror and set of transparent art cards all for \$1.00. World Service Co., 336 Marcy Ave., Brooklyn, N. Y.

**MAGIC**—Tricks, Books and Supplies. For amateurs as well as the great professionals. Anyone can learn through our instructions. Feature Acts in Mind-Reading, Spiritualism, Rope Ties, etc. Large illustrated professional catalog. 20c. Chicago Magic Co., 140 So. Dearborn St., Dept. B, Chicago, Ill.

**TRICKS** With cards. Mystify your friends. Easy to do. Produce any card called for. Name any card drawn from pack. Six tricks for 25c, including large catalog. Wizard Magic Co., Dept. 15D, Box 1055, Station "C," Los Angeles, Calif.

**FREE** Card trick with every catalog 10c. A. B. C. Stamp Novelty Co., 3801 Woodland Ave., Kansas City, Mo.

**MAGIC** Tricks, card tricks, coin tricks, hypnotism, ventriloquism. Instructive 64-page books 10c each. All five 40c. Geo. Fenner, 2401 Jefferson, Louisville, Ky.

**FREE**—250 Tricks, with 10c catalog. Superior Specialties, 112 West 42nd, New York.

**ELECTRIC** Fun! Seventy stunts, 110 volts, \$1. Cooper Sons, Campbell, Calif.

**SEVEN** Magical Delusions and catalogs—25c. Gilmaglio, Morgan Park, Ill.

**MAGIC** Catalog 20c. Lynn's, 105 Beach, Dept. 3, Jersey City, N. J.

#### GAMES, ENTERTAINMENTS AND PLAYS

**PLAYS**, Musical comedies and revues, minstrels, comedy and talking songs, black-face skits, vaudeville acts monologs, dialogues, recitations, entertainments, juvenile plays and songs, musical readings, make-up goods. Catalog free. T. S. Denison & Co., 623 So. Wabash, Dept. 11, Chicago.

**PLAY** The new indoor bowling game. Very fascinating and exciting for both young and old. Send 25c for complete outfit. Agents wanted. Reliance Trading Company, Loew Bldg., Syracuse, N. Y.

**LEARN** Ventriloquism by mail—small cost, 2c stamp brings particulars. Geo. W. Smith, Room S-329, 125 N. Jefferson St., Peoria, Ill.

#### CHALK TALKS

**LAUGH** Producing program, \$1.00. Catalog free. Balda, The Cartoonist, Oshkosh, Wis.

**BECOME** Chalk talk wizard in one evening. Make crayon, clay, sand and smoke pictures. New method. No talent needed. G. E. Hendrickson, Argyle, Wis.

#### STAMP COLLECTING

**SAMPLE** Copy free. In order to introduce the readers of this magazine to Scott's Monthly Journal, philately's liveliest magazine, we will send a copy free to all who write us and ask for it. Scott's Monthly Journal is not only a very interesting and up-to-date philatelic journal, but it is also a monthly supplement to the Standard and the specialized U. S. catalogs, listing new issues, price changes, etc. Ready Feb. 18, 1929. "Stamp Collecting Why and How," or Riding a Hobby with Prescott H. Thorp. People who have read advance copies say that this is the most unusual book on stamp collecting ever written. Write us for a descriptive circular, or ask your dealer (book, department or stamp store) to show you a copy. Approvals. The world-wide connections of this company have made it possible for us to build up, and keep on hand, one of the finest assortments of fine approvals in the world. Write us for approval circular. Scott Stamp and Coin Co., 1 West 47th St., New York, N. Y.

**ANCHERS** \$\$\$ Outfit—only 12c! Fine triangle stamp; set German stamps with (pre-war) value forty million dollars (interesting!); perforation gauge, mime scale; airmail set; scarce stamp from smallest republic on earth; newspaper set; packet good stamps and Travancore, Malay, Dutch Indies, etc. Entire outfit for 12c to approval applicants! (Nice pocket stock book, value 25c, with every order!) Ancher Stamp Co., Box 126, Rutherford, N. J.

**FREE**—Six Cretes. Sets and approvals, 60% discount. Charles Cleveland, 806 No. Humphrey Ave., Oak Park, Ill.

**1,100** UNUSED Stamps, cataloging nearly \$25.00. Only 95c. Forty page illustrated price list free. West Coast Stamp Company, Alhambra, Calif.

**SEND** A 2c stamp and get our illustrated price list of sets and packets. Approval circular, details of our profit-sharing plan, and a credit slip good for 5c on your first purchase. Write Dept. 2, Argonaut Stamp Co., New Canaan, Conn.

**100** STAMPS Free for subscribers to Pacific Stamp News at 25c per year. 17 So-telo, Piedmont, Calif.

**CAPE** Verdi: 25 varieties 25c. Lists free. Allison, Angola, Ind.

**UNITED** States, 24 varieties 1/2c to \$2 current catalog, \$1.25 for 25c. Leduc, Red-Hon, Penna.



**MYSTIC "Queer Country" Packet!** Contains scarce stamps from the following strange lands: San Marino, Antioquia, Congo, Cyprus, Fiji Islands, Gwalior Hyderabad, Iceland, Jhind, Kenya, Uganda, Lebanon, Monaco, North Borneo, Nyassa, St. Thomas Prince, Eastern Roumelia, Siam, Sierra Leone, Tanganyika, Trinidad Tobago, Ubangi, Upper Volta, Wallis Futuna, Alaouites. Get this wonderful packet of "freak countries" and make your friends envious! Price only 10c to approval applicants! Write today. Mystic Stamp Company (Dept. 8), Camden, N. Y.

**500 DIFFERENT Stamps for 25c.** Big collection from Bosnia, Crete, Epirus, Honduras, Iceland, Kenya, Liberia, Malta, Nyassa, Quelimane, Stam, Zambesia and other "hard" countries. Catalog value \$10. Price 25c to approval applicants! Bargains, 1,000 different 79c; 15 triangles 49c; 100 Africa 45c; 100 Asia 50c; 100 Balkans 35c; 100 British Colonies 30c; 100 French Colonies 35c; 100 Portuguese Colonies 50c. Eight packets for \$3.00! Illustrated lists free. Loma Stamp Co., 3926 32nd St., San Diego, Calif.

**\$1.00 FREE.** Black U. S. postage, given away with each order. Pioneer Stamp Album with 500 illustrations. 150 different stamps from 40 countries, Syria, Lebanon, Hejaz, Liberia, New French Colonies, British, Portuguese Colonies, South Africa, Australia, 500 hinges, 36 page illustrated catalog. All for 15c. Big commission to agents for the best approval sheets of stamps ever offered. Write for sample outfit. Hussman Stamp Co., Dept. M, 620 Olive St., St. Louis, Mo.

**MOVIE Envelopes.** 100 different foreign from all over world with stamps attached addressed to Hollywood movie stars postpaid \$1.15, 40 for 60 cents. Edwin Van Wart, 1827 Cahuenga, Hollywood, Calif.

**MOVIE Mixture** foreign only. Large packet 20 cents. Tyson, 1825 Cahuenga, Hollywood, Calif.

**200 COUNTRIES!** All different, one stamp from each, also valuable premium offers, only \$1.50, with approvals. Murray, 515 Tower Bldg., St. Louis.

**ONLY 25c** For a five months' subscription to The Stamp Collector, America's finest stamp magazine. 100 all different stamps given free to each subscriber. Money refunded if you are not more than pleased. The Stamp Collector, Dept. P. M., 719 Lodi St., Syracuse, N. Y.

**FREE—20 Different Argentine.** Approvals. List. Send 4c today for postage, etc. Reuter, Santa Ana, Calif.

**33 1-3c COMMISSION.** Sell stamps. Unsold stamps returnable. No investment required. References necessary. Lux Stamp Co., 805 Fairmont Place, Bronx, New York.

**FREE Surprise packet** with bargain lists, postage 2c. Rheame, Dept. 75, 7748, Henri Julien, Montreal, Can.

**70 DIFFERENT U. S. stamps,** including \$1.00 postage-stamp and many commemoratives, 25 cents. Mountain City Stamp Co., Box 335, Mannington, W. Va.

**50 DIFFERENT United States 5c** to approval applicants. Special bargain: 1,000 mixed foreign 35c. Glendale Stamp Co., 1311 Linden, Glendale, Calif.

**FREE 25 Different French colonies.** Reference, 2c postage. Beall, 1209 Park Road, Washington, D. C.

**WATERMARK Detector** free. Send 2c postage. Howard McIntosh, Mittineague, Mass.

**300-300-300 ALL Different stamps** (6.00 catalog); 300 hinges; 5 approval sheets; duplicate stamp album; perforation gauge; millimeter scale and ruler to approval applicants for only 20c. Edgewood Stamp Company, Milford, Conn.

**1,000 MIXED Stamps 10c.** Homer Boster, Summit Hill, Ohio.

**BIG Value!** 25 airmails 10c; 25 Roumania 10c. Free premium. 50% approvals request. Webster Stamp Co., Box 11, Tremont Sta., New York.

**FREE! 50 Good foreign stamps** to approval applicants. Reference please. Send 2c for postage. Samuel L. Fox, 1200 Park Ave., Baltimore, Md.

**300 DIFF. Foreign, album, hinges and gauge.** 25c. Lakota, La Plant, S. Dak.

**FREE.** One scarce set of Jugo Slavia cataloging \$1.06 to applicants for our new, low priced approvals. Send 4c postage. Paul Bayer, 269 Jewett Ave., Jersey City, N. J.

**GET Acquainted!!** Hidden treasure 6c. Cyclone blow 11c. Approvals. Golden Rule Stamp Co., Box 1248, Chicago.

**VIKING "De luxe packet"!** Contains excellent stamps (no European) from Liberia, Kouang-Tcheou, Rhodesia, Bermuda, Siam, Trinidad Tobago, Nyasaland, Alaouites, Orange River Colony, Hyderabad, St. Lucia, many British and French Colonies, scarce stamp cataloging 40c, triangle stamp, and useful premium. Price 10c with our famous approvals. Viking Stamp Co., P. O. Box 18, Sheepshead Bay Station, Brooklyn, N. Y.

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ASH Trays are good advertisers. Let me quote on your needs. Sample 30c. C. W. Platts, Box 366, Thomaston, Conn.

CARPENTERS Make money, selling and installing Duplex Adjustable Sash Balances. Write Department "B," General Water Heater Corporation, Los Angeles, Calif.

GET Exclusive agency city or state. Clever invention, "pneumatic suction door cushion," stops rattles, squeaks, slam on auto, house, office doors. Retails 25c. 400% profit. Free sample. Milhander, 1421 East 38th St., Los Angeles, Calif.

300% PROFIT. Article sells to women, by mail, or through agents. Advertising literature furnished free. Send for copy of letter that sold over 10,000 orders. Gordon, Dept. 304, 63 E. Lake St., Chicago.

YOU Can make \$35 weekly, spare time, "resilvering mirrors" or "collecting and selling names." Both only 10c. Rush for yours now. Toney Sowin, 245 Sheridan Ave., Albany, N. Y.

LEARN To paint sign outfit, complete \$2.00. A. C. Garcia, Rosenberg, Tex.

STOP Renting, build rammed earth house with common labor. Stronger than concrete. Instruction, full information, two dollars. Mrs. Effie Wilson, Rotan, Tex.

MILLIONS—Waiting to buy the wonder patented-combination auto tool-wrench-pry-clawhammer; indispensable to every autoist, no springs, no screws, quick ratchet adjustment, drop forged, steel, indestructible. Salesmanship unnecessary; just show it, it's sold. Agents, big money. Territory free. Write Auto Tool Company, 12 South Canal St., Chicago, Ill.

"SCHEMER" Subscribers surely succeed. One reports \$50,000 from one tip; another \$25,000 from three Schemes; another \$10,000 from one formula. Try your luck! Year, \$1.00; three months, 30c. Patterson, Publisher, 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.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

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

SELL by Mail! Books, novelties, bargains! Large profits! Particulars Free! B-Elfco, 525 South Dearborn, Chicago.

UNPATENTED Ideas can be sold. I tell you how and help you make the sale. Free particulars (Copyrighted). Write W. T. Greene, 810 Baltic Building, Washington, D. C.

SELL Latest imported novelties. French model pocket mirror and transparent art cards. Samples of all postpaid \$1.00. World Service Co., 336 Marcy Ave., Brooklyn, N. Y.

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



**ARTIFICIAL Marble sanitary flooring** instructions, covering wood or cement flooring  $\frac{1}{2}$  inch thick, fireproof, waterproof, all colors, low cost. Ornamental casting, concrete, plaster, papier-mache decorations, garden furniture, statuary, flexible molds. 18 years instructing the public; particulars and illustrations free. Chris. Mahler, Huntington, N. Y.

**MECHANICS, Painters, carpenters, start furniture refinishing, painting, handyman shop on nearly nothing; winning plan brings customers quickly.** John Braceland, 1439 So. Ninth, Philadelphia, Pa.

**MAIL Order business your opportunity.** Breniser's famous hand books by expert 28 years' experience show how to start selling articles you make or buy—all or part time—small capital. Fascinating, profitable. Set eleven books, \$3.25. Breniser Company, 1607 P. Sansom, Philadelphia. Sample book, 25c, pay \$3 for other ten if satisfied.

**DELAWARE Incorporator.** Charters; fees small; forms. Chas. G. Guyer, 901 Market St., Wilmington, Del.

**I MADE \$30 a Week Home.** French Breadmaking. 15 years' experience; Free Booklet tells. Ashbrook 87, Marengo, Ohio.

#### TELEGRAPHY

**TELEGRAPHY—Both Morse and wireless—taught thoroughly. Big salaries. Wonderful opportunities. Expenses low; chance to earn part. School established fifty-four years. Catalog free. Dodge's Institute, H St., Valparaiso, Ind.**

#### CHEMISTRY

**1929 BOOKLET** Of chemical experiments. Illustrated, 15c. General Chemical Company, Box 397, Reading, Penna.

**CHEMICAL Analysis, Processes, technical information.** Robert Henderson, Laboratory, Madison, Me.

**YOUR Chemical problems solved and working formula or process furnished for \$5.00.** Write me. W. Stedman Richard, Industrial Chemist, Box 2402, Boston, Mass.

#### FORMULAS AND TRADE SECRETS

**TRY Using a proven anti-knock compound and get results.** Formula \$1.00. James P. Holler, Odenton, Md.

**SAWDUST.** Chemicals makes sanitary flooring in colors. Directions \$1.00. Universal Supply Co., 777 Boulevard, Bayonne, N. J.

**INDUSTRIAL Chemist furnishes and develops formulas, processes; all lines. Moderate charges. Inquiries invited.** L. Clore, Industrial Chemist, Crawfordsville, Ind.

**BAKED Enamel remover** 20c per car. E. M. Reighard, 4437 Finley Ave., Los Angeles, Calif.

**CANTRUN Prevents runs in silk stockings.** Formula 50c. Any formula 50c. Bernard Wells, 852 George, Chicago.

**DICTIONARY** Of drugs 25c. Formula catalog free. Western Chemical, Salem, Oreg.

**GUARANTEED Formulas 50c; toilet preparations specialty.** Richard Bastien, Plymouth, Mass.

**EVERCLEAR Windshields \$1.** Guaranteed. Auto formulas \$2.00. Szabo, 579 Seventh, Sheridan, Wyo.

**PLASTIC Wood, liquid leather, brake juice, thermoline.** Formulas \$1.00 each. Moscato, 757 East 107th St., Brooklyn, N. Y.

**GUARANTEED Formulas \$1.00 each.** Chemical analysis of your sample and formula prepared \$5.00. Expert attention. Stenton Laboratories, 2122 Griffith St., Philadelphia, Penna.

**FIVE Regular \$5.00 formulas and our 1929 catalog. Tested formulas 10c.** Grinstead Company, Oswego, Kans.

**OIL—Make big profits collecting and refining used crank case oil by my process.** Enormous demand, process \$1.00. R. W. Barker, 1706 So. Michigan, Chicago.

**WHAT Is it? Not paint. Not polish. Not wax. A transparent liquid. Refinishes your car and renews it to delightful showroom lustre.** Formula \$2.00. Donahoo, 2621 Jackson, Wilmar, Calif.

**INDUSTRIAL Chemist furnishes formulas, plans, trade secrets. All lines. Work guaranteed. Lists free.** J. F. Mazur, 941 20th, Lorain, Ohio.

**GUARANTEED Formulas, best science can produce for making popular, biggest-selling specialties all lines. Don't buy formulas till you've received valuable eye-opening literature.** Miller, Chemist, 706-F Jetton, Tampa, Fla.

**MAKE Honey without bees.** Good as the bees make four cents pound. Formula one dollar. Frame, Rockland, Ohio.

**CHEMICAL Consultation and analysis. Manufacturing ideas made practical. Money-making formulas. Charges moderate.** Write Associated Chemists, Indianapolis, Ind.

**FORMULAS—170 Money makers and big illustrated catalog 20c.** Ideal Book Shop, (K) Park Ridge, Ill.

**SUCCEED With your own products. Make them yourself.** Formulas, processes, trade-secrets. All lines. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

**DON'T Sell for others. Employ agents yourself.** Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

**3,000 FORMULAS \$1.00, 500 25c.** National Service, 3937 Marburg, Cincinnati, Ohio.

**FORMULAS: Guaranteed, catalog free.** Restovall Laboratories, 6720 Oecento, Ave., Chicago.

#### AGENTS WANTED

**NO Dull times in the food business.** Selling Federal Pure Food Products is the greatest, surest and safest business in the world today, and here is your opportunity to get into it. You can make \$3,000, \$5,000, \$10,000 or more per year—the only limit is your ability to take care of the business. You will need no experience or money to get into this business. We teach you everything you need to know. We furnish you with license. No dull times, for the people must eat, and our food products are the fastest selling, surest and quickest repeat order goods in the world. Sell on sight in every home where food is used—repeat orders immediately and every week thereafter. A real big business all your own. Every new customer adds a great deal to your weekly income. Your business once established, has a market value just like a store and can be easily sold. The greatest money-making opportunity of your lifetime because you risk absolutely nothing. Remember! Guaranteed! Best products, biggest sellers, surest repeat orders. No capital or experience is required. We furnish capital and everything necessary for you to become a Federal distributor. Exclusive territory will be given honest men or women who write at once. Federal Pure Food Company, A2307 Archer Ave., Chicago, Ill. Largest packers of pure food specialties in the world. Reference, any bank, Dun or Bradstreet Rating Agency, Express or Railway Company in America.

**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 Canal, Newark, N. Y.

**AGENTS. Send for free sample.** "Fretnot" washes clothes snow white without rubbing. \$5.00 daily and more easily made. Credit given. Empire, 1549 N. Wells, Dept. 201, Chicago.

**REPRESENTATIVES: Enormous profits. No investments. Neither selling.** Meriden Dyeing Works, Meriden, Conn.

**AMERICA'S Greatest tailoring line, free, 175 large samples all wool tailored to order, union made, sensational low price. Big commissions paid daily. Cash bonus besides. Exclusive territory to producers. Hustlers making \$100 a week and up. Get outfit at once.** Address Dept. 49, Goodwear, 844 Adams, Chicago.

**MAKE \$20 To \$35 a day selling Imprint Book Matches, spare or full time. Big repeat business—no investment—every merchant a prospect.** Write Imprint Book Match, Dept. 113, 877 Meigs St., Rochester, N. Y.

**NEW Invention—100% profit. Liquid quick mend for fabrics and hosiery.** Stops runs. Every woman buys. Hundred other fast sellers. J. E. Johnson Co., Dept. 475, 6129 Wentworth, Chicago.

**NEW! \$10-\$15 Daily showing patented article of unusual merit, \$1.50 up. Real comfort.** Endorsed by leaders in business and sports. Free sample. Flexible Buckle Belt, F20 E. Jackson, Chicago.

**\$25 DAILY Selling newest Damask tablecloths, no laundering, ironing, full line slickers, raincoats, leatherettes, trenchcoats, umbrellas.** Free outfit. American, 2724 Roosevelt, Chicago.

**3,000 VALUABLE Formulas prepaid \$1.00.** National Sales Service, 3937 Marburg, Cincinnati, Ohio.

**AGENTS Buy direct. Hosiery, lingerie, neckwear at lowest mill prices.** Men's heavy silk hose, doz. pairs, \$2.25. Latest novelty hose, doz. \$1.65, \$2.35 and \$3.50. Men's silk knitted ties, doz. \$1.40. Latest cut silk ties, doz. \$3.50. Ladies, hose, silk to top, doz. \$3.75 and \$6.50. Latest Pointex silk hosiery, doz. \$4.50, \$7.50 and \$8.50. Genuine full-fashioned silk hose, doz. \$11.50. Ladies' pure Rayon silk bloomers, doz. \$8.50. Vests, doz. \$7.25. Silps, doz. \$13.50. All merchandise strictly first quality, 10% required with order. Balance C. O. D. Satisfaction guaranteed or money refunded. Act at once. Superior Knitting Co., Dept. 12, New Haven, Conn.

**PRIVATE Brand toilet articles, household specialties, perfumes, soaps, extracts, etc.** We pack these goods for you under your private label. With your name on the goods you get all the repeat business. Don't sell for others but build up a profitable business for yourself. Highest quality merchandise. Extremely low prices. Quick shipments on both large and small orders. Write immediately for lowest wholesale prices and complete information regarding our amazing offer. Address Supply Department, National Scientific Laboratories, 1903W Broad, Richmond, Va.

**WANTED: Women who need quick money.** "New Idea" imported ladies' necessity; sells on sight; everyone buys; representatives everywhere cashing in big. Miss Ely has made \$1,900, Mrs. Hart \$2,200. New sales plan puts you in business without capital or experience. Samples free. Write Mary P. Coleman, Meriden, Conn.

**GOLD Leaf Window Letters and script signs; no experience; 500% profit.** Sample free. Dearman made \$19.50 first 2 hours. Consolidated, 69T West VanBuren, Chicago.

**42 MILES On 1 gallon.** Wonderful moisture gas saver. All autos. 1 free. Critchlow, O1-805, Wheaton, Ill.

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

**BIG Ohio corporation has county position open. \$50.00 weekly commission. Earnings start immediately. Good for \$5,000.00 yearly.** We furnish everything, deliver and collect. Capital or experience unnecessary. Fyr-Fyter Co., 1866 Fyr-Fyter Bldg., Dayton, Ohio.

**FREE—Complete selling outfit free.** We furnish honest and industrious men and women complete selling outfits free. Start a toilet and household specialty business of your own. Exclusive territory. Write today. W. C. Johnson Co., Dept. 22, Atlantic Highlands, N. J.

**ELECTRICAL Invention, absolutely legitimate; storekeepers amazed, buy immediately.** Costs 29c, sells \$1.00. Send 29c for sample. Patented Products, 912 Trinity Ave., New York.

**CAN You sell? Try our easily sold crystal plate glass house numbers and signs.** 35 cents brings you sample to sell by. Reliable House Number Co., 2539 S. State St., Chicago, Ill.

**CASH Paid for Butterflies, Insects.** See Sinclair Display Advertisement on page 16.

**PROFITABLE Little business.** Operate our plans! Write Makary, D-339 Mountain St., Pittsburgh, Pa.

**AGENTS. Enormous profits selling \$5.00 to \$10.00 pen and pencil sets for 50c and 75c. Guaranteed five years.** Nassau Pen & Pencil Corp., 111 Nassau St., New York City.

**BROUGHT From Holy Land. Fascinating, inspiring religious novelty. Christians buy on sight. Big commissions.** Write Jadet, 1472 Broadway, New York.

**HANDYMAN Shop; painting, fixing; start on nothing.** I did. Braceland, 1457 So. Ninth, Philadelphia, Pa.

**EARN \$10 To \$15 daily, \$5 evenings, showing startling new trouble light.** Sticks anywhere on car by electro-magnetism. Just demonstrate, motorists grab it. Big cash commission and extra bonus. Best season just starting. Write quick. Lea Sales Co., 426 Shell Bldg., St. Louis, Mo.

**EASY As pie, to make big money with Christy's Polishing Cloth.** Works like magic. Sells like wildfire. Big profits. Write for free sample. Christy, Inc., 6467 Canal, Newark, N. Y.

**\$10-\$25 DAILY Simply showing new Polly wrench.** 10 wrenches in one. Guaranteed seller. Sample free. Gellman Mfg. Co., Dept. 6-C, Rock Island, Ill.



**DISTRICT Managers! Crew managers! General agents! Wanted:** Men and women to appoint saleswomen to sell "New Idea" imported sanitary necessity. New feature never before used; sells on sight. Every woman buys and repeats. Without capital new salesplan nets you big commission on new sales plan nets you big commission on producers. Write Box J-708, Meriden, Conn.

**IT Rings the bell for salesmen who must have big money.** Krystal Kleen actually sells 100% on calls. Its demonstration is irresistible, its field is three-fold. Fifty-fifty deal. Write today. Fenton Chemical Company, Jackson Heights, New York.

**WE Have the finest needle case, self threading needles, needle threaders.** \$50.00 to \$200.00 weekly. Samples 25c; particulars free. Empire, 1549 N. Wells, Dept. 201, Chicago.

**12 MILES On 1 gallon.** Wonderful moisture gas saver. All autos. 1 free. Critchlow, O3-805, Wheaton, Ill.

**DON'T Sell for others.** Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

**AGENTS \$300 Month.** Dri-Kleanit makes any car look like new. Removes mud, grease, road oil, all one operation. No soap or water used. Cleans any car for 10c. Wonderful seller. Make \$5,000 year. Free demonstrating sample. American Accessories Co., Desk 4431, Cincinnati, Ohio.

**MAKE \$15.00 Daily!** Simply show rhinestone initial buckles, fountain pens, etc. We deliver. No competition. No investment. Write quick for special free sample outfit. Chaston Novelty Co., Dept. C, 606 Blue Island, Ave., Chicago.

**AGENTS—Two biggest 1929 profit makers.** Rubber kneeling pad and latest patent guaranteed razor blade sharpener, sharpen any blade. Quick sellers. Sample and territory furnished. Ideal Utensil Company, Otis Bldg., Chicago.

**SELL Fountain pens through stores.** No canvassing. Counter displays furnished. Brooking, Warren, Ark.

**AGENTS! Just think, a dust cap that's air tight yet tires are filled and tested without removing cap.** Price 20c. Handee Air Appliance Co., Box 494, Kalamazoo, Mich.

**DISTRIBUTORS Wanted—For new, patented specialty selling through dealers.** Exclusive territory is now available on a fast selling, low-priced specialty which is taking the country by storm. If quick sales and enormous profits interest you and if you can finance and organize your own territory we have a wonderful proposition to offer. Write for particulars and mention details. Gordon Manufacturing Co. (Dept. D-4), 110 E. 23rd St., New York City.

**\$15 DAILY** Paid men, women to show finest neckwear. Biggest values. Experience unnecessary. Free samples sent first 500 applicants. Nawco, Desk YC-105, Covington, Ky.

**STATE And crew managers to handle agency for new electric water heater.** Sells for \$5.95. Jiffy Electric Water Heater Co., 812 Maxlow, Detroit.

**MANUFACTURE At home—Pure food products; popular household, toilet, automobile specialties, etc.** Particulars, 1929 catalog free. Grinstead Company, Oswego, Kans.

**FREE Booklet describes 67 plans for making \$20-\$100 weekly, home; office.** Your own business. Elite Co., 84 Elizabeth St., New York.

**SELL Books on etiquette.** Sample 50c. J. Daurer, Route 3, South Bend, Ind.

**"WHERE To buy 500,000 articles at lowest wholesale prices."** 1929 directory. Distributors wanted. Pruitt System, Brookfield, Ill.

**FREE Booklet describes 67 plans for making \$20-\$100 weekly, home; office.** Your own business. Elite Co., 84 Elizabeth St., New York.

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

**NEW Kind of metal polishing cloth.** No odor, no oil. Absolutely dry, but polishes like magic! Agents making big profits. Sample free! Ludlow Laboratories, Dept. 223, 331 W. Ohio, Chicago.

**WANTED—County distributors to handle sales privilege on popular, quick-selling auto accessory.** Big profits. Quick sales. Real demand. Fits all makes of cars. Low retail price. You can sell wholesale and retail. Endorsed by A. A. A., Motor associations, magazines, newspapers and motorists everywhere. A positive necessity. This is real opportunity for the right man to become independent. Write today for descriptive literature. Address Room 396, % Popular Mechanics, Chicago.

**GENERAL Agents—Something new.** Whirlwind seller. "Repeat" washing powder. Washes clothes without rubbing. Women throw away washboards. Big profits. Exclusive territory. Write today free package. Kiltredge Co., 82 Putnam St., Tunkhannock, Pa.

**WE Offer the selling agency for the world's largest, most complete direct to wearer men's wear line; consists of 145 large cloth samples, shirts, neckties, underwear, pajamas, waterproof trench coats and lumberjacks; spare or full time; experience unnecessary; outfit free.** Howard, 1213 VanBuren St., Factory 223, Chicago.

**40 CENTS Profit on every \$1.00 sale.** Our article is a repeater. Excello Sales Co., Shreveport, La.

**SELL Ties—Make big profits.** Get big sample selling outfit absolutely free. Wonderful patterns; splendid values; liberal commissions. Write today to Public Mills, 4927CE Hudson Boulevard, North Bergen, N. J.

**AGENTS: Magic hot pads, sponge rubber mats, Damaaskold table covers, adjustable rubber aprons, ironing board pad and covers, and fifty other big profit producers.** Write B & G Rubber Manufacturing Co., Dept. 395, Pittsburgh, Pa.

**SHARPENER For scissors and knives.** Has flat, movable, re-versible, and re-newable sharpening surface. Live seller at 300% profit. Sample 25c. Lake Mfg. Co., Clarendon, Va.

**SAVE Those old shoes.** Three minutes and 50 cents taps any shoes or rubbers twice. Spreads on with knife like butter, wears like leather, waterproof and easy to apply. Agents wanted. Large size sample \$1.00. Eastern Supply House, Bangor, Me.

**ANXIOUS To hear from lady interested in starting little home dress shoppe.** Madame Isabelle, PM65 Times Square, New York.

**ALUMINUM Solder saves thousands of dollars in restoring to full value "All articles made of Aluminum" formerly junked.** Sample and selling plan 25 cents. No acid or flux required. M & D Aluminum Solder Co. of America, 1664 Washington St., Boston, Mass.

**AGENTS: Buy for one cent a package fifty-cent size, extracts, pie-fillings, toilet articles.** "Holland," Harvey, Ill.

**SELL Famous fashions from Fifth Avenue.** \$95 weekly. 100% virgin wool suits, ramshorn wool, camel's hair topcoats, \$19.75, \$4 commission; special numbers \$13.75; commission \$3.50. Free outfit. Dept. PM-3, Avenue Tailors, 140 Fifth Ave., New York.

**WANT A bigger income? Write now for the fastest-selling line in America.** Get my free outfit, latest shirt fabrics. Full year guarantee with every shirt. Free initials 48-hour delivery. Biggest commissions in advance. Leonard Gould, 1237B3 Broadway, New York.

**\$5.00 HOURLY.** Mercerized Damask scalloped table cloths 75c! Tremendous demand. Other bargains. Experience unnecessary. Big sample line free. American Braiding, W-329 W. Monroe, Chicago.

**\$90.00 WEEKLY** Wearing and showing my beautiful new free raincoat and giving away free hats. Write today for yours. Robert King, 230 S. Wells, Dept. AB-3, Chicago.

**WELLS Cleared \$620.00 in one month with "Business Guide" and free legal service.** Outfit absolutely free! Prof. Nichols, Dept. 47, Naperville, Ill.

**\$15.00-\$25.00 DAILY** Easy representing manufacturer Instant Weld, marvelous new rubber repair. Dealers-individuals everywhere buy on sight. Write for free sample. Tourists Pride Manufacturing Co., Desk E, Minneapolis, Minn.

**UNUSUAL Opportunity—\$100 weekly selling better-quality, all-wool, union-made-to-measure suits and topcoats at \$23.50 and \$31.50.** Build big repeat business. Liberal bonus for producers. Large swatch samples free. W. Z. Gibson, Inc., 500 Throop, Dept. C-517, Chicago.

**SELL Kohler's 9x11 blue signs.** Kohler, 717 North Fourth, St. Louis, Mo.

**SELL Durable rubber namats.** \$6.00 an hour easy—all business places buy. Men! Sell these Durable Rubber Namats either as a side line or full time. Store dealers, banks, apartments, hotels and all buy on sight. Show samples and pictures and how their name will look and get the order and pocket your liberal cash commission. Attractively made and has great advertising value for the user. Show them our line and make an easy \$6.00 an hour. Write for outfit and start taking orders at once. Durable Rubber Co., Dept. E, 1140 Broadway, New York.

**AGENTS—I'll pay your bills, give you steady income for rest of your life if you will take care of my business in your locality, full or spare time.** You be my partner, make \$15 a day, ride in Chrysler sedan. Distribute teas, coffees, spices, extracts, things people eat. I furnish everything, world's finest super sales outfit containing 30 full sized packages; low prices, big repeat business; \$25,000 guarantee on quality. I go 50-50 with you. Get my amazing offer. C. W. Van de Mark, Health-O Building, Dept. 193-C, Cincinnati, Ohio.

**ARE You old at forty? See our advertisement on page 169 of this issue.** The Electro Thermal Company, 2115 Morris Ave., Steubenville, Ohio.

**SELL Stores carried 5c breathlets.** Cost you 1c per package, 150% profit. S. H. Carroll Co., Albany, N. Y.

**AT Last, Diamond rival discovered.** Amazing blue white Egyptian diamond astounds and deceives. Greatest spare time side line article ever known. Write quick. The J. A. Powell Co., 406 Main St., Dept. K. E., Houston, Tex.

**AGENTS—Rapid fire seller to mechanics, machinists, tool makers.** Big profits. Sample and terms 25c. Roman Arndt, Box 1401, Detroit, Mich.

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

**AGENTS, Distributors; whirlwind seller; gas stations, dealers, drivers.** "Miracle" windshield cloth; one wiping defies rain 24 hours; amazing results; retails 50c. Celco Chemical Co., 2225 Lawrence Ave., Toledo, Ohio.

**NEW Automatic window washer, washes, cleans, dries, polishes in one operation.** Carries own water supply. Sensational demonstration. Agents reaping harvest! Write for free sample offer. National Industries, 67 E. Lake St., Dept. 153C, Chicago.

**BIG Pay every day taking orders for dress and work shirts, pants, overalls, sweaters, underwear, hosiery, pajamas, play-suits!** Experience unnecessary. Outfit free! Nimrod Co., Dept. 8, 4922-28 Lincoln Ave., Chicago.

**DON'T Sell for others.** Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

**AGENTS \$300 Month.** Brand new hot bag, 3 spoonfuls cold water gives 10 hours heat. Use it anywhere. No competition. Write quick. American Accessories Co., Room 631, Cincinnati, Ohio.

**BRAND New—Clever 8-in-1 household device mops, scrubs, waxes, polishes, dusts, wrings, cleans walls and ceilings.** Housewives wild over it. Popular price. Big commission. Make \$15 daily. Kleanezzy Co., Dept. G-29, Delphos, Ohio.

**\$80-\$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.

**\$100.00 WEEKLY** Selling "Storm King" clear vision windshield cloths. Phenomenal triumph in chemistry. Prevents blurring of windshields in fog, rain, snow, sleet. Make them yourself. Costs 4c; retails 50c. Unlimited demand. Complete instructions \$1.00. G. Weinman, 414 Sherman, Elkhart, Ind.

**CAN You appoint agents? If you have had experience in traveling and hiring lady agents to sell toilet articles, food products, etc., we have a real proposition to make you.** Territory open in various states. Davis Brothers Company, Dept. C, Greenfield, Ind.

**AGENTS—\$10-\$25 Daily** showing newest trench coats, all colors, \$5.95. Other fast sellers. Men's, women's, children's. Outfit free. Pontiac Sales Co., 711E, Pontiac Bldg., Chicago.



**AGENTS: \$240 Month.** Bonus besides. Earn auto to travel in. Introduce finest line guaranteed silk hosiery you ever saw. 126 styles, colors. Guaranteed to wear 7 months or new hose free. High class proposition. New sales plan. No experience needed. No license to pay. Credit given. Silk hose for your own use. Samples furnished. Write quick. Wilkmit Hosiery Co., Dept. 6631, Greenfield, Ohio.

**AGENTS—New lines just out.** Everything in hosiery, lingerie and underwear for men, women, children. Beautiful, irresistible. Catalog and samples now ready. Two new special big-money plans. Cash bonus, service awards. No capital needed. Choice territories going. Write quick. World's Star Knitting Company, 7353 Lake St., Bay City, Mich.

**\$13.00 DAILY** Installing nifty stair corners. Details free. M. Ruth Company, Wheelersburg, Ohio.

**AGENTS—Best seller: Jem Rubber Repair** for tires and tubes; supersedes vulcanization at a saving of over 800 per cent; put it on cold. It vulcanizes itself in two minutes, and is guaranteed to last the life of the tire or tube; sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, address Amazon Rubber Co., Philadelphia, Pa., Dept. 505.

**AGENTS \$12 To \$15 daily.** Something new. Fast seller. Cee-Dar Kills Moths, chases insects. New form hangs on hooks. Repeater. Women buy one to six. Free particulars. Cee-Dar, H77 W. Washington St., Chicago. Live territory open for distributors to earn \$400 to \$600 monthly.

**AGENTS Wanted** in every town for the greatest foot relief discovered in 50 years. Liberty Corn Freedom is absolutely guaranteed; sent anywhere for 25c postpaid. Made exclusively by The Liberty Chemical Co., 729 Race St., Philadelphia, Penna.

**MAKE \$50-\$75 A week.** Everyone needs shoes. Sell Mason's all-leather shoes, amazingly low prices. 85 styles—men's, women's, children's. No experience needed. Big outfit free. Mason Shoe Mfg. Co., Dept. 223, Chippewa Falls, Wis.

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

**\$8 DAILY Extra;** free equipment; free sample caps, hats. Amazing new money-making opportunity. Write quick for outfit. Fits-U Caps, Dept. EC-75, Cincinnati, Ohio.

**MANUFACTURE Auto specialties:** Battery charging electrolyte, radiator seal, hand soap, gasoline dye pep, puncture plugger, silk life, glass cleaner. Get my free list. John Mickman, Chemist, St. Paul, Minn.

**A PAYING position** open to representative of character. Take orders shoehosiery direct to wearer. Good income. Permanent. Write now for free book "Getting Ahead." Tanners Shoe Mfg. Co., 2002 C St., Boston, Mass.

**\$100 WEEKLY—Appointing agents** Mother Hubbard Foods. No canvassing, delivering or investment. Mother Hubbard Products, 554-U Congress, Chicago.

**CHICAGO Expert** valued \$3 stone at \$900. The diamond's only guaranteed rival! Greatest spare time, side-line article ever known. Amazing profits. \$5 pocket sample case free. Write quick. Mexican Gem Company, Dept. PM, Monterey, Calif.

**SALES Agents—Take orders** high grade tailored neckwear. Hand made. Guaranteed for 6 months. Insured never to roll, twist, stretch or bunch. Not sold in stores. Patented. Samples furnished. Write quick. Better Made Cravat Co., Wholesale Dept. 6, Columbus, Ohio.

**MIRRORS Resilvered** at home. Costs less 5 cents per square foot; you charge 75 cents. Immense profits plating autoparts, reflectors, tableware, stoves, refinishing metalware, etc. Outfits furnished. Details free. Write Sprinkle, Plater, 128, Marion, Ind.

**\$100 WEEKLY!** Amazing new auto invention! Big sensation. Accurately registers oil and grease changes. Low cost. Free offer! La-Barometer Co., A-229 S. Market, Chicago.

**\$2.95 AUTOSEAT Covers.** Cash daily. Amazing. All America. Postcard brings leatherette sales outfit. "Quality." JJ513 So. Dearborn, Chicago.

**PROTECT Any radio set,** tubes, attachments. Protector complete with directions 30c. 5958 Washington, Chicago.

**AGENTS** Become a regular established McConnon dealer! Buy on credit; sell for cash or credit. 228 absolute household necessities; all repeaters. Enjoy a sure income 52 weeks per year, year after year, city or country trade. Capital, experience unnecessary. McConnon & Co., Dept. M-903, Winona, Minn.

**\$50.00 WEEKLY.** Men wanted to demonstrate and take orders daily direct from motorists. Amazing Magnetic Trouble Light. Sticks anywhere! More orders, bigger pay. Write for demonstrator and particulars. The Magno Co., 6 Beacon St., Dept. 163, Boston, Mass.

**MAKE \$20 Daily** selling merchant's changeable letter show window signs. Experience unnecessary. Send for free sample offer. Maze Company, 542 W. Washington St., Chicago.

**HOUSEWIVES** Buy duplex sifters on sight. Magnus sold 120 first 24 hours. Profit \$54.40. Jackson sold 72 in 5 afternoons. Profit \$35.00. Retails \$1.00. Sifts and resifts without removing flour. Sample outfit 60c. Uneek, 4533 Lexington, Chicago.

**BECOME Your home town leading business man.** Sell full line of groceries, motor oils, paints. Everybody a customer. No capital or experience necessary. Selling outfit free. Write Loverin & Browne, 1602C, So. State, Chicago.

**MEN Wanted** to canvass farmers. \$160 monthly and expenses. Opportunity for advancement. Bigler Co., M-17, Springfield, Ill.

**STRANGE Invention!** Pays \$25 daily. Keeps telephone and iron cords from tangling and kinking. Prevents scorching. Saves electricity. Samples free. Neverknot, Dept. 3-A, 4503 Ravenswood, Chicago.

**MARVELOUS Product** and selling plan will bring you over \$100 weekly. 500% profit! Big repeat business. Samples free. Write now. Ever-Ready, 52 East 9th St., Dept. C-8, New York.

**\$15 DAILY Paid** men, women to show finest neckwear. Biggest values. Experience unnecessary. Free samples sent first 500 applicants. Nawco, Desk YC-105, Covington, Ky.

**AGENTS Cleaning up** with Lanowa combination. 65c clear profit every dollar sale. Write for free sample. Great Western Industries, 4125 D Penn, Kansas City, Mo.

**AGENTS Free sample fast selling mail-order and agency specialty.** Repeater. Big profits. Going strong. Flinger, 5003 W. Gateway, Kansas City, Mo.

**MAKE Big money.** Be the sign man in your town. New process. Beats them all. Particulars free. Swanson's, Inc., Mankato, Minn.

**CARTER Window washer.** Cleans, dries, polishes. One operation. Carries its own water. Exclusive distributor wanted. Big profits. Carter Products, 989 Front Ave., Cleveland, Ohio.

**Be Independent, make, sell your own goods.** Immense profits. Catalog dependable formulas, special selected agents' best sellers free. R. Lustro, 626 Reaper Block, Chicago.

**WOULD You like** to receive a beautiful ladies' or gentlemen's white gold filled wrist watch, Eastman folding kodak, 26 Pe Rogers silverware set, bungalow clock 3 Pe fancy toilet set and many other valuable premiums. Any of the above given for only an hour of your spare time. Write Home Sales Co., Box 473, Memphis, Tenn.

**AGENTS—Make a dollar an hour.** Sell new kind of sharpeners. Sharpens all knives and tools quickly. Demonstrating sample 10c. Premier Mfg. Co., Dept. 89, Detroit, Mich.

**AGENTS: Free catalog** 200 household specialties, toilet preparations, food products, portraits, frames, pillow tops, medallions, religious goods, pictures. Credit. James C. Bailey Co., Station C-3, Chicago.

**AGENTS: Earn \$16 day** and new Bulk auto. Sell groceries. Over 400 items used daily every home. Steady all year job. Your own groceries about half price. Send for samples. Harley Company, Dept. C-2015, Dayton, Ohio.

**AGENTS—90c An hour** to advertise our goods and distribute free samples to consumers. Write quick for territory and particulars. American Products Co., 2513 Monmouth, Cincinnati, Ohio.

**AGENTS—Make \$10 daily.** Latest Ford sedan given. Finest line 200 guaranteed extracts, pure foods, toiletries, remedies. Agents and district manager wanted. Write today. Perkins Products, M-12, Hastings, Nebr.

**\$75 WEEKLY.** Man or woman wanted with ambition and industry, to distribute Rawleigh's Household Products to steady users. Fine openings near you. We train and help you so you can make up to \$100 a week or more. No experience necessary. Pleasant, profitable, dignified work. Write today. W. T. Raleigh Co., Dept. C-53-PPM, Freeport, Ill.

**JUST Out—New patented apron.** No strings or straps—\$20.00 a day every day; over 100% profit; commissions daily. Write for free offer. Sta-Put Co., Dept. 203, St. Louis, Mo.

**AGENTS: Gold-eyed needle cases.** Beautiful cases at factory prices. Wonderful sellers, immense profits, \$50 to \$100 weekly. Proof free. Sample 10c. Paly Needle Co., College Ave., Somerville, Mass.

**TIME Counts** in applying for patents. See pages 154 and 155. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

**NO Experience necessary.** You'll sell Wonder Changeable Signs fast. We show you how. Write Currier Mfg. Co., 31 Northwestern Terminal, Minneapolis, Minn.

**BIG Profits.** No splash 4 strainer water filter; brass or nickel; ship quick; pay postage; free plugs when ordered; 6 doz., \$2.40, with bumpers \$4.50. Jones Mfg. Co., 243B2 Franklin St., Boston, Mass.

**FIBRE Brooms—detachable handles,** fine finish. Good profits, repeat sales. The Fibre Broom People, 147-C New Jersey Ave., Brooklyn, N. Y.

**GOOD Profit** selling our easy back spring seat for tractors and farm implements. Dependable Mfg. Co., Streator, Ill.

**AGENTS Make \$3.00 an hour** taking orders for our 40 fascinating kitchen specialties. No competition. Write quick. General Products Co., Dept. 207, Newark, N. J.

**WE Start you** without a dollar. Soaps, extracts, perfumes, toilet goods. Experience unnecessary. Carnation Co., 641, St. Louis, Mo.

**DON'T Sell** for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

**FLAVORING Extracts—Bottle yourself!** Concentrated, add water. Free labels. 600% profits! Whirlwind money-making opportunity! Hurry! Thomas Manufacturing Company, Indianapolis, Ind.

**AGENTS—Mosco Corn and Callous Remover** will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 424 Searle Bldg., Rochester, N. Y.

**\$12.00 DAILY** Showing new table cloth. Looks like linen. Wash like oilcloth. No laundering. You just take orders. We deliver. Pay daily. Sample free. Bestever, 152 Irving Park Station, Chicago.

**PORTRAIT Agents** make more money than any other class of agents. Write for our new catalog—Portrait enlargements, medallions, etc. Adam J. Kroll & Co., 2543 South State St., Chicago, Ill.

**MONOGRAM Automobiles.** \$1.35 Profit ten minutes' work; every owner wants them; millions without; particulars free. Motorists Accessories Co., Mansfield, Ohio.

**"HOW to Secure Agents,"** a specially prepared booklet, tells of one of the most inexpensive methods in which to secure good live producing agents. It is free; write for your copy today! M. L. Rund, Mgr. Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago, Ill.

**32 SECONDS** Complete tire change by Detmer, Ohio, with Morey Quick Action Rim Tool. Sold, singly, 49 three days, cleared \$100. Anderson, Mont., sold 1,400 in 14 weeks. Get details for good territory. Harvest time now. M. Morey Rim Tool, Buffalo, N. Y.

**AGENTS, Canvassers, grab this!** Mexican curios, Indian room fixtures, drawn work. Non-competed line. Easy territory terms. Fastest selling goods. Fifty cents brings bargain list and attractive samples. Write G. Medina, 78-P La Rosa St., Mexico City, Mex. Satisfactory references furnished.

**SOMETHING New!** Every motorist buys our Electro Magnetic Emergency Wonderlamp. One minute's demonstration makes a sale. Experience unnecessary. \$5 an hour easily made. Full time or evenings. Write for sample. Wonderlamp Co., Fisk Bldg., Dept. 10A, New York.



**ELECTRIC Cigar lighters.** Make \$100 week. Brilliant flashing advertisements. Three beautiful models. Used by dealers everywhere. Write Drake Mfg. Company, Dept. M, Milwaukee, Wis.

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

**MAKE AND sell your own goods.** No machinery. Guaranteed formulas. Catalog free. Clover Laboratories, (E) Park Ridge, Ill.

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

**PORTRAIT Men:** Why not Pasco portraits? We refund your money for all you cannot deliver. Frame catalog free. Portrait Agents' Supply Co., Dept. F, La Porte, Ind.

**SUCCEED With your own products.** Make them yourself. Formulas, processes, trade-secrets. All lines. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

**\$50.00 WEEKLY Easy,** applying gold initials on automobiles. No experience needed, \$1.45 profit every \$1.50 job. Free samples. "Raleo Monograms," X1043 Washington, Boston, Mass.

**REPLATE Brassy worn-off automobile parts, reflectors, bath room fixtures, worn spoons, forks, etc., with pure silver.** Looks like new. Use U-Kan-Plate Polish. Positively no mercury. \$1.00 half pints. Post paid. Satisfaction guaranteed. Agents wanted. Dept. A, U-Kan-Plate Co., Philadelphia.

**WORKERS Buying and applying Axtell Metal Weather Strips to door bottoms** make \$1.00 to \$3.00 hourly. Prices, territory, etc. E. L. Church Co., Whitman, Mass.

**AGENTS Sell household brushes.** Over 100% profit. Sample case outfit containing fifty different kinds of brushes sent on approval. National Fibre Broom Co., St. Louis, Mo.

**BIG Profits! Fast sales!** \$9.75 automatic washing machine. Guaranteed. Write Storm Royalty Co., 3601 Enright, St. Louis, Mo.

**DON'T Sell for others.** Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

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

**SELL Men's neckwear: wonderful proposition.** Astor, 318-M Broadway, New York.

**AUTOMOBILE Specialties.** Guaranteed formulas for all latest money makers. Lowest prices. Write for free lists. Murphy, Chemist, Tujunga, Calif.

**AGENTS, Our cigar lighters and sales-boards sell quick.** Large wholesale catalog free. Joseph Sales Company, 223 Madison St., Chicago.

**GOLD-LEAF Sign letters; copyrighted manufacturing instructions; profits 1,000%.** Johnston Co., Quincy, Ill.

**\$1,000.00 REWARD** If this is not the greatest money-making house to house proposition ever known. N. R. G. tablets wash clothes in 10 minutes without rubbing. Free samples. N. R. G. Co., H 500 W. Division, Chicago.

**TWO Money makers for agents.** "Francis" Pocket Adding Machine retails \$4.85. To you \$1.00. "Excelligraph" Rotary Stencil Duplicator \$37.50 retail. Write Typewriter Supply, 102 Hersch Bldg., Pittsburgh, Pa.

**POLMET Polishing Cloth** removes tarnish from metals without the use of liquid, paste or powder. Our agents say it sells like "hot cakes." Retails 25c; sample free. Gale & Co., Inc., 15 Edinboro St., Boston, Mass.

**OUR Luminous Crucifix Shines in the Dark.** Every one amazed at the wonderful effect. Easily demonstrated—easily sold. W. G. Hannan Co., 2543 So. State St., Chicago.

**AGENTS—Engraved name plates, signs, numbers, etc., easily sold, profits large.** Brett Bros., Roxbury Crossing, Boston, Mass.

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

**PHOTO Medallion Men and Women,** the largest line of Photo Novelties in the world. Lowest prices, quickest service. Send for catalogue showing over 200 money makers. Photo medallions, photo medallion clocks, photo mirrors, photo fountain pens, photo powder compacts, photo jewelry and photo buttons. Gibson Photo Jewelry Co., 608-614 Gravesend Ave., Brooklyn, N. Y.

**REMNANT Store, Bethel, Ohio.** Greatest Dry Goods Bargains on Earth. Agents and Dealers.

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

**AGENTS—\$50 Weekly selling shirts.** No capital or experience needed. Commissions in advance. Samples free. Madison Company, 566 Broadway, New York.

**\$3.90 PER Hour** selling a service to keep stairways clean. Every housewife interested. Write today. Ideal Stairway Equipment Co., Dept. PM, Canton, Ohio.

**WANT Distributing agent for Handslick, powdered hand soap; removes anything from hands; everybody a customer; sample free.** Solar Products Co., J-2142 S. Troy, Chicago.

**START The new year right!** Manufacturing these popular specialties yourself. Have salesmen everywhere. Investment small. Profits great! Get my eye-opening literature explaining all. Mystery Polishing Floss, Loidlac, guaranteed automobile refinishing; Thermaxx Eveready Anti-Freeze; twenty-six new unusual carded specialties, many other wonderful necessities. Here's an exceptional opportunity. Miller, Chemist, 706-B Chemical Building, Tampa, Fla.

**BIG Money and Fast Sales.** Every owner buys Gold Initials for his auto. You charge \$1.50; make \$1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

**AUTO Owner tire agent** wanted each locality to use free demonstrating tires and take orders for new heavy duty Mellinger tires, guaranteed 15 months against all road trouble. Shipped on free trial. Get your own tires and earn \$300 monthly—no capital or experience needed. Write Mellinger Tire Co., Dept. 282, Kansas City, Mo., Warren, Ohio, Oakland, Calif.

**HIGH-GRADE SALESMEN WANTED**

**SALESMEN:** Be you minister, farmer, clerk, bookkeeper, laborer, mechanic, policeman, fireman, college or high school student, regardless of where you live, you can increase your earnings from \$5.00 to \$30.00 daily without interfering with your present duties, demonstrating and selling the "Adams Magnetic Auto Light." Sticks and stays put anywhere on metal. Sold on satisfaction guaranteed or money refunded basis. Sells in U. S. for \$3.00, Canada \$3.50. Big commissions. Exclusive territory to producers. This is not an endless-chain selling plan. For demonstrator and sales equipment write at once as territory is going fast. Adams Merchandise Company, Inc., P.M., Williamsport, Penna.

**JUST Out!** Amazing new vending machine! Pays merchant 1,600% profit! Sensation wherever introduced. \$50.00 daily! Dept. 9, Acme, Room 360, Old Colony Bldg., Chicago.

**TRAVELING Salesman's chance** for permanent connection with leading specialty manufacturer. High commissions year round. Box E222, Boonville, N. Y.

**ALUMINUM Advertising calendars and specialties.** Sideline, thirty pocket samples. Outfit weighs only five pounds. Big commissions promptly paid. Write Wilson Hurd Co., Wausau, Wis.

**HAVE Wonderful proposition** on new hand soap—tools and supplies. Need man with car to make deliveries. Can earn \$2.00 an hour. Work is near home. No experience required. Write for free sample and full particulars. The Connecticut Can Co., Hartford, Conn.

**A PAYING position** open to representative of character. Take orders shoes-hosiery direct to wearer. Good income. Permanent. Write now for free book, "Getting Ahead." Tanners Shoe Mfg. Co., 2002 C St., Boston, Mass.

**WONDERFUL Invention.** Seals fifty envelopes minute. Sells on sight at \$3.50. Attractive proposition. Square deal. Bank references. Kendall Sealer Co., C-9 East Jaffrey, N. H.

**SALESMEN: New—Different.** Instead of asking a merchant to spend money in advertising you show him a plan that will positively make his business bigger, better and at the same time make him several hundred dollars profit. The country's most remarkable selling success. No competition. Fascinating work with splendid commissions, averaging from \$10.00-\$260.00 each sale-advanced. Some of our men averaging four sales daily. Pocket outfit free. Highly rated, old established company. Factory 710 Wythe Ave., Brooklyn, N. Y.

**FEW \$1,000 Monthly earnings** ads are truthful. Our men actually earn \$300 to \$500 regularly selling our lines. Adelite, the newcomer in electric window salesmen, is making a big hit. More for the money than anybody gives. Business posters for every line. Changeable letter system too. Permanent business for you working with us. Territory protected and repeats credited. Fat commissions. Full details will prove very interesting. Display Products, Ltd., 409-A East 31st St., Kansas City, Mo.

**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, 10 Clinton St., Newark, N. J.

**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, Dept. 24, 406 S. Sangamon, Chicago.

**\$18 TO \$25 Daily; biggest selling line** of 2-piece suits, \$9.95 and \$12.50; 3-piece wool suit, \$17.95 (regular \$28.00 value). All-wool overcoats \$18.50. Splendid rain-coats, slickers and boys' suits. Biggest commission. Free outfits. "Jim" Foster, Inc., Dept. 23, 2250 S. Spaulding Ave., Chicago, Ill.

**SALESMEN For carbon solvent:** No more spark plug trouble; valve grinding; motor overheating and excessive cylinder oil. Removes carbon in fifteen minutes. 100% profit. St. Clair Sales Bureau, Tolland, Colo. Box 26.

**EVERY Home a prospect.** Make big money. Take orders tree, shrubbery. Experience unnecessary. No dull season. Commissions paid weekly. We deliver, collect. Write Perry Nurseries, Dept. R-3, Rochester, N. Y.

**IOWA Salesman** made \$78.00 first day selling new hot dog machine at \$18.50. Commission \$6.50; direct factory connections. Leonard E. Dickerson, Dept. E-10, Springfield, Mo.

**\$282.80 COMMISSION** on a \$21.50 original sale. Every merchant a prospect. Absolutely new and different. Exclusive territory. Ben Braude, 337 W. Madison, Chicago.

**SELL Nothing! \$170 weekly** empty handed. Punchboard headquarters announce amazing new plan. No investment. We even pay express. K&S Sales Co., 4378 Ravenswood, Chicago.

**IT'S Legal.** New and aplenty different! "Gypsy." It's whirling wheels fascinate everybody. Merchants buy eagerly. Clean up \$100-\$150 week. Cigar Stores, Dept. 18-T, Peoria, Ill.

**GOLD Leaf Window Letters** and script signs; no experience; 500% profit. Samples free. Dearman made \$19.20 first 2 hours. Consolidated, 69-V West VanBuren, Chicago.

**POOL Shooter; new, fascinating** vending machine. Merchants everywhere buy. Sideline men make \$200 weekly. Free pocket outfit. Specialty Mfg. Co., Dept. 1, 617 W. Division, Chicago.

**NEW Invention—Sells every business** and professional man; used by Bell Telephone Co., Armour & Co., etc.; costs \$2.50; retails \$7.50. Walker made \$165 first day. Write Adjustment Service, Dept. PM, Mobile, Ala.

**SALESMEN—\$4 In your pocket** every half hour. Write orders for Hollywood News. New idea advertising service for store windows. No competition; every store prospect. Permanent repeat business. Free sales outfit. Retail Stores Service Corp., 1165 Broadway, Dept. J-1, New York.

**WOW Of a sideline! Make \$200 monthly** extra. Show new, exclusive line coveralls and shop coats. Advertising embroidered on back. Every business prospect. Outfit free. Master Co., 4734 Dorchester, Dept. A-3, Chicago.



**OH! What a sideline. Gigantic money-getter.** \$4.00 commission every \$5.00 sale. Collects accounts so fast—storekeepers, doctors get dizzy. Brooks, Texas, sold (20) first day—commission \$80.00. We deliver and collect. Full commissions all reorders. Sample free. Federal Association, 17th St., Hartford, Conn.

**SALESMEN!** Sixty year old New England concern manufacturing high quality broadcloth shirts is opening new territories. Big, unusual opportunity for permanent, profitable business with steadily increasing income. Write today for sales proposition. This is a real money maker. Bostonian Mfg. Co., 106 Bickford St., Boston, Mass.

**SELL** Union label printing—Brand new proposition. Copyright cuts and elaborate outfit free. 40% commissions advanced. Beats all competition. Meyerson, R1132 So. Racine, Chicago.

**\$40.00 SUITS** For \$23.50! Union made to special order, of finest quality virgin wool. You don't have to know anything about selling clothing. We guarantee your success if you are honest and willing to work. Write at once, Madison Brothers, 133 South Peoria, Dept. 642, Chicago.

**BIG Money** taking orders for printing. We ship everywhere. 43 standard items every business man buys. Low prices, hundreds free cuts insure quick sales, repeat orders. 40% commissions. Experience unnecessary. Outfit and complete instructions free. Kaeser & Blair, Dept. 58, Cincinnati, Ohio.

**SALESMEN \$75 To \$125 weekly.** Established line coveralls, shopcoats, autoseat covers, garage fabric accessories. Red hot seller. Every garage, storekeeper, and auto owner are buyers. No investment. Valuable territory open. Write today for complete selling outfit. John Leeding Co., 314 W. 33rd, Dept. SH-3, Chicago.

**\$150.00 PER WEEK!** This ad is actually worth \$150.00 per week or more to you. Write us at once for full details on latest selling item ever produced. Absolutely new. 20 million will buy on sight. All classes of retailers will buy for resale, also advertisers. Act quick. The Lyco Co., 2637 Canton St., Chicago.

**SALESMEN:** Cash in \$24 a day with new salesboard. Marvelous seller; big profit maker. Place boards with stationery and cigar stores, barber shops, poolrooms, etc. Quick sales, big profits. Write for free outfit. D. Gordon Corp., 110 E. 23rd St., New York City.

**SELL** Neon daylight signs. Uses no electricity, batteries or wires. No competition because of patented features. Priced low. Unusually liberal commission. American Store Sign Company, 228 North LaSalle St., Chicago, Ill.

**EARN \$20 A day.** Establish income for life selling for \$1 a year \$1,500 accident policy. Write W. C. Stone, 11 So. LaSalle, Chicago.

**BIG Pay every day,** selling men's shirts and work clothing—complete line. Also sweaters, hosiery, underwear, pajamas, play-suits! Experience unnecessary. Outfit free! Nimrod Co., Dept. 65, 4922-28 Lincoln Ave., Chicago.

**AUTOTOOL Salesman:** Get prices on 20 piece ignition sets; other tools, it pays. Electrotool Works, 11521 132d St., Ozone Park, N. Y.

**REBUILD** Spark plugs, Bendix drives, ignition coils. Sell other supplies. 5958 Washington, Chicago.

**SALESMEN:** New line, new prices, bigger slice for you. America's best known, biggest value suit line. Something extra for producers. Write J. B. Simpson, 843 Adams, Dept. 118, Chicago.

**PUNCHBOARD Salesmen.** New deals \$25 daily profit! Great assortment. No selling. Repeat. Free outfit. Manager, G-4334 West Harrison, Chicago.

**NEW Item** for retail stores. Repeat business. Box 160, Norfolk, Va.

**STATE Mgr.** Marvelous invention sells 3,000 envelopes hourly! Sells \$4.50 only; equals work expensive electric machines. Offices buy 1-100. Exclusive territory. Opportunity earn \$7,000 yearly. Free trial offer. Write quick! Rede, 29 Winthrop Bldg., Boston.

**ALL-YEAR-ROUND** Profitable business selling wonderful new water softener and cleaner. Removes grease, oil, ink and dirt quickly. Every home and business place a live prospect. 100% profit. Big repeat orders. Exclusive territory. Write for free sample. Seacoast Laboratories, Sea Bright, N. J.

**COVERALL Salesmen—**Make \$20 daily selling new \$3.50 improved coveralls, also service coats with customer's name embroidered on back. Unusual construction. Commission 75c. Wonderful advertising value. Lowest priced; highest commission. Free outfit. Am. B. Co., AK-329 W. Monroe, Chicago.

**A NEW deal** by an old house for men seeking big opportunity and pay. Union made-to-measure all-wool suits at \$23.50 up. Double ordinary size samples. Big commissions and bonus. Write for details or give experience and references for return action. Pioneer Tailoring Co., Congress and Throop, Dept. C-1117, Chicago.

**SIDELINE Men wanted—**Tell us what you sell, your territory. References. We manufacture over a thousand novelties and can always give you a line. Reliable house, 25 years in business. Bradford & Company, Inc., St. Joseph, Mich.

**\$60-8200 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.

**ADVERTISING Salesmen** in every state. Year around position, selling merchants and manufacturers, booklets, calendars, novelties. Commissions weekly. Plenty repeat business. Matson Pub. Co., Main St., South Whitley, Ind.

**PUNCHBOARD Men!** Sideline salesmen! Sensational merchandise catalog just added to famous "Lincoln Line"! No more closed territory! \$200 weekly. Easy repeat commissions paid daily. Smashing color catalog free. Samples unnecessary. Best season now. Get busy! Lincoln Sales, 9 So. Clinton, Chicago, Dept. D.

**PUNCHBOARD Salesmen.** \$200 weekly. Liberal plan assures sales. Latest assortments. Nothing to carry. Full commissions on repeats. M&L Sales Co., 301 W. Adams, Chicago.

**SALESMEN—**Four \$15.00 sales to merchants net you \$40.00 daily. Sayers Systems, 2813 Sheffield, Chicago, Ill.

**SALESMEN—\$75-\$100** Weekly selling high grade signs, calendars, fans and novelties; full or part time. Big commissions paid promptly. Sample outfit supplied. Write today. Scioto Sign Co., Dept. L, Kenton, Ohio.

**TO Market** 3A garage door holders, simple automatic action, quickly installed, instantly attracts garage owners, builders, dealers. Write for exclusive territory proposition. Knowlson-Stevenson Co., 1118 Packard, Ann Arbor, Mich.

**NEWEST, Finest** and most complete line of novelties and pencils for 1929. State experience. Advertising Novelties Company, Newton, Iowa.

**SALESMEN—**Calling on stationery department, drug, novelty trade. New "Twin Pencil," popularly priced. Sells immediately and repeats. Liberal commission. References. Multipoint, Corona, N. Y.

**PUNCHBOARD Salesmen.** 2 hours daily, \$100 every week. New line. Lowest prices. Full commission on repeat business. Catalog free. Puritan Novelty Co., 1409 Jackson, Chicago.

**BANG-UP** Good new sideline! Sells everywhere, all merchants, banks, mfrs. Big comms. advanced daily. Pocket outfit free. Carroll, 319 N. Albany, Dept. 346, Chicago.

**SUCCESS** is no accident! You will fully understand this slogan when you examine our automatic credit and collection plan. Copyrighted, brand new, unusual. You make 250% on original sale. Half cash on repeats without call-backs. Commonwealth J. Publishing Company, 508 So. Dearborn St., Chicago, Ill.

**DON'T Sell** for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

**SELL** Printing: 40% commission daily. Lowest prices, with or without deposit. Copyright cuts free. Inquiry brings pocket outfit. Salesmanager, 1522 Wells-VanBuren, Bldg., Chicago.

**HELP WANTED**

**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. Hillyer Ragsdale, Drawer 350, East Orange, N. J.

**YOU Are invited** to resilver mirrors at home. Immense profits plating autoparts, tableware, etc. Write for information. Sprinkle, Plater, 287, Marion, Ind.

**DO You need more money?** Let me add \$20 a week to your pay without interfering with your present occupation. Interesting, pleasant work. Particulars free. Albert Mills, 2514 Monmouth, Cincinnati, Ohio.

**GOOD Wages** and steady work interest you. Get list of 180 big construction jobs, costing up to \$20,000,000. Send stamped addressed envelope for details. M. Roberts Service Bureau, Box 1051, Denver, Colo.

**CASH Paid** for Butterflies, Insects. See Sinclair Display Advertisement on page 16.

**ARE You old at forty?** See our advertisement on page 169 of this issue. The Electro Thermal Company, 2115 Morris Ave., Steubenville, Ohio.

**SILVERING Mirrors,** French plate, patented process, easily learned. Immense profits. Plans free. Wear, Excelsior Springs, Mo.

**BETTER Jobs** are easy to get anywhere. Write for free advice P22. Allard, 4724 Des Erables, Montreal, Can.

**OBTAIN Employment!** Get positions you want, quickly, anywhere. Use clever "Ways That Win." One person was offered 70 jobs! Complete methods, 50 cents. Money promptly returned if wanted. New Idea Service, Box 39-1, Station K, New York.

**MEN—Big money.** Free samples. Pop-Goo, Box 471, New York.

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**SPECIALTY** Manufacturing, including models, dies, stamping, casting, welding, screw machine, wire products, plating, enameling, assembling, boxing and printing. Our increased facilities make it possible to manufacture a few more products complete at surprisingly low cost. Estimates promptly furnished on products acceptable to our engineers and factory supt. Majestic Products Mfg. Company, Lock Box 877, Chicago.

**SPECIAL** Machinery or parts, dies, tools, metal specialties, models, special gears, stock gears and model supplies. Send for Catalogue. The Pierce Model Works, Tinley Park, Ill.

**ECONOMICAL** Manufacturing from sheet, bar, wire or tubing. Models, dies, special machinery. Swanberg, 5124 N. Kildare Ave., Chicago.

**WIRE** goods made to order. Cooley Mfg. Co., 530 N. Western Ave., Chicago.

**LET** Us make your dies and do your punch press work. Co-Operative Eng. Co., 32 South St. Clair St., Dayton, Ohio.

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**ATTENTION**—Home mechanics: We sell unusual cabinet hardware, chest trimmings, tea wagon wheels and casters, big line small hinges, locks, etc. Upholstering supplies, electrical hardware, knocked down cedar chests, etc. Send ten cents stamps for catalog. Thurston Manual Training Supply Company, Jobbers and Manufacturers, Anoka, Minn.

**THE** Midget slide rule instantly solves any mathematical problem. Price \$1.50. Catalog free. Gilson Rule Co., Stuart, Fla.

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**NO.** 14 1/2 Becker universal milling machine, with dividing head, complete, \$425.00; 16"x8" Prentice engine lathe, \$175.00; No. 60 Heald grinder, \$275.00; 20" Hendy shaper, \$225.00; 24" Barker back geared crank shaper, \$400.00; 20"x8" Bradford engine lathe, complete, \$215.00; 24" Hamilton drill press, complete, \$135.00; Quincy air compressor with tank and hose, \$65.00; 10" bench drill press, \$19.00. Terms to suit. Write for catalog. Cincinnati Machinery & Supply Co., 27 West Second St., Cincinnati, Ohio.

**CONCRETE** Building block machines and molds. Catalog free. Concrete Machine Co., 5 North Main St., St. Louis, Mo.

**STEEL** And brass rod assortment. Eighteen sizes steel 3-32 to 3/4 dia., three ft. long \$2.55. Seven sizes steel squares, 1/2 to 1/2, two ft. long 90c. Twelve sizes brass 3-32 to 1/2 dia., three ft. long, \$3.60. Highest grade drawn stock. Thompson Manufacturing Co., Meadville, Pa.

**PORTABLE** Electric saw tables, band saws, scroll saws, jointers, mandrels, etc. Factory to user. Circulars. Peter M. Hoof, 3013 15th Ave., So. Minneapolis, Minn.

**WOODWORKERS.** New accessory for circular saw. Makes tenon joints quickly. Guaranteed. Price \$2. Particulars 2c stamp. Clayton's Workshop, Port Huron, Mich.

**WOOD** Turning lathes, \$17.50. Hallin Machine Co., Parkers Prairie, Minn.

**COMPRESSORS,** Twin cylinder, for small tire shops. Duco spraying. J. Trockman & Sons, Inc., 110-112 Lincoln Ave., Evansville, Ind.

**ELECTRIC** Drills 1/4" portable, universal 110 \$12.00 each. Refund guarantee by manufacturer. H. F. Gustin, 180 East Huron St., Pontiac, Mich.

**START** business of your own, small investment required, doing nickel, copper and silver plating. This work in big demand. Information free. Electro Platers Supply Co., 547 Considine Ave., Cincinnati, Ohio.

**NEW** Six volt soldering iron. Economical, redhot point, guaranteed. Price \$1.50. Soldering Co., Republic, Kans.

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**ELECTRIC** Motors, reconditioned equal to new. A.c. or d.c. 1/4 hp. \$5.50; 1/2 hp. \$16.00. 3/4 hp. \$18.50, 1 hp. \$24.00. Others to 10 hp. Also motors rebuilt, repaired, armature winding. Tell us your motor problems. Temps Brothers Motor Company, One Martin Ave., Glendale, Long Island, New York.

**NEW** 1/4 horse, 110 volt, alternating motors, cord, plug and pulley, \$7.00. New 32 volt, General Electric, 500 watt generators, \$18.50. New 1/2 horse 110-220 volt, 1,750 speed, repulsion-induction alternating motors, \$22.50. 1/2 horse, induction, alternating motors, \$16.50. Large stock all kinds. Write us for quotations. Electrical Surplus Company, Dept. 12, 1911 West Chicago Ave., Chicago.

**BARGAINS**—Electric drills, \$11.95; bench saw outfit, \$7.35; electric bench grinders, \$13.20; combination lathe, \$8.15; scroll saw, \$5.60; motors, generators, farm plant equipment; flexible shafts; 100 other bargains. Send for several bargain bulletins. Acme Tool Co., 627 W. Washington, Chicago.

**FOR** Sale: 1-6 1/4 h.p. motors, 60 cycle, alternating current, slightly used, first class condition; all motors tested before shipping \$4.50 and \$5.00 while they last. Cash with order. The Maytag-Chicago Co., 337 W. Madison St., Chicago, Ill.

500 NEW 1/4 Hp., a.c., double shaft grinders, \$12.75. Cash with order. Wm. M. Miller & Sons, 2553 Madison St., Chicago, Ill.

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**FOR** Sale motors 1-6 to 100 h.p. Single or three phase, motors bought, sold, re-wound and exchanged. R. R. Roby, Truro, Iowa.

**BRAND** New 1/4 hp. 110v. a.c. motors \$7.00 with cord, plug pulley. 1/2hp. \$16.00. 1 hp. \$36.00. 32v. motors 1/4hp. \$7.50; 1-6 hp. \$6.50. 32v. motors with emery, buffer and drill chuck \$6.50. Large stock motors and generators. Queen City Electric, 1736 Grand Ave., Chicago.

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**NAVY** Surplus 800 new radio generators, d.c. and 500 cycle. Unusual prices. Literature. Henry Kiengle, 501 East 84th St., New York.

**STEAM** Engines—One H. P. \$18.00; 1/2, \$12.00. James Chambliss, Bessemer, Ala.

**TIME** Counts in applying for patents. See pages 154 and 155. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

**EDISON** And Graphophone electric universal motors with speed governor and idler \$5.00 plus express on 10 lbs. Geo. Schulz, Calumet, Mich.

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**HUNDREDS** Of people have sent their old gold, silver, platinum jewelry, dental work to me. Why not mail yours today? Highest prices paid. Satisfaction guaranteed or goods returned. F. Polcer, 2408 South Cicero Ave., Cicero, Ill.

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**HOME** Workshop designs. Twelve working sizes \$1.00. Address Designer, 121 Hall St., Rockford, Ill.

**ARTISTS:** Make comic art pay! Our plan—your opportunity. Kaas, Box 281, Hermosa Beach, Calif.

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**TIME** Counts in applying for patents. See pages 154 and 155. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

**I** CATCH from 45 to 60 foxes in from 4 to 5 weeks' time. Can teach any reader of this magazine how to get them. Write for particulars. W. A. Hadley, Stanstead, Que.

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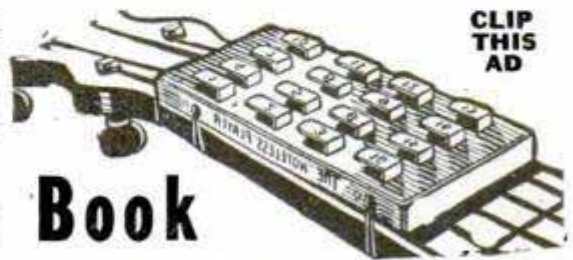


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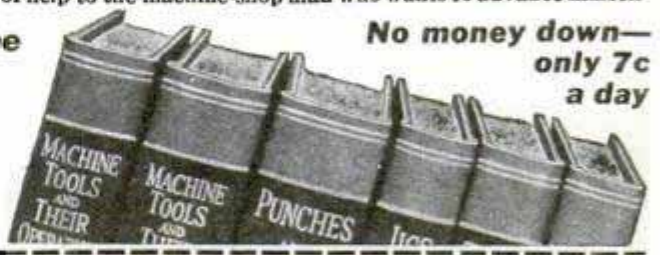
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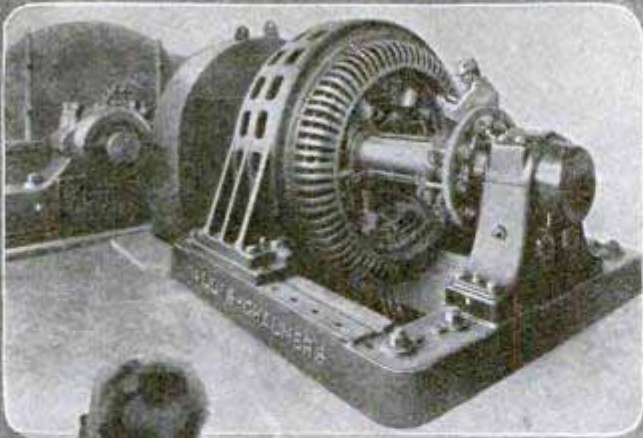
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# ELECTRICITY

*You Learn by Seeing it Work*

**N**OW you can fit yourself for a big pay job in electricity by watching real motion pictures in your own home! Easy and fascinating as seeing a show at the theater! You see electrical machinery *in operation*. Moving diagrams make all the facts easy to understand.

*This New Way is Easier, Quicker, Surer*

At home, in spare time, you can fit yourself to make more money in electricity. This giant industry is constantly calling for men to fill jobs

paying from \$70 to \$200 and more weekly! Practical electrical men, holding down big jobs, praise this new way, *as the easiest and best way to learn how to do electrical work.*

### You Get this DeVry \$75 Projector

Every student is given a standard school model DeVry Motion Picture projector to keep, at no extra cost. Thousands of feet of motion picture film are supplied for use during the course. You show them on the wall or on a screen in your home. *Projector is so simple anyone can operate it without experience.* Used with regular light socket, farm lighting equipment, or automobile battery. Think of it, you own a projector for showing all kinds of movies right in your own home!

### You Get This Pledge in Writing

We promise in writing to give you the training and employment service necessary to get you a better job and more money *or you need not pay a cent.*

**FREE** Our Big New Book, "The Film-Way to Bigger Pay"

Tells all about how we use moving pictures to train you for bigger pay. Get your copy now. No obligation. Send the coupon TODAY!

Mail This Coupon

**THE NATIONAL SCHOOL of VISUAL EDUCATION**  
 (The Film Way to Bigger Pay)  
 537 S. Dearborn Street, Chicago, U. S. A. Dept. 3H  
 Send your book "The Film Way to Bigger Pay" and full facts about this new, easier way to master electricity.

### What a Practicing Engineer Says:

"I am amazed at how clearly and simply you explain the facts about electricity. The points are so much easier to grasp than by the usual instruction methods that the student must make quicker, surer progress. This is by far the best method of getting thorough preparation for practical electrical work." Charles E. Fitz, M. E., E. E., formerly associated with Steinmetz.

### Film-Way Trained Men in Demand

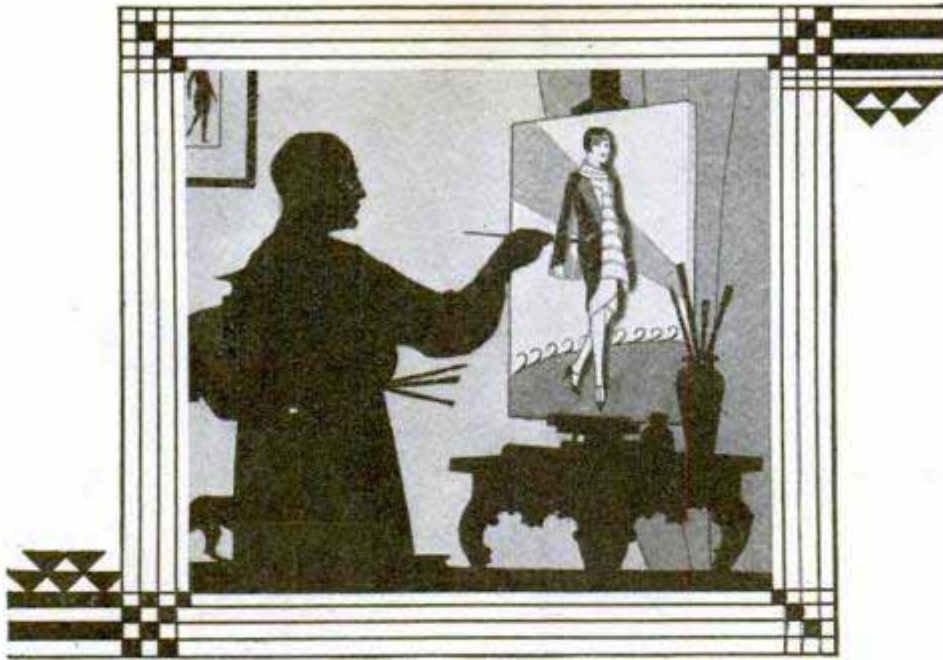
"We will gladly co-operate with you, not only in employing your students when vacancies occur in our organization but also by recommending that our employees take your course."  
 Electric Material Co., South Bend, Ind.

Representatives with School Experience Write



**TAKE THE FILM WAY TO Bigger Pay**





## ARTISTS EARN MORE

**W**HILE 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. Hundreds of successful students of the Federal School of Illustrating are now making from \$2500 to \$6000 a year and some are making even larger incomes.

More than fifty famous artists . . . earning big money themselves . . . have contributed

their drawing secrets to the Federal Course. Clare Briggs, Neysa McMein, Sid Smith, Norman Rockwell and many others know the way to make money through art. 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.

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3139 Federal Schools Building



Minneapolis, Minnesota



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

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# This New, Easy Blue Print Way Prepares You for These 9 Big Pay Jobs!

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2 Building Inspector \$4,800 to \$8,000

3 Appraiser \$6,000 to \$10,000

4 Material Buyer \$5,000 to \$7,500

5 Material Salesmen \$5,000 to \$12,000

6 Building Estimator \$6,000 to \$10,000

7 Real Estate Expert \$5,500 to \$12,000

8 Construction Foreman \$4,500 to \$8,500

9 Contractor and Builder in Own Business \$5,000 to \$12,000

**Make**  
**\$4,800 To \$12,000 A Year!**

**H**AVE you ever stopped to consider what stands between you and a big-pay job? Simply a lack of training on the "Headwork" side of Building and Contracting—that's all! The men who command the high-salaried positions know how to read blue prints—how to lay out and run jobs.

There is no reason why you, too, can't bridge this narrow gap between you and the jobs that pay up to \$12,000 a year. You need only to equip yourself with this essential knowledge to win a better position or a business of your own. With the Building Trades calling frantically for practical men who can read blue prints—with this training so easily available to you the Chicago Tech "Blue Print Way"—the opportunity is yours to take NOW!

## Get This Big-Pay Training

The day when a tradesman could get practical "headwork" training only on the job is gone forever. The records of thousands of Chicago Tech graduates have proved that the idea is no longer true. That it's easy to learn how to read blue prints by the Builders' Course, the "Blue Print Way To Big Pay." This practical method is quick, easy and it's certain. You learn right at home in your spare time with real blue prints and les-

sons as simple and easy to understand as a story book. Everything is explained in every day language and worked out by practical, experienced building experts. No text books. No grinding study. Simple as A. B. C.

## Mastered In A Few Weeks

And the beauty of this wonderful course is that it teaches you plan reading in amazing short time. Yet this valuable knowledge is just what you need to equip yourself for one of the big indoor or outdoor jobs that yield \$4,800 to \$12,000 annually!

Take this positive, easy way to make your ambitions materialize. Simply mail the coupon at once. It brings a complete set of actual working blue prints and a valuable, instructive book, "How to Read Blue Prints" free, *absolutely* FREE! Get these true facts before you as soon as possible. See what fun it will be to learn the fascinating "Blue Print Way." Know what wonderful opportunities await you in the seven billion dollar building field! Don't delay!

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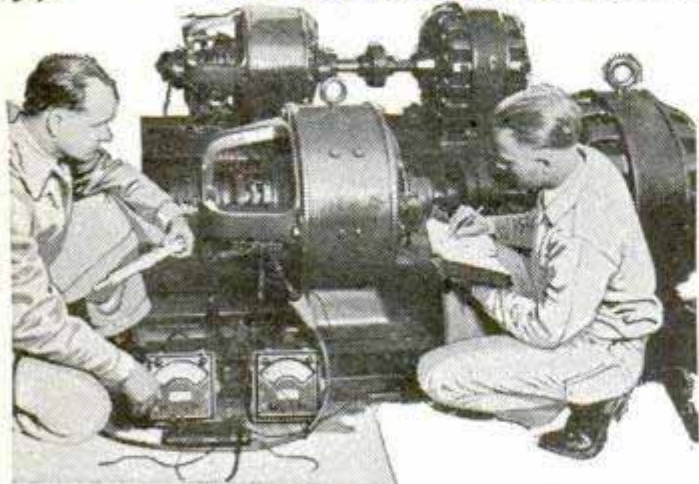
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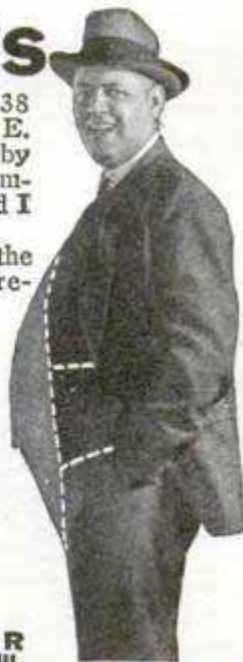
"I reduced from 48 inches to 38 inches in 35 days," says R. E. Johnson, of Akron, O., "just by wearing a Director Belt. Stomach now firm, doesn't sag and I feel fine."

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# AN OPEN LETTER to Ambitious Young Men

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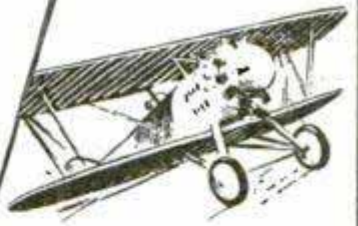
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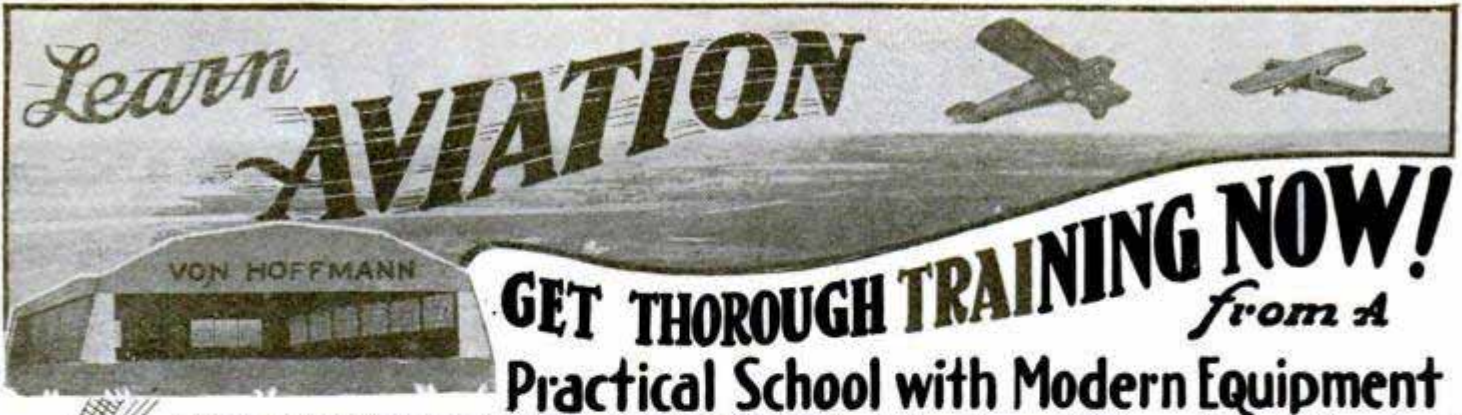
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There are 7 cars in the circle. By drawing 3 straight lines you can put each one in a space by itself. When you do this send me your answer right away and receive full particulars.

**\$750.00 Extra for Promptness**

In addition to the many valuable prizes and Hundreds of Dollars in Cash, we are also giving a Special Prize of \$750.00 in Cash for Promptness. First prize winner will receive \$2,750.00 in cash, or the Nash Sedan and \$750.00 in cash. In case of ties duplicate prizes will be awarded each one tying. Solve the puzzle right away and send me your answer together with your name and address plainly written. \$4,500.00 in prizes—EVERYBODY REWARDED.

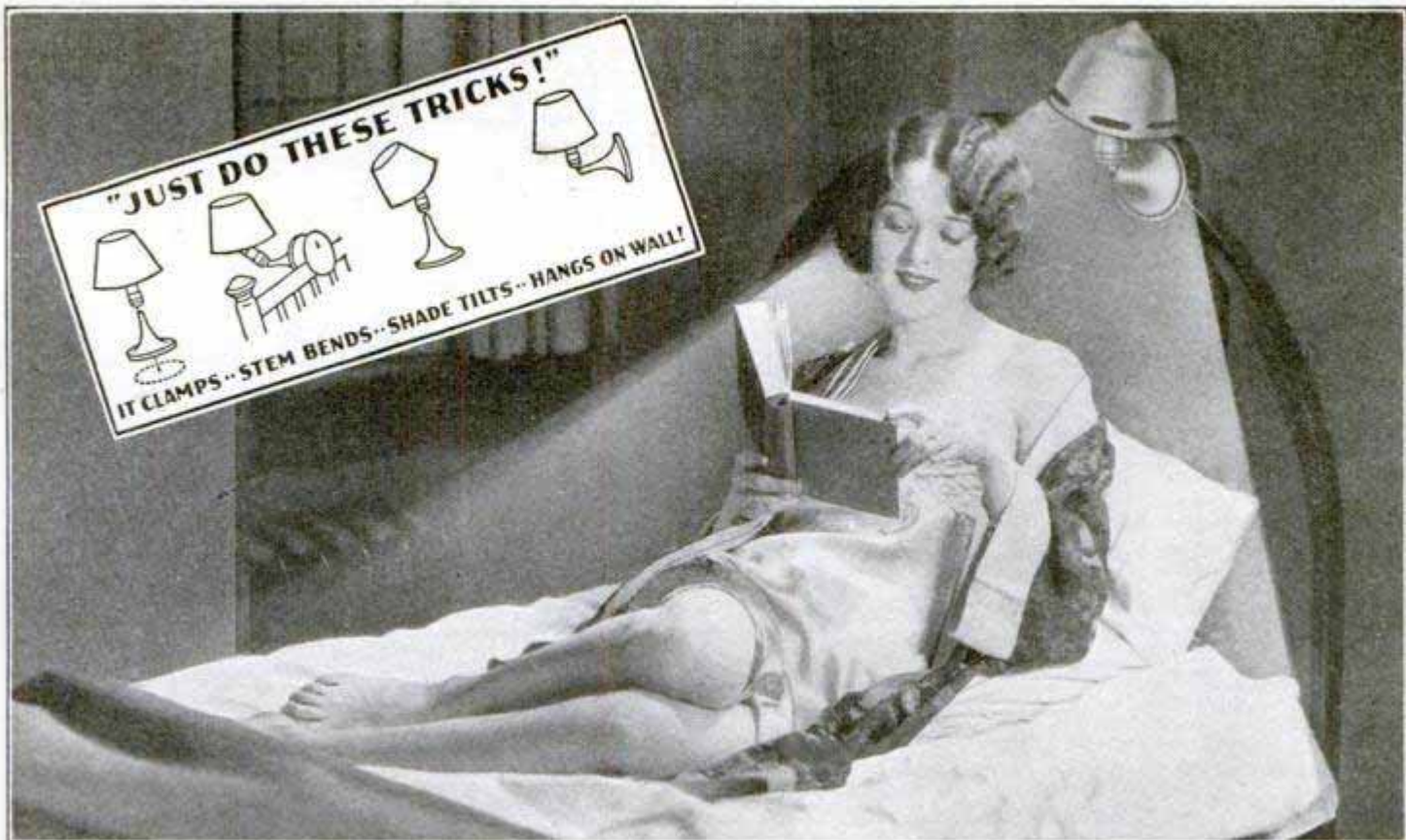
John T. Adams, Mgr. Dept. 1773 323 S. Peoria St., Chicago, Ill.



Clip This Ad

Send Answer Today





# 19 Lamps Combined in One Brings Sensational Profits to Agents!

"WHY didn't some one think of this long ago!" That's what hundreds of agents are hearing from women who see the amazing demonstration of this new kind of lamp. In one large office Adley made \$22! Miller, Penn., canvassed only eight homes and collected \$12.00. Zinn of Texas has sold half the people in his county. A woman, Mrs. St. Germain of New York, made \$82 in spare hours.

## Amazing 10-second Demonstration

And no wonder! For this astonishing lamp does everything but move itself. A flip of your finger unscrews the base and clamps it anywhere—on the bed, shaving mirror, work bench, the running board of a car. A gentle touch tilts the shade to throw full light when reading, sewing, searching in dark bedrooms, etc. Bend the stem and hang it on the wall. Or stand it up straight on an end table.

## Startling Low Prices

No wonder agents call it "the nineteen in one lamp." In every home there are at least nineteen places where a Falcon serves to better purpose than the old-fashioned stiff necked eye straining lamp. Then realize the utter

beauty of these lamps at the amazing low price. You offer six choices to suit every taste; the Parchmentex type or the ivory or bronze tinted metal lamp. Bases are rich ivory or statuary bronze. Size, 11 1/2 inches high. The most amazing combination of lamp beauty and utility ever offered at such a low price.

## New Direct Selling Plan

The Falcon money-making plan is one of the most simple, yet powerful, methods known in direct selling. Every angle of it has been worked out to bring agents' profits up to steady \$20 days. Veteran salesmen are delighted with the big commissions, "repeat" sales possibilities, territory arrangements, etc.

Mail coupon now for free descriptive catalog, beautifully illustrated in color. Read and compare the Falcon money-making plan, either full time or sideline, with any proposition in direct selling. Expect many pleasant surprises! Coupon brings you full details without obligation.

## FALCON MFG. CO.,

Dept. C-90, 2550 Sullivan Ave., St. Louis, Mo.



## An Electric Lamp

Above is shown the Falcon ivory-tinted metal lamp with leaf design embossed in color, and ivory metal base. Same available in statuary bronze metal. Size 11 1/2 inches high.

**\$22 in  
2 Hours!**

Falcon agents often sell 10 to 25 lamps in one demonstration. Adley, who made \$22 in 2 hours, collected all this money in one office, selling to stenographers who need such an adjustable lamp for typing.



Falcon Mfg. Co., Dept. C-90,  
2550 Sullivan Ave., St. Louis, Mo.

Without obligation, send me your color catalog of Falcon Lamps. Also complete details of your money-making plan for demonstrators.

Name.....

Address.....

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





# "Mary, I Owe It All to You"

"MR. WILLIAMS called me into his office today and told me he was going to raise my salary \$50 a month.

"I am glad to give you this opportunity," he said, "for the best reason in the world. You deserve it.

"You may not know it, but I've been watching your work ever since the International Correspondence Schools wrote me that you had enrolled for a course of home study. Keep it up, young man, and you'll go far. I wish we had more men like you."

"And to think, Mary, I owe it all to you! I might still be drudging along in the same old job at the same old salary if you hadn't urged me to send in that I. C. S. coupon!"

How about you? Are you always going to work for a small salary? Are you going to waste your natural ability all your life? Or are you going to get ahead in a big way? It all depends on what you do with your spare time.

More than 180,000 men are getting ready for promotion right now in the I. C. S. way. Let us tell you what we are doing for them and what we can do for you.

**Mail the Coupon for Free Booklet**

## INTERNATIONAL CORRESPONDENCE SCHOOLS

"The Universal University"

Box 5605-F, Scranton, Penna.

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

### BUSINESS TRAINING COURSES

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| <input type="checkbox"/> Business Management                     | <input type="checkbox"/> Business Correspondence      |
| <input type="checkbox"/> Industrial Management                   | <input type="checkbox"/> Show Card and Sign Lettering |
| <input type="checkbox"/> Personnel Management                    | <input type="checkbox"/> Stenography and Typing       |
| <input type="checkbox"/> Traffic Management                      | <input type="checkbox"/> English                      |
| <input type="checkbox"/> Accounting and                          | <input type="checkbox"/> Civil Service                |
| C. P. A. Coaching  | <input type="checkbox"/> Railway Mail Clerk           |
| <input type="checkbox"/> Cost Accounting                         | <input type="checkbox"/> Mail Carrier                 |
| <input type="checkbox"/> Bookkeeping                             | <input type="checkbox"/> Common School Subjects       |
| <input type="checkbox"/> Secretarial Work                        | <input type="checkbox"/> High School Subjects         |
| <input type="checkbox"/> Spanish <input type="checkbox"/> French | <input type="checkbox"/> Cartooning                   |
| <input type="checkbox"/> Salesmanship                            | <input type="checkbox"/> Illustrating                 |
| <input type="checkbox"/> Advertising                             | <input type="checkbox"/> Lumber Dealer                |

### TECHNICAL AND INDUSTRIAL COURSES

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|--|---|
| <input type="checkbox"/> Architect               | <input type="checkbox"/> Automobile Work                                    |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Airplane Engines                                   |
| <input type="checkbox"/> Building Foreman        | <input type="checkbox"/> Plumber and Steam Fitter                           |
| <input type="checkbox"/> Concrete Builder        | <input type="checkbox"/> Plumbing Inspector                                 |
| <input type="checkbox"/> Contractor and Builder  | <input type="checkbox"/> Foreman Plumber                                    |
| <input type="checkbox"/> Structural Draftsman    | <input type="checkbox"/> Heating and Ventilation                            |
| <input type="checkbox"/> Structural Engineer     | <input type="checkbox"/> Sheet-Metal Worker                                 |
| <input type="checkbox"/> Electrical Engineer     | <input type="checkbox"/> Steam Engineer                                     |
| <input type="checkbox"/> Electrical Contractor   | <input type="checkbox"/> Marine Engineer                                    |
| <input type="checkbox"/> Electric Wiring         | <input type="checkbox"/> Refrigeration Engineer                             |
| <input type="checkbox"/> Electric Lighting       | <input type="checkbox"/> R. R. Positions                                    |
| <input type="checkbox"/> Electric Car Running    | <input type="checkbox"/> Highway Engineer                                   |
| <input type="checkbox"/> Telegraph Engineer      | <input type="checkbox"/> Chemistry  |
| <input type="checkbox"/> Telephone Work          | <input type="checkbox"/> Pharmacy   |
| <input type="checkbox"/> Mechanical Engineer     | <input type="checkbox"/> Mining Engineer                                    |
| <input type="checkbox"/> Mechanical Draftsman    | <input type="checkbox"/> Navigation <input type="checkbox"/> Assayer        |
| <input type="checkbox"/> Machine Shop Practice   | <input type="checkbox"/> Iron and Steel Worker                              |
| <input type="checkbox"/> Toolmaker               | <input type="checkbox"/> Textile Overseer or Supt.                          |
| <input type="checkbox"/> Patternmaker            | <input type="checkbox"/> Cotton Manufacturing                               |
| <input type="checkbox"/> Civil Engineer          | <input type="checkbox"/> Woolen Manufacturing                               |
| <input type="checkbox"/> Surveying and Mapping   | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Bridge Engineer         | <input type="checkbox"/> Poultry Farming                                    |
| <input type="checkbox"/> Gas Engine Operating    | <input type="checkbox"/> Mathematics <input type="checkbox"/> Radio         |

Name.....

Address.....

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

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

# Both only

# \$3<sup>95</sup>



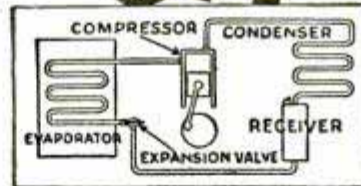
A guaranteed 10-Cable CHEST PULL (the most powerful one ever manufactured), adjustable up to 200 lbs., that will quickly develop muscles of shoulders, arms, chest, abdomen and back—and a pair of patented HAND GRIPS for developing powerful grip and forearm—both for only \$3.95.

5-Cable Chest Pull and pair of Hand Grips for only \$1.95

Take advantage of one of these limited offers immediately—before it is too late. No such bargains ever given by any manufacturer.

FRED A. KORTH, 1139 Tiffany St., New York City

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## Amazing Opportunities in ELECTRIC REFRIGERATION

WHY look for big pay in crowded industries? Get into the newest and fastest growing industry in America—Electric Refrigeration. Millions of dollars being invested by Wall Street in factories and advertising. Urgent need for scientifically trained men in manufacture, installation, sales and service. Jobs pay \$200 to \$1,000 a month. And now a new easy method trains you at home to fill a big pay job. Learning Electric Refrigeration simplified amazingly. This course sponsored by Kelvinator, and praised by Servel and other leading manufacturers. Our Employment Dept. helps you find big jobs, FREE.

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Mail coupon now for big book free "The New Giant Industry—Electric Refrigeration." See how easy it is to quickly become a highly paid refrigeration expert. No obligation. Utilities Engineering Institute, Dept. 13, 3120 N. Clark St., Chicago, Ill.

"Your Institute should be of great interest to young men wishing to get into the service and sales end of this business. It will be a pleasure to co-operate with you." Col. F. E. Smith, President, Servel, Inc.

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Without obligating me, send free book "The New Giant Industry—Electric Refrigeration."

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# A Million Dollar Can Opening Machine

## BRAND NEW INVENTION BRINGS FORTUNES TO AGENTS!

Here's Something Brand New! An Amazingly Simple Invention—Yet, Absolutely Revolutionary! For Now, At One Sweep, Millions Of Old Style Can Openers Are Doomed To The Scrap Heap! Think Of It, Men! A Tremendous New Opportunity For Quick Profits In Every Home In America! No Wonder Agents Are Making Astonishing, Almost Incredible Sums—\$75, \$100, \$150 A Week Easily Right Along. So Mail The Coupon For All The Facts And Full Details Of My Remarkable FREE TEST OFFER!

ABOUT once in a "Blue moon" some genius pops up with a new invention that everyone has been waiting for. Then, presto! Almost like magic, agents' profits go soaring overnight to tremendous heights! And now the cold, hard-boiled facts about this amazing new can opener bear convincing proof!

### More Than a Can Opener

This queer new device doesn't just cut a ragged hole around the edge of the can. It lifts the entire top completely out, clean as a whistle! The machine 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 jagged edges to hack your fingers—all in a couple of seconds! You just put the can in the machine—turn the handle—and almost instantly the job is done! Built to do the job better than anything ever devised! Will last a lifetime! It's far more than just a can opener, it's a real can-opening machine!

### The Secret of Big Money

Women hate the old style can opener—and with good reason, too. It's the last relic of barbarism in the modern kitchen. Yet every day millions of women have to open cans the dangerous, laborious old-fashioned way. Food is spilled and wasted. Fingers are cut and torn—often followed by infections and blood poisoning that result in expensive doctor bills. Opening cans the old way is a job nasty enough to make most any man swear—this amazing new way—it's so easy a ten year old child can do it with perfect safety! No wonder women—and men, too—simply go wild over it!



**AGENTS!**  
**FULL TIME—**  
**\$265**  
**in a week**

"Here is my record for first 30 days with Speedo:  
—June 13, 60 Speedos;  
June 20, 84 Speedos; June 30, 192 Speedos; July 6, 288 Speedos. Speedo sells to 9 out of 10 prospects."  
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**SPARE TIME—**  
**\$9 First half day**  
"The first afternoon I received my Speedo outfit I made \$9."

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**\$20 in 3 hours**  
"I worked about three hours and took 25 orders. This is certainly a money-maker."  
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### A Spectacular New Sales Plan

I want you to see this surprising new invention with your own eyes. I want you to know why everyone, man or woman, falls for it the instant they see it. Whether you are an experienced salesman, or never sold a penny's worth of anything in your life—I want to tell you about a remarkable new sales plan that wins you a profit on every call you make. This plan is made possible by another spectacular money maker in the Speedo line and guarantees you a steady income of up to \$150 a week!



### Free Trial— Act Quickly!

If you are ambitious—if a new, but tested and proved opportunity to make \$75 to \$150 a week interests you—act at once before some other live wire beats you to this lifetime opportunity. Without obligation, learn about these amazing new patented inventions, and get my FREE TRIAL OFFER. Just mail the coupon today—NOW!

**CENTRAL STATES MFG. CO.**  
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**SPEEDO**

Central States Mfg. Co.,  
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St. Louis, Mo.

Yes, rush me the facts and details of your FREE TEST OFFER.

Name .....

Address .....

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

Check here if interested only in one for your home.



# Discovered!

## The Scientific Secret of Caruso's Amazing Vocal Power

*A post mortem of Caruso's throat showed superb development of his Hyo-Glossus muscle—again proving the soundness of Eugene Feuchtinger's theories of voice production.*



*Eugene Feuchtinger, A. M., Musician-Scientist, who discovered this scientific method for developing the voice.*

*The arrow points to the all-important Hyo-Glossus muscle, the "keynote" of the Physical Voice Culture method.*

## The Great Discovery

Professor Feuchtinger, A.M.—famous in the music centers of Europe—discovered the secret of isolating the Hyo-Glossus muscle. He devoted years of his life to scientific research and finally perfected a system of voice training that will develop your Hyo-Glossus muscle by simple, silent exercises right in your own home. Since the Professor brought his discovery to America—over 10,000 happy pupils have received his wonderful training.

### 100% Improvement Guaranteed

The Perfect Voice Institute guarantees that Physical Voice Culture will improve your Voice 100%. You are to be your own judge—take this training—if your voice is not improved 100% in your own opinion, your entire tuition will be refunded.

**Inspiring Book FREE** Send the coupon below and we'll send you FREE this valuable work, "Physical Voice Culture". You assume no obligation. It may be the first step in your career. Do not delay.

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**Perfect Voice Institute** 1922 Sunnyside Ave. Studio 13-53 Chicago

Please send me a copy of your new book, "Physical Voice Culture", FREE. I understand that it is mine to keep and there is no obligation on my part. I am interested in

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- Speaking
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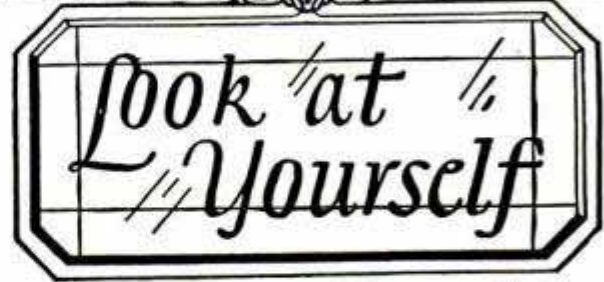
### FREE TRIAL PLAPAO

PLAPAO CO., 951 Stuart Bldg., St. Louis, Mo.

Send me a 10 day trial Plapao, and 48 page book on Rupture. No charge for it now or ever.

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## Rupture Curable

Success or failure? Real or weak counterfeit? You cannot enjoy life's pleasures enslaved to steel or rubber bands. If a rupture has held you down, now is the time to get rid of it and to—

### —THROW AWAY THE TRUSS

Those weakened and atrophied muscles need to be strengthened—not continuously shut off from the normal blood supply through severe truss pressure. The Mechanico-Chemico System as embodied in the Plapao-Pads provides remedial nourishment for the weakened muscles. Upon restoration to normalcy, the unsightly blemish disappears, and such recovery in harmony with Nature should be permanent.

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At our expense, prove to your satisfaction that health and happiness are within your grasp. A request will bring you a ten day test of the remedial factor—Plapao. Make a start TODAY to say good-bye to trusses and rupture. Mail Coupon above.

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The uncrowded, highly paid profession of Accountancy offers marvelous opportunities to ambitious men and women. Send for our 80-page book, "How to Learn Accounting," and the first easy lesson. Both will be sent free.

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A Division of the  
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Trained men needed! Geologists, Drillers, Refiners, (Chemists and Still Men) Oil Salesmen, earn 2 to 10 times more than in other fields! Write today! FREE Booklet!

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A good strain of domestic raised birds make big money. Here is a galvanized wire breeding cage—wood frame—18"x9"x13"—sanitary solid wire bottom—under galvanized sliding drawer pan—equipped with cups and nest \$3.75 prepaid. Female canary to mate with your male selected from our healthy and popular Seifert Roller strain \$3.75 prepaid. Write for information on Seifert Roller Males.

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# FROM NOW ON— Aviation Mechanics' training *must meet* *a new standard!*

**EVERY** graduate of Parks Air College Airplane and Engine Mechanics' School is fully qualified by training for Department of Commerce licenses as Airplane and Engine Mechanic!



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Our mechanical course gives you every class of work necessary to qualify for a Federal Airplane and Engine Mechanics' license and in addition gives you the academic background that you will need as a factory superintendent or airline executive.

**Largest Civilian Aviation School  
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The moment you get to Parks you'll realize why other men have come from every part of the United States. The bustling activity, the enthusiasm and spirit that pervade the institution, fire you with a new thrill. You are at a school where you can prepare for a definite future.

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234-N Missouri Theatre Bldg.  
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Parks Air College, Inc.,  
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Send me "The Man Who Tunes the Plane," with complete information about your Aviation Mechanics' Course.

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Learn by the thorough, approved scientific methods which our 24 years of specializing enable us to give you. In addition to Electrical Engineering, the following complete courses are given: **A. C. and D. C. Armature Winding—Wiring and Testing—Commercial Electrical Engineering—Automotive Electricity—Radio Sales Service and Broadcasting—Electrical Refrigeration.**

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Without obligating me in any way please mail free Photostory book, "Rise to Success Through Electricity" (just off the press), and NEW Bulletin regarding the course I have marked with an X.

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# You Can Play TRAP DRUMS easy extra money

Learn  
at  
Home



## Play in 10 Minutes!

Now you can have the joy of being a trap drummer—the thrill of popularity—new friends—more money-making opportunities, if you wish. These are just a few of the things the idolized dance, theatre or stage orchestra trap drummer enjoys today. Trap drumming is natural! Easy! It is simply the carrying out of natural rhythmic instincts. Our instruction book makes it easy. You can play trap drums in 10 minutes.

## 10 Days Free Trial—Easy Payments

We want to make it as easy as possible for you to learn to play trap drums. Try one of the famous Ludwig Trap Drum outfits in your own home for 10 days, absolutely free. If you keep it, send us the balance in small monthly payments. A Ludwig Trap Drum Outfit fit every purse. All built to the same high standard of workmanship. Don't waste time! Don't delay! If you are eager to learn to play trap drums, if you honestly yearn for popularity and money making opportunities, act at once. Write today for our big 2-color circular describing Ludwig Trap Drum Outfits—the world's standard for 22 years. Mail coupon now!

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Gentlemen: Without obligation, please send me one of your Big Illustrated Catalogs showing Ludwig Trap Drum Outfits, along with details about your 10-day Free Trial Offer, Free Instruction Book, Drummers' Magazine, and Easy Payment Plan.

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Address.....

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

# Be An Auto Paint CHAIN-SHOP MANAGER

## EARN \$90 A WEEK

We are organizing a nation-wide chain of auto paint shops and need reliable men to manage them. We will open one in your section. If you are honest and ambitious, with a good reputation we want you to manage it.

Prefer men with no painting or executive experience. We want to teach them our own way.

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25 million autos in U. S. need repainting—not 1/20 enough real shops to do the work! We'll train you in a few months, at very small cost, during spare time to do the work and to be the boss. YOU MAKE THE BIG MONEY! We even have a plan for refunding the small training fee, so that it need cost you nothing to prepare for this job.



G. King Franklin  
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These Men Now Making Good As A Result of A. A. P. S. Training: Henry LeFebvre's Shop in Wellsburg, W. Va. paying him \$500 a month. C. J. Shine's Shop in Springfield, Mass. nets him \$20 a day. W. A. Davis makes his shop in Swanton, Ohio pay him \$85 a week. Ben Ives of Chateaussey, N. Y. clears \$400 a month from his shop.

Get details now of this remarkable plan whereby we train men at home, quickly and when qualified set them up in business as managers of profitable A. A. P. S. Chain Shops.

Be the first in your community to get the facts.

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## MAIL THIS COUPON NOW!

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Send me without obligation, details of how I can learn to manage a Chain Auto Paint Shop, and tell me about your plan for refunding the service fee so that the training will cost me nothing.

Name.....

Street.....

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



# WINS \$10000



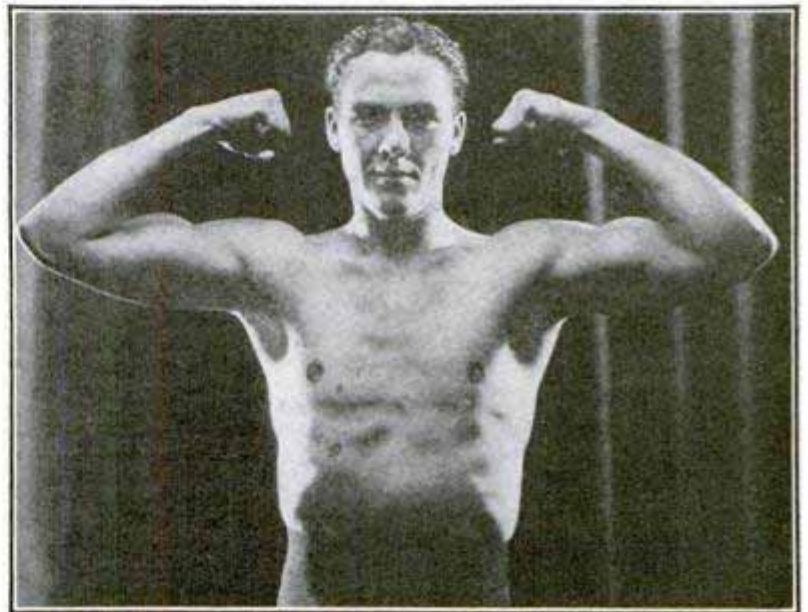
**BEFORE** Here's how Daniel Gully used to look—stoop-shouldered, flat-chested, scrawny and ungainly. Scarcely a muscle on his body—just soft, flabby flesh. He was as weak as a cat—no pep, no energy, no ambition.

**F**ELLOWS, it was a wow! On December 31st my 1928 muscle-building contest ended with a bang. I wish you could have been there when the winner was selected. It was a great occasion! Famous authorities of the physical culture world were present as the records of thousands of applicants were presented to the jury.

Man, you should have seen those records! Photographs of my pupils and actual measurements "before and after." I developed them. Talk about building muscles!

Well boys, 1928 is past and now we're off on our 1929 Prize Contest. Are YOU going to be the WINNER? Never mind what your present condition may be. Say! I've taken **cripples** and changed them into perfect specimens of manhood. Leave it to me—I'll make 1929 the greatest year of your life.

Here's my prize winner for 1928! What do you think of him? \$1,000.00 in cash and solid gold medal awarded to Daniel Gully, for the greatest *improvement* in physical development. Nationwide contest proves another amazing demonstration of **MIRACLES in MUSCLES!**



**And Only 30 Days AFTER**

Yes—after just one short month of Titus Training, Daniel Gully was a **NEW MAN**. Look at that build! Look at those muscles! Almost overnight Danny changed from a weakling to a **PRIZE WINNER**.



**SAXTON**  
World-Famous  
Strong Man Says:

"My feats of strength on the stage have brought me hundreds of inquiries asking how I developed such extraordinary strength. I tell them all to write to Titus; he'll show them how to develop physical power that will amaze them. Every red-blooded man should send for that marvelous book: **"MIRACLES IN MUSCLE."**

## YOU'RE NEXT Now Watch YOUR Muscles

Almost overnight the man you see above changed from a puny weakling into a physical **GIANT!** Looks like magic, doesn't it? But it's just an example of what **TITUS Training** has done for **thousands**.

30 days—that's all I want—and just 20 minutes a day. I'll cover your body with wads of solid muscle. **PANTHER MUSCLES**—packed with **SPEED** and **POWER**. The kind of muscles that make **CHAMPIONS!**

**I Guarantee:** to put 2 inches of solid muscle on your arms; to increase your chest five inches; to develop your neck to a size larger collar; to add three inches of powerful development to your thighs two inches to your calves; to give you a trim, slim waist-line. I don't just **promise** these things, I back every statement with an iron-clad written **GUARANTEE**.

## Amazing Book FREE

Tear off that coupon! Mail it today! It will bring you **FREE** the greatest book you've ever seen—a book filled with astounding photographs of men rebuilt—a book packed full of Titus's own secrets of making muscles **GROW**. No cost or obligation—just rush coupon to Dept. M-136.

The One **TITUS** 105 E. 13th St.  
and Only New York City



### Wear This Medal

The treasured trophy of world champions of strength. Awarded in solid bronze to every Titus Trained Man—and in **SOLID GOLD** to winner of each year's Contest.

MAIL THIS TO-NIGHT

Titus (Dept. M-136)  
105 East 13th Street,  
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Dear Titus: Sure I'd like to have your book. Send it Free. Also details of your 1929 Prize Contest.

Name.....

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# Strong Men Are Not Born

## THEY ARE MADE!

### I Develop Muscular Giants —I Can Make You Strong

It is a proven fact that strong men are made—not born. Many of today's famous strong men, including myself, were forced to take up physical culture or some form of exercise for their health, because they were physical wrecks. With proper handling they soon developed into veritable giants of strength.

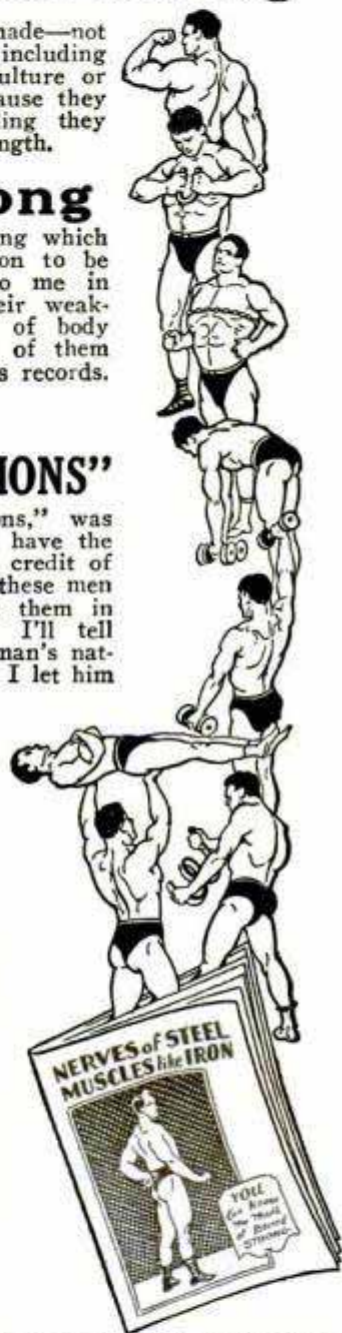
### You Can Be Strong

I have perfected a system of mail training which permits anyone to realize his life's ambition to be strong and muscular. Men have come to me in despair because they were ashamed of their weaknesses—needless to say with my method of body building they quickly improved and many of them developed into strong men who broke world's records.

### They Call Me

### "The CHAMPION of CHAMPIONS"

The title, "The Champion of Champions," was given to me by the men I have made. I have the longest list of champion strong men to my credit of any muscle builder in the world. Some of these men at first seemed hopeless yet after I took them in hand they became world beaters. Why? I'll tell you the reason. I do not try to change a man's natural self or nag him about what not to do. I let him follow his own individual taste and tell him what he should do. In other words, I give him the "know how" of getting strong and doing feats of strength. Regardless of what condition you are now in I know I can help you. My system never fails. I will make you fit and peppy. I will give you the body that you want and that nature intended you to have and I will do it in less than 90 days. After I get through with you, you will become popular and be sought after by both sexes. I will satisfy your hunger for love, strength and happiness. No matter if you want to put on yards or inches of muscle my proven method which has made thousands of men happy, healthy and strong, will do the trick without hard work or inconvenience. Don't wait another minute! Don't envy strong, healthy, popular men. Come to me! I will give you a body to be proud of. I guarantee to make a super-man out of you so that you will enjoy perfect manhood—I know I can do it. I work with you by mail and perform this miracle without interfering with your daily routine. Every week I visit you by sending instructions which take you step by step into a new world. When I get through with you, you will have a body to be proud of—you will have muscles like mine with a grip of steel and the strength to easily do feats that now seem impossible. From the first lesson you will notice the pickup and difference, you will walk differently—you will act differently—you take on that feeling of assurance that you are "there."



**GEORGE F. JOWETT**  
Champion of Champions

### Lend Me Your Body for 90 Days

After the first 30 days the new muscles on your arm will stand out like the village blacksmith's. Your legs from calf to hips will bulge with muscle, and your chest expansion will be the marvel of yourself and friends. This is no idle promise—I can do it, because I have done it for thousands of students and champions who thank me for the secrets of strength that I gave them.

### Send For My FREE Book

Send for my free book, "The Thrill of Being Strong." No obligation. You will get a real kick out of it. It tells what I have done for others—it shows many photographs of myself and my prize winning students and it tells how easily you too can have nerves of steel and muscles of iron. This book is yours absolutely free. Write for your copy and learn for yourself why they call Jowett "The Champion of Champions" and be convinced that I can help you.

### The Jowett Institute of Physical Culture

422 Poplar St., Dept. 4Q, Scranton, Penna.

DEAR MR. JOWETT:

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Name \_\_\_\_\_

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Without Obligation

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Address.....

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

Mail this coupon to  
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Here is an amazing offer to victims of rupture—an offer that has proved to be worth hundreds of dollars to many who have accepted it. Yet it costs you nothing.

A famous rupture specialist with a record of more than 20,000 cases will send you free of cost a newly-

edited book that contains amazing new discoveries about rupture relief . . . case histories galore . . . illustrated in detail. A few of the facts contained in this free book are given below. But do this right now. Tear out the coupon at the right and send for this unusual book!

## Can Rupture Be Exercised Away? Get Newest Book Now **FREE** to Ruptured

"It was twenty years ago when I first got ruptured. Today I consider myself entirely cured. Your system is nothing short of marvelous." John Miller, Jr. "Some months ago I ordered your outfit for the treatment of rupture of my son. Our doctor fitted it on him and he was skeptical it would help cure the condition, for it was one of the worst ruptures he had ever seen. Five months later I took the boy back to the doctor. He examined him and pronounced the rupture completely healed." D. E. Lytle, Orrville, Ohio.

These are but two of many astounding letters received from people, many of whom had despaired of obtaining relief from the torture and agony of rupture.

### Not a Truss

What is this wonderful device that has made thousands feel again the joy of living a full life? It is not a truss like men wore in the days of Lincoln. It has no steel springs, no leg straps, no bulky cushions. It can never slip off the rupture. Wearing it, you can still cough, run, jump, bend or sleep in any position. In fact, many are able to work every day—exercise as much as they desire—probably we should say truthfully actually **EXERCISING RUPTURE AWAY!**

Imagine a simple little device weighing less than a feather—little larger than a quarter—that rests firmly against the rupture without the need of strapping tightly. Think of a flesh-soft pad that yields with the slightest movement of your body—filled with millions of air-cells that breathe fresh, cool air into the spot around the rupture. And all the while blood circulation is more free

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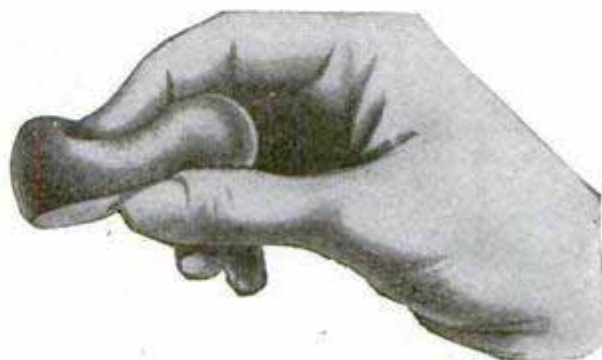
### Now or Never!

Be fair to yourself. Get the complete facts about Magic Dot and the offer that permits you to feel this marvelous relief, before you decide to buy. Don't go through life in constant pain. Relief from rupture is certainly worth the 2c stamp it costs you to send the coupon above. Send it—not tomorrow or next week—but **NOW!**

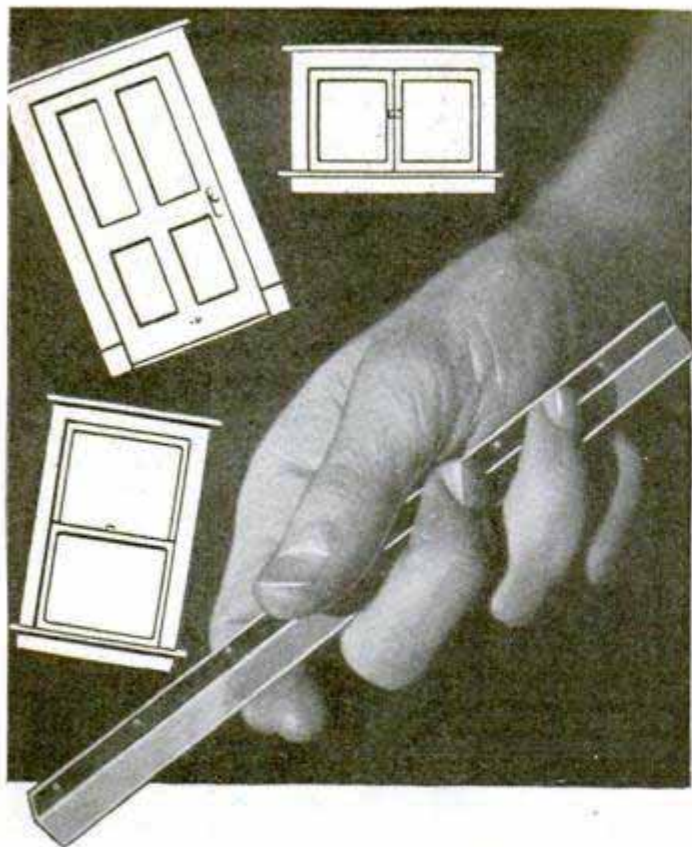
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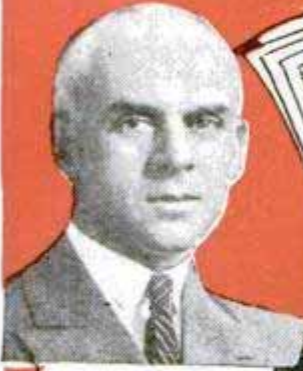
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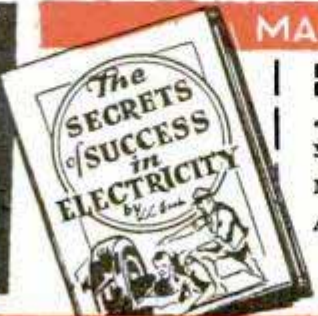
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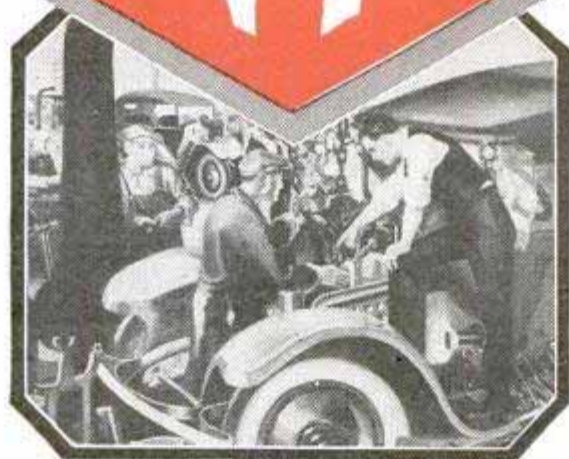
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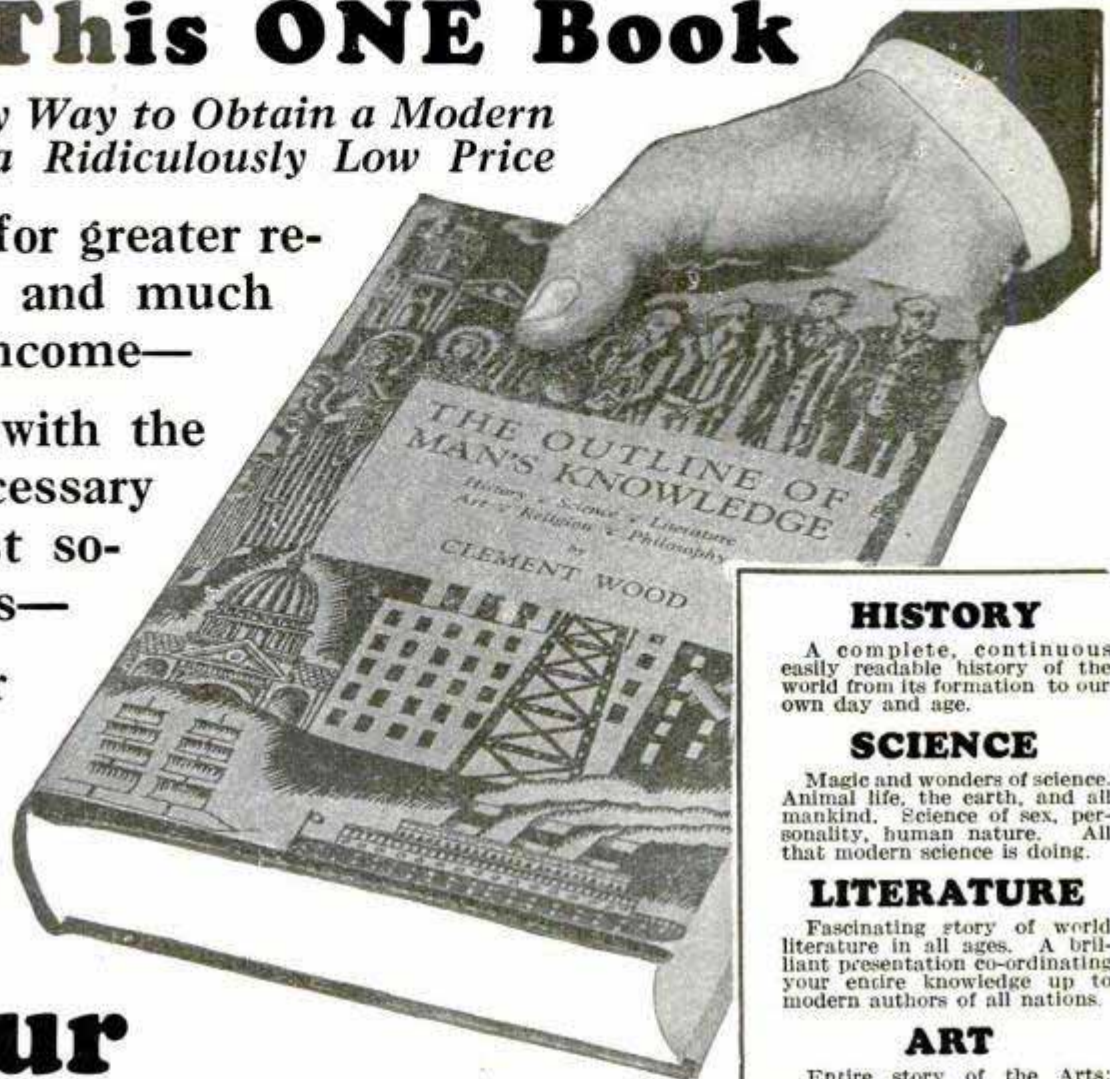
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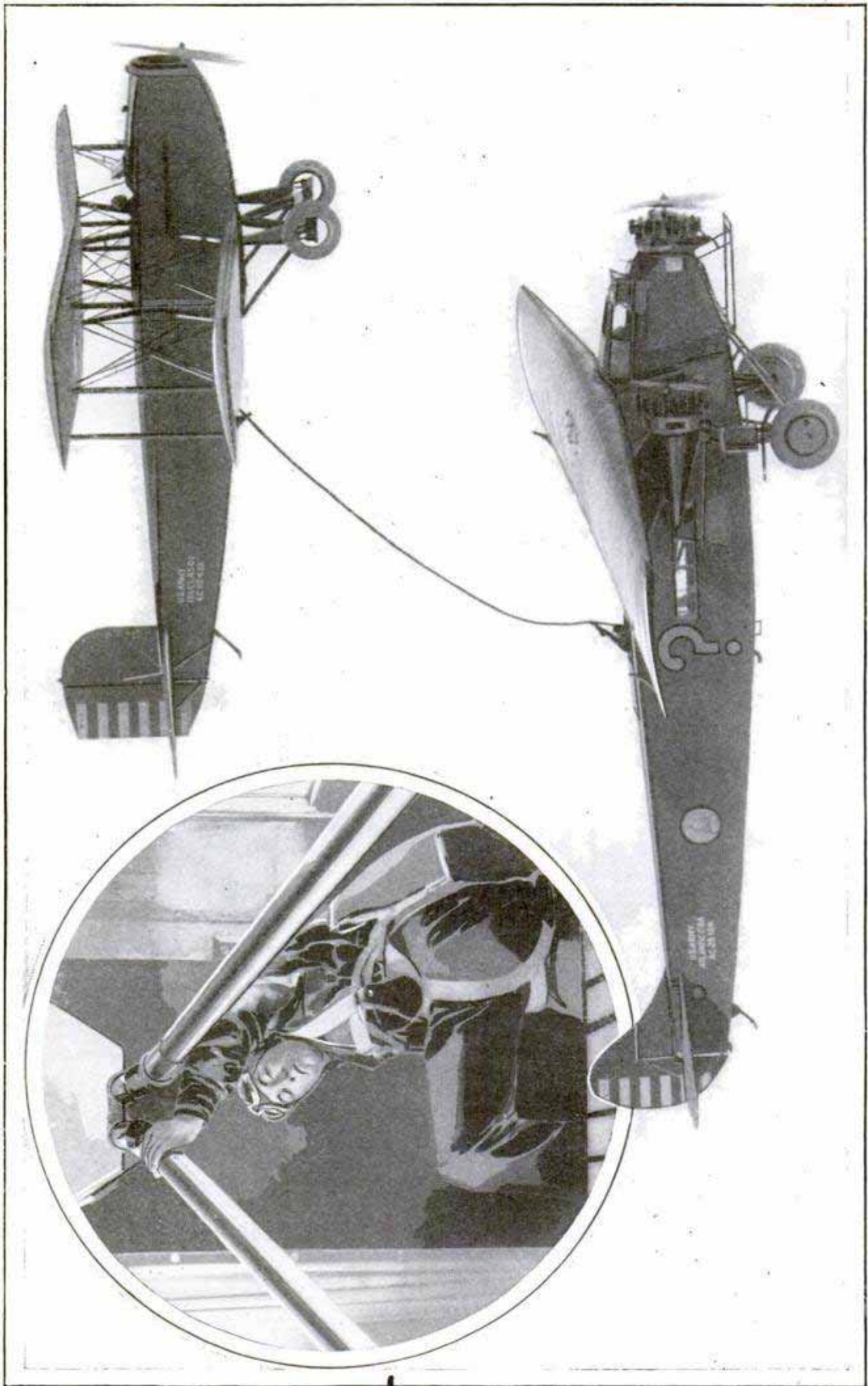
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The Big Tri-Motor Fokker "Question Mark," Refueling in the Air over San Diego; the Gasoline Hose, Dropped from Above, Is Caught through a Hatchway in the Cabin Roof; Inset, Lieutenant Quesada of the Record-Breaking Crew Looking After the Gas Lines

Wide World Photos



# Popular Mechanics Magazine

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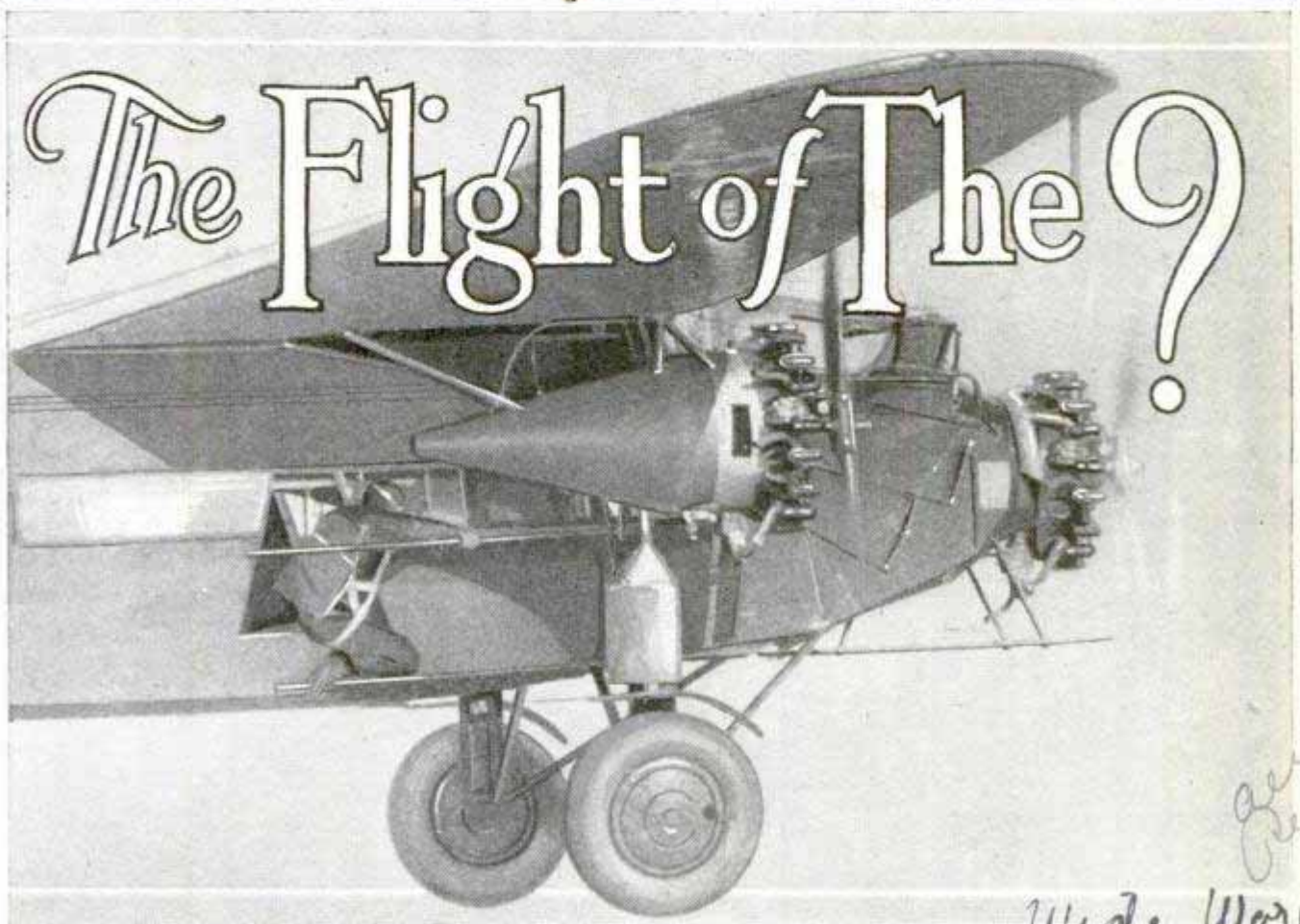
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 51

MARCH, 1929

2076

No. 3



Sergt. R. W. Hooe, Wearing Both Back and Front-Type Parachutes, Starting Out the Catwalk to Look Over the Starboard Engine of the "?" While Flying above San Diego, California

*Gene Buford*  
*Wide World*

**F**IVE weary flyers, their faces grimy and smudged with oil, stepped out of a great tri-motored airplane at the Metropolitan Airport, Los Angeles, and jumped into waiting ambulances to be speedily transported to food and baths and rest. Their huge machine had been aloft 150 hours and 40 minutes; which meant that they had broken every aviation endurance record in history.

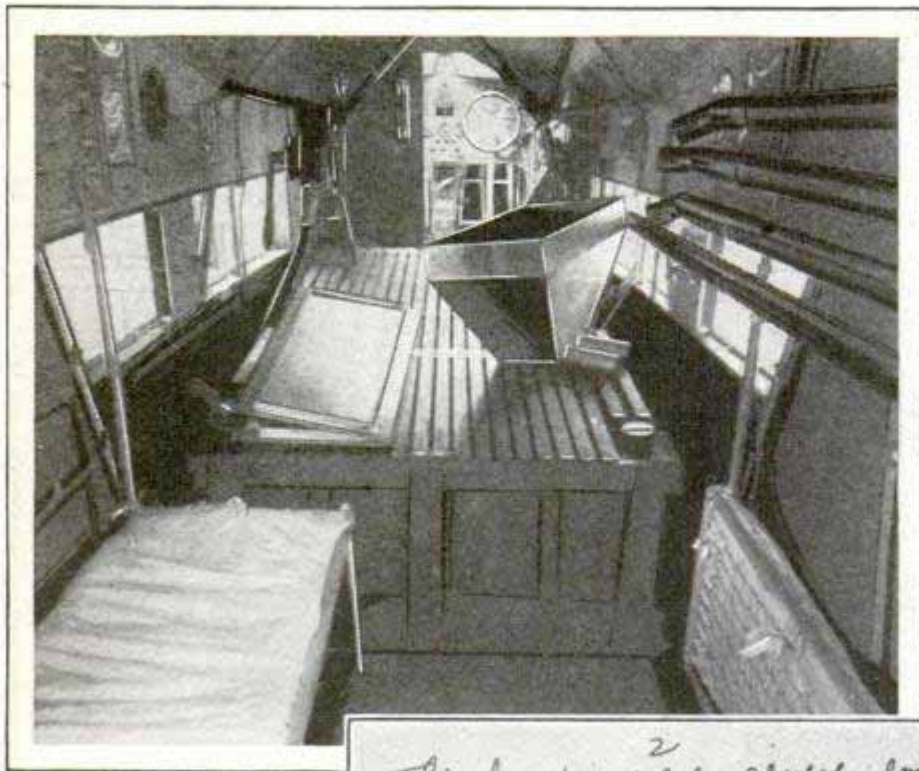
A few minutes earlier, a forced landing had averted what might have been a tragic fall to the earth. For a night and a day, all hands had fought fiercely against engine failure in every motor. And at a time when once again the craft had seemed to be in ship-shape condition, it was found that the left motor was missing, a situation calling for but one procedure—immediate descent.

Nearly five days previously the giant

plane, refueled at stated intervals by means of an especially devised hose attached to a plane that flew to within a few feet of the "Question Mark," had broken the American refueling record of 37 hours and 15 minutes, made at San Diego in 1923 by Lieuts. Lowell Smith and Paul Richter. Having shattered this mark, a few days later the "Question Markers" broke the world's refueling record of 60 hours and 7 minutes made by two Belgian airmen, in 1928. Later the intrepid American flyers proceeded to break the world's record of the "Graf Zeppelin," which soared 3,967 miles in its flight to America last fall while remaining in the air 111 hours and 34 minutes.

The "five musketeers," as they are affectionately known in air-corps circles, were Maj. Carl Spatz, flight commander, Capt. I. C. Eaker, Lieut. H. A. Halverson,





Lieut. E. R. Quesada, and Sergt. Roy Hooe.

The method of transferring fuel from the air was unique in aviation history. In this connection Maj. Gen. James E. Fechet, chief of the air corps, says: "The manner in which the refueling apparatus was installed and perfected is marvelous. Watching the actual operation previous to the flight, I was astonished to find that there was no difficulty at all in attaching the hose to the fuel pipe of the endurance plane (going at about seventy miles an hour) and when the gasoline was being delivered the pressure was such that the hose became an integral part of both planes. No effort on the part of Major Spatz was required when the delivery

The humps were severe enough to cause a difference in distance between the two airplanes of 20 or 30 feet in a fraction of a second. The piloting by both men. Eaker in the C2 and Moon in the C1 was superb. spatz.

Refuelled with 150 gallons gas.  
 35 gallons oil food + supplies - 9:42 - 9:48 am.  
 over San Fernando valley - Fog still creeping up toward airport.

of the fuel took place."

As emphasized by the air-corps experts at the outset, the purpose of the flight was not only to put modern airplane engines to the acid test of absolute endurance and to determine the strain of flight on the human system over a protracted period, but also—in fact primarily—to investigate the practical value of refueling in both military and commercial aviation. Bombing planes, for instance, would be given a wider range of action,

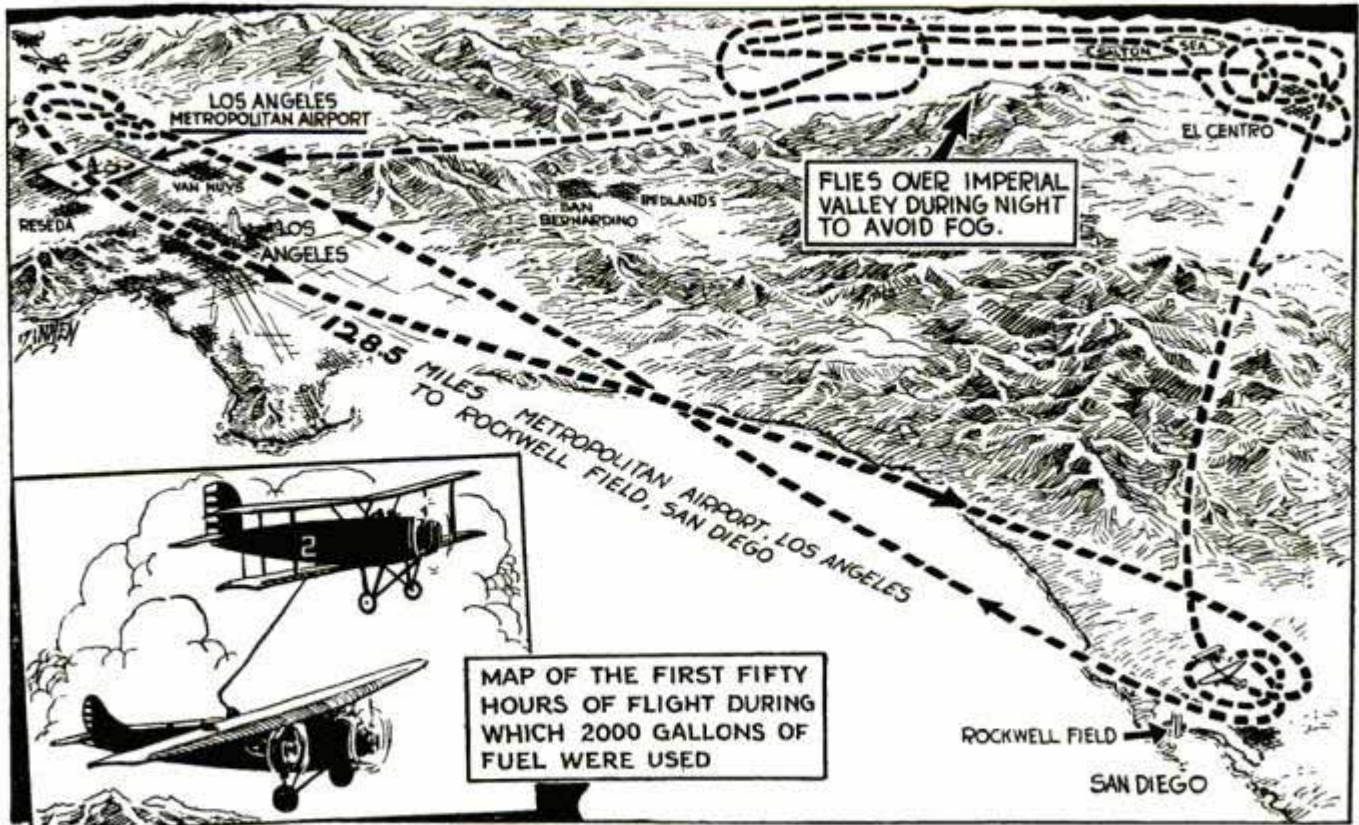
while commercial planes, owing to decreased fuel weight, would be able to carry greater payloads, if refueling could be demonstrated as a successful routine function in aviation.

Both the refueling plane and the endurance ship were equipped with two gas tanks and



Interior of the "?" Showing the Berths and the Big, Square Refueling Funnel; Center, a Sheet from Major Spatz' Log; Bottom, Chalking Messages on the Messenger Plane, Which Flew Alongside to Deliver Them





The Map of the Epoch-Making Six-Day Flight, Which Broke All Records; Because of Fog on the Coast, the Plane Spent One Night Inland Flying over the Desert Waste of the Salton Sea

an oil container. The tanks in the former are joined with a pipe to which is attached a fifty-foot hose with a two and a half inch diameter. A similar hose is attached to the oil tank, while ropes were provided also for lowering food, water, messages and other supplies. On top of the gas tank in the "Question Mark" is a berth with two other beds of the folding variety in the rear of the cabin. The gasoline is pumped by hand from the special tank in the refueling ship's cabin.

During refueling periods, the two ships came within about seventeen feet of each other, the endurance plane flying beneath and slightly behind the supply ship. Major Spatz, wearing goggles, rubber face mask, rubber gloves and a raincoat, stood on a small platform built in the entrance compartment of his ship. Thus he was about shoulder-high in the opening cut in the top of the ship at this point. As the hose was lowered from the plane above, he caught it, pulled it through the opening and turned a valve; whereupon the gasoline poured into a reception funnel just beneath the mouth of the hose, at the rate of seventy-five gallons per minute.

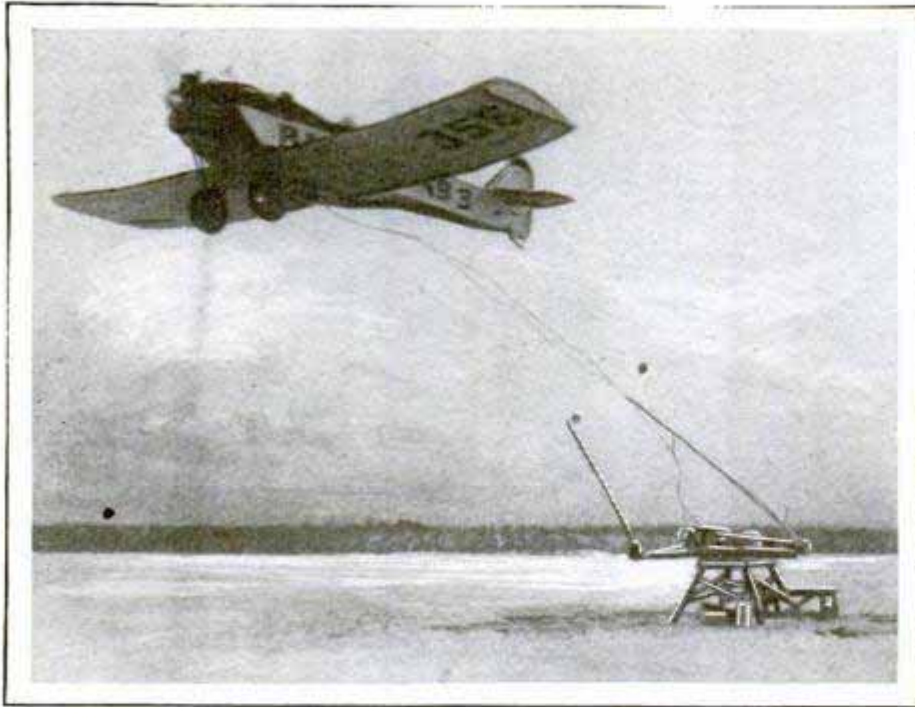
A complete log of the ship tells a graphic story. In its earlier stages, it tells buoyantly of luxurious repasts of roast chicken,

ham and eggs and hot coffee, pleasant lounging about the cabin and perusal of the very latest magazines and newspapers. But there are, too, Major Spatz' entries about his experiences when the refueling hose slipped during its speedy journey and spread gasoline all over the interior of the cabin; for instance: "The refueling last night was the most severe test we could have had. Air was very bumpy. Our batteries were low and gave only a faint light. Moon, Jopkins and Solter (in the refueling plane) stuck to their guns nobly. The bumps were severe enough to cause a difference in the distance between the planes of between twenty and forty feet in a fraction of a second."

Late in the flight, in fact the day before the forced landing, Lieut. Elwood R. Quesada, one of the four pilots in the "Question Mark," wrote: "One motor sounds all right but doesn't look so good. It is slowing up. We can't trust our ears any more. It looks as though the human being would outlast the motors. They are going fast."

One of the unsung heroes of the epochal flight is Sergt. Roy G. Hooe, chief aviation mechanic at Bolling field, Washington, whose task on the "Question Mark"





A Refueling Flight That Failed; Blaine Tuxhorn's "Barling" Taking Gasoline from a Catapult That Hurlled ~~Cans~~ into the Air

was to maintain at all times the steady beat of the engines. If any of the three great 225-horsepower motors happened to skip or falter, Hooe had to repair it at once, and to say that his was a man-sized job in the midst of the terrific speed and frequent cold weather, is to express the situation mildly. Many a time he had to climb out on the fuselage and repair an engine. Along with the four tireless pilots he made aviation history.

No objective was set concerning the length of time the plane was to remain aloft. The problematical feature of the mission is best indicated by the naming of the ship the "Question Mark." Air-corps heads early emphasized the point that a minor mishap, which means little in ordinary flying, can put a most effective though temporary brake on any non-stop experiment. However, every precaution was taken to have plane, engines and equipment as flawless as possible. Nothing was left to chance.

Regarding the earlier refueling test, Major General Fechet says: "Preliminary research along these general lines was made five years ago when Capt. Lowell H. Smith and Lieutenant Richter conducted experiments which had their climax in a border-to-border flight along the Pacific coast. This flight furnished opportunity for the transfer of the largest quantity of gas then on record."

However, the tests of 1923 and those conducted by the "Question Mark" differ in certain marked respects. In the first place, the 1923 endurance plane had only one motor while the record breaker has three. The largest quantity of gas transferred at the earlier date was 125 gallons while hundreds more had to be poured into the tanks of the 1929 endurance ship between dawn and dusk every day. Two men sat in open cockpits in 1923, while five men enjoyed a far greater share of comfort in the "Question Mark," which includes

among its special equipment three berths, two comfortable wicker chairs, books, radio and a small electric stove.

The plane in the recent flight was to have two officers on duty in the pilot's compartment at all times. Major Spatz attended to the transfer of supplies and Captain Eaker was at the wheel during the contact periods, of which there were from three to six each day. That is to say, these two officers took charge by day while Lieutenants Halverson and Quesada took their places by night.

Many and enthusiastic were the expressions of opinion about the probable effects of the record-breaking flight from men high up in the war department or air corps. Major General Fechet said: "I believe that within a few years we will have commercial planes capable of a cruising speed of 150 miles an hour crossing the continent from New York to San Francisco and Los Angeles without stopping and picking up their fuel in the air."

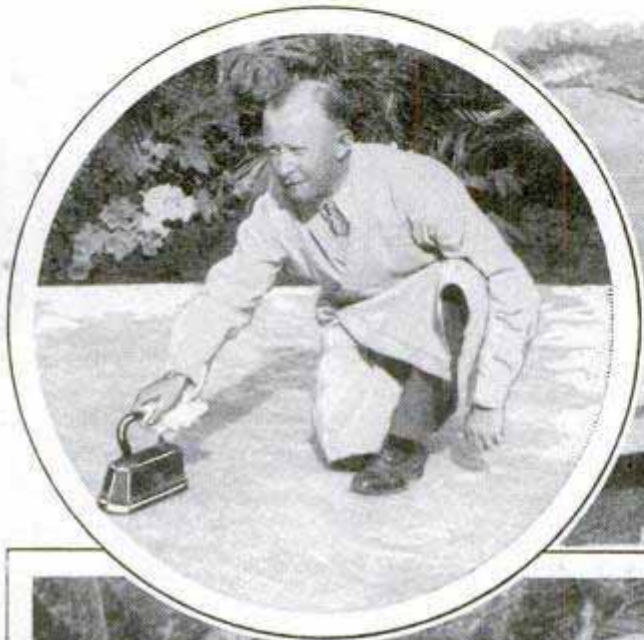
F. Trubee Davison, assistant secretary of war in charge of aeronautics, called the feat, "a new and thrilling chapter in man's conquest of the air." He added: "Several important problems were solved in preparation for the flight, all of which make for materially increased safety and reliability. Many other lessons have undoubtedly been learned which a study of the details of the flight will reveal."



*Chemical Engineer,*  
*Paramount Studios, Hollywood,*  
*Calif*

# CHEMICAL SKATING RINK SMOOTHED BY HOT IRON

Synthetic ice, made from chemicals, places skating in the list of summer sports where an artificial pond is practical. It is warm instead of cold and does not melt, and when it becomes rough after too much use, it is smoothed out with a hot



Pouring the Chemical into the Frame of Rink, Smoothing Rough Places with Iron, and Skaters Enjoying the Thrills of a Winter Sport in Tropical Surroundings

iron. The formula for the composition of the artificial ice is the invention of a chemical engineer of Los Angeles, and the rink illustrated is installed, amidst

tropical surroundings, in a Hollywood studio, for use by the actors during recreation hours. For skating, the ice has all the properties of the natural product.

*A. B. Maas Chemical Co 3082 8 11 14*

*Prof Arthur B. Maas, Industrial Chemist University of Southern California*

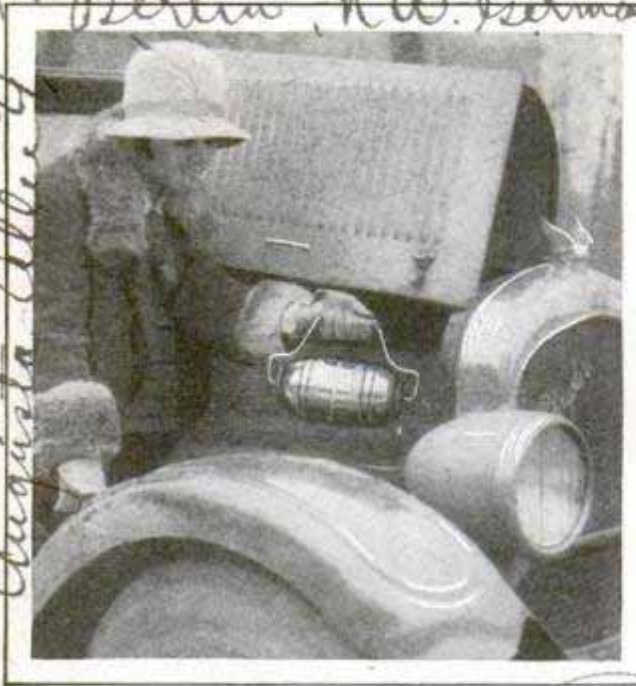
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*University of Florida Gainesville Fla*

**COAL STOVE FOR AUTO ENGINE PREVENTS FREEZING**

*2044 Berlin N.W. Germany*  
*Ulro Motor and Truck*  
*Zubebar A. So. Kaiserling*  
*Augusta Illinois*



© P. & A.

Placing the Stove under Hood, to Keep the Engine Warm; the Degree of Heat Can Be Regulated

To keep the automobile engine and radiator warm while the car is parked in cold weather, a portable coal-burning stove has been introduced. It is said to be entirely safe, has an arrangement for regulating the degree of heat desired and can be carried under the hood when it is not needed.

**PRAYER WHEEL RUN BY WIND PUT ON EXHIBIT**

*2018*

Devout natives of Tibet have an easy way of saying their prayers. The supplication is written out on a long strip of paper something like stock-ticker tape, then placed in a wheel or cylinder which is spun at a rapid rate, sometimes for days. Each revolution, the worshipers believe, is equivalent to an oral repetition of the prayer; therefore many spinnings make it more effective, it is thought. Some of the cylinders have a tin propeller to produce the revolutions when the wind blows. Dr. Berthold Laufer, noted orientalist of the Field Museum of Natural History, who has collected a number of the prayer wheels for the museum's exhibits, points out that it is curious that a people so backward and slow-moving in other things, should have devised a mechanical means of saying their prayers. The idea, he sug-

gests, seems more in keeping with the more mechanically minded people of the west. Near the villages, and in the galleries of some of the temples of Tibet, are huge barrels, thirty or forty feet high and fifteen to twenty feet in diameter, turned by windmills or waterpower. In these are placed complete collections of the books of Lamaism, the native religion.

**CHEMICAL IN GRAPEFRUIT PEEL FORMS GOOD FERTILIZER**

*2005*

Grapefruit peelings contain chemicals that make good fertilizer, tests at the Florida experiment station have shown. Nitrogen, potash and phosphoric acid are among the substances they release to the soil. In certain producing centers, where large quantities of the offal are available, the peelings can be used for fertilizer with but little expense, the tests indicate.

**BILLIARD AND DINING TABLE COMBINED IN ONE**

*2022*

Entertainment and utility are combined in a table that has a removable top with space for playing billiards beneath. When the top is on, the table cannot be told from an ordinary living or dining-room article, and the cover is made in sections so that it can be removed easily. Drop aprons conceal the billiard rails and pockets.



Table Top Slides Back in Sections, and Is Removed for Playing Billiards on Base Underneath

*Brunswick. Baker*



**PLANTS SNEEZE AND TAKE COLD  
SCIENTIST FINDS** 2090

Plants and flowers are afflicted with a form of sneezing and catching cold, according to H. H. Whetzel, of the New York state agricultural college. Professor Whetzel has photographs of a plant sneezing. A certain kind of destructive fungus has cup-shaped seed holders and at the bottom of each seed-pod bag is a charge of starch which ferments and explodes. This causes the seeds to blow out in all directions. They float through the air and lodge on the leaves of other plants, taking root there and causing effects similar to those produced by colds. Among the plants, however, the "colds" are not contagious. Each variety has its own kind of cold and these do not attack other plants not even in the same garden. A photograph, taken at the instant of the explosion of a seed bag, shows tiny seeds swirling like a dust cloud from the cup.

*Dr. Joseph C. Marcelais, 60 Safety Clear Vision Co. Fitchburg, Mass.*

**WINDSHIELD WIPER IS HEATED  
AND ALSO REDUCES GLARE** 2049



To prevent the formation of snow and ice on the windshield, an eastern inventor has devised a heating chamber, installed with the wiper. It is wired to afford different

degrees of heat and can be swung out of the way when not needed. The heat chamber itself is of tinted glass, which is said to reduce the glare from approaching headlights and also protects the eyes from the glare of the snow in winter driving.

**SHARKS TO YIELD PROFITS  
IN OIL AND LEATHER** 2010

To reclaim valuable products from the tons of sharks that are caught every week during the whaling season, an Australian concern plans to erect a factory at Two-fold Bay, New South Wales. It is estimated that nearly \$1,500 will be reclaimed each week in oils, leather and other substances produced from the sharks and other inedible fish.

*Conk. K. E. Chute  
Box 407, Route 4*



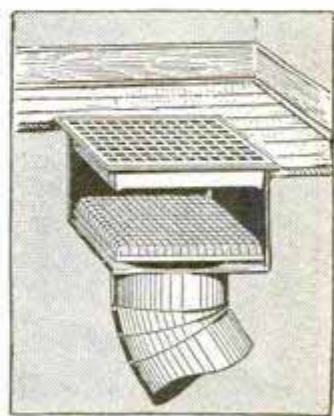
Outlets Installed in Office, and Close View of the Single and Double Types

**ELECTRIC OUTLET ON FLOOR  
SIMPLIFIES WIRING**

Adapted especially for stores and offices, an electric outlet is set up near a desk or table for lights, telephone, dictating machines or other equipment. It is made in single or double-connection styles, is easily installed and has a brass housing that protects the wires. With a number of these outlets in place, various combinations of service can be worked out with practically no extra wiring, and the floor connections are often more easily made than those from wall sockets.

**FILTER FOR HOT-AIR REGISTER  
KEEPS WALLS CLEAN** 2052

To prevent dust and dirt from soiling the walls and ceilings in homes that are heated by hot-air furnaces through floor registers, a filter pad has been designed to be installed just below the register. It is made of a finely woven, chemically processed steel wool and is thick enough to cleanse the air of soot and smoke without appreciably hindering the heat from rising into the room. It is easily removed for cleaning.

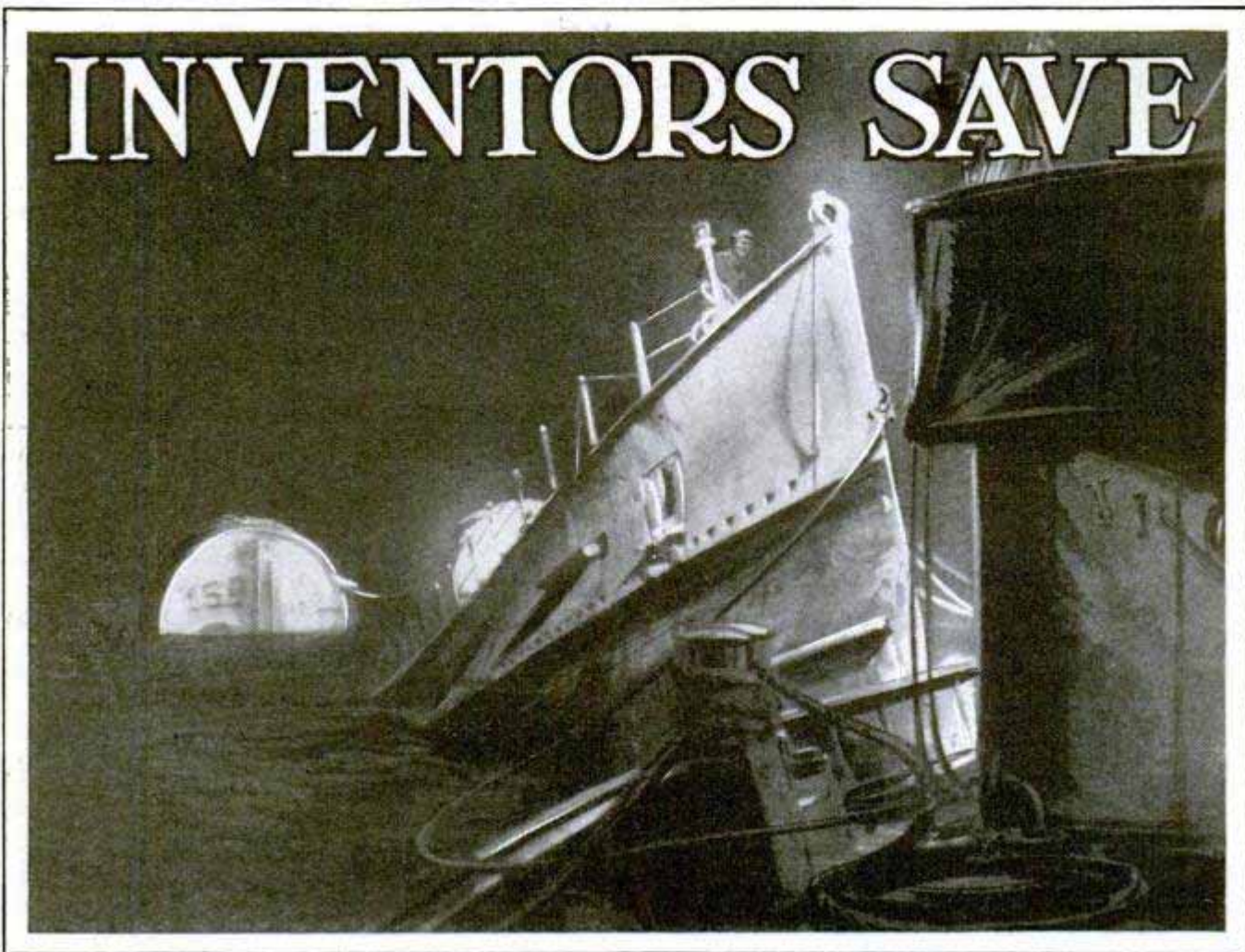


*Fettle Register  
H. C. ...*

*Chicago, 53 Jackson Blvd.  
Frank H. ...*



# INVENTORS SAVE



The Bow of the "S-4," Supported by Two Pontoons under the Lights of the Salvage Tugs, After It Broke the Surface Following Forty-Nine Hours on the Bottom of the Atlantic

**T**ESTING the best of more than 5,000 submarine-rescue devices proposed to the navy during the last year, the "S-4," which was rammed by the coast guard destroyer "Paulding," on Dec. 16, 1927, is now undergoing trials as the world's first experimental rescue submarine.

Raised and repaired, after the removal of the bodies of her forty dead—six of whom lived for seventy-two hours in the torpedo room before their air supply was exhausted—the "S-4" was sent to the bottom again on the first anniversary of her fatal accident in the first of the series of experiments which may continue for many months. Her engines had been removed and the apparatus that remained aboard concentrated in two main compartments, leaving three sections which may be flooded at will to simulate conditions on a damaged submarine.

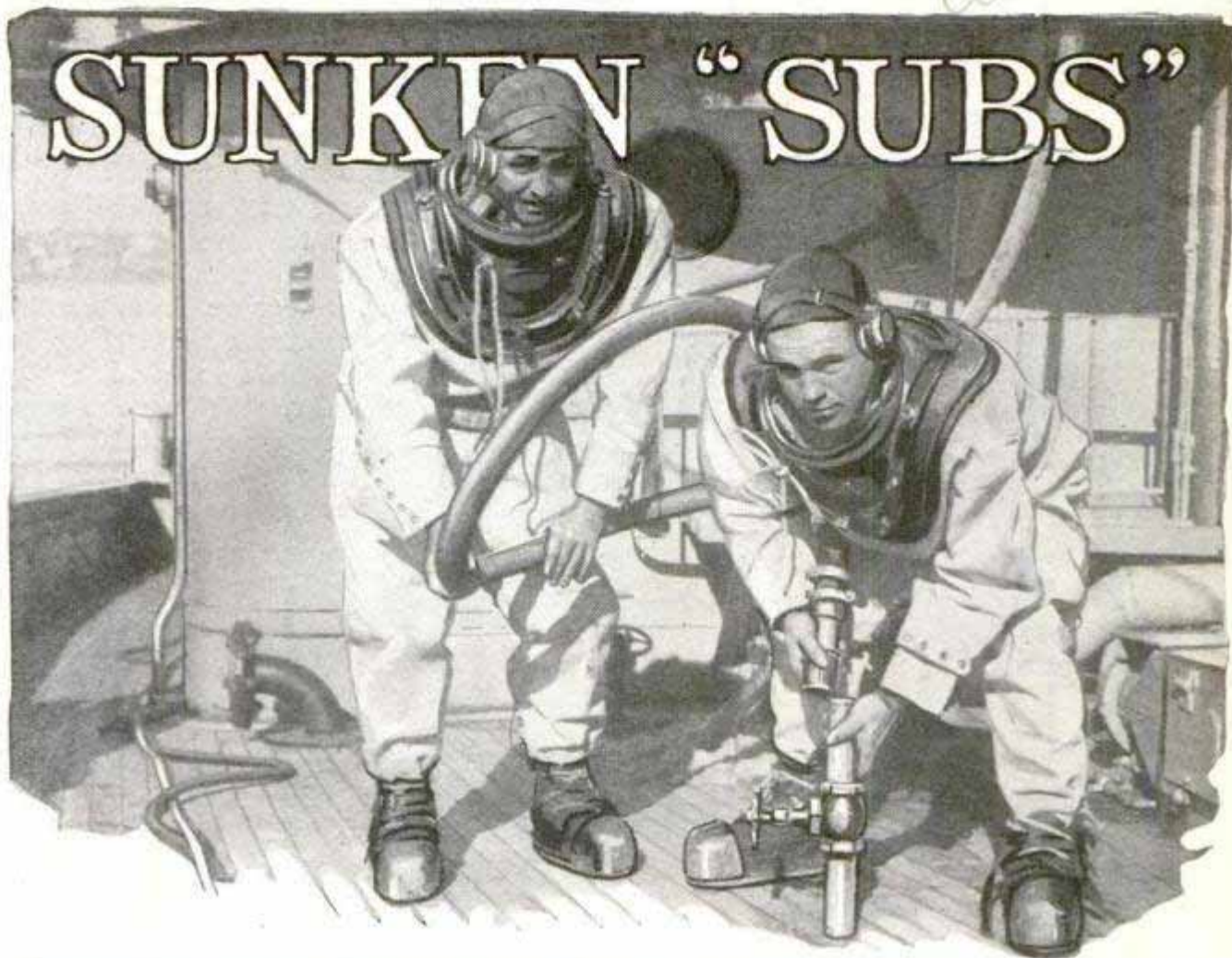
The first test was not an unqualified success. It took forty-nine hours to bring the boat to the surface after sinking her in sixty feet of water, and that was with the rescue equipment ready alongside to start

rescue operations the moment she reached the bottom. Had it been necessary to gather the pontoons, chains, divers and rescue craft, and tow the heavy pontoons to the scene, it would have been impossible to bring the boat up in the seventy-two hours that six men had survived aboard her. The first device tried was a set of "pad eyes"—huge eyebolts built into the hull—to which the chains of the lifting pontoons could be shackled without tunneling under the sunken boat, as is necessary when chain slings must be passed around the hull.

It took ninety minutes to attach the first of the four chains. After the two forward chains were fastened, water ballast was blown from one of the side tanks to make the submarine list over at an angle of twenty-five degrees, so that one of the after pad eyes was almost buried in the mud and the other elevated on the sloping side of the craft. This was done to test the ability of the divers to reach the eyes under adverse conditions. Despite the change, the two after chains were



# SUNKEN "SUBS"



Clarence Knight and George Boone, Two of the Divers on the "Ortolan," Submarine Rescue Ship of the Pacific Fleet; the "Ortolan" Can Put Twenty-Four Divers over the Side at One Time

attached in about the same time as those to the forward eyes.

The submarine rescue ship "Falcon" then began blowing the water out of the pontoons and flooded compartments by sending down air at high pressure, but instead of coming up, as expected, the bow of the submarine broke the surface while the stern remained on the bottom.

After a consultation, it was found that two errors in designing the rescue devices were to blame. One was that the single air line was forked in order to supply the three main ballast tanks, and the second was that the escape vents for water in both forward and stern compartments were all placed at the forward end of the sections. With the boat resting on an uneven bottom, the bow being higher than the stern, the air line could only force out a certain amount of water in the stern, and too much remained to restore buoyancy. The navy experts decided that individual air lines, as built in the navy's new V-class submarines, and the location of forward vents at the forward end of for-

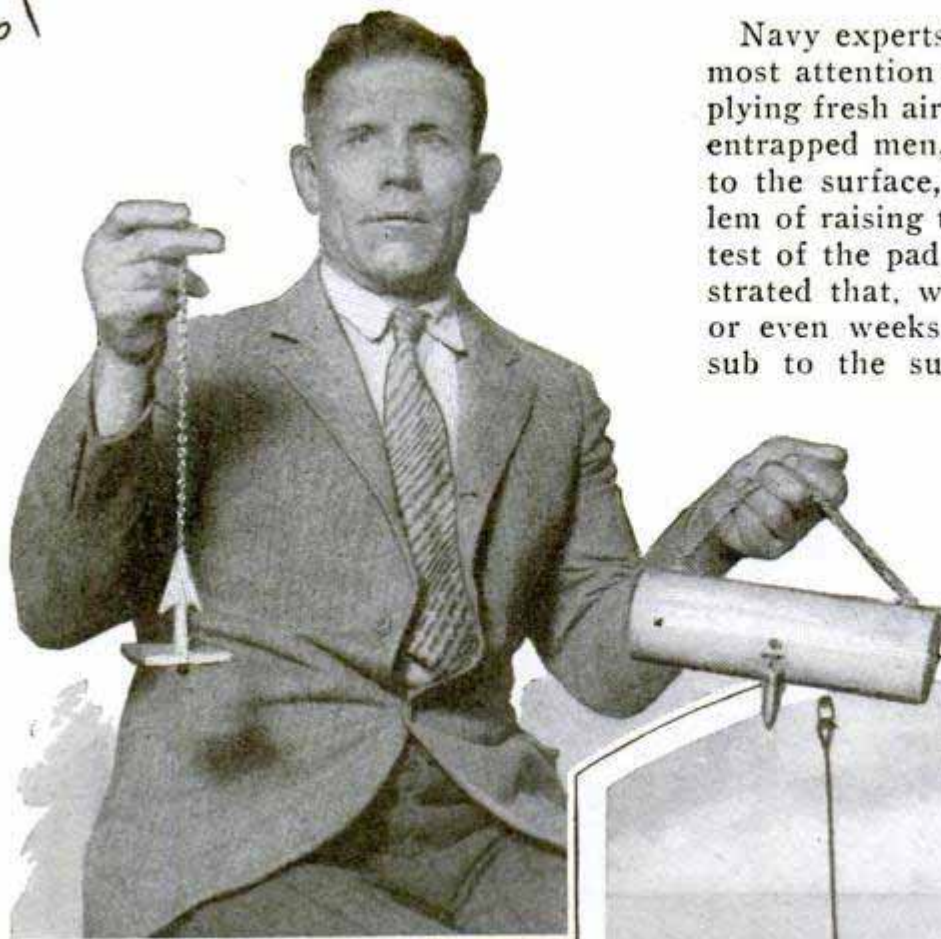
ward compartments and after vents at the aft end of stern compartments would solve that difficulty.

Following the first experiment, the submarine was towed to Key West, where tests will be continued in warmer waters. One of the first things to be tried there is a submarine diving bell, built to fit a special escape hatch on the deck of the submarine. The hatch is provided with a coaming over which the diving bell comes to rest, forming a watertight joint. The divers descending inside the bell can guide it into place and then open the escape hatch and take a number of the crew into the bell. It was estimated that three hours would suffice to rescue forty men.

Another form of escape, is the concentration of all the available air in the submarine in one compartment by flooding the others, to provide a reserve supply for the crew while they don the navy's new rescue helmet, called a "lung," and escape singly through a special hatch. The lung is a small face mask attached to an air supply in a container that closely



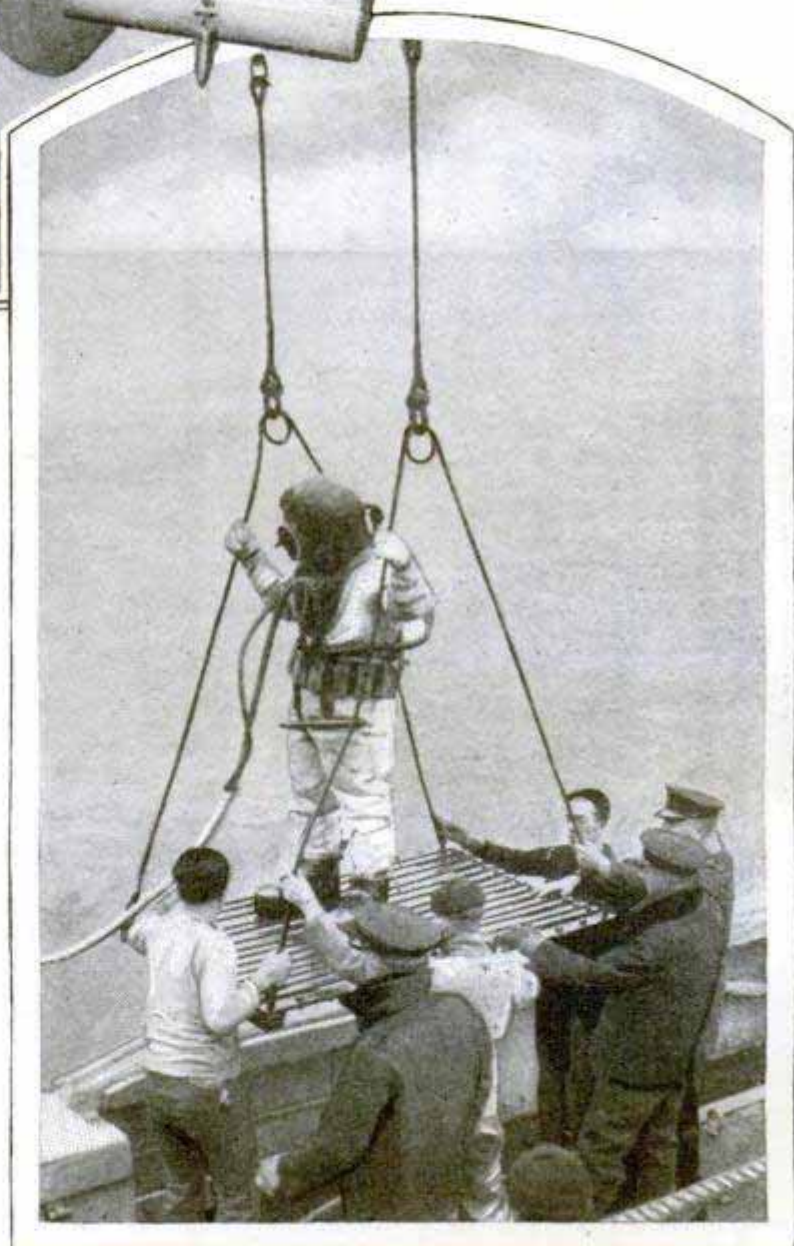
2061



Navy experts are generally agreed that most attention should be devoted to supplying fresh air, and, possibly, food, to the entrapped men, and effecting their escape to the surface, before tackling the problem of raising the sunken craft. The first test of the pad eyes on the "S-4" demonstrated that, while they would save days or even weeks of effort in bringing the sub to the surface, there is still small chance of collecting the pontoons and rescue gear, reaching the scene of an accident, and getting the submarine up before the crew had died from lack of air.

resembles a rubber hot-water bottle. Experiments already made show that even inexperienced men can rise 155 feet without discomfort, and without suffering from the dreaded diver's cramps, or "bends."

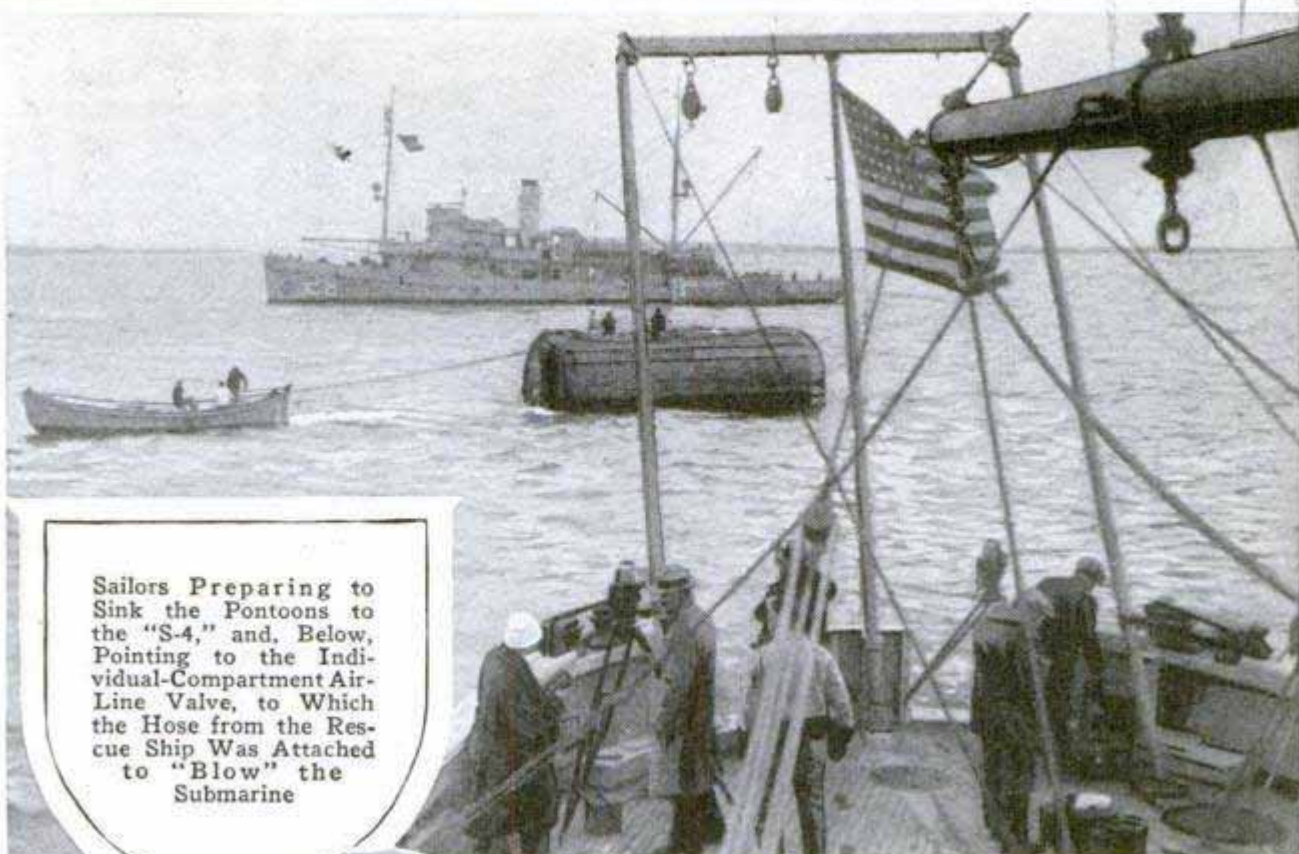
Simultaneously with the "S-4" tests, experiments started with the old submarine "Defender," one of Simon Lake's early boats, which has been rebuilt as an under-sea salvage boat. As rebuilt, the "Defender" has an air lock on the underside of the bow through which a diver can reach the water. The first experiments were made in raising a sunken pontoon, but it is planned to carry out thorough tests with a submarine. The "Defender" will be able, the builders believe, to drop to the bottom alongside a sunken craft and send over divers to couple on air lines or hook on lifting chains much faster than it can be done from the surface. Lying on the bottom, the boat will be independent of weather conditions.



A Diver on the Stage, and Henry Lotz with His Model Hook and Pontoon Which Eliminates Divers Entirely

While the rescue crews on the east coast were experimenting with the "S-4"





Sailors Preparing to Sink the Pontoons to the "S-4," and, Below, Pointing to the Individual-Compartment Air-Line Valve, to Which the Hose from the Rescue Ship Was Attached to "Blow" the Submarine



Sailor, on Right, Holding to One of the Pad Eyes Built into the "S-4's" Hull





Diver in the Recompression Chamber, Preparing to Test an "Artificial Lung," Which Has Proved Practical at Depths of 155 Feet

and "Defender," a successful attempt at supplying both fresh air and food to a crew on the bottom was carried out by the Pacific fleet off the southern California coast. Special valves, developed under the direction of Rear Admiral Ridley McLean, were installed in each compartment of the "S-29," and the submarine then put to sea. Acting the part of a surface ship which had rammed a submarine, the sub sent out a radio call for help, giving its position, and then dived and came to rest on the bottom in ninety feet of water.

Ten miles away, the rescue ship "Ortolan" received the radio call and steamed at full speed to the position given. As it approached, an air "slick" was sighted. The "Ortolan" put out a pair of motor launches equipped with sweep wires and grapnel, and while they patrolled the sea, the listening device down in the bow of the rescue ship began to signal the submarine. Back came a code reply, tapped

out on the "S-29's" hull with a hammer.

With the spot well marked, the rescue ship anchored directly overhead, lowered hose lines, and the divers prepared to couple on to the valves in the hull. Eight hours after the submarine had submerged, Lieutenant Karns, looking through the eyepoint of his conning tower, saw a diver clamber along the deck and through the faceplate of his helmet recognized Diver Knight, a Sioux Indian. Knight saluted and began coupling on the first hose. A moment later the submarine crew heard muffled words as another diver expressed his heated opinion of a balky coupling. Within a few minutes the "Ortolan" was ready to send down air, or use the hose lines to furnish fresh water or hot soup. The "S-29" had eleven hose connections.

In a report of the bureau of construction and repair, the tremendous difficulties in the way of any form of special apparatus is emphasized. Unlike a surface ship, a submarine is a delicately balanced thing in which the available buoyancy, when operating submerged, is practically zero. To add equipment means that something else must be taken out. In the building of new submarines, it is possible to assign any desired proportion of weight to the necessary rescue equipment, but when it comes to re-equipping the existing ships, the problem is entirely different. Part of the weight of the rescue equipment can be compensated for by reducing the weights in the ballast keel, but any such reduction cuts down the reserve stability of the ship, and therefore increases the danger to both submarine and crew, making an old refitted sub actually more dangerous than one without the new safety devices.



V. J. Surmeli, Keppawh N. J.  
POPULAR MECHANICS  
Office, 247 Park Ave  
New York



Twenty-Passenger Metal Monoplane with Its Wide Cabin, Shaped like the Wing Itself, to Afford More Room for the Occupants and Decrease Air Resistance

### METAL PLANE WITH WIDE CABIN CARRIES TWENTY PERSONS

A cabin, fourteen feet wide and having accommodations for twenty passengers, is one of the chief features of an all-metal monoplane which has been designed for fast service between New York and Chicago. The broad, flat shape of the cabin, conforming to the pattern of the wing, is expected to contribute to the ship's sailing qualities. The plane has two motors of 650 horsepower each; its landing wheels fold up into recesses in the bottom of the cabin while in flight, to decrease wind resistance, and a powerful hinged searchlight, which may be adjusted to different angles, has been installed in front to aid in night landings. A speed of 175 miles an hour is expected. The plane has been designed to afford pilots and passengers exceptionally unobstructed vision.

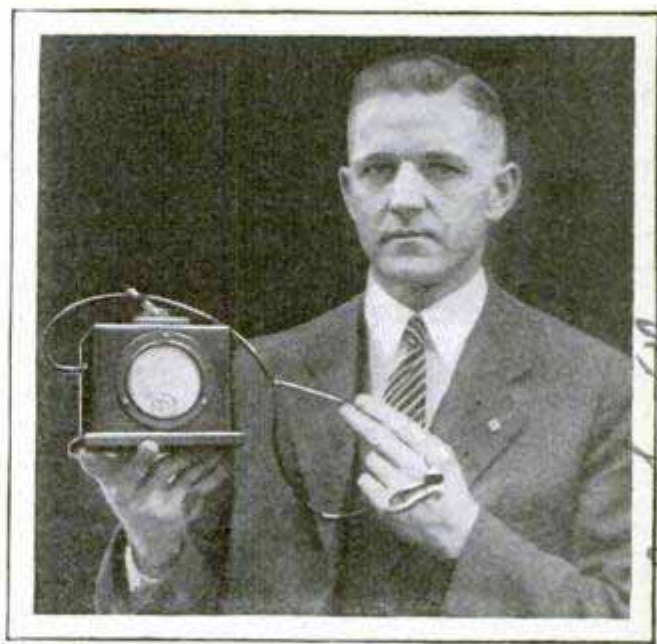
*Sky Lines, Inc.*

that the gods were angry with him, the worker confessed the next morning and handed the mask to his superior. The relic was discovered in a grave and represents a high degree of craftsmanship.

### IODINE INJECTOR FOR TEETH TO ELIMINATE PULLING

To cure abscesses and so make it unnecessary to pull teeth afflicted with them, a southern engineer has devised an injector which drives iodine far down into the roots of the affected member. It is compactly constructed and has been successfully tested, according to reports.

2036



Injector for Forcing Iodine to the Roots of the Teeth in Order to Cure Abscesses

### INDIAN SCARED BY EARTHQUAKE RETURNS STOLEN TREASURE

Because an earthquake frightened an Indian excavation worker, helping British scientists uncover Maya ruins in Honduras, the British museum is now the owner of a prized death mask that it otherwise might not have received. The mask had been stolen by the Indian while his overseers were not watching. That night, a severe earthquake occurred. Thinking

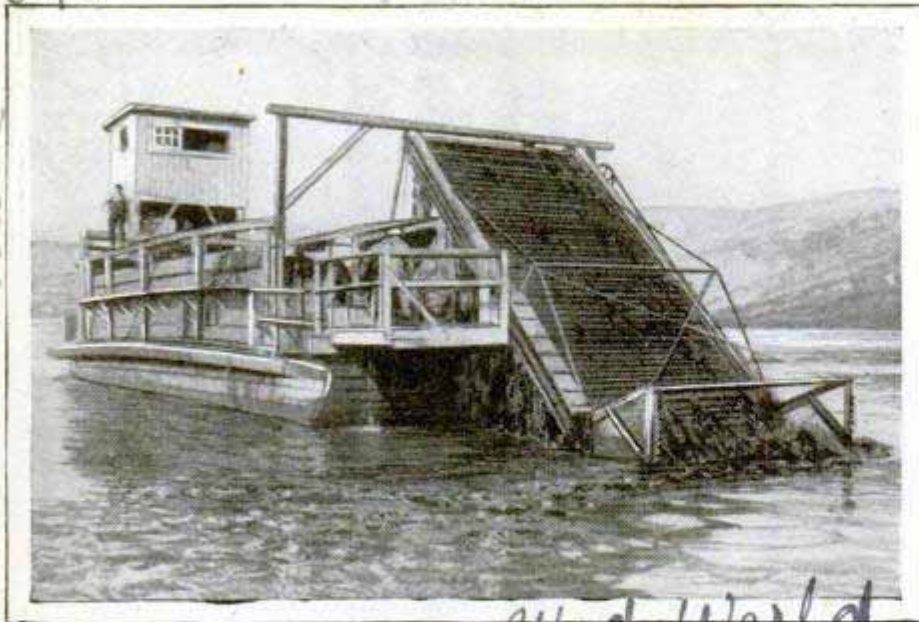
2066

*La change St.*  
*Dr. H. Clayton - 31*

*Com. H. J. Williams, Esq.*



2045



Mowing "Grass" from the Bottom of the Sea; Cutter Which Clears Kelp from the Los Angeles Harbor in Operation

### "LAWN MOWER" FOR SEA KEEPS OCEAN HARBOR FREE

The floor of the Los Angeles harbor is kept free from kelp by means of a marine "lawn mower" with blades on an endless chain. The growth is cut and ground for stock food after being dried.

### "WHEN IS IT REALLY COLD?" SCIENCE ASKS

In Siberia, the mercury commonly goes down to ninety degrees below zero during the winter; test balloons, sent to high altitudes have recorded temperatures four degrees colder, and sixty degrees below zero is not uncommon at the poles. Much lower temperatures are reached in the laboratory. In the production of liquid air, a mark of 320 degrees below zero is reached and liquid hydrogen has a temperature of 422 degrees below. Articles such as pieces of metal, paper, meat or other solids are shattered like china by a slight blow after they have been plunged into a vessel of liquid air. What scientists regard as the ultimate degree of coldness is the absolute zero, 459.6 degrees below the familiar zero of the Fahrenheit thermometer. Such is the cold of space through which the earth and other planets move. Atmospheres shield many from this terrific cold, but the mark is reached on the dark side of the moon, although boiling temperatures are experienced during the day on the side turned to the sun.

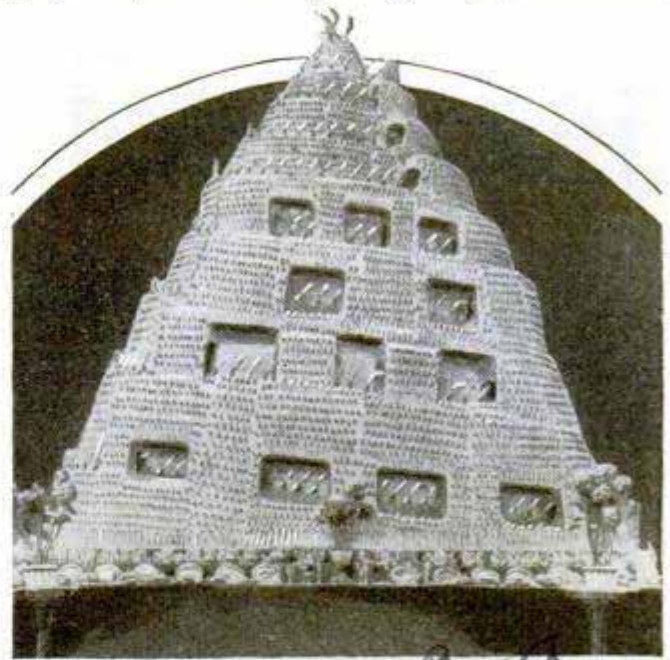
### MILE-LONG TRAINS GO BY FERRY TO CUBA

Ninety-five freight cars, enough to make a train a mile long, can be carried at one time in a huge ferry recently placed in operation between New Orleans and Havana. The craft is nearly 430 feet long, has a beam of more than sixty-three feet and differs chiefly from other units of its kind in that cars are carried throughout the holds, between decks and

on the superstructure, instead of only upon one deck. The loaded cars are handled by an immense crane at each terminal. The ferry will take about fifty-two hours for the transit between the two ports.

### "MOUNTAIN" BUILT OF SPOONS FOR FAIR DISPLAY

One of the most attractive exhibits at the Leipzig trade fair in Germany was a huge mound of 25,000 spoons. The display represented passageways, tunnels,



A Mountain of Spoons; Interesting Display Constructed for the Leipzig Trade Fair

foliage and other details, all worked out in spoons.

W. C. C. Co. Wash. D. C. Frigues Wash. D. C. 1620. A. St. N. W.

Wide World

new Orleans, La. 2017  
Seatrax  
2017  
Ninety-five freight cars, enough to make a train a mile long, can be carried at one time in a huge ferry recently placed in operation between New Orleans and Havana. The craft is nearly 430 feet long, has a beam of more than sixty-three feet and differs chiefly from other units of its kind in that cars are carried throughout the holds, between decks and on the superstructure, instead of only upon one deck. The loaded cars are handled by an immense crane at each terminal. The ferry will take about fifty-two hours for the transit between the two ports.  
Built by J. W. Richardson, Walling, & Co.



# RADIO LOCATES ORE HUNDREDS OF FEET IN EARTH

*see article Feb 1925-189*



Transmitter and Direction-Finding Apparatus, Two Essential Parts of the Radio Outfit Used in Prospecting for Ores; It Has Located Veins 500 Feet Deep



*British Empire - Radio Co. of Canada. Transportation*

Prospecting by radio has been simplified by the introduction of improved apparatus, which already has located veins of ore to a depth of 500 feet. Trained engineers are required to operate the outfit, but it is not difficult to handle, and its accuracy has been tested repeatedly. It employs the principle of electromagnetic induction. An electromagnetic field is sent out from a transmitter to a depth of several hundred feet. If an ore vein is within the radius of the field, a current is set up in the conductor, which, in turn, sets up a secondary field, and this is detected by direction-finding apparatus. By further observations, the extent of the ore vein is determined. The outfit consists of a radio transmitter, a power box and the direction-finding set. A crew of four men is generally employed with it. This method of radio prospecting is not intended for hunting lost treasures or small quantities of minerals, but for locating ore veins or bands of minerals and to pick up lost veins due to faulting. It does not determine the type of ore or the quantity of it, although it does show its depth and the length of the veins. The method is being used widely in Canada, where weather conditions and the roughness of the coun-

*dated all countries*

try make ordinary surveys difficult. The radio prospector can work in snow or rain, as his apparatus is not affected by these elements.

## POCKET ATOMIZER FOR SCENT FITS VANITY BAG

*2060*

A pocket-size atomizer, using a plunger pump instead of the bulb arrangement, has been placed on the market in Germany and likewise patented in the United States. The device, about the size of the usual lipstick container for the vanity bag, is finished in gold, leathers and snake skin, in various styles. The top pushes in, to eject atomized perfume through a small nozzle in the side. To close the nozzle after use, the pressure on the top is released, causing a spring to push the top out and seal the vent.



*the U-S Agent known.*

*Maurice Macovitz*



2043

**X-RAYS DETECT ART FAKES  
BY REVEALING AGE**



Studying a Painting before Subjecting It to X-Rays, to Test Its Genuineness

Spurious paintings are sometimes detected by X-rays which show a difference in the structure of new and old materials. For instance, an old painting has been re-touched by a modern artist to make it resemble the work of a recognized master, or some other method has been followed to disguise a subject. If materials of widely varying age have been employed, the difference is likely to be detected by the penetrating rays and the photograph that is taken with their aid. If a recent painting is reputed to be old, the fraud can often be discovered by the X-ray comparison with a genuine ancient painting.

**MYSTERIOUS TUNNEL IN CHINA  
MAY LEAD TO TREASURE**

Discovery of a mysterious tunnel, seven feet high and a yard wide, in a hill near Nanking, China, has interested explorers, as the passage, they believe, may give a clue to the whereabouts of a great treasure, buried 500 years ago with the coffin of the first Ming emperor. The secret of the horde of gold, jade and jewels entombed with the ruler has puzzled generations of historians and treasure seekers. When the emperor died, Nanking, his capital, had thirteen gates. Through all of these, coffins were borne simultaneously, and thirteen tombs were erected

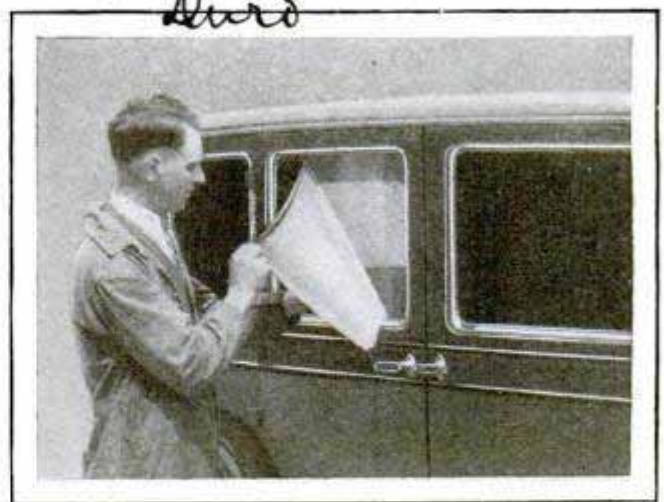
at as many different places, it is recorded, so that his enemies and treasure hunters might be baffled in their search for his remains and the hidden gold. The tunnel is lined with blocks of stone and was found by workers constructing a new road.

**BEAUTY IS TRACED TO LONG  
USE OF THE JAWS 2083**

Constant use of the jaws, during a period of millions of years, has been largely responsible for the beauty of the human face, according to Dr. Martin Dewey, an eastern authority. He declares that the use of the jaw muscles has caused part of the development of the underlying structures of the face and that the exercise of those muscles has contributed to the broadening of the skull with the consequent increase in the size of the brain chamber.

**FLUID MASK KEEPS LACQUER  
FROM CAR WINDOWS**

To protect glass and other surfaces from being spotted or streaked while applying lacquer, a fluid mask has been introduced. It is applied to the area which is to be shielded, dries and hardens quickly and is then peeled off when the lacquering or painting is done. The mask may be painted or lacquered over without danger to the surface beneath. As shown in the accompanying illustration, a film or mask



Car Window Has Been Lacquered Over, But Is Kept Clean by the Mask Which Peels Off

is being removed from a car window. The material is also used in striping or other forms of decorative work, the design being cut through it and the lacquer or paint then brushed over the entire surface.

2065

Carl H. S. Wilkins

O'Neil Shuro Co. 295 211

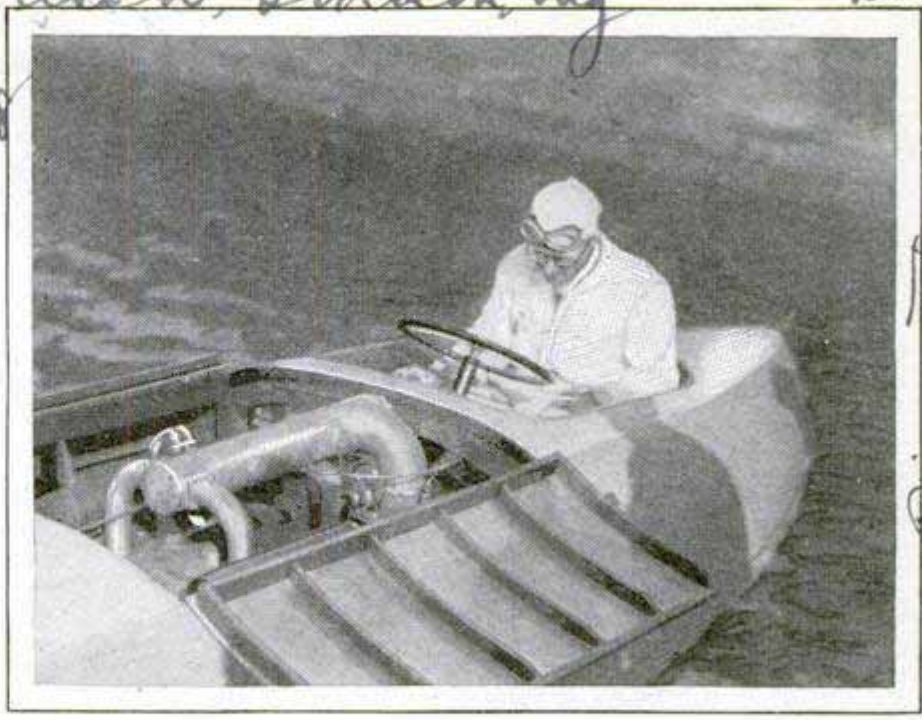


### TRANSPLANTATION OF TREES AIDED BY DRUGGING

1988

*Herald Tribune 12/23/28*

That trees react to chloroform and other drugs in somewhat the same manner as do animals, is the report of an English naturalist who believes that trees have many powers not commonly associated with them, such as the tendency to be attracted or repulsed by the presence of human beings. He points out that full-grown trees with mutilated roots have been successfully transplanted after they had been put under the influence of certain drugs, whereas other trees, not treated, died. Their response to human beings, he declares, can be indicated by various instruments that are attached to them to record their reactions. An outstanding example of "nerves" in vegetable growth is the sensitive plant which shuts its small leaves tight at the slightest touch. This action is suspended when the plant is drugged.



Speedy Motorboat of Improved Design, Showing Arrangement of the Engine to Afford a Low Center of Gravity

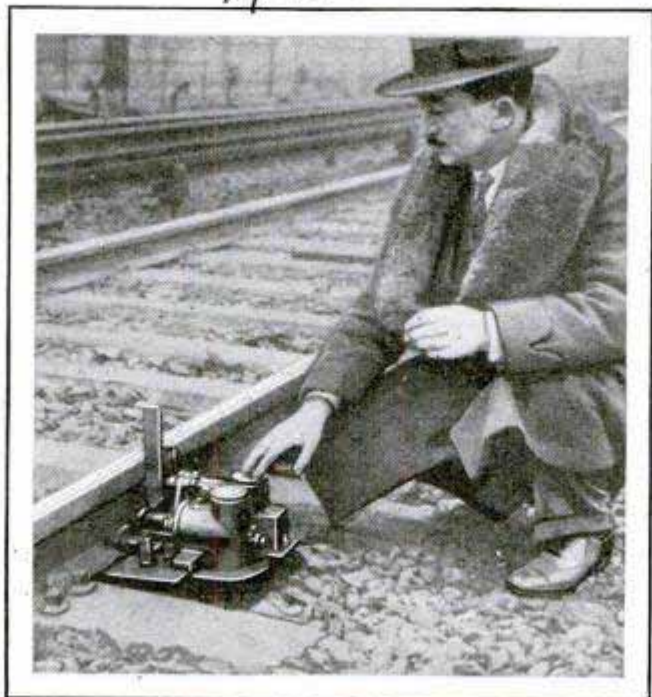
### SPEEDBOAT MOTOR LIES FLAT TO LOWER GRAVITY CENTER

Cylinders, and other parts of a specially constructed motor for a speedboat, lie flat so that the center of gravity of the craft is lowered to six inches above the water line. The arrangement of the cylinders is also said to equalize the strain more nearly than is done by other motors. This particular craft, with all the care and thought expended in its construction, proved a failure because of an unfortunate accident. In a test run of seventy miles

### NIGHT TRAIN SIGNAL ON TRACK PROMOTES RAIL SAFETY

1982

So that trains may be able to signal their approach at a considerable distance down the track, on sections where ordinary block systems are not in use, a special warning device has been introduced. It is attached to the rails and affords contact with a passing train whereby another signal is shown at a point farther down the line. The system is intended for service at night.



Railroad Track-Signal Unit That Gives Notice of Approaching Trains at Night

an hour, a hole was broken in the bottom of the hull when the boat leaped from one wave to another. It sank and divers spent fifty hours before they could locate and raise it. After repairs, oiling troubles developed, and the pilot had the disappointment of seeing the race won by a motorboat that developed far less speed; in fact, something under fifty miles an hour.

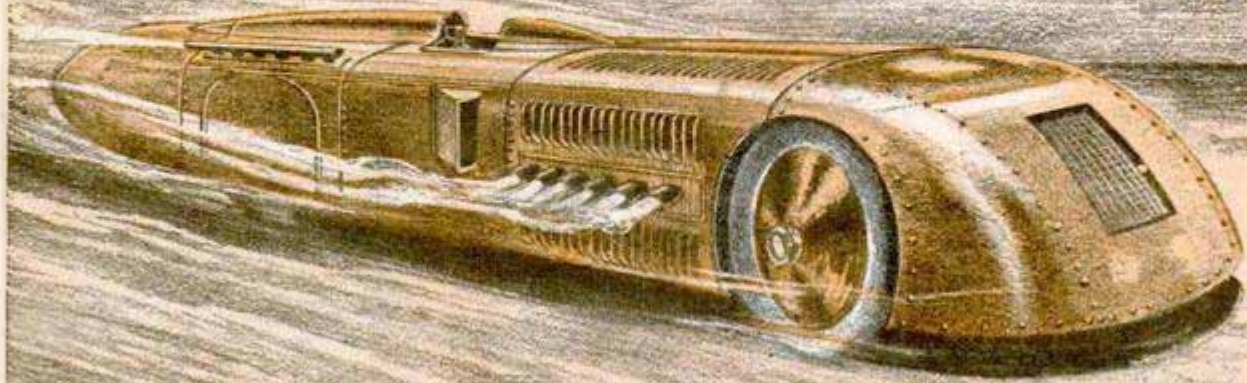
*Mrs. Bioco III  
Owner: James A. Talbot  
Emb. George H. White  
110 Broadway, San Diego*

*ch. n. exarde*



International Bldg  
Washington, D.C.

More



The 1,000-Horsepower Sunbeam Car in Which Maj. H. O. D. Segrave Set a Record of Nearly 204 Miles an Hour at Daytona Last March, Only to Have an American Break It

**M**AJ. H. O. D. Segrave is coming back to Daytona Beach to try and regain his lost speed laurels, this time with a thousand-horsepower car designed to travel at 240 miles an hour, with a possible maximum speed of 260.

Flight Lieut. D. D'Arcy A. Greig, of the British royal air force, on Nov. 4, flew a seaplane with the same kind of engine over a measured course at 319.57 miles an hour, slightly better than a mile an hour faster than the speed record held by Maj. Mario de Bernardi, of Italy.

Gar Wood, down in Florida, is preparing to tune up "Miss America VII," with which he made a world's record of 92.834 miles an hour last September, and will go out to try and boost the speed record on water above 100 miles an hour, as the boat is expected to make 105 to 107 miles when properly tuned.

And a pleasure car has just been shown at the New York auto salon, which, with a touring top and windshield up, does 120 miles an hour in high gear and ninety miles an hour in second speed.

What have these four events to do with each other?

Three or four years ago, it was gener-

ally said that the automobile had about reached the ultimate in development, and any future changes would be in the nature of little refinements in equipment and body appointments, rather than major developments. Some manufacturers had begun to advertise the fact they no longer made yearly models, and, save for an occasional sport roadster, cars generally had come to look very much alike, in the same shades of blue or done in sober black.

Just about that time the speed field produced the small, eight-cylinder engine; engineers turned out the four-wheel brake and balloon tires; color experts produced spraying lacquers in bright colors; body designers got some new and original ideas, and in a space almost of months, the automobile had been revolutionized.

As usual, the major engineering development turned up on the speedways long before it was adopted for general use. Eight-cylinder engines of small displacement were proven at Indianapolis, Atlantic City, Los Angeles and on other speedways.

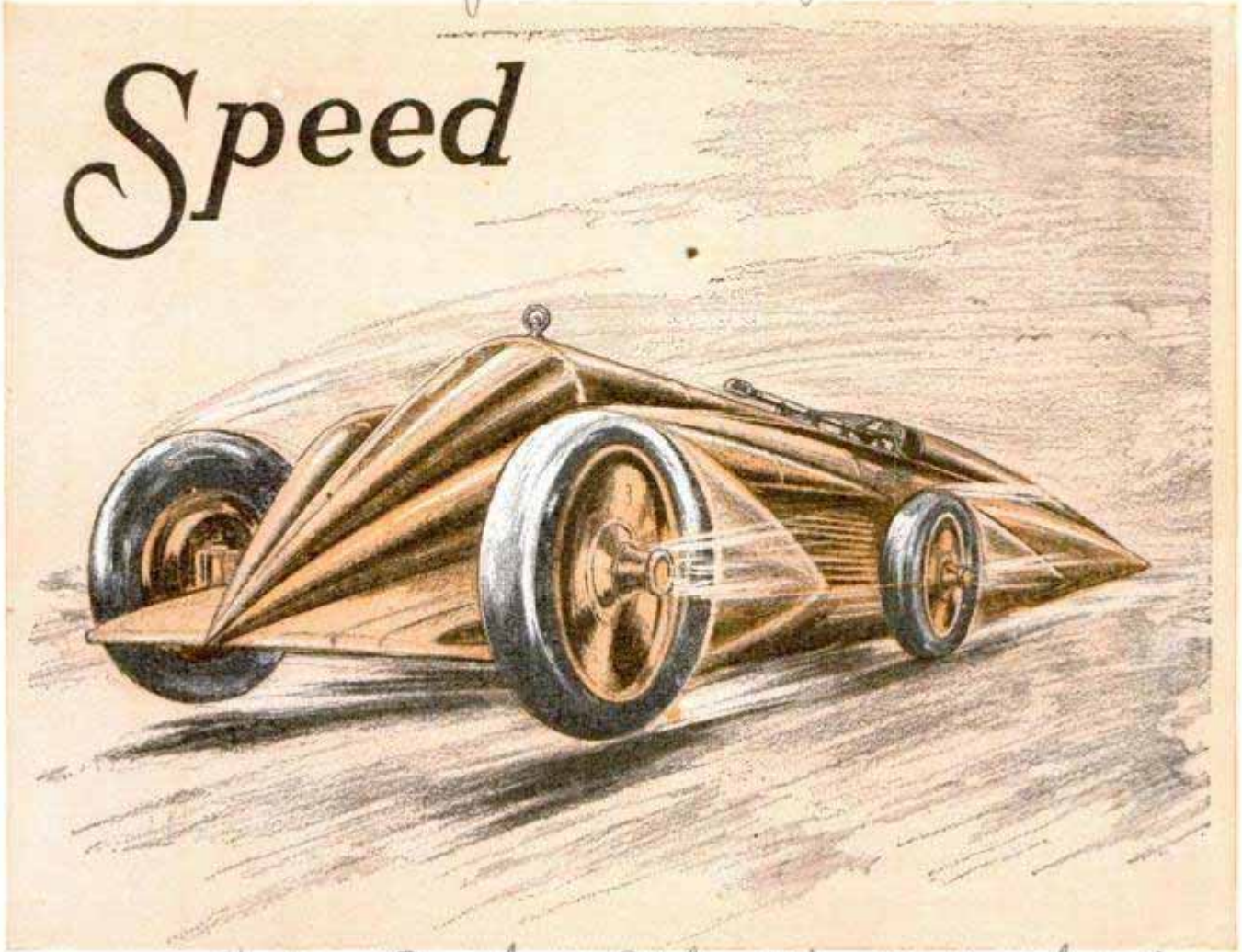
It is interesting to note that one of the leaders in their development, Fred Duesenberg, has gone back to the big engine in

Duesenberg, Inc.



*Wagner engine auto 1816*

# Speed



© The Motor

Major Segrave's "Golden Arrow." Steered by Rifle Sights. Built to Make a New Attempt to Regain the World-Speed Crown for England at Daytona Beach This Year

*Photos - Pacific + Atlantic 25 Park Place New York*

his latest car, a 265-horsepower job that, with touring body, has done 120 miles an hour on the road. The big engine, with three and three-quarter inch bore and four and three-quarter stroke, has a displacement of 420 cubic inches, as compared with the little ninety-two and a half cubic inch racers. At 4,200 revolutions per minute, the engine develops 265 horsepower, and when driving the car at ninety miles an hour in second gear, it turns up to 5,200 r.p.m.

Two men led in the revolution in car design which associated bright colors with good looks, luxury appointments and more speed. One was Walter Chrysler, and the other E. L. Cord. Mr. Cord was twenty-nine years old when he took over the Auburn plant in 1924. While Mr. Chrysler had come into the automobile business by way of a railroad machine shop, Mr. Cord had grown up with automobiles, being successively proprietor of a wash rack on the coast, part owner of a desert trucking outfit, salesman of used

and new cars, manufacturer, at the age of nineteen, of rebuilt and "hotted up" Ford racers, and automobile salesman and distributor in Chicago and Milwaukee. Bright colors and bodies that "look different," he maintains, were a natural development.

"Color was coming into the daily life of everyone, along with modernistic design," he says. "Furniture of radically new style, decorated in bright lacquers, was finding a vogue. Drapes and other decorations in the new colors were replacing the more somber furnishings of the past. Clothes were brighter. You only have to look at the shirts and collars men wear today and recall what they wore four or five years ago to appreciate the change.

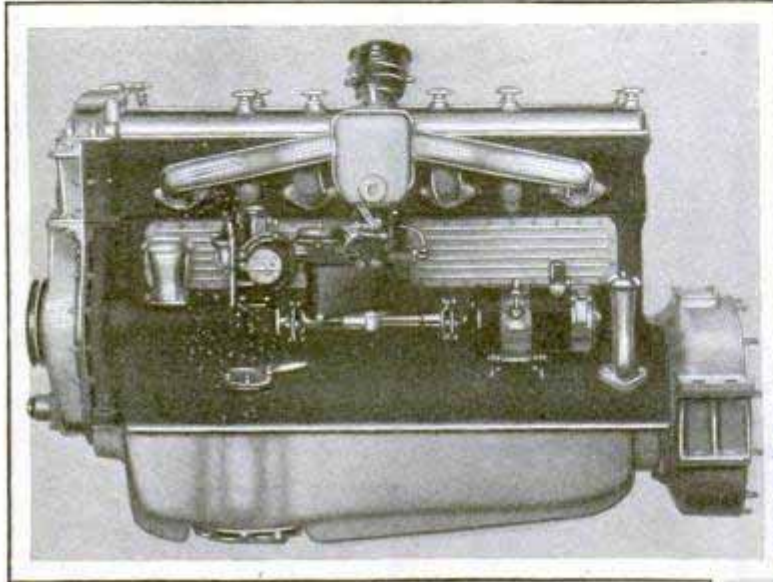
"We started out to make a car that would look different, on the theory that there are enough people who will pay for something that is a bit different from what the neighbors have, to make their business worth while. When we created the new mold line in the hoods of our cars,

*Auburn Automobile Co*



there was a serious question whether the public would like it. Some people didn't, but a lot did, and even those that didn't talked about the Auburn, for we had a distinctive appearance that made the car attract the eye.

"That little mold pressed into the hood and the distinctive two-tone color combinations were the outward symbols of the change, but we made a lot of others



Fred Duesenberg's New 265-Horsepower Engine and, Right, the "Shimmyless" Spring Shackles Developed by Packard

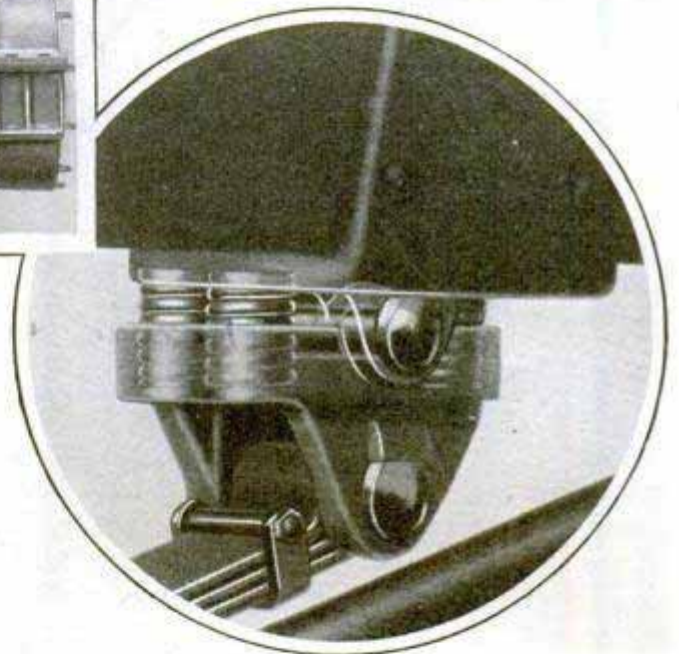
that didn't appear at the first glance. The trouble with so many automobiles is that they are built from blueprints, and look it. I am not an engineer, and when engineers come to me with a set of prints and say there is enough leg room under this instrument board, and that this rear door is wide enough for even an extra-plump woman to get through, they may be right, but I want to know that they are.

"So we build up full-sized body models out of wood and clay, complete to the last bit of decoration, and we study them. We fit them out with seats and dummy steering column, and doors that work, and I can climb in and try the leg room myself. We studied what the women wanted, and as a result put the starter button up on the instrument board, where you don't have to hunt around for it; moved the light switches to the steering column, where they are easily accessible, and switched to a big rubber-covered accelerator pedal that won't scuff or mar the leather on a pair of fancy slippers.

"Another thing that has helped revo-

lutionize automobiles is a study of what the customer wants, the things he complains about, and the things he asks for. We try to build the kind of cars customers want, rather than the kind engineers think they ought to have. I found in my car-selling days on automobile row that a lot of complaints that were made could have been avoided by little changes that might have cost no more than a few cents per car. Engineers usually are stubborn about making such changes because, in their driving, they do not need them. They know their cars and drive them carefully, and don't always realize that the average buyer is not an expert."

One of the developments which



the modern trend in design is going to emphasize in the coming year or two is lower and more perfectly streamlined cars. The bureau of standards has discovered that, if cars were as perfectly streamlined as airplanes, their speed would be doubled, with no increase in power. Speed of stock cars is determined almost exclusively by the resistance offered by the air. A car with a speed of fifty miles an hour would have to have eight times as much power to make 100 miles an hour, with no change in the body.

The trouble with streamlining has been that a perfectly designed body would be so futuristic that few motorists would care to buy it. The new racing car being brought over by Major Segrave, called

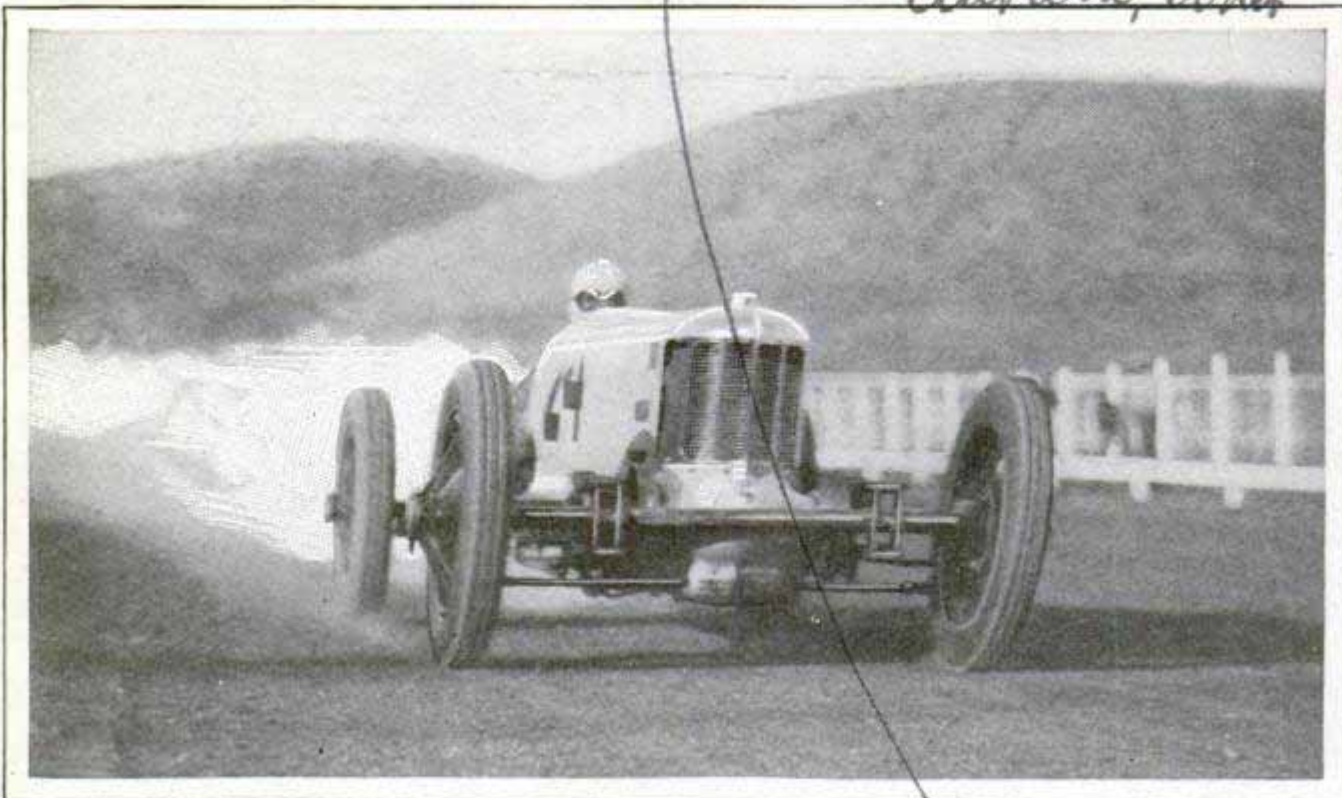






18/16

Co S Main St  
Auburn, Ind



Proven on the Speedways in Recent Years, Harry Miller's Front-Wheel Drive Is to Make Its Appearance on a Stock Car Shortly; It Permits Even Lower Bodies

the "Golden Arrow," is one of the finest streamlined bodies yet made. The car is so fast that it is to be steered by sights, just as a rifle is fired. Two huge bull's-eyes will be erected above the course, and the pilot will "aim" his car at the first, and as he passes under it pick up the second. At 240 miles an hour, his estimated speed, the car travels four miles a minute or the length of the mile course in fifteen seconds. The slightest wavering from a straight line might carry the car into the sea before the driver could correct it. It is impossible, according to Major Segrave, to steer by ordinary objects, as the flags marking the course become a blurred line and the timing posts are too far away at the start, which must be made four and a half miles away in order to get up full speed.

One major development of the speedways, which is to appear this year on a production passenger car, is front-wheel drive, following the system proven by Harry Miller's racing cars in recent years. While the car which is to employ it has not been named or built, it is understood the designs call for an exceptionally low car, with streamlined body closely resembling, in some models, the fuselage of a cabin airplane. One model is reported to be but fifty-eight inches high—two inches less than five feet—yet has sufficient head-room for tall people.

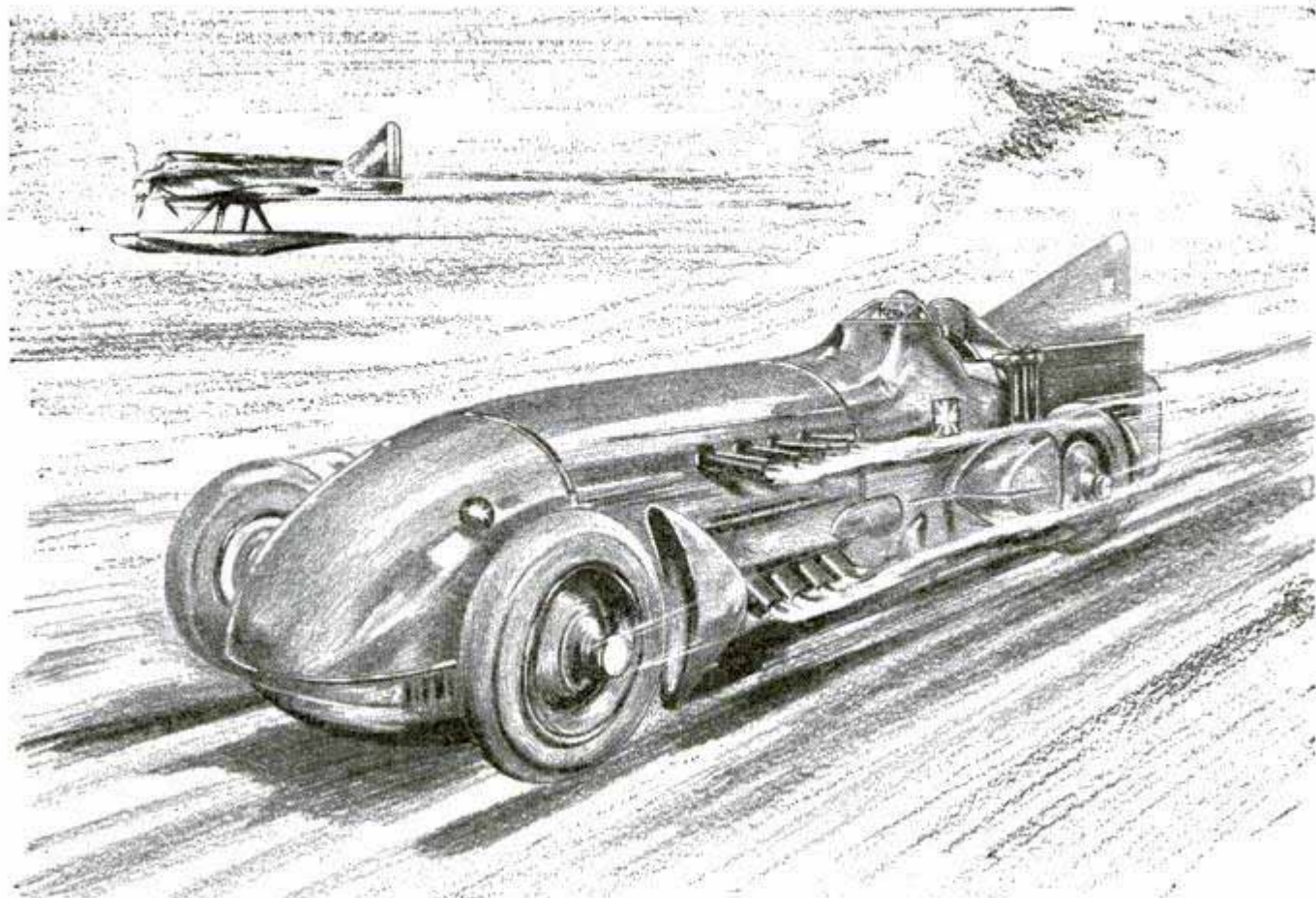
The front-wheel drive proved exceptionally safe on the speedways. It gets the power back where the horse used to be, pulling the load, and as a result, the car can take sharp turns at higher speed, climb over obstacles, and is claimed to be



The New Duesenberg's Instrument Board Includes Brake-Pressure Gauge, Tachometer, Altimeter, and, in the Corners, Four Telltale Lights to Warn When Attention Is Needed

Harry A Miller





Capt. Malcolm Campbell's "Blue Bird," Which Uses the Mate to the Twelve-Cylinder Napier Engine That Won the Schneider Trophy in the Plane Shown on Page 373

generally safer. Engineers have often contended that the proper place to apply the power was as close as possible to the point at which it was generated, but with rear-wheel drive this meant moving the engine to the back, with a resulting body design so radically different that it would not be acceptable to the average driver, accustomed to a long hood projecting in front of him.

The return of Duesenberg to a big engine probably marks the end of experiments with superchargers for small high-speed motors, at least for general use. The supercharger proved inefficient at the average operating speed of pleasure cars. The new Duesenberg, with its high power, is designed for quick acceleration in traffic, rather than for exceptionally high speed in ordinary use. It has a gasoline consumption of seventeen miles to the gallon at twenty miles an hour; eleven to fourteen miles, at forty miles an hour, and four miles to the gallon at 104 miles.

One of the most interesting things about the car is an automatic system of chassis lubrication, which functions every seventy miles. A telltale light on the instrument board indicates whether or not the oiler

pump is working, and another light indicates when the reserve oil tank is empty. Another pair of lights come on, one every 700 miles, to tell when it is time to change the oil in the crankcase, and the other every 1,400 miles as a signal to fill the battery with distilled water. In addition to the usual instruments, a speedometer calibrated to 150 miles an hour, ammeter, and oil and gasoline gauges, the instrument board has a pressure gauge for the hydraulic four-wheel brakes, an aneroid barometer to indicate altitude, a tachometer to give engine speed, and a clock.

The engine has four valves to each of the eight cylinders. It also is equipped with a vibration dampener consisting of two cartridges, each containing a pound of mercury. Practically every part of the chassis except the frame, parts of the motor and the spokes and rims of the wheels are chromium-plated.

☐ The Popular Mechanics' Bureau of Information offers its free service to all readers of this magazine. Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished.



# FLOAT BRIDGE SPAN INTO PLACE TO SAVE LABOR



One of the Huge Spans of French Bridge Being Floated into Position; It Is Nearly 600 Feet Long, the Chief Link in the Structure, Which Reaches a Mile across the River Elorn at Brest

In constructing a mile-long bridge across the Elorn in France, a huge span was built at a distant point and floated into position. Although the task was a difficult one, it was considered simpler than forming the span in the usual manner. Each span is nearly 600 feet long. The bridge will serve the city of Brest.

## ELECTRIC TRAIN OBEYS VOICE TO START AND STOP

Spoken commands govern the movements of a model electric train demonstrated in New York. The word "Stop" brings the engine to a halt; "Back Up" causes it to reverse, and some such phrase as "Get Along There" will cause it to go forward. The action is the result of the vibrations of the voice through a microphone.



Testing Model Railway Which Obeys Voice

## AIRPLANES OF SLOWER SPEED DEMAND OF AVIATION

Development of airplanes capable of slow speed is necessary for the promotion of civil aviation, according to Lord Thomson, former secretary of state for air in Great Britain. He points out that the high speed of military craft is not necessary for commercial flying; that slower speed and safe operation at lower altitudes would promote the security factor in flying, and that such planes would become increasingly popular among businessmen and others who would use them for distances of 150 miles and less. Greater economy in operation would also be possible for slower craft, it was suggested by Lord Thomson, who was the chief of the British delegation to the recent aeronautic conference at Washington.

From Brest to Longastel

2037

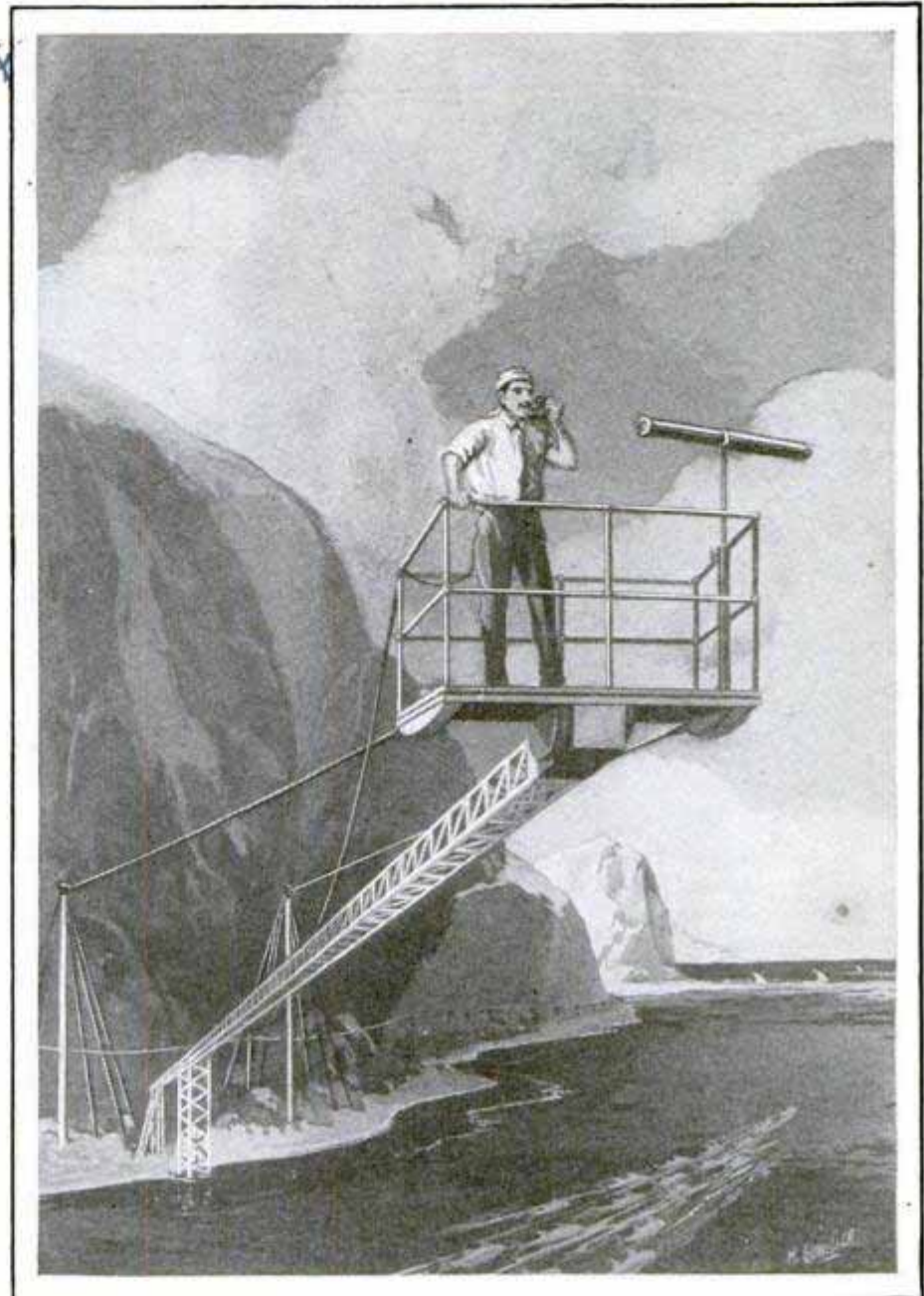


## EARTH'S INTERIOR NOW KNOWN TO SCIENCE

With the aid of special instruments, scientists have been able to explore the inner earth to a depth of 2,000 miles and more, according to Dr. Bailey Willis, retiring president of the Geological Society of America. The latest findings indicate, he said, that there are two parts of the earth, an envelope 2,000 miles thick which consists of elastic rock, and a core that is 2,000 miles in radius and evidently unelastic. This core is exceedingly hot and may be molten, but it is sluggish and viscous because of the tremendous pressure of the outside envelope upon it. Doctor Willis has advanced the theory that continents are formed by "blisters" which occur as the heat from the core of the earth, unable to penetrate immediately through the envelope of rock, is sent sideways and forms, beneath the earth's surface, an immense blister several hundred miles wide and more than twenty miles deep. In time, these blisters have burst through the surface with the result that the land areas have been formed.

## FIRST AIR-MAIL ENVELOPES PRIZED BY COLLECTORS

Envelopes used in the first run of air-mail lines, are in great demand among collectors. Good prices are received for some varieties, and whenever a new air-mail route opens, collectors throughout the world arrange to obtain some of the envelopes. They are doubly valuable when they have special air-mail stamps attached to them.



Watch Tower near Village on Mediterranean Coast, Where Observer Seeks Schools of Fish with Telescope and Relays Word by Telephone

## LOOKOUT ON TOWER FISHES WITH TELEPHONE

Near a small village on the Mediterranean coast is an odd-looking steel framework, supported by braces and leaning far out over the water. At the upper end, in a small cage, stands a man with a telephone at his side. He is a watcher, on the alert for schools of fish that can be seen at some distance from his lofty elevation. When a school of fish is sighted, he telephones to the village and the men hurry to their nets and boats.

Ⓞ During calm weather, the average speed of the worker bees' flight is a little less than fifteen miles an hour.



1789

# Will She



Looking through a Wind Tunnel; in the Background Is a Model Plane, Mounted in the Test Chamber Ready for Measurement, and in the Foreground the Propeller That Furnishes the Gale

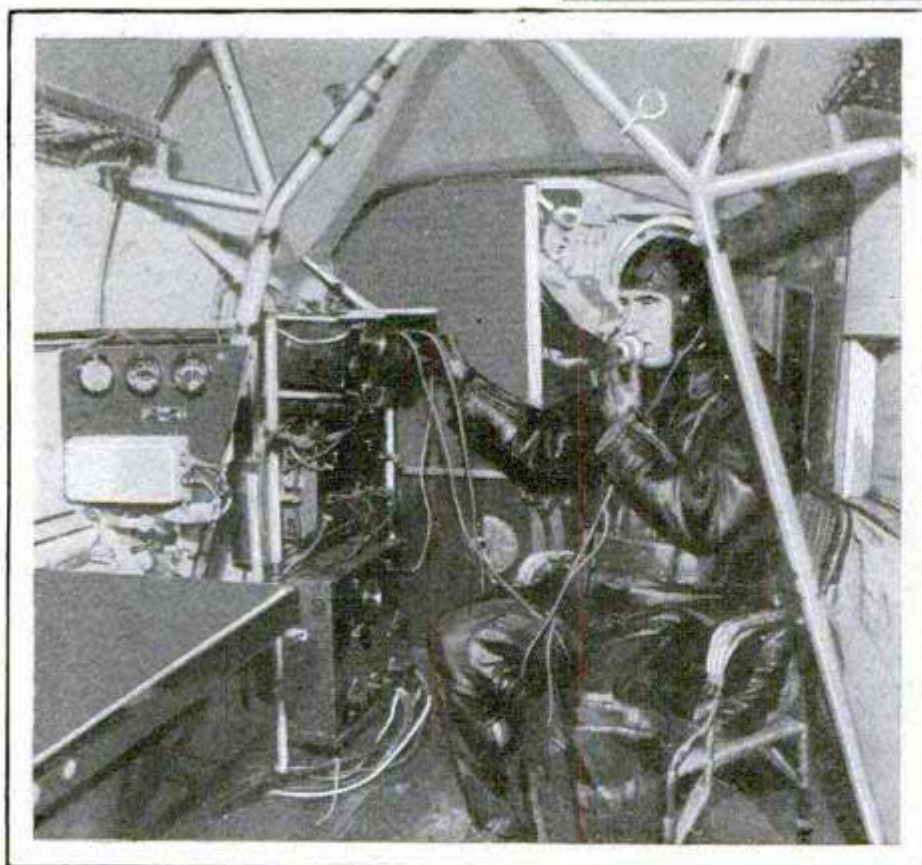
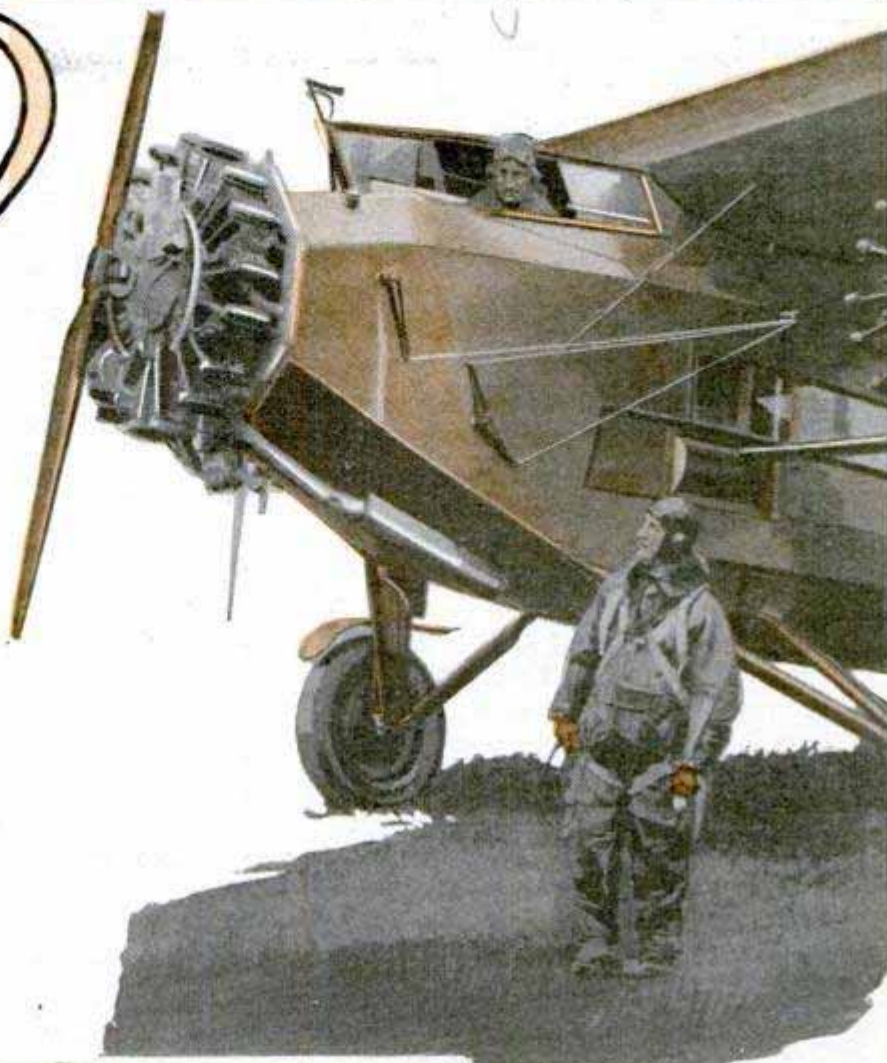


1906 Ft. Detrick, Md.  
Washington, D.C.

# Fly?

By A. M. JACOBS

**I**T WAS flyers' weather, clear of sky, winter snap in the air, and a sun that penetrated even heavy flying togs. The air above Uncle Sam's big mid-west test field was full of roaring craft. Two parachute planes were making test drops of the mammoth silk parasols from low altitudes. A target glider spiraled down from 3,000 feet, the big DeHaviland to which it had been attached following it, a photographer in the rear



cockpit grinding out motion pictures of its maneuvers.

At 8,000 feet, a twirling point of light in the sun, a plane being put through a series of spinning tests. A huge bomber left the earth, none too briskly with its heavy load, but soon was climbing, its great wing sharp against the blue. A supercharged altitude plane, due for a climb to 25,000 feet, had engine trouble at 17,000 feet, and came down, the pilot hedging carefully into the field with a dead stick. Low over the speed course, an observation plane was skimming with steady speed.

All test flights! Either

The Army's Flying Radio Laboratory, a Tri-Motor Fokker, Top, and the Interior of the Experimental Cabin Where New Radio Ideas Are Tested under Actual Flight Conditions



the planes themselves new and experimental, proving their worth to serve as standard in the U. S. army air corps, or some special equipment in them on trial. Almost everyone carried a story of adventure or daring on the part of the flyers who do the testing for Uncle Sam, and whose reports are determining factors in gauging the value of the articles in question to the service.

And these flyers? As the sun dropped low in the winter sky, they landed the planes and drifted into the flight office. They are a physically fit, capable-looking group of army officers, most of them come into aviation during the war. Big planes little planes, swift, light, sensitive, pursuit planes, heavy bombers, only a man with skill and daring at flying all types can be admitted to their ranks. Even then it takes about six months to become efficient in the various types of testing. A pilot new to the work may think he is coming along magnificently, but quite frequently, unknown to him, one of the

others is repeating his tests to be sure of getting correct results and also to learn just how accurate and dependable as a test pilot he shows promise of becoming.

Day after day, they take into the air new and experimental types of planes, or old planes equipped with new and untried installations, sure to effect the flying qualities to an uncertain degree. Purposely they throw a plane into all the maneuvers into which it might accidentally slip in flight, in order that they may study its behavior under each condition and may know whether it is going to respond to the controls for the pilot throughout the service. Usually they can place a fault and it is corrected. If the fault cannot be corrected, the plane never reaches the service, and in learning that it is not fit, the pilot must now and then save his life by parachute—or lose it.

Such a tragedy occurred at the field about two years ago. One of the test pilots had thrown an observation plane into a spin, which developed a strange



Lieut. Leroy M. Wolfe and Capt. P. S. Edwards in the Flying Laboratory at Wilbur Wright Field; Experimental Work Is Carried On While in Flight, to Test Radio Beacons, Two-Way Voice Conversations, Long and Short-Wave Code Transmitters and Receivers, and Various Types of Radio-Operated Signals



vicious flatness from which it was almost impossible to level out. He reported this experience in conference next morning, and, as is customary, a second pilot took the plane up to check the finding. He brought in a similar report. Lieut. E. H. Barksdale, better known as "Hoy," his middle name, or "High Pockets," because of his long-legged slimness, a southerner, much loved for his sunny temper and respected for his remarkable flying ability, was chief of the test pilots at the time. None of the test pilots is ever called upon to do anything that his chief would not do,

and Lieutenant Barksdale decided that he would be the third to investigate the mystery and see if he could fathom its cause.

Taking the plane up to 6,000 feet, considered a safely high altitude for such tests, he pulled the nose up into a stall and kicked on right rudder. The plane came to 2,000 feet in a flat right spin before he could level it out. He started climbing again to learn if it was as unmanageable in a left spin. This time the nose rose flatly out of control, the gyrations developing into a maddening speed. Lieutenant Barksdale, struggling with the unresponsive controls, knew he'd have to jump for his life. That held no terror for him, however, for it was not the first time he had to escape a doomed plane in mid-air. But the force of the spin was so great that, in leaving the plane, he was thrown violently out into the wing-brace wires, which sheared the cords of his parachute, letting him fall free to the ground.

Grief went broadcast through the field and the great company of flyers throughout the country, for the like of Hoy Barksdale was not often found. For a time, no one cared what happened to that particular plane and its spins. But there it was—a problem and a mystery—and aviation has achieved its present degree of safety only because problems have been unflinch-



Ready for a High-Altitude Test, with Report Books Strapped to Their Knees and Stop Watch Hung about the Neck

ingly tackled and mysteries ferreted out. Attempts were made to solve this one in the wind tunnel with small models of the plane. But the wind-tunnel test results did not explain the behavior of the planes tested, since there was not in existence sufficient information on spinning upon which to base sound theories. The thing would have to be fought out in the air.

About this time, Lieut. Harry Sutton, who had been much interested in the project from the first, volunteered to attempt a solution. The flat spin developed, it was fairly certain, only when the plane was carrying military load. Therefore it seemed reasonable that if the equivalent of this load could be carried in droppable form, such as bombs, and the plane went into one of those irrecoverable spins, he could drop the load and bring it under control once more. There was no surety that this was so, of course. It was a highly experimental proceeding. There was, too, a second purpose to the movable load; he would change its position, move it backward and forward on the fuselage center. They would experiment and find out, if possible, in just which location it most affected the spinning characteristics.

So quietly did Lieutenant Sutton go about his preparations, so quietly embark on those first hazardous flights, that the



majority of people on the field were unaware of the courageous task being undertaken in their midst. For more than a year, he made flights to 10,000 feet, his plane a mere twirling point of light in the sun as it came down the sky. But the moving-picture camera on the ground, equipped with a special telephoto lens, which photographed the spins in order that the engineers might study them thoroughly, accurately, and repeatedly, registered sometimes as many as twenty-two successive spins before the plane leveled out. Often the weight had to be dropped before Lieutenant Sutton could regain control. Once the same swift flatness of spin that had thrown Lieutenant Barksdale into the wing, threw a bomb, upon release, through the wing fabric, tearing a great hole. Those watching expected him to jump then, but he brought the plane in, making a breath-taking landing at ninety miles an hour. After that, for the bombs they substituted tanks, the bottom of which could be opened at will, and they placed in the tanks the equivalent of the load in shot, which would fall through the bottom of the tanks when released. The information on spinning garnered by Lieutenant Sutton as "just his job," has proved invaluable, and the whole project has been regarded proudly

by older flyers as a daring piece of special test work performed with thoroughness and intelligence.

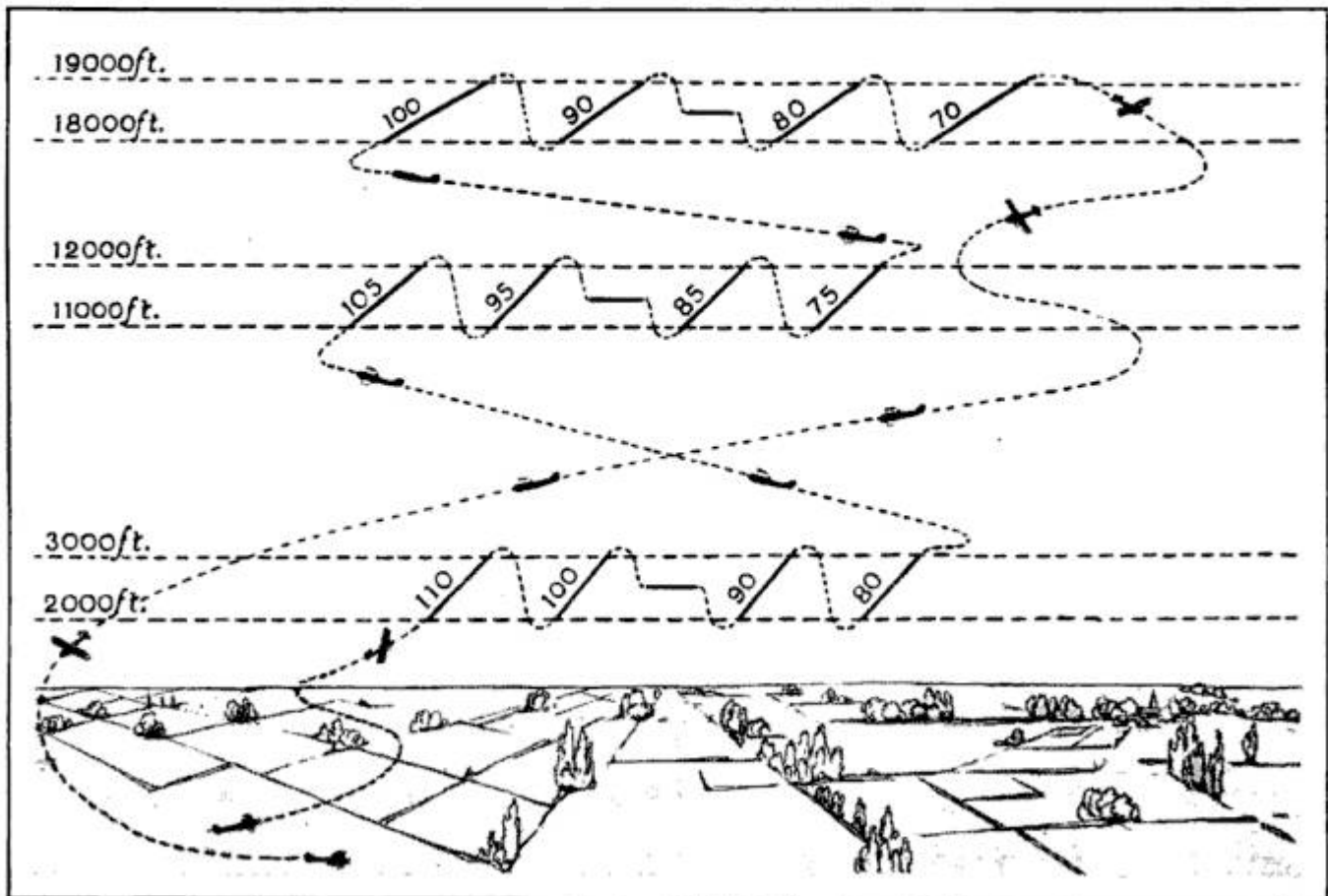
Back in the flight office, they are not discussing the spinning tests of today, however, for the solving of a more recent puzzle has taken their place. Earlier in the week, a test pilot new to the ranks brought in a complaint of something wrong with a new bomber he had been flying. When you moved the rudder, he complained, everything else in the ship moved along with it. The older men smiled. Among themselves they were inclined to believe that the youngster although a seasoned flyer was probably not familiar with the severe vibrations set up in flight in that particular experimental ship. They would check the report. One day they went up—three of them; one to pilot, one beside him to watch the forepart structure, and one behind to observe the rear. At 2,000 feet, the pilot started the test by seesawing on the rudder bars. Immediately there was an alarming distortion of the whole plane. The youngster was right. This was something more than vibration. He tried it again, the observers searching about diligently. After several repetitions, the observer in the rear cockpit suddenly, in the language of the small boy, "threw a fit,"

looking scared and pointing to the left longeron. Undoubtedly he had found something. The pilot started to fishtail once more, to enable him to check observations thoroughly, whereupon the observer almost went wild, pointing again to the longeron, making motions as of snapping a stick and gesturing for a landing. It then dawned upon the two in front that the rear observer was telling them that the upper-left longeron, a main member of the fuselage skeleton, had broken. In that case only the fabric and cowling strips would be holding the ship intact there.



The Test Pilot Completes His Report Immediately after Landing, While the Details Are Still Fresh





Graphic Chart of a Test Flight, Showing How the Plane's Climbing Speed Is Repeatedly Measured at Various Altitudes All the Way Up to 19,000 Feet

Simultaneously they looked over the side to gauge the altitude and sought their parachute rings. But the plane was under full control, and since it showed no tendency to go out of it, the pilot brought it in, in a clean easy landing. But he lost no time and tried no more "rough stuff" with the rudder. The break, which had undoubtedly occurred during the flight of the younger test pilot, had escaped detection by the ground inspector because of its location behind the bombs which had remained mounted in the plane through all tests.

That topic is supplanted by news of a new plane ferried in from a manufacturer's plant that afternoon. All listen interestedly to the comments upon it made by the pilot who has flown it in. All will have to fly it, partake in some phase of its testing, give their opinions upon it. A very few years ago, this ferrying of a new plane to the field for flight testing would scarcely have happened. It would have been shipped in, assembled at the field, and a great deal of speculation would have been rife as to whether it would really fly or not. New planes didn't always. They had been known to refuse to lift, or now

and then they had been nose-heavy and come crashing down, or the controls had been improperly balanced and flight in them therefore dangerous. Because of this uncertainty, there had usually been a certain amount of thrill not only in the first flight, but in the pilot, who was sometimes named for the job by the chief test pilot, or might be chosen by the drawing of a name from a hat. So far has aviation progressed in the last few years, however, that unless a plane represents a radical departure, it is seldom shipped in for assembly at the test field, but receives its preliminary try-outs at the manufacturer's plant and is flown to the field.

The question is no longer, "Will it fly?" That is presupposed. The interest centers in, "How will it fly?" Will it live up to the specifications set down for its performance? How convenient are its equipment installations, how comfortable is it as a flying vehicle for pilots and crew? Will the power plant in that particular design cause such heavy vibrational characteristics in the structure as to cause the fracture of the main supporting member, as discovered in the bomber? Or, if an observation or pursuit type, will it be fully



maneuverable and at the same time easily controllable in all possible maneuvers? These fighting planes would be twisted all over the sky in battle and, if they failed to respond to the pilot's will, he would be lost. The system of inspection and flight testing in force in the army today is planned to answer such questions.

The first flight step in this system for a new plane, after a pilot has given it preliminary runs to get thoroughly the "feel" of his ship, is taking it over the "speed course." This is a two-mile straightaway, permanently laid out on the test field, set off by markers and with a long black line down the middle. These tests require more expert piloting than any others flown, for in order that he may safely see the markers, and fly directly in line with the black line, holding his plane at an even level, where the air is quietest, the speed course is flown low—a mere ten to twenty feet off the ground. A calm day is always chosen. Braced steadily in his seat behind the windshield, tense against any slightest movement, with one hand the pilot grasps the control stick, with the other, the engine throttle, while a stop watch in one of the hands is held from slipping by having the cord wrapped between the fingers. No chance of escape by parachute should anything go wrong. The pilot could only land, hurtling at the ground, and probably crash.

The main purpose of these tests is to calibrate the air-speed indicator, that is to check the time taken to fly the two miles as shown on the air-speed indicator against the stop-watch time, and to learn the plane's low and high speeds, and its

flying qualities at various other speeds. In the high-speed tests, the pilot opens the throttle wide and strikes his level about a mile before entering the course. As he approaches the first marker, he compresses the stem of the stop watch almost, but not quite, to the clicking point. As the forward edge of the wing reaches the marker, he clicks the stem in, starting the hands around, clicking it in again as the final marker is passed. If he has been flying a pursuit plane with the wind in his favor, the time taken to cover those two miles has perhaps been forty-three seconds. The mere flash of an arrow!

The course is then flown in the opposite direction. The average speed of three of these round-trip flights is taken as the plane's high speed. A series of round trips follows, each with the same extreme accuracy and care, and each timed exactly ten miles slower than its predecessor, until the plane is moving over the course as slowly as possible, just flirting with stalling speed. This, the pilots call "taking it over the hump," and it represents the plane's low speed. With the plane seeming scarcely to move against the background of the great field, this test is quite as picturesque to watch as the high-speed test, and requires as firm and practiced a hand on stick and throttle and as great a nicety of judgment. Although not of long duration, each minute on the speed course is one of extreme strain, and it is with a feeling of relief that the pilot finally climbs to safer flying altitudes, preparatory to bringing his plane in and placing the information



The Radio Plane at Wright Field; to Keep the Slipstream of the Nose Propeller from Interfering with the Wing Screws, It Has Three Blades, Thereby Making a Smaller Diameter Possible



he has gathered into the hands of the engineers.

There are also the "saw-tooth" test and the "check-climb" test, in which the pilot usually goes high enough to meet subzero temperatures and to use artificial oxygen; the "oscillations" test, in which by alternate diving and climbing, sometimes with hands off the controls, the inherent stability of a plane is determined; the "accelerations" test, the purpose of which is to learn the stresses upon the plane surfaces in dives, loops, spins, and other extreme maneuvers of flight.

"If it has wings, we'll fly it," might be considered typical of the test pilot's attitude toward the ships that come for test. Difficult, brilliant, at times, dangerous work—and a cigaret and banter at sundown in the flight office. Now and then, for some special feat, such as landing a burning plane instead of taking a parachute, a letter of commendation slips into the files. And for a mistake, such as bad landing, getting lost on a long flight, or any of the variety of personal slips possible in such work, there is the "Dumb Bell Trophy" or the "Alibi Trophy," or another, which, presented by his fellows, the recipient must keep displayed on his desk until he can find a new offender to pass it to.

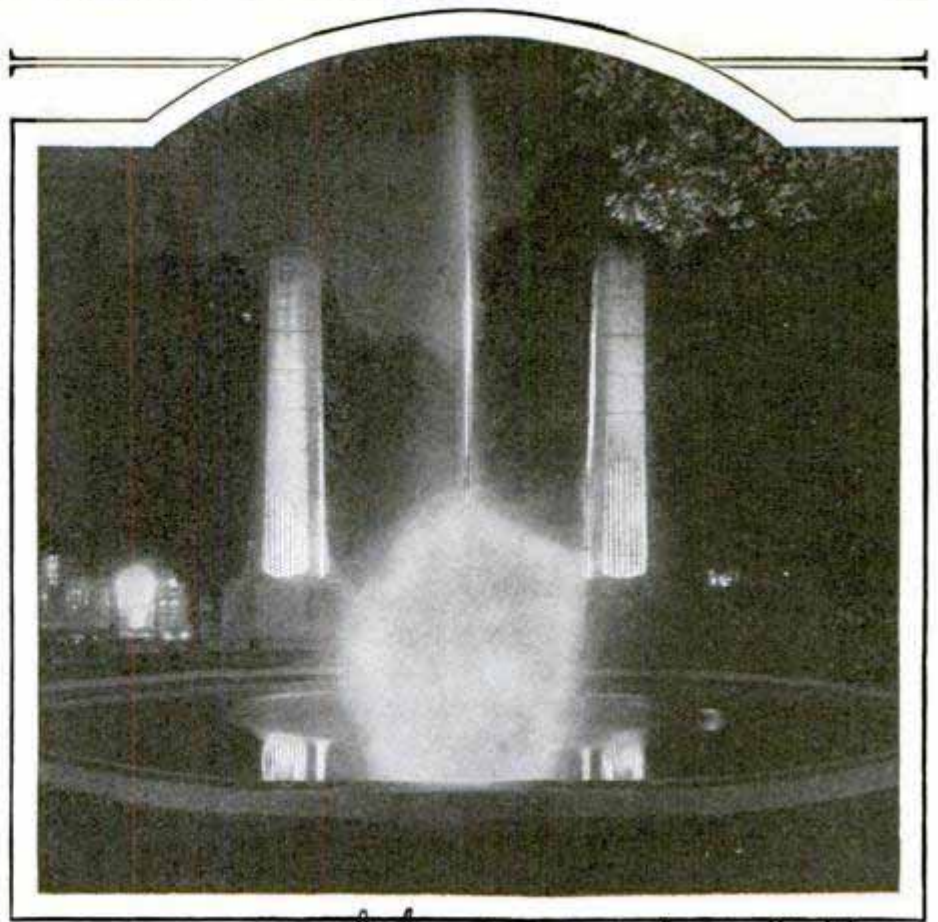
In the army air corps, Uncle Sam places high responsibilities. Planes may fail him now and then—but his flyers, never!

*operating with Alabama d. industrial development board*

### SUGAR FROM PEANUT SHELLS

Experiments are being made aiming toward the commercial production of a kind of sugar from peanut shells and cottonseed bran. The product sells for about \$100 a pound and is useful not only as a food but for textiles and leather industries. A plant has been built in Alabama for its manufacture.

*Bureau of Standards, Alabama Polytechnic Institute*



Courtesy General Electric Co. Schenectady, NY  
Illuminated Fountain and Colorful Background, Showing the Effect of Carefully Placed Floodlights

### TINTED LENS ON FLOODLIGHT ADDS TO NIGHT DISPLAY

Effects that were impossible a few years ago are now attained in night floodlighting by the introduction of improved reflectors and tinted lenses for the lamps. Doorways, fountains and other units are beautifully illuminated during the hours of darkness and at a considerable saving over what would have been required with older forms of equipment. Projectors with clear glass, stippled and colored lenses are sometimes used in combination for special blends and tones.

### GROW COTTON READY-COLORED TO SAVE DYEING 2039

In Peru is a plant that produces cotton of a reddish tint; a yellow cotton grows in China; India produces a gray shade, and, in Egypt, a brownish-colored variety is gathered. The plants breed true to type, the colors are fixed and do not change with variations in soil or climate. By crossing suitable kinds, scientists see a way of growing cotton of various hues, dyed by nature and of fast colors.

*Answers 12/22/28*



1899



Capt. A. I. Eagle, Bolling Field, Filling the Sand Box before a Flight in an Attempt to Disperse Fog with Electrified Sand

# Rain

is called the "dew point," the water vapor forms a cloud. Exactly what is the temperature of the dew point depends on the amount of moisture in the air. The more moisture, the higher the dew point. But no matter how much moisture there is in the air and how low the temperature, there can be no formation of cloud and no precipitation unless there are particles of dust or other nuclei about which the moisture can condense into drops.

So, in his experiment, Professor Knipp introduces tobacco smoke into a tiny glass tube containing the saturated air which he has expanded. The microscopic particles of matter which form the smoke are large enough for the water to form about, and immediately drops of water run down the sides of the tube.

In his second experiment, instead of introducing bits of dust into the air, Professor Knipp forces the saturated air to pass in front of a bit of radioactive substance. This substance, radium bromide, sends out rays, called alpha rays, which have the peculiar property of splitting up the air into tiny electrically charged particles. And these charged particles, acting exactly as though they were bits of dust, give the water vapor the nuclei upon which it can condense into droplets. Because the rays extend horizontally over the glass tube, the droplets, instead of falling as in normal rain, also extend across the top of the tube, each droplet, according to Professor Knipp, representing a charged bit of air or ion.

What is the possibility of applying these experiments to the production of rain?

Like most scientists—though not all—Professor Knipp is inclined to doubt.

"The idea of producing rain by shooting a cannon into humid air is not altogether poppycock," he told me, however.

By VICTOR RUBIN

Harwell Co. Chicago 1549

ALTHOUGH attempts to produce rain artificially have generally been regarded as wild dreams by scientists, two experiments recently conducted by Prof. Charles T. Knipp, of the department of physics of the University of Illinois, have removed the subject of rain making from the realm of the fantastic.

Both experiments, adapted from somewhat more elaborate tests by C. T. R. Wilson, of London, winner of the Nobel prize in physics for 1927, reproduce in miniature the conditions present in nature just before a thunderstorm. In both cases, the air is saturated and suddenly expanded. And then, in the first experiment, minute particles of dust, in the form of tobacco smoke, are introduced.

In nature, this expansion takes place when the moisture-laden air is warmed and rises from the earth's surface. As it ascends, it gradually cools—one degree for every 300 feet. When it reaches what



2079

# Made to Order



A Composite Photograph, Showing How It Was Proposed That Clouds Be Forced to Give Up Their Moisture by Spraying Them with Electrified Sand Particles, Dropped from Airplanes





These conditions, Professor Knipp pointed out, limit rain making too severely for practical application. As demonstrated in his second experiment, one could theoretically cause a downpour by sending a powerful electric current through water-saturated air during a falling barometer to ionize the air.

"In fact that is what happens when a stroke of lightning brings on a shower," he explained. "The practical objection to this plan is the impossibility of getting enough electrical power. The energy in a stroke of lightning traveling between a cloud and the earth a half mile below is greater than the entire Commonwealth Edison company has available!"

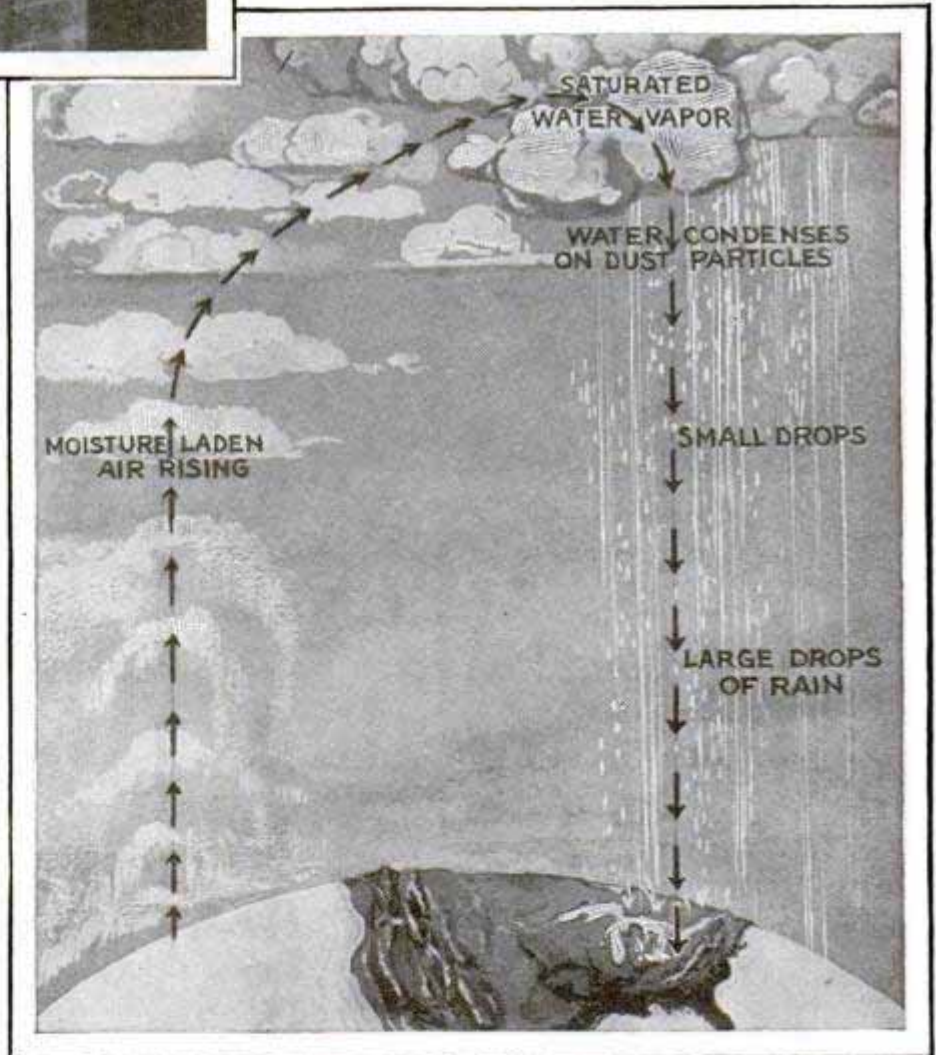
While the explanation of why the lightning flash or the sudden introduction of smoke—especially noticeable after forest fires or volcanic eruptions—produces rain has only recently been discovered, it has been guessed at more or less ingeniously.

"There is a certain element of truth in it.

"We know that before we can have rain two conditions are necessary: first, the air must be supersaturated; second, it must contain enough particles of dust on which the drops can form.

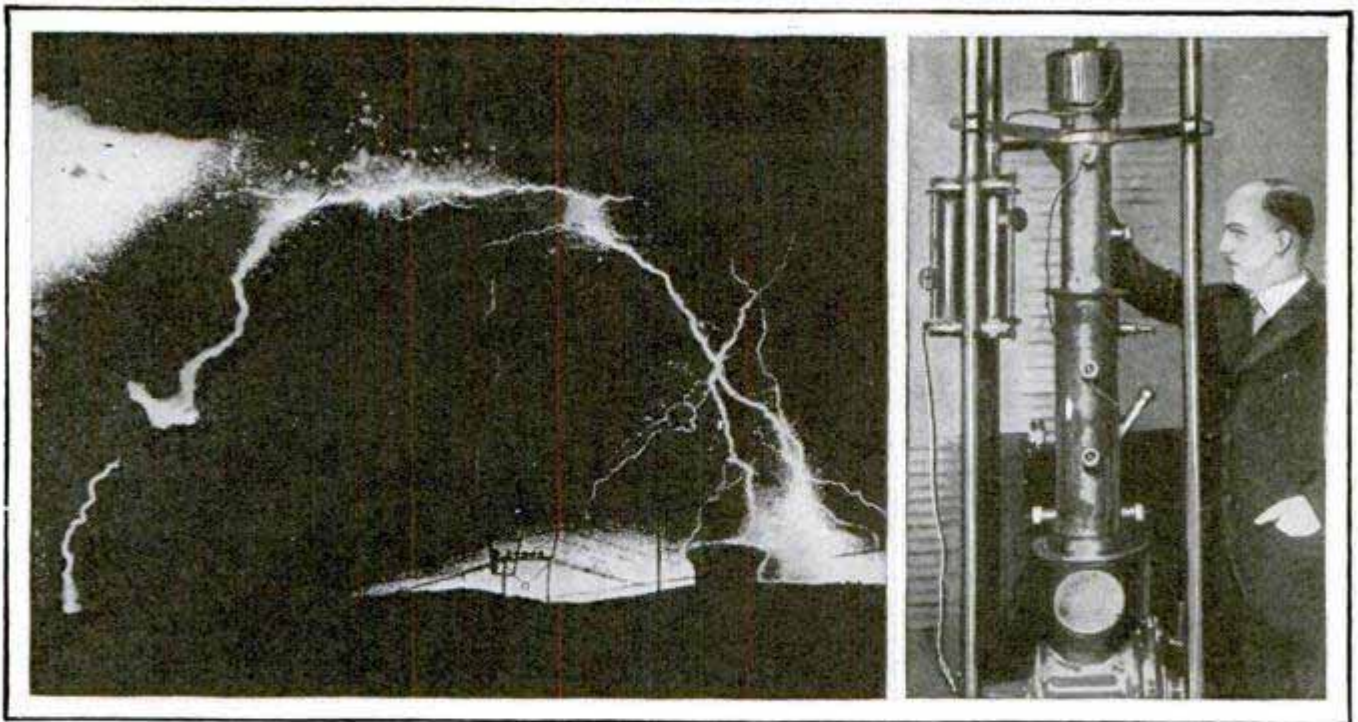
"So, theoretically, in a region where the air is practically dustless, the introduction of smoke—say from a passing locomotive or the shooting of a cannon—would provide the bits of dust on which the drops could form.

"That is, of course, provided all the other conditions were favorable—the saturation and the sudden expansion of air (a condition which occurs when the barometer falls) at the very moment the smoke was introduced."



Dr. Chas. T. Knipp with His Simplified Cloud Apparatus, and Diagram of How Nature Produces Its Rainstorms by the Condensation of Moisture on Dust Particles in the Upper Air





A Natural Lightning Flash near a Power-Transmission Line and, Right, an Oscillograph to Be Used by Westinghouse Engineers in a Study of Lightning in the Tennessee Hills

The occurrence of showers after battles, led Edward Powers, in 1871, to begin a campaign to induce congress to appropriate money for extensive experiments in producing rainfall by firing cannon into the clouds.

In his book "War and Weather" Powers showed, among other things, that the battle of Waterloo was followed by rainstorms for two days and that the battle of Buena Vista, fought in the midst of the dry season, was followed by two showers. In all, he studied fifty battles.

Powers' theories have since been discredited. At least one scientist has pointed out that no one has yet been able to cause steam from a teakettle to precipitate by clapping his hands in it, although he would be jostling the drops more violently than would an explosion one-fourth of a mile away.

At any rate congress, in 1891, appropriated \$20,000 to carry out the experiments suggested by Powers, and General Dyrenforth was appointed to superintend them. After preliminary trials, the experimenters went to a ranch near Midland, Tex., where balloons filled with a mixture of hydrogen and oxygen, and dynamite carried up by kites were exploded in the air.

Although the principle on which Powers based his experiments is now generally considered fallacious—namely that the concussion would be sufficient to cause the

warm water-bearing air to rise to the colder air above—General Dyrenforth reported that the cannonading actually did produce precipitation, drops often commencing to fall within twelve seconds of the first explosion. But Dr. W. K. Curtis, who was with General Dyrenforth's party, declared that the only rainfall which followed the explosions was that which would have fallen or had actually begun to fall anyway.

At the beginning of the World War, followers of the Powers theory expressed apprehension that a series of devastating storms would sweep Europe. As we now know, the rainfall during the four years of the war was normal for that part of the world. While this clearly disposed of the concussion theory, it by no means disposed of the smoke theory.

Declaring that Indians started prairie fires to produce rain, James P. Espy, the naturalist who discovered how rising air is cooled by expansion, suggested, in 1845, a novel means of ending drouth. He proposed to burn forty acres of timber for every twenty miles, along a line extending 600 to 700 miles from north to south in the western part of the United States. Such fires once a week, throughout the summer, he said, would cause the air to rise, cool by expansion and condense the water vapor into rain.

Espy's theory is apparently confirmed



by the observation that clouds commonly gather above burning forests. But the cure would be far worse than the disease. For, even so tremendous a conflagration as the Chicago fire of 1871 was accompanied by only a moderate shower, most of the storm clouds which hung over the city—whether caused by the fire or not—having been swept away by strong winds.

One of the most spectacular attempts at rain making was made a few years ago when airplanes, circling above Bolling field, Washington, scattered heavy clouds by discharging into them a steady stream of electrically charged sand. Prof. E. L. Chaffee, assistant professor of physics at Harvard University, directed the experiment on the invitation of L. Francis Warren, a business man.

Again at McCook field, near Dayton, Ohio, in the presence of army officers and aerial experts, including Wilbur Wright, army planes charged clouds with a stream of sand flowing between two electrodes, and a small shower followed. Although the area affected was too small to prove of practical benefit, the event was hailed in the newspapers as the first artificial rainfall in history. Most meteorologists, however, refused to accept this verdict.

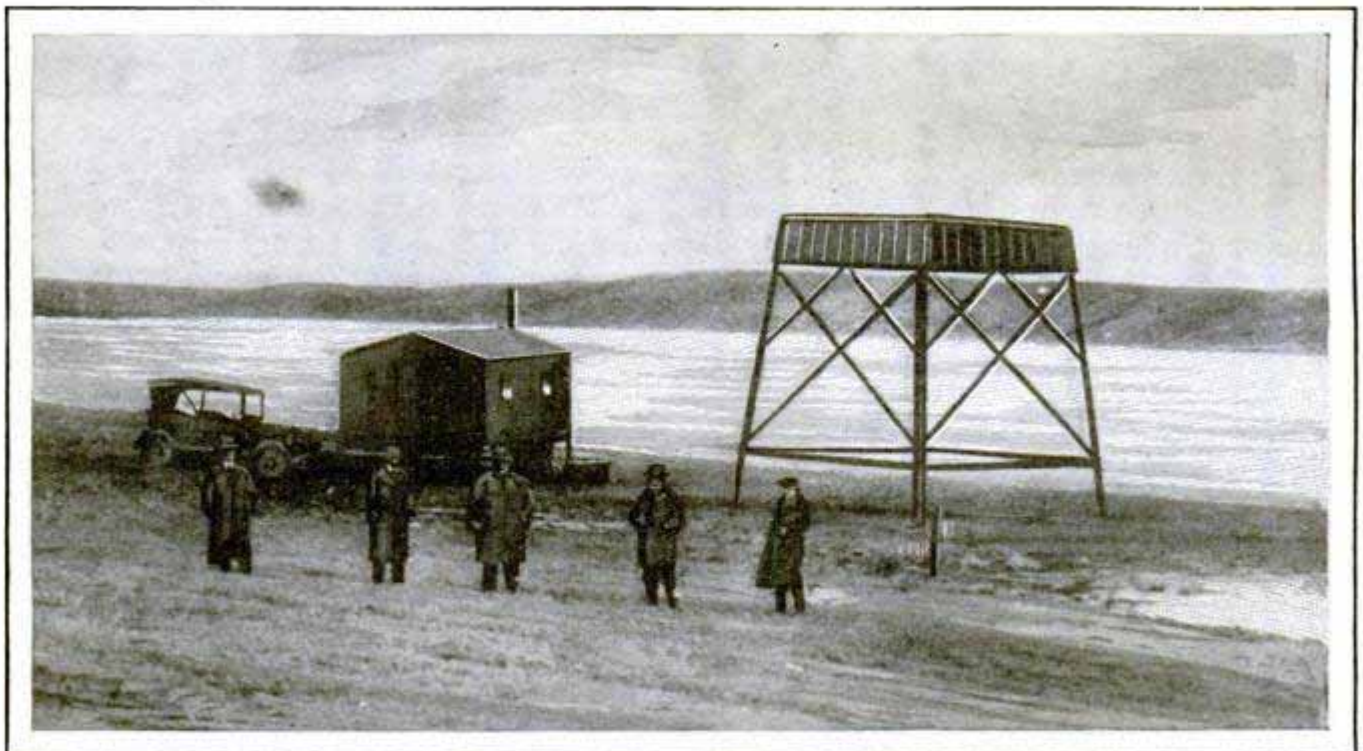
Probably the most successful rain maker of modern times is "Prof." Charles

M. Hatfield. Newspaper records show that, since 1905, rain has fallen uniformly following his operations. In 1905, he was paid \$1,000 for producing eighteen inches of rain in southern California, in the winter and spring. In 1922, he collected \$3,000 from the farmers of Medicine Hat, Alberta. Among his other successes reported in the newspapers was a 2.29-inch fall of rain at Hanford, Calif., in March and April, 1924, for which he received \$8,000.

In April, 1926, a group of farmers, perhaps in a spirit of irony, gave Hatfield a section of land in the arid and unirrigated Tulare Lake region of California as compensation for his services. And although the rain did not fall until ten days after the date he predicted, it finally fell in sufficient quantities to save his crop, according to newspaper reports at the time.

Physicists and meteorologists have uniformly condemned Hatfield's methods as scientifically valueless. They have declared that rain would have fallen without his presence and did actually fall elsewhere in surrounding territory following the long periods of drouth he was engaged to break.

Hatfield himself never revealed the mysterious "chemicals" which he used, although he said that his process was the



© Kadel & Herbert

A Successful Rain Maker, Charles M. Hatfield, Got \$3,000 When a Deluge Followed the Erection of His Mysterious Chemical Tower



result of ten years' study and three years' practical experimentation. He asserted that he had discovered the power of his chemicals to attract moisture by accident, when he observed that steam from a tea-kettle followed a mixture of them as he moved it about the kitchen of his home.

His method of getting the mysterious substance into the air was to erect a square wooden tower mounted on supports fifty feet high and varying in diameter from fourteen feet at the bottom to twelve at the top. The tower was sheathed with tar paper and inside were 104 galvanized-iron evaporation pans filled with chemicals and water. The tower, provided with an opening at the bottom to produce a draft, acted as a chimney through which the evaporating chemicals were carried into the air. At night, when there was no sun to heat the tower and evaporate the chemicals, they were burned. The result was eerie clouds bellowing into the sky and illuminated from beneath by the colored fire.

Whether or not rain making will ever be placed on a practicable basis, man has apparently wrested its secret from nature. Like all other scientific discoveries that have first been successfully worked only in the laboratory and under ideal conditions, the artificial production of rain may eventually be developed to the point where drouth will be a thing of the past and abundant rainfall assured every plot of farm land in the world.

But how stupendous the problem is may be gathered from the fact that the average annual rainfall of the United States is approximately 6,055,245,753,000 tons. The energy furnished by the sun to evaporate and transport this enormous quantity of water has been estimated to be not less than 7,000,000,000 horsepower operating continuously.

Professor Knipp, with the conservatism of the scientific research worker, admits the possibility of producing artificial rain only under special conditions. But so eminent a physicist as Sir Oliver Lodge recently declared that the problem of electrifying the atoms of humid air in clouds and forcing them to fall in drops is no more difficult than the problem of controlling contagious disease at one time appeared to be.



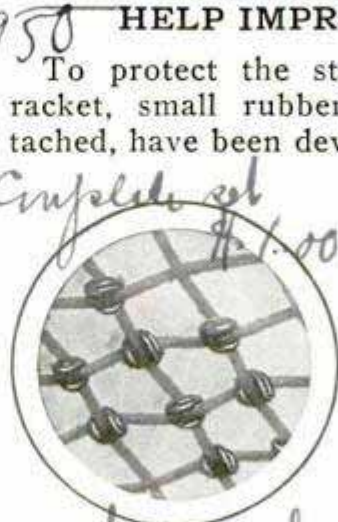
Receiving Radio-Photo Transmission of Popular Song in London from New York

**SONG HIT SENT BY RADIO PHOTO ACROSS ATLANTIC OCEAN**

So that it could be used in time for a ball, a late song hit was sent by wireless photo from New York to London, recently, and was received a few minutes after it was delivered to offices in this country. Words and notes were successfully transcribed for the London singers, who were to render the song at the Three Arts ball.

**TENNIS-RACKET STRING GUARDS HELP IMPROVE GAME**

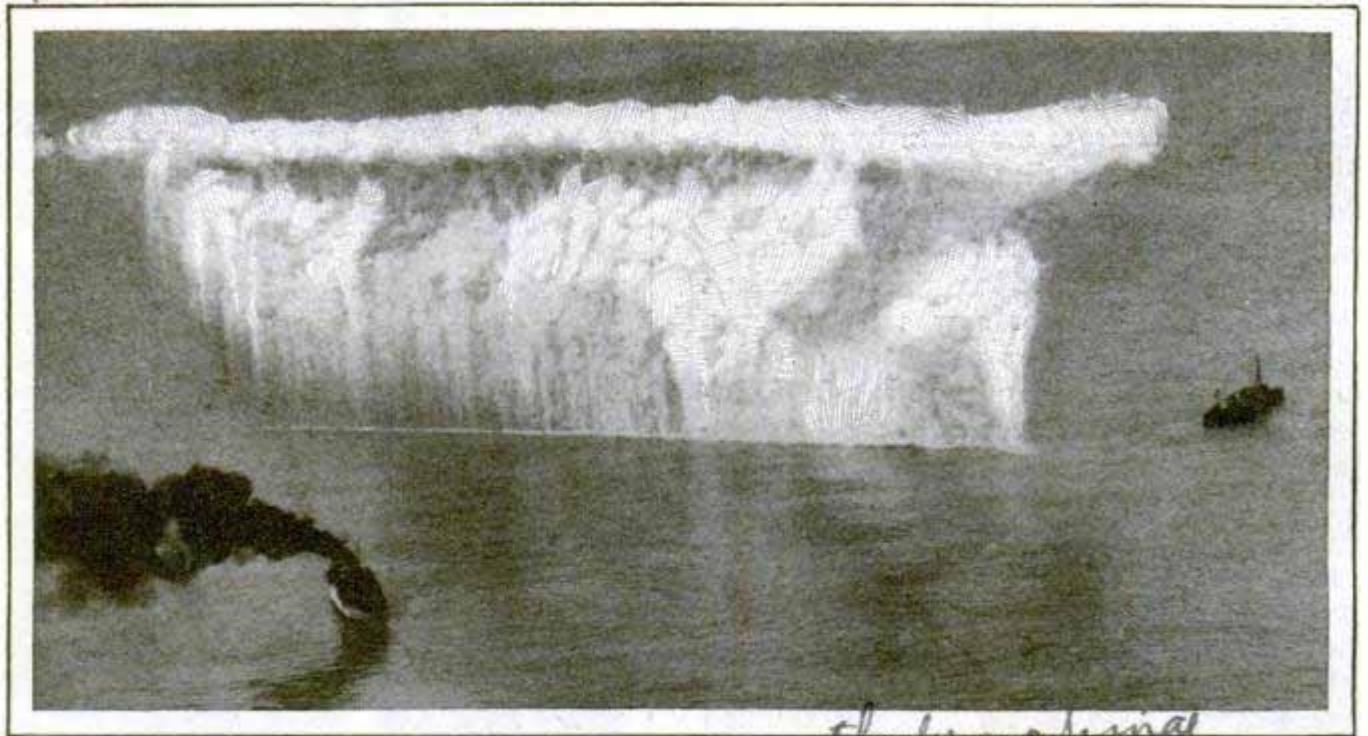
To protect the strings of the tennis racket, small rubber guards, easily attached, have been devised. They grip the bottoms and sides of the strings at their crossings in the center playing area of the racket, distributing the strain and making the pull of the strings more effective. At the same time, the guards are said to help grip the ball, giving better control to the stroke.



*Tennis Specialties Co.,  
220 California St.,  
San Francisco, Calif.*



264



Lowering a Curtain from the Skies; Smoke Screen from Airplane, Laid Down to Show How Effective It Would Be for Operations against a Battle Fleet

*International*

**SMOKE BARRAGE FROM PLANES TO FIGHT FOREST FIRES**

Controlling forest fires by means of a barrage of chemicals from airplanes is one of the plans under consideration by the chemical service and the air corps. Recent experiments in laying smoke screens and gas barrages from planes over the sea have shown that the work can be done at altitudes as low as 200 feet.

**CABINET FOR DRYING CLOTHES ALSO WARMS PLATES**

For drying clothes or warming plates, an electric cabinet has been introduced for house and apartment use. It is set into operation simply by turning a switch and has a means for ventilating the contents at the same time. Heated air is pulled from the top of the drier, down through the clothes, but the action is accomplished without fans or other moving parts.

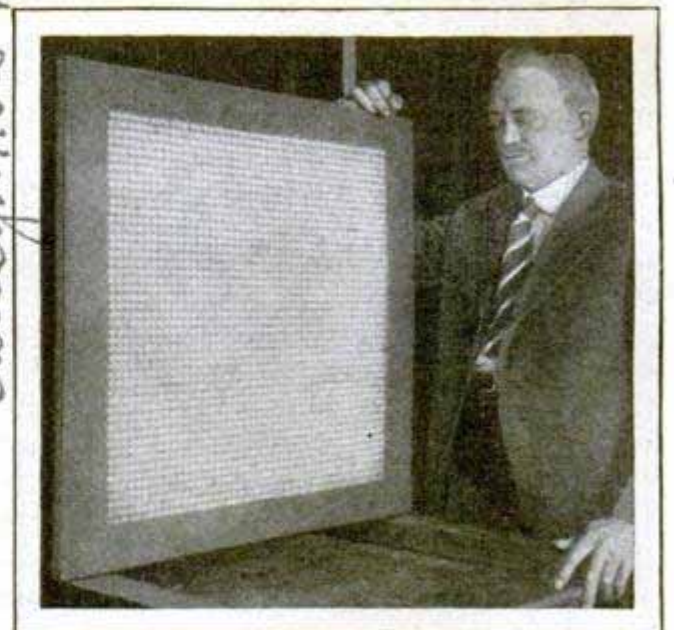
**PIANO HAS BUILT-IN CABINET TO PROTECT MUSIC**

Two patented improvements have been added to the piano by a German manufacturer. One is a built-in cabinet to hold the music where it will not easily become disarranged or dusty, and the other is a built-in lighting unit so arranged that it

illuminates the music and the keyboard without a glare. It is controlled by a push button concealed near the keyboard. Another button raises the top lid of the piano case when greater volume is desired.

**CELL BOARD FOR RADIO VISION HAS MANY LIGHTS**

More than 2,000 tiny light-sensitive cells are contained in a board devised by C. Francis Jenkins for an improved radio-vision apparatus intended for broadcasting baseball games and other outdoor



© Harris & Ewing  
C. Francis Jenkins with Multi-Cell Board for Radio Vision and Reporting Outdoor Events

*Canton Clothes & Dryer Co  
Canton Ohio*

*Chicago 116 S Michigan 1996*

*U.S. agent  
Knaum*

*Stichel Leipzig*

*1519 Connecticut Ave  
Washington*



*Chiswick, England*

events. As a receiver, the unit will be suited to use in a theater.

**LEVERS STOPPING TRAIN PREVENT COLLISIONS**

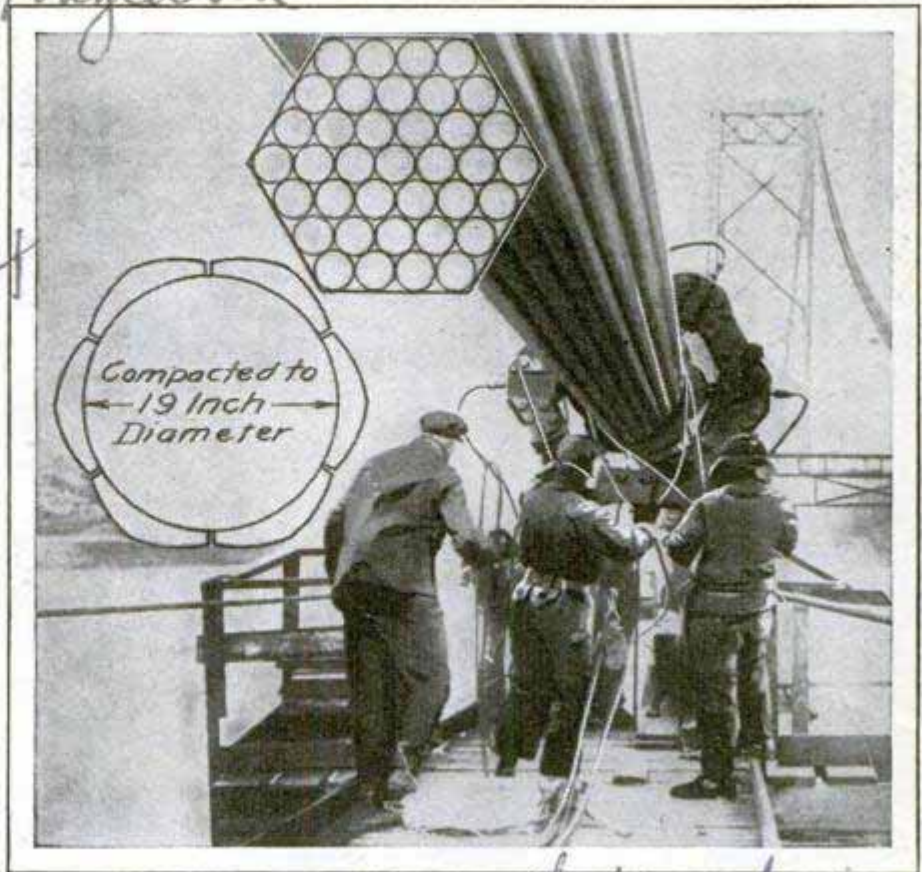
By means of a lever installation which he has devised for railroad trains, an English inventor expects to prevent collisions. Levers are placed at intervals of half a mile and are interconnected. The locomotive sets them in operating position as it passes, thereby protecting successive track sections as it enters them. Should another train run into the guarded area, the projecting lever would automatically apply the locomotive's brakes and halt the train. According to reports, the installation of the system is comparatively inexpensive, costing only a few dollars per mile.

**PORTABLE HUMIDIFIER IN HOME RUNS FROM LIGHT SOCKET**



Operated by current from a lighting socket, a portable humidifier for the home or office helps keep the air at healthful moistness and may also be used as a means to spread disinfectants or deodorants. It is shaped and decorated in the form of an attractive urn, and the connections are so adjusted that the current is turned off automatically, if the container goes dry.

[Popular Mechanics Magazine does not publish the name of the maker or seller of any device described in its pages, but this will be furnished free upon application to our Bureau of Information.]



Preparing Cables for the Big Bridge, and Drawing of Section Before and After Being Compressed with Jacks

**WIRES SQUEEZED INTO CABLES TO HOLD BIG BRIDGE**

Six hydraulic jacks, each capable of exerting a pressure of thirty tons, have been used to compress the wires that make up the cables for the Ambassador bridge, linking the United States with Canada at Detroit, into round cables. Each cable is composed of 7,622 wires, which are compacted to form a circular line nineteen inches in diameter. The cables are wrapped to hold them in the round shape and to protect them against weathering. There are thirty-seven cables to support 12,000 tons, the weight of the bridge structure so suspended.

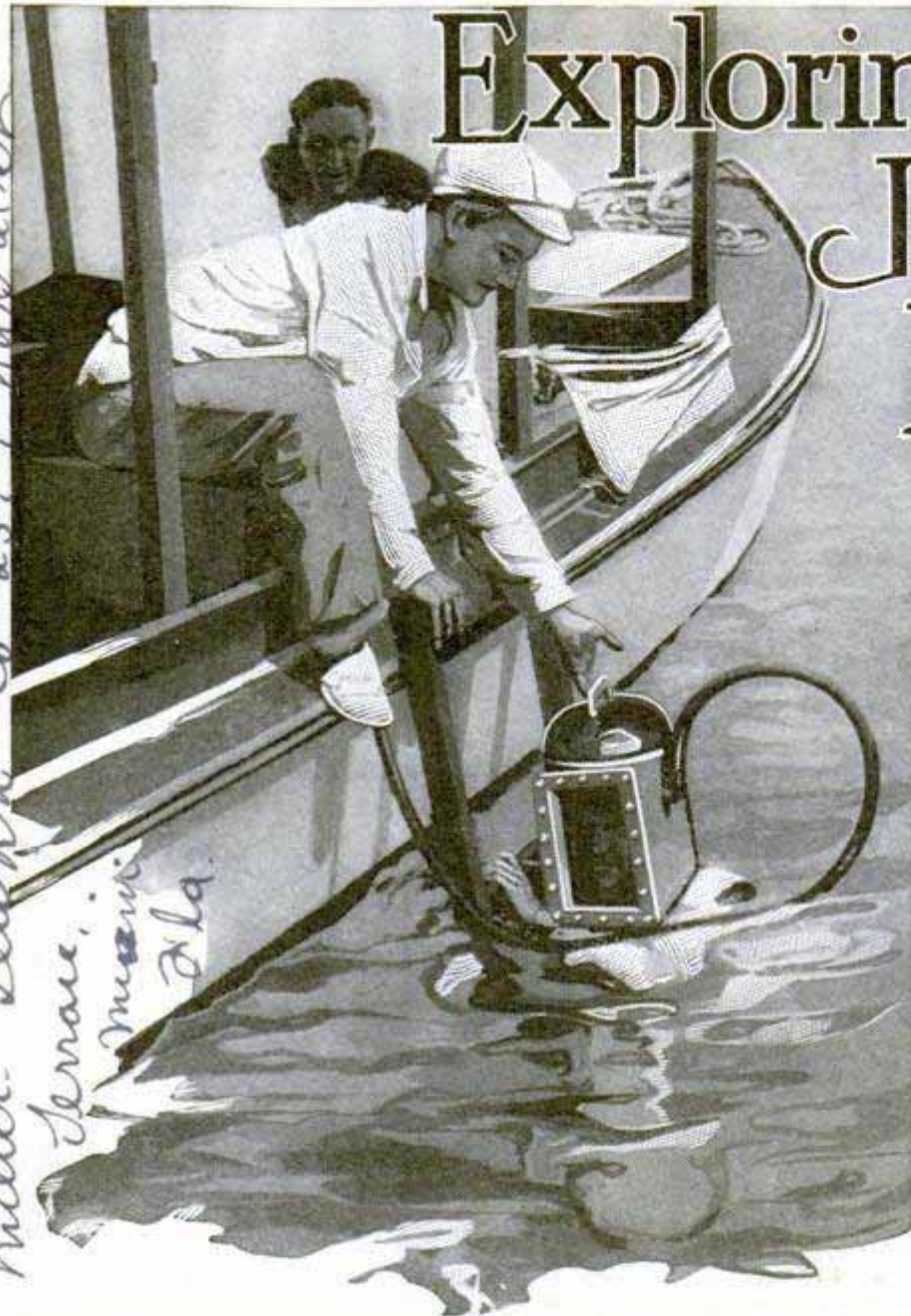
**FARMER RAISES HORNED TOADS TO DEVOUR INSECTS**

Near Abilene, Tex., a farmer is conducting a profitable business by raising horned toads for zoos and shows, and for other farmers who keep them to devour insects that damage crops. Since the reported finding of a horned toad that was said to have slept in a cornerstone for thirty years, the specimens have attracted unusual interest among visitors at zoos.

*American Radiator Co.*



# Exploring Davy Jones' Locker



ladder is hung over the side. If you reach the last rung, before stepping out into water-filled space, the hose is attached to a copper helmet, in the front of which a square of plate glass is securely fitted.

Carefully, John Mills, the engineer, lowers the helmet over your head until its weight rests firmly upon your shoulders. An assistant takes his stand at the air pump. You are told to let go, to proceed where you please. When your breath clouds the glass, Mills warns, tip your head, letting the water run inside the helmet and the glass will clear. Follow the hose back to the boat when

Helmet with Large Window Used for Shallow-Water Diving; with It the Wearer Can Stay Down Four or Five Hours at a Time

By C. MORAN

SCIENTISTS wearing under-sea helmets are exploring submarine life in the Gulf of Mexico. Carrying cameras, they proceed leisurely at their work of observing and recording fish and plant activities. One of these explorers, Prof. W. H. Longley, of the Carnegie Institution of Washington, has spent more than 3,000 hours under water.

A stroll on the bottom of the sea is a thrilling experience. A small launch, equipped with air pump and coils of rubber hose, is anchored over a spot twenty to thirty feet deep off Loggerhead Key, seventy miles west of Key West. A short

you wish to return.

Gently as a feather you come to rest on the ocean floor. You may strain your ears but will hear no sound. You look upward but see no sky. You gaze outward, but even under the most favorable conditions, fifty feet marks the limit of your horizon. No sharp contrasts of light and shade are to be observed, for the all-pervading illumination softens every outline and angularity and shrouds every object in a peculiar haze.

The water, transparent and constantly moving as seen from above, seems no longer to be water, but a queer encompassing medium without motion. You are not conscious even that it is wet. You

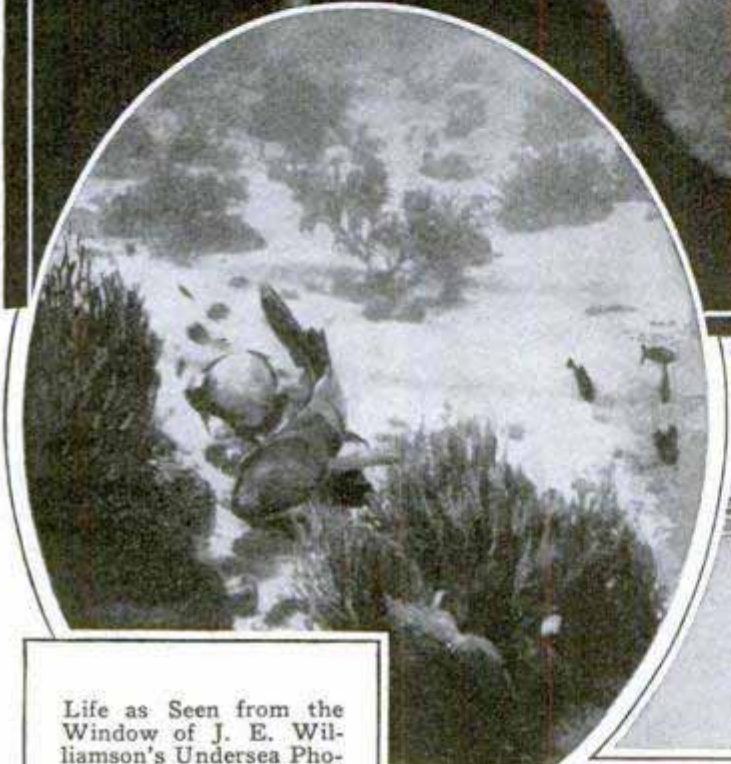
helmet for shallow water diving -  
 Miller Electric Co 2517 N.W. 21st  
 Terrace,  
 Miami  
 Fla.

Washington D.C. 3825-13th St NW

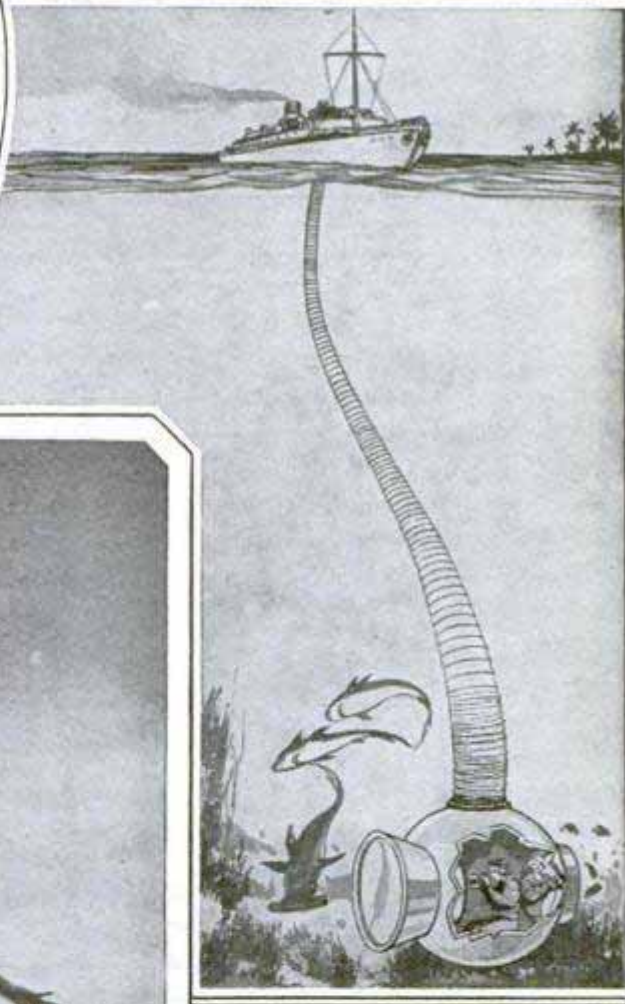




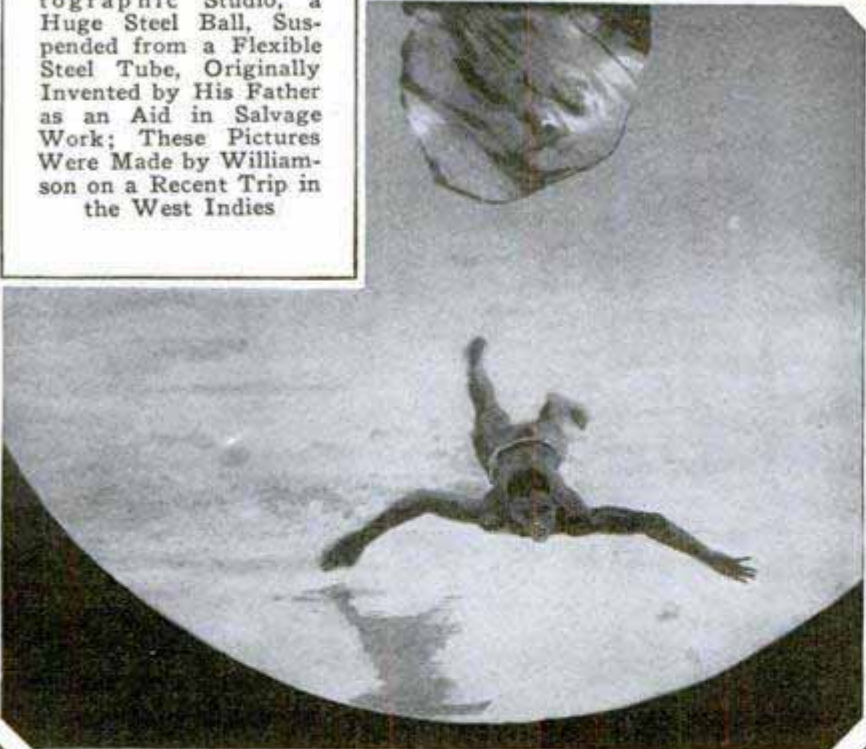
Sitting at the Submarine Window Watching the Fishes Flash By in a Coral Forest



Life as Seen from the Window of J. E. Williamson's Undersea Photographic Studio, a Huge Steel Ball, Suspended from a Flexible Steel Tube, Originally Invented by His Father as an Aid in Salvage Work; These Pictures Were Made by Williamson on a Recent Trip in the West Indies



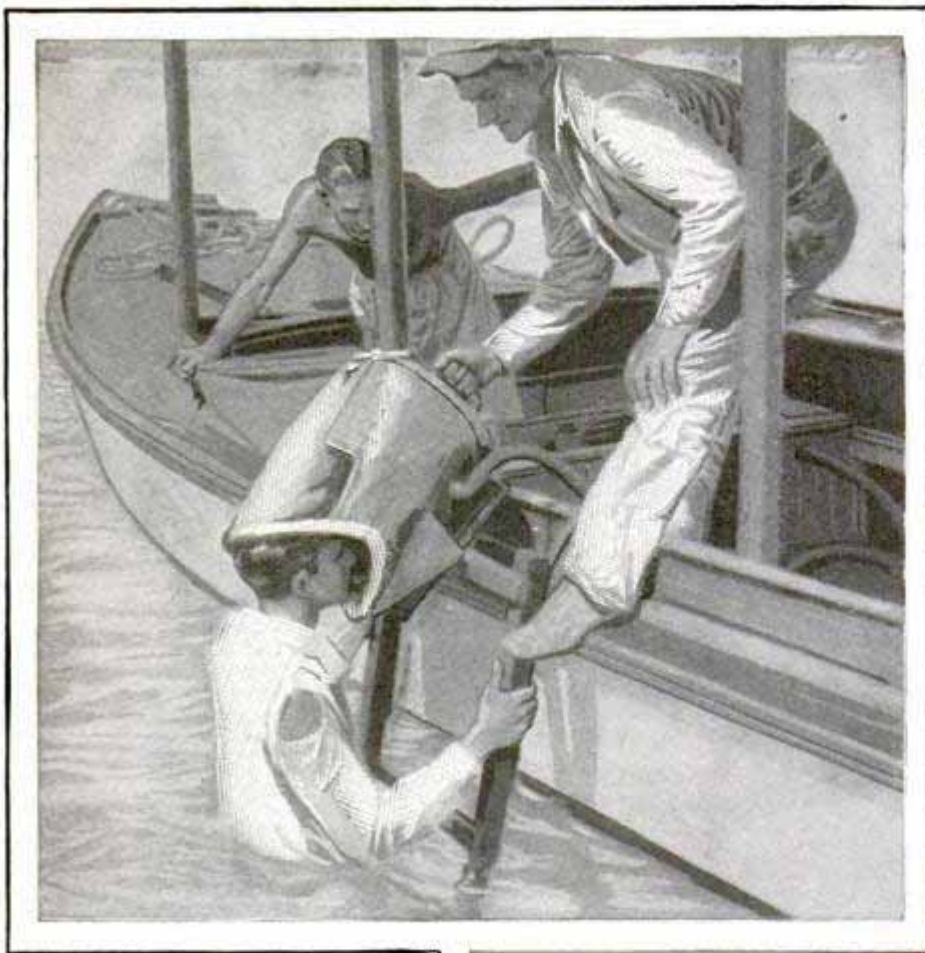
The Tube from the Ship Above Incloses a Ladder, Telephones and the Air Duct, and Can Be Lengthened or Shortened



How a Diver Looks on the Sea Bottom; Williamson Has Photographed Thrilling Fights with Sharks and Other Big Fish through the Circular Window of His Diving Chamber

*70 Hotel Berkeley*  
*170 7th St*





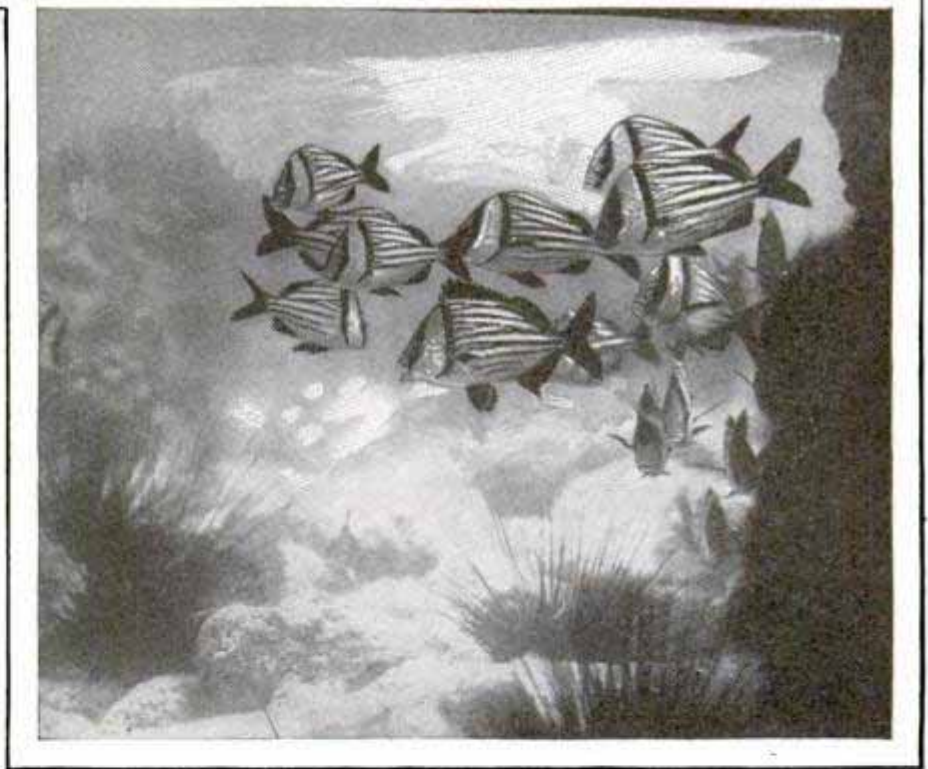
a dreaded barracuda, the "tiger of the sea," treats the astonished stranger with good-natured consideration, inspects him casually, and swims slowly away.

Professor Longley, who frequently spends four to five hours on the sea bottom, gives the following description of his experiences:

"Except when the light is strongest and the water itself most free from sediment, one is denied sight of all but the immediate surroundings, the world being resolved into a diminutive hollow hemisphere, pervaded with silence and on all sides fading

stretch your hand toward a great coral head towering beside you. It is beyond the sweep of your arm. You attempt to place your foot on a bit of jutting coral but miss it entirely. Gorgonians, a corallike form, and other growths, ankle-high when viewed from the boat, strike you at waist or shoulder or overtop you altogether. Declivities which seemed slight before are often seen to run off into huge depressions, and sometimes into real gorges.

Your movements at sea bottom are like the slow-motion pictures at the movies. The fishes appear suspended lightly in their investing fluid, a quiver of fin or tail propelling them with equal ease in any direction, up or down. They exhibit a mild curiosity at the presence of a man, swim lazily about you and idly nose you over. Even



The Simple Diving Helmet Used for Shallow-Water Work, and a Close-Up of a School of Pork Fish Swimming, as Airmen Say, in Formation

into nothingness. One's narrow field, however, if wisely chosen, may teem with life. It is more than probable that long-spined sea urchins infest the place, twiddle their spines if one approaches, or make off at a surprising rate of speed to shady



*Suggest kayaker gun. Abercrombie & Fitch, Madison Ave & 95th, New York*

places if disturbed. Yellow, brown or purple gorgonians, heavy with expanded polyps, stand on every side, with an occasional coiled basket star close-wrapped about their branches, where its inertness completely belies its power of motion.

"Large spiny lobsters, torn between distrust and greed, from under mushroomed heads of coral protrude their antennæ and wave them frantically over proffered food. Hermit crabs with heavy shells sit aloft on purple sea fans. With their spoon-shaped fingers, spider crabs, ensconced in safe retreats, grub off the encrusting growth of plants and fill themselves to repletion.

"The variety in coloration of fishes is an unfailing source of delight. Whether one looks down upon them through the glassy water or whether they float into one's field of view through the circumambient haze, they provoke recurrent expressions of admiration. One is thrilled as by the beauty of Aladdin's garden.

"Particular colors are correlated with specific habits. Red, for example, is almost wholly restricted to nocturnal fishes which lie hidden by day. The greens, on the other hand, characterize such species as live upon the green reef flats, or swim near the surface in open water.

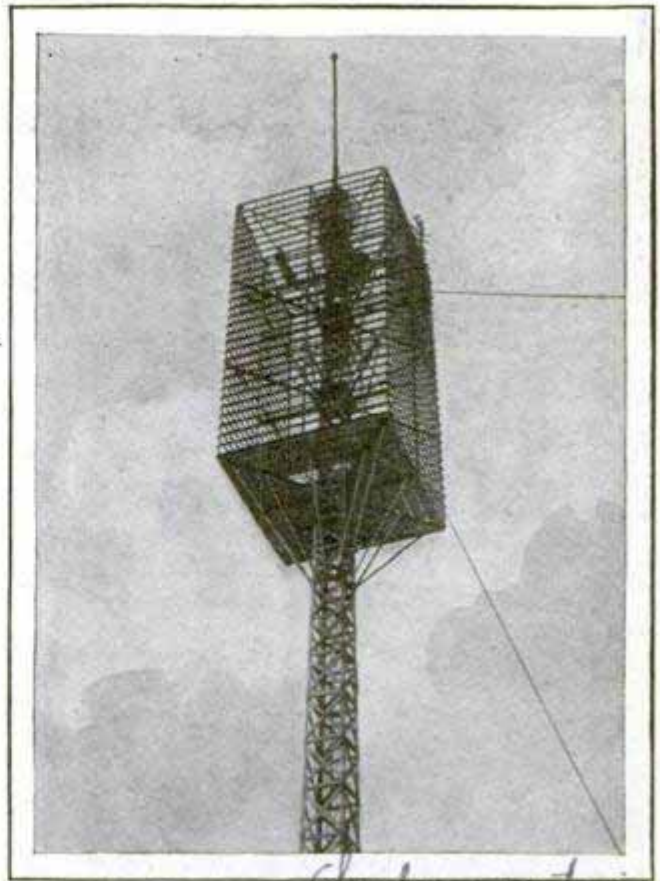
"Equipped with diving hood, one may walk about freely and thus lead carnivorous forms from point to point by offering them food. It is possible under such circumstances to evoke their various color phases at will by selecting the spot to which the creatures are led.

"The movements of herbivorous forms are not subject to quite such definite control, but one may walk up to browsing schools of tangs or parrot fish, follow them about, and procure information with little effort. All the creatures may be photographed amid perfectly natural and typical surroundings with little difficulty."

**YACHT IS FITTED WITH GUN TO SHOOT BIG FISH**

Mounted on the forecastle of a sportsman's Diesel-engined yacht, is a one-pound gun for shooting fish that may be found on cruises in the south seas. The equipment may also be employed for hurling harpoons at whales.

*A. K. Macomber's*



Distributor Box for Telephone and Telegraph Lines in Valparaiso, Chile

**PHONE AND TELEGRAPH WIRES CONNECTED ON POLE**

Both telephone and telegraph connections can be made on a boxlike unit at the top of a high pole in Valparaiso, Chile. The distributor section is as large as a good-sized room and is adapted for quick changes in the lines.

**JOINT GRIP ON RUBBER STAMP IMPROVES PRINTING**

So that clearer impressions may be made without blurring, a rubber stamp just put on the market has a jointed handle, allowing



free play between the grip and the base of the article. This prevents disturbing the impression when pressure is being applied. The base is of bakelite, and the rubber is firmly attached to it by an especially strong cement.

*Lake Mfg Co*

*1910 Caddis Sh*

*Chicago, Ill. 178th St. 1919*

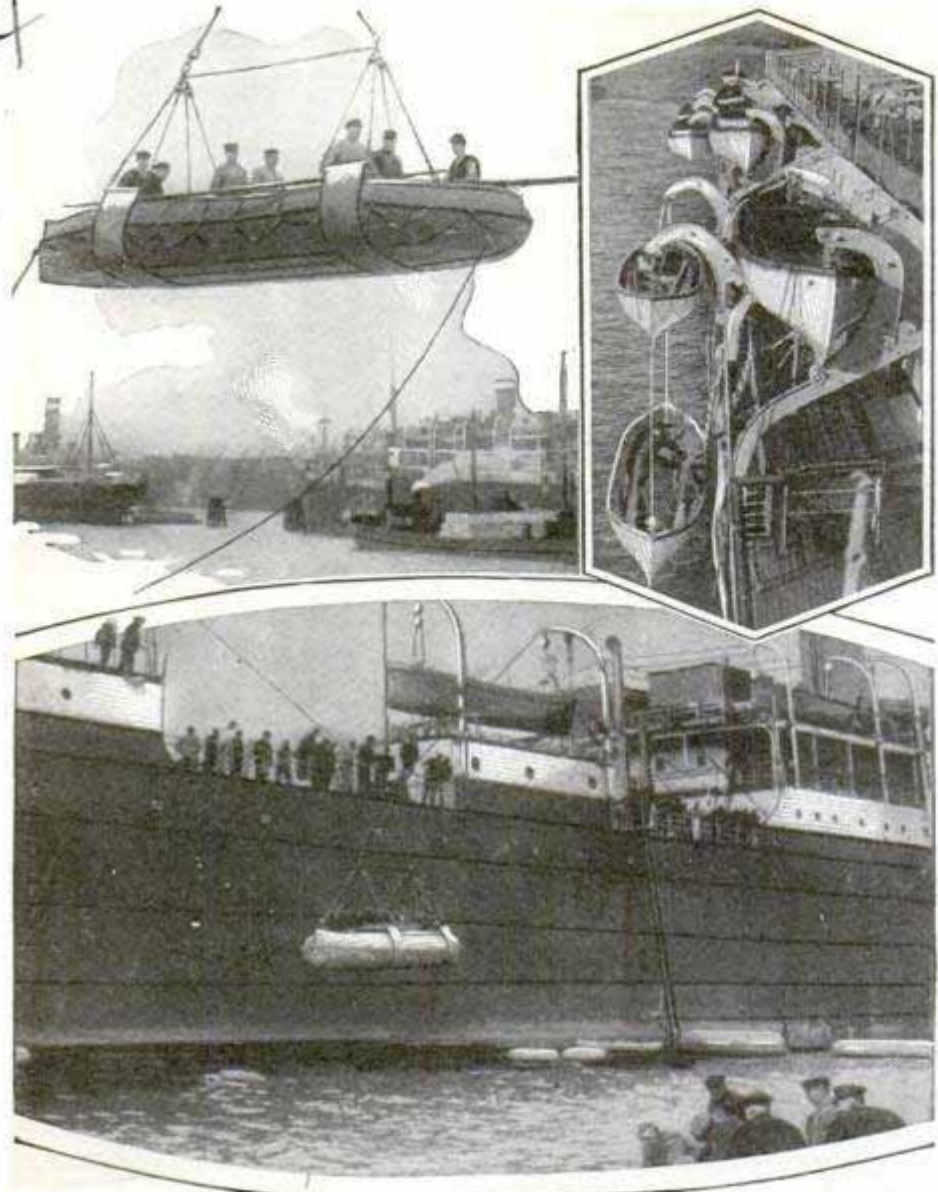
*1992*

*Aug 30, 1912*



1984

Tried on Canadian Pacific boat



Making Tests with the Collapsible Lifeboats, and, at Upper Right, Inset of the Davits That Roll Down Vessel's Side

### BETTER LIFEBOATS TO CURB TOLL OF SEA ACCIDENTS

Loss of life in the "Vestris" disaster and in similar accidents has placed renewed emphasis on the question of proper lifeboats for vessels. Just recently, interesting experiments have been made with improved forms of the craft. One has movable davits that slide down the side of the boat on rails, insuring the safe launching of the boat without tipping over or the breaking of ropes. Another is a raft-shaped boat that may be quickly inflated or collapsed. It cannot capsize and will hold several persons.

Names and addresses of manufacturers of articles described in this magazine will be promptly furnished, free, by our Bureau of Information.

### PLANES TO CARRY DIAMONDS TO LONDON

2067

A ton of gold and many diamonds are to be carried each week by all-metal flying boats and airplanes from South Africa to India and London, it was announced recently. The boats will be used on the area between Cairo and the Central African great lakes. Beyond this district, trimotored planes will fly to the Cape of Good Hope. Well-equipped landing fields and hangars have already been established between Cairo and Capetown. One advantage of this transport system will be a saving in interest charges which now are about \$750 a day on an annual shipment of \$70,000,000 in gold.

### FOOT CLAMP AIDS IN REPAIRING BATTERY

2026

Quickly adjusted to storage batteries, a clamp is offered battery-repair and service shops to save time and work. It is slipped on and held by footplates when changing the cells and making other repairs; is practically universal in use as a slight pressure on the footplates makes it adjustable to almost any battery. It also does good service in reinsulating a battery as the connecting bars on each cell do not have to be drilled off, but all three cells can be removed at once. The tool is easily portable, and patents have been applied for.

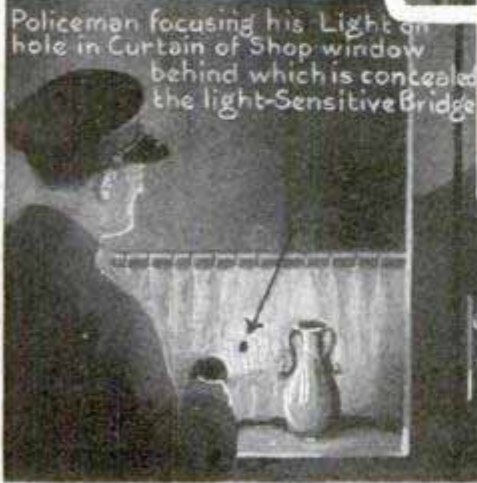
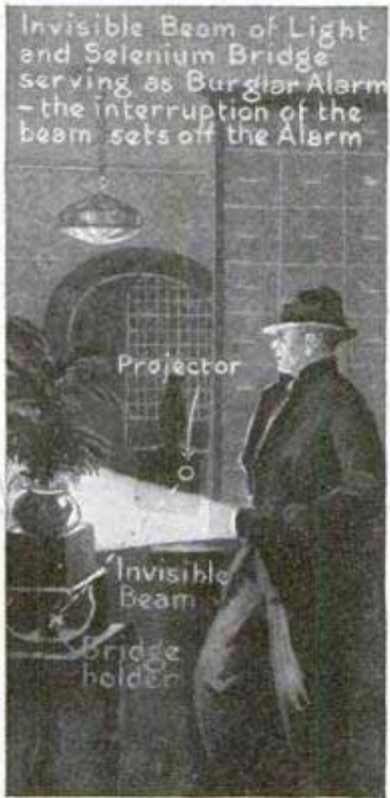
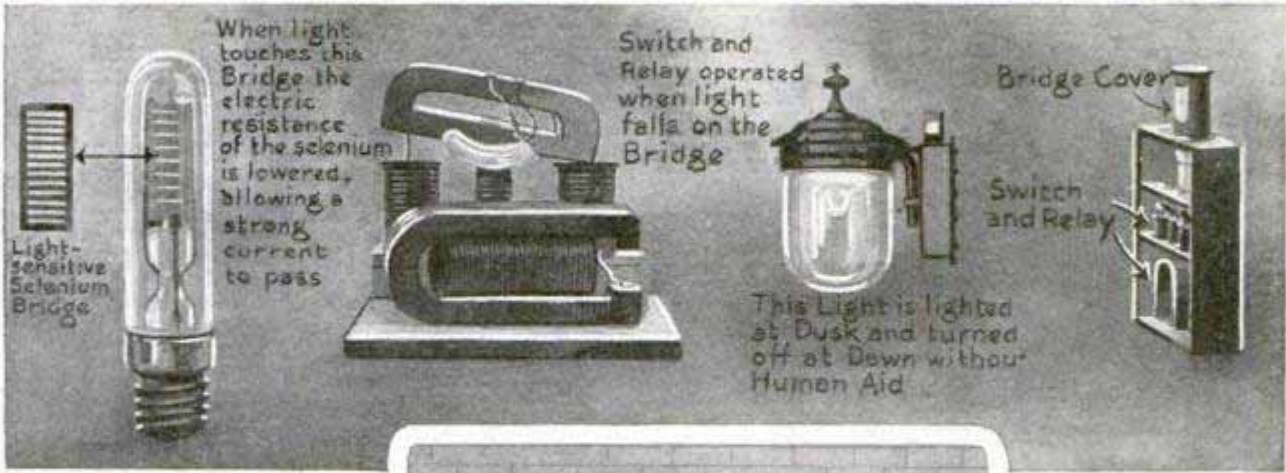


R. W. S. Co.  
 100 W. 1st St. St. Louis, Mo.



# HOW INVISIBLE LIGHT SERVES TO PREVENT CRIME

*26 Coventry St London W 1 Eng*



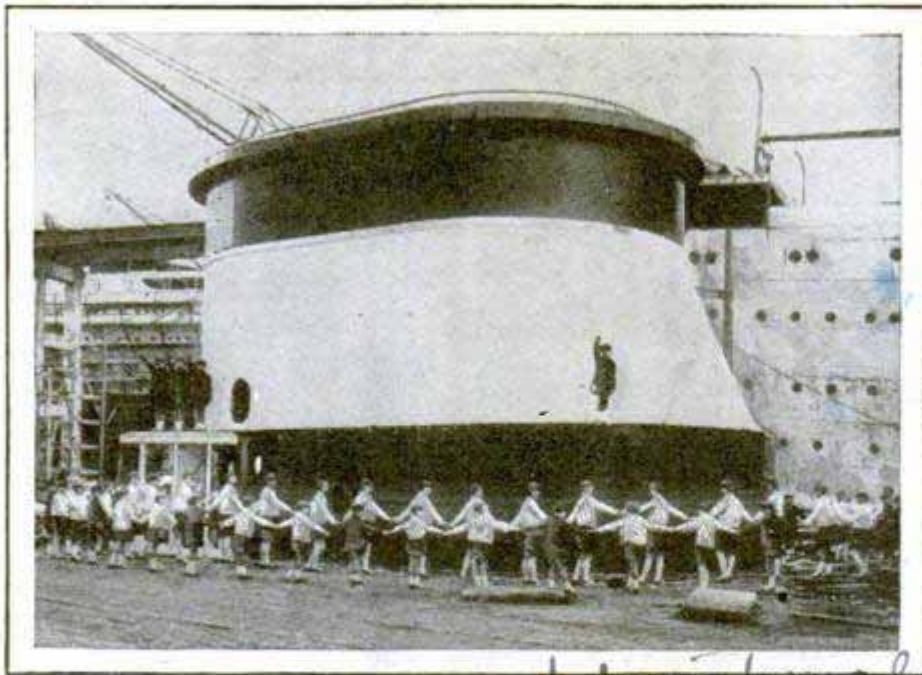
© The Illustrated London News.

*11/17/28 P-907*

The Development of Cheap and Practical Light Cells for Television and Other Radio Uses Has Opened a New Field in Burglar Alarms; Lights Can Be Turned On by Playing a Beam on a Sensitive Cell, or Alarms Can Be Sounded by the Breaking of an Invisible Light Beam When Some Solid Object Passes across It

*Radivision Parent, Ltd*





Children of Shipbuilders Celebrating the Completion of the Huge Funnel for the Motorship "Vulcania"

**FUNNEL ON ITALIAN MOTORSHIP ONE OF WORLD'S LARGEST**

What is said to be one of the largest funnels in the world was built for the Italian motorship "Vulcania." Before the vessel started on its maiden voyage to New York and before the funnel was installed, a number of Italian school children celebrated the completion of the giant craft by exercises in the shipyard. In some of the steamers that have been converted into oil burners, the funnels are not all used for smoke, some being employed as ventilators or as storage places.

**SELF-WATERING FLOWERPOT HAS DOUBLE WALLS**

Plants are automatically irrigated in a self-watering flowerpot recently introduced. It has double walls, the inner being of a porous material and the outer one of a waterproof substance. The two are united at the top by means of a flanged rim, and the space between is filled with water. The pot has been carefully tested and has been pronounced a success.

**SPREAD SALT ON FLYING FIELD TO LAY THE DUST**

Salt, sprinkled over a Michigan flying field was effective in laying dust and also improved the visibility of the area, as the salt became a glistening white, especially

after a rain. The material has been used successfully on roads and, purchased in large quantities, is by no means prohibitive in cost.

**COIN-IN-SLOT LOCK FOR CYCLES TO FOIL THIEVES**

Persons who ride bicycles in Berlin are afforded an efficient means of securing their vehicles against thieves by a coin-in-the-slot locking arrangement. Depositing a coin releases a chain with a lock and key. The rider fastens his bicycle, pockets the key and goes on his way, knowing that his property is protected against theft. The locks are conveniently placed in public places and are reported to be



Lock Box for Bicycle, Which Gives Owner Stout Chain and Key for His Vehicle

earning a revenue for the owners as well as affording protection for bicyclists.

*Mr. J. Blair Wilson, Esq. 1915  
Chicago, Ill.  
1915*

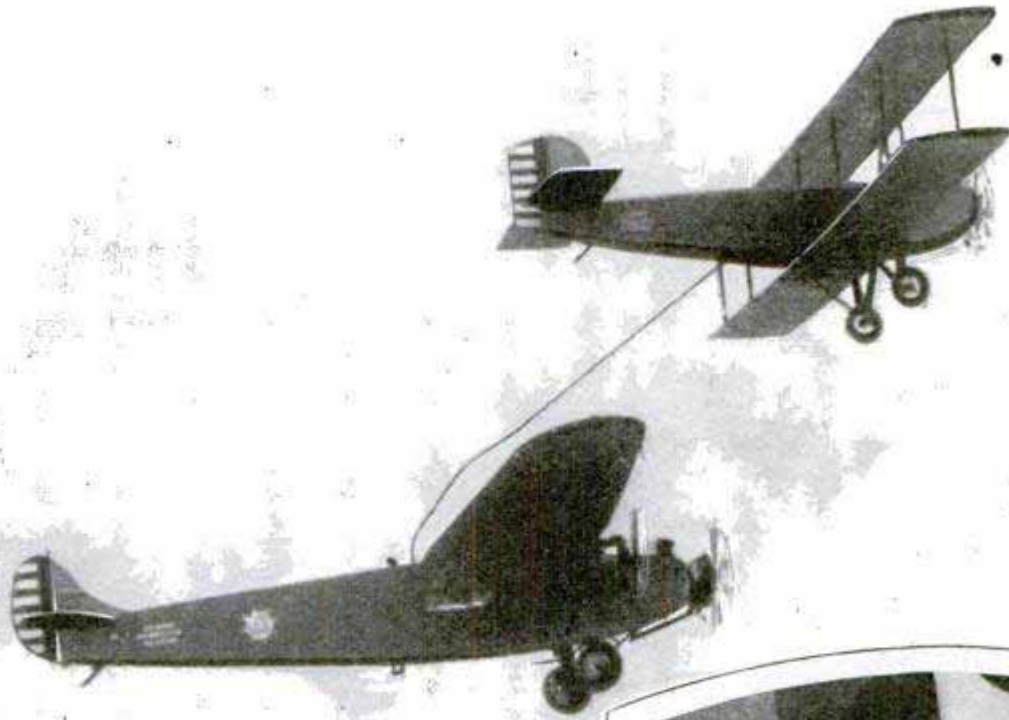
*International*

*International*

*Mr. Miss J. A. Harris*

*Can't locate map*





© Henry Miller

Releasing Fuel into the Tri-Motored Plane from the Smaller Ship Above, While Flying at High Speed, and a Close View of the Supply Hoze and Nozzle

### PLANE REFUELED IN FLIGHT FOR ENDURANCE RUN

Flying at a speed of ninety miles an hour, a tri-motored plane was refueled from a smaller ship sailing just above it. The test was made to further prove the feasibility of replenishing aircraft while in motion, and was directed particularly toward preparations for a coast-to-coast endurance tour. The most difficult part of the operation, it is said, was the lowering and connecting of the fuel hose. The nozzle weighs fifteen pounds. Food has been successfully passed from a service ship to a moving plane with a hose.



### SKATING ON FROZEN ALCOHOL POSSIBLE ON MOON

Taking baths in molten sulphur at noon time and skating on frozen alcohol at night would be possible for persons dwelling in the moon if they could survive there. Scientists have been measuring the temperatures of the satellite with improved apparatus and have found further evidence of the extremes of temperature experienced there. When the sun is directly over a point on the moon's surface, that is, at noon, the temperature

reaches about 265 degrees Fahrenheit, higher than the boiling point of water and high enough to melt sulphur. Some indication as to conditions that probably prevail on the unilluminated side of the moon was found from measurements made during a recent eclipse. Before it began, the temperature was 156 degrees Fahrenheit. At the end of the total phase, it had dropped to 196 degrees below zero, the freezing point of alcohol. Half an hour after the eclipse was over, the temperature had returned to 135 degrees, nearly as hot as at the beginning.

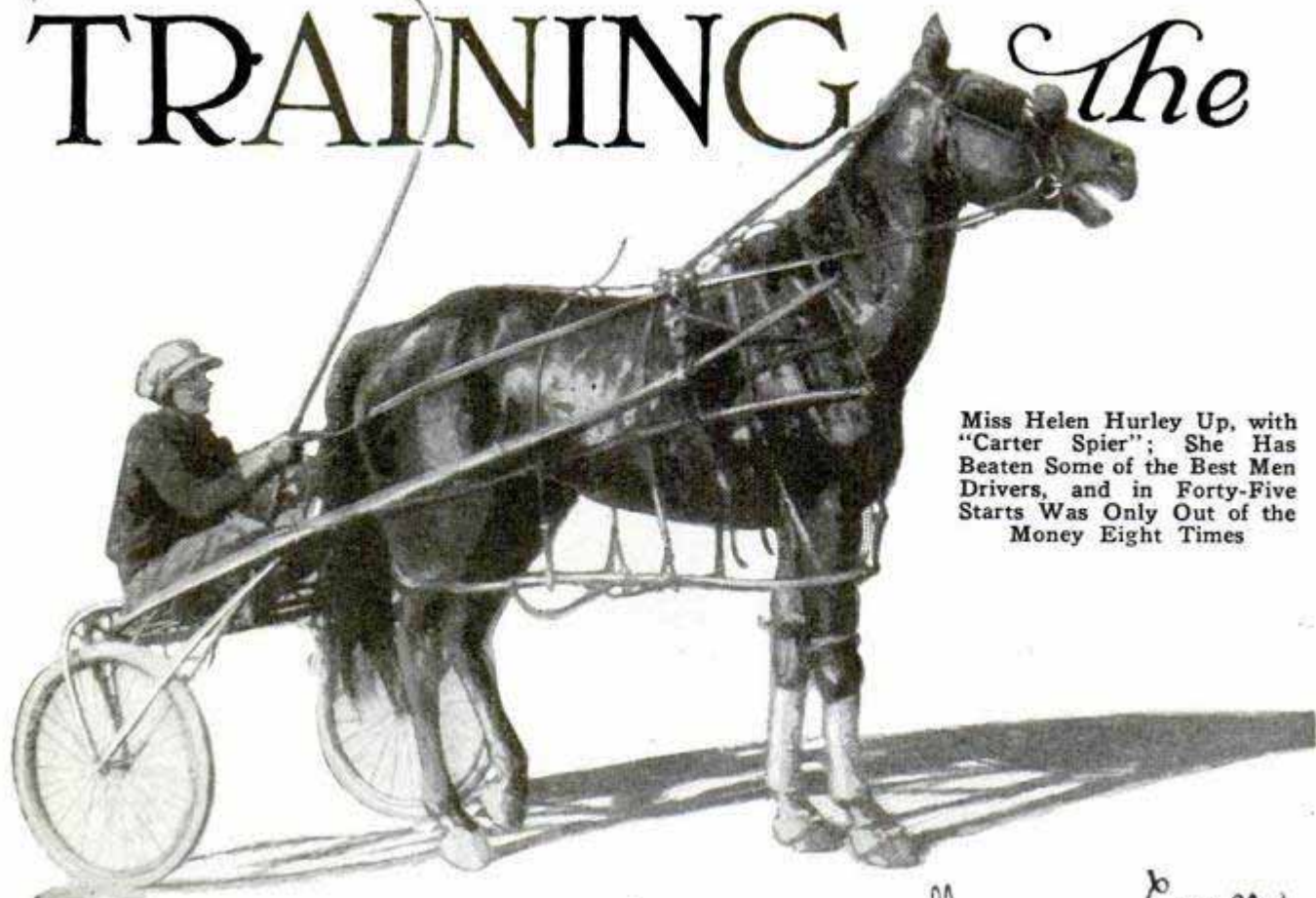
*See Seth B. Nicholson, Mr. Wilson*

*Science Service 404 8/12/28*



1639

# TRAINING *The*



Miss Helen Hurley Up, with "Carter Spier"; She Has Beaten Some of the Best Men Drivers, and in Forty-Five Starts Was Only Out of the Money Eight Times

By EARL CHAPIN MAY, *Sharon, Conn*

**A**MONG the 12,000 light-harness-horse fanciers who saw "Grattan Bars" win the \$25,000 New England pacing derby at Windsor, Conn., were some strangers to the trotting tracks who wondered that the big Canadian stallion came under the winning wire without a break.

It was a "driving finish" in horsemen's vernacular, which meant that Vic Fleming, from his sulky seat, plied his whip. Reinsmen behind other horses in that race also lashed their light harness horses. But not one of the fast steppers broke into a gallop under punishment. Each stuck to its side-wheeling gait and did the best it could to win the race.

Part of this willingness to stick to pacing under punishment was properly ascribed to the hobbles each racer wore. Hobbles are straps which hang over the horse's back and encircle each horse's legs. Pacers have been prominent in light-harness racing since "Hero" and "Pocahontas" won mile events and purse money on Long Island tracks in the early fifties. But hobbles did not come into general use until the nineties. Now nearly every fast pacing horse wears them. They hasten the development of pacing horses by

making an unusual gait more practicable. Pacers are frequently termed side wheelers because the pacer's legs on each side of it move forward and backward in unison. During 1928, when more than 1,500 light-harness racing meets were held in the United States and Canada and about 10,000,000 persons were spectators, more pacers than trotters were entered in the events. "Grattan Bars," from Canada, won first money in three of these \$25,000 races in three weeks, something no other horse has done. But this new world's record was made possible because of the skillful training given him.

So carefully had the year's sensation been trained that he didn't break into a gallop under the whip—he flattened out and paced his fastest, which was what he was taught to do through three years of careful tutelage. About 10,000 pacers are being schooled in this manner. About 10,000 trotters are similarly schooled. In light-harness vernacular, all of them are "trotting horses," to distinguish them from the "gallopers," or running horses.

Breeding, training and racing all horses is a specialty—or two specialties, to be exact. For, with a few exceptions, those



# TROTTERS

who specialize in light harness horses have nothing to do with the gallopers, which they refer to as "bang-tails." Those who follow bang-tail racing speak contemptuously of light harness horses as "turkey feet."

More time, patience, money and intelligence are required to develop a light harness horse, that is, a trotter or pacer, than are required to make a running horse. Also, it requires more skill and more mature judgment to win a light-harness race than a running race. That is why you very seldom see a mere boy in a sulky seat. It takes a man's brains and muscle to get the best out of a light harness horse. Galloping is a natural gait. Most horses run, in pasture or on the road or track, naturally. Once in a blue moon a colt is born

to the trotting or pacing gait—"lot trotters" or "lot pacers" they are called. But ninety per cent of these natural-gaited ones are failures on the racing tracks until they have been manipulated.

Colts bred for track life are halter-broke almost as soon as they are foaled, whether destined for harness or saddle racing. Once the soft halter is on a colt's head it stays there until it is replaced by a bridle and a soft rubber bit—a teething ring, in other words. From that point, methods of training diverge. Light harness horses and running horses enter different schools after they are six months old.

The school for the light harness horses is much more exacting. It is the result of a century's experience, for the trotting or pacing horses are strictly American products, while the running thoroughbreds are English in origin, although many great



The Trotter "Great Forbes," with H. H. Hellman in the Saddle of the Racing "Bike," So-Called from Its Bicycle Wheels

ones have been developed in this country. The training of the light harness racer is much the more complicated.

After the future trotter has become accustomed to the soft bit by guiding it around its nursery grounds with reins held in the light hands of a pedestrian, a light steel bit is substituted. Constant care is exercised to avoid hurting the tender mouth of the baby horse. Well-bred stock is too valuable to take any chances with its flesh or spirit. The days of rough handling passed long ago.

When the colt has learned its first lesson and responds to gentle pulls to right or left, it is made whip-wise as well as bridle-wise. A long lash is snapped in front of it or behind it or at one side of it. But the whip does not touch the gangling colt, so the latter does not shy at it. Then comes the lesson on the breaking cart,



which is a sulky having a heavy frame. This cart is rattled along the ground; its thills are dropped close to the youngster's legs. The wheels are rolled noisily along the stones. But nothing harms the nervous colt. By and by the pupil understands that the cart will not injure it. Then it is hitched and gently jogged on the track a quarter mile. It is on its way to being a racing horse. It has passed through the first preliminaries. It has also passed through its first year.

The professional trainer now takes a hand and takes it very gingerly. Each yearling is an infinite possibility. It may be a world's champion and win a fortune for its owner or it may be a dud, a total loss. It is the trainer's job to find what is in the animal. He studies its gait and "personality."

Back of the yearling is the trainer who holds the reins. Back of the trainer-driver is trotting-track history. He knows that from the time the first trotting track

was opened—on Long Island in 1828—down to 1874, when the great reinsman, Bud Doble, drove "Goldsmith Maid" to her record mile, trotting, in 2:14, little attention was paid to horses' shoes.

Among Bud Doble's fellow reinsmen were two blacksmiths, Peter V. Johnston and James D. McMann, who banked the fires of their forges and drove to many a race-track victory. But neither they nor their driving contemporaries paid any attention to improving the shoes. "Goldsmith Maid" won more money during the ten years she was racing than any other racing horse until the runner, "Zev," in this generation, piled up \$313,000 of money won. Yet Doble sent "Goldsmith Maid" to the nearest blacksmith shop when he thought she needed reshoeing. She wore a pound of iron on each foot until she wore her shoes down to where she had to have new ones or go barefooted.

But Dan Mace and other old-time reinsmen began to experiment with shoes of

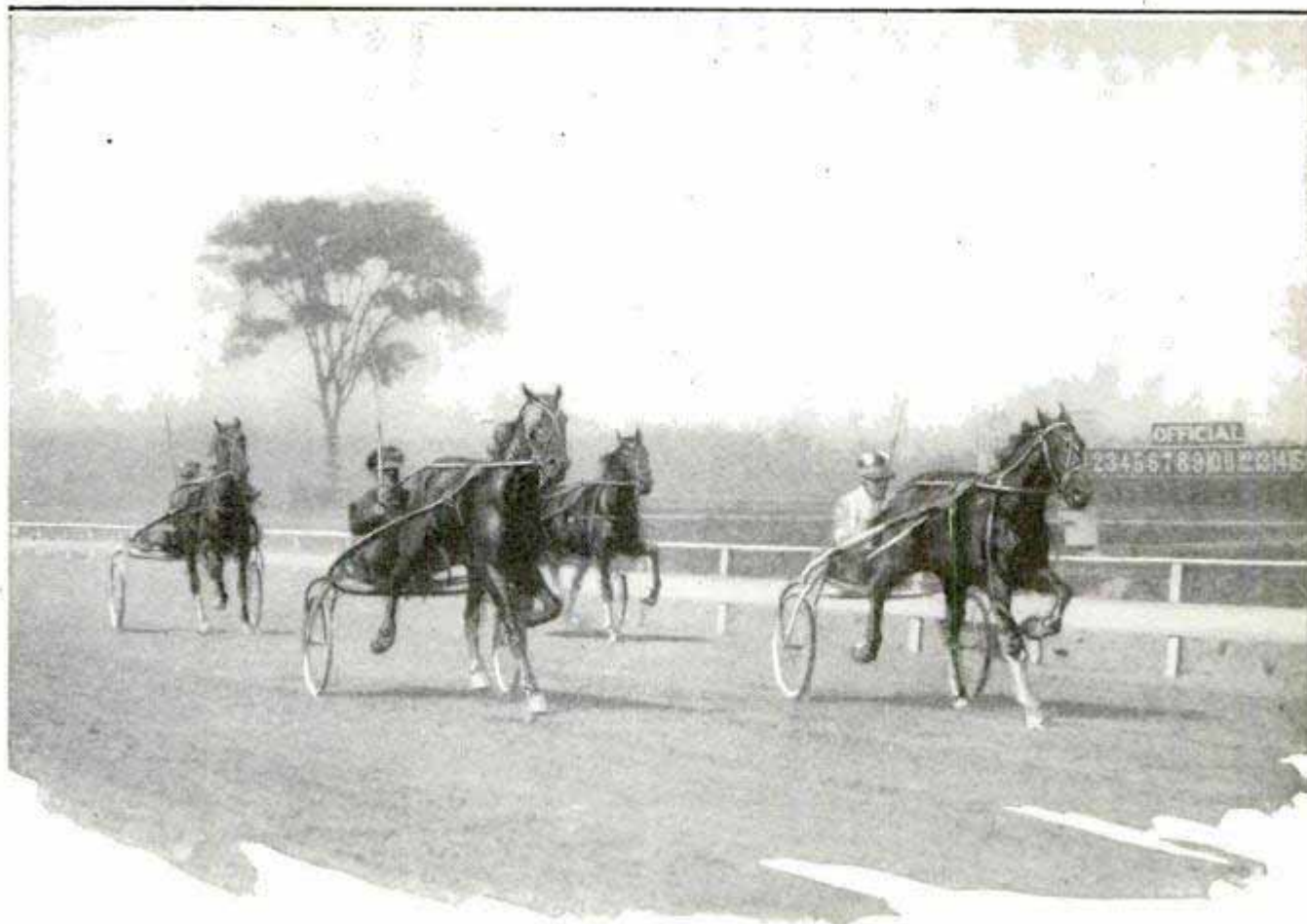
different weight on different feet. Mace proved conclusively that a then famous trotter, "Lady Thorne," went faster when he changed the weight of her iron shoes. From that experiment light-harness horsemen began to study balancing, by which is meant varying the number of ounces in each shoe, usually by making the front pair lighter or heavier than the hind pair, and thus assisting the motion of the horse's feet.

Whole volumes have been written about balancing. Fortunes have been made and lost by it. Six ounces on any trotter's feet is now considered heavy. Four ounces is close to orthodox. A Kansas trainer, named Charles Marvin, drove a pacer known as "Smugler" with indifferent success until, by putting toe weights on the pacer's



The Trotting-Race Winner Is Decorated with a Floral Wreath at the End of Three Victorious Heats





The Great "Miss Morris" Leads the Field Home in the 2:22 Trot; Harness Racing. Because of Its Close Connection with Practical Driving, Always Had a Great Hold in America

feet and making other changes in shoes and rigging, the "Smuggler" became a champion trotter, a "converted pacer" as the horsemen say.

As years went by and the call for speed sent horses past the 2:30 mark and gradually into the "Golden Circle" of trotters or pacers which could go a mile in two minutes or less, horsemen learned that changes in shoeing would prevent knee knocking and that boots would also remedy this difficulty. They also learned that in many cases a trotter or pacer went better if his head was held high with an overdraw instead of a side checkrein. Dan Mace discovered that goggles corrected the faulty vision of a stallion named "Fearnought." Blinkers for shying racers came into vogue.

Certain trotters and pacers are inclined to jump and break at shadows such as are cast across the track by quarter poles. Some genius evolved the shadow roll, which looks like a long sponge and is stretched across the racer's face a short distance below its eyes. Many a layman wonders what it is for. Another genius learned from experiment that if his trotter

or pacer was inclined to side-rein, or not go straight, especially when rounding the turn of a trotting track, a billiard cue or other small pole, fastened to the horse's bridle and its bellyband, between the reins, would help materially in eliminating that difficulty.

Then came the era of light-handed driving. The first of the old masters of the reins was Hiram Woodruff who reigned between the forties and the eighties. He and many of his contemporaries depended for success on main strength and awkwardness. The modern masters, such as Thomas W. Murphy, Walter Cox and Vic Fleming, put very little pressure on the reins. They depend more on delicacy of touch and feeling and control their steppers with a minimum of muscular effort. With a kind of magic they "lift" their racers to victory, though lifting is a physical impossibility.

Up to 1892 the high-wheeled sulky, with wooden spokes and iron-bound wooden rims, was all the vogue. In some of the earlier ones, the driver's seat was six feet from the ground. In many of the later ones, the driver's head and body were



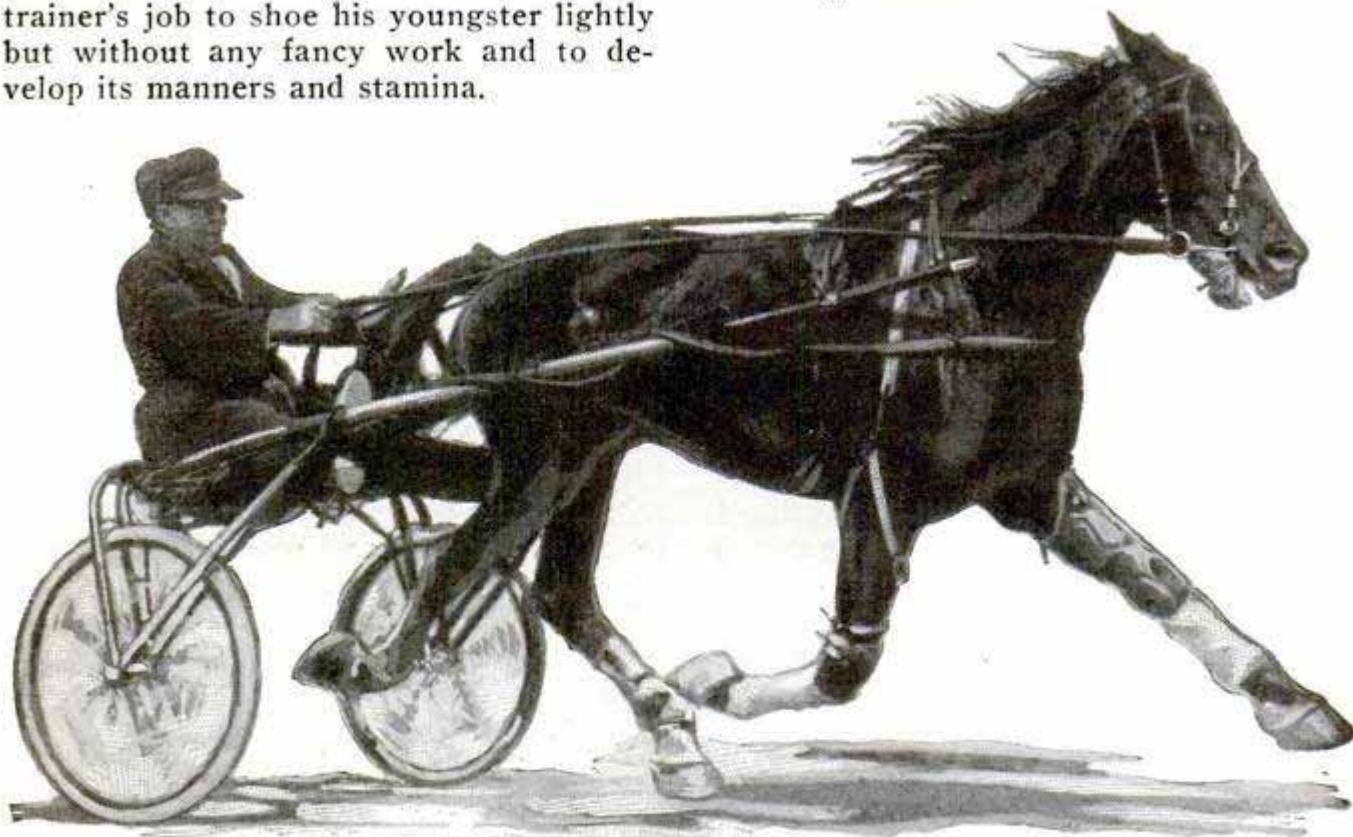
above his horse. In such a sulky John and James Goldsmith could really lift their horses' heads by holding the reins high in air. This was possible with some of the first "bike" or pneumatic-tired sulkies, which, by the way, reduced the average light harness-horse mile by about four seconds and made the two-minute mile less difficult.

But as science entered into racing, the sulky seat was lowered until now the driver is down behind his horse and hence does not increase wind resistance with his body. Yet, sitting at the low level, a skillful driver can still so rein a tired horse that it will brush or spurt under the wire to first money. That is what the reinsmen call lifting it.

These are only a few of the things the trainer knows when he starts out with a yearling horse. He begins by jogging the pupil slowly, gradually increasing the speed and distance. During these training miles he learns the nature and capabilities of his pupil. If the yearling trots naturally by putting its feet down in one, two, three, four fashion; if it gathers its hind feet quickly from beneath the sulky; if it does not throw the hind feet wide, but gets its front feet up in time to place the hind feet under them, then it is the trainer's job to shoe his youngster lightly but without any fancy work and to develop its manners and stamina.

But if, as a trotter, the pupil does not go so well, then experiments are made in weight changing. If it interferes or knocks its knees, boots are put on its feet and legs. Its feed is always watched religiously. Rigging and feed are the subjects most often discussed by light-harness men. Mr. Murphy, who drove trotting and pacing horses into more than \$2,000,000 of stake and purse money and has more speed records to his credit than any other light-harness man, made a big winner out of a discard, named "Hetty G.," by mixing ground carrots with cracked wheat and corn, whereupon she picked up in flesh and speed. But his favorite food for trotting horses is cut-up clover, oats and bran, to which he adds a pinch of senna leaves and a half cup of olive oil. This combination is a prime conditioner.

The able and industrious trainer who wants to drive his stable into the money on the Grand Circuit or anywhere, gets up at daylight winter and summer and sits in a sulky for a hundred miles before the day's work is ended. During the rest of the day he studies horses, his own and those of his competitors. At night he dreams of faster horses. That is the life of the light-harness man.



"San Peder Girl," an American-Born and Trained Horse, Was Taken to Sweden and Offered Some Stiff Competition to the Swedish Harness Horses on the Stockholm Track



Once he has decided that some particular pupil shall be a trotter with suspenders on its front legs—suspenders look a little like half hobbles and help the trotter get its stride—he enters the horse in its proper class. This is fixed on certain courses, after the horse has won its first race, by the time in which it won the contest, or, on other courses, by the money it won. If long experiments convince the reinsman that his pupil is faster at the pacing gait, either with hobbles or as a free-legger, into a pacing race it goes.

Then the man at the reins of the new hopeful has to decide whether he better trail some other driver who breaks the wind resistance and thus take a chance on coming out from behind and going around at the home stretch to make a winning, or whether he should take the lead and head the field along the route.

Above all and everything, he must know whether the horse he drives is so trained and constituted that it can be rated at top speed throughout the mile or whether, after it has trailed to the three-quarters pole, it will have enough speed left to brush by those that have led the way. He must also know how much pressure he can put on his horse before the horse will forsake its artificial gait and go to galloping. The latter is disastrous, for the judges may disqualify a breaking horse.

There's a tremendous lot to the trotting game. That is why men and not boys must follow it, professionally. But among the non-professionals, it has had its millions of followers since the gray mare, "Lady Suffolk," first trotted a mile in less than 2:30 in 1845. The world's record for trotting a mile, in the open, that is, without a wind shield, was made by "Peter Manning," with Murphy up, at Lexington in 1922. That mile was covered in 1:56 $\frac{3}{4}$ . The fastest mile ever paced in the open was by "Directum I," with Murphy up, at Syracuse in the same fast time. "Dan Patch," the pacer, made the fastest mile alone in harness, at Hamline, Minn., in 1906, behind a wind shield.

These records indicate what progress has been made in fixing light-harness-horse gaits. But faster trotters and pacers will be developed. Trotting and pacing are American sports and more people watch them than ever before.



To Make Haircuts More Pleasant for the Children; Barber's Chair in Form of Toy Automobile

**TINY AUTO AS BARBER'S CHAIR HELPS QUIET CHILDREN**

Children are induced to forget the terror of the barber's shears and clippers in a chair that is made to resemble an automobile. It is comfortable and attractive and, like the ordinary chair, can be regulated as to height.

**HEAT GUARD ON ELECTRIC PLUG SAVES CURRENT**

Electrical appliances are heated to varying degrees by means of a disk control on the attachment plug. It provides a range of "medium" and "hot" temperatures as well as a shut-off, preventing overheating and enabling the operator to have the flat-iron, toaster or other unit heated to the most efficient point. The control eliminates the necessity of pulling out the iron plug.



*Safeguard Electric Co. 1015*

*with cord \$2.25*



*72 Hubbard St. Brooklyn N.Y.*

*1946  
pat. pending  
With motor  
\$225.00  
board only - \$60.00*



*No Chicago - can be bought thru boat engine dealer*  
Surfboards Pulled behind Fast Motorboats Are Common, but Here Is One That Is Pushed, and by an Outboard Motor - Leaning to the One Side or the Other Steers the Board

### SURFBOARD RUN BY MOTOR GIVES WATER THRILLS

Riding a surfboard is becoming increasingly popular among persons who like water sports, but its possibilities have been somewhat limited as it has been necessary to have some sort of boat to tow the board. This need has been eliminated in a unit that has its own power plant, an outboard motor attached to the end. The board is wide, is fitted with ropes for holding onto and attains a speed of thirty miles an hour. No steering mechanism is needed as the board is guided by the rider simply leaning his body in the direction he wishes to go. If the rider falls off, the board will stop at once.

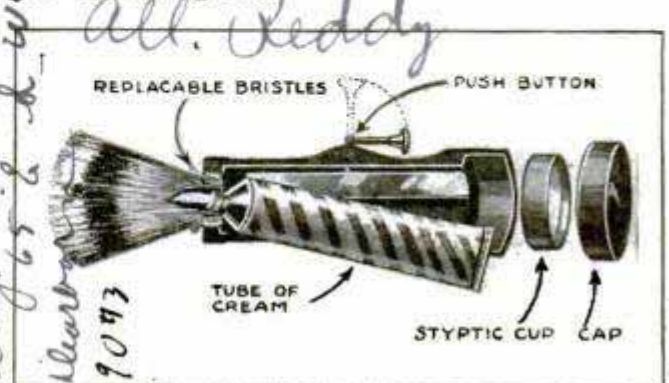
### SIDEWALK LANES FOR SHOPPERS TO AID PEDESTRIANS

Special lanes for window shoppers and for other pedestrians have been tested by the Detroit police department in an effort to expedite sidewalk traffic. Persons who wish to loiter along by the shops have one lane while two others are provided for

"through" traffic. The plan helps keep pedestrians to the right and avoids confusion. To supplement the traffic lights at some of the downtown intersections, loud speakers were installed to give directions and warning as to the proper time to cross.

### SHAVING BRUSH HOLDS SOAP AND POWDERED STYPTIC

Besides a tube of cream, a fountain shaving brush holds a cup of powdered styptic, and also has replaceable bristles. The assembly takes up but little space in the traveling kit.



Parts of the Shaving-Brush Kit, Showing the Feeder Button, and Cup for Styptic

*2006*

*Christian Science*

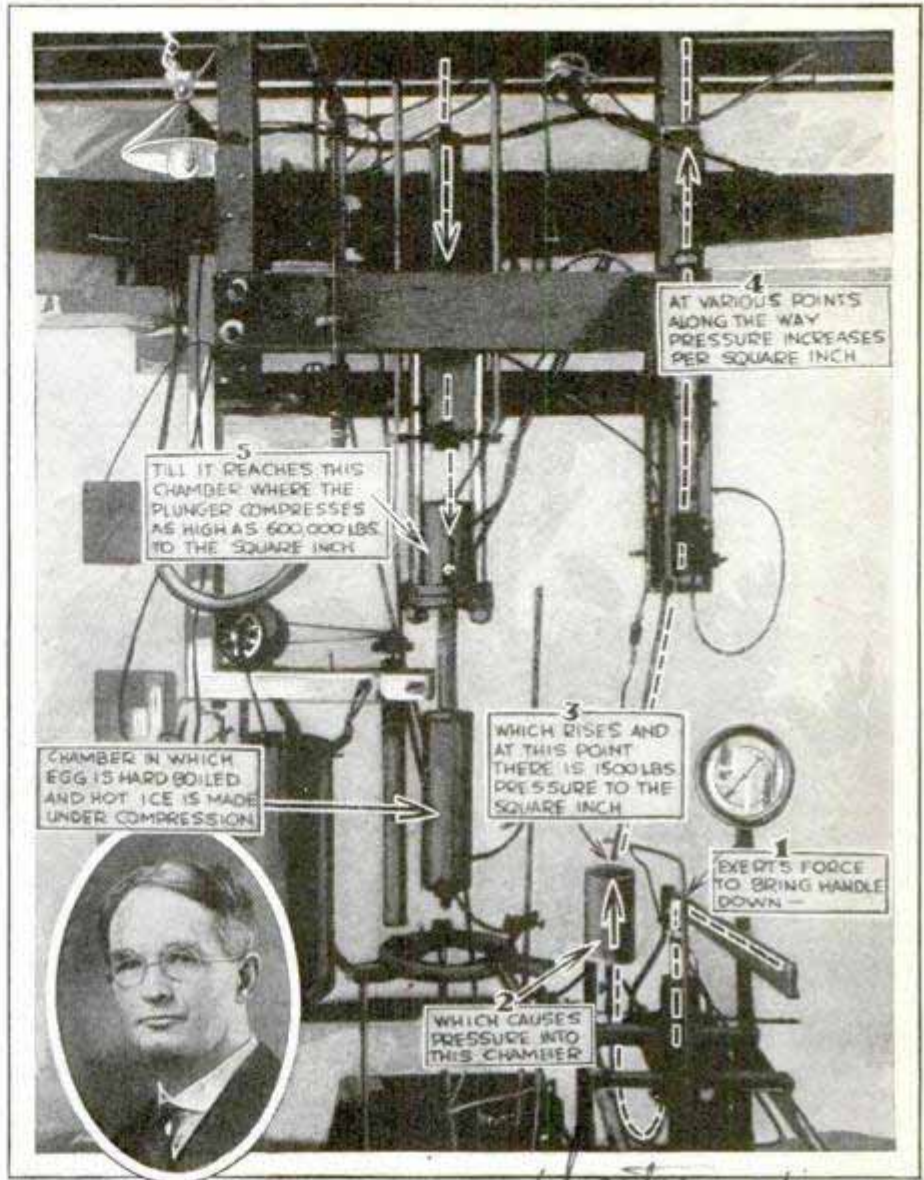
*Chicago S. Shyber & Co.,*



**EGGS ARE "BOILED" UNDER PRESSURE IN ICE WATER**

Artificial pressure of 600,000 pounds to the square inch, the highest so far produced, has been attained by Prof. Percy W. Bridgman, of Harvard University, with an apparatus of his own invention. This pressure corresponds to what would be found at the bottom of an ocean 250 miles deep. Under its force, steel tends to spread, paraffin becomes harder than machine steel and rubber turns so hard that it can be used as a die to cut steel. Mercury froze at room temperature under a pressure of 200,000 pounds, although it normally freezes at forty degrees below zero or lower. The outfit Professor Bridgman developed is described as relatively simple. What appears to be an ordinary hand pump is used to create the pressure required.

Materials to be compressed are held in a small hole bored in a solid piece of steel, five inches thick. This is stopped by a small steel plug which spreads under pressure to keep the contents and air from escaping. During one of the experiments the compression cham-



Some of the Chief Details of the Pressure Apparatus and an Inset of the Inventor, Professor Bridgman

ber exploded and fragments were imbedded six inches deep in hard-pine planking back of the apparatus. In another test, eggs taken out of ice water that had been heated by subjecting it to a pressure of 100,000 pounds were found to be hard-boiled.

**OPERATE ELECTRIC POLICEMAN BY SOUND OF VOICE**

"Mr. Televox," a mechanical policeman installed near a street intersection in a California city where it operates a winking light and warning arms by the effect of vibrations from automobile horns, has been thrown into confusion by small boys. They discovered that they could successfully imitate the sound of the horn by their own voices. A yell of the proper

volume and pitch caused "Mr. Televox" to wink an eye and wave an arm when no signals should have been produced. The inventors are now trying to readjust the "policeman's" mechanism so that untimely signals cannot be given. The device is intended especially for the protection of cars being driven from a side street across the main intersection. By tooting their horns, the drivers can cause the mechanical policeman to halt traffic on the main street until they have passed it.

*at Peninsula Highway*

*International  
Wesley Electric  
9110 1st Ave  
San Francisco*



## LIVING IN LUXURY HIGH ABOVE CITY STREETS

1963

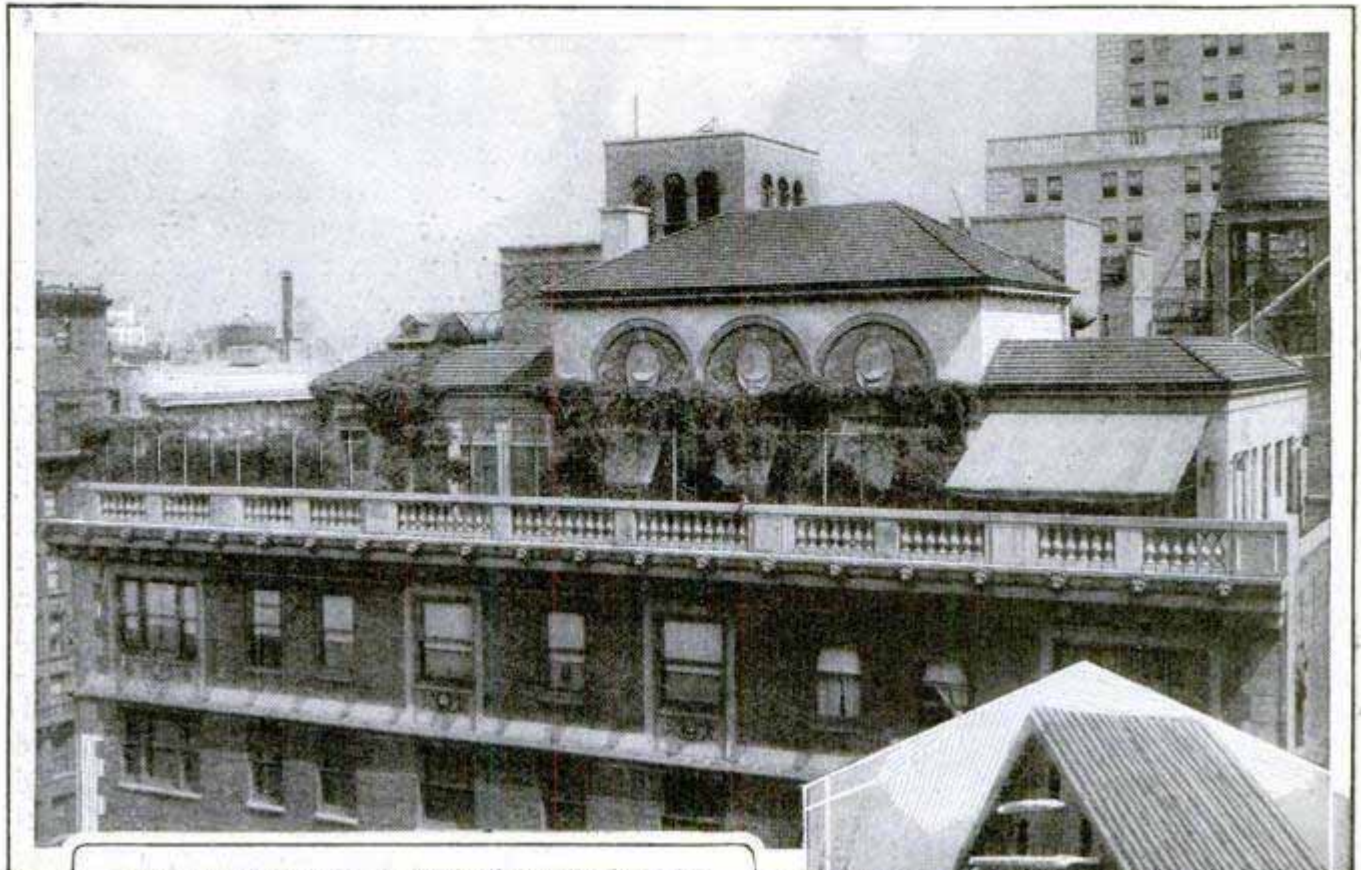


An Elaborate Roof-Top Bungalow and Garden in New York, Where Such Skyscraper Homes May Cost Anywhere from \$2,500 to \$300,000; at the Left Is a Vista of a Charming Garden, with Rustic Paling Fence, Which Might Be a Suburban Home, but Actually Is High above Manhattan; Below Is Another of the Lofty Penthouse Homes, with Bushes and Flowers Lining the Stone Coping; Tile Floors and Gay Awnings Make the "Yard" Attractive

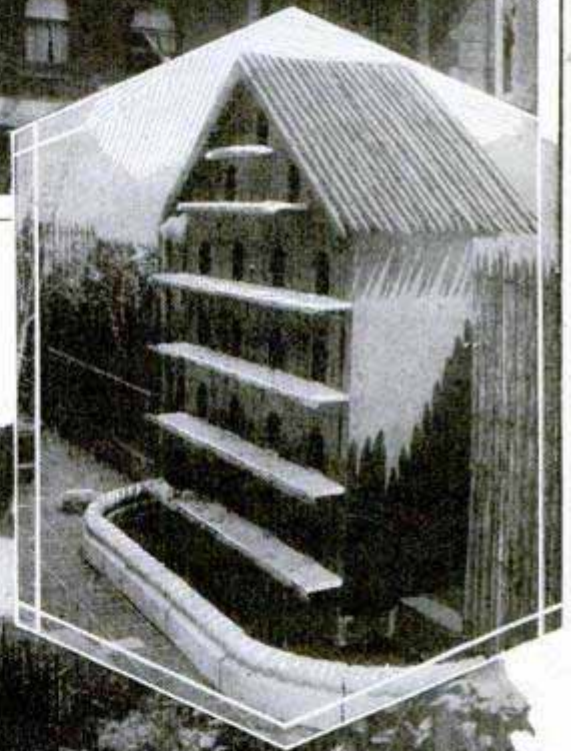




## IN BUNGALOWS BUILT ON SKYSCRAPER ROOFS



How a Roof-Top Home Looks from the Opposite Side of the Street; the Usual Penthouses, Covering Elevator Machinery and the Like, Are Concealed within the Bungalow's Walls; Many of the Lofty Homes in New York Have Magnificent Views over the Harbor and Lower Bay, or up the Hudson; at the Right Is a Pigeon Cote in the Garden of a Skyscraper Bungalow, and Below, a Corner of the Yard in One Famous for Its Garden and Rustic Picket Fence





SEEK CURB ON RADIUM DEATHS TO PROTECT WORKERS

Scientists are seeking ways whereby hazards may be reduced for those who work with luminous paints and other materials containing radioactive substances. Seventy-five chemists and industrial officials met in Washington not long ago to consider the matter, the action following the death of several persons who had been engaged in painting luminous dials and figures on clocks and watches. Some observers of the malady have declared that the principal cause of radium poisoning was the "eating" of the substance, that is, the workers' tendency to place paint brushes dipped in the material, between their lips to moisten the tip. It has been suggested that substitution of a stylus or die for the brush would solve the problem. This theory has been discredited, however, since some persons have died from the poisoning even though they did not use the paint brushes in any way. According to Dr. A. B. Moore, dean of science at Purdue University, the real cause of some of the deaths attributed to radium poisoning is still unknown. He said he had experimented extensively with radium without ill effects.

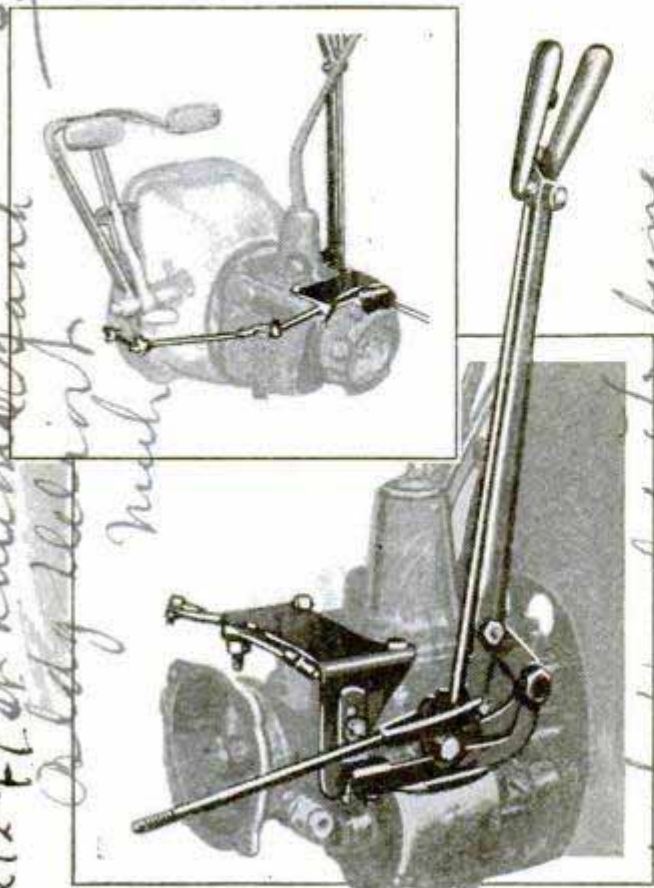


Photo Diagrams to Show Installation of the Automatic Safety-Brake Release

AUTO SAFETY-BRAKE RELEASE HELPS PREVENT ACCIDENTS

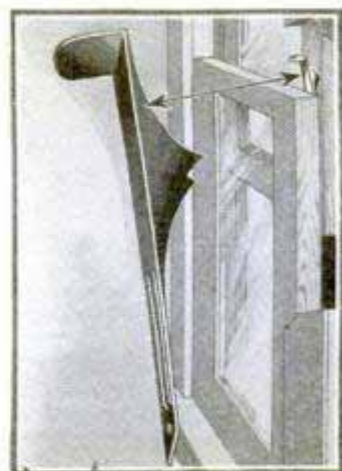
Many motorists have experienced difficulty in shifting gears when the car is stopped on a hill with the emergency brake on. The tendency is to let the auto roll back and possibly collide with a car behind before starting forward. This difficulty is eliminated with an automatic release for the safety brake. It frees the emergency at the proper moment, leaves the right foot to operate the accelerator and prevents running, or attempting to run, the car with the emergency on, a big saving for the linings.

PLANTS BREATHE ONLY BY DAY LIGHT TESTS SHOW

Plants open their breathing pores only under the influence of daylight or its equivalent, Dr. J. D. Sayre, of the Ohio agricultural-experiment station, recently told plant experts. The "invisible light" beyond the red end of the spectrum has no effect on the leaves, he declared. The longest-wave light rays to which they would respond are just inside the limits of the visible red.

ANTI-BURGLAR WINDOW CATCH ALSO PREVENTS RATTLING

Intended to make windows burglar-proof, a steel wedge, with sharpened points for holding it in place, also keeps the windows from rattling and may be used as a door-stop. It can be adjusted without nails or screws.



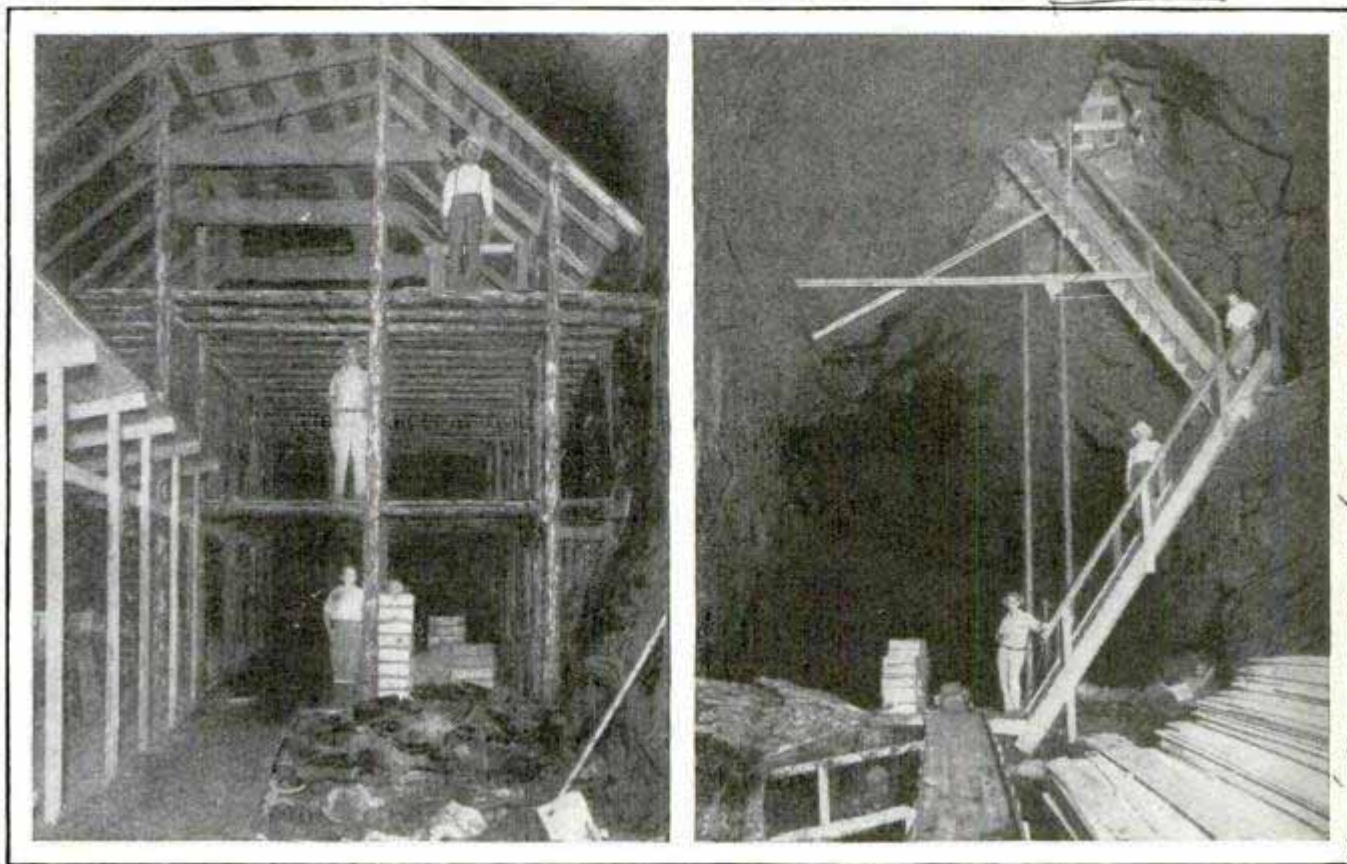
The Popular Mechanics' Bureau of Information offers its free service to all readers of our magazine. Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished by addressing the bureau.

*U.S. Auto Safety Brake, Inc. 1859*  
*212 9th St. National Bldg. Wash. D.C.*  
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*Science News Bulletin Staloh Co.*



BIG WAREHOUSE BUILT IN CAVE FOR POTATO CROP



Views inside the Cave Warehouse Where Quantities of Potatoes and Other Crops Are Stored; the Cavern Was Formed during a Volcanic Eruption Many Years Ago

In a section of the potato-producing area of Washington, a three-story warehouse has been constructed in a natural cave formed by a volcanic eruption many years ago. Surplus potatoes are stored there, the temperature remaining at about thirty-seven degrees Fahrenheit the year around. The warehouse is equipped with an elevator and there is room for many more buildings, as the cave is about a mile long and forty feet high. Geologists believe that it was formed by a huge air bubble that gathered during a flow of molten lava.

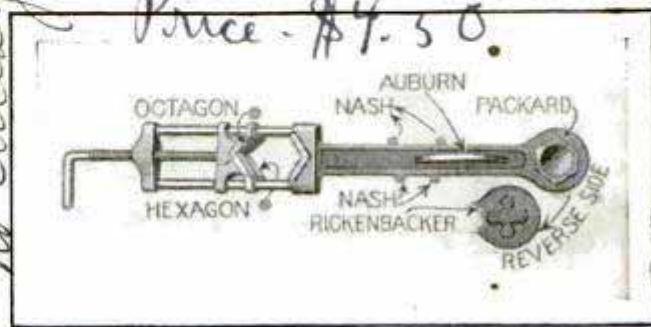
foam. By cooling and by the addition of a special compound, this trouble was eliminated. Later, a chemical was found which made cooling unnecessary, so that the water could be piped into the engines directly from the well.

**HOT WATER FROM DEEP WELL HEATS RAIL STATION**

Water from an artesian well, nearly 1,700 feet deep, at Capa, S. Dak., is used to heat the railroad station and also in the locomotives, for it comes spurting out of the ground at a temperature of about 120 degrees Fahrenheit, and at a rate of 100 gallons per minute. Some experimenting was necessary before the water could be employed in the boilers because it contained mineral substances that produced

**WRENCH FOR AUTO HUB-CAPS FITS ALL MAKES**

Hub caps on all makes of cars, including the 1929 models, are easily removed with a universal wrench now on the market. Hexagon and octagon jaws are adjusted with a slight twist of the wrist, and the tool is said to be especially adapted for damaged or tightly wedged caps.



Hub-Cap Wrench, Showing Different Makes of Cars for Which It Is Adjusted

*Conl. Marichio & Birdston  
 Price 215  
 Seattle Wash  
 1829  
 Chicago  
 Golden  
 Prof. H. C. Baker - Beling*

*Christian Science Monitor. 12/20/28  
 Bingo Mfg. Co. 466 Wren Drive*

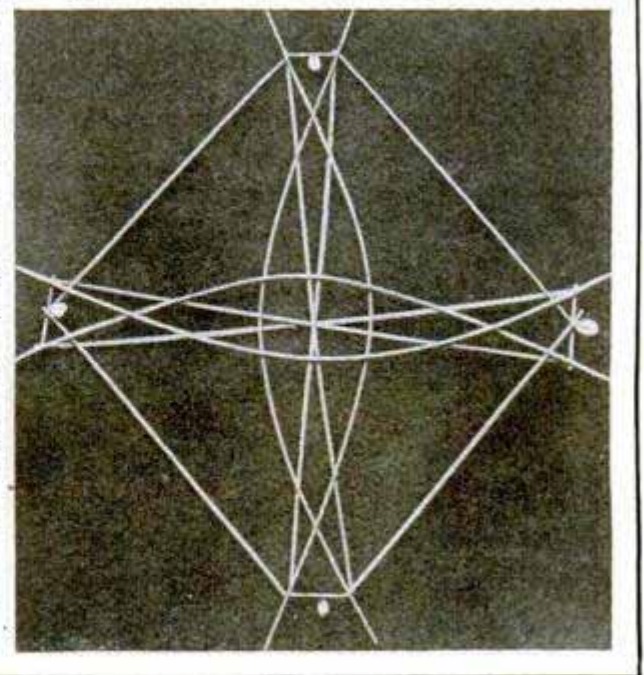


ULTRAVIOLET RAYS FROM SUN NOW ON INCREASE

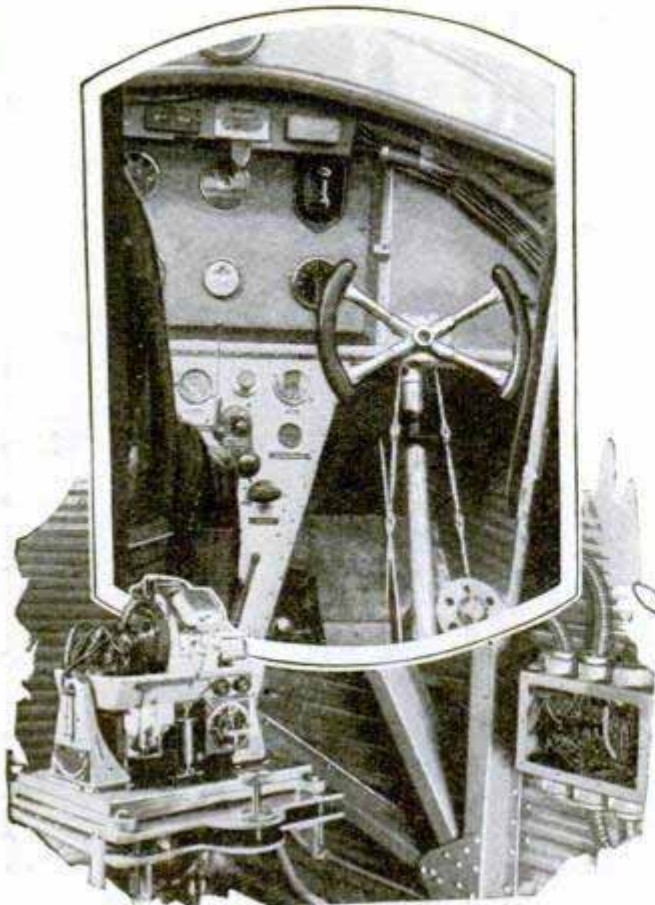
Ultraviolet emanations from the sun are on the increase, according to reports from scientists who have been keeping close watch on the body. Dr. Edison Pettit has been making measurements of the intensity of the sun's ultraviolet light at Mt. Wilson observatory, for four years. Since the first measurements were made in June, 1924, the monthly average intensities, have, on two occasions, been half again as great as they were in that month. That was in October, 1925, and February, 1927. The variation closely follows the number of sunspots, Doctor Pettit announced, and now seems to be increasing.

STICKS AND LEAVES AS MAPS GUIDED EARLY SAILORS

Among the most curious maps in the world are those fashioned by certain tribes of island dwellers, and used as recently as sixty years ago. One of these is simply a framework of sticks from the center ribs of palm leaves, tied together with palm fiber. The islands are represented on the map by small shells. The curving lines of the sticks are thought to designate the ocean currents and winds a traveler would be likely to meet in going from one spot to another. The maps were used for many years by the natives.



Curious Map Made By Early Sailors; the Objects at Each Corner Represent Islands



View of Automatic Steering Gear as Installed in Cockpit of Plane for Safer Flying

STEERING GEAR FOR AIRPLANES WORKS AUTOMATICALLY

Successful tests with an automatic steering gear for airplanes are reported from Germany. The device, it is said, frees the pilot from keeping his hands on the controls, yet does not interfere with operating the ship in the usual manner.

GAS TREATMENT FOR POTATOES CAUSES EARLY SPROUTING

Potatoes are made to sprout in three weeks by dipping them in a chemical substance, and then gassing them in air-tight containers for twenty-four hours. The method, developed at the Nebraska agricultural station, is expected to be of great aid to the growers, as it will make seed potatoes suitable for earlier shipping to southern markets, where planting is possible long before farther-north conditions permit, and it also allows experimental work with different grades to begin much earlier than is ordinarily possible. Potatoes usually lie dormant about four months before beginning to sprout. The treatment is also effective in ridding the potatoes of certain diseases.

10/08

University of Nebraska  
State College Nebraska

Engineering  
1961  
South China Sea  
Museum of Science

at h... ..

News Collection  
12/21/28



*Chattanooga Tenn*



Three Kinds of Iron; Gray Cast Iron, with Coarse Graphite Flakes, at Left; Pure Iron and Carbide of Iron, Center, and, at Right, Crystals of Pure Iron Imbedded in Carbide

## MEEHANITE—A New Metal

*Dec. 1928-977*

It Has the Structure of Fine Steel and Promises to Replace Cast Iron in Motor Cars

A LARGE automobile company recently brought out a new model with an engine having thirty-five per cent more power than its predecessor. Offhand, it would be expected that proportional enlargement of transmission and rear-axle parts would be required to withstand the greatly increased turning effort of the engine.

But, with minor exceptions, the dimensions of these parts are unchanged, yet they are much more than thirty-five per cent stronger than those of the previous model.

It sounds like magic, but, like all sleight-of-hand performances, the explanation is simple, for the greater strength was obtained by using improved alloy steels. In adopting this course, the manufacturer realized many advantages. The new transmission and axle parts could be made on the same machinery used last year, thus avoiding the large expense and trouble involved in putting new designs into production. Much weight was saved because obviously the new parts weigh no more than the old. The service-parts problem was greatly simplified, for nearly all the new parts will fit the old chassis, thus making it unnecessary for dealers to carry separate sets for the old and the new models.

This illustration is merely one of many which could be quoted to show how improved steels have greatly assisted in devel-

oping the modern automobile. But in spite of the great advances made in metallurgy during the past twenty years, automotive engineers expect even greater improvement in the next decade.

In the beginning, steel consisted fundamentally of an alloy of carbon and iron with a tensile strength of about 100,000 pounds per square inch. Then it was discovered that, by alloying this material with various metals and by proper heat treatment, the strength and other desirable properties could be greatly enhanced, incidentally raising the tensile strength up to 280,000 pounds in some cases.

Generally speaking, hardness, brittleness and strength go together, as do softness, ductility and low strength. Thus a steel with .15 per cent carbon is soft, ductile and relatively weak, while a steel with 1.25 per cent carbon is hard, brittle and strong. Between these limits, hardness, brittleness and strength increase as more carbon is added. With any given percentage of carbon, these three qualities are brought to a maximum by rapid cooling from the right temperature, while softness and ductility with reduced strength are secured by slow cooling.

Broadly speaking, the addition of nickel to a carbon steel gives toughness; chromium, hardness; chromium and nickel, hardness and toughness combined; vanadium or molybdenum, shock resistance; silicon, resiliency. And the best of it is

*Meehanite Metal Copy Chattanooga Tenn.*

*Emil Harold J. Blanchard 39 Read*

*Ans. H. J. Meehan Foundries*





that, by selecting a suitable combination of alloys properly heat-treated, a steel with almost any desired properties may be obtained.

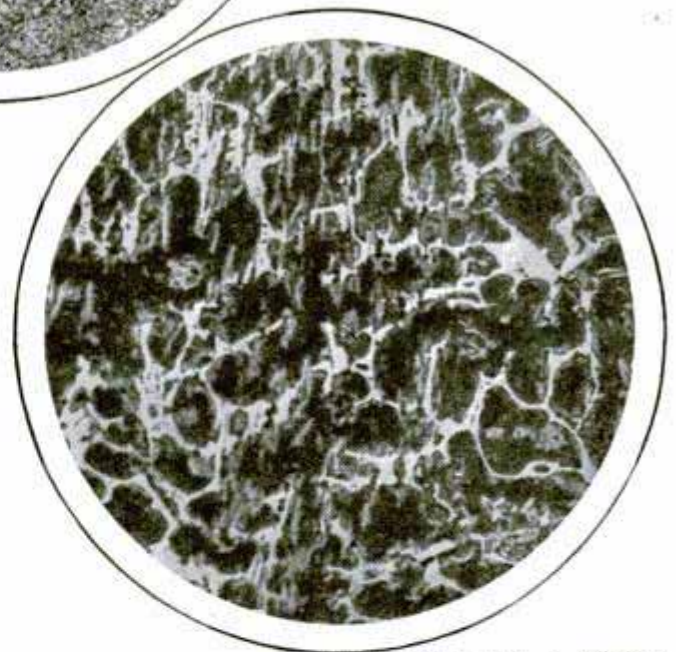
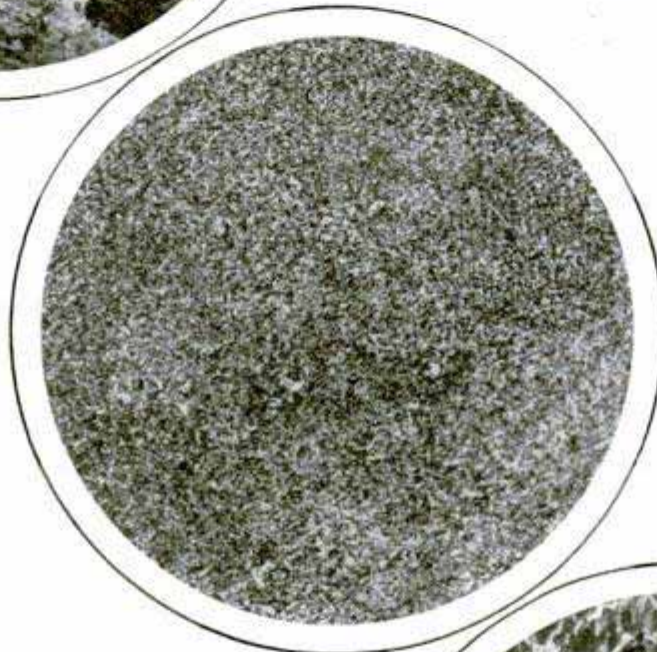
Now here is a curious fact: An automobile chassis is largely composed of steel and cast iron. The reader is fully aware of the great progress that has been made in the metallurgy of automotive steels. But what of cast iron? Steels have been growing better but it is rather shocking to realize that progress in the development of cast iron has been almost negligible. In twenty years, the strength of steel has nearly trebled and its other properties have been similarly improved. During the same period, the strength of cast iron has only increased from about 20,000 to 30,000 pounds per square inch, and its other properties roughly in proportion.

Fortunately, however, metallurgists all over the world are beginning to give cast iron the attention it deserves, for it is a very important material. In fact, very encouraging progress has already been made, and this brings us logically to a discussion of a wonderful new material, Meehanite, named after its inventor, G. F. Meehan.

Chemically, cast iron differs from steel in that it has considerably more carbon, 3.4 to four per cent. Meehanite likewise is composed of iron and two to three per cent carbon, and while it is designed to replace cast iron, it has the structure of fine steel, whereas the structure of cast iron is an uncertain hodgepodge, as will presently be explained.

Meehanite has three times the tensile strength of gray cast iron, that is, its strength runs up to 100,000 pounds per square inch. It has twice the stiffness of cast iron. It may be heat-treated like steel. By this means it can be made as soft and ductile as malleable iron or as hard as chilled cast iron. It has unusual strength at high temperatures and is very resistant to corrosion. It machines as readily as gray iron, but with long, curved chips like steel.

Meehanite may be used anywhere cast iron is used,



Courtesy Prof. Robt. S. Williams  
A Hard Tough Steel, Top; a Fairly Hard and Tough Sample, Produced by Hardening and Tempering, and, Bottom, a Sample of Meehanite, Magnified 100 Times.

and, in some cases, successfully replaces steel. The material looks particularly promising for cylinder blocks, because of its greater hardness and resistance to ab-



reason. Tests already made indicate that wear on cylinders and other surfaces is likely to be cut in half.

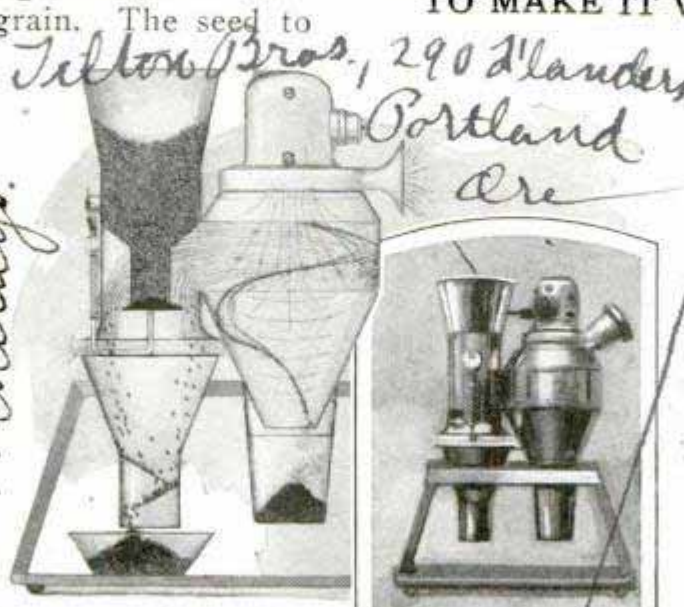
The utility of the material is also indicated by the recent manufacture of some air-cooled airplane-engine cylinders. By correct heat treatment, the air-cooling fins were made as soft as malleable iron to resist accidental breakage, the cylinder bore was made hard to give exceptional wear quality, while the metal between the cylinder bore and the fins was treated to give high tensile strength. Thus these cylinders are not only stronger and lighter, but have superior wearing qualities.

### SPREAD POLLEN BY ELECTRICITY TO AID PLANT CULTURE

In raising tomatoes under glass, a western grower simplifies the task of spreading pollen by using a vibrator operated with current from small batteries. It taps the blossoms lightly but with a frequency many times greater than is possible by hand. The pollen is seen to shower forth, and the entire operation is done in about one-third the time required by ordinary methods.

### VACUUM CLEANER FOR GRAIN TO IMPROVE CROPS

Better grading and testing of seed is said to be possible with an electrically operated vacuum unit, developed by the department of agriculture. It can also be used for removing foreign substances from other material than grain. The seed to be treated is placed in a hopper from which the rate of flow is controlled by means of a cone valve. Suction, produced by a vacuum-sweeper fan and governed by an air valve, lifts light particles away from the heavy ones so that the cleaned grain falls into one compartment and dust and the like, into another.



Vacuum Grain Cleaner



Wheeled Cart for Carrying Mail Bag; It Takes a Load from the Postman's Shoulders

### WHEEL CARRIER FOR MAIL BAG EASES POSTMAN'S LOAD

Letter carriers in Washington, D. C., tested a wheel carrier for the sacks during the Christmas rush. Instead of carrying the bag from the shoulder, the postman placed it on the wheeled holder and pushed it along. A brace kept the sack upright when left on the sidewalk.

### CEMENT SPRAYED WITH METAL TO MAKE IT WATERPROOF

Reports from Germany state that a scientist there has developed a process for covering cement objects with a spray of molten zinc, tin or lead to make them waterproof. The method has been applied to cement and concrete slabs, pipe and tanks and is said to be equally successful with all forms of artificial stone.



Brass with the Bee Brand San Francisco

Tilton Bros., 290 2<sup>nd</sup> Avenues  
Portland Ore

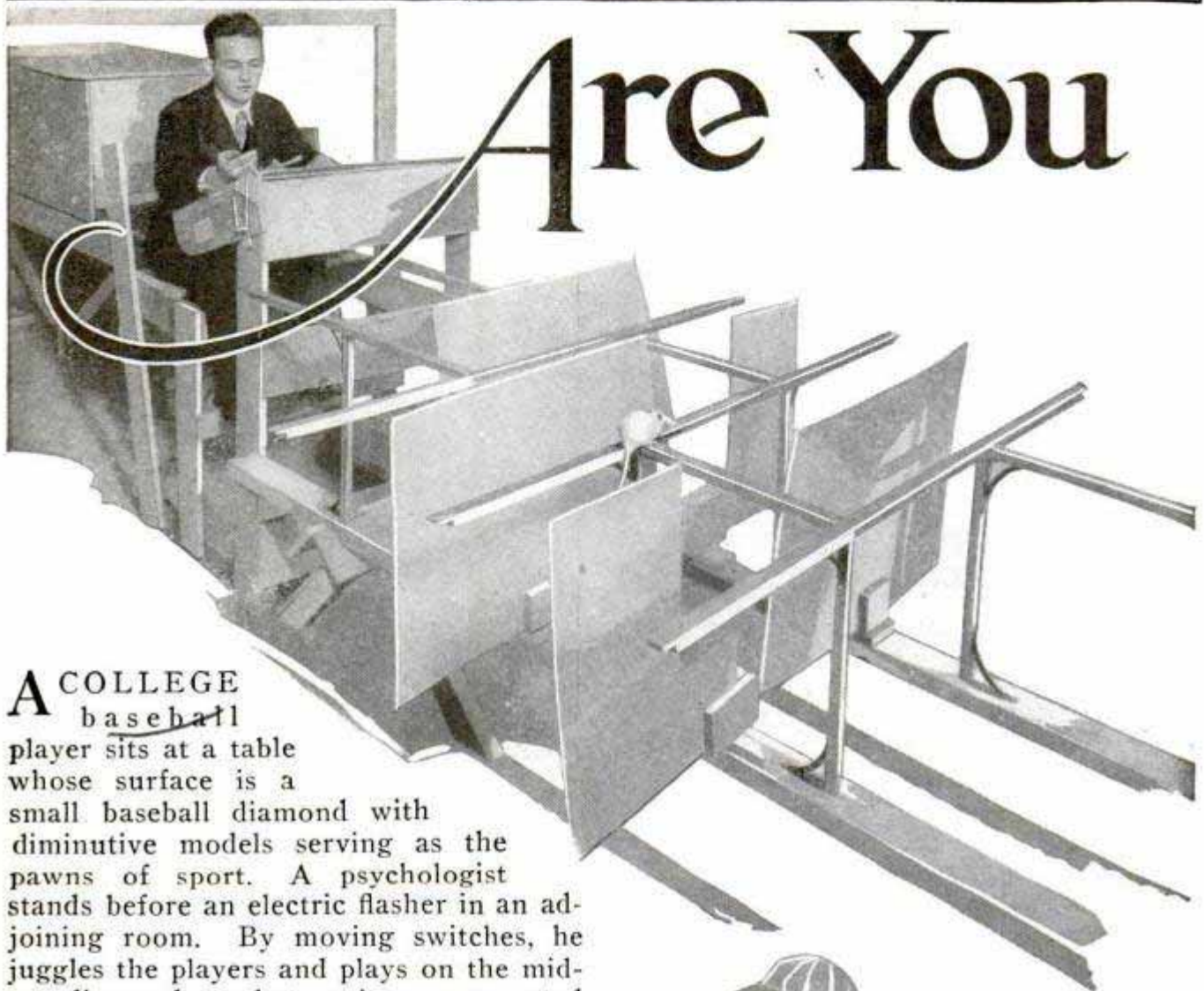
mfrs, Tilton Bros.  
290 2<sup>nd</sup> Avenues  
Portland Ore.

International  
Metals Coating Company of America  
497 20<sup>th</sup> St  
San Francisco

San School



1817



# Are You

## A COLLEGE baseball

player sits at a table whose surface is a small baseball diamond with diminutive models serving as the pawns of sport. A psychologist stands before an electric flasher in an adjoining room. By moving switches, he juggles the players and plays on the mid-gem diamond so that various unexpected situations are developed.

The campus athlete who is undergoing tests to ascertain his baseball knowledge and reactions to emergencies in the game, solves the various sport puzzles as they are presented on the imitation diamond. A careful record is kept of the time required by each candidate in working out the diamond problems. These data aid in culling the misfit from the fit baseball candidates at the University of Illinois, long famed as a hatchery of champion college nines.

When the candidates take the field in early spring, they use a remarkable electrified bat in hitting practice. This scientific bludgeon is equipped with electrical contacts linked directly by telephonic connections with recording devices in the psychological laboratory, which is an important feature in the new university gymnasium. Similar electrical contacts are imbedded in the batter's box and at first base. A special time recorder registers



Exercising a Rat on a Boardwalk "Maze," Top, as Part of the Study of the Effects of Over and Under-exercise on Living Tissues



# Another Babe Ruth?



A Test for Mental and Muscular Co-ordination; the Athlete Attempts to Make Regular Contact with the Electrified Hammer as It Is Moved by the Hidden Mechanism

the exact second when bat meets ball, while it also keeps tab on the instant the batsman leaves the batter's box and when he arrives at first base.

This electrified detective of baseball-player defects explains definitely the failure of many players to make the "varsity" and to win their coveted college letters. It demonstrates that certain unsuccessful candidates consume as much time in hitting the ball and covering the first ten feet to first base as they do in negotiating the remainder of the distance to the initial sack. These men lack the qualifications of satisfactory co-ordination. They fail because they are unable to shift swiftly from the status of baseball batter to track sprinter in the sudden scurry to first.

Dr. C. R. Griffith takes regular technical measurements of the rates of development of pitchers, catchers, infielders and outfielders at the University of Illinois, which recruits its baseball nine from a student body of 13,000. He graphs and diagrams the baseball practices, paying particular attention to the natural hitting range of the different players. These diagrams enable him to ascertain where any given

player will naturally hit a ball. If the natural inclination of the player is to hit consistently to left field and into the hands of the opposing fielder, the coaches, on the recommendation of the psychologist, change the batting stance of that particular athlete so that he will hit naturally into safe territory. A stop watch is used in timing the intervals required by different players to field balls and to throw to first base.

Tests of athletic candidates bring to light the individual adaptations and propensities of certain students for particular sports. They may identify an unsuccessful sprinter as a superior broad jumper. They may prove that a man who tries out for baseball would have a better chance for athletic success on the wrestling mat or in the squared circle. The series of tests divulge athletic secrets. They aid, so to say, in untangling the scramble into which some modern coaching systems have futilely massed their athletes.

The timing factor, as well as form or habit, is of vital importance in many sports such as golf, boxing, discus throwing, shot putting and hammer tossing. Professional



1817



that it records the mental lapse of the baseball or football player, runner or golfer under test. In response to a signal—light, sound or human voice—the athlete presses a response button. The interval between the original signal and his reply is the measure of his reaction time. This test is a keynote to the athlete's response to future field-of-play emergencies.

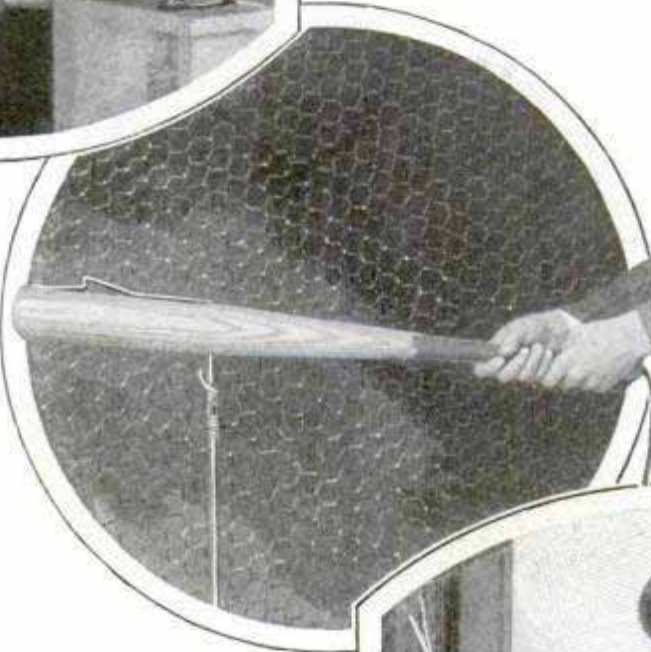
In another test which aids in the accurate determination of a student's athletic aptitude, the subject sits directly in front of a perpendicular board equipped with an electrified apparatus. This equipment provides ten distinct and separate appliances which serve as a scientific proving ground for the eye, ear and hand co-ordination of the would-be athlete.

A bell rings and the student under test immediately presses a button in response. Then a pair of weights fall. The subject restores them as rapidly as may be to their original position. A white light flashes.

pugilists who remain out of the ring for long periods become rusty and lose one of their most treasured assets—efficient timing. The undergraduate runner wins keenly contested races because of his stamina, speed—and perfect timing.

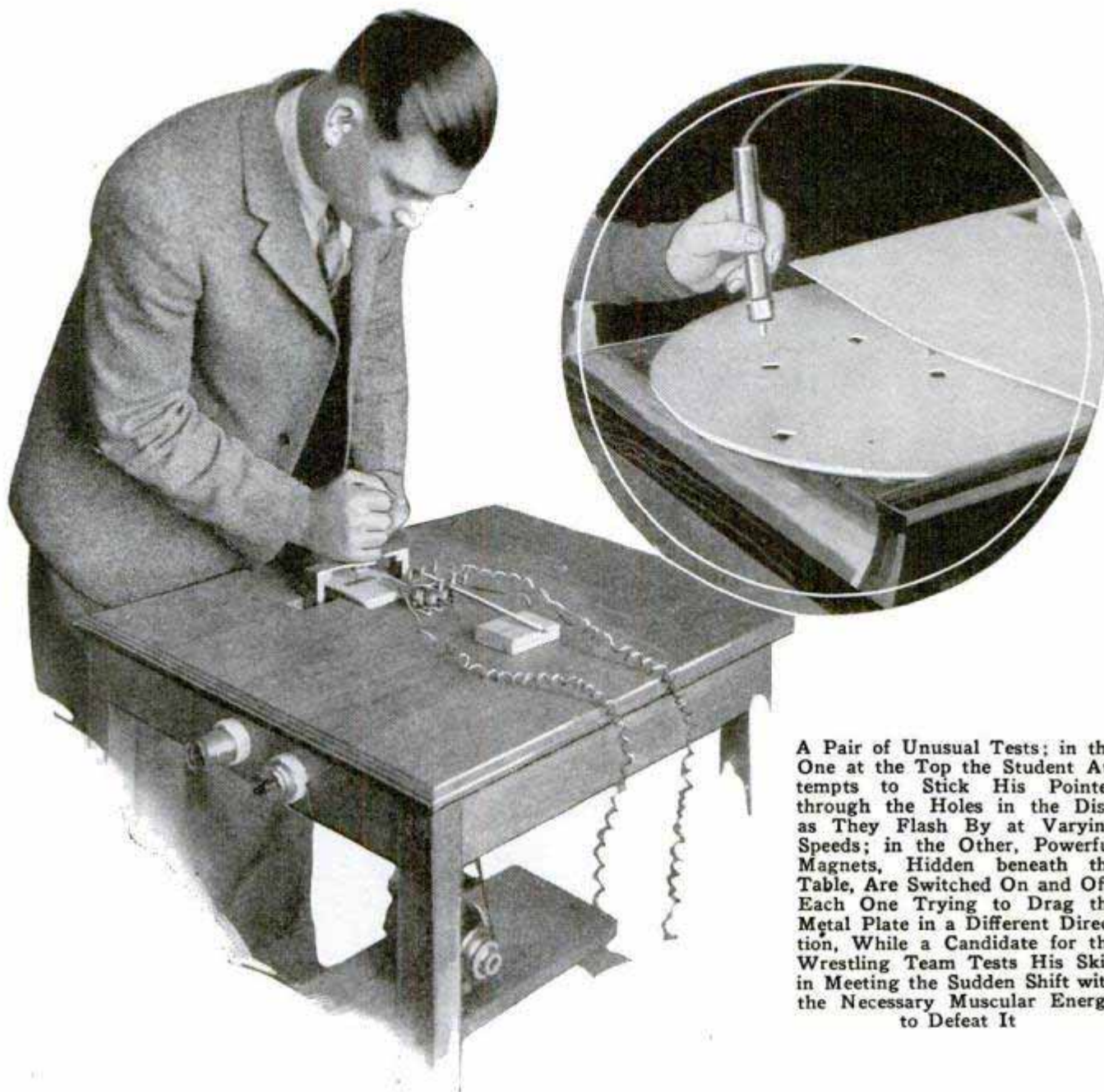
Doctor Griffith employs an ingenious slotted maze in his experiments to determine the timing attributes of different athletes. The candidate takes hold of an electrified handle and attempts to move it uniformly and correctly from one end of the maze to another and through its complicated twists, turns, bends and curlicues. At regular intervals throughout the maze, this handle touches electrical contacts and writes the scientific history of the candidate's timing qualifications. A student gifted with good co-ordination and timing will complete this astonishing timing test five times quicker than the athlete whose sense of timing is vague and undeveloped.

A unique reaction-time apparatus is used to measure the muscular quickness of the athletes. This device is so arranged



Dexterity Is Tested, at the Top, by Sticking a Contact Pointer in Holes; Center, a Wired Baseball Bat, and, Bottom, an Electric Maze





A Pair of Unusual Tests; in the One at the Top the Student Attempts to Stick His Pointer through the Holes in the Disk as They Flash By at Varying Speeds; in the Other, Powerful Magnets, Hidden beneath the Table, Are Switched On and Off, Each One Trying to Drag the Metal Plate in a Different Direction, While a Candidate for the Wrestling Team Tests His Skill in Meeting the Sudden Shift with the Necessary Muscular Energy to Defeat It

He turns a switch in answer. And thus the automatic examination is continued. A supplementary chart recorder graphs the reaction time of the athlete to this round robin of tests, which demonstrate his rapidity of action, concentration, reaction to orders and similar information.

The dexterity of the gymnast, swimmer or basket-ball player is studied by means of an electrical contraption consisting of a peg or pin which fits very loosely in a certain hole in the device. The athlete grasps the pin in his hand, quickly inserts it in the plug hole and then removes it and repeats the process for several minutes. It is a reliable test of hand-eye co-ordination. Each time the pin strikes the sides of the opening instead of the center of the hole, the subject is faulted corre-

spondingly, while he is credited with all the clear-cut "bull's-eyes" he scores.

The co-ordination of one's hands and mind is examined technically in another test, in which the athlete holds an electric pencil in each hand and attempts to guide them simultaneously through two mazes without touching the sides. Another novel test features the use of a specialized appliance to disclose the individual muscular tension, if any, which is characteristic of a certain subject. For example, a baseball pitcher unknown to coach and captain may be handicapped in his effectiveness by some unusual condition of muscular tension. The apparatus brings to light such condition. Its detection can then be followed by emergency control measures. The test itself is simple, as the



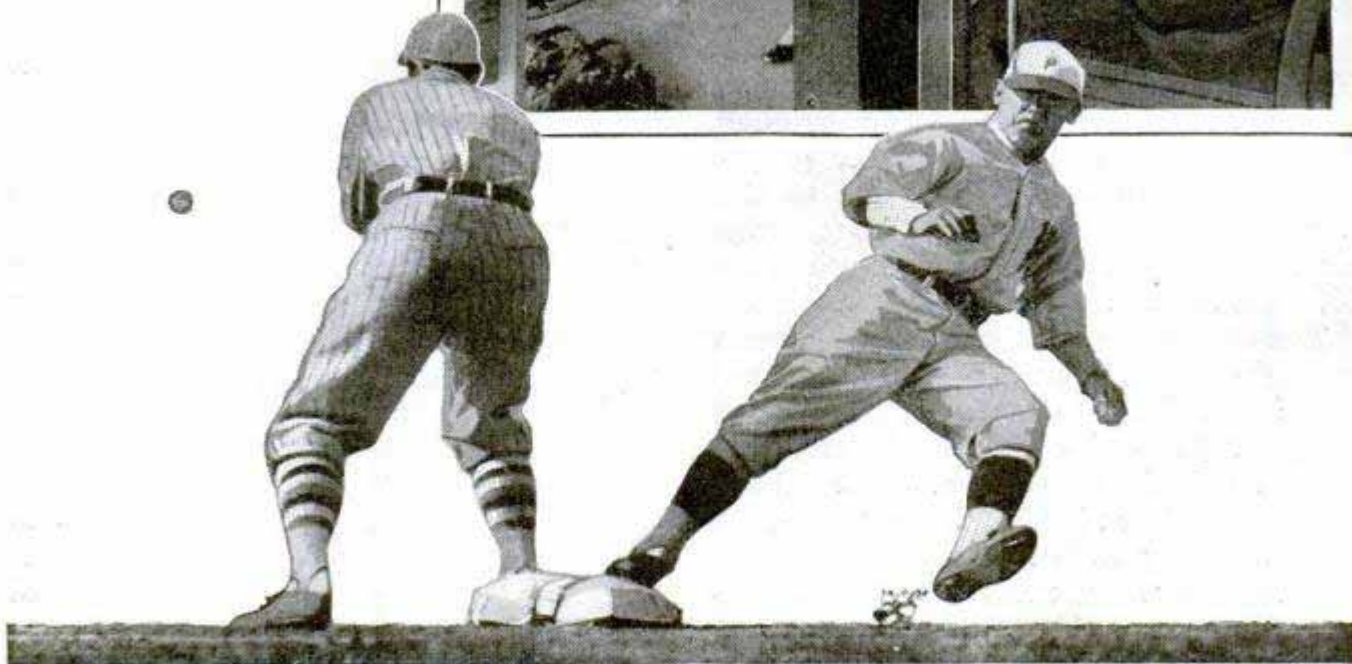
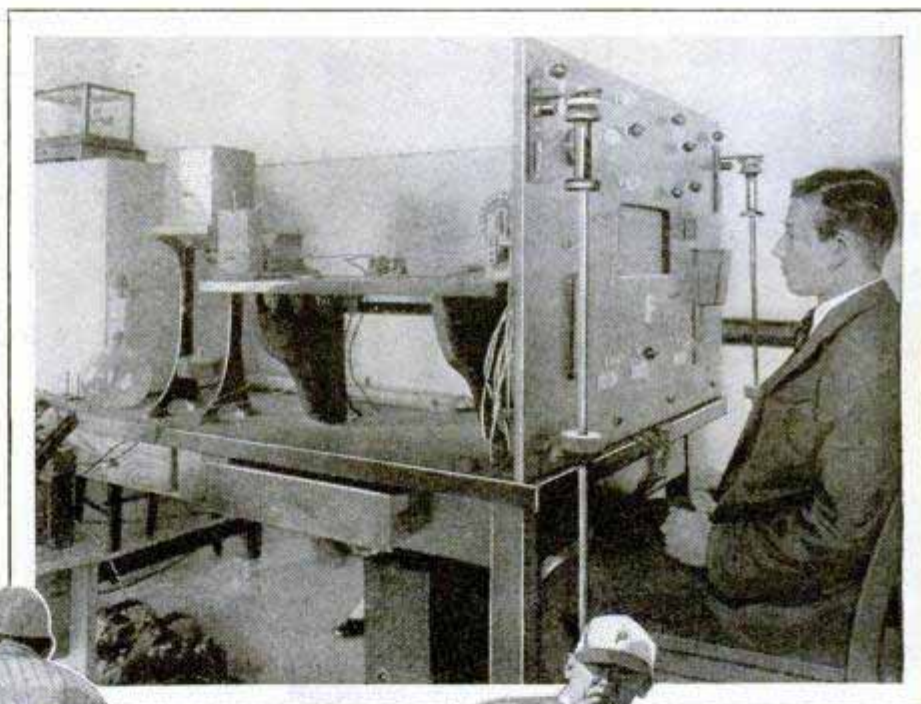
pitcher is asked merely to hold an electrified hammer so that it makes contact with a swinging arm mounted above a glass plate. This efficacious detective registers the baseball player's peculiarities as related to muscular tension.

Another apparatus measures a man's muscular time reactions. It is particularly valuable in making a survey of wrestling and boxing candidates. The athlete is asked to hold a handle in a stationary position at the center of a limited surface. Two powerful magnets are mounted under the table below this handle. They are employed to pull the handle in different directions. The subject does not know at any moment in what direction the pull will be directed. This is a laboratory simulation of the ruses and fake movements to which the college wrestler is exposed in a competitive match. He has to outguess the test machine and outmaneuver it in the same way that he would handle a tricky adversary on the mat.

An athlete's accuracy of movement and alertness are gauged by a revamped talking machine, geared for extraordinary purposes. The revolving dial of the automatic speaker is covered and

has only three small copper-based apertures exposed. The arrangement is such that the disk can be revolved at various speeds. The psychologist gives the athlete under test an electrified pointer and asks him to touch the various openings in the rapidly turning dial. Each contact is recorded automatically. The machine measures the athlete's rapidity of action in this eye-to-hand test.

White rats are being used as athletic actors in an original experiment which Doctor Griffith has inaugurated recently, to determine the effects of exercise on well-being and longevity. The rats are divided into groups of uniform age, size, development and intelligence. A complicated maze is used to develop rat intelligence as learning is essential to athletic



On the Test Board at the Top, the Candidate for Athletic Honors Undergoes Ten Different Reaction Tests to Prepare Him for Scenes like This, with a Runner Safe at First



skill. Brawn must be supplemented by brain for success in modern sports.

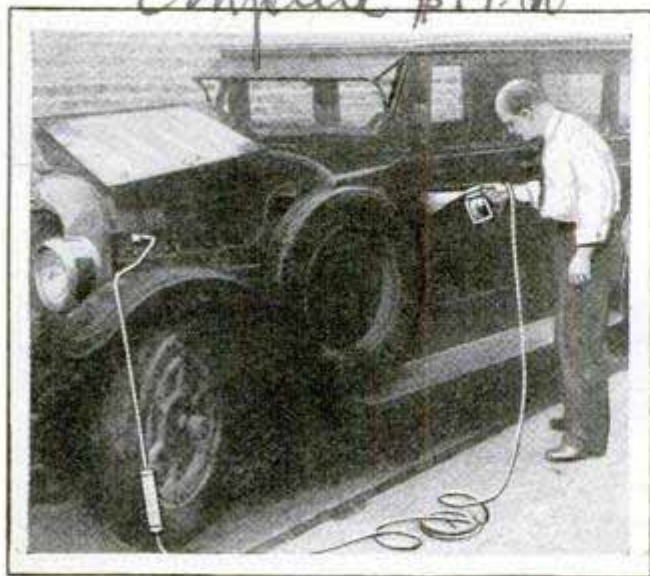
The only definite data now available pertaining to the benefits or evil effects of athletic training consist of statistics compiled at several leading universities. For the most part, these figures cover only the collegiate life of the athletes and do not provide information about their after-college days.

Doctor Griffith, by the use of novel rat exercisers, such as revolving cages operated tread-power fashion, is overexercising some rats, while other rodents are given average exercise, and additional groups are underexercised. The research will cover at least one generation.

Experts are co-operating with Doctor Griffith in the experiment, which is expected to be productive of data on the results of regular, irregular and excessive exercise—moot points whose conclusive solutions will interest millions of sport lovers.

**POWER PAINT SPRAY OPERATED BY AUTOMOBILE MOTOR** 1912

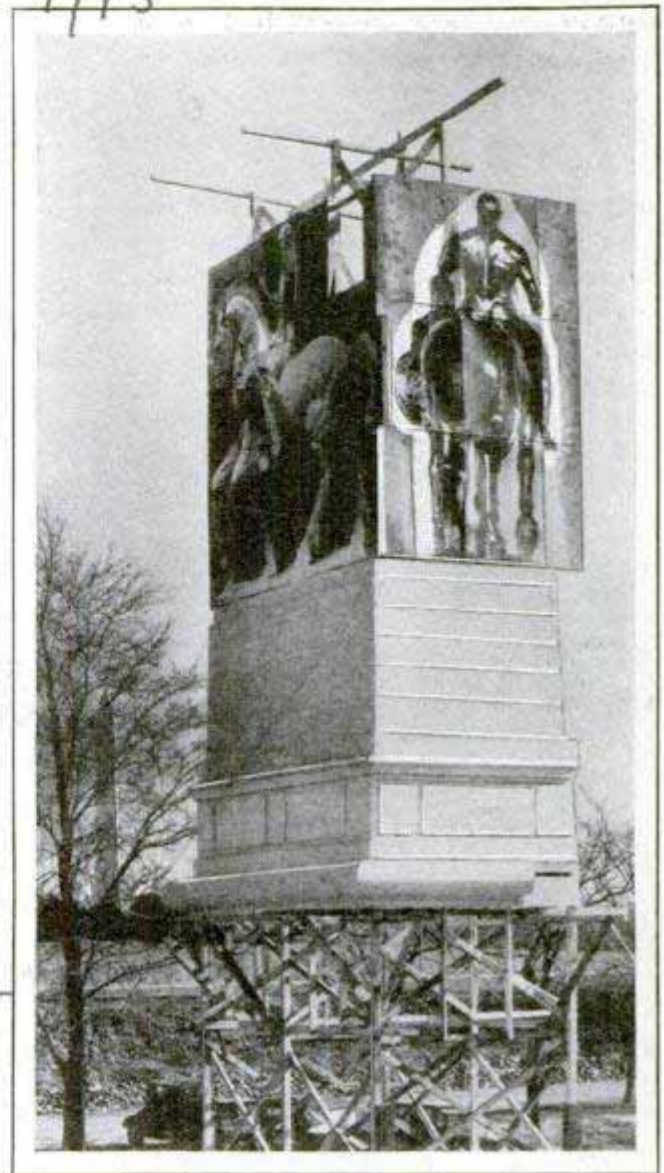
Operated by power from the auto's motor, an efficient spray gun for applying paints, lacquers and other liquids is now on the market. The outfit includes twenty-five feet of hose and an equalizing filter tank, and is attached simply by removing one spark plug and screwing in the compressor unit. The device may also be used to inflate tires, to clean upholstery and to oil the springs.



Spraying Auto from Gun Operated by Power from the Car's Own Motor

*Complete \$14.50*

*Eschick & Co,*



© U. & U. Photographs Mounted on Replica of Bridge Pylon, to Show How Finished Sculpture Will Appear

**PHOTOS SERVE AS SCULPTURE FOR BRIDGE STATUES**

In choosing the equestrian statues for the Arlington memorial bridge pylons at Washington, huge photographs of the proposed designs were mounted in the position that the sculptures will take later, so that the commission could determine the appearance of the finished structure. The photographs are said to be the largest ever made by the signal corps.

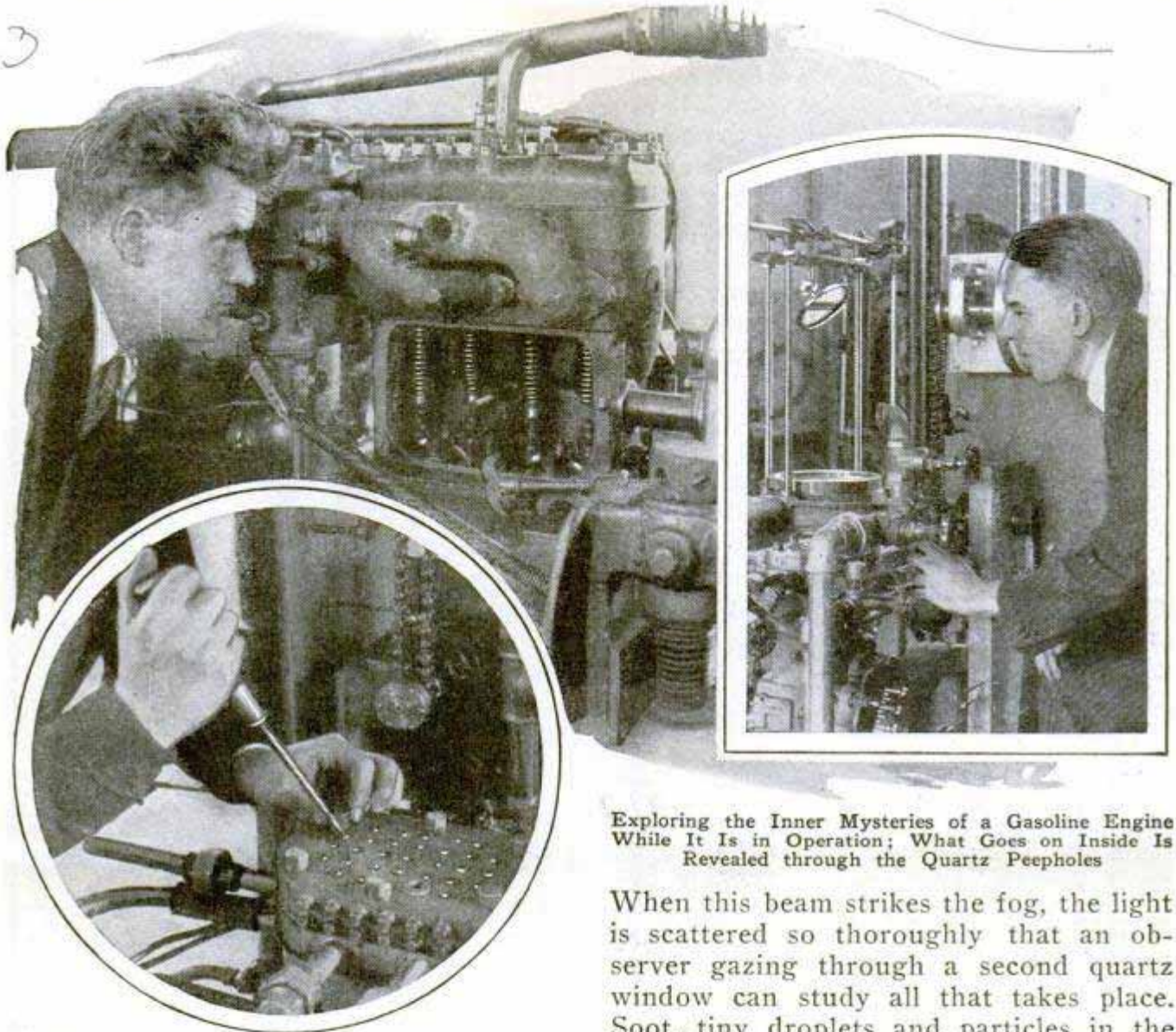
**PLANE LANDS IN DRAG SAIL** 1901

Successful tests with a huge sail, dragged from a moving vessel and used as a landing for hydroplanes, are reported from Germany. The plane repeatedly started and landed on the sail, an advantage of the plan being that the canvas presents a smoother area than the water itself.

*St Joseph News Press*



## WINDOWS REVEAL INNER SECRETS OF AUTO ENGINE



Exploring the Inner Mysteries of a Gasoline Engine While It Is in Operation; What Goes on Inside Is Revealed through the Quartz Peepholes

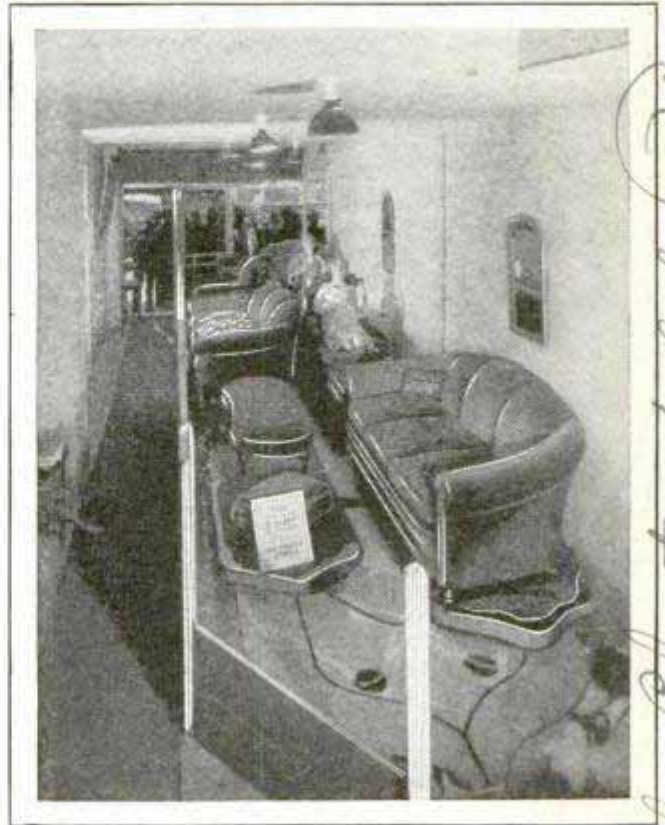
If there is one thing known to science which is darker than the inside of a cow, it is the interior of a gasoline engine. Uncle Sam has attacked the problem in a novel manner by equipping two engines with peepholes of quartz through which engineers are studying what goes on in the combustion chamber. The layman who visits the laboratory can peep through a device known as a stroboscope and watch the engine operation from the inside out and from the outside in. The stroboscope slows down swift motion so that the eye can see what previously was unseen. It is a sort of simulation of the slow-motion picture idea applied to the study of mechanical activity. When you step on the starter of your motor car, a condition of fog exists in the intake manifold. The federal experts have capitalized this fact by throwing light through one of the openings into the manifold.

When this beam strikes the fog, the light is scattered so thoroughly that an observer gazing through a second quartz window can study all that takes place. Soot, tiny droplets and particles in the intake manifold or in the combustion chamber also operate to scatter light similarly, when its revealing rays are focused at such points. The arc is thus used to cast its beam into the experimental cylinder of one of the test engines. A glass lens, seven inches in diameter, is mounted above the engine head and the series of quartz windows, so that all beams of light from the combustion chamber which penetrate these peepholes are brought to a focus at the stroboscope. A mirror is also used to reflect the image to the side of the engine where the stroboscope is attached. Each quartz window is one-eighth of an inch in diameter. These openings are distributed so that the rate of flame propagation in the combustion chamber may be computed by watching the illumination spread from one row of the holes to the next. The rate of flame development with different fuels, mix-



tures and varying engine-operating conditions are being studied. The phenomena of spark production, ignition of the charge and the resultant explosion are yielding new facts about old engines which have never previously been understood thoroughly. Potentially, airplanes, speed boats and motor cars will be operated more efficiently and economically as a direct result of Uncle Sam's tests with "windowed" gas engines.

1944 WINDOW DISPLAY ON WHEELS HELPS DRAW CUSTOMERS



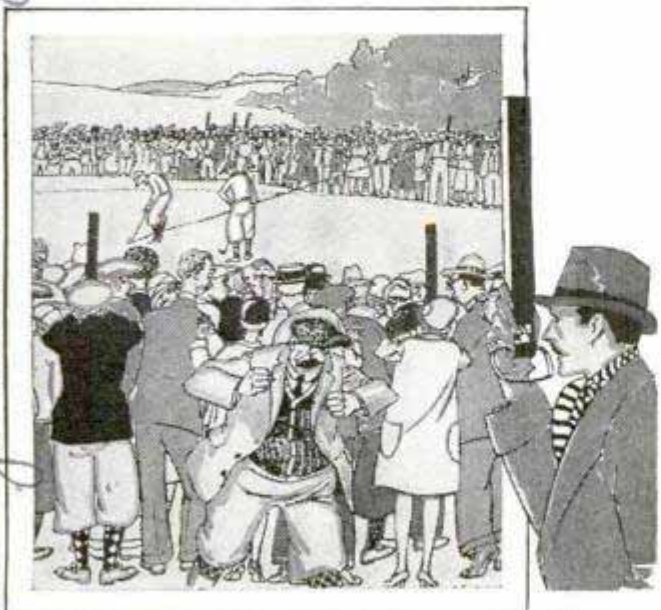
Furniture Display on Moving Platform; the Show Window Is Seen at the Far End

12/10/28 CHIMNEY FELLED FROM INSIDE TO PROTECT BUILDINGS

1970 Wrecking a 155-foot chimney in London without letting a brick fall on neighboring buildings was the task of a skilled steeplejack. He erected a scaffold on top of the shaft and a staging reaching half-way down the inside. Bricks were thrown down to the bottom of the interior into a seven-foot hole that was cleared at intervals. The first part of the work was more difficult because of the overhanging top section of the chimney.

PERISCOPE FOR GOLF FANS CARRIED LIKE CANE

1937 So that golf enthusiasts may be able to see over the heads of others at matches, a leather-incased periscope has been devised. It may be swung as a cane by its strap, when not in use, and is quickly inverted to be employed as a periscope. It is said to give a clear view.



Using the Golf Periscope Which Permits Spectators to Look over the Heads of Persons Near By

Realizing that moving objects attract the eye more readily than fixed ones, the proprietor of a western furniture company devised a novel form of display for his windows. The goods were placed on a moving platform, or series of carriages which rolled in endless-chain fashion the full length of the window, so that the display was completely changed every few minutes. As the articles moved, they were turned about so that all sides of them could be viewed from the street. This method of display is patented.

MOVIE VOICE FOLLOWS ACTOR IN SCREEN MOVEMENTS

1964 Talking motion pictures have been improved, it is asserted, with an apparatus which causes the actors' voices to follow them as their shadows move across the screen. This does away with the fixed-tone effect under the usual "talkie" arrangement and gives a more realistic interpretation of the action. It also is said to eliminate distortion. The apparatus is fitted to the camera taking the pictures and recording the voices.

Chicago 304 & Michigan

1944 Chesterfield Seed Co

Kaschel + Kaschel

Chas. Capt. Alban



11 W. 42nd St. New York

LIGHTER FITS IN LAMP SOCKET FOR SMOKER'S EASE



Lighter Attached to Lamp, and Close View of the Cord and Sockets, Showing the Push Button

Screwed into a lamp socket in the same way as a bulb, a lighter for cigars, cigarets or pipes has a long cord and also contains a lamp switch. It gives a decorative touch to the room and is always in a convenient position for use.

CANDLE SIXTH OF WAY TO MOON SEEN BY GIANT TELESCOPE

If a lighted candle could be placed 41,000 miles from the earth, about one-sixth the distance to the moon, its flame would still be visible through the 200-inch telescope planned for the California Institute of Technology. Dr. Walter S. Adams, director of the Mt. Wilson observatory, recently explained this and other features of the huge instrument, which will reveal many more of the secrets of the heavens. Its mirror, he explained, will collect about 1,000,000 times as much light as the human eye. Stars from five to ten times fainter than can now be registered on the 100-inch telescope on Mt. Wilson, will be shown. So far, astronomers have been able to determine that there must be a million or more nebulae, mysterious systems of stars lying far out in space. The

new glass will probably show that there are many more, and it will doubtless enable scholars to learn more of the nature of the stars that compose them. Some of the interesting things about the nebulae are illustrated by Andromeda, 870,000 light years from the earth. Its light is about a billion and a half times as great as that of our sun, and its mass probably five hundred million or a billion times as great as astronomers have estimated.

LEATHER MADE TRANSPARENT FOR AUTO HOODS

By a special tanning and chemical treatment, a kind of transparent leather is being produced by an English expert. It is said to be stronger than canvas and especially suited for automobile hoods, tobacco pouches, raincoats and similar articles. It is also used as a substitute for gut in sewing leather, and as small belts for lathes, looms and sewing machines.

TOWN HISTORY UNDER ROOF GUIDES TRAVELERS

Persons passing through the village of Bentley, England, are likely to remember it, for in the center of the main street is a thatched pavilion under which is a large replica of a book bearing the important facts of the town's history since 41 A. D.



English Town's "Name Plate" Consists of a Big Book under Thatched Canopy Giving Historical Facts

The marker has proved a helpful guide to motorists and attracts wide attention.

Lamp. C. Lighter 1911  
1969  
4046 12/19/27  
Came from

Useless Appliances,  
% George H. Holden,  
High field New  
Chester, N. H.



1995

Zimmerstrasse 35.41  
Berlin SW 68, Germany

# If They Were Larger



Courtesy Die Woche

10/13/28

Imagine a Little Three-Inch Garden Lizard, Enlarged to the Size of a Dinosaur of Old, Chasing You through the Woods, and You Get the Effect of This Composite Photograph

**WHAT** would happen to civilization if the little garden lizard ever grew up to be the size of his ancient relative, the ichtyosaurus, and all the other insects and reptiles assumed the size of the monsters from whom they descended?

That is hardly apt to happen, for nature, millions of years ago, discovered the monsters were inefficient and in the process of evolution finally came down to the ant as the highest type of insect development, and man as the best of the mammals. From the beginning of time the process of creating the world as we know it today has been one of unending experiment, nature discarding one form after another, of plants, insects and mammals, until she found the types best fitted to survive, and the proper balance to insure a food supply for all.

The problem of food supply is the chief reason why there is small chance that future evolution may ever go back toward the monsters of the past, just as it is the problem that some day will face the constantly growing human race. Once there was a dinosaur that grew to be 150 feet

long, stood twenty feet high at the shoulder, had a neck reach of thirty feet or more, and weighed, according to the best calculations, somewhere around thirty or forty tons. Even his little brother, the brontosaurus, scaled around sixty feet from the tip of his nose to the tip of his tail, waddled along leaving yard-square footprints in his wake, and would have tipped the scales, had scales been invented then, at 40,000 pounds, which is half the capacity of a good-sized freight car.

But the dinosaur and the brontosaurus, the trachodon and the tyrannosaurus, the mammoth and all the rest of the strange beasts and reptiles that once roamed the earth and the air—for there were giant flying reptiles then—discovered one day they had eaten themselves out of house and home, so they laid themselves down and died.

In South America there is a valley of the giants where that final tragedy of great size was enacted. There the types peculiar to South America, moving northward in search of new feeding grounds, met the tourist monsters which had drifted





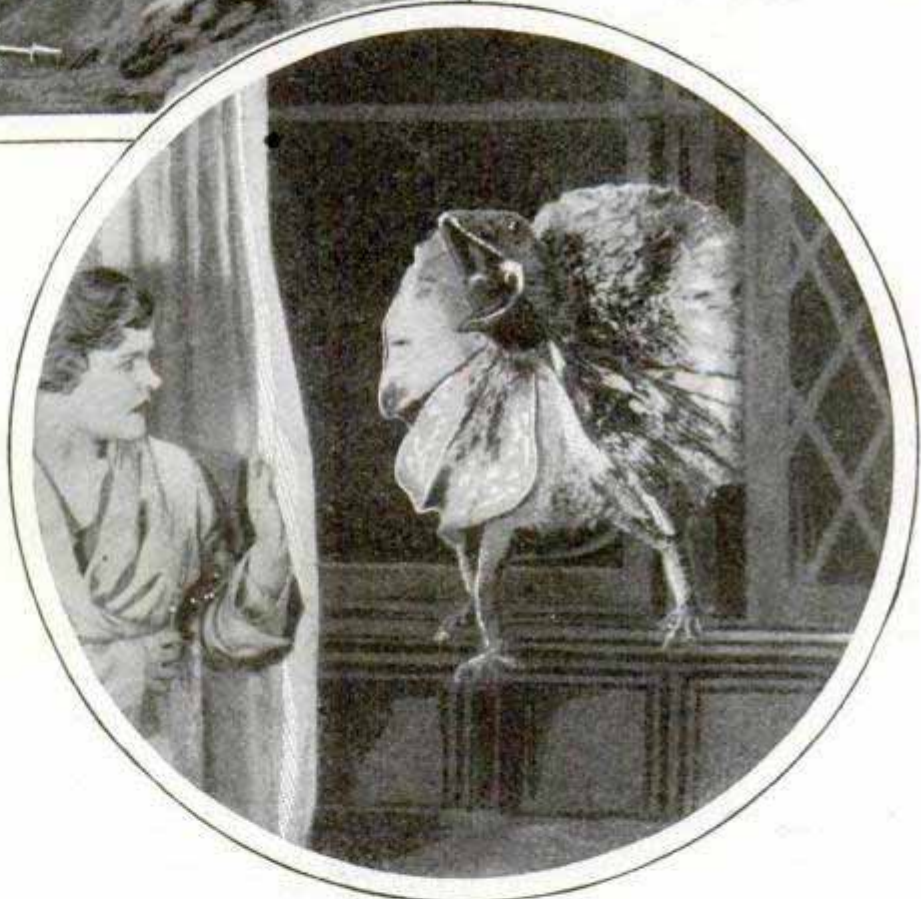
In the far north, similarly, a seal-blubber diet and the necessity of keeping indoors as much as possible to keep warm, have made the Eskimo another of the world's smaller races. In between the two extremes, the restless races have developed, fed by a well-balanced diet, made restless by a comfortably brisk climate, and stimulated by habit and habitat.

The rise of man as the highest type of mammal,

down from Asia on the same mission, and today the valley is studded with the bones of the two groups.

Science is just beginning to appreciate what an important bearing food supply has on life, whether animal, insect or human. For one thing, stature itself, according to R. Bennett Bean, of the laboratory of anatomy, University of Virginia, depends on food, water, habit and habitat, and he puts food first. There are pygmies and undersized people in the tropics and in the cold latitudes, while the taller races originate in the more temperate climes where food is most abundant and most diversified.

The picture of the tropics as a land where the native need only lie under the right tree to have his dinner drop in his mouth is greatly overdrawn, for, while fruits and some other foods are abundant in the torrid zone, they are not particularly good body-building types, nor is the indolence born of heat conducive to the activity that makes for greater growth.



If Turtles Were Giants, It Would Take Hand Grenades to Stop Them; the Lady Is Entertaining a Ruffled-Neck Bat

with the intelligence to grow part of his own food and capture and kill the rest, may have been the natural result of changing conditions in food supplies. Nature took care of the insects and reptiles by scaling them down until their appetites balanced with the food available.

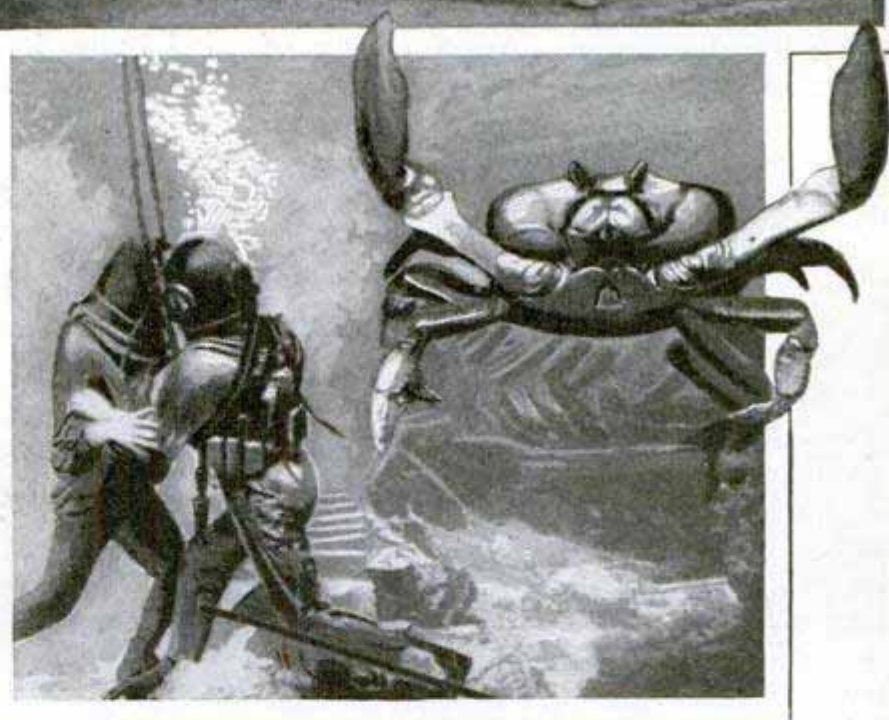
The paramount goal, a German scientist points out, was always to keep an exact balance between hunter and prey, eaters and food supply, in order not to put an end to organic life when the last victim





should be devoured. For this reason, he adds, and to make possible for man a future development that would include such luxuries as radio and television, the wild animals were gradually reduced in size and numbers. Today the elephant is the largest survivor, but even he has been largely domesticated and put to work.

"But imagine if you can," he adds, "the lowly garden inhabitant, a grasshopper, the size of an elephant! What if an ant as large as a tiger, a ferocious panther on six legs, with monstrous fangs and burning breath, broke out of the jungle? Thanks be to the Providence that spared us the necessity of contending against an insect world of such dimensions. No further proof is needed that ants, four or five feet in length, would



A Hawk Enlarged to the Proportions of an Ancient Flying Lizard, and a Crab as He Might Have Been Long Ago

then have become the masters of the world. Look at nature through the microscope. A horned beetle is a rhinoceros in size, a veritable nightmare. What would become of our philosophy of life? It would be bankrupt, fear and horror would be the only emotions awakened in



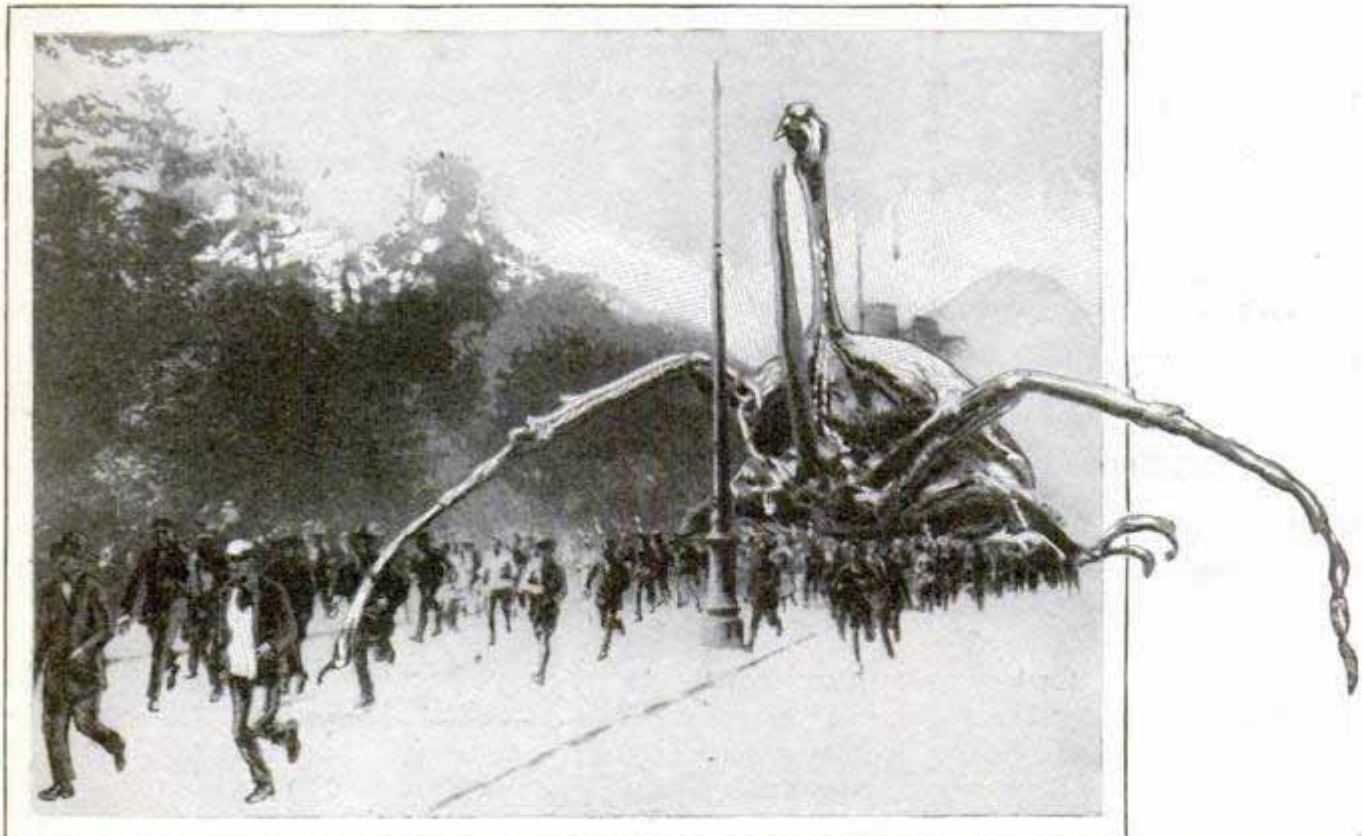
us by a contemplation of nature. Civilization was made possible on our earth by the balanced relation of human and other life and their interdependence. But on another planet the insect world may have won out. The mammals, perhaps, expired on Mars, and its world may be ruled by scaly creatures, wise in their way but armed with claw and fang."

What the future is going to hold for insects, animals and man on earth can only be foretold by examining the past, and it is there that the zoologist, the anthropologist and the other scientific research leaders come in. The question most often asked the scientist by the layman is, "what good does your work do?" Piecing together the discoveries of this group furnishes a fascinating picture of the rise and fall of life through the centuries.

The gigantic reptiles of a few million years ago didn't come into being as monsters. They started out, undoubtedly, on a small scale. Roaming through a young world, with plenty to eat, they gradually grew in size. Nature helped them along in their fight for survival by gradually adding scales and bony armor to resist their natural enemies. With plenty of food, there was no limit to their growth. But as they grew in size, and as their pro-

tective armor reduced losses from natural causes, they slowly filled up their territory until eventually there was an excess of population over food supply. Exactly the same thing can be seen happening today. Rabbits, for example, will increase rapidly in a period of good years, until lack of food, disease, epidemic, or a corresponding increase in their meat-eating enemies, brings them down again, and the cycle starts all over.

Most of the early monsters were hybrid land and water beasts, and the great size and ponderous movements of all the species, with the possible exception of the mammoth, rather limited the zone of their feeding activity. Eventually they had to begin spreading out in search of more food. Probably the older and stronger kept crowding the younger and the weaker away. If, as seems probable, the reptilian life originated in what is now the Gobi desert, but was then a rich tropical jungle, the animals eventually went far afield, for they crossed the land bridge from Siberia to Alaska before Bering strait was formed in a later ice age, and shoved southward through Canada, leaving myriad bones in Alberta, down through the United States, with a trail of carcasses in Montana, Utah, Colorado, Arizona and



Just a Little Water Beetle in His Native Element, But a Fearsome Monster When His Picture Is Enlarged to Giant Proportions and Overprinted on This Berlin Street Scene



Texas, through Mexico, Central America and into South America. There they met the northward-moving horde of distinctly South American species and the final battle with starvation was staged.

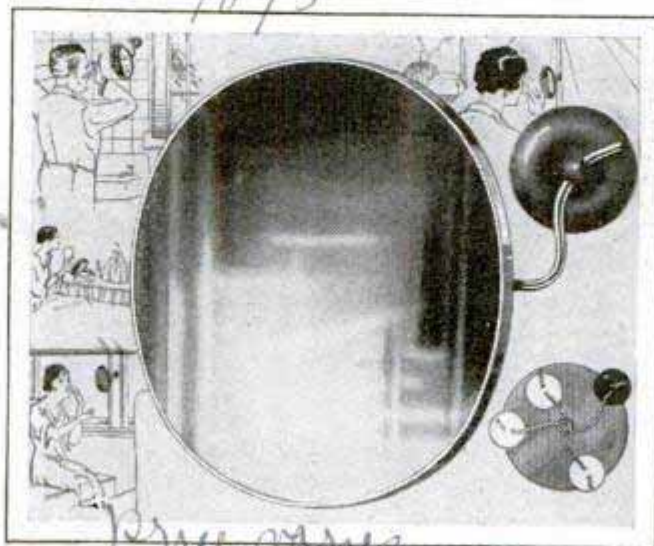
That is the picture of what happened a few million years ago, as science has pieced it together. First, nature, by armoring the giant vegetarians against the meat eater, brought about overpopulation, upsetting the balance that nature usually maintains, and then exhaustion of the available food supply, particularly after the advance of the next glacial age which cut down the semitropical jungle area of the northern latitudes, did the rest.

The human race at times suffered just as severe changes, and science has begun to study them. The west coast of South America, down in the windswept, barren, rainless district from which Chile exports a large share of the world's nitrate supply, was once one of the most prolific garden spots in the world.

It is now a treeless desert, a lonely waste in which virtually no rain falls, where the hillsides are bleak and brown, one of the most monotonously lonesome coasts in all the world. But recent excavations in vast graveyards which show the region once supported a vast population, have uncovered burial urns containing corn, wheat and other grains, remnants of cotton cloth that show a great cotton-growing industry flourished there, and other relics of prosperous, well-fed times.

**HAND MIRROR WITH ANCHOR  
LATEST TRAVELER'S AID**

For the railroad or auto tourist, a hand mirror that can be attached to almost any surface by a vacuum cup, has been introduced. It is instantly adjusted or taken down and has an arm that can be turned to different angles. It is held in a strong frame of rust-proof metal.



Close View of Mirror with Its Cup and Some of Its Many Uses



A Turn of the Wrist Adjusts Shade and Bulb of This Handy Bridge Lamp to Different Angles

**BRIDGE LAMP IS ADJUSTABLE  
AT PRESS OF BUTTON**

Two lamps are combined in one for the convenience of the home in a stand that has a shade and bulb which may be tipped down or set erect by pressing a button. The lamp has two intensities of light, for close use or for general illumination.

**RAISING KARAKUL SHEEP FUR  
NEW U. S. INDUSTRY**

Near Goldfield, Nev., a number of karakul sheep are being raised for their fur which is used in making coats and other garments. Until recently, practically all the world's karakul sheep have been produced in Bokhara, which before the World War had flocks numbering 1,800,000, but they seem to thrive in the climate of southern Nevada, and this activity promises to become a profitable industry. The karakul is the only sheep that produces fur instead of wool. The lambs are born with a heavy coat of glossy black or brown and their pelts are used early.

*Meriden, Conn.*

*also Karakul Fur 148*  
*George (Brahm) Indragie*  
*syndicate headed by*

*Specialty Mfg. Co.*  
*Ranch at*



Bulletin 404 12/20/28

1947 Canton, Ill. Clark Ave. & 4th St.

elements, are opened and closed by means of a small lever on the base of the unit.

**GERANIUM KILLS BEETLE THAT IS FLOWER PEST**

Japanese beetles, one of the dreaded pests of the gardener, are fatally affected by the leaves or flowers of ordinary geraniums, Charles H. Ballou, of the department of agriculture, has discovered. Dissection has shown that the geranium destroys a part of the beetle's digestive tract within twenty-four hours, and that all the soft contents of the body cavity are disintegrated within forty-eight hours. The insects manifest a peculiar fondness for



A Roller Coaster in Summer and a Sled in Winter; the Adjustable Rig with Its Pusher That Gives Good Exercise

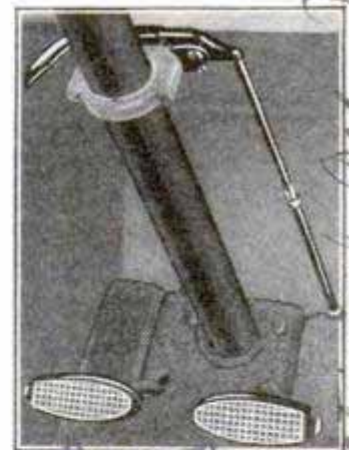
**COASTER FOR SNOW OR GROUND GIVES GOOD EXERCISE**

Quickly convertible into a roller or a runner coaster for ground or snow, a speedy sled, propelled by pulling and pushing a lever, has been placed on the market. It can be changed from one form to the other in a few minutes, small rubber-tired wheels being attached for ground operations. The pusher, which works on a collapsing extension arm like a folding hat tree, has a sharp point for gripping snow or ice and an effective gripper for the ground or sidewalk. The sled itself folds up for easy carrying, weighs but a few pounds and is so strongly built that two large men can ride upon it in safety.

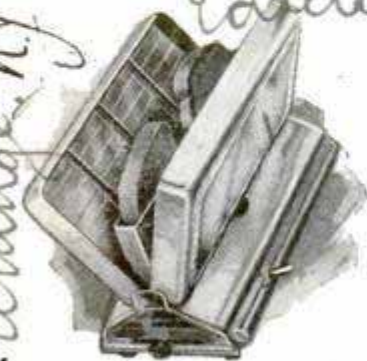
the plant, in spite of its fatal results, and will fly hundreds of yards to find baits which have been scented with geraniol, the basis of the geranium odor.

**STARTING LEVER FOR FORDS LEAVES FEET FREE**

Easily installed and handy to reach, a starting lever for Model-A Fords replaces the usual button or rod. It is bracketed to the steering-column support, is operated by simply lifting the finger and leaves the feet free for brake and clutch. The installation of the lever requires no alterations or drilling of extra holes.



**AUTOMATIC TOASTER OPENS UP LIKE A BOOK**



An automatic toaster, which browns both sides of the bread at the same time and has the novel feature of opening like a book, is one of the latest electrical appliances on the market. The sides which contain the two heating

**ELECTRIC SHOCKS KEEP FISH FROM IRRIGATION CANAL**

Electrified screens have been erected at the openings to irrigation canals in various parts of the west to keep fish from entering the channels. A low-frequency current is used and does not injure the fish, but gives them a distinct warning to keep away from the headgates.

the rabbit sled

normal wire Milwaukee

Thomas A. Edison Chicago, Ill.

The Fulton Co 75th &

Cont. (1 way & 2 way) 11



**TALKING MOVIES SENT BY RADIO FROM ORIGINAL NEGATIVE**

2059  
Talking movies, which, it is claimed, can be reproduced on any size screen, are transmitted by radio by a new device invented by a Luxemburg scientist. The apparatus is expected to be particularly adaptable to quick transmission of news-reel subjects, as the original negative is used, eliminating the delay while a positive film is made. The transmission and reproduction do not necessarily take place at the same time, as a transmitted picture can be stored for future use. The film is transmitted in the usual way, but at the receiving end is recorded on a series of fine metal ribbons, so it can be "played" later, just as a phonograph record is used. The accompanying sounds of a "talkie" can be registered at the same time. The quality of the reproduced image is said to increase with the size of the screen.

**AUTOISTS REQUIRED TO SPEED ACROSS MIAMI VIADUCT**

2032  
Speed of less than thirty-five miles an hour is prohibited to motorists while driving across a viaduct at Miami. This rule is to prevent traffic congestion and is said to have had a beneficial effect in this respect. Violators of the rule are charged with parking.



Sign on the Miami Viaduct, Warning against Driving at Less Than Thirty-Five Miles an Hour



Testing the Sap of the "Cow" Tree; the Liquid Tastes like Milk, Explorers Say

**TREE IN TROPICS GIVES MILK LIKE THAT OF COW**

3 + a  
Sap from a tree that grows in a certain part of Guatemala, looks and tastes like cow's milk, Prof. Samuel J. Record, of Yale University, and a member of a recent expedition from the Field Museum of Natural History, reports. He says that the natives use it in coffee and for making desserts. It sours easily, like real milk.

**NEW FIREPROOF INK PROTECTS LEGAL DOCUMENTS**

2015  
For the use of attorneys and others desiring a material not affected by blazes, a fireproof ink has been prepared by an English expert. He employs a mixture of chemicals with varnish and a specially treated lampblack. If fire attacks a paper on which the liquid has been used, the ink is not obliterated but turned to a brownish-black tint. Used on fireproof paper, it becomes transparent after a fire. The paper is mainly of asbestos and fiber.

The Secretary, Vescova

*Barrios*  
*destru*  
*Cherterfeld*  
*End*  
*Resub*  
*to let on this road*



1735

207 E Ohio Chicago

# Adventures in



Testing Automatic Sprinkler Heads to Determine Whether Corrosion, Suffered during Use in Industrial Plants, Is Sufficient to Prevent Their "Popping" at the Correct Temperature

By J. EARLE MILLER 207 E Ohio Chicago

A HUGE door of steel and firebrick rolls upward, opening the portal to the fiery pit. The roar of gas-fed flames, after raging for hours, has died away, leaving behind red-hot bricks, and, in the center of the furnace, a big steel office safe. Workmen tug at a block and tackle, and the safe and its iron platform come rolling out on a track laid in the floor.

Shielding faces with upraised arms while their clothing smokes and steams, two men dash in, shove an iron grating beneath the safe and affix chain slings. There is a rattling of tightening links and the glowing mass disappears up a smoke-grimed shaft rising through the center of the building. The iron cart is wheeled aside and the floor opens up to uncover a vast slab of reinforced concrete.

From the moment the furnace opened, a watcher has been counting off the seconds. At 120 he calls "time," a workman pulls a trip line and the red-hot mass of steel plunges thirty feet back to earth, landing on the cement with a thud that shakes the building.

A madhouse? No, just the Under-

writers' Laboratories getting under way for the day's business. Chicago

Over in the corner a little group surrounds a miniature roller coaster. A torpedo-shaped steel Juggernaut on wheels, weighing a ton, rolls down the inclined track, picks up speed, and smashes with terrific force into a bright new automobile bumper which bends under the blow, then springs back with such force that the flying weight rebounds on its track. Instruments have measured the effects of blow and rebound, and over them bend young men with notebooks and pencils.

In the next room, a fine big fire window of steel frame and wired glass is fixed into a strong brick wall. Behind the glass, flames are raging, and, as you watch, the molten glass begins to run and little tongues of fire dance through. At a signal, the flames die away, the wall, window and all, rolls away on an overhead track, a man in overalls turns a fire hose on the still glowing window, and a group of observers watch to see what happens when water at sixty pounds' pressure strikes the incandescent glass



# Wonderland



One of the Most Unusual Fires on Record; the Top Floors of the Fireproof Building on the Right Were Set Ablaze by Heated Air from the Conflagration across the Street

Upstairs, an automatic machine is sticking three keys into as many automobile locks, turning them, turning them back again, and then withdrawing them, only to repeat the performance with monotonous regularity.

Down in the basement a board, hinged at one end, reclines against the wall, with a big copper fire extinguisher strapped to it. An arm on a traveling belt comes around, pulls the board out from the wall, then lets it fall back with a thud, comes around and repeats the performance, time after time, hour after hour and day after day, while an automatic counter registers the shocks the extinguisher's glass insides can stand.

Scattered around through several acres

of floor space, a couple of hundred expert destructionists are busy earning a living breaking up the things other men have built.

If you have ever bought an electrical appliance or fitting, examined an automobile accessory, purchased some fire hose, had your house wired against lightning, installed a burglar alarm, bought a penny box of safety matches, built a fireproof building, purchased an oil burner or a mechanical refrigerator, or done any one of a hundred and one other things that may affect your fire, burglar or accident insurance rates, you have come in contact with the Underwriters' Laboratories.

Most everything that affects your safety from fire or accident, or your burglar





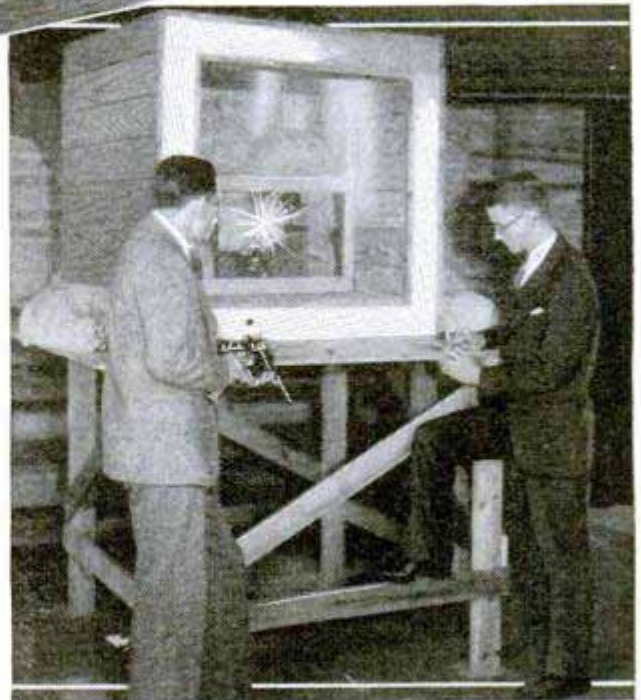
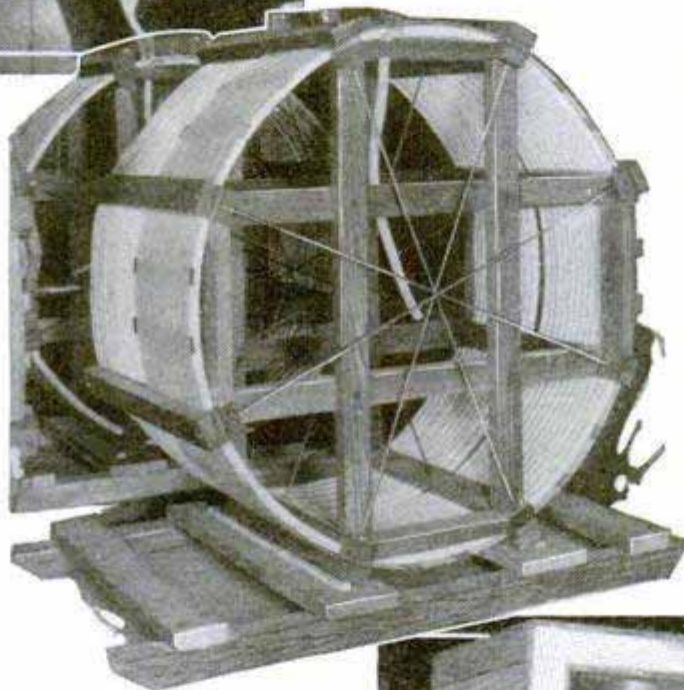
risk, has come under the scrutiny of the laboratories. If you want to build a business structure, the architect knows not only what loads the columns and walls will bear under normal conditions, but what they can stand when assailed by flames. A combination press and furnace that cost \$35,000 to build tells him that. Your architect will know what kind of fire walls, fire doors and fire windows to install, and when it comes to burglar insurance for your tenants, the laboratories have not only examined and approved them, but they pass on and supervise the equipment of the watchman's service that answers your alarm.

This testing has involved engineering and inventive problems that often surpass those of the builders of the original device. When you press a button, turn a switch or pull a chain and the electric light flashes on, you do not give the matter a thought. But just as part of the day's work a testing engineer built a machine that takes either or all three of those types of electric switches and turns them on and off, day and night for week after

week, until they wear out, while an automatic counter keeps track of their life span. Because of that one machine, there is built into your electric-light fixtures the maximum of life and safety.

When domestic oil burners began to appear, an entirely new problem in fire hazards was presented. A battery of furnaces was set up at the laboratory and the manufacturers' samples began to pour in for testing. For weeks, a crew of scientists lived in the heat of a dozen furnaces and watched the performance of the burners. They were not interested in economy of oil consumption or heat produced, but solely in the possibility of fire or explosion—two things the purchaser might never inquire about. The oil burners that got by the grueling test were awarded "approved" labels.

At about the same time, domestic mechanical refrigerators began to challenge the ice man's supremacy. They involved placing in untrained hands a highly complicated plant. Some



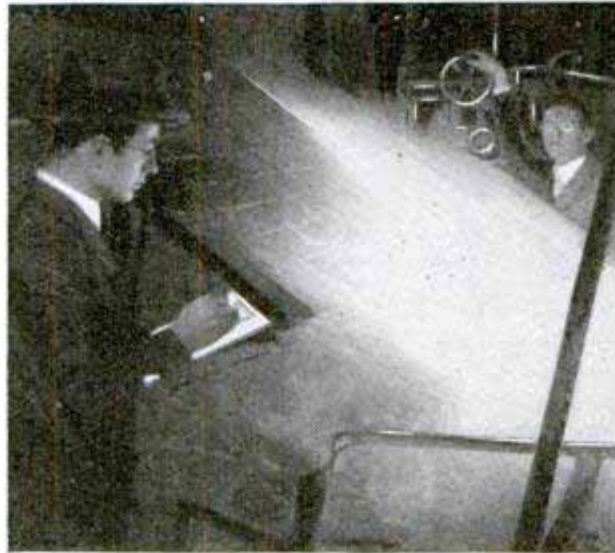
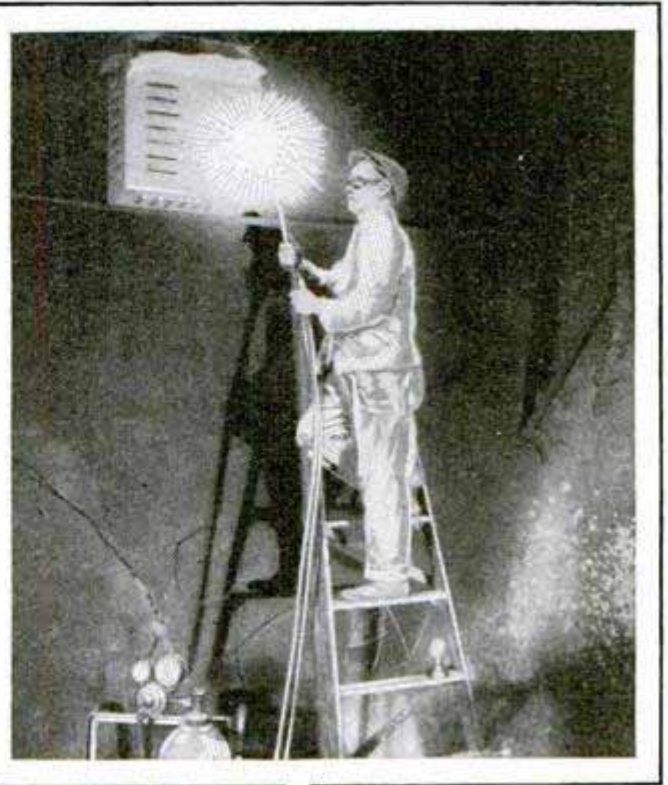
Testing an Office-Vault Lock; a Giant Air-Cooled Test Coil, Five Feet High, and, Bottom, the Bullet-Proof-Glass Testing Range



of them used gases that, under certain conditions, are explosive. Others used poisonous gases. The underwriters had to know that neither type would develop a leak and release the contents. And they had to know that the electrical pumping equipment and its automatic control switch were safe against fire.

So, another corner of the fire and life-hazard department was cleared out, rules drawn up to describe a safe refrigerator, and the testing started. It still continues, as more and more makes and models appear from time to time, and as samples of makes formerly approved are brought in for a check-up test.

All sorts of things come in for test, and many a manufacturer has escaped great loss by finding out the weakness of his device before spending money to put it on the market. They still chuckle in testing circles over the hopeful inventor who solved the automobile-theft problem for all time—to his own satisfaction—by devising a combination lock and siren, the latter supposed to set up a terrific clamor if anyone attempted to tam-



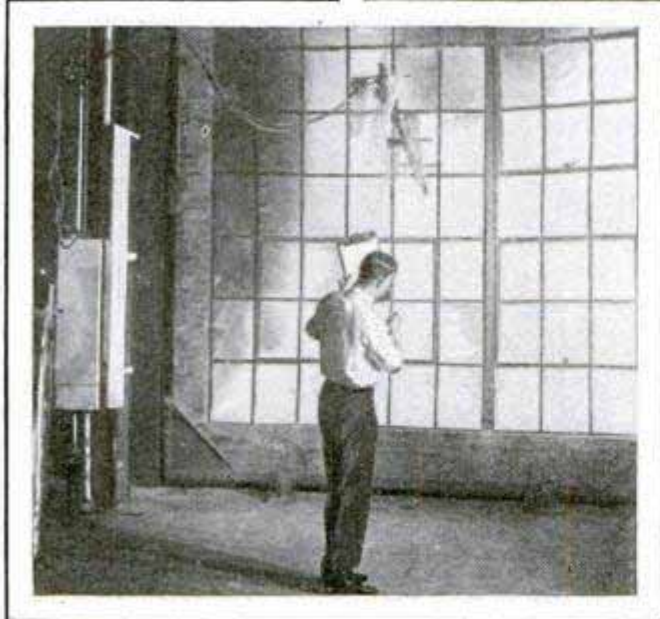
per with the car, and keep on screeching for the police until the owner appeared to stop it.

The inventor equipped his own car, and then drove it around to the laboratory to be tested. He pointed out the car, standing in the street, and stated his wants. The head of the burglar depart-

ment excused himself for a moment, stepped outside to speak to an assistant, returned and completed the arrangements. Then he announced the test was concluded and invited the inventor to look out the window. His car was gone!

The assistant had gone out, picked the lock and driven the car around the corner. Another good invention had been revealed as the possessor of a flaw. If the laboratory had not discovered the weakness, the inventor might have been ruined, and automobile-theft insurance rates all over the country might have taken an upward jump.

A machine shop is maintained in the laboratory just to turn out testing machines. Each problem presented requires



Attacking a Burglar-Alarm Guard with a Torch; a Flame Test on Roofing, and, Bottom, One of the Fire-Window Furnaces





An Experiment to Find Whether the Gas Pump Is Safe from Cigaretts and Carelessly Tossed Matches

ratory wonderland reaches the heights of the spectacular. There is one device on which sections of composition roofings can be laid, just as in actual service, and then long tongues of flames sent swirling up the surface to see how well the material withstands fire. There is a vat in which gallons of gasoline can be poured, a match applied, and the efficiency of chemical fire extinguishers measured by timing how long it takes to smother the fire. There are all kinds of gas-fired furnaces for every kind of test. A pair of them will each take a twenty-foot-square slab of floor and subject it to any desired degree of heat for any required length of time.

When a class-A safe, the best, is to be tried by flame, it is first loaded with old books, newspapers and magazines, to see whether it will preserve its contents intact; then a hole is drilled through the top and a thermocouple introduced within, to make sure the internal temperature never exceeds the permitted maximum of 300 degrees, and another hole bored and a pipe line installed to draw off samples of the

its own means of solution. A device that will sell for a few cents may necessitate the investment of hundreds of dollars to perfect just the machine that will subject it to the wear and tear which, within a few days or weeks, represents years of service.

Did you ever see the inside of an automobile muffler? Few people have, but when the insurance men began writing automobile insurance they wanted to know all about the fire danger, particularly from the hot and sometimes flaming gases that pass through the muffler and exhaust line. In the laboratory, a pair of engines mounted on massive concrete stands form the testing equipment. Not satisfied with ordinary backfires, the testers install spark plugs in the mufflers and ignite charges of explosive gas in them to see whether a powerful blast will tear the muffler to pieces.

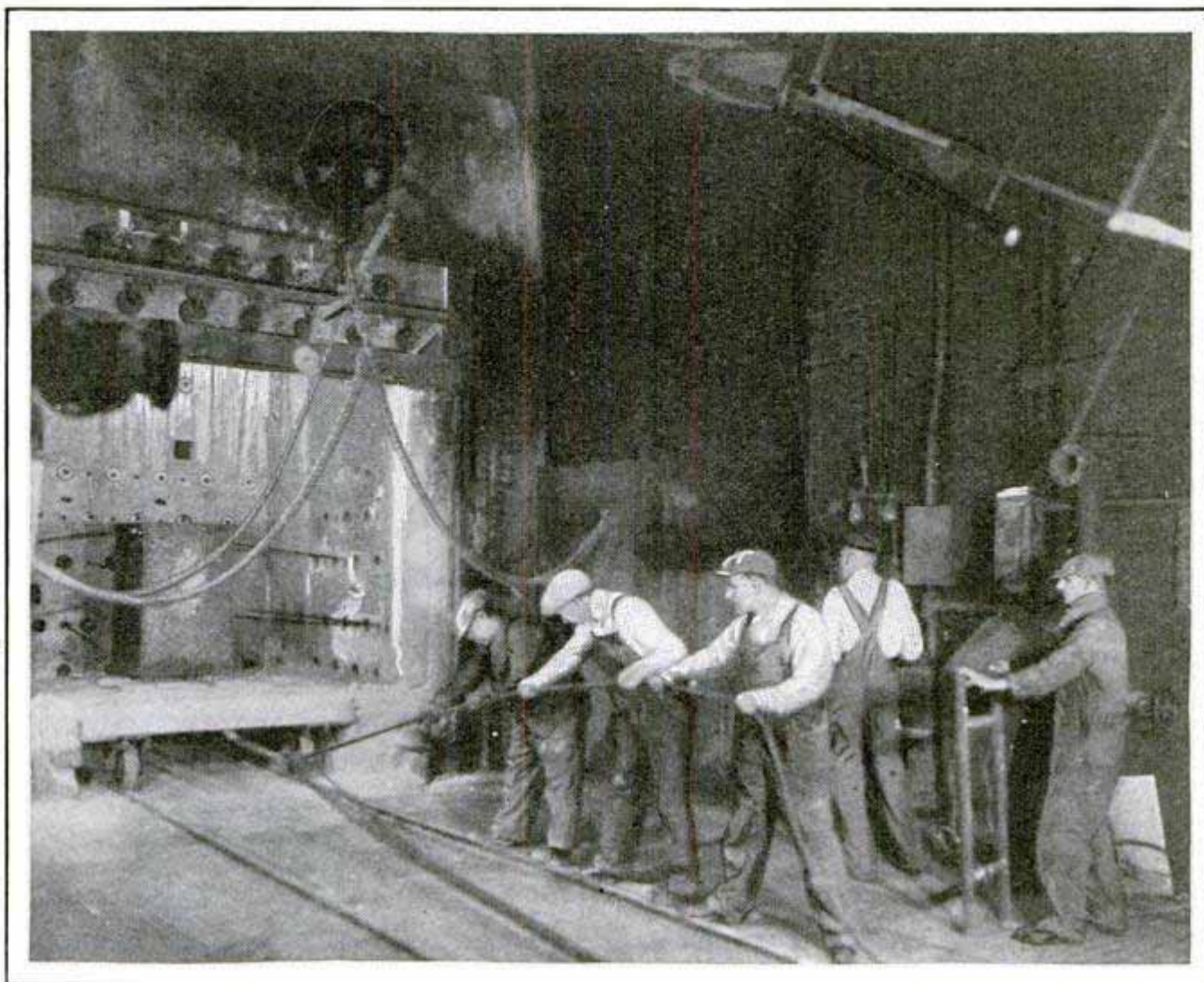
It is in the flame tests, though, the labo-

air for chemical analysis, to make sure the fireproofing compound generates no explosive gases under the heat.

The first test is by fire alone, lasting four hours and reaching 2,000 degrees at the end. Then the flames are turned off, and the red-hot mass of steel is allowed to cool for a day or two until a "burglar" squad can force an entrance with steel bars and oxygen torches and examine the contents. Next, piece by piece, the battered safe is torn down until every part can be scrutinized, particularly the condition of the fireproofing between the double steel walls.

If the safe gets by the first ordeal, a duplicate, fresh from the maker's factory, is fitted up the same way, save for the gas-pipe line and inside thermocouple, subjected to the flames for an hour, taken out, hoisted thirty feet into the air, dropped onto a hard concrete floor, and then allowed to cool, so the stresses and strains of contraction may have a chance





Pulling a Safe from the Furnace, after an Hour of Intense Heat Preparatory to the Drop Test, When It Will Fall Thirty Feet to Duplicate the Drop into a Basement

to rip its joints apart, if they can. When it is cool, it goes back into the furnace, this time upside down, and stands another hour of fire, following which it is opened and the books inspected.

The ceaseless fight against burglars is as thrilling as the battle against fire. First science "perfects" an unbeatable safe, then craft finds a way to destroy it. Science studies the method, and comes back with a superior product, proof against the latest attack. Criminal cunning starts all over again, and the cycle is repeated.

Years ago, the manganese-steel safe was hailed as the last word in burglar-proofness, for it was too tough for the hardest drill, and without a drill the "yegg" could not get an opening in which to plant his nitroglycerin. Then came the oxyacetylene torch, which could burn through even manganese in a matter of minutes. So safes were designed with the idea that, if an enterprising torchman tried to burn

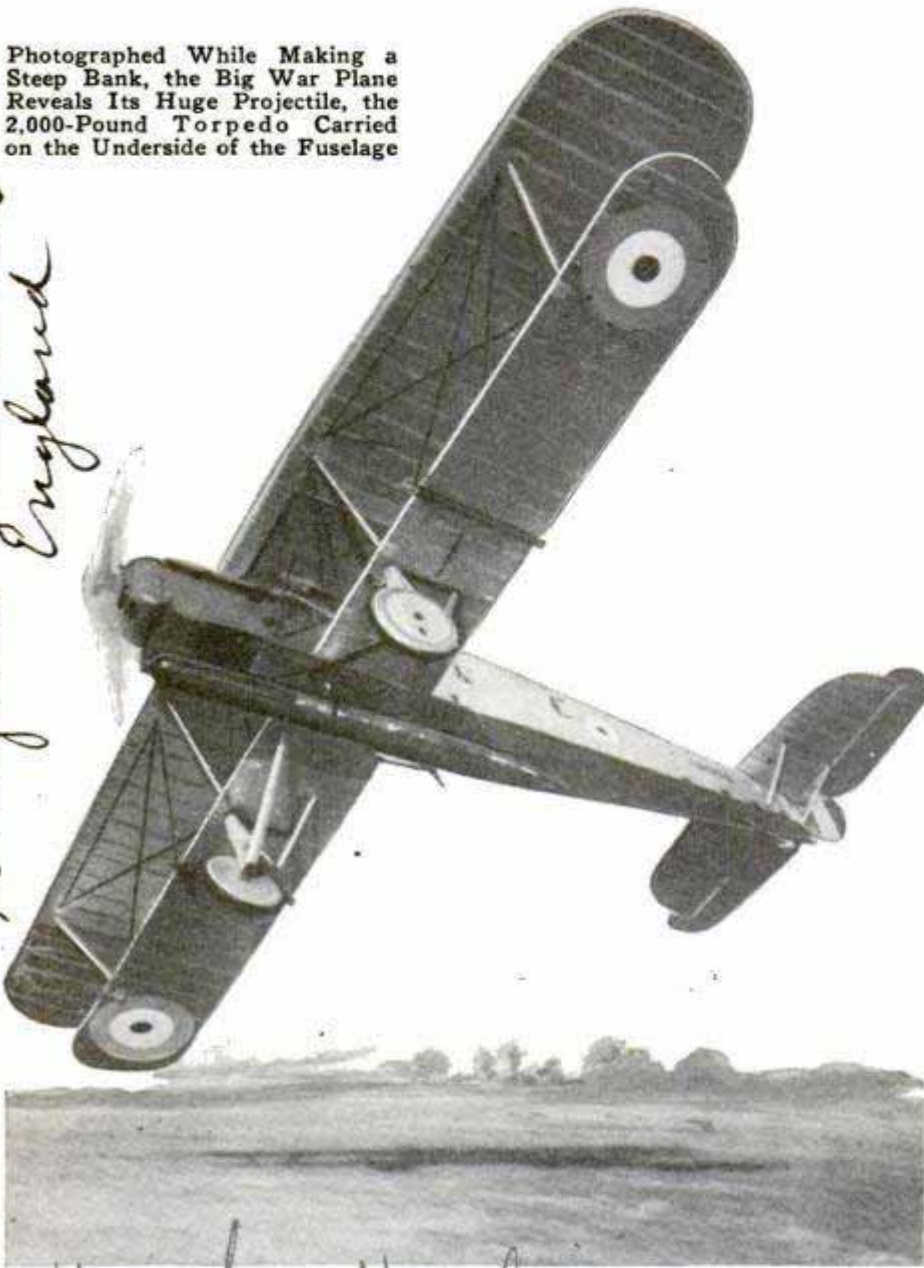
his way in, he would destroy the contents before he could effect an entrance, an argument that was expected to keep the most enterprising yegg away.

But one morning a Michigan banker came down to work and found his fine new safe had been looted during the night—a supposedly impossible achievement. His complaint, relayed by telegraph, brought a platoon of burglar and safe experts to the scene. They found that a master crook had melted a tiny hole through the top of the safe with a torch, inserted a funnel, filled the safe with water, and then proceeded to burn out a section large enough to lift the loot through, while the water protected the paper money from the destructive heat.

In recent years, the manufacturers have concentrated not on building safes that can't be burglarized—for they agree that is impossible—but on safes that will require more time and tools than the burglar can bring to bear.



Photographed While Making a Steep Bank, the Big War Plane Reveals Its Huge Projectile, the 2,000-Pound Torpedo Carried on the Underside of the Fuselage



*Makers - Probably H. S. Hawker Mfg Co. Kingston-on-Thames England*

**BIG AIRPLANE CARRIES TORPEDO WEIGHING ONE TON**

A torpedo, weighing 2,000 pounds and capable of sinking a battleship if exploded at the right spot, is the formidable weapon carried by a huge English airplane. The projectile is attached to the bottom of the fuselage and is launched with special apparatus. In spite of its heavy load, the plane is a fast one and is easily handled in the air.

**SHOTGUN FIRED UNDER OCEAN TO MEASURE ITS DEPTH**

How a shotgun served the cause of science is the story recently reported from the non-magnetic yacht "Carnegie," which is now making a scientific tour of the

south Pacific. The vessel's oscillator, which sends out sound waves from the keel to the bottom of the ocean so that a measure of the water's depth may be obtained by timing the return of the echo, was out of commission, and, for a time, the scientists were at a loss for a substitute. Finally, a shotgun was attached to the end of a pipe which was extended twenty feet below the surface of the water. When the gun was fired, the sound waves traveled to the bottom and returned as an echo, just as they did with the regular apparatus. Capt. J. P. Ault, commander of the "Carnegie," said that the shotgun method checked well with depth measurements made by lowering a sounding wire to the bottom.

**RARE PINK WOOD IS FOUND IN ZULULAND**

A sample of rare wood is now on display at the Field Museum of Natural History. In days past, possession of the material by anyone except a king was an offense punishable by death in Zululand, where the wood was found by Bruno Lessing after a search of three years. Its rarity is indicated by the fact that the whole country was combed for a bit of it two years ago when the Prince of Wales wanted a piece suitable for a cane, but none was found. The museum sample was presented by Prof. Samuel J. Record, research associate in wood technology. The wood is of a delicate shade of pink and in hardness and appearance is like ivory. Spears of it were symbols of regal authority among the Zulu leaders.

China is one among the best of America's customers for dyes.

2038

2013

*Science Museum Letter*







2018



Safety Belt for Traffic Policemen with Its Red Reflector in the Center

### RED-SPOT BELTS FOR POLICE GUARD THEM FROM AUTOS

Policemen in an eastern city are being equipped with belts that have red reflectors on them so that motorists, driving at night, will be less likely to run into the officers. The plan was devised by a sergeant of the city's police department and also recommends that spotlights have red lenses to give the traffic men additional warning of cars. These reflectors are commonly known as "cat's eyes."

### SEA DIVER HELPS BUILDERS DIG FOUNDATIONS

To help sink foundations for the new department of commerce building in Washington, D. C., a deep-sea diver was engaged. He descended several feet below the water at the bottom of the excavation to dig a well from which water was pumped to reduce the pressure in the surrounding area. So far as known, this was the first time a diver had been employed on a building at the nation's capital.

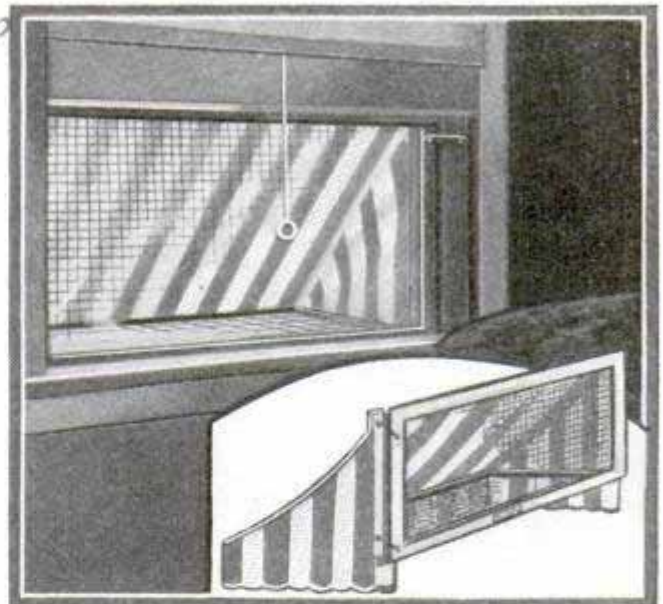
*Emil Aronberg*

### GOLD FOUND IN THE ANTARCTIC TO BE MINED WITH STEAM

Rich deposits of gold that may be mined with steam jets are likely to be discovered in the Antarctic, according to Sir T. W. David, an engineer who is familiar with the lands far to the south. He found seams of coal in the cliffs of the great Beardmore glacier, and under the coal are formations of granite and clays where gold often is found. Should the metal be discovered, there would be abundant coal to make steam for mining operations. In ages past, the Antarctic regions enjoyed a mild climate and were covered with dense forests of pines and ferns and with swamps, geologists believe. Gold fields are now being worked at Tierra del Fuego, at the tip of the South American continent. They are a part of a formation that extends far into the Antarctic.

### AWNING AND SCREEN IN ONE PREVENTS DRAFT

Window awnings and two screens have been combined by a western inventor to keep out rain and drafts when the sash is raised. The entire outfit is collapsible and easily taken off or installed. The



Awning and Screens Combined Allow Window to Remain Open When It Rains

awning may be used at the top or the bottom of the window as desired.

Many kinds of insects injurious to crops are devoured by sparrows.

*Frank E. Holzman*  
926 Twin Peaks Blvd

*Chicago Warming Unit*

1995



Montgomery Ave  
Bethesda, Md

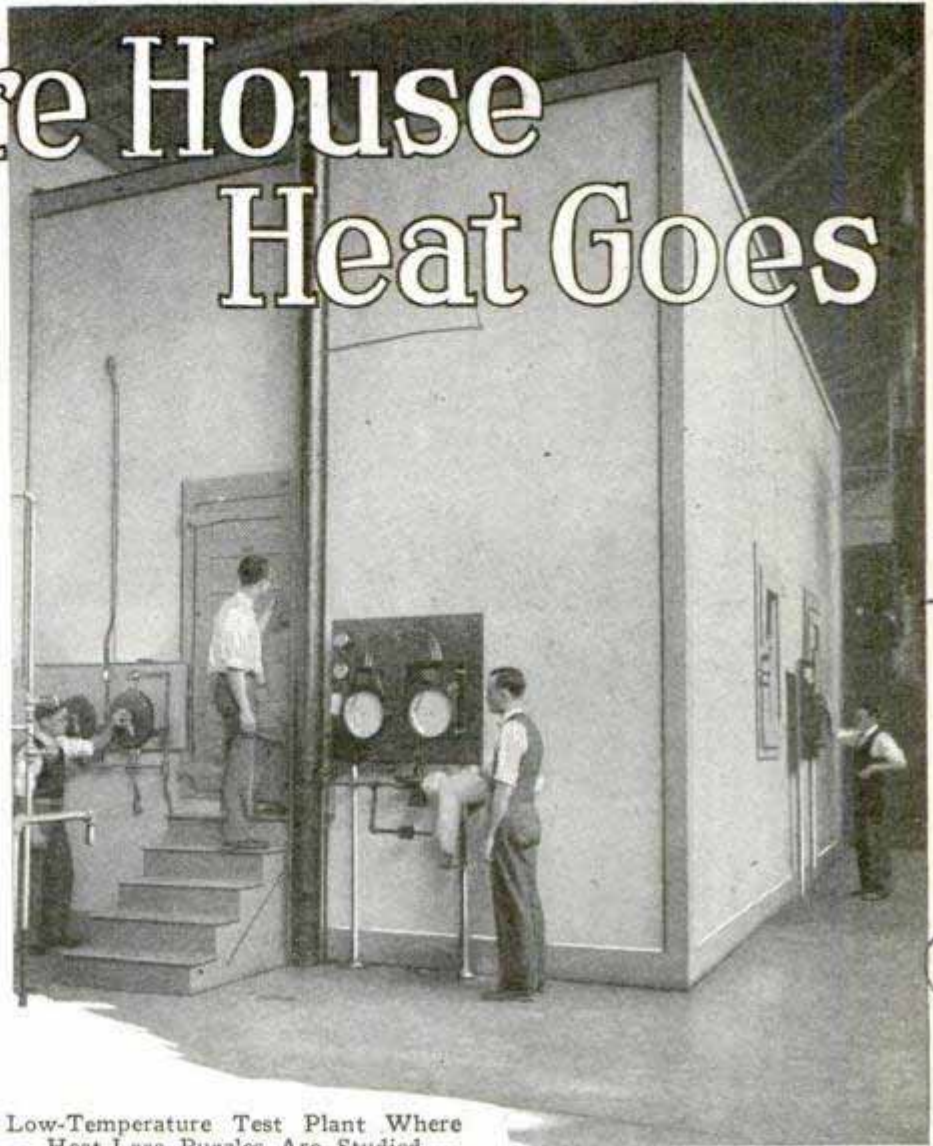
# Where House Heat Goes

**M**ISTER Average Householder does not realize complete home-heating, efficiency from the winter supply of costly fuel that he burns because his residence is not properly insulated.

Downstate in Illinois, where one of the largest universities in the world is located, eminent engineering experts have built a remarkable low-temperature testing plant which is being used in part to determine where house heat goes and how to save it.

If you doubt that losses of heat occur through walls, floors and ceilings in uninsulated homes, scan the following facts carefully and change your opinion on this subject.

A recent tabulation of the heat losses from 200 average uninsulated American homes, located in New York, Michigan and Ohio, explains concisely how Boreas, Jack Frost and King Winter apparently conspired unintentionally with ordinary builders to waste valuable heat with which these home owners hoped to keep their houses warm and comfortable in the coldest weather. The loss of heat through walls averaged twenty-seven per cent, while the loss through glass windows and doors amounted to 25.8 per cent. Another 24.6 per cent of the heat units stole away by infiltration—the leakage of heat through air cracks and crevices. The ceiling as a wastrel of house heat allowed 16.2 per cent of the warmth to filter outside instead of keeping the home family comfortable. A final loss of 4.3 per cent of the heat supply through doors ended this disagreeable picture of fuel extravagance.



Low-Temperature Test Plant Where Heat-Loss Puzzles Are Studied

In co-operation with the National Boiler and Radiator Manufacturers association and the Illinois Master Plumbers association, the University of Illinois is now making tests of steam and hot-water heating systems in a modified constant-temperature chamber built in the form of a house within a house.

The novel low-temperature testing plant has been erected in a large engineering laboratory. The outside walls of this proving ground of heat distribution are composed of six inches of corkboard—efficient insulating material. Two walls of standard construction for the two identical test rooms, respectively, with large air spaces under the floors and above the ceilings, are incased within the insulated structure so that the heat that filters from them under varying conditions may be measured. The insulated walls of the large refrigerated room form the two remaining walls of each of the test rooms.

National Boiler and Radiator Manufacturers Association  
29th Street  
St. Louis, Mo.

Engineering Dept. Cooper. 443



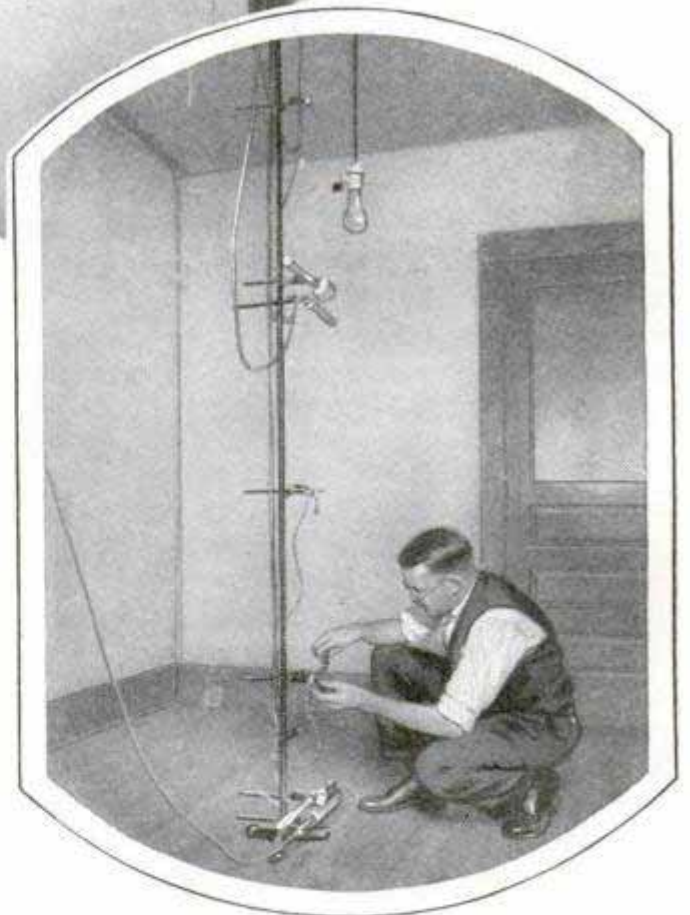
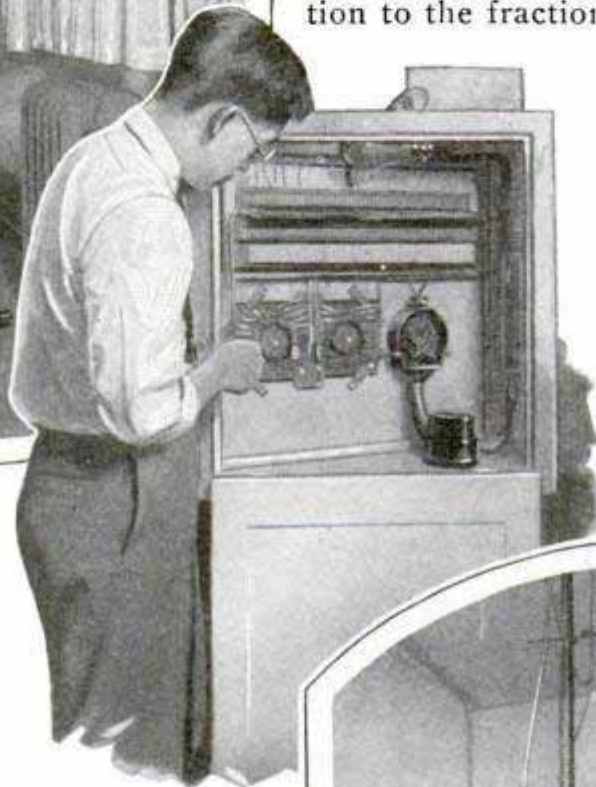


The exposed inner walls can be changed on the completion of each experiment. In this way, all types of building material and insulation can be tested thoroughly. Accurate knowledge of the efficiency of every material will result from the research, which will be continued for several years, or longer, until all the riddles of house insulation and the prevention of heat losses have been ferreted out.

The basement and attic spaces aid in exposing the floors and ceilings of the twin test rooms—each is nine by eleven feet in dimensions and nine feet high—to air of any desired temperature. The basement spaces resulted from elevating the floors of the two “scientific cells” two and one-half feet above the floor of the refrigeration chamber, while the attic space was obtained by building the test-room ceilings three feet below those of the cold-insulated chamber. These overhead and underfloor spaces, as well as the other unoccupied space in the cold chamber, can be heated to any desired temperature.

By means of the system of refrigerating coils, the series of electric heaters and an adequacy of ventilating fans, placed at key positions within the cold chamber, the scientists can duplicate any range of conditions which might exist in a house, while they also can simulate practically all outdoor conditions except rainfall. The simple readjustment of control devices can shift the temperature from arctic cold to tropical heat in record time. The weather generated in this testing plant is capable of constant control and regulation to the fraction of a degree.

The various points in the test rooms where heat escapes during any of the experiments are “spotted” forthwith by reliable “patrolmen”—the many electrical temperature recorders which are distributed here, there and everywhere throughout the walls,



Tracing Air Currents with Fumes; Examining Heat Recorders, and Adjusting Thermocouples at Different Distances above the Floor

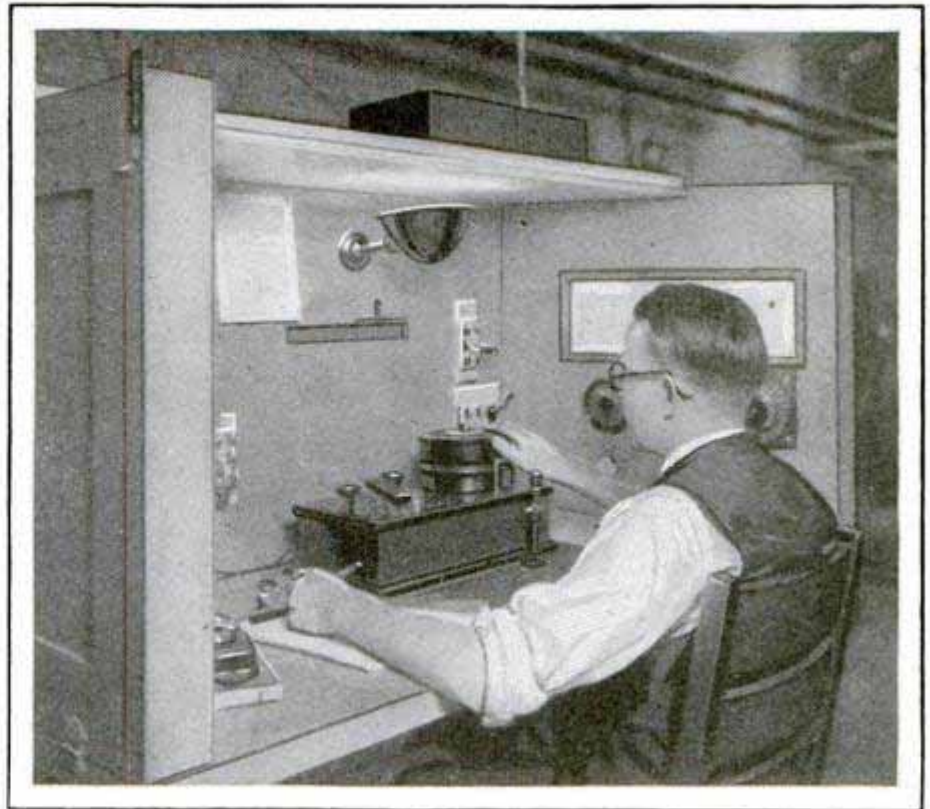


floor spaces, ceilings and in other strategic positions where they may detect run-away heat. The customary practice during one of the tests is to maintain a standardized temperature of zero in the cold chamber while the thermometer stationed at the normal breathing line within either of the test rooms simultaneously records seventy degrees Fahrenheit. In a word, the experimental radiator or other heating unit under test is made of such size and heat-distributing capacity as to maintain that temperature constantly.

A temperature as low as five degrees below zero can be maintained in the cold chamber as long as desired, while the efficient utilization of electric fans facilitates the accurate imitation of wind action on and in the walls of the research rooms. Ordinarily, the tests are conducted under still-air conditions, but in a certain test, if a miniature wind storm is desired, all that is necessary is to switch on the battery of electrical fans and to study their effects on the normal heat losses which occur under such conditions.

An interesting feature hinges on the "smoke tests," which are made to observe and register the movements of air currents in the test rooms during the multiplicity of heat-loss experiments which are being carried on. By use of a metal stand with adjustable shelves for dishes of chemicals, which can be raised or lowered as desired, white fumes are liberated at various distances above the floor and below the ceiling. The drift of these fumes produces a tangible record of the direction in which the air currents are moving.

There are two windows in each test room, located in one of the exposed walls which face the cold chamber and its icy blasts of winter weather. There is also a door leading into each room and a central passageway between the two rooms. The outer door is insulated and of heavy



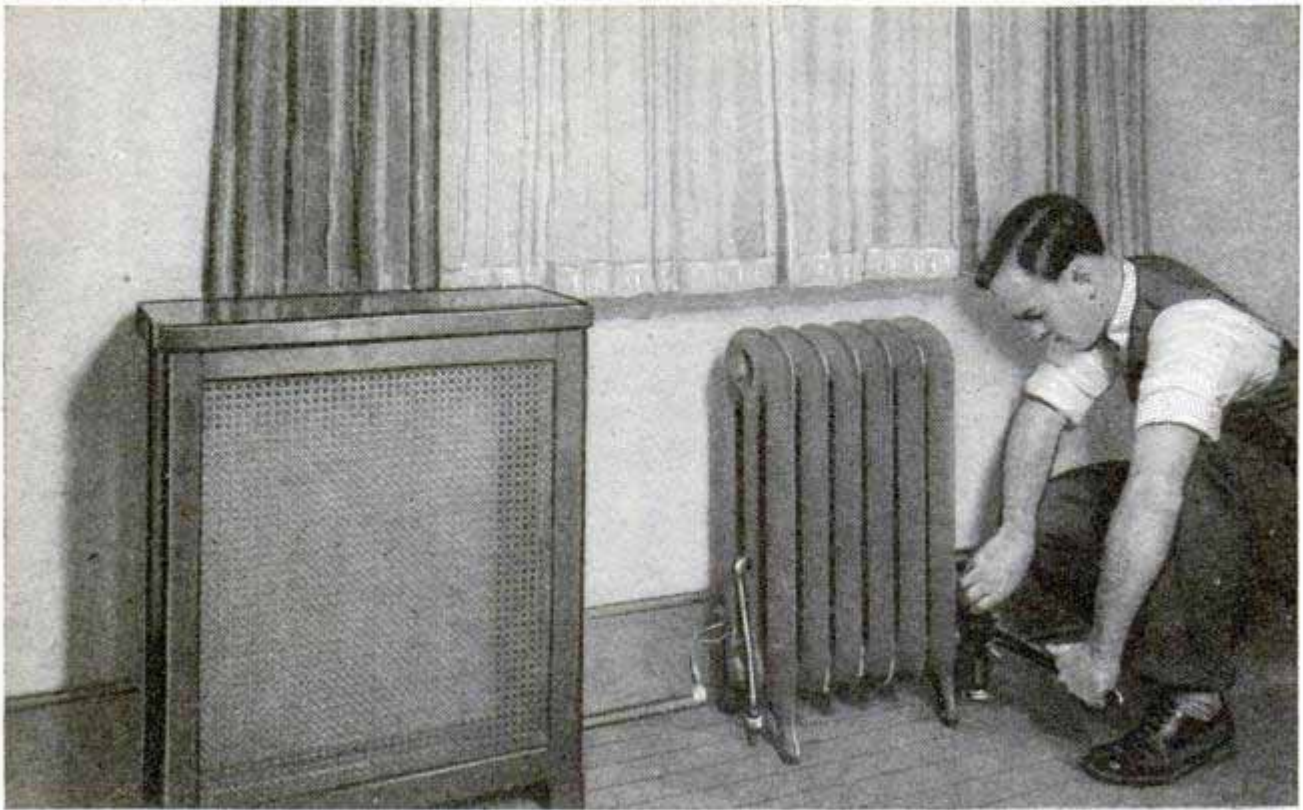
Tabulating the Records as They Come In by Wire during One of the Heat-Loss Experiments

refrigerator construction, as it is the outlet through the cold chamber. The test radiator, shown in the accompanying illustrations, is located in the usual position directly underneath the windows. The plant is adapted, however, for testing any type of house-heating equipment placed at various locations in the room, or in the exposed walls as invisible sources of heat.

In certain homes which appear well-built and comfortable, as much as one-half of the average winter fuel supply is wasted in vagrant heat which shirks indoor work and flows away through uninsulated floors, ceilings, walls, windows and doors, it has been shown. A thorough insulation of the ceiling may cut down one-half the normal heat loss through that part of the house at once, but it may represent only one-tenth of the total heat loss from the room.

Plaster-and-lath construction for walls and ceilings, so builders say, is only about one-half as retentive of heat as similar construction where the dead-air spacing between the studding is filled with satisfactory insulating material. This is true where wall area alone is considered without any reference to window openings. Storm windows are more satisfactory in reducing heat losses through windows





Installing a New Heating Unit in One of the Test Rooms; the Exact Amount of Heat Produced Is Measured by a Simple Steam-Condensation System

than the ordinary metal weatherstrips, because the latter only check the flow of air through cracks while the former reduce the heat transmission through the single pane of glass by providing a dead-air space between the two glass surfaces.

It is safe to say that the heat losses in the 200 typical homes in the cold-weather belt, referred to previously in this article, could be reduced from one-third to one-half by practical modern insulation methods, the use of storm windows, calking the window frames and door frames with oakum or similar material, and filling the dead-air spaces in walls and above ceilings with suitable insulation.

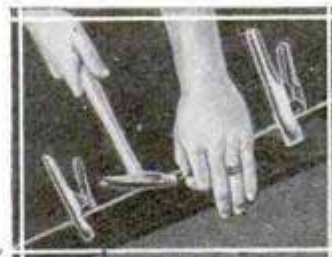
The important research at the University of Illinois will yield facts and figures which will aid potentially in stamping heat losses and costly fuel waste from the calendar of winter worries of the average householder. This will in the future save billions of tons of coal. Our homes will be maintained at stable temperatures during cold weather and, under normal circumstances, a measurable reduction in mysterious drafts will be apparent.

Engineering research, by its remarkable heat-loss tests in the house within a house, adds another scalp of worth-while achieve-

ment to its many trophies of successful accomplishments.

### CLAMP TO HELP HOLD WORK LEAVES HANDS FREE

To hold strips in place for nailing, and for many similar tasks, a spring clamp is al-



most as useful as an extra man, for it leaves the hands free. It snaps in place in a second, has a strong grip and is handy on many occasions.

### DESIGNS ON NEW PAPER MONEY TO CURB RAISING BILLS

Fraudulent alteration of bills will be practically impossible with the new, smaller paper money soon to be placed in circulation. The principal reason is that the designs are restricted. For example, George Washington's portrait, which has been on both one-dollar and twenty-dollar gold certificates, will appear only on one-dollar bills of the new issue. Other designs will be confined wholly to certain



*Levy - Michael Harry Wiener*

denominations. According to careful estimates, the new money will save the government at least half a million dollars in its paper bill annually. Four additional notes will be made from a sheet of paper. In the opinion of W. H. Moran, chief of the secret service, the new bills will not stop counterfeiting although they will make the task no easier, for it is just as difficult to counterfeit a small note as a large one.

*Quartermaster Corps*

### ARMY BLANKET RESISTS WATER AND IS TWICE AS WARM

Said to have twice the warmth of the usual kind and be more resistant to water, an improved blanket has been developed for the army. In a test, one was subjected to water for sixty hours, but was not penetrated although no waterproofing compound was used. The material is light in weight, can be manufactured in any worsted mill and will make excellent lining for trench coats.

*1909  
see Oct. 1919 506*

### WINDOWS THAT TIP INWARD MORE EASILY CLEANED

Both upper and lower sash of improved windows pull inward from the top and lie flat, locking at a convenient height for washing from the inside. In an upright position, they move up and down freely. The sash can

*1587 1/2*

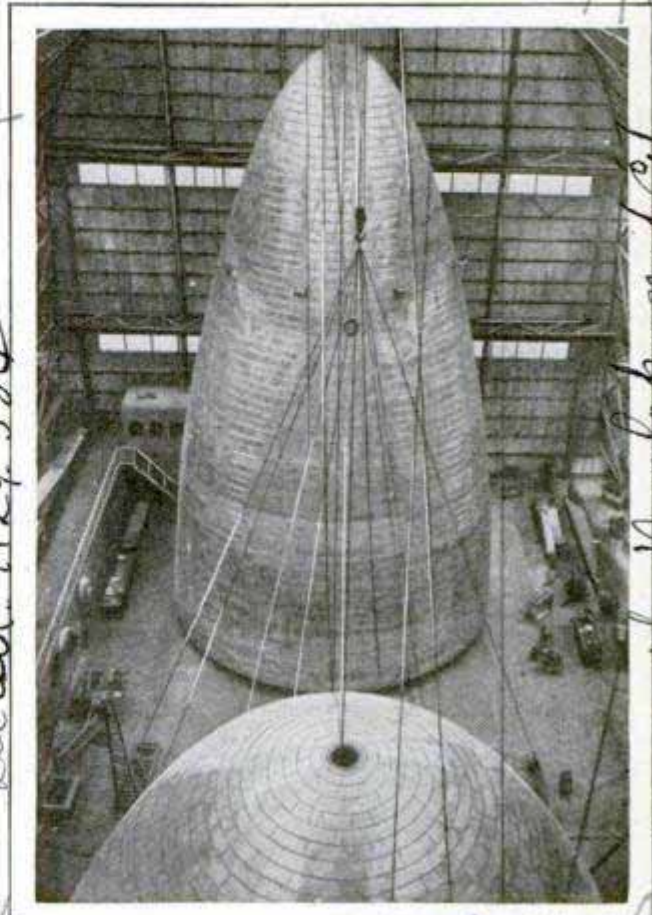


Window in Various Positions, to Show Ease of Cleaning It from the Inside

be installed in old or new frames.

*The Car Mfg. Co.*

### ALL-METAL AIRSHIP TO TEST CONSTRUCTION THEORIES



Sections of the All-Metal Airship, Being Prepared for Assembly and Trial Flight

Flying engineers are awaiting with interest the completion of the navy's all-metal dirigible, scheduled for launching at an early date at a Detroit plant. It is 150 feet long, fifty feet in diameter and is made of duralumin instead of fabric. The "bag" part was made in two huge sections, as shown in the accompanying illustration, and then fitted together.

### ELECTRO PROCESS FOR PATTERN ELIMINATES SHRINKING

Patterns for making metal objects are prepared in copper by a recently developed electric process for which several advantages are claimed. Among them are an elimination of shrinking as now occurs when making a pattern in the ordinary way from a master pattern of wood or metal; economy of time and labor when many patterns are made; elimination of machining, and greater accuracy. It is stated that the error in patterns made by this process is within .003 of an inch.

*Electro-Chemical*

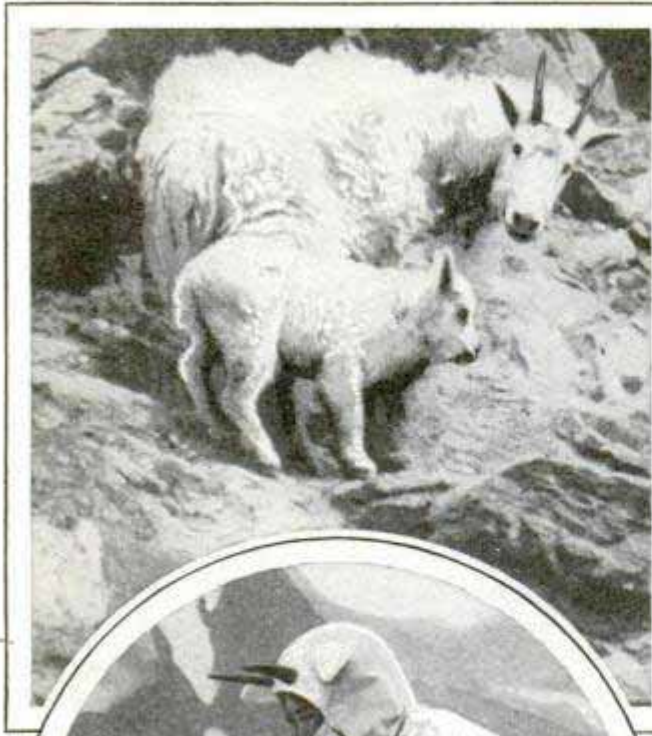
*1919*

*Aircraft Development Corp  
Det. Detroit Aircraft Corp*

*Wide World*

*3975 Beard Tail Ave.*





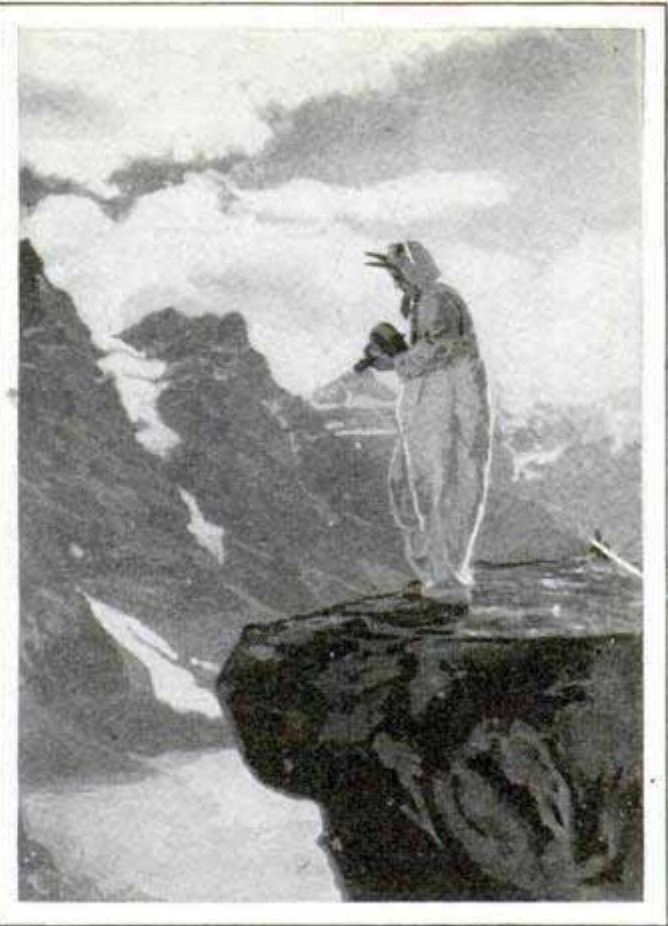
Rare Snapshot of Mother Goat and Young, with Views of Photographers in Disguise

### HUNTING GOATS WITH CAMERA REQUIRES DISGUISE

Photographers with a recent expedition in the Rockies wore white costumes with horns and whiskers while stalking mountain goats with their cameras. The disguise was of aid in helping the men to approach the animals, which are exceedingly wary and difficult to photograph.

### FLOWERS KEEP FRESH LONGER WITHOUT CHEMICALS

Cool, fresh water, without the addition of chemicals, is the best medium for preserving the freshness of cut flowers, tests at the Boyce Thompson institute for plant research have shown. More than forty-three chemicals were used in the experiments, but comparison with flowers that were kept in plain water clearly indicated



that the substances did not add to the life of the flowers.

### EDISON EXPLAINS COST FACTORS IN PRODUCING POWER

Generating electric power at a hydroelectric plant is but a small part of the total cost, Thomas A. Edison recently explained. Often, from seventy to ninety per cent of the total expense comes in delivering the electricity to the consumer after it has left the generating station. The real test of economy in electric-power production lies in the final cost of the energy when it is delivered to market, he pointed out. "Approximately eighty per cent of the undeveloped water power of the country lies in the Rocky mountains and in the Pacific coast region," he said. "The large market for power, unfortunately, is east of the Mississipi. Great as have been the advances in transmission of electricity, the art has not yet reached a stage when it is probable, or even possible, that electrical energy can be transmitted from the Pacific to the Atlantic." He showed that about seventy-two per cent of the country's water power is in territory embracing only twenty-one per cent of the country's power requirements.

started by A.S. Hitchcock. The more I read of the animal society

11-11-11

4-12-12 Santa

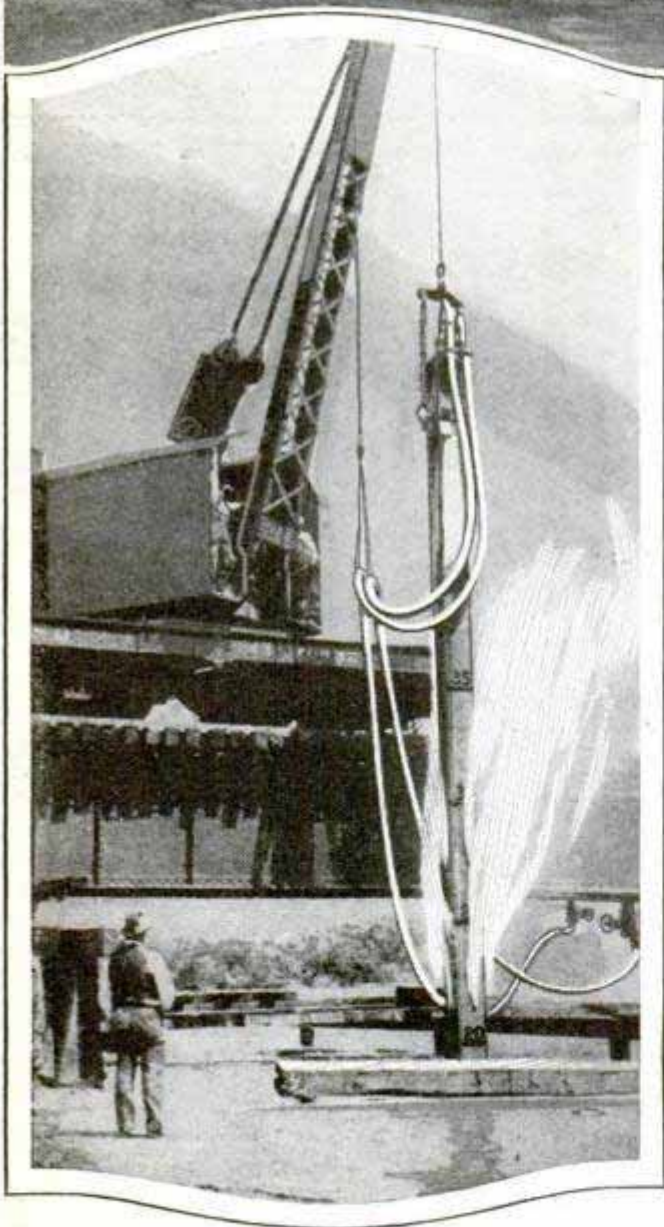
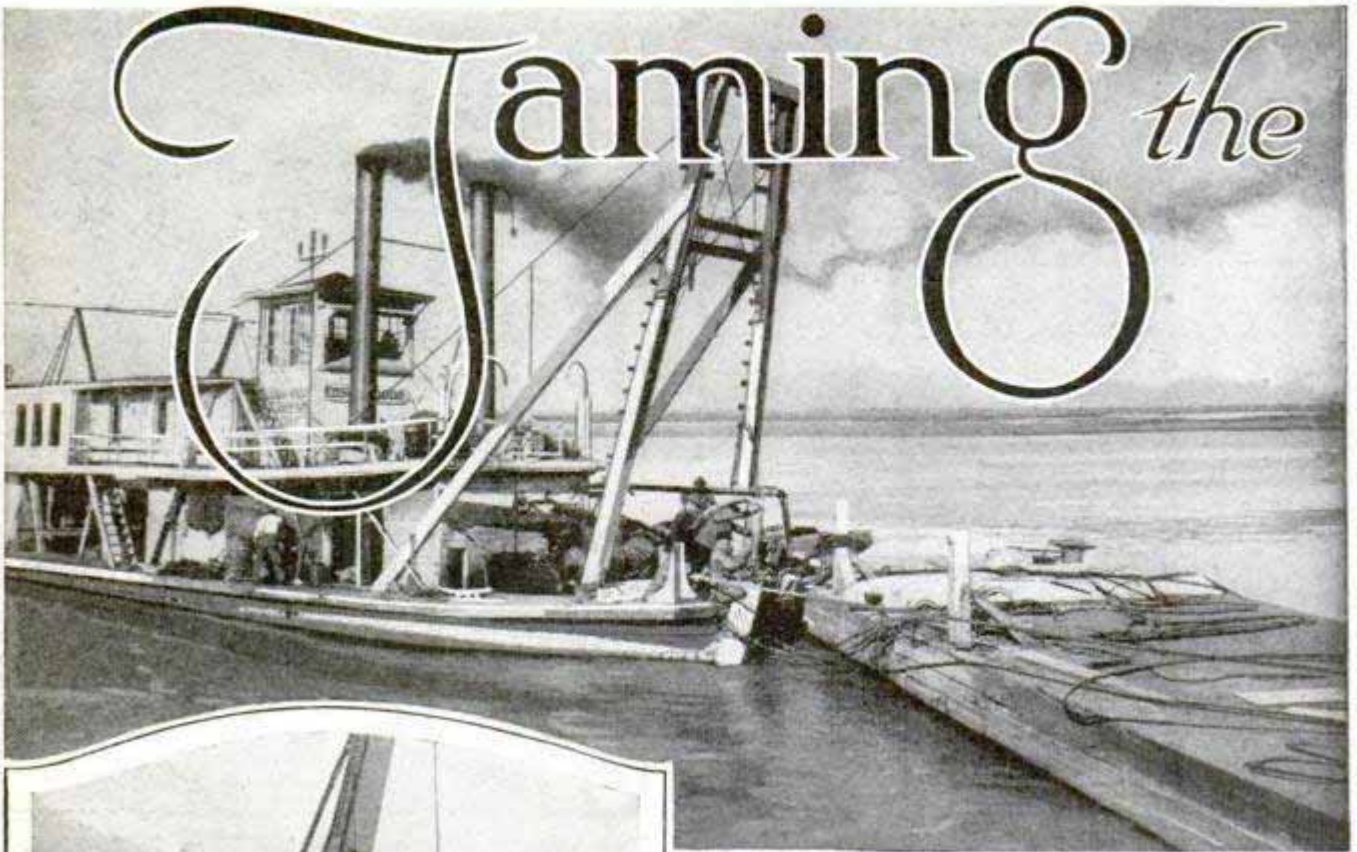
Public Service news 12/24/18 - Texas Publi







# Taming the



Sinking Bignell Pile from A-Frame Derrick and from Railroad Viaduct; Note Side Jets of Water

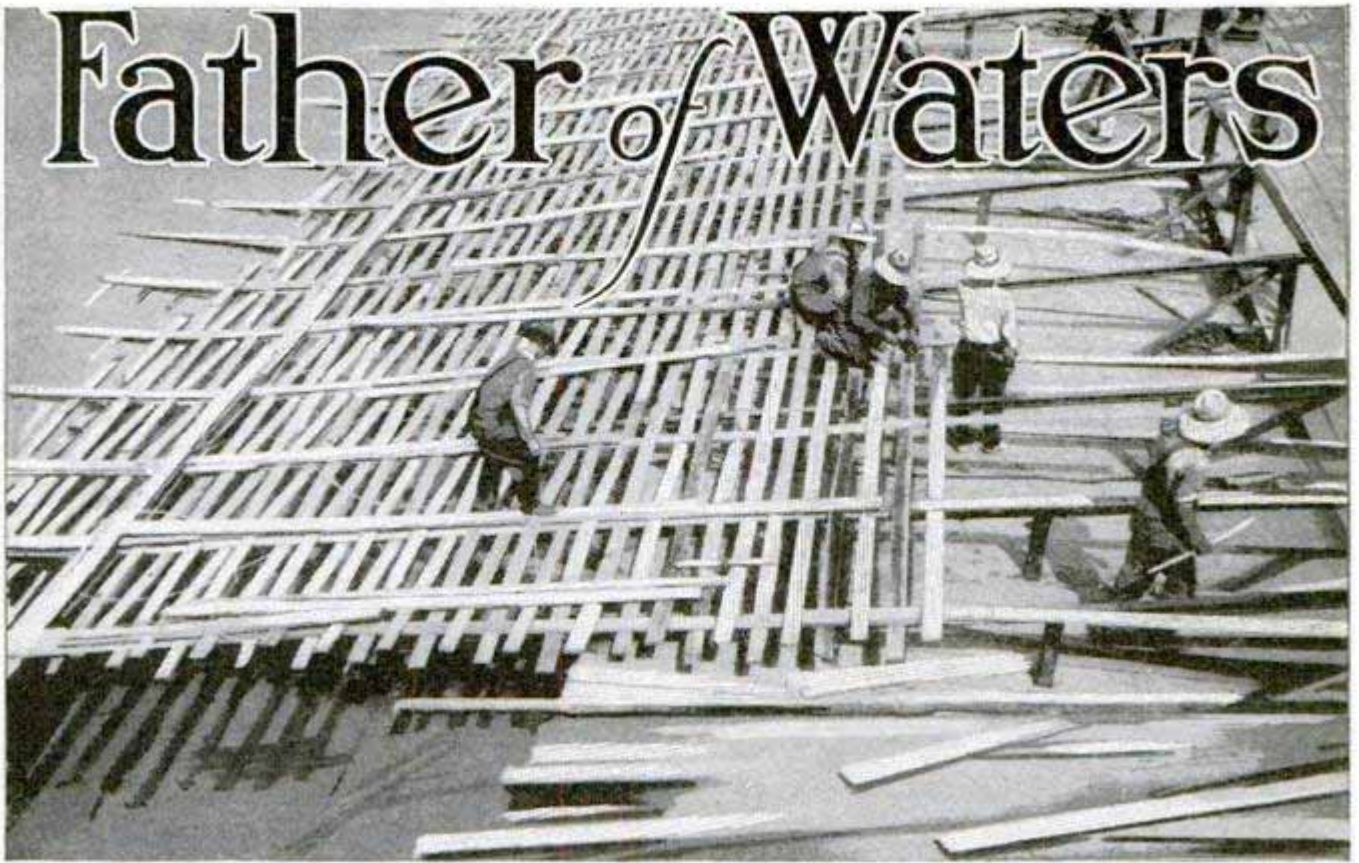
By PAUL D. PADDOCK

A PERPLEXED engineer stood watching a pile driver at a bridge site on the Platte river. With every stroke of the big hammer, the pile would go down several inches, but, to the engineer's disgust, it would bounce back again. Quicksand! It held the pile as in a mass of sponge rubber. Caissons were out of the question. The engineer pondered and then necessity gave birth to an idea.

For some time, on jobs such as this, engineers had been using a pile with a hole running the full length of the center, through which a column of water was forced at high pressure to clear away sand at the bottom, but this plan worked only moderately well, for, in quicksand especially, the material closed tightly about the body of the pile along the sides. Edward Bignell, the worried engineer, made a great improvement. He was unaware of the fact at the time, but his idea was to prove an important factor in one of the most romantic undertakings of all ages—man's struggle to control the mighty Mississippi system, that great network of rivers which drains more than forty per cent of the United States all the way from



# Father of Waters



Weaving Timbers to Form Retevment for Strengthening a River Bank: This Mattress Is Spread Well Up on the Shore and Out in Stream, Weighted with Rock and Sunk

the Alleghenies to the Rocky mountains.

He bored crossholes in the pile at intervals of about four feet, forming side apertures leading from the central passage. Water, gushing out of these openings, surrounded the pile with a film of liquid, keeping the sand from squeezing around it. He made a still further improvement. He projected the side jets upward by attaching upturned nozzles to the openings. The result was something like a downward-speeding skyrocket that burrowed its way through the sand and kept on going until it came to rest on a hard stratum to help form a stanch foundation for the bridge.

He wisely patented the pile, and shortly occurred the second episode in this interesting chain of events that were to have such an important effect on America. He called one day at the office of a friend, Mark Woods, president of the largest organization in the country engaged in the protection of property along river and other water fronts. It happened that Mr. Woods had purchased a Missouri bottom farm that was disappearing in chunks at the rate of 100 acres a year as the river gouged out the banks and swept them to

the Gulf. In Bignell's pile he saw a means of permanently anchoring retards to slacken the river's speed and thus make it dump part of its load and build up the land instead of tearing it away. For years, the retard idea had been employed, but the structures did not last. They had insufficient anchorage. A flood or an ice jam—and out they went, carrying with them the land that had been piled up, plus a few acres of the richest soil on earth. Careful measurements have shown that, between its mouth and Sioux City, Iowa, the Missouri river alone is carrying away more than 10,000 acres of land every year.

Mr. Woods hired men to place retards along his farm and anchor them with Bignell piles. They held. His land stopped slipping away and began to grow. Bank erosion was effectually counteracted. Before long, his company was installing these retards for other property owners and for railroads whose tracks and bridge crossings were constantly in danger of slipping into the stream. The business grew by leaps and bounds.

Today, the Woods organization employs between 1,500 and 2,000 men on its river

Woods Bros. Construction Co.



projects and uses 120 river craft of various kinds, including a dozen steamers, interesting stern-wheelers of the packet days, now busy at the useful task of helping to subdue the streams over which they have struggled for so many years. Just recently, the company has completed more than forty projects along the Missouri alone, while work has been done or is under contract on nearly every important river in the United States where similar conditions demand protective measures. The company has a six-passenger airplane for inspection and survey work over sites of operations. In an hour, engineers in the plane can learn more of the require-

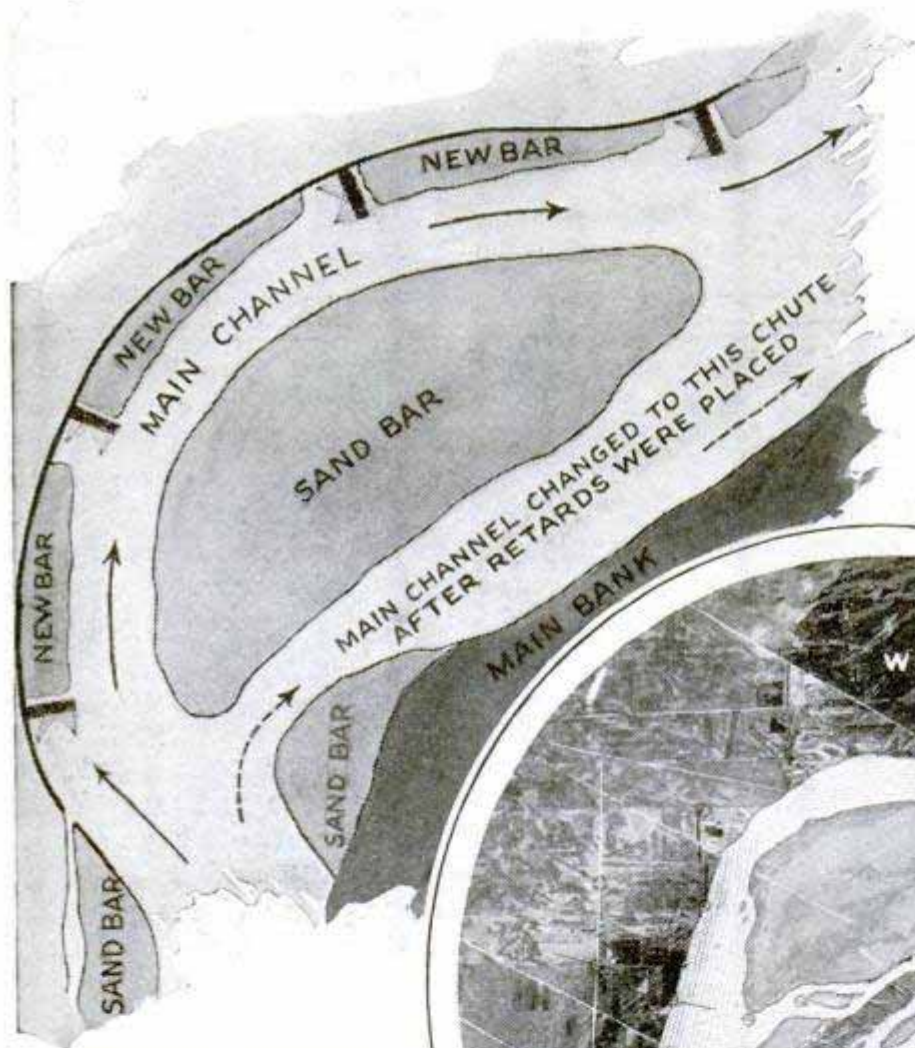
and the location of works in relation to each other can be determined accurately and quickly.

The Bignell pile, purchased by Mr. Woods primarily to save one of his farms, has thus turned out to be a magic-working aid for the entire country. Along the Mississippi and Missouri rivers, the piles are often sunk to a depth of forty to sixty feet below the stream bed. The river piles are like gigantic needles, fifteen or twenty feet long, sixteen inches square and weighing from 3,600 to 3,800 pounds each, threaded with 1,600 feet of inch or inch and one-half steel cables which, in turn, are securely lashed to the retard itself, a

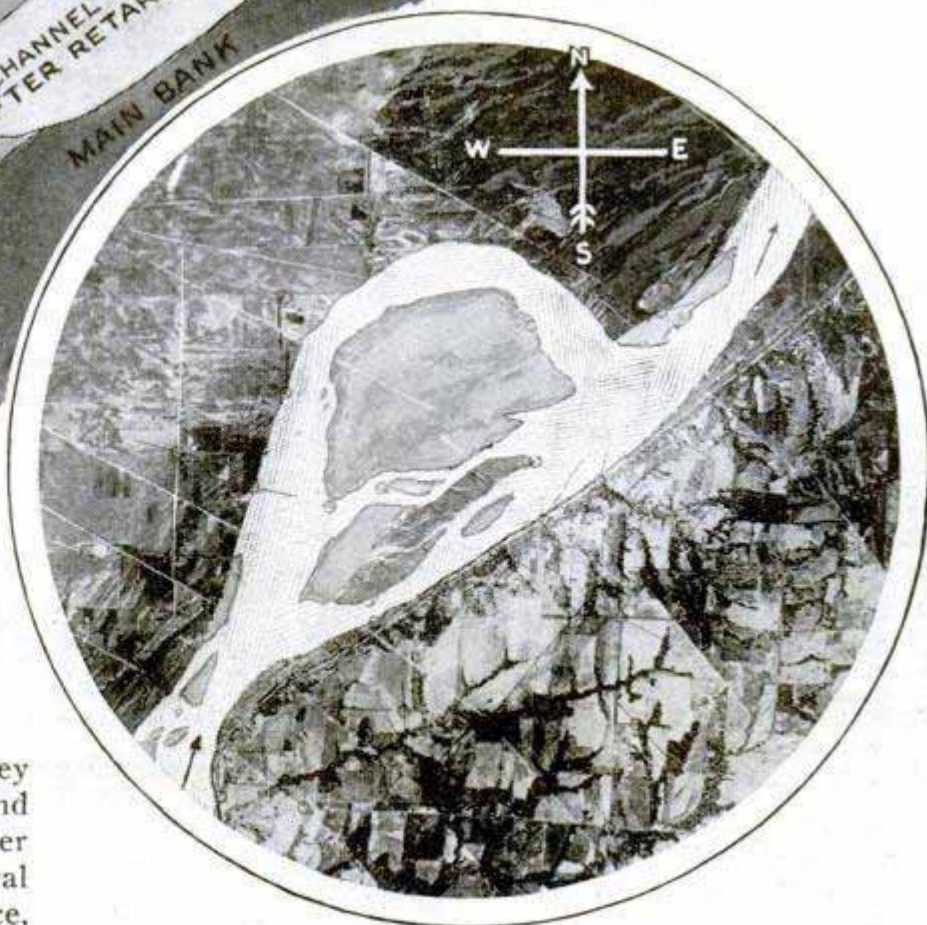
barrier of trees tied together with the butts pointing upstream and the branches down.

These barriers, or retards, are placed in series at proper intervals, from three or four to twenty-five or thirty being used at the same locality, depending upon conditions.

The first one, that is, the one farthest upstream, may extend fifty

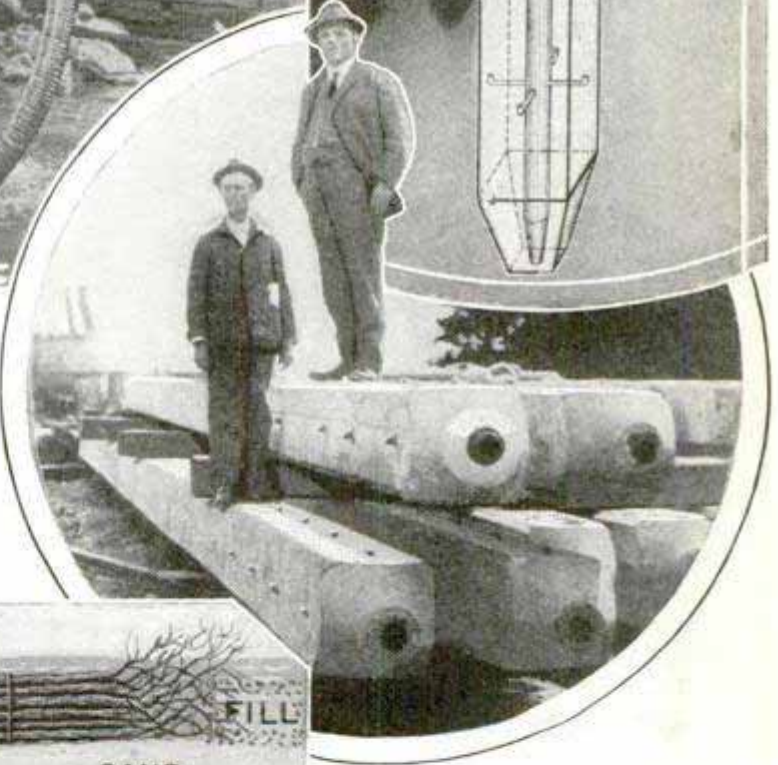
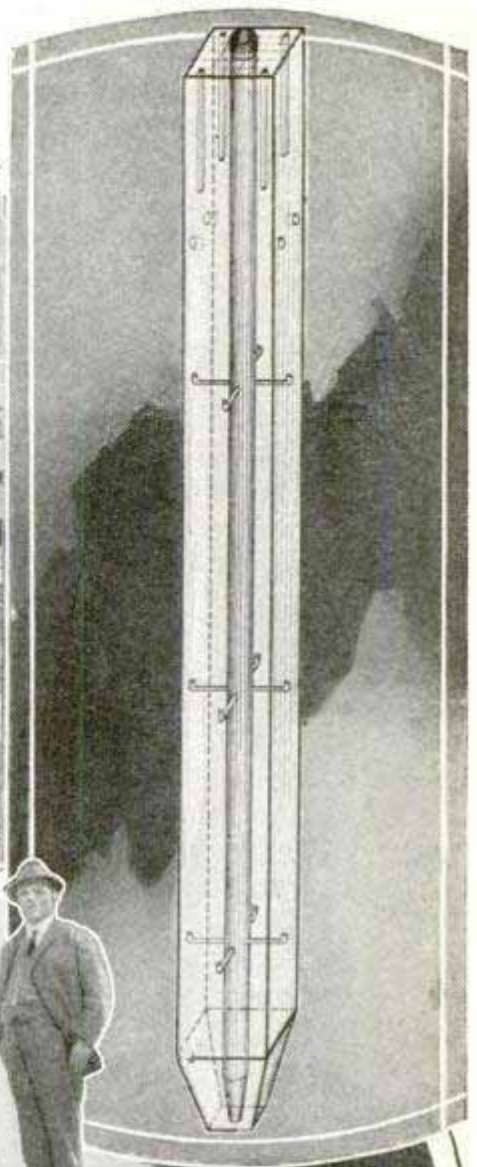
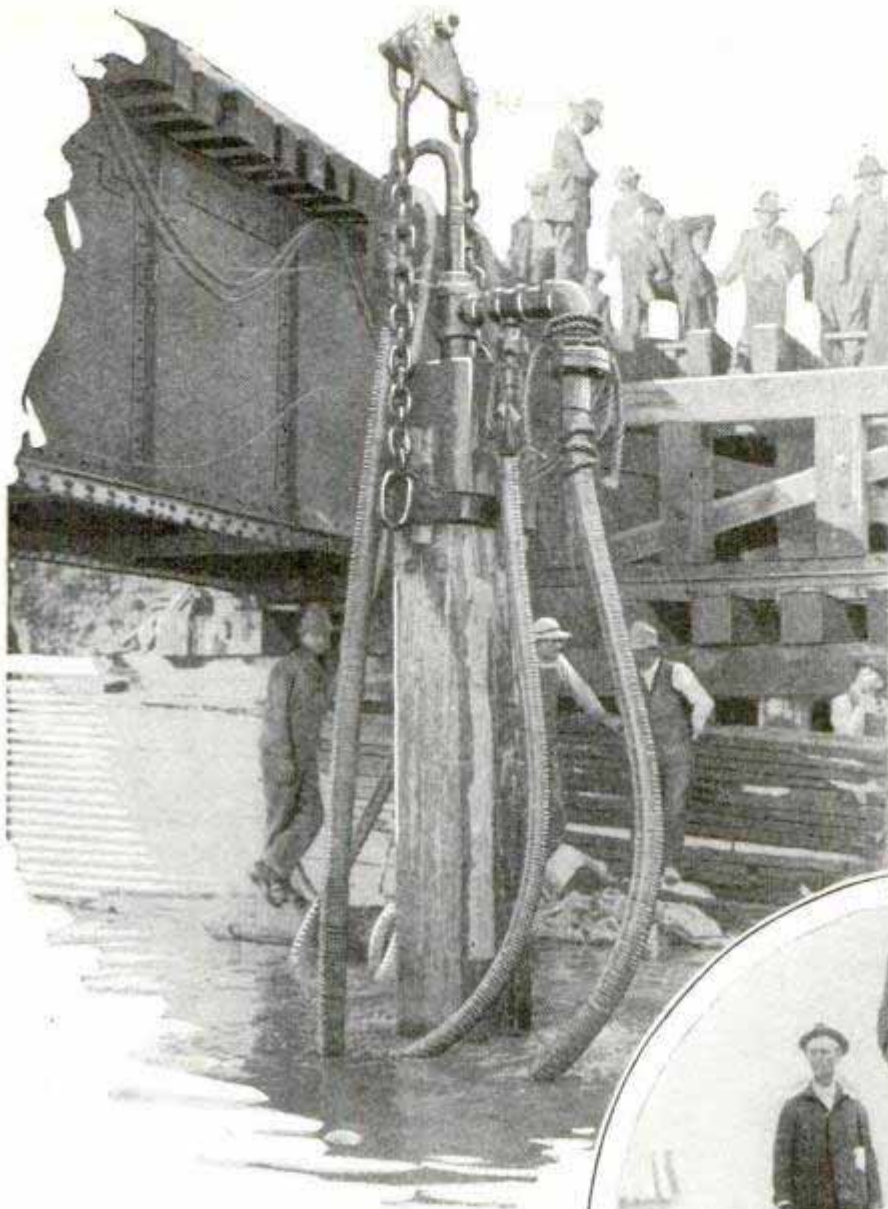


Drawing to Show How Retards on Concave Side of the River Bend Cause Formation of Land to Prevent Further Destruction, and Aerial Photograph of Missouri River near Lexington, Missouri

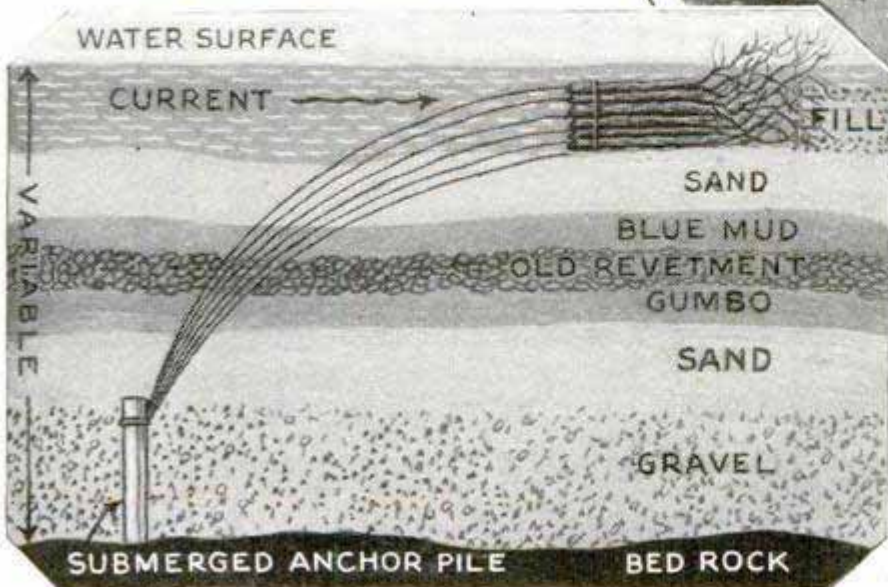


ments of a project than they could in days of ground surveys, because the river can be seen over several miles of its course at once,





Hose Connections for Forcing Water through Pile; Drawing to Show Water Ducts in Pile; in Circle, Edward Bignell, the Inventor, Is Standing on Top of Pile, and, Below, Drawing That Explains the Secret of Retard's Effectiveness; Note How Far the Pile Is Sunk below the Possible Level of the River's Scour; Retard So Anchored and Tied to Cables Cannot Wash Away



feet from the bank, the next 100 feet, the next 150 feet, and so on, the bank ends always being built highest, with the rest of the barrier sloping off as it projects into the stream. The trees that form the retard are lashed together in big raftlike units, each from ten to thirty feet high, and are anchored to



the pile with steel cables. The pile is set 150 feet or so above the spot where the retard is to rest. The barrier is in no sense a dam. It is essentially a brake on the river's speed. Fifty per cent of the retard's upstream face consists of openings between the logs. The water flows in, but, detained by the sievelike obstruction, its speed is slackened and then, due to the natural law of gravity, a lot of the river's burden of silt falls to the bottom. More accumulates. Gradually, just below the retard, a fill develops. The river is actually making land instead of destroying it, and at the same time, the bank that was threatened with complete destruction is being fortified with an earth barrier that will stand for all time.

Besides its permanence, the Bignell pile has several other advantages, all of which help to simplify the big problem of river control. Under ordinary conditions, it can be sunk to a depth of fifty feet or more in less than ten minutes. It is not shattered as sometimes occurs when driving wooden piles, and the equipment needed is simple—an A-frame derrick to hoist it in position and a pump with suitable con-

nections to force water at a pressure of 150 to 250 pounds to the square inch through the hole in the center and out of the side openings.

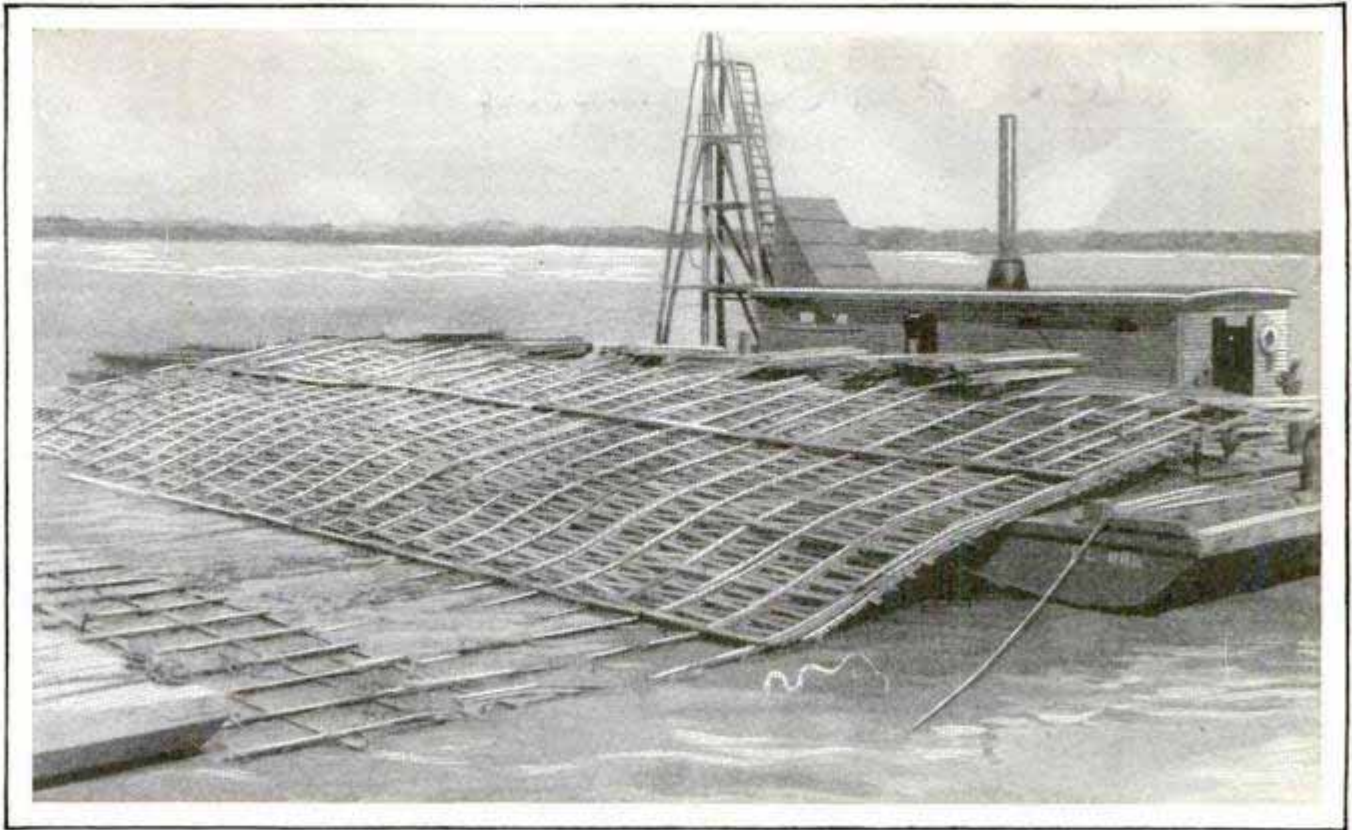
With this effective concrete needle, ragged river banks all over the country are being sewed up permanently and at a great saving over previous methods. This simple unit, born of quicksand and an engineer's inspiration, has cast an entirely new light on the problem of flood control and the construction of inland waterways. The situation today, as regards flood regulation and inland waterways, is essentially this: A valuable new tool has been found for the work, a huge organization is equipped to use this tool, the various agencies that have been working more or less at crosspurposes are united as never before under a big, comprehensive plan, outlined by the United States corps of engineers, and finally, congress has passed two generous appropriations to help put the projects well on the road to realization.

Briefly, the essential problem to be solved before floods can be controlled or inland waterways become a reality, is to



Revetment of Woven Willows Ready for Rock Covering; Protections Such as This Are Spread along Areas Where River Is Weakening Its Own Banks and Those of Levees





Laying a Timber Mattress from a Barge to Strengthen a Bank and Guard It from the River's Force; Concrete Mats Have Been Used with Good Effect for This Purpose

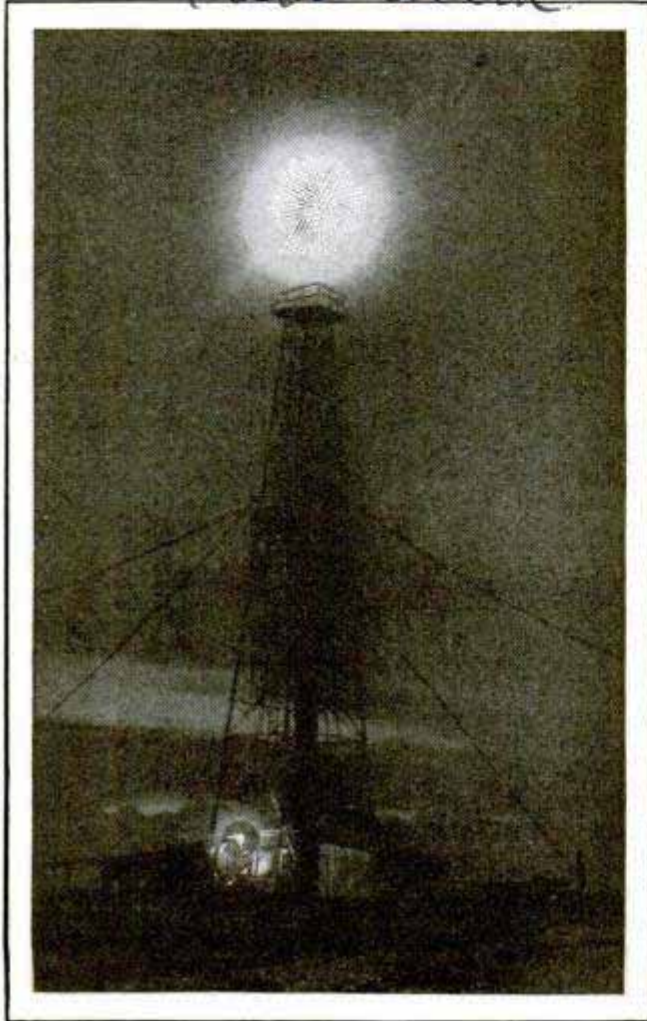
squeeze the river into a fixed channel and hold it there. A big task—the biggest of its kind ever attempted in human history—but, engineers declare, a relatively simple one after all. Once the streams have been directed into this channel and their speed accelerated, they will automatically keep the silt from piling in the passage and will cease their disastrous wanderings. Floods are bound to happen. But engineers hope to keep them under control also. The disaster in 1927 when the levees broke in 253 places, drowning 240 persons and flooding 23,000 square miles of productive land and cities, was directly due, of course, to the big, swollen tributaries of the Mississippi, all pouring their individual overflow into the main channel at approximately the same time. But indirectly, the terrible state of affairs was the penalty paid for years of compromising with the river instead of taking it in a firm hand and making it stay where it belonged. Such a course was impossible, because the means were not available to accomplish such an end. Levees, 1,800 miles of them, costing more than \$238,000,000 have, up to now, been man's best answer to the flood question. They are still to be of aid, but an attack is now to be made in a big way, at the heart of the

trouble, the lack of a fixed river channel. To help in this, congress passed the Jones-Reid bill, carrying an appropriation of \$325,000,000 for an extensive program of river-control work. The other important measure, the Deneen-Denison bill, provides \$10,000,000 for the further development of the federal barge lines.

The big program of river control as outlined by the United States corps of engineers and now going forward at various points, involves six main attacks: First, the construction of floodways from Cairo to New Madrid, from the Arkansas river through the Tensas basin in the Red river and from the Red river, through the Atchafalaya basin, to the Gulf of Mexico to relieve the main channel of waters it cannot carry; second, a controlled spillway to hold the levels down to a safe stage at and near New Orleans; third, local setting back of the levees in the Mississippi river at "bottle necks"; fourth, greater protection and strengthening of levees; fifth, revetment of caving banks; sixth, improved channels for river traffic, not less than 300 feet wide and from six to nine feet deep, to be obtained by dredging and by contracting the rivers at strategic points so that they will keep their own channels clear.



*new market Buena*  
*1921*  
*the first*  
PILLAR OF FIRE MARKS FIRST AUSTRALIAN OIL WELL



Flaming Gas at 550 Pounds' Pressure from Australian Well over 3,000 Feet Deep

The quest for oil and gas in Australia, which has been prosecuted since 1907, was successful when an American firm of oil drillers, from California, struck both oil and gas at a depth of 3,078 feet. The gas, which became ignited, had a pressure of 550 pounds at the start, and the oil flow which followed was remarkably clear. Owing to the scarcity of firewood in some parts of Australia, gas and oil for heating and cooking purposes are coming into more general use.

### GAS ATTACK ROUTS RAT ARMY TO PROTECT CITY

When hordes of plague-infested rats threatened to descend upon the city of Johannesburg, South Africa, authorities laid down a gas attack over a wide area on the outskirts in an effort to halt the advance. Arsenic and poison gases of various kinds were pumped into holes on

farms, and other places where the rodents were numerous, and inspectors were stationed to check the spread of the plague.

### AUTOMATIC SEA RADIO BEACON HAS WIDE RANGE

*1965*  
Sweeping a radius of 200 miles and requiring no operator, an automatic radio beacon installed at Orfordness on the coast of the North sea, is regarded as an improvement over other devices of this kind. Listeners on ships or airplanes, need only a stop watch and a radio receiver, and the apparatus is said to be free from night errors and interruptions which interfere with many radio light-houses. A revolving loop rotates mechanically and sends out signals on a wavelength of 1,040 meters. The receiver registers the maximum effect when the loop points directly at it and a minimum report when the loop is at right angles. Rotation is at a known rate of speed and from a known bearing. By listening to the signal changes and noting the time required, for the signal to reach its maximum or minimum, the receiving operator can calculate his own bearings.

### GUIDE FOR DRAWING LETTERS MAKES FIFTY STYLES

*1951*  
Aluminum guides for quickly drawing letters, numerals and other characters are made in one piece and each makes more than fifty different styles and sizes. They are especially useful to sign painters and decorators, are helpful in teaching children and require but little skill.



Using the Lettering Guide Which Makes Fifty Styles and Sizes and Requires Little Skill

*with them*

*master*

*Consolidated sign*

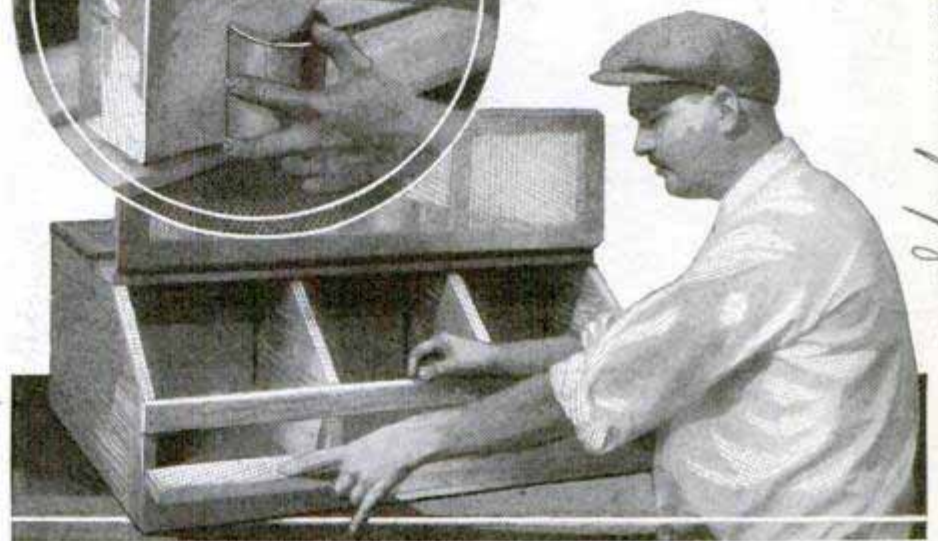
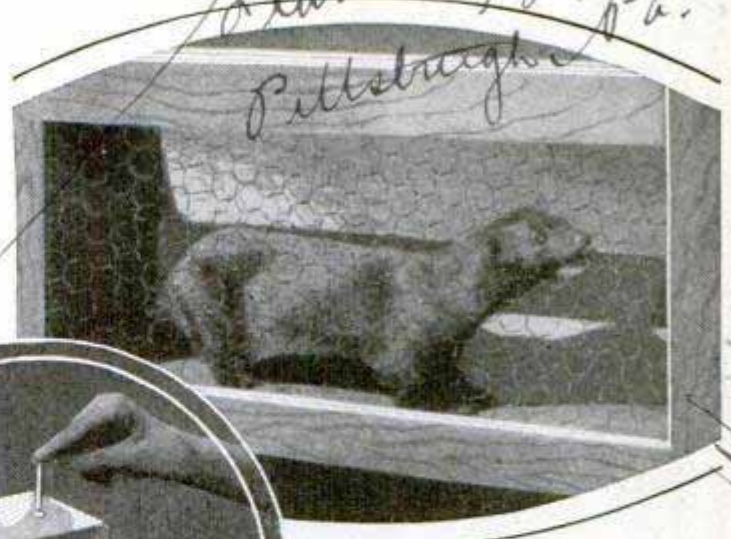
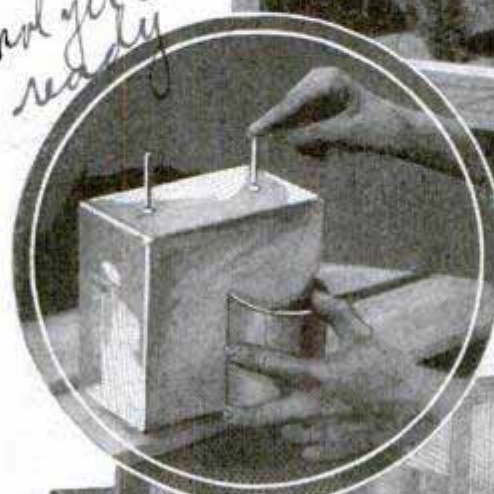


*Madison Wis.*

*Chemical ready  
illumination 457 Pa.  
Pittsburgh Pa.*

### HARMLESS LUMINOUS PAINT TO LIGHT HOMES 1932

Within the next few years, the interiors of homes may be illuminated at night without the aid of electricity, in the opinion of Prof. J. H. Mathews of the University of Wisconsin. A new kind of luminous paint, non-poisonous and capable of being made in colors, dull in the daytime and brilliant at night, is being developed, although the chemical process by which light is stored up in the paint in the day and released at night is not fully understood. Hallways of a home could be a light brown in the daytime and a brilliant green at night; the bathroom, a white by day and violet at night. The paint furnishes sufficient light to make possible passage through the rooms without electric light, but, for the present at least, there is not sufficient illumination from it for reading. The substance is not injurious, since it does not contain radioactive materials. Its use already has been applied to the stage, where costumes have been treated with it to give novel effects when the lights are turned off.



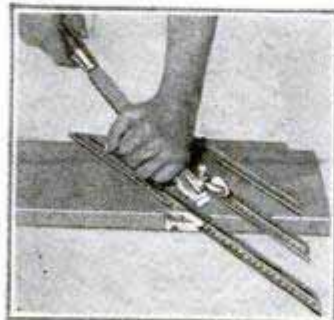
Mink in Special Cage, the Watering Can, and a View of the Three Compartments with Punched-Steel Lid

### SHIP MINK IN SPECIAL CRATES TO AID FUR INDUSTRY

Raising wild animals for their fur has become an important industry and required the development of special shipping crates to care for the animals on journeys between breeding farms and points where they are tended until the fur is ready for market. A three-compartment crate has been devised especially for mink, one of the shyest of all animals raised, and one that has suffered the most on railroad journeys. This box is covered with a punched metal screen instead of wire, a special type of watering can that prevents spilling has been provided, and a false bottom simplifies cleaning the cage. One of the compartments is a "nest box" and is well ventilated so that the animal cannot cut off the air by stuffing the openings with bedding as sometimes occurred with ordinary crates.

### HAND DECORATOR FOR METAL REQUIRES LITTLE SKILL

Spotting or decorating metal is done many times faster and more uniformly with the aid of a hand tool which unskilled persons can operate with good results. It is simply pushed across the work, a small wheel serving to keep the tool on the track of the guide which is designed to give a rocking action to the blade. This produces crescent-shaped designs on the metal.



*Cont. 20 U.S. Harbor 106 Prospect Ave. Madison*

*Farm at Sheboygan, Wis.*

*address man...*

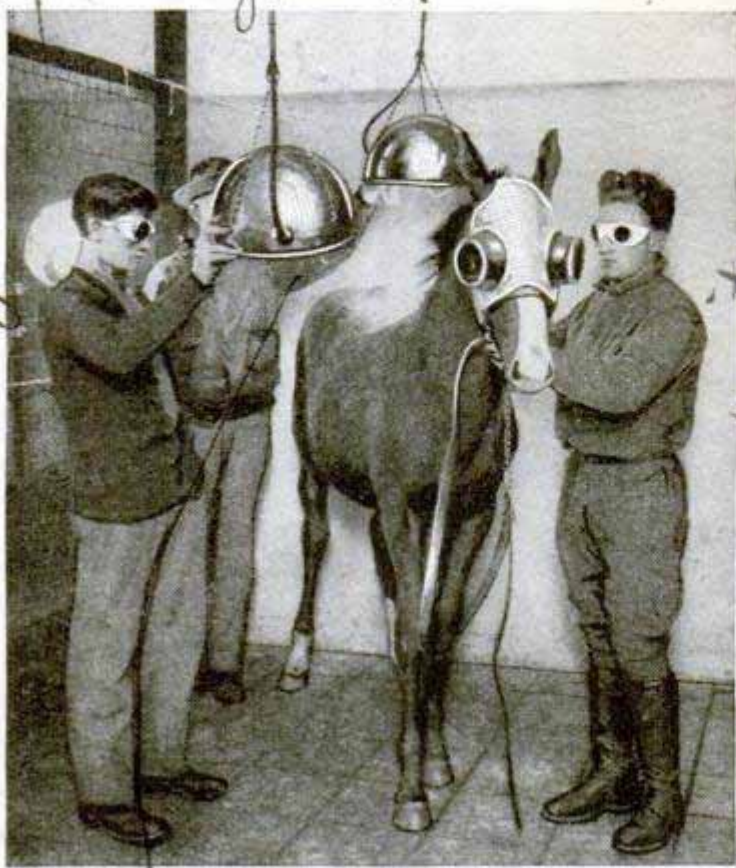
*Madison, Wis. 1932*



*Dr. Schumann  
Munich*

*1939 Cary, Ill.*

*Horse owned by Mrs. John Kaestly*



Giving Colt Its Daily Treatment of Ultraviolet Rays to Insure Health and Proper Growth

### MUSCULAR MOVEMENTS PRODUCE ELECTRICITY TESTS INDICATE

*1927*

Interesting tests that seem to indicate still further the close relationship between life and electricity have been conducted recently in Germany. By using amplifiers and other apparatus, a record was made of the electricity developed on the skin or immediately below its surface. The person used for the tests was placed in a large metallic cage and careful checks were made to determine that the electricity came from the subject's muscular movements and not from any other source. A striking record was obtained, indicating fluctuations in the electric force during the muscular efforts, according to reports. A rise to a peak was found to occur by degrees in several rapid stages, and, in the event of a continuous effort, the electric response declined somewhat, before the person was fatigued, but this was believed due to the fact that the skin became moist with perspiration. While the test showed a connection between electricity and muscular work, the origin and other factors of the electric currents still remain more or less of a riddle.

*End. Dr. A. Schumann*

### LIGHT RAYS FOR RACE HORSES WARD OFF DISEASE

*Suggest Frank & Betty*

Thoroughbreds in a racing stable near Chicago receive ultraviolet-ray treatments every day, as it is believed that they need artificial sunlight when the natural supply is unavailable, as much as do human beings. A short exposure to the special lamp is said to give an effect equivalent to that from a whole day in the sun. The treatment is of special benefit in winter when the animals are confined indoors.

*Cashed*

### SIGNAL ON AUTOMOBILE CHOKE PREVENTS MOTOR ILLS

To remind motorists to regulate the choke properly, a warning signal has been devised. It consists of a small light that glows when the knob is out but is extinguished when the choke is in. This eliminates the likelihood of forgetting to push the choke in, an oversight that often results in fouled spark plugs, damaged bearings and other troubles caused by an excessive use of gas and oil. Back of the lens on the knob light is a semitransparent disk on which a monogram or other legend may be printed.



### COMBINED CASE AND LIGHTER SAVES POCKET ROOM

Cigaret case and lighter are combined in one attractive article, saving the bother of two units with the demand for extra space. The case holds ten cigarets and the lighter is said to be a dependable type, and is not likely to get out of order.



*The Shepley Co.*

*E.C. Wilson Corp*



### PIPE STEMS MADE FROM COAL BY DISTILLING PROCESS

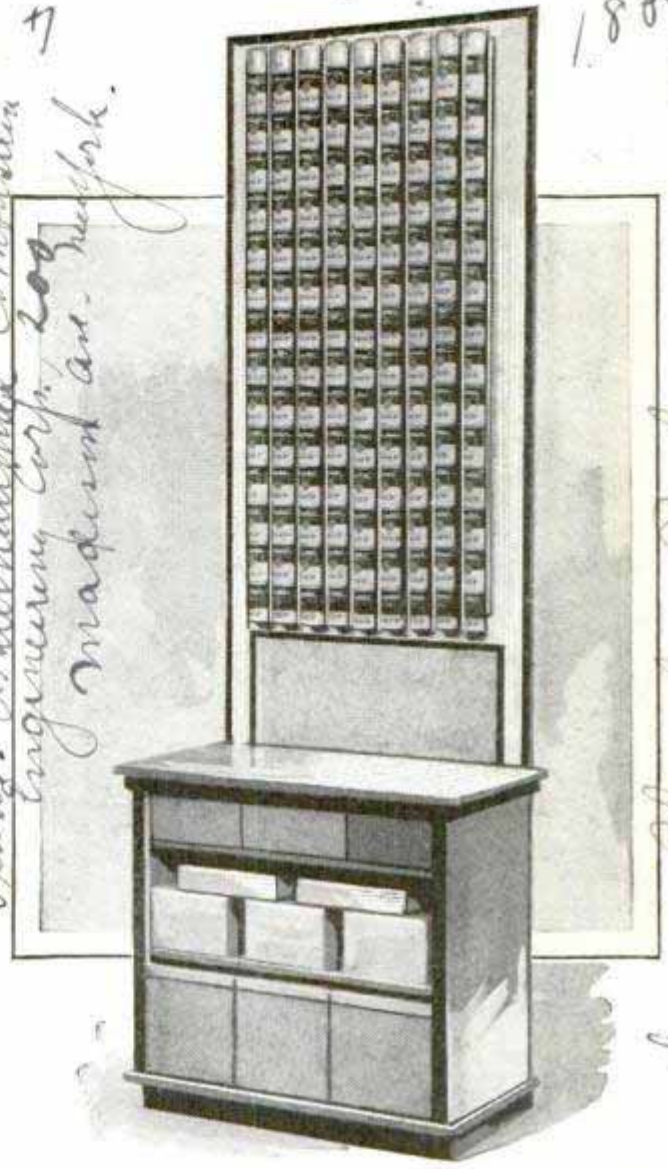
Materials for the manufacture of pipe stems, umbrella handles, cue balls and many other articles will be prepared from coal products derived by a special distilling process, according to a recent announcement. Synthetic furniture is predicted as a result of the development in this field. The method is new to the United States and differs from other processes chiefly in the quantity of by-products that are obtained. It produces about two and one-half times as much tars from which synthetic resins are made. From these latter substances, chemists have made a wide variety of articles, including brilliantly colored pens and pencils, bathroom tiling, tops and stoppers for bottles, radio parts and automobile accessories. Gasoline made by the new method of coal distillation is said to produce less "knock" than that obtained by other processes.

### MODEL OF ROCKET AIRPLANE CONTROLLED BY RADIO

Designed to be propelled by rockets, a monoplane in model form has been tested by a western inventor. In demonstrating the craft, he used a radio-control outfit, manipulated by a keyboard. The completed ship is expected to contain eighty-six rocket "barrels" to furnish power.



Inventor Demonstrating Radio Control for His Model Airplane to Be Propelled on the Rocket Principle



Section of the Self-Filling Shoppers' Shelves; Cans Removed at Bottom Are Replaced from Top

### SELF-FEEDING STORE SHELVES LATEST AID TO SHOPPER

Adapted especially for canned goods, a special shelf arrangement has been introduced for the convenience of the shopper. It is filled at the top and, as cans are pulled out at the bottom, others slip into their place. This eliminates difficult reaching and keeps cans from being pulled out on the floor. Another innovation, used in connection with the shelves, is a basket with rollers which the customer pushes along on a counter at the base of the shelves, instead of carrying.

Popular Mechanics Magazine does not publish the name of the maker or seller of any device described in its pages, but this information is kept on file and will be furnished free upon application to our Bureau of Information.

Chicago-1300 N Branch

1927

Clark International Combustion  
Engineering Corp. 200  
Madison Ave. New York

1889

Dr. Charles Poles  
Amant's

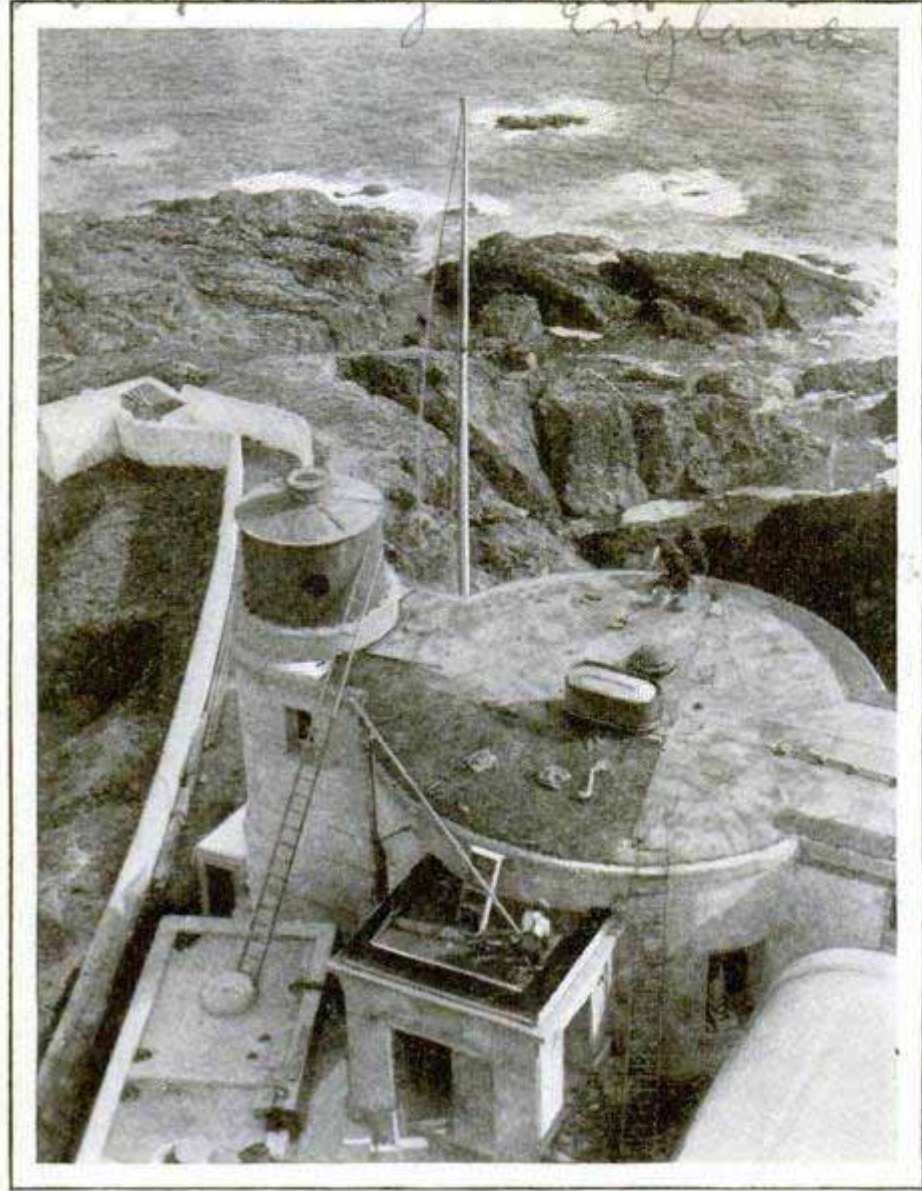
1929-1930

Wick Wald

Maurice Pomeroy



*Colborne Barnhurst Road, Berley Heath, nr. London, England*



© Daily Press

Radio Lighthouse at Start Point, England; Beams Are Transmitted through Hole in Turret to Guide Ships

### LIGHTHOUSE SENDS RADIO BEAM TO GUIDE SHIPS IN FOG

Wireless beams are transmitted from a hole in a turret of a radio lighthouse at Start Point, Eng., off the steamship route from Plymouth to London. The range of the apparatus is about 100 nautical miles under normal conditions, and the turret helps to overcome some of the difficulties that otherwise would be encountered in sending from a station built on rocks. The code is sent automatically, at in-

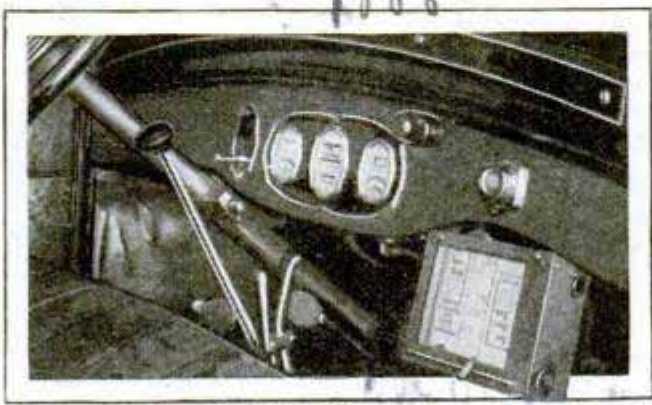
tervals or continuously, depending upon the weather. All running machinery is duplicated in case of a breakdown, and if a tube should fail, an alarm is sounded.

### NEW CABLE SENDS EIGHT MESSAGES AT ONE TIME

Eight messages are dispatched simultaneously over the latest Atlantic cable from Bay Roberts, Newfoundland, to the Azores. Four are sent in each direction at one time. What happens is that the time on the wire is divided equally between four different sending machines. For instance, there are four messages, the first word of each in order being, cat, rat, boy and dog. The first letter to go on the cable would be "c," the next "r," the next "b" and the next "d." The second letters of each word would follow, and so on until the messages were completed. At the re-

ceiving end, a device separates the various messages and diverts each to an instrument that registers the message properly.

### MOVING MAP FOR AUTO DRIVER PREVENTS GETTING LOST



Moving Map at Right Unrolls as Auto Proceeds, and Pointer Tells Exact Location of the Car

Motorists traveling over strange roads or driving at night, are guided by a moving chart installed under the dash. It is keyed to synchronize with the speed of the car, unrolling as the vehicle progresses. The position at all times is indicated

*Marconi Company*

*Product to 200 ft. cable, with 1000 ft. of wire.*

*1888*

*make unknown.*



by a pointer, so that, if landmarks do not agree with the moving map, the driver will quickly know that he is off the way.

**RADIO TRAVELS BEYOND MOON  
ECHO TESTS SHOW** 1922

Radio waves travel far beyond the moon, recent tests have shown, so that communication with the satellite would not be impossible were someone there to receive the signals. Dr. Carl Stormer, a Norwegian scholar, experimenting with a thirty-one-meter wavelength, observed echoes from signals back as much as fifteen seconds after the original impulse had been transmitted. Since radio waves travel at the rate of about 186,000 miles a second, the echo tests indicated that they had gone more than a million miles out and back again, much farther than the distance of the moon from the earth. Doctor Stormer believes that the echoes are caused by a layer of electrons which come from outside the earth.

**LANDING LIGHTS SET IN GROUND  
SHOW WIND'S DIRECTION** 1916

Airplane landing-field lights, installed in protected depressions where they cannot be damaged by the ships, have appeared at an eastern airport. They are



Landing-Field Lights in Small Wells Are Protected against Breakage and Serve as Wind Indicator

so set that lines of them may be turned on to indicate the direction of the wind as well as to show the runways.

Now built John S. ...  
Constructed by Park



Turning the Dial That Causes Buzzer to Sound When Answer to Question Is Reached

**BUZZER TO ANSWER QUESTIONS  
LATEST QUIZ GAME**

Resembling a small radio cabinet and loud speaker, a buzzer set that answers a wide variety of questions has been introduced for the instruction and entertainment of children and others. A card, bearing the questions and answers, is slipped over the two knobs in front of the box. The one at the left is set opposite the question selected. The other is turned until the buzzer, concealed in the loud speaker, sounds. The proper answer will be found opposite the arrow on the "tuning dial." A small electric battery inside the cabinet provides current for the buzzer. The set of cards furnished gives a large number of interesting and amusing questions with answers, and children enjoy some of the thrills of operating a real radio set while learning facts about science, history and many other topics.

**HIDDEN SPRINKLERS IN LAWN  
KEEP GRASS GREEN** 1917

Ninety acres of lawn in New York's Central park are to be kept fresh and green by a hidden irrigation system recently tested. Pipes and disks that give an effective spray, are concealed in the grass, and water may be turned on for the whole area or for just a small part that needs a special amount. The spray disks have gravity caps that fall back when the water is turned off, to prevent the nozzles from becoming clogged.

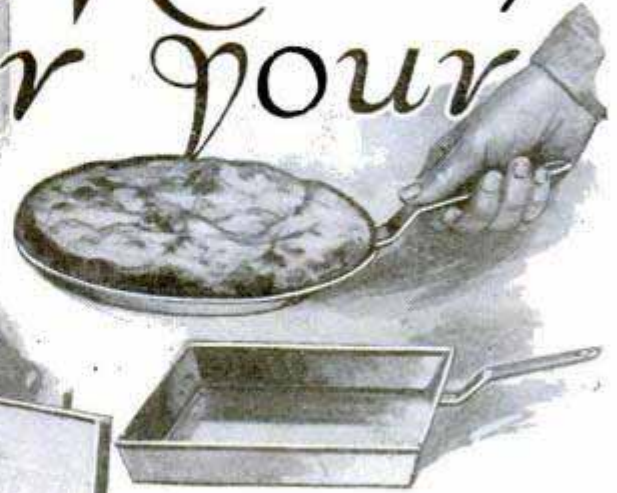
Constructed by Park

Handwritten notes on the right margin: '1893', '3.75', 'Radio Quiz Corp. Jackson Blvd. Baltimore, Md.', 'Roosevelt Field', 'Feb. 21', '118-8261', 'New York Herald', '12/10/17', 'Constructed by Park'.



138

# Time and Money for your

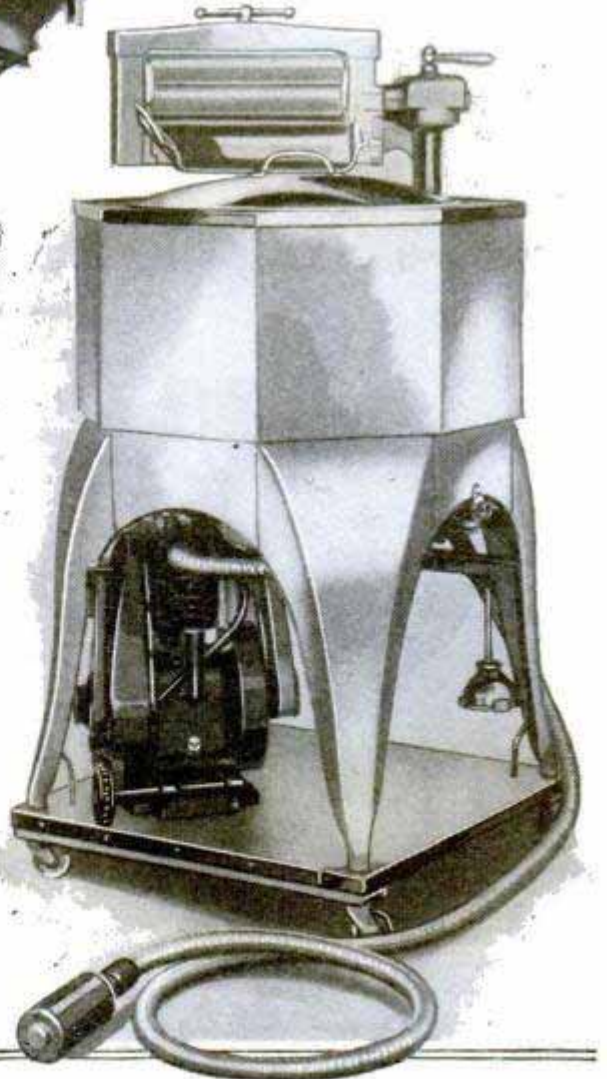


Pie and Cake Pans with Handles Are More Easily Placed in Oven and Removed without Burning the Fingers or Dropping; They Are Furnished in Several Different Sizes; at Left, Dust and Moisture-Proof Envelopes for Garments Fold Flat for Convenience in Traveling

Below Is a Bag with Small Outer Side Pocket for Loose Change, to Save Opening and Fumbling through the Main Compartments; It Is Just Large Enough to Hold a Small Number of Coins



At Right Is a Washing Machine Operated by a Small Gasoline Engine Instead of an Electric Motor; Its Wood and Steel Construction Reduce Vibration to a Minimum So That It Is Said to Be Nearly as Smooth-Running as the Usual Kind





# Saving Things home

Ver  
Pat  
P  
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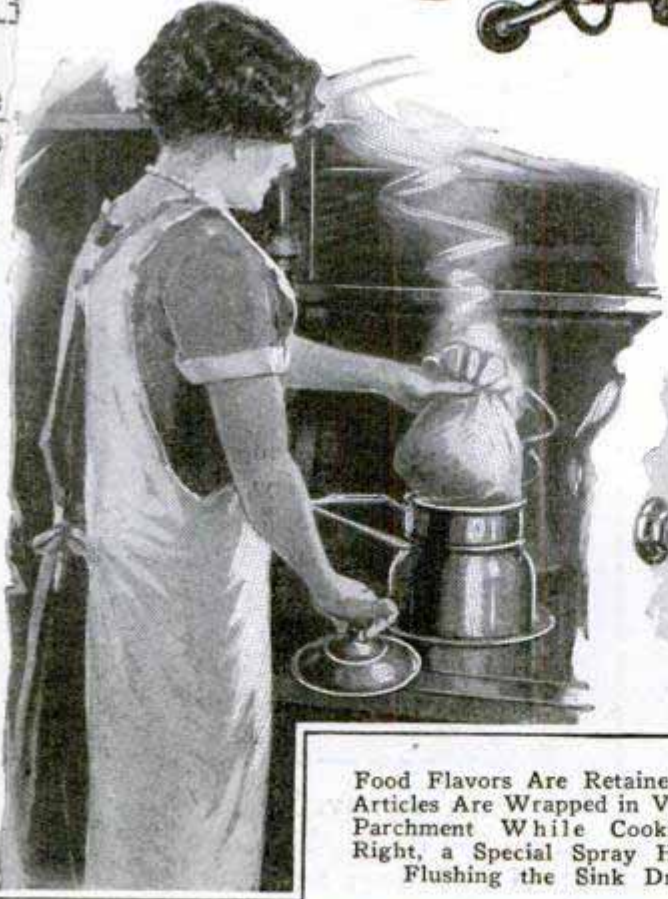
Man



This Oil Heater Has a Patented Floor Tray Attached, to Prevent Its Tipping Over and to Protect the Floors



Serviceable Hair Drier Is Connected to the Vacuum Cleaner, and, Below, a Specially Shaped Frying Fork Which Simplifies Turning Bacon and Other Foods without Dropping



Food Flavors Are Retained When Articles Are Wrapped in Vegetable Parchment While Cooking; at Right, a Special Spray Hose for Flushing the Sink Drain



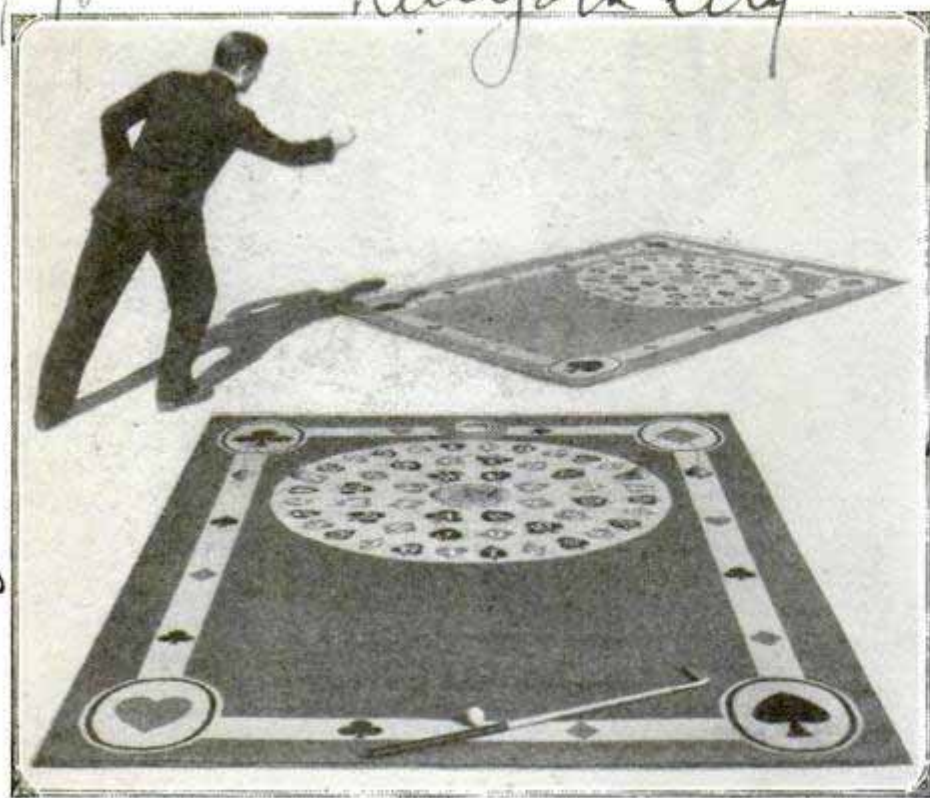


Chicago. Uses & padding & cover.

2.1102-464  
1948

347-5th Ave  
POPULAR MECHANICS  
New York City

12/11/28



Playing the Quoit Poker Game, and a Close View of the Rug, to Show the Design and Arrangement for Golf

### RUG SERVES AS GAME BOARD FOR GOLF OR CARDS

Double service is afforded from a novel rug now on the market. Besides its normal function as a floor covering, it serves as a field for two interesting games, a form of poker and indoor golf. The pattern consists of an arrangement of the symbols on playing cards. To play poker, a pitching quoit is used, the object being to throw the quoit upon the joker, the central figure in the design, and so fill out the hand to the best advantage. Five quoits are used in this game, the landing place of each being determined by a hole in its center. If a line between two or more "cards" shows through the hole, the higher card is scored. In the golf game, a putting disk is placed on the joker and a regulation golf ball and putter are used. Here, the main object is to land the ball in the disk or joker and so fill out the hand. The figures on which the ball stops are also used as in the poker game, to determine the hand. Both games require considerable skill, help steady the eyes and nerves, and the putting practice improves the real game on the links. The rug is made of durable material and is handsomely colored. A pleasing variation of the putting game is played with the aid of

wickets placed before the disk, the object being to get the ball through the wickets and into the disk in as few strokes as possible.

### LUMBER WASTE IS REDUCED BY THINNER SAWS

1954 By using thinner saws, lumbermen could save some \$60,000,000 annually in this country, engineers have estimated. Reducing the thickness of the cut as little as one-sixteenth of an inch would effect this economy, the experts declare. They point out that with the present saws not less than \$30,000,000 is wasted

yearly in preparing the saw logs and about \$33,000,000 in converting the logs into boards. This is the annual bill for sawdust, only a small part of which is salvaged for useful purposes. Efficient standardization of blades would result in the saving, a report made to the American Society of Mechanical Engineers stated, and the economy is recommended in view of the none too abundant supplies of timber.

### LIFTER FOR MILK-BOTTLE CAPS PREVENTS WASTE



Paper caps are removed from milk bottles without spilling the contents with the aid of a simple lever device recently introduced. It fits around the neck of the bottle, the cap is attached to a sharp prong,

and is then removed simply by prying down on the lever. The device is quickly adjusted and does not mutilate the cap, which can be used repeatedly.

Chas. Robert



*Oberlin*  
465  
*Germany*

1945

**"NORSE" RUINS LAID TO ESKIMOS  
MUSEUM EXPLORER SAYS**

1914

Norsemen may have landed in America long before Columbus did, but, so far, no tangible evidence has been found to support this belief, Dr. William Duncan Strong, assistant curator of North American ethnology and archæology, recently declared after research into the question of alleged Norse ruins by the Rawson-MacMillan subarctic expedition of the Field Museum of Natural History. Ruins on Sculpin island, near Nain on the Labrador coast, which had been regarded as relics of an ancient Norse settlement, proved, upon examination, to be only the remnants of an old Eskimo whaling camp, it was found. The stonework did not resemble the authenticated Norse ruins in Greenland, and no Norse implements were found, whereas the material discovered closely resembled that which is commonly found in Eskimo burial grounds and camp sites in other regions.



Gas Mask for Asthma Victims Affords Treatments While the Wearer Is at Work

**GAS MASK FOR ASTHMA VICTIM  
WORN WHILE AT WORK**

German engineers have devised a lightweight gas mask that is said to be effective in the treatment of asthma. It can be worn about the house or other place while at work, has wide glasses to permit unobstructed vision and is quickly adjusted or taken off.

*see June 1930 953*

**STOVES AND BLANKETS IN CAFE  
DRAW WINTER PATRONS**

1941

Coke stoves and blankets are provided patrons of a German cafe when the weather is cold. The innovation has already proved popular in France, where permanent heating facilities are not installed and outdoor dining is common.

Sidewalk Dining Is Now Comfortable Even in Winter with the Aid of Stoves and Blankets



*Oberlin*

**SEEDS LIVE FORTY YEARS  
IN DEEP SOIL**

1916

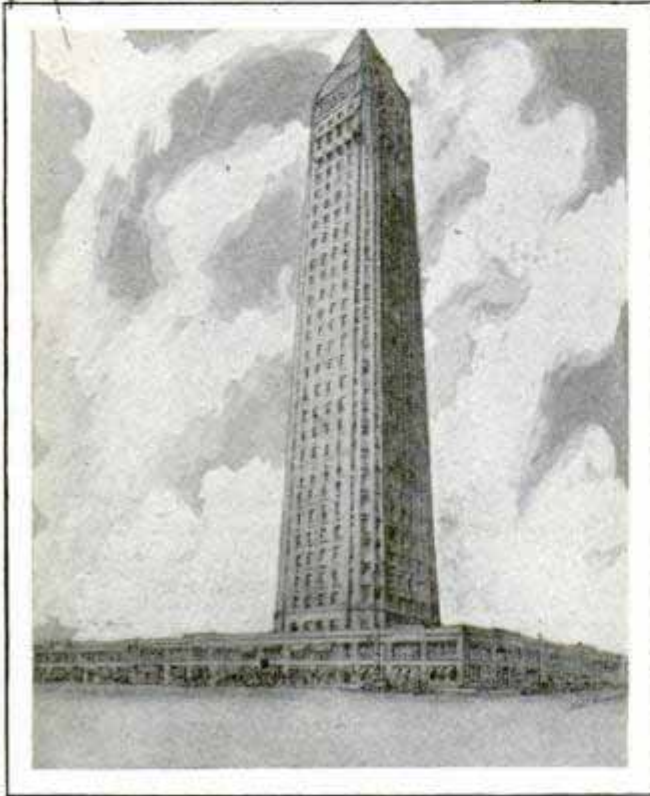
That the seeds of weeds and other plants will grow even though they have been buried forty years, was shown recently by Prof. O. A. Stevens, of the North Dakota agricultural college. Nearly seventy per cent of the seeds of pigweed germinated after this long burial, and about the same results were obtained with the evening primrose. Seeds of some varieties of grass did not grow after five years. The tests showed that there is comparatively little to fear from seeds of weeds buried deeply.

Of the world's volcanoes sixty-five are active.

*State College*



**TALL BUILDING LIKE OBELISK TO GUIDE AVIATORS**



The Foshay Tower in Minneapolis; Unique Office Structure Modeled after the Washington Monument

The Washington monument is said to have been the inspiration for an obelisk-shaped business building now nearing completion in Minneapolis. There are thirty-two stories reaching 450 feet in height, with five stories underground. Two of these will be used as a garage with a storage capacity of 250 cars. At the tip of the building is a wide observation balcony. A radio broadcasting station and an aerial beacon will be installed there.

**MAGIC METAL RESISTS WEAR AND HARDENS IRON**

Aelium, a strange mineral discovered about three years ago, possesses many remarkable qualities that fit it for special service, an expert reports. It fuses lead and copper with any other metal, he declares. It reduces the flowing temperature of molten metals, making possible die-casting and the molding of metals of high melting point into intricate patterns. It increases the tensile strength of iron, steel and other metals, and also increases the capacity of copper and aluminum to carry electric current. One of its most peculiar properties is that, under certain

conditions, it provides a natural film of oil so that other lubrication is not necessary. In fact, Thomas J. Clark, a Utah stockman who discovered it, thought at first that it was an oil shale and was experimenting with it in the belief that it would yield oil. Harry Miller, auto racer, made a shop test with an aelium bearing, running it for four hours at 5,000 revolutions per minute without oil. It was then clamped down and run for twenty-eight hours without heating or shaft injury, according to reports. A bearing in an automobile clutch was run for twenty-four hours under a pressure of 1,500 pounds to the square inch without lubrication and showed no signs of wear. According to engineers, an automobile with bearings of this material would probably need but ten per cent of the oil required on the usual car and burned-out bearings would be practically eliminated.

**GLARE SCREEN ON WINDSHIELD PROMOTES SAFE DRIVING**

To protect the eyes from the glare of approaching headlights, an adjustable shade of transparent material is attached to the windshield. It is also effective against the rays of the sun and is said to promote visibility in fogs. It may be used effectively for shades on the headlights of the same car, to lessen the glare in the eyes of other drivers.



Glare Screen in Place on Windshield, Showing How It Protects the Eyes from Approaching Headlights

*1849*  
*Tests made by Jean & Joris, Los Angeles, Calif. 1833 Wilson, Los Angeles, Calif.*

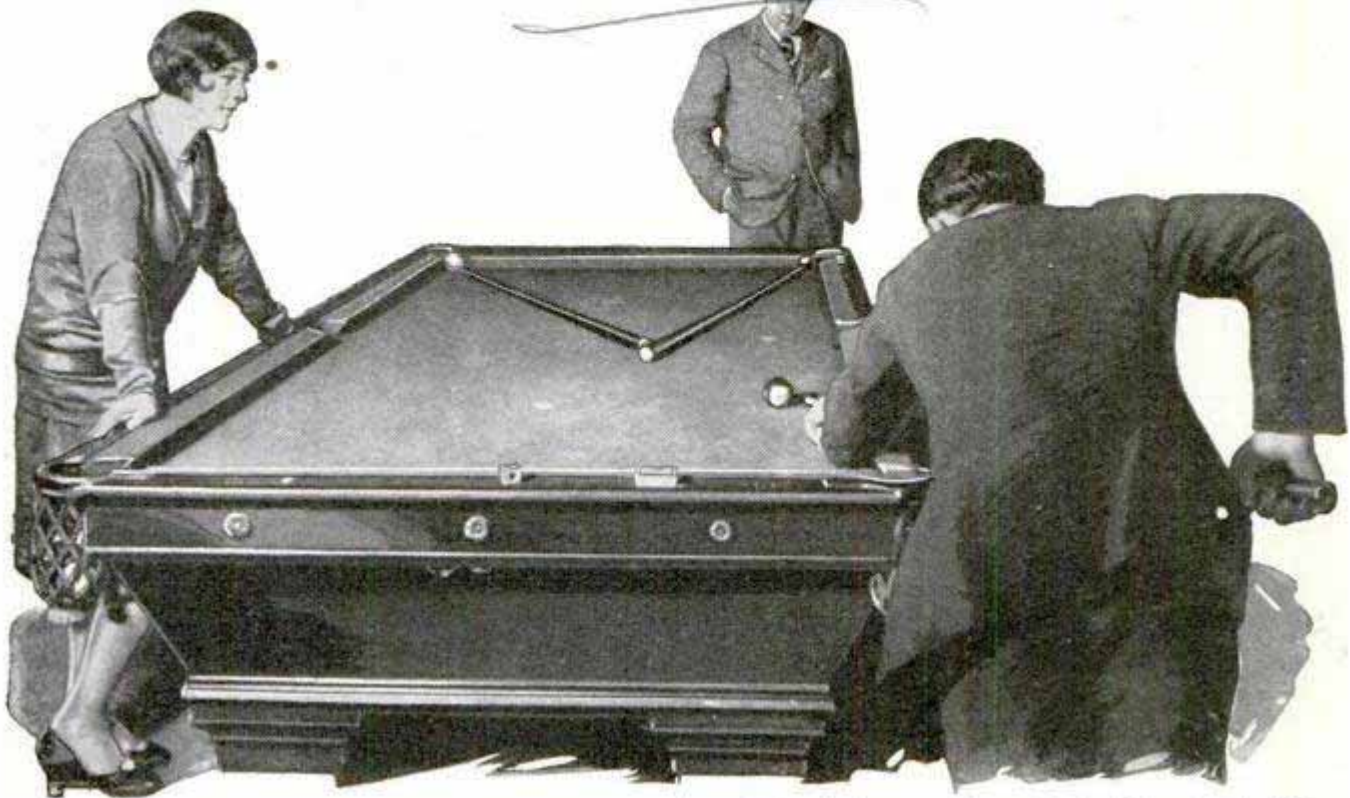
*924*  
*no change*

*Drive with safety*



51 Carhart St  
Marion, Ohio

# Tricks at the Billiard Table



All Three Balls Can Be Pocketed at One Shot by Using a Pair of Cues to Transmit the Blow to the Pair Placed in Front of the End Pockets, the Cue Ball Going to the Side

**P**ERHAPS you can neither shoot a good game of "Kelly," nor run up an imposing string at three-cushion billiards, but it is well within the ability of any person to present a few diverting tricks on the green table.

Such as this: The performer places a ball in the mouths of the two end pockets, and sets his cue ball at the opposite end of the table. The trick is to pocket all three balls in one shot.

A tall order? Not at all! The performer merely places two cues in the position shown and then shoots his cue ball so that it strikes the butt end of the nearest cue. That's all! A trial will show you that the seemingly impossible is quite easy.

Did you ever go rabbit hunting? And laugh a little, cruel as it may seem, at the funny way a shot rabbit flops over when hit? You can demonstrate the same quaint toppling-over effect on the billiard table by shooting a ball into the open end of a heavy, fur-lined

glove, as shown. It is really very funny.

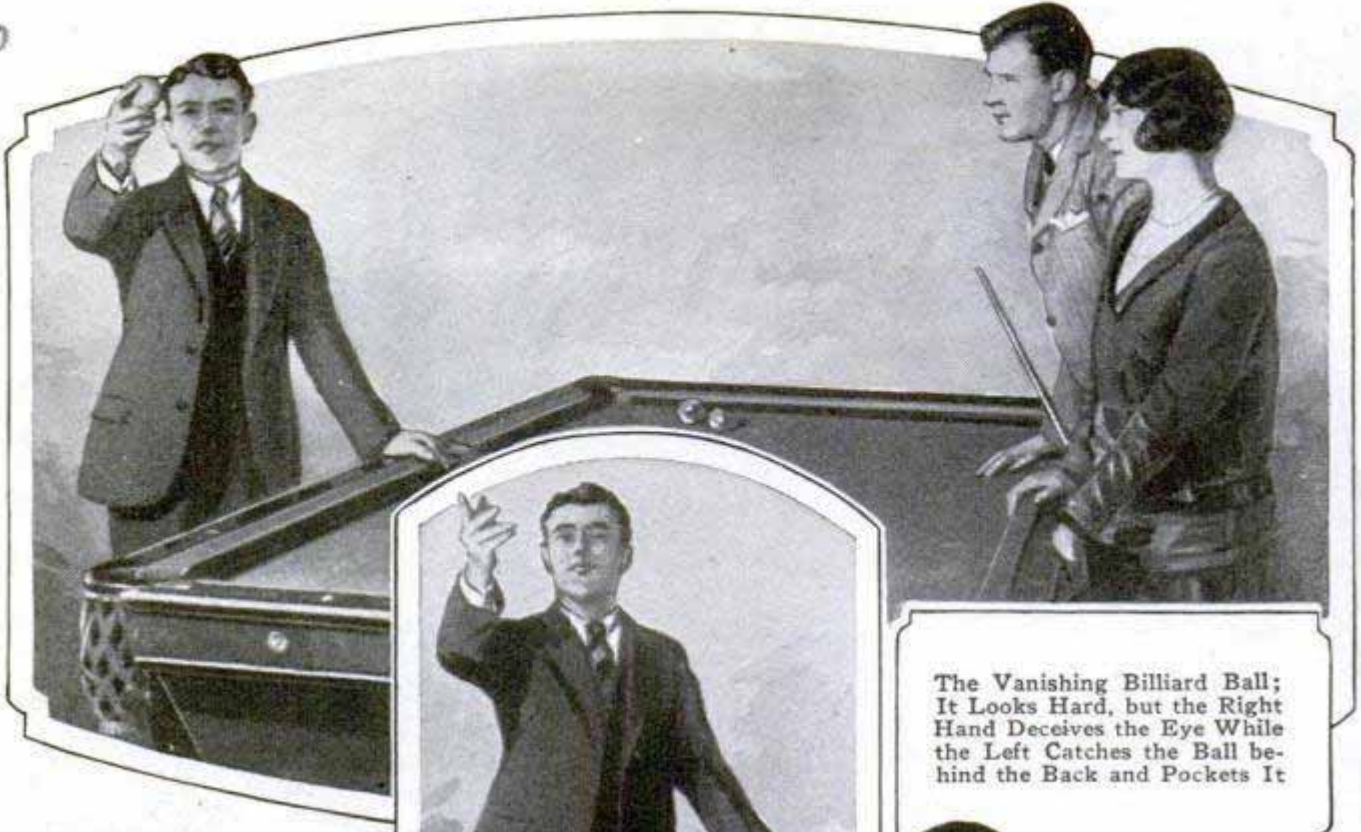
One of the old stand-bys in magic is the sudden disappearance of some object; at the billiard table, the magician does it with a billiard ball. Like this: He takes a ball



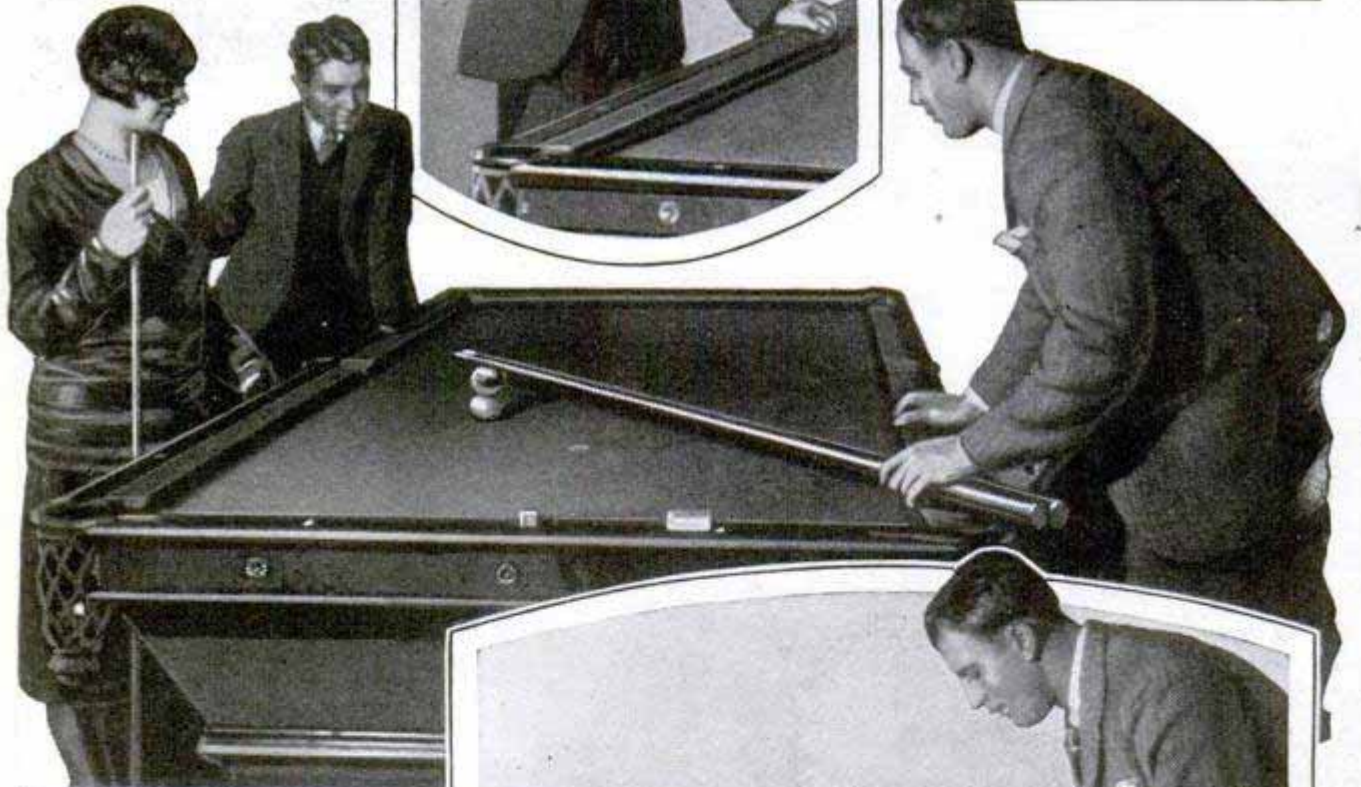
The Imitation of a Shot Rabbit, Done by Shooting the Cue Ball into a Fur-Lined Glove



603



The Vanishing Billiard Ball; It Looks Hard, but the Right Hand Deceives the Eye While the Left Catches the Ball behind the Back and Pockets It



Rolling Two Balls across the Table, One on Top of the Other, Looks Like a Difficult Feat; the Trick Is Accomplished by Using Two Cues to Keep the Top Ball in Position; the Start Is Shown at the Right, and, Above, the Balls Have Almost Reached Their Destination, Propelled by the Force Exerted by Pressing Down on the Pair of Cues





in his right hand, and swings his hand up three times, as illustrated. On the third time, the ball obligingly melts away into thin air.

Of course, the ball didn't really melt. It was merely caught behind the back on the third swing, and the left hand slyly slipped it into the side pocket. Try it! And don't worry about anyone gluing their eyes on your left hand; the misdirection is too powerful.

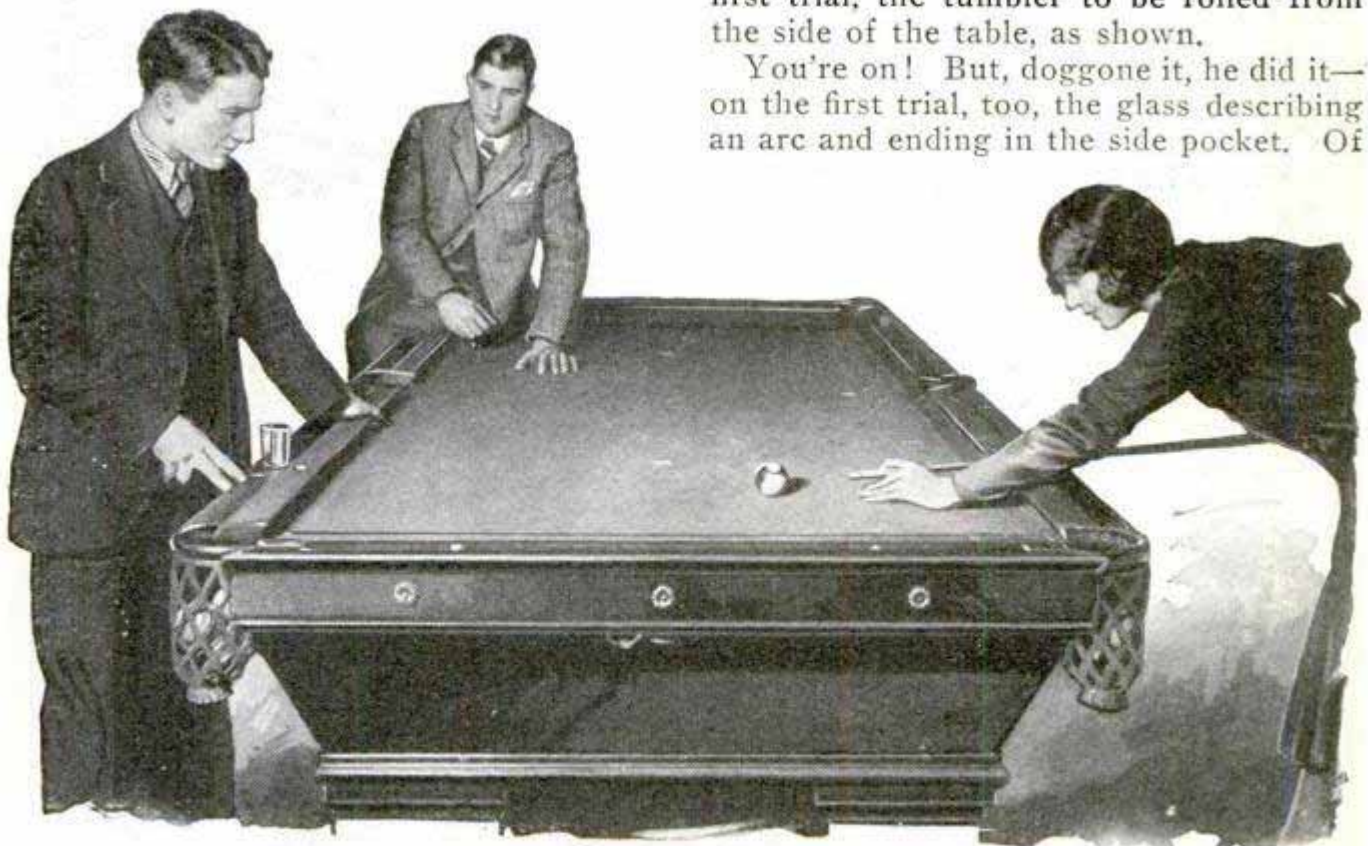
There is a trick, and a good one, too, in which one billiard ball is balanced on top of another. But, here's a better one: The balls are not only balanced but they run the length of the table in their two-high majesty.

You do it with two cues. The picture shows the start of the operation, the balls being held in place until the cues are properly adjusted. Notice that the cues point upward. Now, if you release the balls and press down on the butt ends of the cues, you will demonstrate what appears to be quite a difficult trick—the balls running the full length of the cues in this position.



In the next effect, the performer takes a tumbler, and wagers anyone he can pocket it in the side pocket on the very first trial, the tumbler to be rolled from the side of the table, as shown.

You're on! But, doggone it, he did it—on the first trial, too, the glass describing an arc and ending in the side pocket. Of

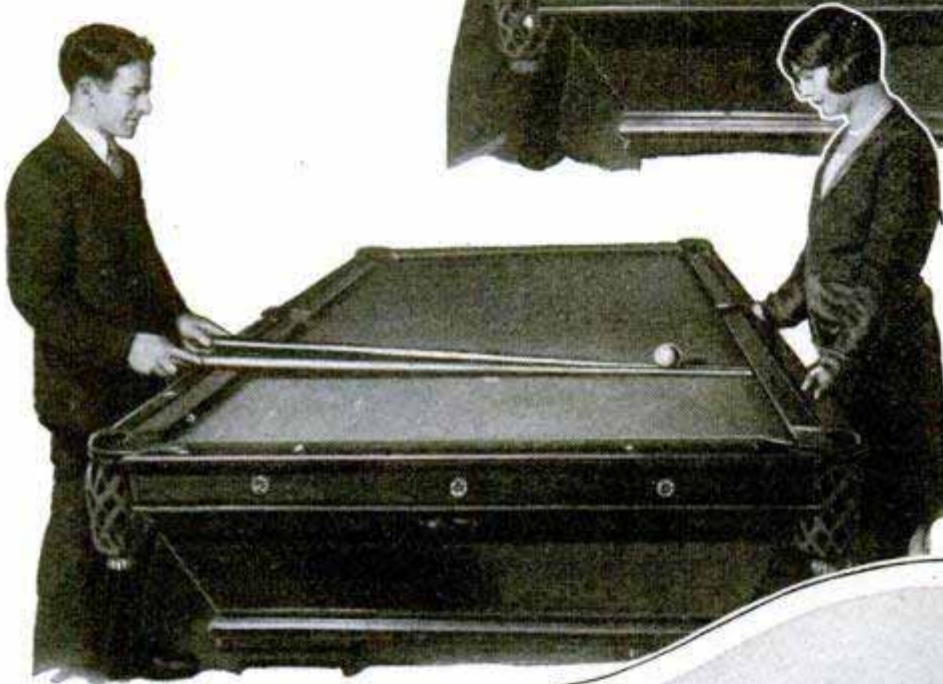


Two Tumbler Tricks; Above, Rolling the Glass into the Pocket, and Below, Pocketing the Dime in the Tumbler by Jarring the Inverted Glass Forward over the Coin



course, no one is supposed to be wise to the preparation, which consists in placing the tumbler in the pocket, and then rolling it up the table and marking the exact spot from which the glass must be started in order to reach the pocket in its curve.

Another excellent trick with the tumbler also is



Making a Ball Run Uphill Looks More Difficult Than It Is; the Ball Is Started by Separating the Butts of the Cues and Squeezing the Tips Together behind the Ivory; When It Gets under Way, the Ends in the Hands Are Suddenly Squeezed Together and the Ball Jumps from Between Them and Rolls up and off the Ends; If the Trick Is Performed Lengthwise of the Table, It Will Be Found Much Easier to Do

illustrated. The tumbler is placed on the ledge of the table, as shown, and a dime is placed on the cushion in front of it. The trick is to pocket the dime in the tumbler. This can be easily done by shooting a ball from the opposite side of the table. The shot must not be too hard, and the ball must strike in a direct line with the dime and tumbler.

Place two cues together, and set a ball on them at the tip end, as shown. The problem is to make the ball run off the butt end of the cues.

It's quite a stunt, even when you're in on the "how." The how consists in separating the cues slightly, until the ball gains momentum, and then closing them sharply so that the ball jumps suddenly forward and rolls off the





2698 & all use  
 Detroit, Mich  
 POPULAR MECHANICS  
 maker not seller;  
 Von Lengerke • Anton  
 471  
 33 S. Wabash  
 Chicago  
 need drawings  
 of food  
 1916

butt ends. By performing the feat lengthwise of the table, and thereby eliminating the extra height caused by the cushion, the problem is greatly simplified

A trick known to our grandfathers, and one which appears to be entirely forgotten by the younger generation, is "The Pressed Ball" The problem is to press a finger down on a ball and make it go the full length of the table. The uninitiated person doing this will send the ball away with too much backspin, and it will only go half the distance, but if you moisten your finger slightly before attempting the feat, it rolls merrily along to the other cushion.

**SPRAY RUN FROM LIGHT SOCKET DEVELOPS EVEN PRESSURE**

For applying lacquers, paints, disinfectants and other liquids, an electric spray gun is operated with current from the house-lighting circuit. The compressor unit is said to develop an even pressure at all times, an essential on many jobs, and it may be carried over the shoulder with a strap or placed on the floor or bench. Only the paint container and the gun itself are held in the hand, so that vibration is reduced and there is less weight to support. The nozzle controls the spray's density.



placed on the floor or bench. Only the paint container and the gun itself are held in the hand, so that vibration is reduced and there is less weight to support. The nozzle controls the spray's density.

**GAS TANK AS AIRPLANE GUIDE HAS FIFTY-THREE LAMPS**

On top of a 418-foot gas tank, recently erected in Chicago, is a tower seventy feet high with several high-powered lights that serve as an airplane beacon. Other lamps, making a total of fifty-three for the entire tank, are provided. They are lighted automatically by an astronomical clock, and a photo-electric device turns them on during the day if fogs or smoke obscure the sun. The tank has a capacity of 20,000,000 cubic feet. It contains 5,500 tons of steel and nearly 2,000,000 rivets. A sign on top points to the landing field.

Review was right



What the Well-Dressed Dog Is Wearing; Kid Boots for All Four Feet and a Handsome Coat

**SUIT AND BOOTS FOR PET DOGS HELP GUARD HEALTH**

Pig-skin boots for all four feet and a slip-on sweater of special pattern have been devised for pet dogs. They keep the animal warm and comfortable.

**SILENT WELDING ON HOSPITAL PROTECTS PATIENTS**

Inmates of a West Virginia hospital were undisturbed although a steel addition to the structure was built recently. Electric-arc welding instead of riveting was the process used, so that practically all noise was eliminated. At one time, the welding was in progress only fifteen feet from an operating table, but the surgeons went on without annoyance.

**SWITCH WITH PILOT LIGHT ALSO HAS OUTLET**

Switch tap, pilot light and electric outlet are combined in a unit adapted to the operation of various appliances, radio, and remote-control lights. The current is controlled by the finger, and the jewel is lighted when it is on.



Harvey Hubbell, Inc

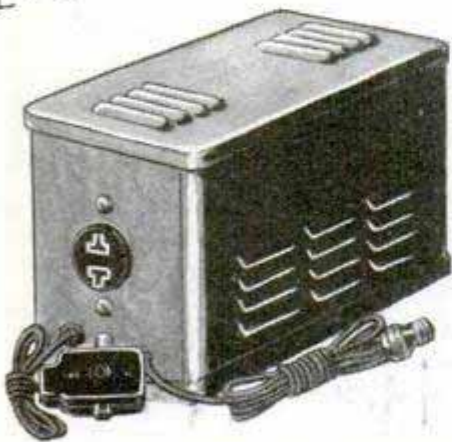
\$7.00 for set of four  
 \$37.50  
 1926  
 1925  
 1892  
 need drawings of food  
 created by J. H. C. Kitchener & Co  
 Wheeling, W. Va.  
 Cleveland, Ohio  
 Welding  
 Supply Electric Co



# Shopping Tips for

854 Blackhawk  
Chicago  
2012 - R. # 5.00

2005 - R. Alkon works here



Above, New Device, for Regulating Line Voltage for A. C. Sets or A and B-Eliminators, Automatically Reduces the Line Voltage If Too High and Increases It If Too Low

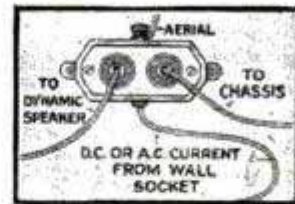
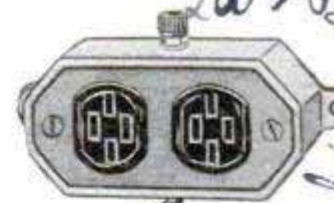


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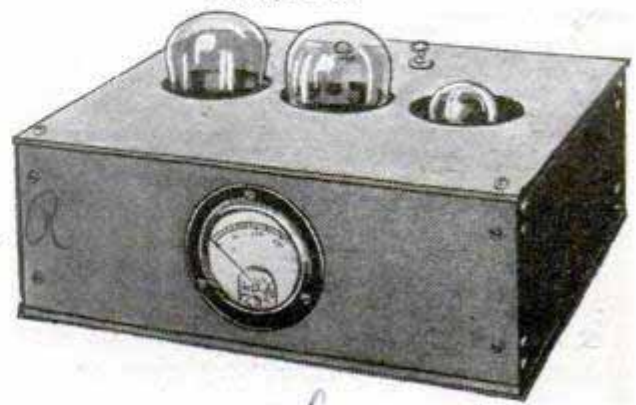
Below, a New and Decidedly, Different Type of Console Radio Cabinet Equipped with Glasses, Decanters and Silver Service; the Cellarette Compartment Is Lined with White Lacquer and the Drop Leaf Is White Enamel on Metal

Left, Dry Rectifier Unit of Plug-In Type, Said to Have Extra-Long Life, Replaces Full-Wave Rectifier Tubes in B-Eliminators; Below, Handy Unit Combines Light-Socket Antenna and Supply Outlets for Dynamic Speaker, Eliminators or A. C. Receiving Sets

Potley Cabinet Co. 1620 Independence Ave.  
 Philadelphia, Pa.



Below, New Push-Pull Amplifier of Excellent Design Can Be Used Equally Well with Radio Receiver or Phonograph Pick-Up; Small Switch Provides Quick Change-Over



Herrenty che.



# Radio Fans



Above, New A-Power Unit of Popular Make Has Improved Filter System Employing Three 1,500 Mfd. Condensers and Improved Choke Coils; It Is Claimed to Be without the Slightest Trace of Hum



Left, Unit of Compact Design Provides Efficient Antenna and Ground Connections as Well as a Means of Controlling Line Voltage; Two Outlets Are Also Furnished for Set and Dynamic Speaker; the Unit Is Well Fused to Prevent Burn-Outs in the Receiver; Right, a Compact Short-Wave Adapter, Now Available for Use with Any Receiver, Covers All Short-Wave Bands without Changing Set Wiring

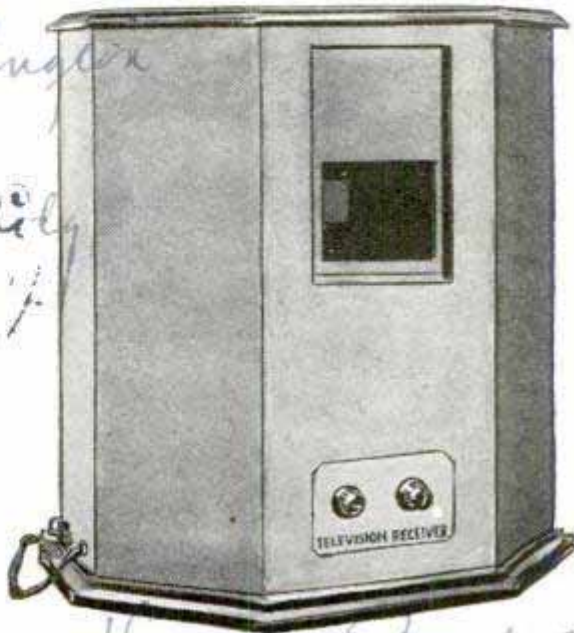
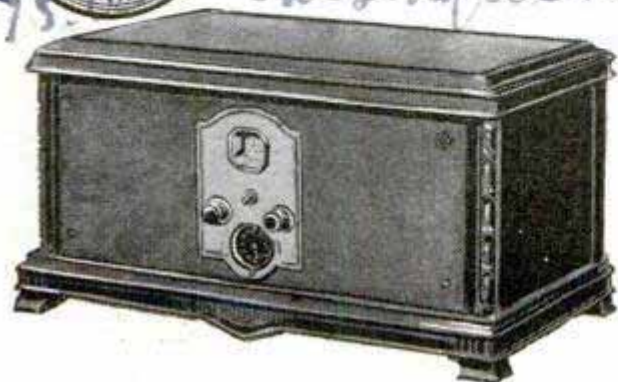


*2008- Raym Co. Dayton*  
*2008- Raym Co. Dayton*  
*2008- Raym Co. Dayton*

Below, Clock Installed in New A. C. Receiver Operates from Light-Socket Current and Automatically Winds Itself Once a Minute; It Keeps Accurate Time



Right, Complete Television Receiver Now Available Is Equipped with Sliding Visor and Combination Scanning Disk for Either 24 36 or 48-Line Pictures

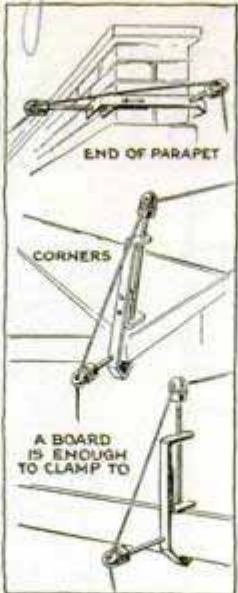
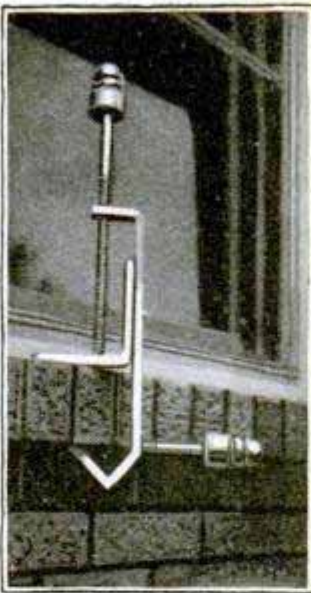
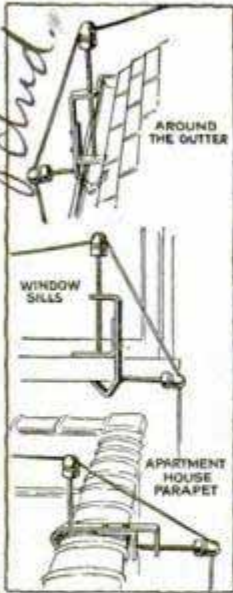


*20060*



*duchana poles. in d*

*Parts Corporation  
733 Virginia Ave. Duchana, Ind.*



Insert Photo Shows Clamp Fastened to Building Near Window for Lead-In

**Clamp for Aerial and Lead-In**

The clamp shown in the illustration replaces unsightly sticks and poles, requires no nailing or bracing and is easily attached and removed. The only tool necessary for its installation is a screwdriver, and the various applications shown in the sketches illustrate its adaptability to all sorts of situations. The threaded shaft is of cadmium-plated rust-proof steel, and the clamp itself is of heavy channel iron similarly plated. Separate lead-in insulators are also available at small cost. These are mounted on short rods which screw into threaded holes provided for them in the clamp. Anyone who has erected antennas will appreciate the handy methods illustrated for running the aerial and lead-in wire around corners, etc.

**Attractive Lamp Forms Antenna**

A pleasing combination of an efficient antenna and a lamp is shown in the illustration. The antenna is of the light-socket type, and the outfit is provided with a length of lamp-cord, for connecting to the house-lighting supply, as well as a binding post, for the antenna connection



to the set. The lamp is useful in checking a.c.-operated radio devices, where it is necessary to turn them off with separate switches, and may be connected in the line as a warning or pilot lamp for this purpose.

**Handy Kink for Set Builders**

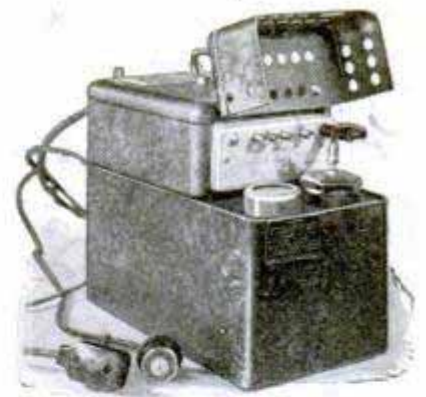
The use of ordinary quilt-frame clamps, for holding paper templates, small wires to be carefully soldered, and other emergencies, where the operator could well use three hands, has solved many difficult situations for the writer. These clamps are cheap and should be of the 2-in. variety.

Corrugate the jaws by making a few shallow cuts with a hacksaw, to prevent shifting of paper templates. Clamps of this type do not mar expensive panels and may be wedged with small blocks of wood.

*2015 R.*

**Compact A. C. Converter**

The compact unit shown in the illustration converts 110-volt 50 to 60-cycle alternating current to 6-volt d.c., and when used with a B-eliminator, combines the convenience of electrical operation with the desirable characteristics of standard d.c. tubes. No changes in tubes or set wiring are required, and the device takes up less room than a 6-volt storage battery.



*Wetzel Co. 514 - 2nd St. - Chicago*

**Heat in Voltage Regulator**

The ordinary regulator used to protect a.c. tubes from excessive line voltage, when plugged into the electric outlet, will often become warm. This is not an indication that the unit is defective; it is a condition to be expected because such devices will dissipate heat, and simply indicates that the unit is doing its work normally.

*Green Bay Wis*

*Abor Co*



# A SCREEN-GRID S.W. ADAPTER

## for YOUR SET



THE LAST few months have witnessed a renewal of interest in short waves, due to the overcrowded long-wave channels, coupled with the fact that television is a field which brings out the advantages of short-wave transmission and reception. A good television transmitter requires a band from 40 to 80 kilocycles wide, which represents from four to eight long-wave broadcasting channels. These cannot be afforded in the broadcast band, so the newer transmitters are working between 30 and 80 meters. The short waves are valuable, because "side-band cutting," with consequent loss of picture definition, is less severe. The width of the side bands is determined by the number of "dots" sent for each picture and the number of complete pictures per second. The definition of the picture will depend on the number of dots to each picture and the continuity or smoothness of motion on the number of complete pictures sent every second. High-quality transmitters have side bands 40 or more kilocycles wide, and future circuits especially designed for television reception must eventually tune uniformly to this wide frequency band.

The best method of doing this will be in the use of r.f. circuits of the band-selector type, with regeneration used sparingly or not at all.

However, the widest interest in short waves at the present time is confined to the excellent programs transmitted by twenty or more stations in the United States and a much larger group employ-

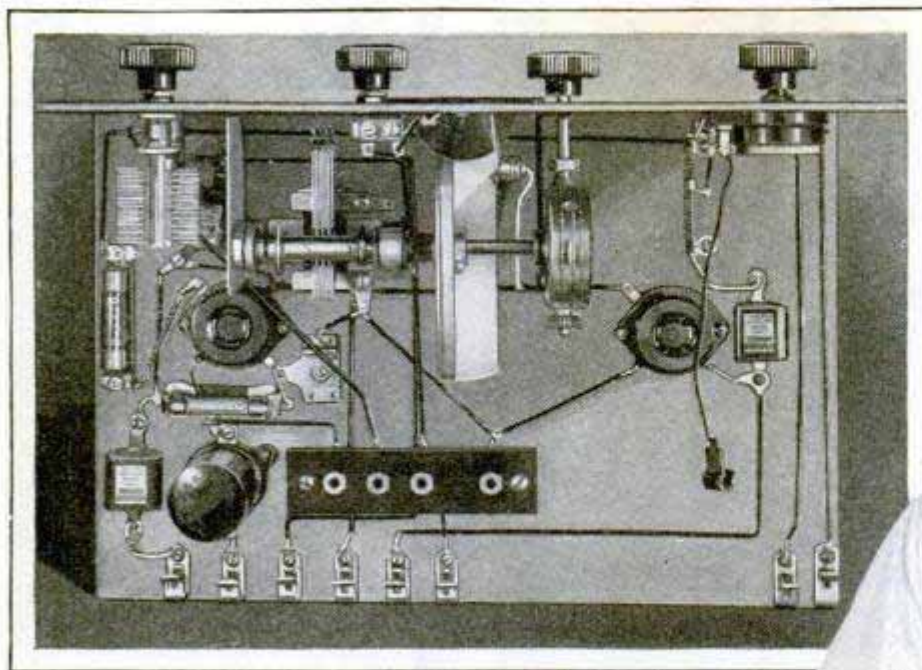
ing code. The simple adapter described in this article is suitable for all three types of reception, but is not especially designed for television, as a compromise must be made in this case.

Byrd's expedition to the south pole; the flight of the "Southern Cross" to Australia, and similar instances, where short waves have enabled a transmission link with civilization, show the value of these short wavelengths.

Great progress has been made with short-wave apparatus. Further advancement in the ultra-short wave bands, below 5 meters, is limited, since the lower end of the ultra-short band merges with the upper end of the heat-wave band, although electrical oscillations have been produced which are near the border line. Short-wave transmitters costing only some thousand dollars have in many instances replaced long-wave transmitters costing hundreds of thousands of dollars. They are not only less expensive and much more compact, but they provide reliable communication over enormous distances and during daylight hours when consistent operation on long waves is ordinarily difficult.

The trend of short-wave receiver design follows closely that of broadcast receivers, and the development of satisfactory short-wave receivers and adapters has been greatly advanced by the new screen-grid tubes, which were used experimentally in short-wave transatlantic reception for over a year before they appeared on the market.

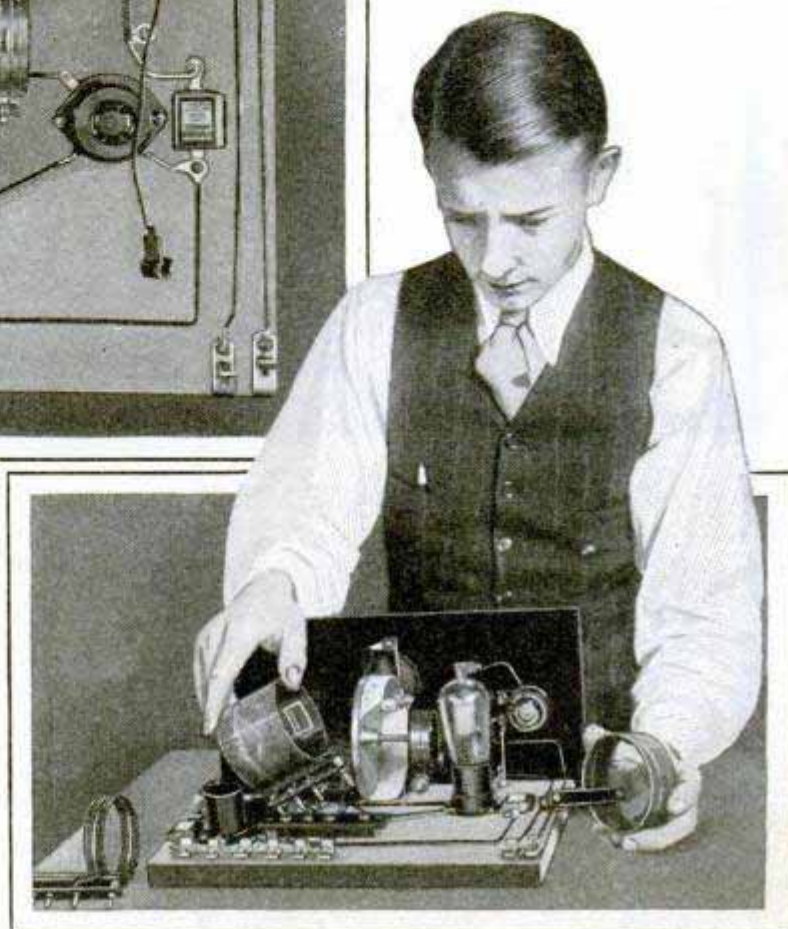




The two-tube adapter described and illustrated in this article employs the screen-grid tube, and greatly increases r.f. amplification without complicating the operation in any way. In fact, the operation is actually improved over that of the standard broadcast receiver, because the regenerative detector is not directly coupled to the antenna, and the antenna coupling does not have to be varied to prevent "dead spots." An adapter of this type does not re-radiate, as the screen-grid tube acts as a "blocking tube" and prevents direct radiation into the antenna. Some years ago, when oscillating receivers became numerous, there was a crusade against them. The necessity for a similar crusade can be eliminated by the use of circuits employing the screen-grid tube.

The model illustrated in this article was built and tested in Popular Mechanics radio laboratory and brought in eastern short-wave television and voice broadcasts with loud-speaker volume during the daylight hours. Reception at night included short-wave stations in all parts of the United States at good loud-speaker volume. These tests were made with the adapter plugged into a standard broadcast receiver. The detector tube in the receiver is transferred to the adapter, and the adapter plug is then plugged into the detector socket in the set. All tuning is done with the adapter-unit dial, as noth-

ing but the audio amplifier in the broadcast set is in use. A schematic diagram for a two-stage audio-frequency amplifier is given for those who



wish to include the amplifier with the tuner instead of using it in combination with the standard receiver. The terminal marked "plate lead" is connected to the binding post which goes to the r.f. choke, and the B-positive terminal is connected to the 45-volt tap of the B-battery. Any high quality a.f. transformers may be used. The first jack is for the use of headphones, and the output jack for the loud speaker.

The construction of the adapter unit is very simple, as shown in the simplified wiring diagram. The front panel is 7 by 14 in. and the wood baseboard  $\frac{3}{4}$  by  $8\frac{3}{4}$  by 13 in. Solder every connection carefully, as perfect electrical and mechanical connections are absolutely necessary in short-wave adapters and receivers. See that the small setscrew on the 100-mmfd. condenser is tightened so as to give a good wiping contact for the rotor. The wiring in short-wave receivers deserves more attention than is accorded it in broadcast receivers. All leads should be as short and



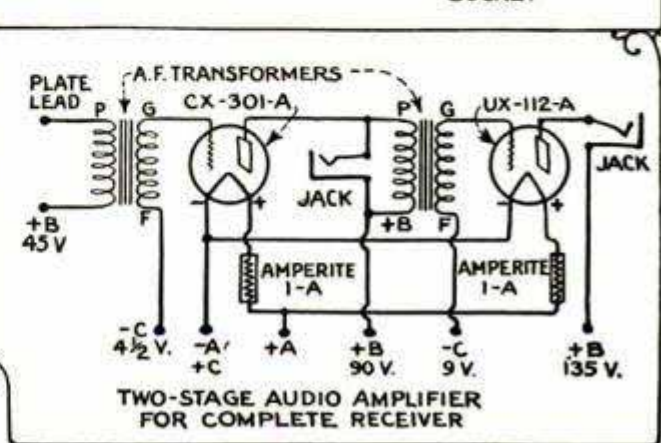
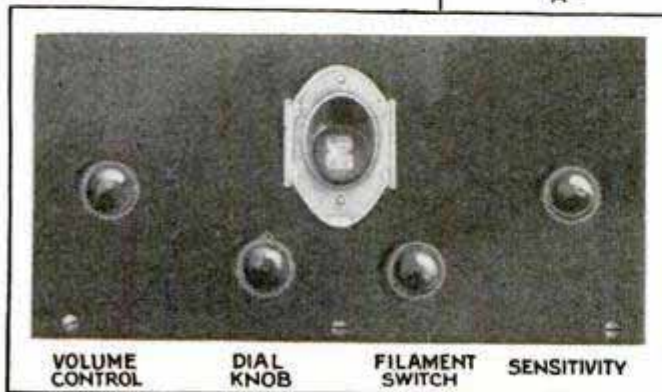
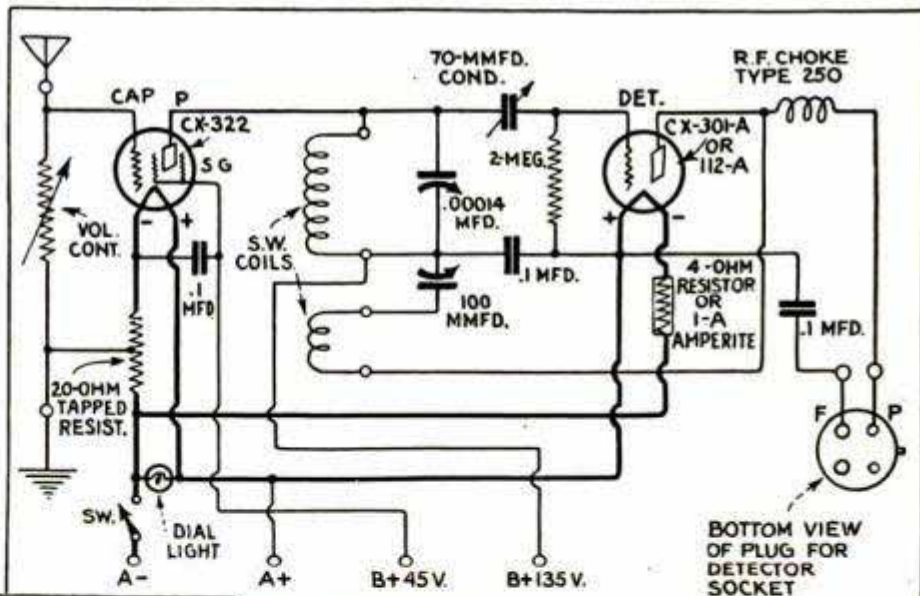
direct as possible, that is, bee-line wiring should be used. Wires carrying r.f. current should cross at right angles and should clear each other as much as possible. A slight increase in lead length may be permitted to make this possible. Capacities between the grid and plate circuits are especially important and should be reduced to an absolute minimum.

Batteries are recommended because of the high sensitivity of the adapter, although it may also be used with sets having an A and B-eliminator by disconnecting the detector-supply lead (positive 45 or 67) from the set and connecting a small 45-volt B-battery in its place. The B-battery 45-volt positive terminal should go to the receiving set and the negative terminal to the B-negative binding post on the set.

Complete a.c. operation of short-wave receivers and adapters has not been found altogether satisfactory, owing to the fact that the B-eliminator introduces extraneous noises on short waves. If the receiver employs a.c. tubes, four separate No. 6 dry cells, connected in series, with a 301-A or 112-A detector, are recommended for filament supply. Where a two-stage power-pack type of amplifier is available, it is a simple matter to arrange a switch to throw the input of the first transformer from the detector of the broadcast receiver to the detector of the short-wave receiver. If the adapter is to be used in connection with a superheterodyne, it should be plugged

into the first-detector socket and the oscillator tube in the superheterodyne must be removed; the converter is then made to oscillate and is operated in this condition. Where the intermediate frequency is high, above 150 kilocycles, the adapter will work better when plugged into the second detector and operated in the usual manner.

The A-battery leads should be permanently connected to the adapter unit; if the a.f. amplifier is combined with the adapter, making a complete receiver, the A-positive leads should be connected direct to the A-battery positive terminal and the set side of the battery switch so that this switch turns off all tubes. Ordinarily 112-A detector and screen-grid r.f. tubes are recommended for short-wave receivers. The 112-A is more sensitive and is a stable oscillator. The 301-A is almost as satisfactory as a detector and may be used when the effective input capacity must be low; for example, when working at the minimum wavelength of the circuit. The 200-A detector tube is very sensitive but noisy. A 199 tube may









# Making Short-Wave Coils

By L. B. ROBBINS

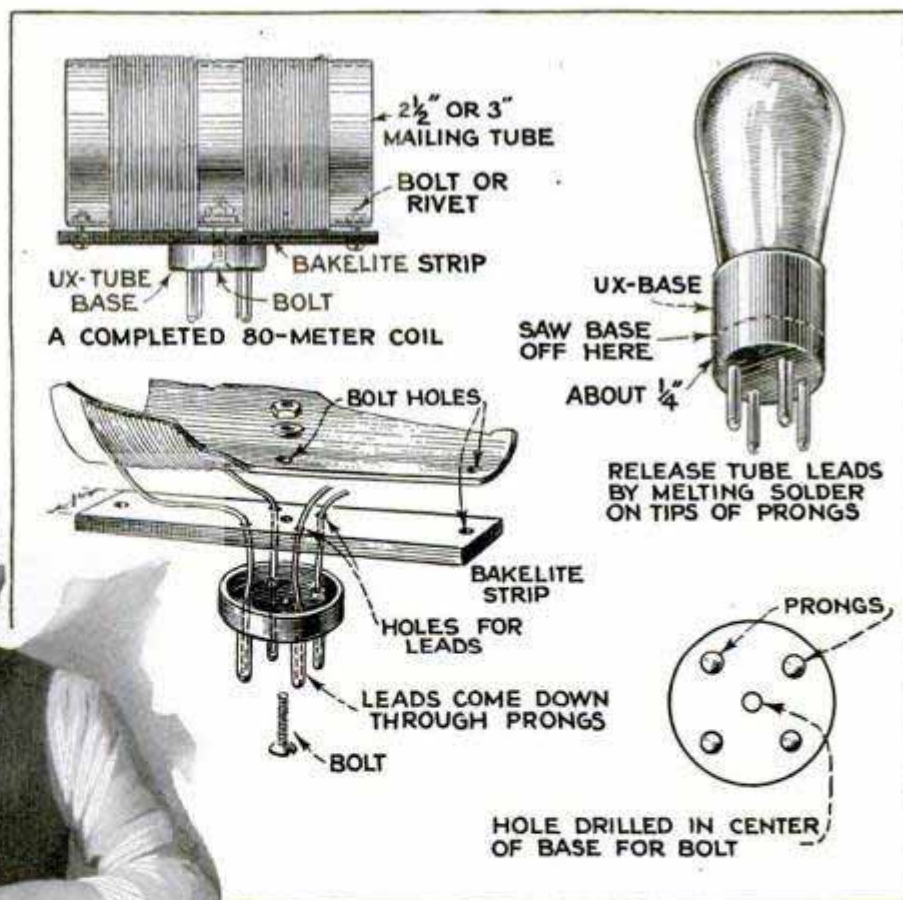
THE INTERESTING programs now available on the short waves have created a demand for short-wave sets and adapters, which are not expensive and are quickly assembled. Suitable short-wave coils can be purchased for from \$5 to \$10 a set, but many experimenters would like to make their own if the data for their construction were available. The purpose of this article is to show the reader how to make a good set of short-wave coils of the plug-in type to be used with standard-tube sockets, suitable for covering the 150, 80, 40 and 20-meter bands at a minimum cost.

The materials required consist of the following items: some stiff cardboard mailing tubes, 3 in. in diameter; a few strips of bakelite, 8 in. wide; four UX-tube bases from burned-out or discarded tubes; a small bottle of orange shellac, a ¼-lb. spool of No. 18 enameled-copper wire, and an assortment of machine screws and nuts.

As these coils are designed with a fixed secondary and tickler, each pair is to be wound on a single piece of tubing and their terminals connected to the four prongs of a single tube base, as shown in the sketch.

The tube for the 150-meter coil should be 4 in. long; for the 80-meter coil, 3½ in. long, and for the 20 and 40-meter coils, 2½ in. The mechanical construction is so clearly shown in the diagrams that little further comment is necessary. The coils (secondary at the left and tickler at the right) must both be wound in the same direction, the turns being spaced ⅛ in. apart, and the space between the coils should be about ¾ in. Punch a pair of holes in the tubing at the start and finish of each coil and thread the wire through them to hold the winding. The ends of the coils are then brought down through small holes drilled in the bakelite strip, as shown.

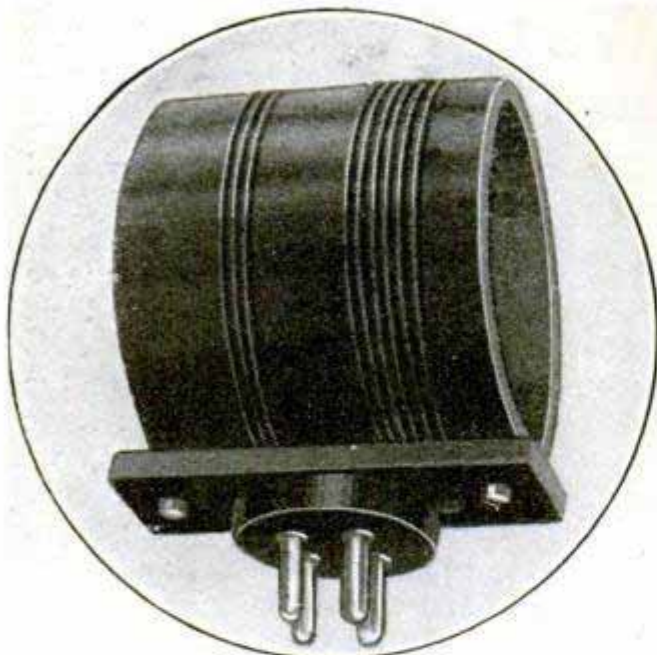
To prepare the four prong bases cut the tube base off with a hacksaw, severing the wire leads at the same time. The leads may then be removed from the prongs by



heating the tips of the latter with a soldering iron. Drill out the prongs and also drill and countersink a ⅛-in. hole in the center of each base.

Each pair of coils will cover a range





Completed 20-Meter Coil

well above and below the band for which they are designed. If an adjustable primary coil is to be used in the circuit employed, one size only is required, and this may consist of 10 turns of No. 26 double-silk-covered wire wound on a tube  $2\frac{3}{4}$  in. in diameter. A variable high resistance may be used across the antenna and ground posts, eliminating the primary coil.

Using .00025-mfd. variable condensers in the circuit, the following number of turns will be found about right for the various short-wave bands: for 20 meters, secondary 3 turns, tickler 6 turns; for 40 meters, secondary 7 to 8 turns, tickler 9 to 10 turns; for 80 meters, secondary 15 turns, tickler 10 turns; and for 150 meters, secondary 25 turns and tickler 20 turns. For smaller condensers, use one or two more turns in the secondary depending upon the total number used. No change is required in the tickler coils or the primary coil.

When using the coils, the idea is to get a number of turns in the secondary that will place the middle of the band somewhere near the middle of the condenser setting for best results.

### Correct Coupling for Receiver

The degree of coupling between the primary and secondary coils in a receiver should be carefully adjusted in order to obtain both sensitivity and selectivity. Because of varying local conditions, the distance between these two inductances will not be the same in every receiver. For

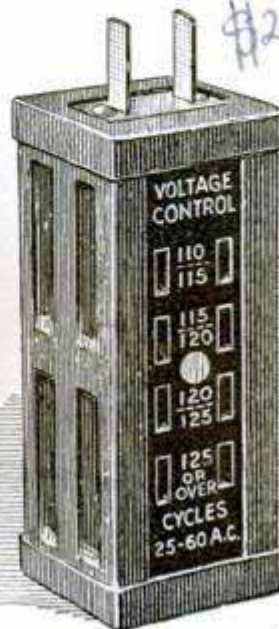
this reason, a little experimenting is necessary. If the coupling is too tight, the local stations will cover a large part of the tuning dial, or even be heard faintly over the entire dial, being present as a disagreeable background while distant broadcasters are tuned in. If the coupling is too loose, distant stations will be eliminated. Because of the extreme weakness of the signals, they cannot be transferred to the secondary coil. In the case of the local station, the oscillations are so strong they easily induce a current into the secondary, even when the two circuits are not in resonance. There is a critical degree of coupling between the two extremes which will not eliminate the weak stations but will sharpen the tuning of the locals, so that the former stations may be received. To find this critical value, tune in a distant station, one that is found near 50 on the dial, and slowly move the primary away from the secondary. At the point where the station begins to fade out, securely fasten the primary in place. It may be necessary to retune the set during this operation.

2014-02

### Unit Protects A. C. Tubes

A simple voltage-control device for protecting a.c. tubes from high line voltage is now available. The need for such a device in some localities where the supply voltage is often as high as 130 volts is very real, as the life of a.c. tubes is very short in such cases, regardless of the type of filament transformer employed in the receiver.

No tools are required to install the unit, which is simply plugged into any convenient outlet. The local power company will advise the user as to the maximum line voltage in the locality. The a.c. set is then plugged into



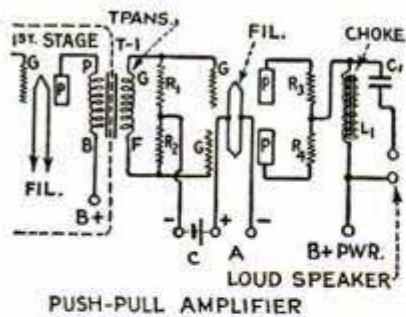
Master Engineering Co



the outlet marked to correspond with that voltage and thereafter requires no further attention. A.c. tubes such as the 226 and 227-types must not be operated above their rated filament specifications and may be further protected by means of suitable filament ballasts in the line to each tube.

**Push-Pull Amplifier Kink**

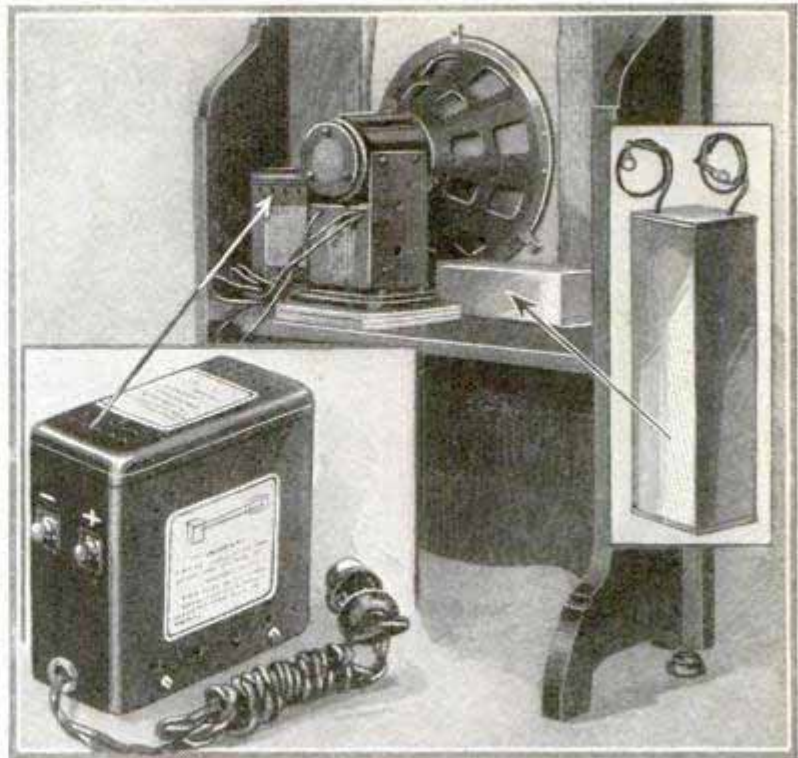
If you are one of the many who would like to try out push-pull amplification, the idea illustrated in the circuit diagram is an economical method of changing the old a.f. transformer so that it will serve the purpose. This form of amplification has many advantages, especially in the output stage, and will be found in many of the latest sets. Bridge the secondary of the first a.f. transformer with two 100,000-ohm resistances as shown at  $R_1$  and  $R_2$ ; these provide a means of finding the center tap, or zero point, of the a.c. voltage in the secondary winding of the transformer  $T_1$ . This point is necessary for the application of the negative bias to each tube. Resistances  $R_3$  and  $R_4$  are each of the 50,000-ohm heavy-duty type, ordinary grid resistors being unsuitable because they will not pass the necessary current for the correct operation of the tubes. The B-battery is led



to the center point formed by these two resistances through an impedance  $L_1$ , which may consist of the primary of an old trans-

former or a standard 30-henry choke. This choke and the 2-mfd. condenser  $C_1$  act as a coupling impedance or output filter which keeps the B-supply out of the speaker winding. Two of the 171-type tubes are advised, the results being faithful reproduction and better volume.

☐ Popular Mechanics' radio department offers its information service free to all readers of our magazine.



Above, Complete Installation in Small Space; Lower Left, Dry Trickle-Charger Unit; Insert, Right, 1,500-Ohm Condenser

**Battery-Operated Dynamic Speaker Converted to Power**

Alternating-current operation for the dynamic speaker of the 6-volt battery-operated type is a simple matter for those who wish to eliminate the storage battery. The illustration shows a dynamic speaker arranged for operation directly from the a.c. 110-volt, 60-cycle line. As the drain of a speaker of this type is only .6 amp., a dry trickle charger is used to supply the necessary d.c. current. This unit is shown at the lower left, and the reader will note that the polarity is carefully marked. It is very important that the red cord from the speaker unit be connected to the positive terminal of the trickle charger. The condenser, shown in the insert, is one of the new low-voltage high-capacity types rated at 1,500 mfd. It is connected directly across the positive and negative posts of the charger unit and effectually reduces the a.c. hum to a minimum. These units take up little space and will work satisfactorily with any of the dynamic speakers designed for 6-volt d.c. operation. With some makes of speakers, it has been found that filament-control units in series shunted across the output terminals of the trickle charger, can be used instead of the condenser. This is, in fact, an experiment, but is worth trying.

*Edison Works*



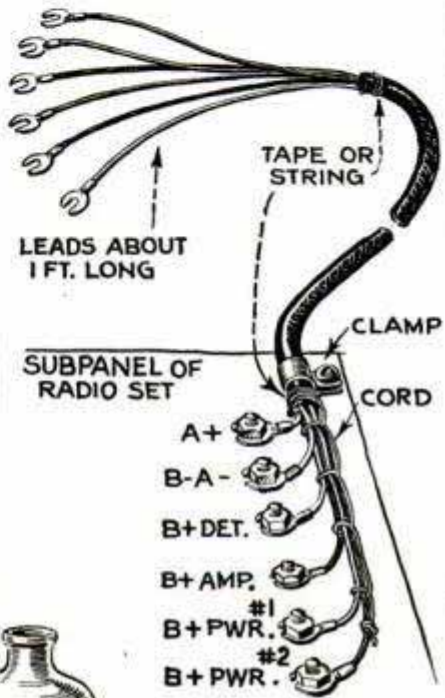
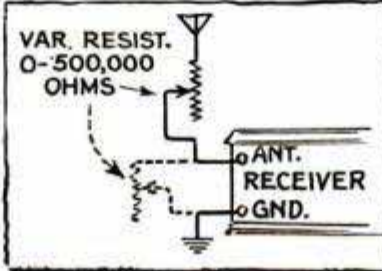
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480 Lexington Ave  
New York

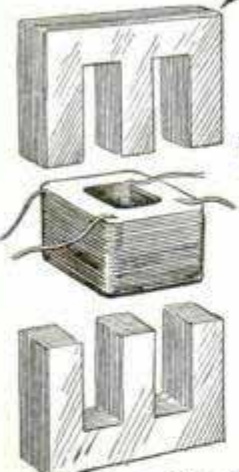
# Hints from the



A Small Variable Resistor Provides a Simple Means for Controlling Speaker Volume and Sensitivity When Connected Either in Series with the Antenna or across the Antenna and Ground, as Shown in the Sketch at Right



CORE STAMPINGS



PRIMARY AND SECONDARY WINDINGS

Secondary Winding of Audio Transformer May Be Used as R. F. Choke; Remove Core Laminations, Cap with Bakelite and Mount with Long Machine Screw as Shown

BAKELITE TUBE



SECONDARY

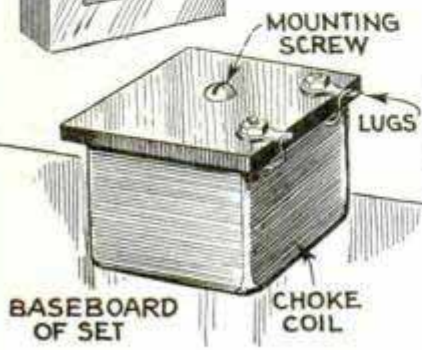
SHEET OF PAPER

PRIMARY



Right, Front View of Dynamic Speaker Baffle, Rear View of Which Is Shown on Opposite Page

Machine Screws Make Inexpensive Binding Posts; Left, Low-Loss Primary Coil for R. F. Transformer Is Wound on Bottle of Size to Fit Inside Secondary at Filament End, 15 to 20 Turns No. 28 S. C. Wire Being Used; Coil Is Painted with Collodion before Being Removed



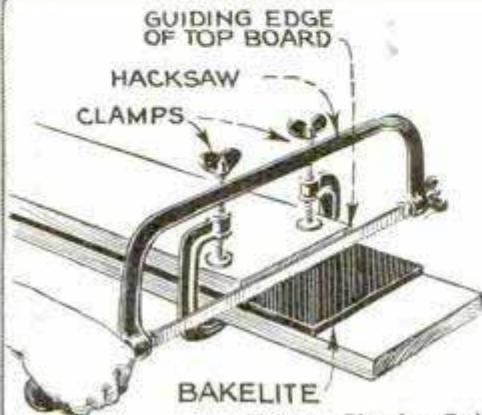
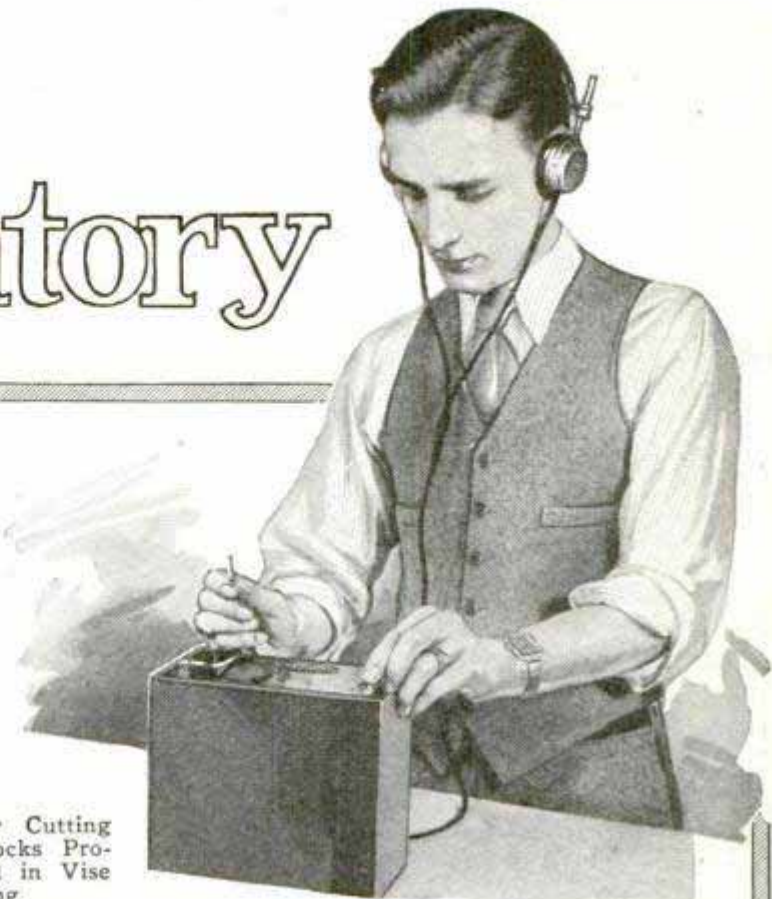
BASEBOARD OF SET

CHOKE COIL

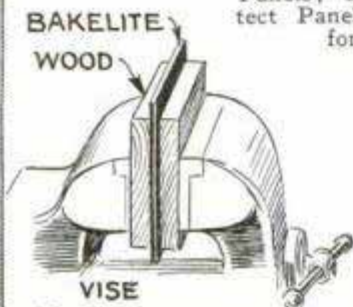




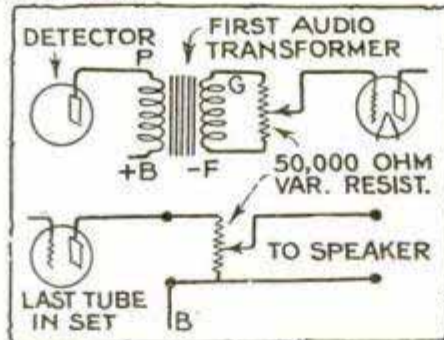
# Radio Laboratory



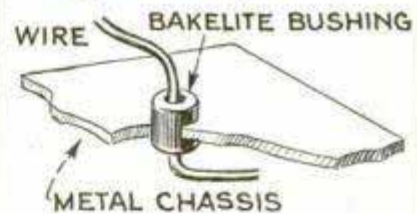
Above, Simple Guide for Cutting Panels; Below, Wood Blocks Protect Panel When Clamped in Vise for Drilling or Filing



Right, Two Simple Methods of Controlling Receiver Volume

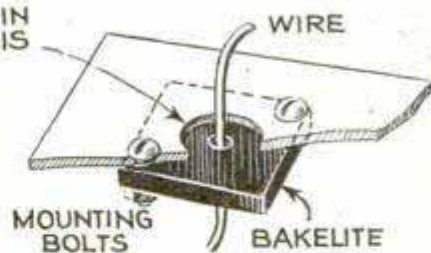


In Testing for Noisy B-Battery, Connect One Phone Tip, Hold the Other and Touch Opposite Battery Terminal

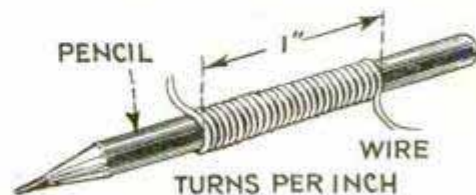


HOLE IN CHASSIS

Left, Rear View of Dynamic-Speaker Arrangement Suitable for Small Theaters; the Baffle is About 4 Ft. Square and May Be Made of Celotex; Smaller Single Speakers Give Excellent Results in Home



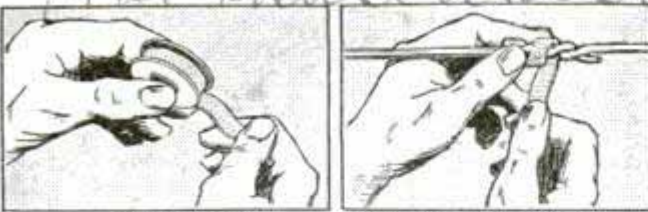
Above, Two Simple Kinks of Insulating Leads Passing through Metal Chassis of Receiver



Above, a Quick Method of Determining the Number of Turns of Wire per Inch for Any Coil; Wind the Wire Selected on a Pencil and Check the Distance with a Ruler, Then Count the Turns

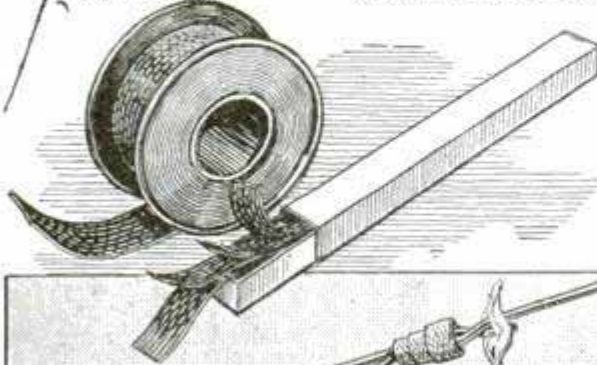






TEAR OFF SMALL STRIP

WRAP THE STRIP AROUND THE SPLICE



THEN APPLY HEAT NEAR BUT NOT ON THE TAPE SOLDER

The Successive Steps in Using the New Tape Solder Illustrate Its Handiness and Freedom from Waste

### Handy Solder in Tape Form

A solder in tape form has recently made its appearance on the market, and is available in 60-in. rolls and also in packages containing five 5-in. strips. No iron or torch is necessary, as the heat from a match or cigar lighter will make a good soldered connection. There is no waste in solder of this type, as just enough is torn off for each job. It is claimed to be non-corrosive and is, therefore, ideal for radio purposes.

### Regeneration Necessary for DX

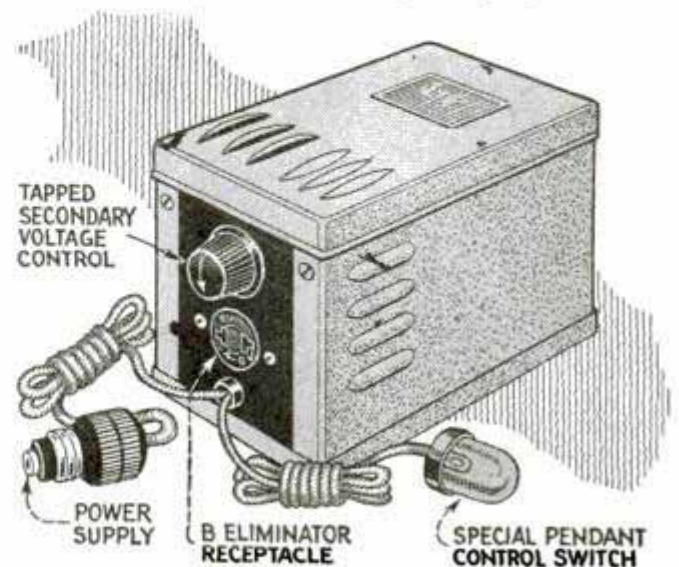
Real DX-results are only possible when some form of regeneration is employed. Care must be taken, however, in order not to interfere with the pleasure of others in the vicinity. The real DX-fan ordinarily listens in after everyone has gone to bed and knows how much regeneration he can use without creating a miniature broadcasting station. Regeneration may be obtained in various ways, and as the modern r.f. circuit is invariably equipped with some means for stabilizing to prevent regeneration, this device can be easily located and temporarily altered for DX-reception. This will permit regeneration to approach maximum sensitivity and is easily kept under control.

### Cutting Down Resistance Stages

The usual practice of using three stages of resistance-coupled amplification was necessary to obtain the same result as with two stages of the transformer-coupled type. The third stage may be omitted if high- $\mu$  tubes, known as the CX-340 type, are employed. The higher amplification factor of this tube makes up for the lack of step-up in resistance coupling and provides just as much volume as two stages of transformer-coupled amplification.

### New Combination A-Supply

A new A-supply unit supplies up to 2½ amp. of current, which is sufficient to operate ten ¼-amp. tubes. Power tubes, such as the 171 or 112-type, drawing ½ amp. each, must be counted as two of the ¼-amp. tubes. The unit eliminates the 6-volt storage battery for the operation of practically any set employing standard d.c. tubes, making possible light-socket operation of the entire set if a B-eliminator is used. A receptacle is provided for plugging in the B-eliminator, and the entire power supply to the set is then controlled by the small pendant switch shown. A tap switch is provided in order to meet the requirements of the set and the voltage conditions in various localities. This switch is set at the lowest point at which normal reception is obtained. Only two units of this A-supply device can possibly be affected by prolonged heavy duty, the rectifier and condensers, which are easily replaced even by a novice. The unit is complete and ready to plug in.



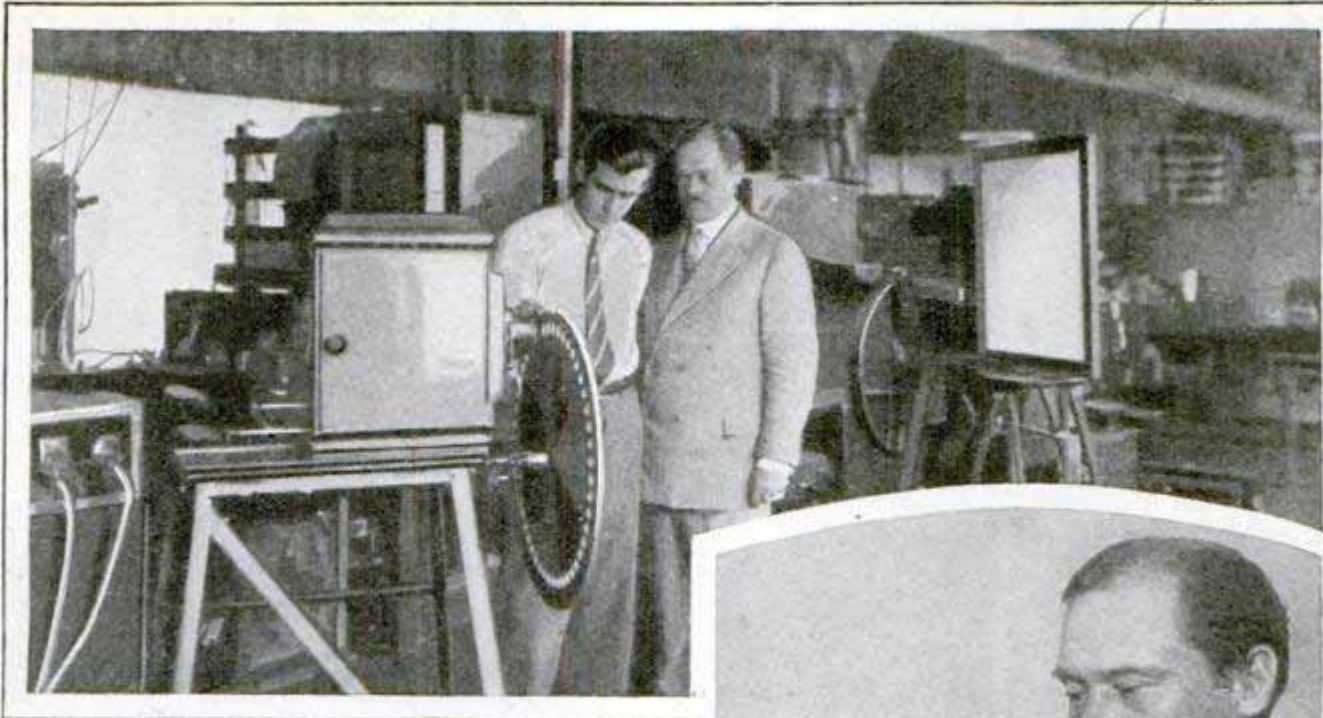
A-Eliminator Housed in Well-Ventilated Container, Showing the Various Controls

+ Radio Corp.  
 142+ Laurel Street  
 Campbell mfg Co. St. Louis Mo.  
 60-in. 2 spools - 50 cents  
 25-in. in strips, 25 cent  
 3961 Alvic

*John Deutschmann*



229 W. 43rd  
New York



Laboratory Installation Showing the Projector and Disk at the Left and the Screen at the Right; Right, Doctor Alexanderson with the Filament and Tube Used in the Television Apparatus

### Projecting Television Pictures

Television pictures projected on a screen by Dr. Ernest F. W. Alexanderson, of the General Electric company, in recent public demonstrations show a rapid advance in the new art. The screen employed is similar to that used for home movies and the pictures are remarkably clear, with good half-tone definition. The projector includes a disk with 48 lenses, and the picture or image is thrown through a ground-glass screen. One of the projectors was demonstrated at the last radio show in New York City, where sound and pictures were synchronized with satisfactory results considering the experimental nature of the apparatus. The results are far in advance of similar television demonstrations where the picture is only about  $1\frac{1}{2}$  in. square, and the rapid progress made within the past year promises an early solution of many of the problems involved.

### Improving Tone Quality

The common practice of supplying all the tubes in a receiver from the same B-battery or eliminator is not by any means the ideal arrangement from the standpoint of tone production. A separate B-supply for the audio tubes will prevent much distortion and also reduce the trouble experi-



enced as motorboating. This is not a new idea, but the cost of an extra B-supply has discouraged its adoption in the past. In the present day of combined audio amplifiers and high-voltage B-eliminators, the objection against a separate B-supply for r.f. and detector tubes has not so much point, and a simple eliminator for this purpose can be built at low cost, or B-battery units can be employed.

☐ When making alterations in a receiver, it is always best to remove the tubes first.



Sharon, E. A.

# From Sputter-Spatter

NEARLY 4,000 outboard motorboat races were held last year in North America, and more than half a million skippers piloted some kind of outboard craft on our inland and coastal waters. Young and old have "outboarditis"—a disease which rages by reason of the many recent developments in hull and marine-engine building.

In the slang of our most active navigators, an "outboard" is any boat from seven

boards travel across this and other countries on or trailing behind motor cars so argonauts of the automobile may pause and navigate on casual water. Motorists thus tour by land and water alternately and find the water not quite so crowded



to seventeen or even twenty feet in length to the stern of which is clamped a light gasoline engine, propeller shaft and propeller—the pushing power. This power plant is one unit which can be easily attached, detached and lifted by one individual. Hence it is a "portable."

Because this small boat and power plant form the most convenient and economical combination for aquatic sport, outboards speed over the surface of almost every bay, sound, lake, pond, canal, river and creek in this country and astonish the heathen occasionally. Thousands of out-

as the road. But dyed-in-the-wool outboarders are the maddest of racing fans.

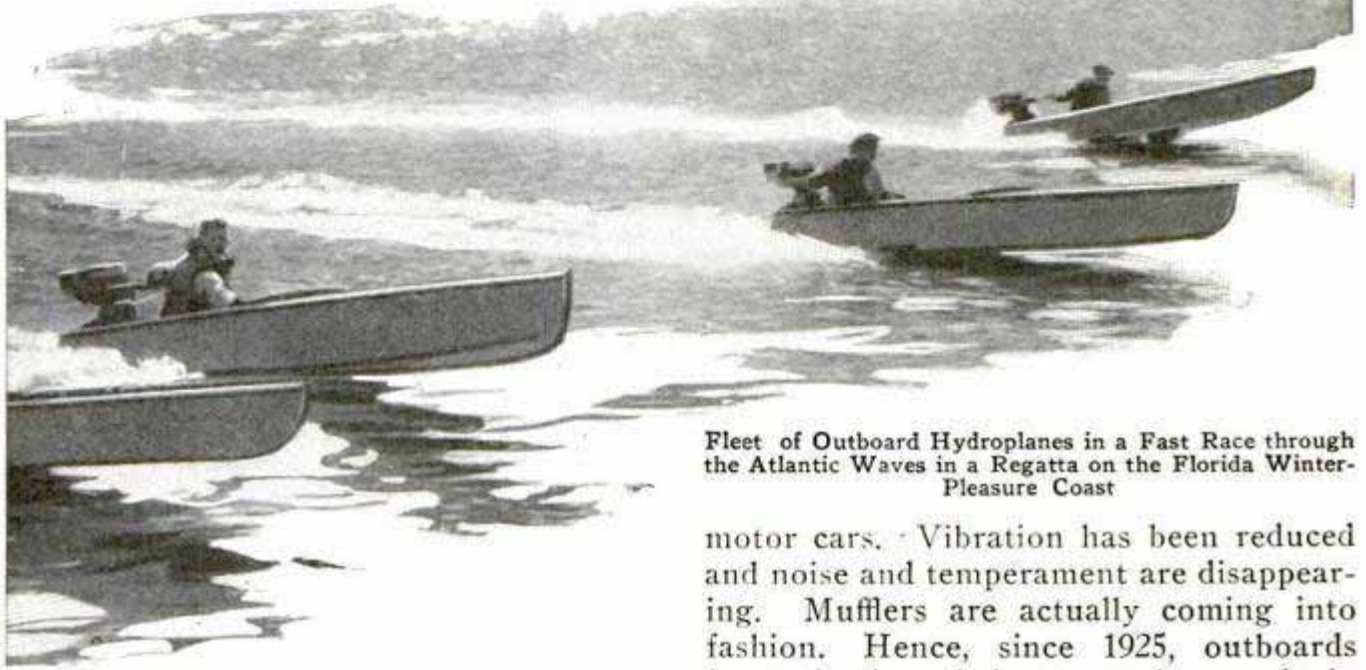
On a windy, sleety, snowy April day, young Earl Widegren of Locust Valley, Long Island, steered an outboard shaped like a large watermelon along the wave-tossed Hudson river from Albany to New York City, to win the Hudson Outboard Marathon of 133 miles at an average speed of thirty miles an hour.

Young Widegren's craft, named "Baby Olds," was twelve and a half feet from stem to stern and fifty-four inches across the waist. It had a high-arching deck of tarpaulin, streamlines and longitudinal body steps and a nose like an airplane's fuselage. It was in the air about half the time and was designed and built in an air-



# to Water-Speedster

plane factory. It crossed the finish line all wet but winning because it had the design and a dauntless navigator, plus a



Fleet of Outboard Hydroplanes in a Fast Race through the Atlantic Waves in a Regatta on the Florida Winter-Pleasure Coast

power plant weighing less than 150 pounds that worked faster than most airplane engines. "Baby Olds" was one of the latest things in outboard boats during the spring of 1928.

It is a far cry from the 1913-model, single-cylindered outboard motor that pushed a flat-bottomed or clinker-built rowboat through still water at eight miles an hour, to the scientifically constructed power plant which rushes a transverse-stepped hydroplane over the waves at thirty miles an hour. Since the days of the "one-lungers," sealed coils and condenser casings have eliminated short-circuiting. Separate feed pipes and cooling tubes now keep fresh and salt water out of lubricants. Two, three and four cylinders insure steadiness. Larger piston displacement gives more power.

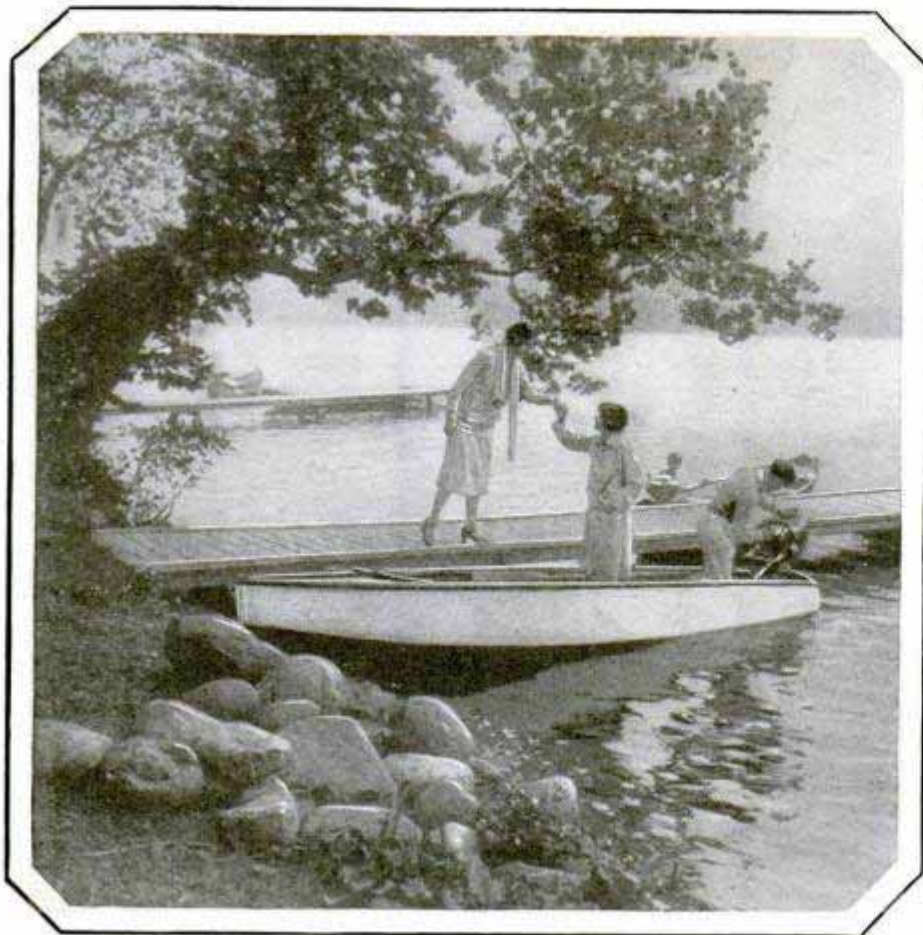
Costly and more serviceable alloys have displaced cast iron and common steel in the combustion and propulsion departments. Outboard metal is often of higher grade than that used for similar parts in

motor cars. Vibration has been reduced and noise and temperament are disappearing. Mufflers are actually coming into fashion. Hence, since 1925, outboards have dominated larger racing craft in many events on protected waters.

This change has been gradual. Judge Aaron B. Cohn, of Toledo, caused a sensation during the Detroit regatta of 1924 when he won the American Power Boat association's outboard championship by speeding nearly twelve miles an hour! That performance broke down official resistance so effectively that "kickers," "putters" and "sputter-spatters" were admitted to the exclusive Gold Cup regatta on Manhasset bay. Then the outboards registered a sensation by covering nearly twenty miles in one hour during the 1926 regatta of the Mississippi Valley Power Boat association, at Louisville. Now outboards are welcomed at the Newport-Naragansett competitions for large and small power boats. The once despised "water bugs" are speeding forward steadily.

Outboard plants, once merely "kickers" for fishing trips, are still depended on for long cruises, but, whereas the spark plugs on Lindbergh's "Spirit of St. Louis" fired from 800 to 900 times a minute, the aver-





**Making a Motorboat of Any Canoe or Rowboat, the Outboard Has Been Adopted by Thousands on Lakes and Rivers**

age outboard spark plugs fire from 3,500 to 5,000 times in sixty seconds. This is one reason why seven outboards, none of them more than seventeen feet long, bucked Lake Michigan and flood conditions in the Illinois and Mississippi rivers from Chicago to New Orleans and finished the 1,750-mile voyage at an average speed of twenty-two miles an hour.

This improvement in mechanism, plus a gift for tricky navigating, permitted fifteen-year-old Mary Alcott Richardson of Glen Ellyn, Ill., to win a handsome silver trophy by driving her tiny, thin-shelled craft along ninety-six miles of rough Lake Michigan to win the Milwaukee-Chicago Outboard Marathon.

A few months later thirty-five outboard devotees started from Boston for New York City, via Cape Cod canal and Long Island sound. C. P. Stevens, Jr., of Albany, won \$1,000 by negotiating the 260 miles five minutes and six seconds ahead of the runner up, Al Buffington, of Fall River, Mass.

Helen Hentschel, of Flushing, N. Y., graduated from a swimming class to command of an outboard in the 1925 Gold Cup

meet. Within two years, she was hailed as our leading lady outboard navigator. Yet she had hard luck in the Hudson River Marathon. The first time she tried to buck the winds and waves and currents between Albany and the great metropolis, her motor was killed by sleet and rain, she drifted helplessly to the eastern shore and reached her destination, soaked, in the caboose of a local freight train. Under the rules, she tried again. When the motor's vibration started the seams in her cockleshell, she bailed and purred southward pluckily. Time and again rain or spray wetted the spark plugs of her engine, but she sucked salt from the wire ends and

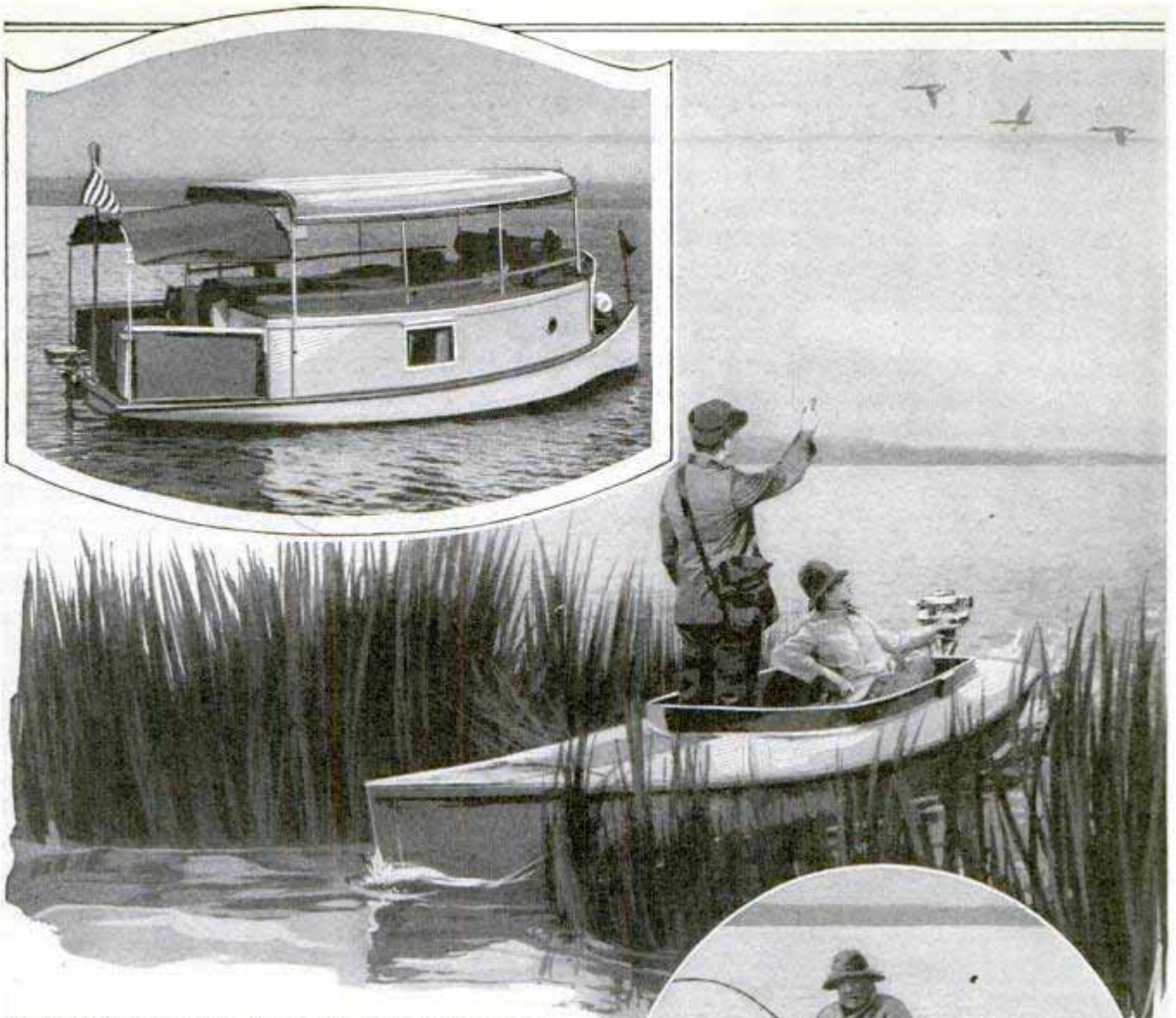
started her motor hopefully. Forced to lean across the steering wheel to pump air into her auxiliary fuel tank, the boat's pounding so agitated her stomach that she was nearly as dead as the motor, when kind rivermen towed her into Garrison.

But though Helen did not win that marathon, she did win against famous European outboarders on Lake Tremplin, Germany, by doing 28.7 miles an hour. Then she hurried back to try for outboard honors in California and Rhode Island.

The boys and girls who pilot outboards, against mature men in many cases, run many risks in their erratic speedsters. The "Driftwood Derby" of July 4, 5 and 6, at St. Louis, is an example. Officially it was the twenty-first annual regatta of the Mississippi Valley Power Boat association, witnessed by 30,000 people, but, between snags and river steamers, it resembled a log-rolling contest.

Two boats of the 151-class sank to the river bottom permanently. That didn't discourage the dozens of outboard speedsters. H. M. Frazier of Auburndale, Fla., got his water bug into a backwash





A Houseboat Pushed by a Six-Horsepower Engine, Top; Duck Hunter, and a Fisherman at Fish Lake, Saskatchewan, Canada

which jammed his head against a stone bridge pier. But, like entrants from Detroit, Cleveland, Birmingham, Kansas City, Houston and Wilmington, N. C., and other cities, Frazier stayed with it, to applaud an outboard record of 33.33 miles an hour made over a course referred to as "a practice for the River Styx."

Naturally outboard racing creates excitement and develops the industry just as motor-car racing developed motor cars. But thousands of miles are traveled annually by amateurs who "putt" for pleasure in their water flivvers. After nineteen years in his local courts, four terms in his state legislature, nine trips to Labrador and various experiences as a state's attorney and a world-war aviator, Judge William J. Malone, of Bristol, Conn., loaded his family and friends on his twenty-foot outboard cruiser and explored the Ohio and lower Mississippi from Pittsburgh to New



Orleans. The same spirit of aquatic adventure sent Mr. and Mrs. Rockwell Stevens clear across France, in an outboard boat, much to the astonishment of the natives. But the water flivver is solving engineering problems as well as giving pleasure to the traveler.

Not long ago the mine manager, A. B. Norris, had to get some six-ton boilers from Quebec to the Melartic gold mines, 433 miles in the Canadian wilderness. The mines were forty miles from the nearest



railroad. Pack horses were out of the question and the roads were impossible. So he made his boilers air-tight, tied them to large canoes, equipped the canoes with outboard motors and floated the boilers up forty miles of winding stream.

This feat could not have been accomplished but for a recent improvement in outboard equipment through which a propeller shaft is not bent or broken when the propeller strikes a stone or other unyielding obstruction, but is tipped upward and backward unharmed. The only part damaged is a small brass sheer pin. A new pin is put in place and the voyage proceeds. During the Norris adventure, the propellers often hit river bottom but no material damage followed. Nothing suffered but the sheer pins.

Outboards also go in for dramatics. Through the blackness of a winter's night, between cakes of ice and over white-capped waves, Ralph Anderson steered an open boat, pushed by an outboard, from Isle Royal, in Lake Superior, to the Michigan mainland and a doctor. Anderson's companion was a fellow trapper who had been seized with acute appendicitis. Anderson had the option of operating with a fish

knife or getting his companion to a doctor.

During a sudden flood which submerged a large part of North Sacramento, Calif., the Wilbur family rescued 300 marooned fellow citizens in the Wilburs' water flivvers. That was an all-night job, also.

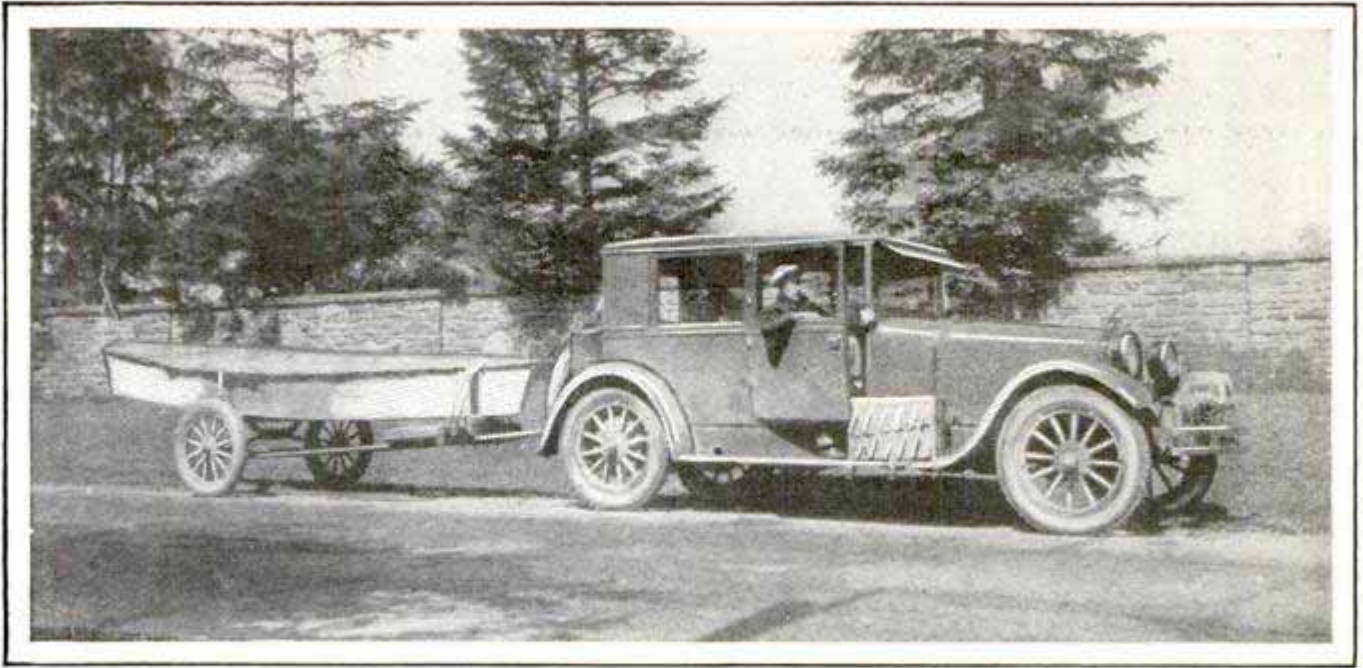
Inexpensiveness as well as versatility increases the outboards' popularity. Following the custom with auto motors, the outboard engines are classed according to piston displacement. Class A, in outboards, has less than fourteen inches of displacement; Class B, from fourteen to twenty inches; Class C, from twenty to thirty inches; Class D, from thirty to forty inches; Class E, from forty to fifty inches; Class F, from fifty to sixty inches; Class G, from sixty to eighty inches and Class H from eighty to a hundred or more inches.

Of course, most outboarders have to buy their motors, though one can rent and sometimes borrow a motor. Capt. Elmer E. Dunn, of St. Petersburg Fla., rented one for fifty cents, rented a boat for \$10, tuned up a bit to get experience, for he was the rawest kind of outboarder, and cleaned up at the Miami Beach Regatta of the Florida Outboard Racing as-



The Flivver of the Lakes; Speeds of Fifteen to Twenty-Five Miles an Hour Are Not Unusual for Outboard Boats Capable of Carrying Four to Six Passengers in Comfort





A Pair of Secondhand Wheels and Ties, an Old Axle and a Few Odds and Ends Provide a Trailer and Eliminate the Necessity of Storing the Boat or Owning a Boat House

sociation last winter. It does not take years of training to make a successful outboard racer. The manufacturer helps the amateur. The modern outboard motor is the only marine engine using ball bearings and roller bearings for internal working parts.

If an outboard fan does not feel like investing in a fancy hull with transverse bottom steps (which make it a hydroplane) with streamlines and brass finishing, he can build his own for a few dollars. Ovide Siouxi, great chief of the Huron Indian tribe, built one from working plans that weighed 140 pounds and cost \$75, and made a speed of thirty miles an hour. But lots of boys build cheaper ones, called "punkin seeds," "tubs," "crates" and "strawberry boxes." In one of these crude small ships, about as pretty as a slab of wood, eleven-year-old David Leonard beat some of the season's most skillful skippers to the Class-B championship at Winter Haven, Fla.

Having won so many peace-time victories, the captains of our "water bug navy" are getting ready for war-time work. At the rate the outboards' speed increases they will be "cracking" fifty miles an hour in a year or so. And if we engage in another war, the mosquito fleet of water flivvers will do their bits in many a naval engagement.

Each fleet outboard will be canvas-covered like a kayak and will head straight for the enemy ship or transport. Each

outboard will bear a torpedo. As each captain of a tiny craft gets within striking distance of the enemy, he will go overboard in his life belt, leaving his ship to keep its course on the surface or beneath the surface of the water. The deadly torpedo will do its work.

There will be plenty of skippers for these infant outboard destroyers. Probably Malcolm Pope will be one of them. Malcolm lives at Winter Haven, Fla. He starts the outboard on one of his home town's hundred lakes, attains a speed of thirty or more miles an hour, shoots his boat up a wooden incline, soars forty feet straight through the air, splashes safely on the water again, and then, for good measure, gets up to high speed once more and skids his light vessel up the sand beach to dry land.

Malcolm proposed the mosquito fleet of outboard destroyers. You'll have to keep an eye on these young skippers. No telling what the outboarders will accomplish now that they try almost anything.

#### PAPER IS USED FOR BLASTING AFTER CHEMICAL BATH 2014

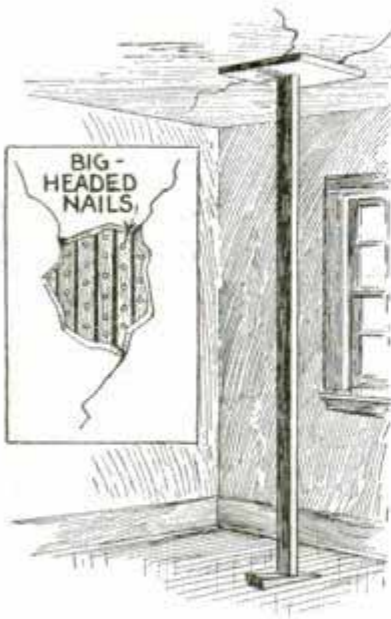
Intended especially for the use of farmers and quarrymen, a kind of paper, similar in appearance to ordinary blotting material, has been prepared for blasting. It is coated with a hot mixture of chemicals and water, dried and then cut into strips, which are rolled into cartridges.

Write The Secretary

c/s woman H. Holden. Highfield, Va. Jackson View Road Chesterfield Va



### Applying Plaster Patch to Ceiling



When redecorating an old ceiling, I found a section of it was badly cracked. Most of the cracks converged to one point where the plaster had broken away entirely. I removed all the loose plaster around this spot and then

drove large-headed roofing nails into the lath, letting them project about  $\frac{1}{4}$  in., to serve as anchors for the plaster of paris with which I mended the place. Then I took a smooth board, about 1 ft. square, and held it against the soft plaster by means of a length of 2 by 4-in. wood, set on the floor, a wedge being used between the floor and the pole to force the board firmly against the repaired section. When the plaster had set and the support was removed, the patch not only was smooth but held the surrounding plaster securely. —Dan Courtney, Chicago.

### Racing Blades Fitted to Clamp Skates

Racing blades can easily be fitted into the runners of ordinary clamp skates by sawing or filing a groove in the runner, setting the racing blade in place and then soldering it in the groove, using muriatic acid cut with zinc as a flux to make the solder adhere to the metal. Of course, care should be exercised to cut the groove accurately. It may be necessary to shorten the racing blades one or two



inches so that they will not project too far beyond the end of the runner, for, if they do, they may easily be bent. I have found skates

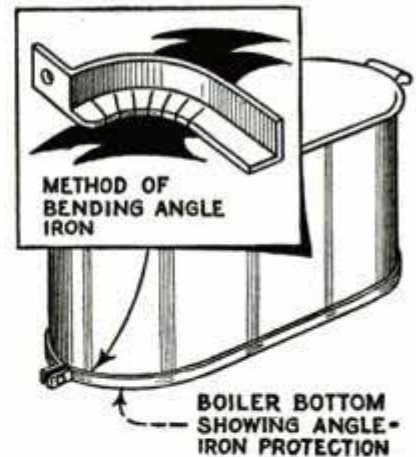
altered in this way highly satisfactory; they can be more easily handled than ordinary skates and the clamping feature is quite an advantage.—Sam Weidman, Lowell, Wash.

### Cleaning Ducks Quickly

Picking wild ducks is a task that most sportsmen gladly leave to their wives. The large feathers are not so hard to remove but the down is very annoying. An easy method is to pour melted paraffin over the bird before picking the down and allow it to congeal. It is then easy to rub the down off with a rotary motion of the palm, leaving the skin clean. Another method is to dip the hand in partly melted paraffin and then massage the feathers off. Either method practically eliminates the need of singeing. Certain kinds of ducks, such as bluebills, butterballs, golden eyes and coots are better skinned than picked, as the objectionable fishy or oily taste disappears with the skin and the fat adhering to it.

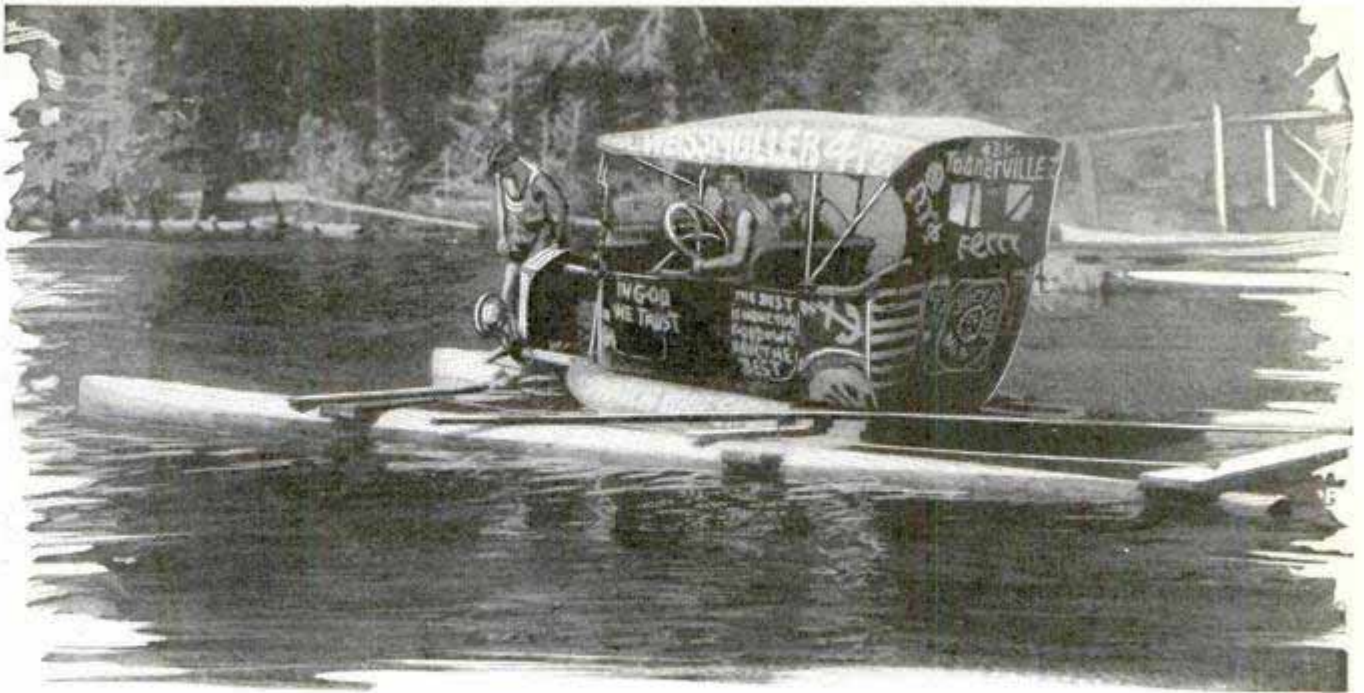
### Protecting Wash-Boiler Bottom

Leaks in wash boilers usually occur near the edge and are caused by sliding them on and off the stove. A length of lightweight angle iron, fitted around the edge of the boiler as shown in the drawing, greatly increases the life of the boiler by eliminating wear on the bottom. The angle iron should be a



few inches longer than the distance around the boiler as measured with a tape, is bent to fit snugly and securely clamped at one end as indicated. It is necessary to make saw cuts in one side of the angle iron where it is to pass the rounded ends of the boiler, as shown in the upper detail. The angle iron also reinforces the boiler so that it is dented less easily.—Wendell Mitchell, Rogers, Nebr.





Old Auto Having a Propeller Attached to the Driveshaft Runs Log Catamaran on California Lake

### Old Auto Propels Catamaran

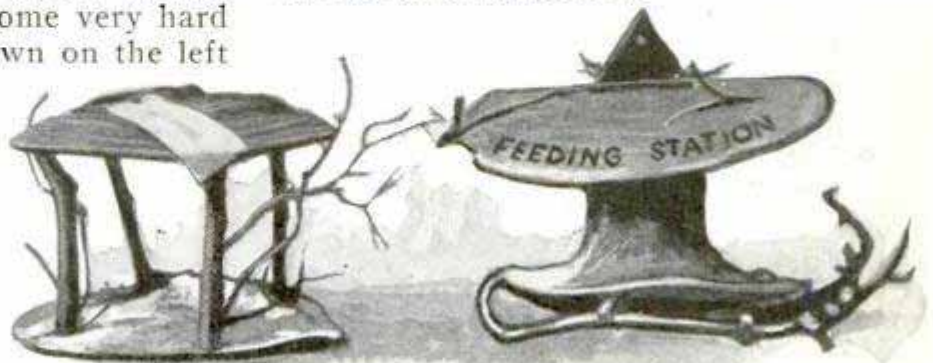
At Lake Almanor, in California, an old auto has been used successfully for propelling a catamaran made of logs. The auto is securely mounted on the cross members, and a propeller is attached to the end of the driveshaft, which is arranged so that the screw is submerged. Running the motor slowly furnishes ample power and surprising speed, enabling the catamaran to travel all over the lake.—Grace E. Grohman, Stockton, Calif.

*Box 802*

### Novel Bird House

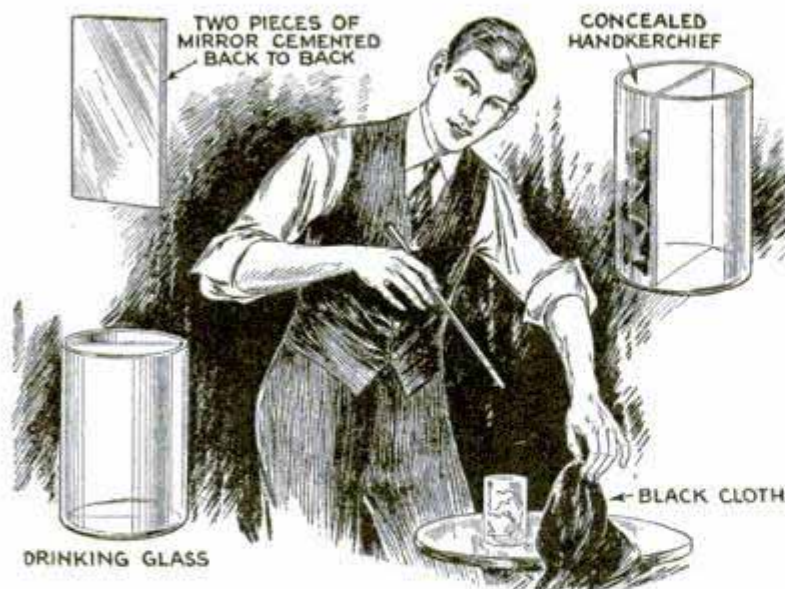
Bird-house contests held in New York rural schools brought out many new ideas. Many peculiar houses were entered in the contest, and one that won first prize was made from the large fungi found growing on certain trees. Cut-off pieces of this growth were found to become very hard when dry. The house shown on the left in the photo is a home for a song sparrow, the measurements, according to the contest rules, being approximately 6 by 6 in., with all sides open. The top and bottom consisted of pieces of fungus, and were held together by means of lengths of hickory twigs

about as thick as one's thumb. Three-penny nails were used to fasten the top and bottom to these posts, the nails being driven into the ends of the posts for a distance about equal to half of their length. The heads were then cut off, and the ends sharpened so that they could be pushed into the fungus. A daub of glue was also put on the end of each post, or on the fungus at the points where the posts were to stand. Stout cord was wrapped around the house after it had been assembled, and it was laid away to dry. After several days, the fungus was hard and the posts were firmly in place. Instead of trimming these posts, a few branching twigs had been left on to provide a place for the birds to alight. The feeding station was also made from fungus, two pieces being rigidly attached to a short board to hold them.—Cora Hamilton, Binghamton, N. Y.



Novel Bird Houses Made from Tree Fungi Win First Prize at School Contest





Simple Trick with Handkerchief Which Can Be Easily Performed by an Amateur

### Clever Handkerchief Trick

For parlor magic, the clever handkerchief trick described in this article will be found amusing. The performer takes an ordinary drinking glass, of the thin variety and with straight side, in his hand, and while standing before his audience, turns it to show that it is empty. Then he places a small red handkerchief in it, and covers the glass with a black cloth. He tells the audience that he will make the red handkerchief turn white without removing the black cloth, and upon removing the black cloth this appears to have happened. The handkerchief can be passed around among the audience for inspection, after which it is again placed in the glass, covered with the black cloth, and it is turned red again. Prepare for the trick in the following way: Be sure to use a glass of the description given, as the trick will not work with any other shape. Take two pieces of mirror, the exact width and height of the inside of the glass. Cement them together back to back, place them in the glass, thus dividing the latter into two compartments. The mirrors cannot be noticed by the spectators as the glass is held so that they look into one mirror, which gives the impression of a plain glass and makes the tumbler look empty. The red handkerchief is placed on one side of the mirrors and a similar white handkerchief on the other side. When, in performing the trick, the black cloth is placed over the glass, the performer turns the glass around unnoticed. Thus, if the

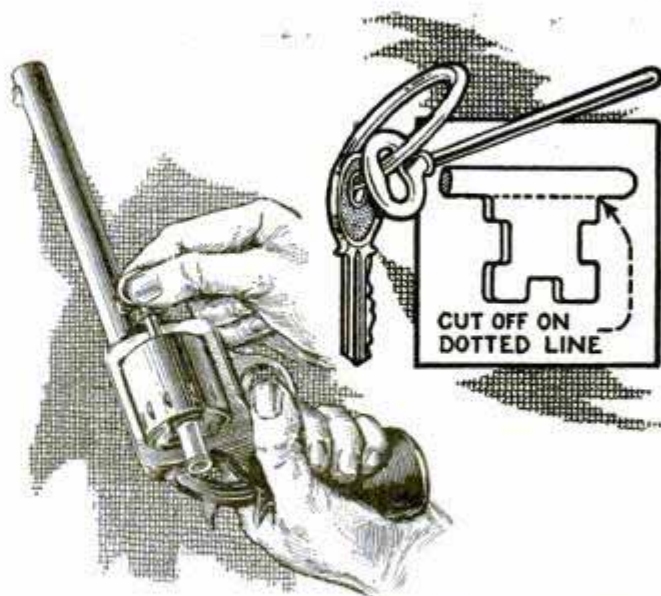
red handkerchief is placed in the compartment facing the audience, the white handkerchief will come into view when the black cloth is removed, and so on.—E. A. Hoppman, Dumont, N. J.

### Repairing Leaky Cellar Walls

At times cellar walls will leak and the condition seems to get worse if neglected. A simple method of repairing a leaky wall is to drive one or more pipes through it at the points where the leakage is worst. The pipes should be calked with fibrous material or lead, so that there will be no leakage between the wall and the pipe. After all the water has drained and the wall has dried out thoroughly, the inside surface is given a coat of waterproofing compound. When this has dried, the pipes are removed and the holes plugged tightly.—L. H. Georger, Buffalo, N. Y.

### Handy Pistol-Shell Remover

Trappers will appreciate the handy pistol-shell remover shown in the illustration. It is made by grinding off the end of a key, as indicated by the dotted line. Plunging the shank of the key into the empty pistol shell will quickly force it out. It should be kept on the key ring



Door Key with the End Cut Off Makes Handy Pistol-Shell Remover

in order to be always available for use.—Harold Eckebrecht, Chicago, Ill.



# A Stand for the Dynamic Speaker



**T**O THE man who has not a console, or other cabinet, large enough to contain a baffleboard, the mounting of the dynamic speaker presents something of a problem. It is easy, of course, to build up a small frame with a shelf across the back; fit a wallboard panel on the front, and, if this assembly can be hidden from sight in some way, nothing more elaborate is necessary. Where the speaker mounting is visible, however, something more decorative is essential, and the stand described in this article is ideal for the purpose, as it is not only simple to construct, but forms a very pretty piece of furniture when properly finished. As may be noted in the head illustration, when the stand is in use set in front of a fireplace or near the wall of the room, nothing of the speaker itself is visible, and the stand resembles only a decorative screen.

The materials necessary for the construction of the stand proper are two pieces of five-ply veneer,  $\frac{3}{4}$  in. thick, 24 in. wide and 32 in. long. One side of the veneers should be of nicely figured walnut or mahogany. The maker can choose any of the four designs shown in Figs. 1

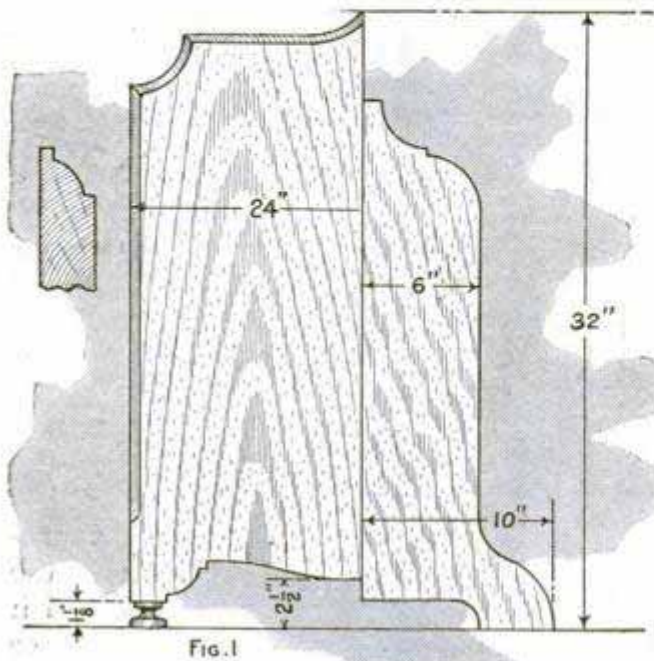
and 2, and none of them presents any difficulty in laying out; the only thing to be borne in mind is that the circular hole in the front of the screen, for the speaker cone, must not be placed centrally, but should be a little higher than the center of the front. In the stand shown in the illustrations, the center of the hole is 12 in. from the top of the screen. In Figs. 1 and 2, the left half of the drawings represents the shape of half the front, and the right half, the supporting brackets, and it will be noted that the brackets are cut so that their length is slightly less than that of the front, at the edges.

The pieces may be cut to shape either on the jigsaw or with a hand coping saw, and the only precaution to observe is to use sharp blades in the saw, so that there will be no tendency to flake off the edges of the walnut or mahogany veneer. The brackets, of course, should be laid out so that the face veneer will be on the outside on the finished stand; this seems an unnecessary warning, but it is very easy to make a mistake and lay them out so that, when cut to shape, one finds that there are two right-hand or two left-hand brackets, instead of a right and a left.

After cutting to shape, finish the edges by filing and sanding dead smooth, then mold the edges of the screen front. Note that the molding on the edges is not carried down to the feet, but is stopped about 3 in. from the bottom. The molding may be a simple bevel or a hollow on the edge, and, in this case, it may be done with the chisel or gouge, on the shaped parts, and with the molding plane on the sides, but if any of the more elaborate moldings is desired, the maker will find it advisable to take the piece to the nearest cabinet shop and have them run the moldings on the shaper, since, although it is easy to run the moldings on the straight edges with the molding plane, it is difficult to mold



the shaped edges. Also, the edge of the circular hole should be molded the same as the outer edges, and this can be done in a few minutes on the shaper. If the reader cannot have the molding done as



described, it is advised that he simply bevel or round the edges of the front, and make the grill for the hole as described later, so as to avoid the necessity of molding the edges of the hole. The edges of the brackets may be left square, or just

rounded a trifle by means of sandpaper.

Since the screen is to be fitted with a grill, and since the grill would be too far back if it were simply fastened to the back of the screen, which is  $\frac{3}{4}$  in. thick, it is necessary to sink a recess in the back of the screen so as to bring the grill forward. Before describing this, however, we will tackle the grill.

The maker, of course, can use a wood grill if he chooses, but the one illustrated in the photos was made of sheet lead. This may seem to be too weak and soft, but as a matter of fact, it makes a very satisfactory grill, and one that is decidedly novel and effective. As shown in Fig. 4, the lead is cut to represent a landscape, and, when backed with gold cloth, the effect is quite striking. The lead used is  $\frac{1}{16}$ -in. sheet, which can be obtained from the nearest plumber's shop. The size of the opening in the screen, of course, depends on the size of the speaker cone, and consequently the size of the grill depends on this also, but a 14 by 14-in. piece is amply large enough even for a 10-in. cone. Lay out a circle of the size of the opening on a sheet of paper, rule it off into 1-in. squares, as in Fig. 4, then sketch in the landscape by referring to the squares in the illustration. Flatten out the lead

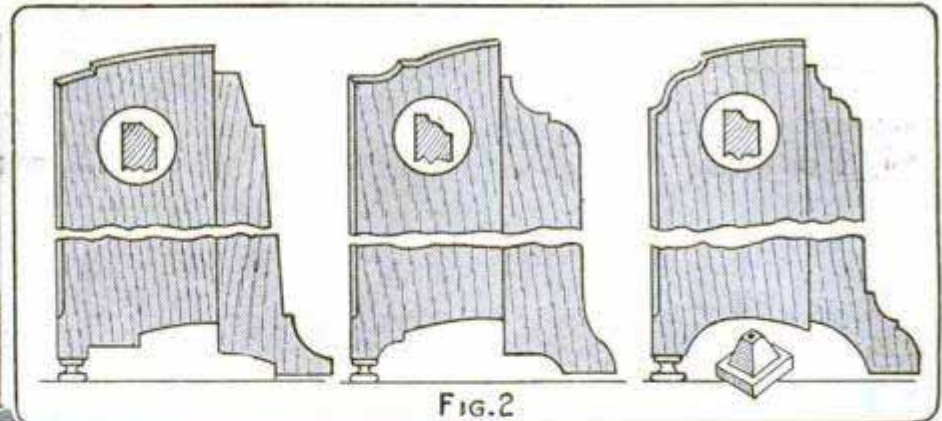


FIG. 2

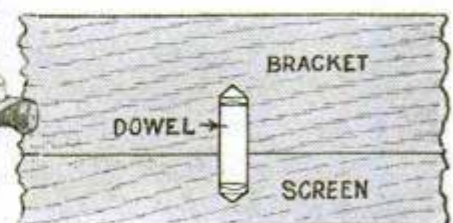
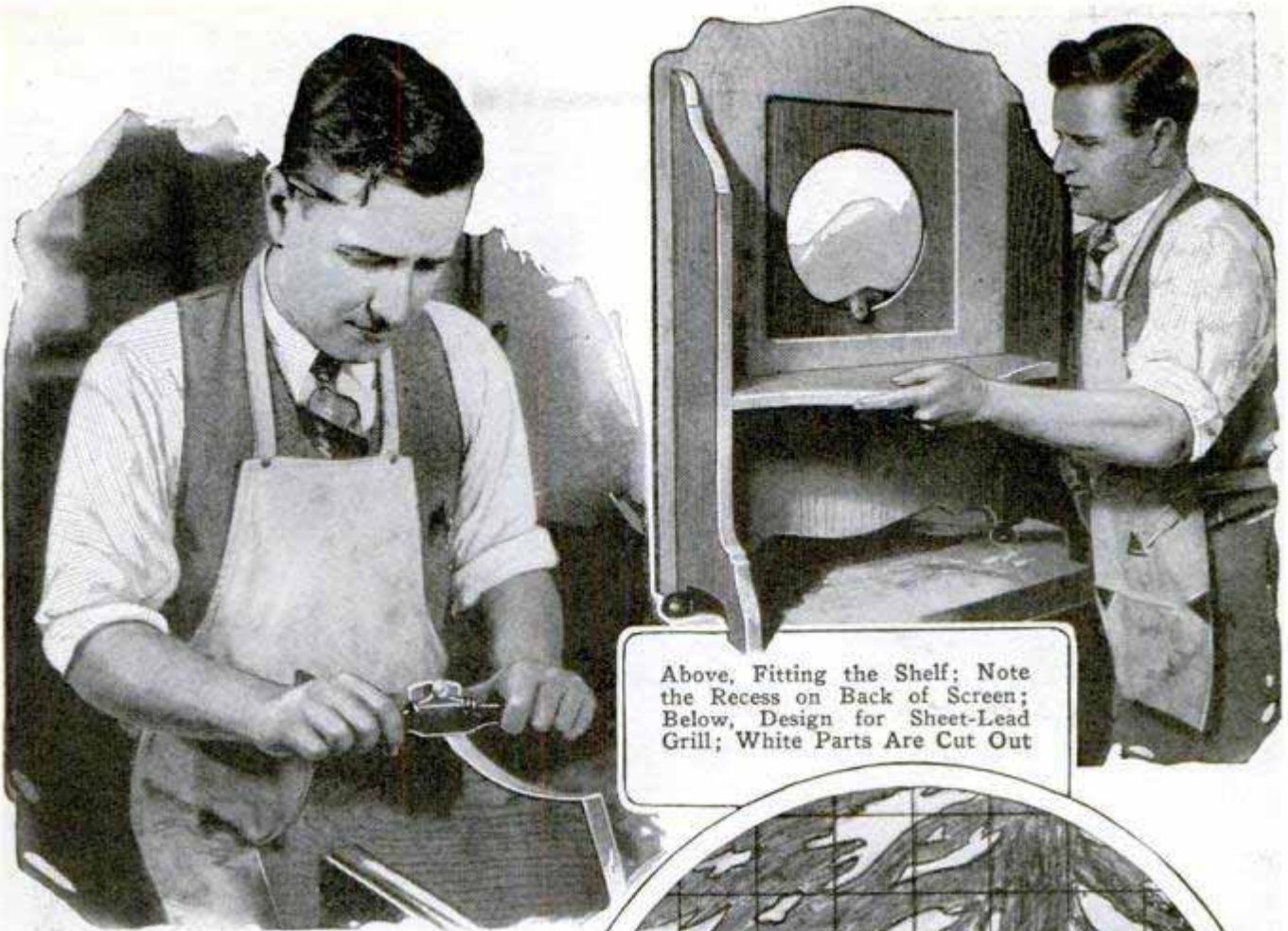


FIG. 3

Left, Gluing a Bracket to the Front; Above, Alternative Designs for Stand; Below, Detail of Joint between Bracket and Front





Above, Fitting the Shelf; Note the Recess on Back of Screen; Below, Design for Sheet-Lead Grill; White Parts Are Cut Out

sheet, pin the paper centrally over it, then trace over the design with a fairly sharp, but round-pointed scribe, so as to impress the design on the soft lead. Remove the paper, and cut out the design with a knife, taking care to make the cuts clean and sharp. Now take a small screwdriver, and "texture" the trunks of the trees by striking the screwdriver lightly with a hammer, varying the impression and direction of the screwdriver point so as to simulate as closely as possible the bark of the tree. The same tool will do for making the leaves of the pines. If the reader has an assortment of small punches, he will find that it is an easy matter to grain and texture the surface of the landscape to produce a very creditable effect, but a small screwdriver, a couple of nail sets and a small round-nose chisel will enable him to do a very good job of landscape "painting."

If the edge of the hole has been molded, this is all there is to do to the grill. If, however, the reader has not been able to mold it, then a sort of ornamental border, about  $\frac{3}{8}$  in. wide, should be punched all

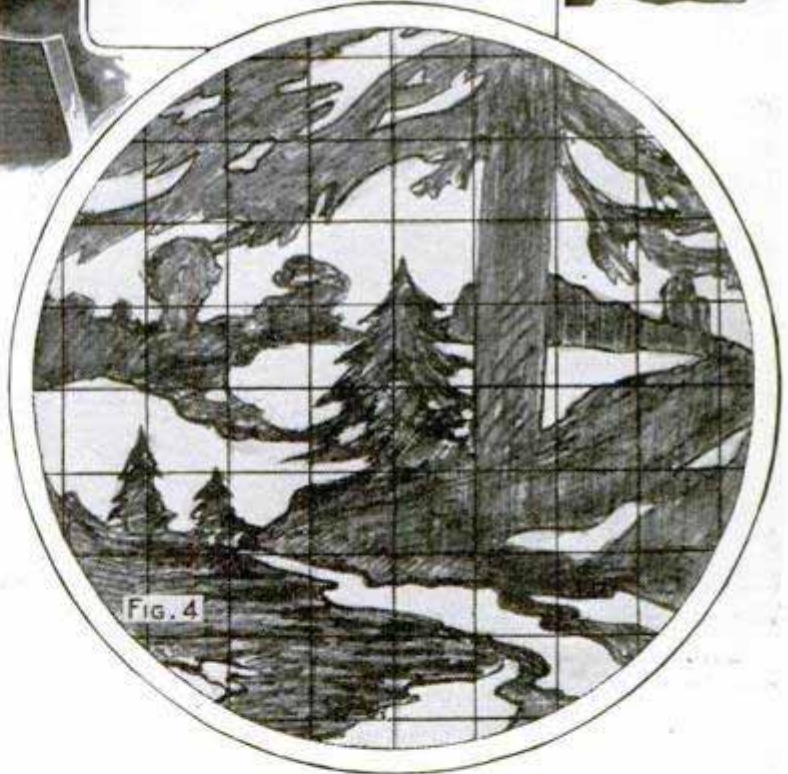
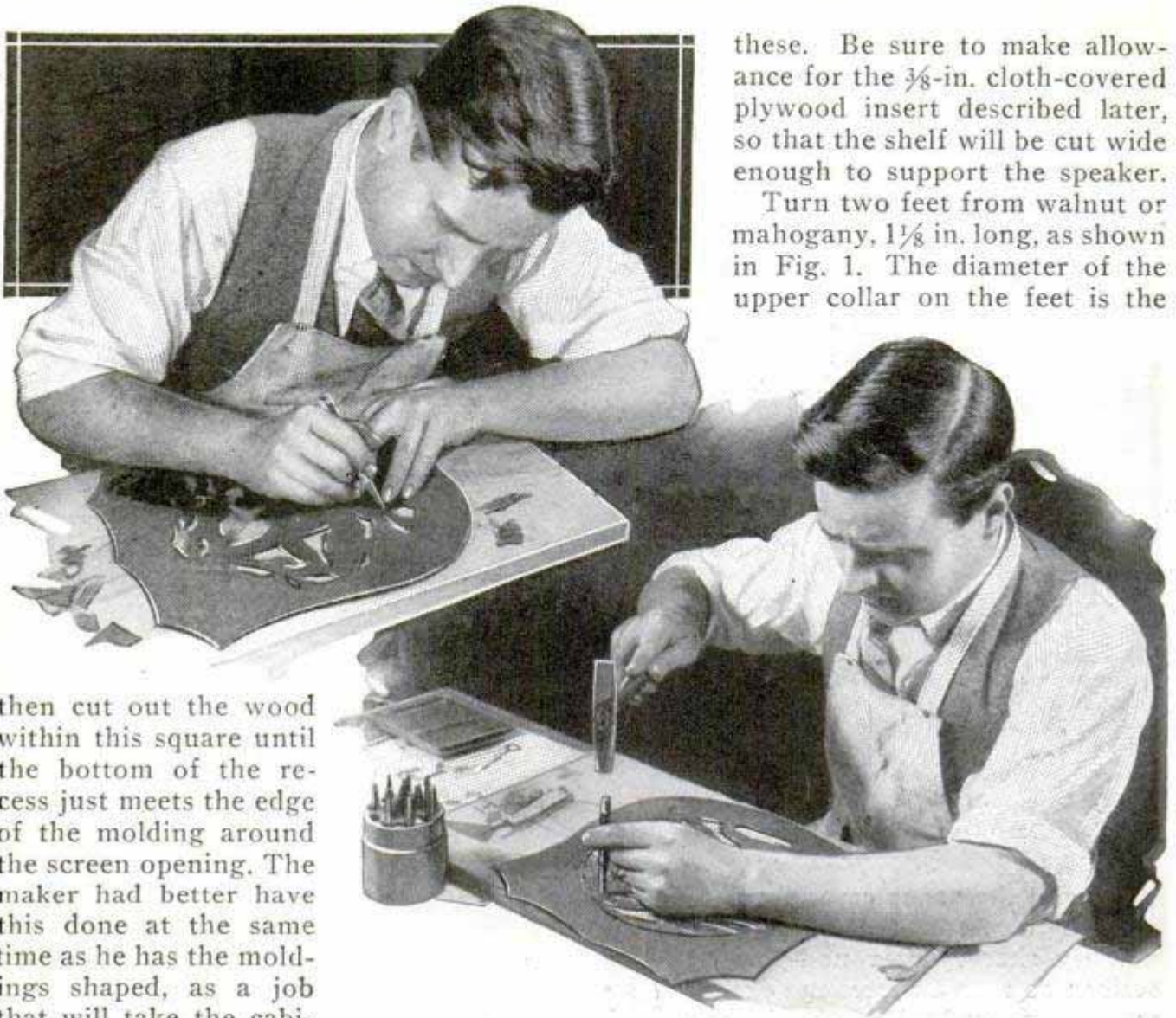


Fig. 4

around the circular rim of the design, and the edge of the sheet lead should be cut to form a shield, as shown in the illustrations. An ornamental border can then be punched around the edge of the shield, and the whole grill may be fastened with gimp tacks over the opening in the screen, thus hiding the edge of the hole. Setting the grill in from the back, with the opening molded, however, makes a much better-looking job.

For the recess, centering on the opening, at the back, lay out a 12-in. square,





then cut out the wood within this square until the bottom of the recess just meets the edge of the molding around the screen opening. The maker had better have this done at the same time as he has the moldings shaped, as a job that will take the cabinetmaker only a short time to do on his router will be found rather tough with hand tools, although it can be done. If done by hand, see that the bottom is smooth and flat, also that the "sight edge" around the molded opening is even all the way.

The height of the shelf that supports the speaker at the back depends on the dimensions of the speaker used, so no measurements can be given for this, or for the width of the center of the shelf. Any piece of wood, about  $\frac{3}{4}$  in. thick, will do for the shelf. It slides into dados or grooves cut in the brackets, and the maker will find it advisable to fit the shelf a little lower than is actually needed, and to shim the speaker up afterward. In this way, it is easier to center the cone of the speaker over the opening in the front. If no means of cutting the dados for the shelf is at hand, simply screw two strips of wood at the proper height on the inside of the brackets, and screw the shelf to

these. Be sure to make allowance for the  $\frac{3}{8}$ -in. cloth-covered plywood insert described later, so that the shelf will be cut wide enough to support the speaker.

Turn two feet from walnut or mahogany,  $1\frac{1}{8}$  in. long, as shown in Fig. 1. The diameter of the upper collar on the feet is the

Left, Cutting Out the Design on the Grill; Right, Punching or Texturing the Design

same as the thickness of the wood front,  $\frac{3}{4}$  in., and the diameter of the foot is  $1\frac{1}{4}$  in. Drill the feet and the bottom of the stand front for  $\frac{1}{4}$  or  $\frac{3}{8}$ -in. dowels, and dowel and glue the feet in place. The brackets are set back from the edges of the front 1 in. Mark a line down the back of the screen  $1\frac{3}{8}$  in. from each edge, and, along each line, lightly drive in four small brads; cut off the heads of the brads, and sharpen the projecting points. Now set the brackets in place, with their lower ends even with the bottom of the feet on the screen, and with their thickness centering on the line, and press them down on the sharpened brads; this marks the position of the dowel holes. Withdraw the brads, and drill for the dowels, taking care that the holes go only three-fourths of the way through the screen. (See Fig. 3.) Dowel and glue the brackets in place and clamp; leave until the glue is hard.

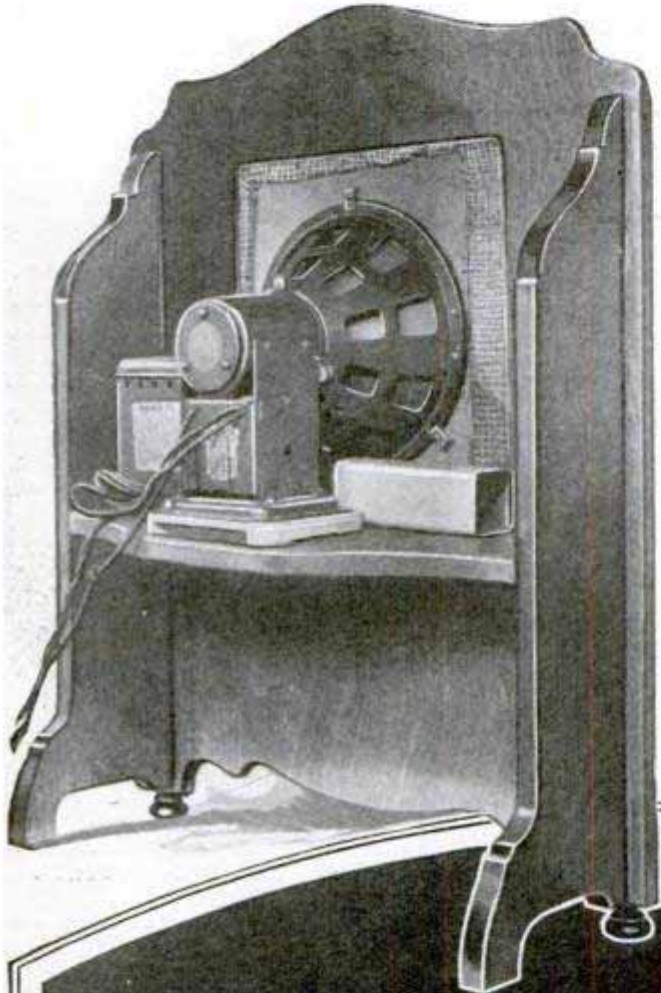


The screen should lean back from 1 to 1½ in. at the top, so, when the glue is hard, mark and cut off the feet of the brackets to secure this effect. Now sand the faces of the screen and brackets very carefully.

Stain the work walnut or mahogany to suit the veneer used, then, after the stain has set, give a coat of walnut or mahogany paste filler, wipe off across the grain, and

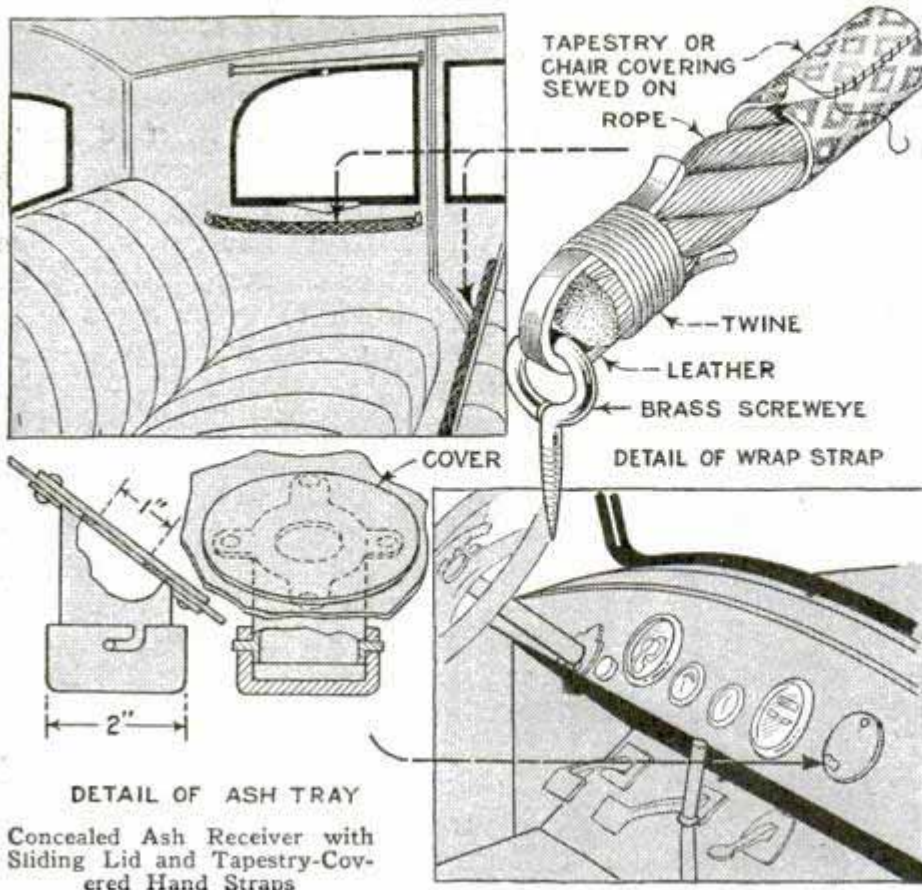
leave to dry. When dry, sand down again, working the sandpaper in the direction of the grain, dust off, and apply a coat of thin shellac. When this has set, sand down with "Wetordry" garnet paper, used wet on a felt pad, dry off and give another coat. Sand this down as before, then give one or two coats of cabinet-finishing varnish, rubbing down between coats with pumicestone and oil, on a felt pad. The last coat may be simply dulled with the pumice and oil, rubbing lightly lengthwise, or, after rubbing, it may be polished by using rottenstone and oil.

Now cut a piece of ⅜-in. plywood to fit the recess in the back of the screen, and cut a hole in the center the same size as the one in the screen. Cover the plywood with gold cloth, carrying the latter over the edges of the wood and gluing it to the back. Tack the grill in the recess, then place the cloth-covered plywood over it and fasten it with brass screws. Set the speaker on the shelf, shim with cardboard until it is centered over the opening, then screw or clamp the edge of the cone ring to the wood. Three brass clamps will fasten the speaker very nicely to the screen.



Above, Finishing Stand, Showing Cloth-Covered Insert behind Grill; Below, Grill in Shield Form for Use on Face of Stand





DETAIL OF ASH TRAY  
Concealed Ash Receiver with  
Sliding Lid and Tapestry-Cov-  
ered Hand Straps

### Ash Receiver and Hand Straps for Auto

Auto owners will appreciate both the concealed ash receiver and the hand straps shown in the illustration. The former is attached to the instrument board, and all that is visible is a sliding cover. An ordinary tin can is used to make it, small bayonet pins being soldered to one end for attachment of a bottom, which is made from a slightly larger can and is slotted to fit the pins. The other end of the can is cut so that four projecting ends are formed, and these are bent outward at right angles to the body of the can. Holes are drilled through these ends and corresponding holes through the instrument board, the latter being countersunk so that the can may be fastened with short flat-head screws. Mark off the center between the holes in the instrument board and cut a large hole through which the ashes are to be deposited, the burr being taken off the edge of the hole with a file. The cover consists merely of a sheet-metal disk pivoted at a point above the hole and having a pin or knurled knob attached near the bottom edge to serve as a handle. It should be large enough to conceal the screw heads.

Hand straps are made from lengths of

$\frac{3}{4}$ -in. rope with narrow strips of leather securely tied to the ends, for which strong twine is used. Before wrapping the twine on one end, a brass screw-eye is slipped over the strip. Tapestry, which can be obtained at any upholstering shop, is sewed around the rope for the sake of appearance. After one screw-eye is driven into the body of the car at the point where the strap is to be located, another screw-eye is driven in at the point where the other end of the strap is to be attached. Then a strip of leather, similar to the first, is slipped through it and is fastened to the rope in the same

way. Do not make the mistake of attaching both screw-eyes to the rope first, as it is then impossible to drive them in without twisting the rope and the leather strips.—G. A. Luers, Washington, D. C.

### Sharpening a Wood Chisel

Ordinarily it takes a skilled mechanic with a steady hand to hold a chisel flat without a guide, when sharpening it on an oilstone. The amateur can do just as good a job by following the method shown in the illustration, which involves the use of an improvised guide consisting of a piece



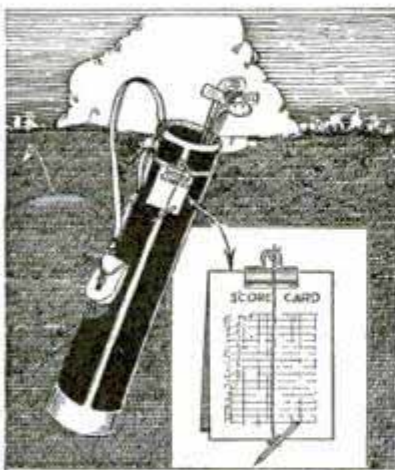
of wood with a slot cut in it as indicated, and a screw to tighten it on the chisel. With this clamp touching the oilstone, you have two points of contact, which makes it easy to hold the chisel at the proper angle all the time.



## Warming the Bed on the Sleeping Porch

When going to bed on the sleeping porch during the winter time, more comfort is assured, if the bed is warmed just before retiring. Here are a few simple methods which have been found successful: In one case where the porch was located directly over the living room, the owner cut a hole through the floor, directly under the bed, and installed a floor register, so that the warm air from the living room would come up under the bed. To prevent the heat from being lost in the cold room, a piece of canvas was placed over the mattress and extended down to the floor on all sides, thus completely inclosing the space under the bed. Another method consists in putting an electric heater under the bed shortly before retiring, and placing blankets over the bed so that they touch the floor on all sides, thus keeping the heat under the bed. Of course, it is necessary to be careful when using an electric heater to avoid fire. A third method consisted in providing a hot-water coil underneath the bed, the coil being connected to the hot-water tank in the kitchen, which was located next to the sleeping porch. When such a system is installed, the possibility of freezing should be considered in case the fire in the range is not kept up; it is advisable, therefore, to install a drain valve in the pipe to empty it.—Harold E. Benson, Boulder, Colo.

## Handy Place for the Golf Score Card



my golf bag and tied a pencil on with a length of heavy string. Both card and pencil are then handy.—R. J. Plaisted, Cleveland, Ohio.

When hurrying around a golf course, I have often wasted time fumbling through my pockets for the score card and a pencil. To avoid this, I took a small paper clip and attached it to

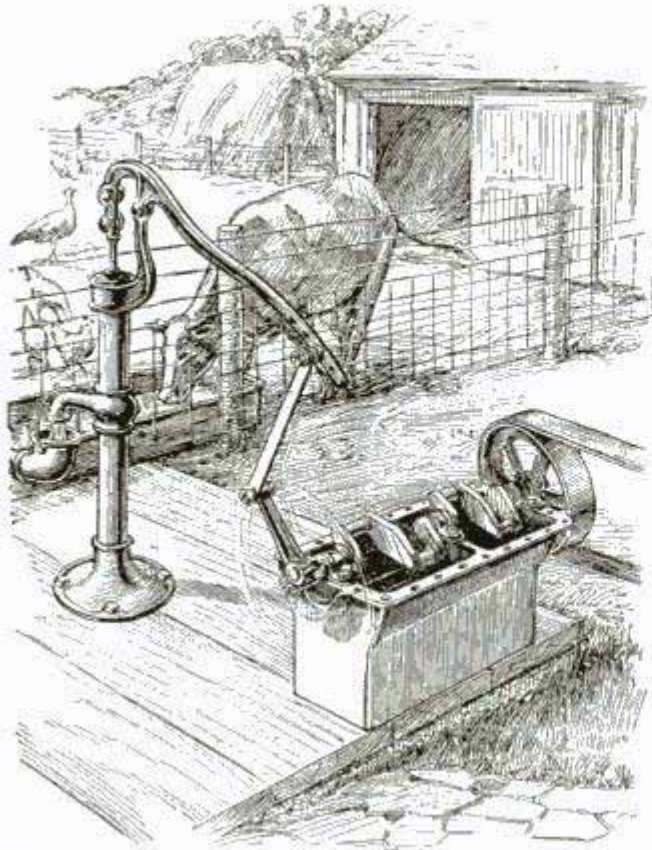


Lap Boards Are Easy to Make and Can Be Used for Many Purposes about the House

## Lap Board Has Many Uses

One of the most useful and convenient articles about the house, and one which is easy to make, is a lap board. I have made a number of these for my friends, who find new uses for them every day. The exact dimensions may be varied to suit the maker, but a satisfactory size for general use is one 20 by 30 in. in dimensions and  $\frac{3}{4}$  in. thick, with a semicircular portion, about  $4\frac{1}{2}$  in. deep, cut out at the front edge, as shown. Cleats should be screwed or nailed across the back, but a neater job can be done by tonguing and grooving the end strips against the body of the board in the same way as drawing boards. I made some of the boards in the finest Honduras mahogany, embellished with a fancy border inlay, and the owner's monogram executed in marquetry of rare woods. The surface was given an application of paste wood filler, varnished and rubbed down. Lacquer can be applied if cheaper wood is used and beauty is not considered.—R. L. Simons, St. Paul, Minn.





Efficient Pump Jack Can Be Made from an Old Auto Crankcase

### Running the Pump with Farm Engine

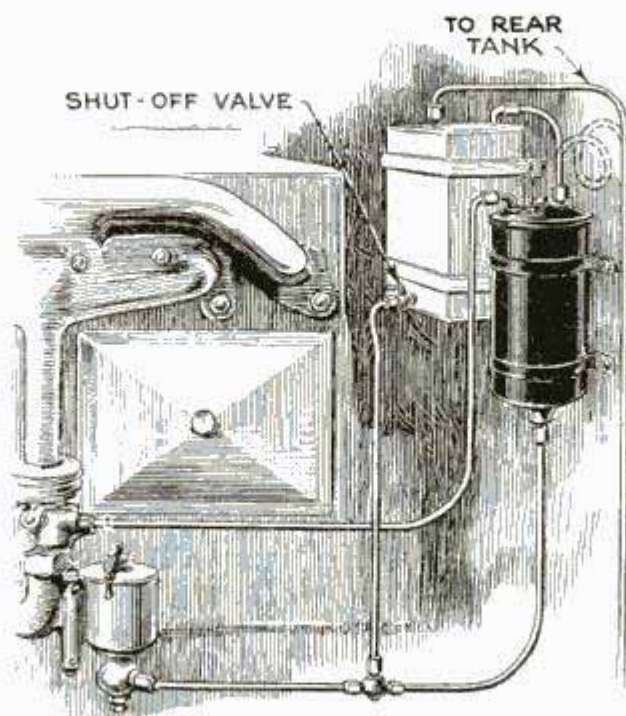
A good, inexpensive pump jack can be improvised from an old auto crankcase in which the shaft has been left intact. The crankcase is inverted, as shown in the illustration, and is placed so that one end of the shaft lines up with the handle of the pump. An old connecting rod is securely fastened to this end of the shaft, while a pulley is keyed to the other end. The pulley should be large enough to keep the pump speed at about forty strokes per minute. A length of flat iron is pivoted to both pump handle and connecting rod as indicated. Although the drawing shows the pan removed from the crankcase, it is better to leave it in place, especially if there are children who are

likely to come near the pump while the engine is being operated.

### Auxiliary Gasoline Tank Prevents Stalling

With the auxiliary tank shown in the drawing it is impossible to knowingly run out of gasoline while driving a car. When the main tank is exhausted, it is only necessary to lift the hook, open the shut-off valve, and the contents of the auxiliary tank will take you to the nearest filling station, provided it is of sufficient capacity. It is automatically kept full at all times, and requires no attention after it is once installed. The construction is simple and the cost should not exceed \$2. It can be installed on any car having a vacuum or electric-suction system from the main gasoline tank. The parts required are: one small galvanized-iron tank which can be made to the desired shape and size at almost any tin shop; two short lengths of copper tubing of the same diameter as that used in the gasoline system of the automobile; two brass compression-fitting elbows; one brass compression-fitting shut-off cock, and one brass compression-fitting tee. These items can be obtained at any auto-supply house. The tank should have straps soldered securely to the front and sides, the ends of the straps being bent, as shown, to permit attachment to the dash. The size and shape of the tank depend

on the space where it is to be mounted. The two elbows are soldered to the top of the tank and the shut-off cock to the front, near the bottom, care being taken that all connections are leak-proof. Fasten the tank securely to the dash near the vacuum tank. Disconnect the main feed pipe from the vacuum tank and connect it to one of the elbows, as shown. Connect the other elbow to the inlet on the vacuum tank



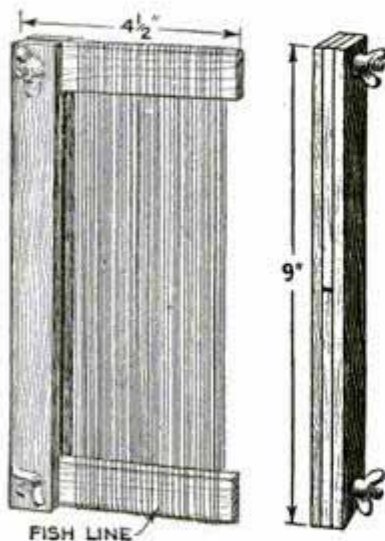
Auxiliary Gas Tank Is Automatically Kept Filled for Emergency When Gas Is Needed



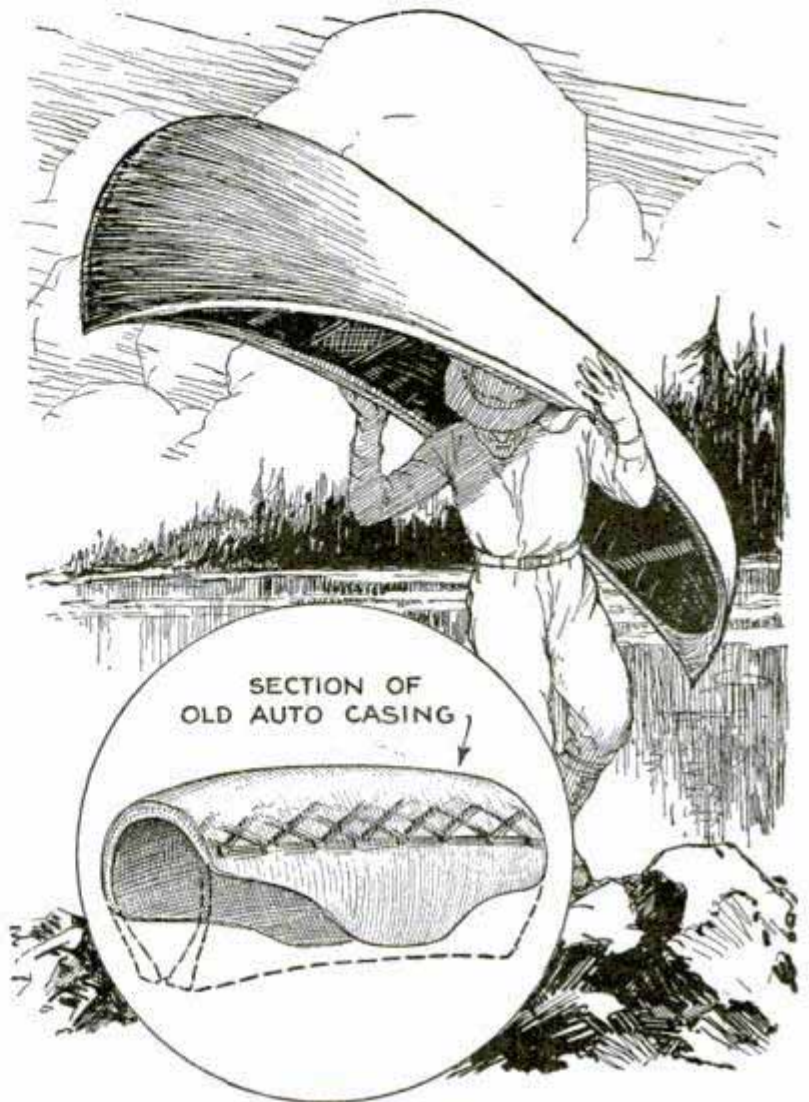
(where the feed pipe was formerly). Cut the tube leading from the vacuum tank to the carburetor and insert the tee, which is then connected to the cock on the bottom of the auxiliary tank. The cock is kept closed all the time, except when the gasoline in the auxiliary tank is needed. The vacuum tank draws gasoline from the main tank through the auxiliary tank, keeping the latter full all the time. When the main tank runs dry, the vacuum tank will not draw the gasoline out of the auxiliary tank, but the supply in this tank can be released by opening the cock that controls the flow into the carburetor.—Albert D. Sayer, San Pedro, Calif.

### Collapsible Fishline Drier

Many fishermen, who have good lines and know the advisability of drying them thoroughly before putting them away, will appreciate the collapsible fishline drier shown in the drawing, which can be folded up and put away with the rest of the fishing tackle when not in use. It consists of four strips of wood, of which two are a trifle less than half the length of the others. The longer strips have holes drilled in each end and the shorter ones have a hole drilled in one end only. The assembly is clearly indicated, two screws fitted with



tightened to hold them securely in this position.—W. A. Murphy, Marshall, Tex.



Heavy Rubber Pad Made from Old Auto Casing Protects the Shoulders When Carrying Heavy Loads

### Shoulder Pads Made from Old Auto Tire

A comfortable shoulder pad can be made from a section of an old tire as shown in the drawing. By stripping off a greater or less number of layers of the fabric, its thickness may be varied. Workers who carry heavy loads will find it useful, and to sportsmen it will be serviceable for carrying canoes or equipment, or when it is necessary to haul a boat through fast water by means of a drag line.

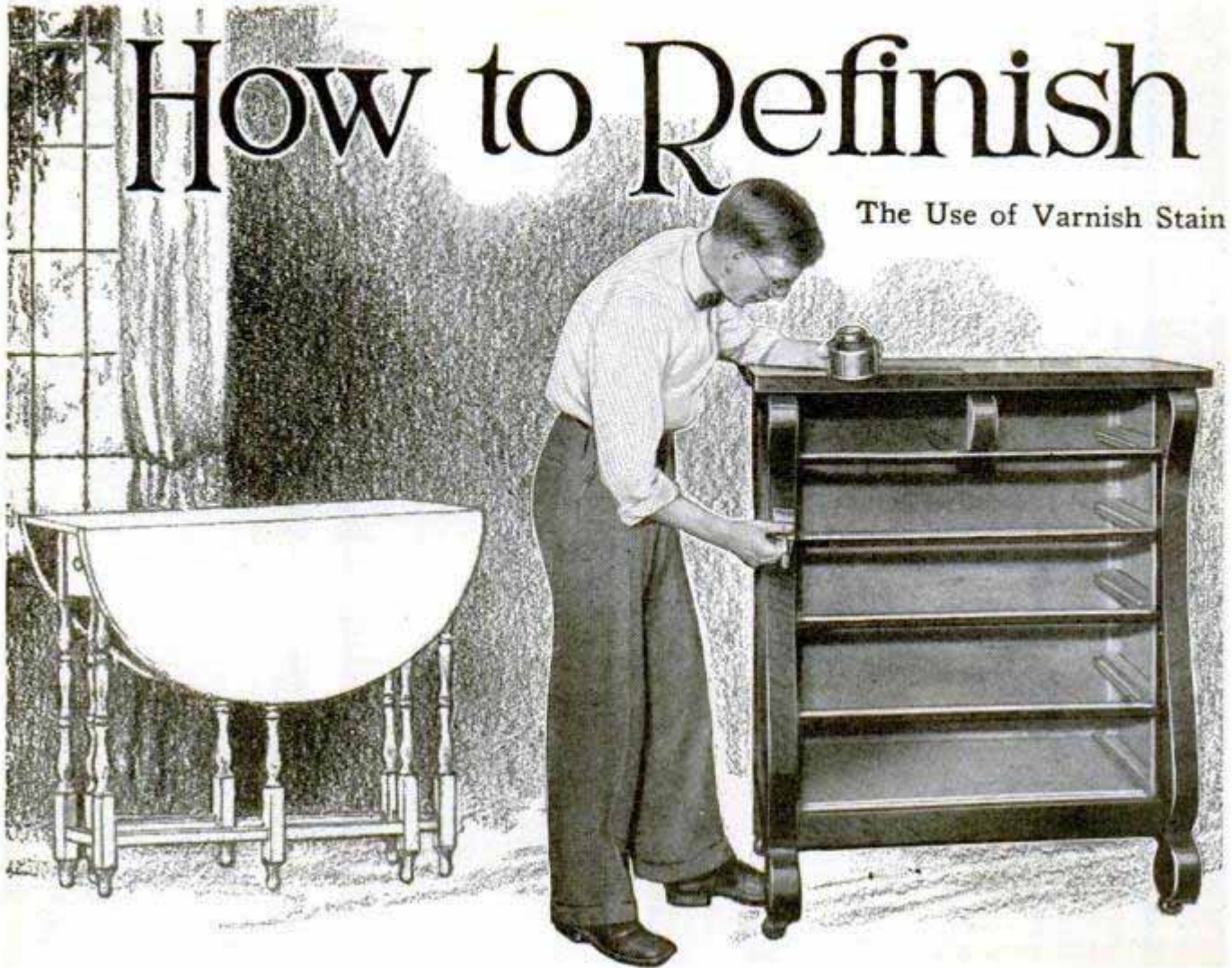
### Finishing Plastered Walls with Paint

Many amateur craftsmen, who have undertaken the painting of newly plastered walls, have been of the opinion that the wall must be sized with glue or some other similar substance before it can be given the finishing coats of flat tints. A better method of preparing the wall is to apply a priming coat of paint on the plaster instead of the size.



# How to Refinish

The Use of Varnish Stain



**T**HE STAINED finish is the accepted high-grade finish of today, correct in taste, reflecting dignity and used in the expensive suites. Walnut and brown mahogany, the popular finishes of the past few years, grace the interior of the more modernly furnished residence, but there are still countless homes with the golden-oak furniture of a decade ago, and comparatively few which are not "blessed" with at least some pieces in this once popular finish. These can easily be changed to the modish walnut and brown mahogany. The work is interesting, it is a profitable use of spare time, and there is a great deal of satisfaction in the attainment of fine results to the man who enjoys producing things with his own hands.

There are two ways to do this finishing. One is to color the wood with stain, and then apply coats of varnish. Practically all new furniture is treated at the factory in this way. For the finest refinishing, the old finish is removed and a new one built up from the wood with stain and varnish coats. The other method is to

use varnish stain (stain and varnish combined) over the old coating.

In this issue we will describe the quick method of varnish-stain finishing without the removal of the old finish. Much realistic and beautiful work has been done in this way, and a really nice finish may be produced, suited for any except very fine pieces. We will take, for instance, a dresser in golden oak finished with gloss varnish, and follow the operation of changing it to a walnut finish. (The procedure will be the same for any of the dark-stain finishes; and light-stain effects, such as silver-gray, cannot be satisfactorily produced over a darker finish.)

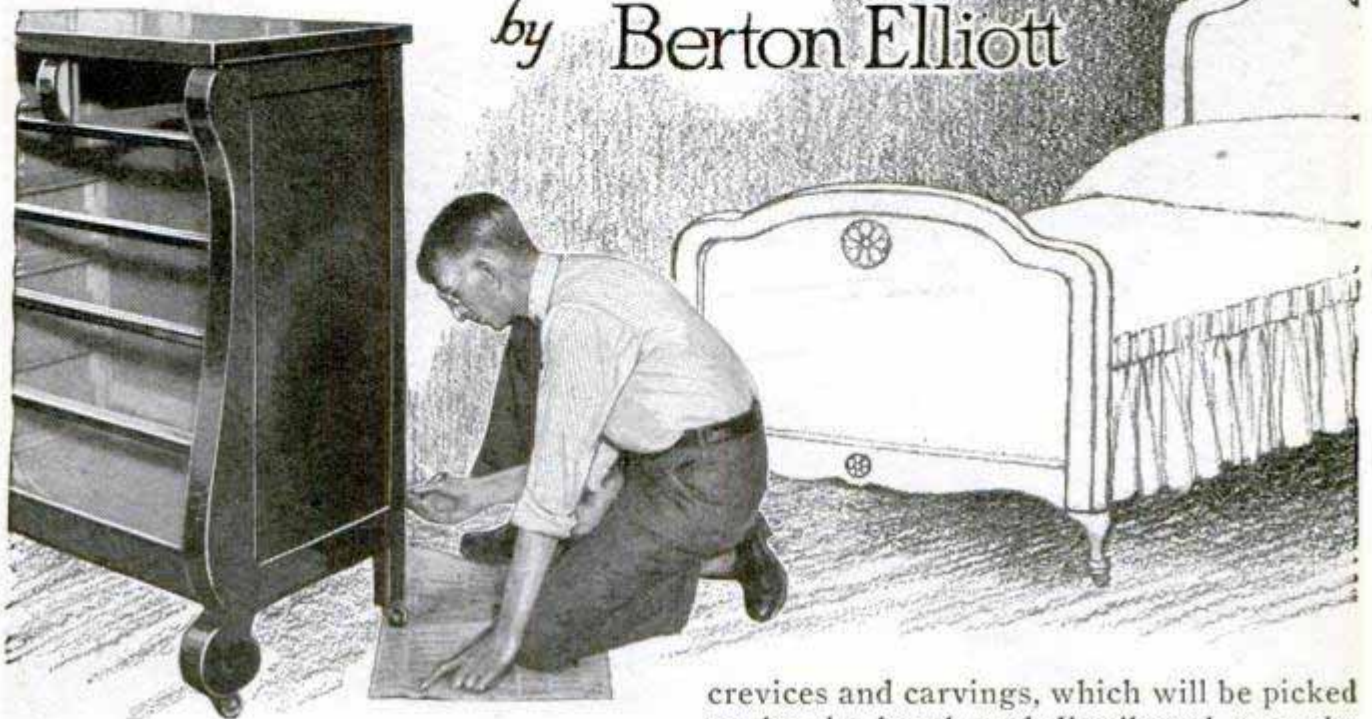
The first step is, of course, to clean the surface by washing with soap and water, followed by a rinse-off with clear water. Wipe the surface with a cloth wet with gasoline, naphtha or benzine, to cut and remove any greasy substances that may be present from handling, or from the use of greasy or oily polishing preparations or of wax.

The next step varies somewhat accord-



# Your Old Furniture

by Berton Elliott



ing to the condition of the old finish. If good, a light sandpapering to cut the gloss is all that is necessary. If it has been chipped off so there are depressions in the surface, the edges around the depression should be feathered or tapered with sandpaper. In case the old varnish finish is badly checked or "alligatored," there is nothing that will prevent the checks showing through the refinishing coats. These will actually magnify and emphasize the checks and cracks. In such cases, the only way to do a really first-class job is to remove the old finish. If this is not desired, the checked finish should be sanded down thoroughly, especially on all conspicuous surfaces, such as the dresser top, fronts of drawers, etc. This, although it will not remove all trace of the checks, will sand them out to some extent.

After the sandpapering has been completed, the surface should be dusted clean from all particles of sand and sawdust, immediately before starting to apply the finishing coats. When using varnish products, it is important that every bit of dust be removed from the surface, as every speck shows through the transparent varnish. Watch out for dirt in corners,

crevices and carvings, which will be picked up by the brush and distributed over the surface.

Our dresser is now ready for the actual application of the refinishing materials. Drawers should be removed. (If desired, the mirror and the uprights supporting it may be removed and left off entirely, or the mirror hung on the wall from the picture molding just above the dresser.)

The first application is an evenly brushed-on coat of walnut varnish stain. As the shade of any stain material varies according to the surface over which it is applied, it will be a good idea to try out the finish on some inconspicuous part of the dresser, to see if the effect is satisfactory. This can perhaps be done on the back of one of the legs, or on an edge next to the wall. If the effect is too dark, it can be lightened by adding a little turpentine. If too light, an additional coat may give the desired effect. Each succeeding coat of a varnish stain darkens the surface perceptibly, and three or four coats may give you just the effect you want.

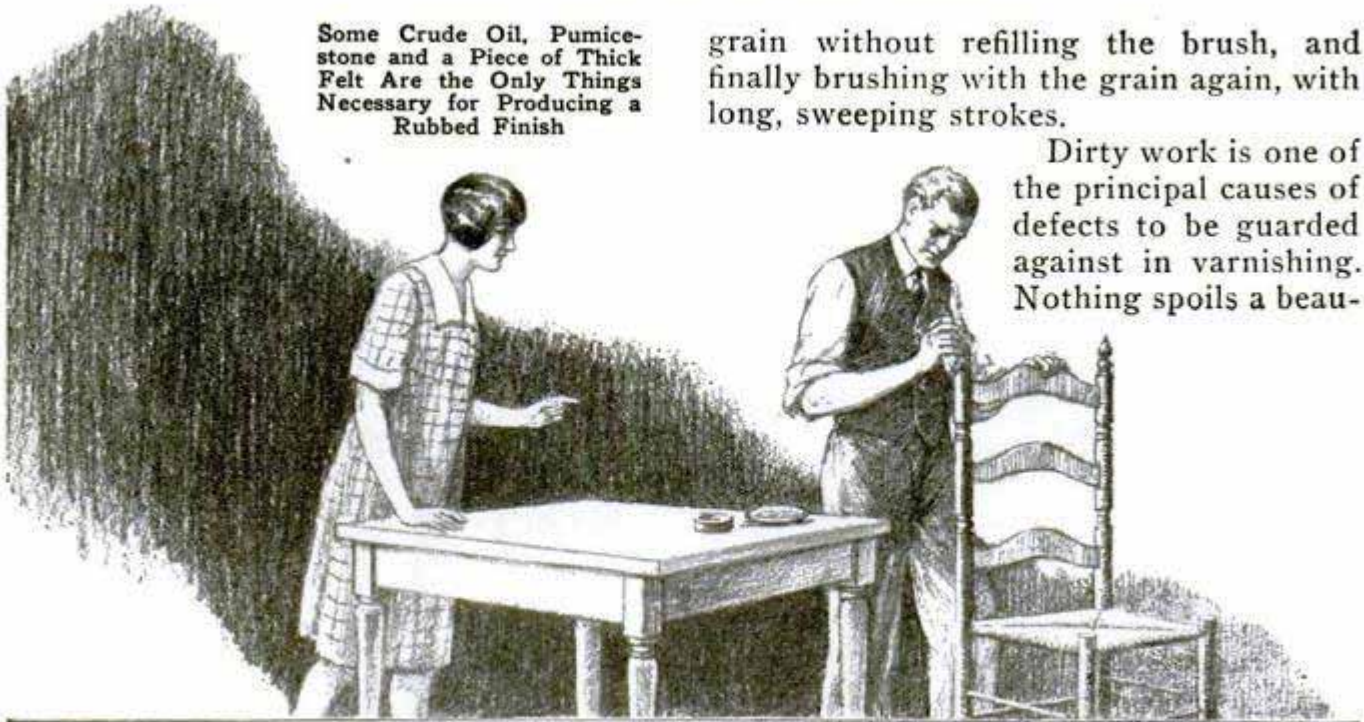
After the try-out, the required number of coats of the stain should be applied over the entire surface. In doing the top or other large panels, do a strip 3 or 4 in. wide the full length of the panel; then



Some Crude Oil, Pumice-stone and a Piece of Thick Felt Are the Only Things Necessary for Producing a Rubbed Finish

grain without refilling the brush, and finally brushing with the grain again, with long, sweeping strokes.

Dirty work is one of the principal causes of defects to be guarded against in varnishing. Nothing spoils a beau-



take another strip of the same width, and so on over the entire surface, working quickly to prevent the edge from setting before you get back over the next lap, which would cause streaking at the overlap. If the material drags a little under the brush and goes on with a blotchy appearance, add a little turpentine. The more conspicuous larger surfaces should be left until the last, so you will be sure the material is working right when you do them. If more than one coat is applied, each coat should be allowed to dry at least forty-eight hours and then sandpapered lightly before applying the next coat.

When the varnish-stain treatment is completed, a finishing coating of varnish should be applied. This may be of gloss varnish, either left in full gloss effect or rubbed to a semi-dull finish, or it may be of flat-drying varnish.

Varnish is applied in about the same way as enamel, with the cross brushing method described fully in the December, 1928, issue of this magazine, flowing it on with the grain, then brushing across the

tiful varnish finish more than dust or grit in the surface, and failure to get a clean finish is, in the great majority of cases, due to the brush, the varnish cup, or the surface not being absolutely clean. Varnish brushes must be kept thoroughly clean clear up to the root ends. Dried skins, and particles of the finishing material left in the heel of the brush, work their way down, and it is almost impossible to get a brush that has been allowed to get "lousy," to use the painter's term, clean enough again to use for varnishing.

Varnish (and varnish stain) should always be applied in a room which is just as free from dust as possible, and care should be taken that no dust is raised in the room during and for several hours after application, until the material has set dustfree. People walking will stir up enough dust to ruin a job. It is also important that varnish be applied in a warm room, that the surface on which it is applied be warm, and that the varnish itself be warm; other-



wise it will not flow properly and level itself to a smooth, even surface. If varnish has been kept in a cold room for any length of time, it should be warmed by setting the can in hot water, or by placing it near (but not on) a hot radiator. If possible, varnishing should always be done on a dry day, as it dries very slowly in damp weather, sometimes causing trouble and affording a greater opportunity for dust to settle on the work before it has dried, and also a greater chance for someone to get against the work and spoil it. Windows should be kept closed while applying varnish and until it has set dust-free; then opened, if practicable, except in extreme cold weather, to provide ventilation and good drying conditions.

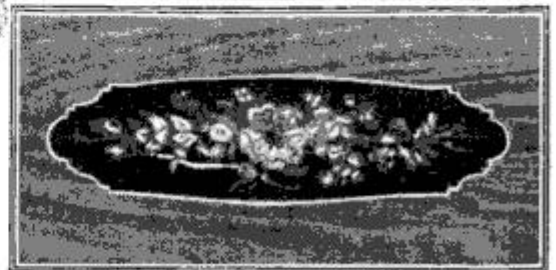
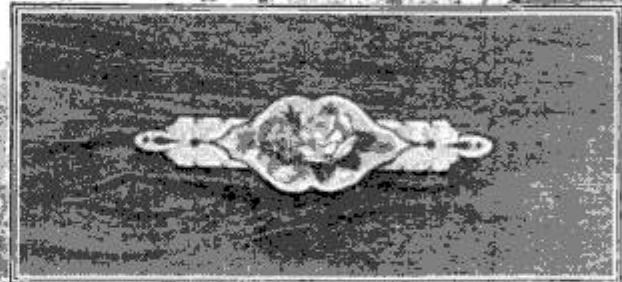
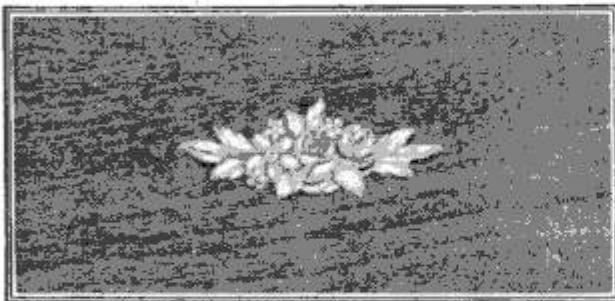
If varnish from a previously opened can is used, even though it has been kept tightly corked, it will be found that a skin has formed over the top. This should be punctured carefully and the varnish strained through cheesecloth to filter out any small pieces of dried skin. If the varnish has become too thick to spread easily, it should be thinned with a little pure turpentine.

In the application of varnish, there are certain defects of workmanship which should be continually guarded against. Skipped places is one of these, and the finisher should keep looking across toward the light, down close to the surface, which will readily show up any missed places. He should also be on the watch out for sags or beads of varnish running down over the work, especially at the corners, and immediately on seeing one pick it up

These should be worked out as much as possible with the fingers, and by dipping the brush in turpentine or in the varnish itself and brushing it out on a clean board or piece of paper. When a hair is shed into the work, it should be poked out with the end of the brush, and the surface then smoothed out. Varnish brushes ought to be kept for use only with varnish, and should be cleaned only with turpentine or benzine (never gasoline).

While on the subject of brushes, a word about the kind to use for varnishing is in order. A good-quality 1½-in. chiseled varnish brush will be found very satisfactory for the average furniture-finishing requirements. Expert finishers generally prefer what is termed a "flowing" brush, but these are rather high-priced, and good work can be done with a regular varnish brush. It is important, however, that a high-grade brush be used, as one should not expect to do good work with a cheap brush. Get a good brush and keep it in good condition. It is also desirable to have a small 1-in. brush for small surfaces.

Decalcomania Transfers, Pastefully Selected and Applied, Add Much to the Appearance of the Finished Work



with a corner of the brush. Another thing to be constantly watched for is loose hairs shed into the work. These are especially common when new brushes are used, for, no matter how high-grade the brush, there are always a few loose hairs.

*Thurston's Varnish*  
*Shurston's Varnish*  
*Wm. Campana Co.*  
*318 S. Michigan St.*



chair rounds, etc. This may be a regular varnish-brush type, but for fitting rounded surfaces a camel's-hair brush is preferred by many.

For the finest finish, a coating of gloss varnish should be applied, and rubbed, about three or four days after application, with pumicestone and oil. Full directions for producing a rubbed effect, by dipping a pad of rubbing felt or soft cloth first in rubbing oil or sewing-machine oil, then in powdered pumicestone, and rubbing over the surface, were also given in the December issue.

For the finest rubbed job, two coats, or preferably three coats, of gloss varnish should be applied, rubbing the first coats lightly with No. 00 sandpaper (or for the best possible job, with pumicestone and water) and the finishing coat with pumicestone and oil to the desired effect. However, one coat of clear varnish over a coat of varnish stain may be rubbed to a reasonably good job, if care is taken not to rub too much, so as to cut through, especially at the sharp edges. Wipe and examine the surface often to note progress.

Another method sometimes employed by home finishers, which will be found very satisfactory for any except the very finest work, is to apply a coat of gloss varnish over the varnish stain, and rub it lightly, after drying three or four days, with fine steel wool (No. 00) wet with linseed oil. This will be found a simpler operation than pumice rubbing, and there will be less chance of the novice rubbing through the finish.

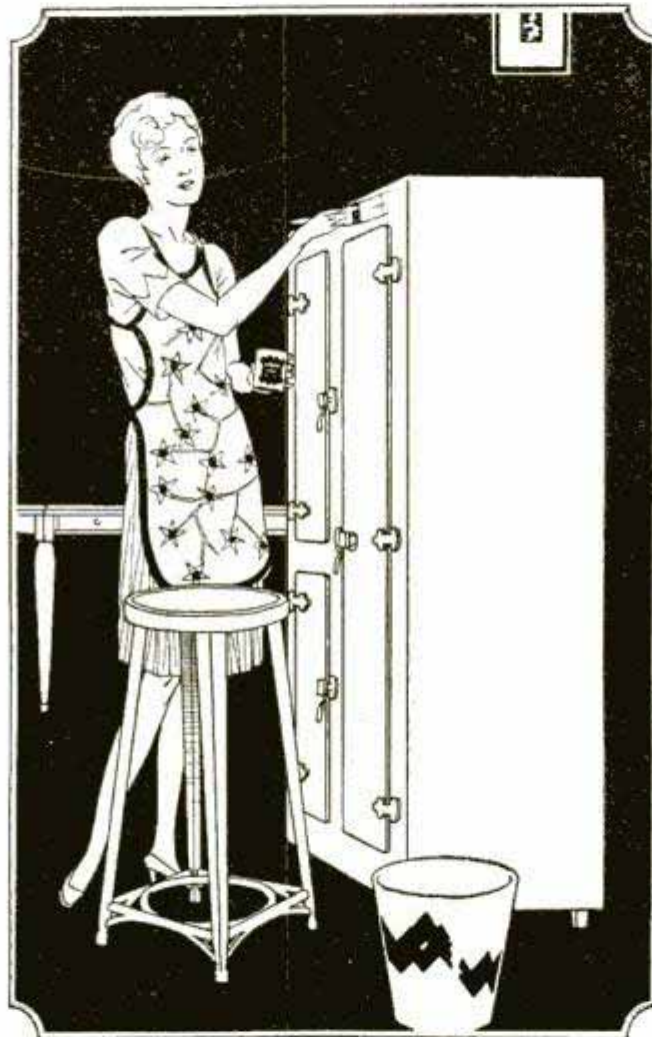
Here it might be mentioned that in case rubbing with any material should not

turn out satisfactorily, and the surface seem to be blurred or streaked, it can generally be corrected by applying a thin coat of prepared wax (floor wax), and polishing briskly with a soft cloth. Many people, also, are especially fond of a waxed finish, and prefer to wax over a varnished finish to obtain the typical wax sheen, but it should be remembered that a wax finish requires more attention, and must be polished frequently to keep looking well.

The other method of finishing—and the easiest one—is to apply one finishing coat

of flat-drying varnish over the varnish-stain coat. This closely approximates a rubbed effect, although it has not the depth and richness of the real hand-rubbed finish. When applying flat varnish, it is important to shake the container immediately before using, as, unlike gloss varnishes, part of the content of flat varnish ordinarily settles to the bottom and should be reincorporated with the liquid before using.

If desired, a finishing touch may now be added with applied decoration. Transfer patterns (decalcomanias) may be obtained



simulating wood inlays, designed especially for use on stain-finished furniture. These are easily applied and impart a note of richness to the piece that is worth while. Stenciling is sometimes used as a last finishing touch, but care must be taken to use designs and colorings that are appropriate to stain-finished wood.

☞ Any old canvas water bag, slit open at the top, makes an ideal creel for carrying fish and will keep them moist and fresh all day.

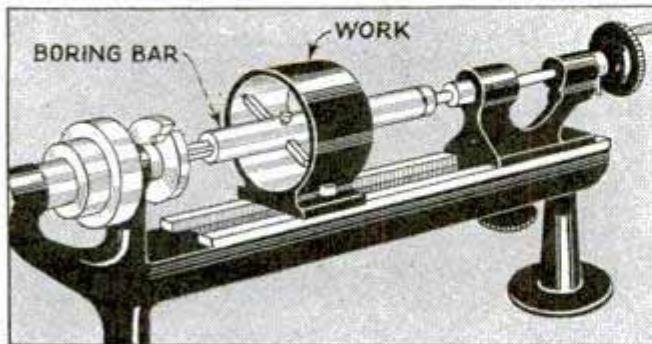
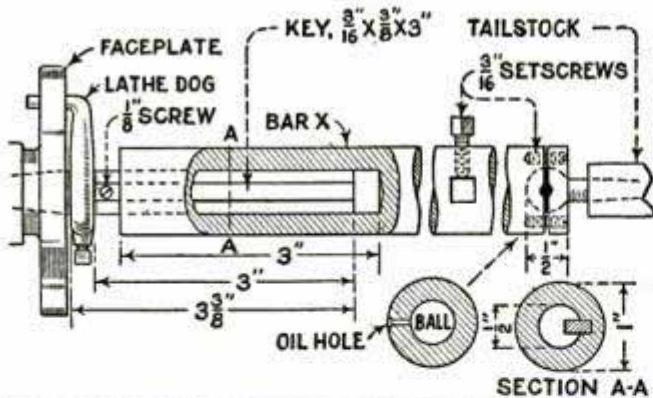


### Removing Dents in Soft Wood

When working with soft wood or medium hardwood, the hammer may occasionally slip, making dents on the surface, which, of course, spoil the appearance of the job. To take out such dents pour on a few drops of alcohol and light it. The heat will swell the wood and raise it to the original surface, the alcohol burning out so quickly that no charring will result.—L. B. Robbins, Harwich, Mass.

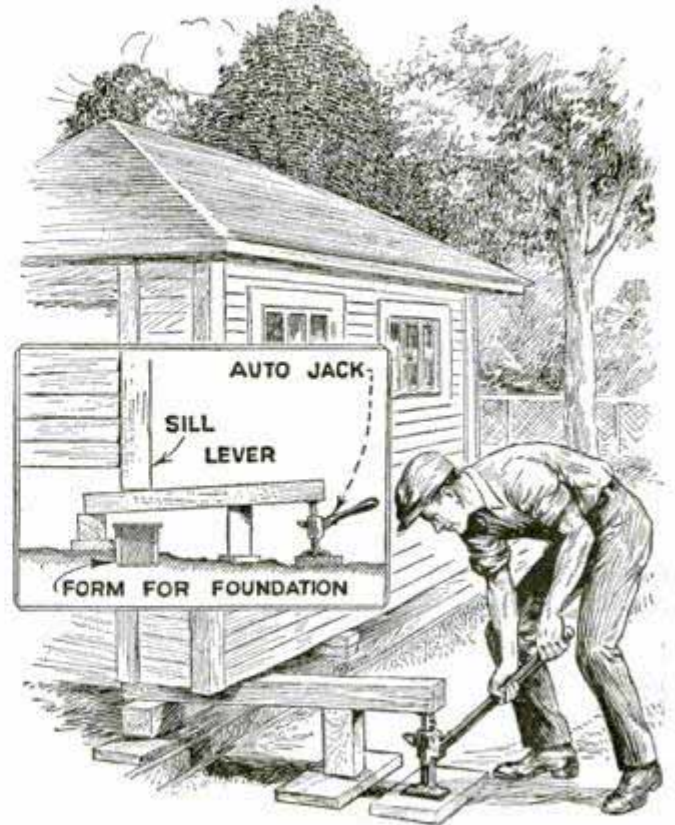
### Boring Bar for the Home Lathe

The drawing shows a simple boring bar which I made for use on a small lathe in my home workshop. The cutting tool is held securely in a sleeve keyed to a shaft, which is driven by the chuck or the faceplate of the lathe, a dog being used in the latter case. With this arrangement it is necessary for the sleeve to slide lengthwise on the shaft so that it can be moved back and forth while revolving. This movement is made possible by the provision of a ball-and-socket joint at the other end of the sleeve, indicated in the upper right-hand detail of the illustration. The joint permits attachment to the tailstock, which is used to feed the tool. The work is



Simple Boring-Bar Attachment on a Small Lathe in the Home Workshop

mounted on the lathe bed as shown.—Ed. M. Wyland, Rapid City, S. Dak.



Raising a Garage Single-Handed with an Auto Jack before Laying Concrete Foundation

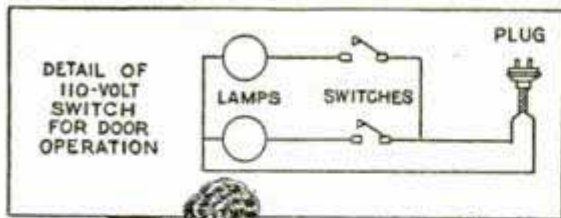
### Raising Garage with Auto Jack

When it is desired to raise a garage that is set on posts, in order to put a concrete foundation under it, an auto jack will be found useful. A number of lengths of 4 by 4-in. stock are obtained, for use as lifting bars, and they are pushed under the sill at right angles to it. A block and plank are set under one end of these and the auto jack under the other. After the jack has raised the bar, a block is pushed under it to hold the load, and then the jack can be used to raise the next bar, a few feet away. Repeat the operation until the whole garage is raised to the desired height. The foundation is then laid, and after it has set for several days, the garage can be let down on it by reversing the method.

### Magnetizing a Pair of Scissors

To make it easy to pick up a needle when it falls on the floor, in water, or places that are hard to get at, I have magnetized a pair of scissors. Anyone can do this by merely stroking the scissors in one direction over a pole of an electromagnet or ordinary steel magnet of sufficient strength.—Andrew Veng, Philadelphia, Pa.





Electric Lamps in Refrigerator Are Automatically Lighted When Doors Are Opened

### Electric Light in the Ice Box

Our refrigerator is located on the rear porch and the light is so far away that it provides very little illumination for the refrigerator. Two small door switches, which close a circuit when a door to which they are attached is opened, were installed on the refrigerator doors. A lamp was provided in each compartment, and a length of lampcord was used to connect the circuit with a near-by wall plug.—Miss Jane Rider, Washington, Ill.

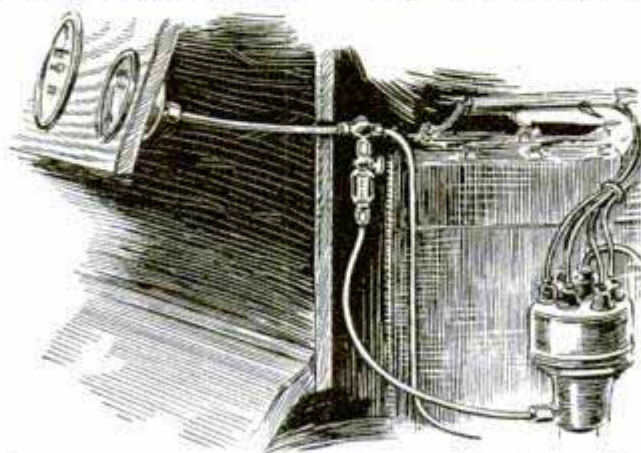
### Oiling Auto-Distributor Shaft

Distributor shafts on some auto motors receive insufficient oiling, due to the fact that the grease or oil cup located at the top of the distributor shaft is forgotten. To insure proper lubrication for this part, without special attention, the method shown in the illustration will be found satisfactory. It consists in getting the oil supply from the pipe running to the oil

gauge on the instrument board. Cut this pipe and install a tee and a needle-valve sight-feed lubricator as indicated, and run a length of copper tubing from the needle valve to the distributor shaft. Adjustment of the needle valve controls the amount of oil fed to the shaft, and as long as there is any oil in the crankcase, the distributor shaft will not run dry. The oil should be allowed to pass only in drops.

### Plastic Paint Made from White Lead

Textured walls are now quite popular and there are several high-grade plastic paints on the market for treating plastered walls. It is not generally known, however, that a white-lead plastic paint can be readily made at little cost, which will give entirely satisfactory results. Plastic paint must be thick enough to allow designs and figures to be worked in it, should dry hard and quickly enough so that it may be glazed over if desired, and have some oil content to give permanency. It consists of the following ingredients: white lead, 19 lb.; dry whiting, 4 lb.; flattening oil, 1 qt., and drier,  $\frac{1}{4}$  gill. The best method of compounding it is to use one-half of the oil to break up the white lead, and mix the other half with the whiting. Then mix the two together and add the drier, which will result in a thick paint, about twice as heavy as the average white-lead paint, which can be applied with a brush. It should be applied heavily. The above quantity will cover about 30 sq. yd. Color can be added to the mixture or it can be applied dry with the brush, giving the desired rough and streaky appearance. As soon as the paint is on the wall, it is ready for the working in of the designs,



Insuring Proper Lubrication on the Distributor Shaft of an Auto Motor

which may be of various kinds. Expensive tools are not required; a graining comb is handy for some designs, and a kitchen spoon is useful for making circular figures. Crumpled paper is sometimes used as well as wadded rough cloth for texture designs.



# SHOP NOTES



All Shop Notes published in 1928, in book form—Fifty Cents—from our Book Department

## A Ball-Bearing Scrollsaw

By W. CLYDE LAMMEY

**I**N TIMES past the writer has made several attempts to construct a scroll saw that would be suitable for a wide range of work, and all have been more or less of a

equal any of like capacity in practical features.

The ball-bearing assemblies in the skate wheels are used in the saw arms and in the pitman and driving wheel, making an easy-running mechanism that may be operated at high speed. The skate wheel is used intact in the saw arms and driving wheel, but only the assembly in the pitman rod.

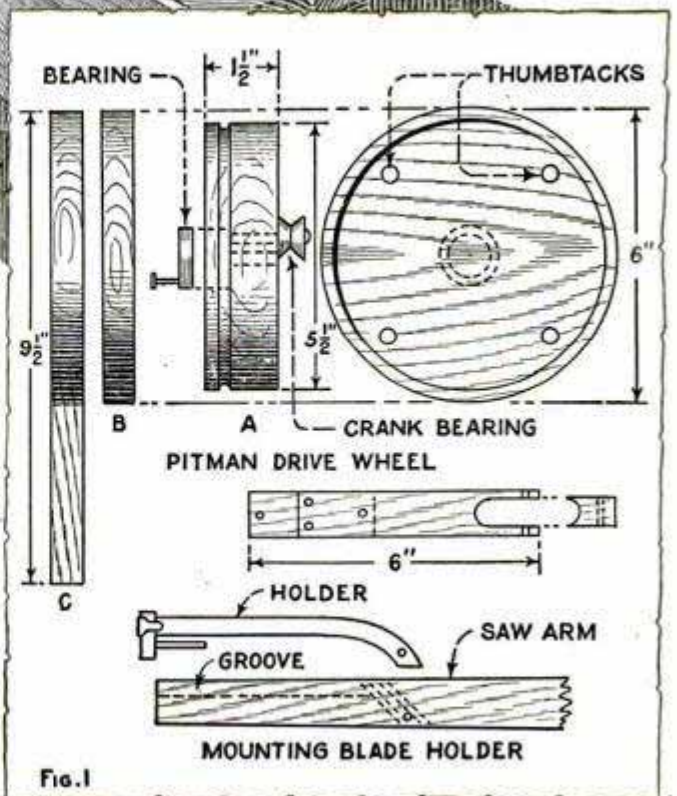
If no discarded skate is available, get four wheels with the regular threaded bolts. These may be obtained at any hardware store where repair parts are carried. Make sure that the wheels are of the



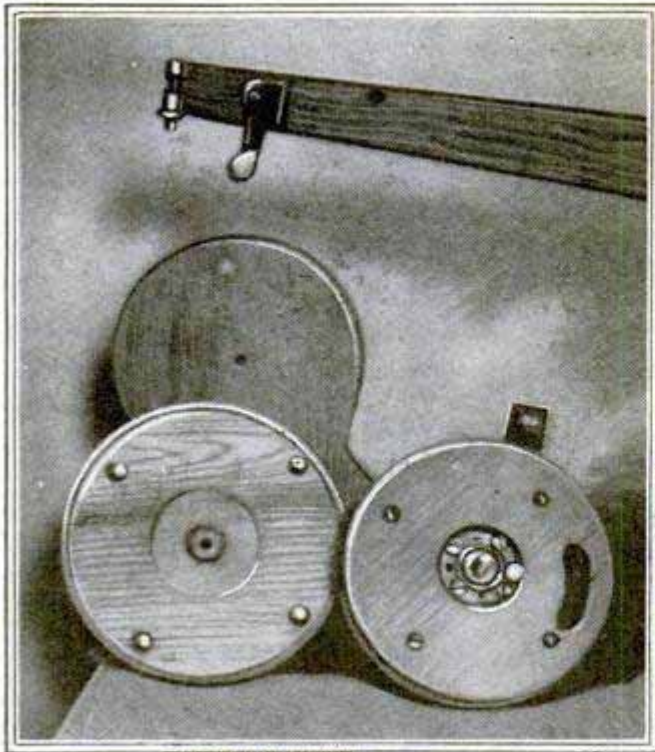
CUTTING OUT TABLE

failure, owing to the difficulty of making a smooth, easy-running assembly. In every instance, the driving mechanism was faulty and soon went to pieces under the strain of driving even small fine-toothed blades.

However, it happened one day, while cleaning the basement, that a discarded pair of roller skates was found, and, after some cogitation, these rusty skates became the nucleus of an idea which in essential is the project described, namely, a ball-bearing scroll saw. Though lacking in refinements perhaps, it has been found to







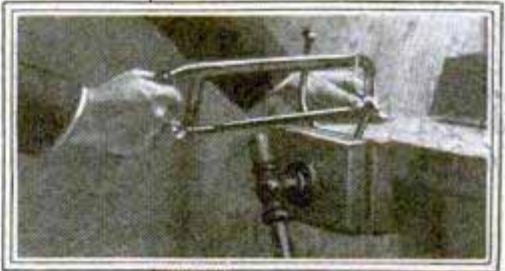
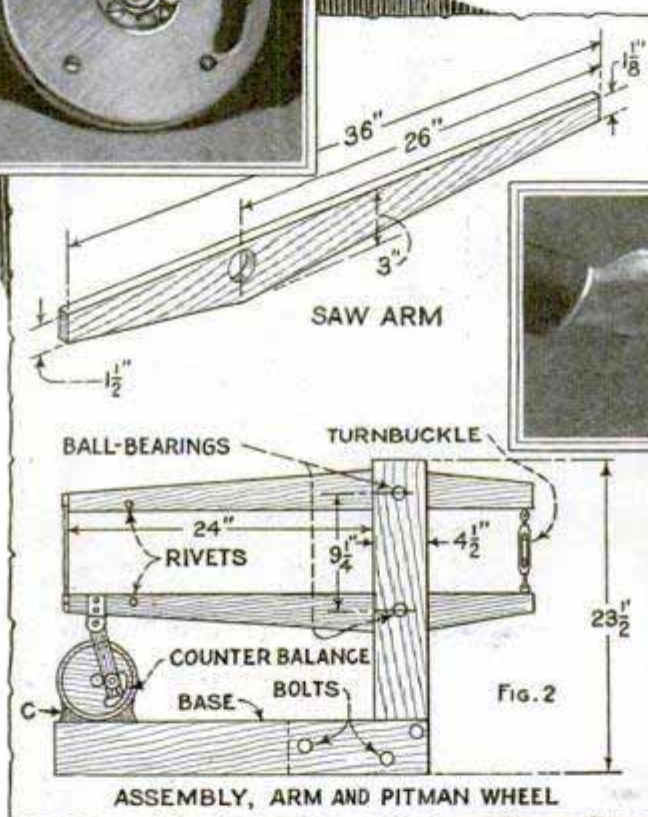
ing saw as shown in Fig. 1. Chisel a groove of suitable size and depth in the end of the saw arm (in the upper edge of the top arm, the reverse in the lower), bore several slanting holes and chisel out to take the curved portion. Rivet the holder in place, using washers; then fill the groove with plastic wood, and, when dry, sand smooth.

A turnbuckle with two fairly heavy screweyes is used to provide a quick means of adjusting the blade tension. The screweyes are turned into the wood and a  $\frac{3}{16}$ -in. rivet put through close to the end, to prevent splitting. Centering 10 in. from this end and  $1\frac{3}{8}$  in. from the lower edge in the upper arm, and the reverse in the

double ball-race type, as these are more certain to run true and are best suited to the purpose.

Rip the stock for the arms and the upright arm supports from 1-in. oak to the dimensions and form shown in the drawings, and true the edges with the jointing plane. Cut two pieces, 28 in. long, from 2 by 4-in. stock for the base. Half-lap the ends over the uprights (Fig. 5), taking care to have the shoulders of the halves square. Use a 1 by 4-in. piece, about 9 in. long, to space between the uprights and for rigidity. Use two hand clamps to hold this assembly square while boring the three  $\frac{1}{4}$ -in. holes for the bolts. Give a liberal application of glue to the joining surfaces and tighten the bolts on washers. If desired, the upright arm supports may extend to the floor to make a floor mounting.

After the stock for the arms has been prepared, the turnbuckle, bearings and blade holders are placed in position. The holders for a pin-end blade are adapted by cutting the frame of a small hand cop-



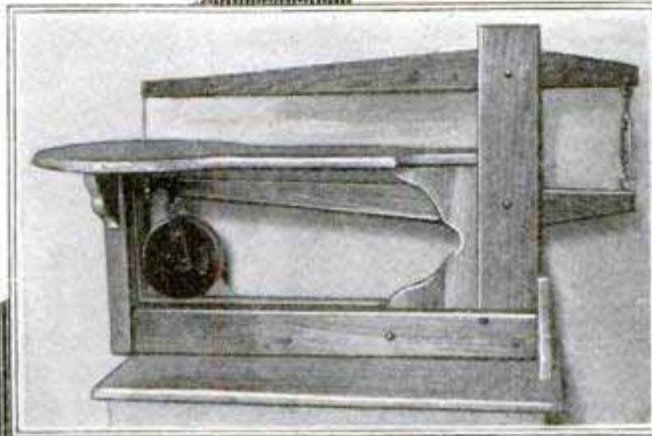
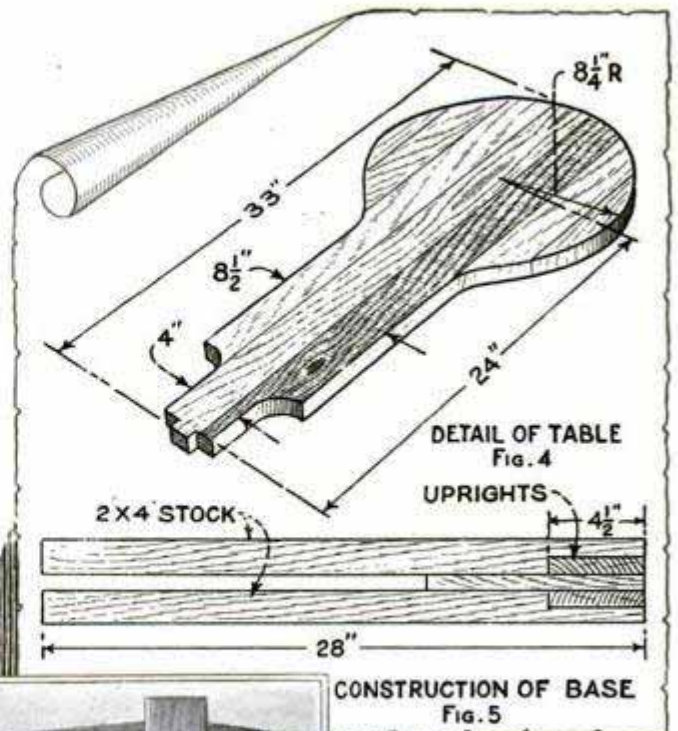
lower, bore a hole for the bearing with an expansion bit, first testing the setting on a piece of waste stock until the skate wheel is a tight driving fit. In driving the wheel to position, use a large nail set on the rim, rather than striking it directly, as this is likely to damage the bearing.

Before laying the arms aside, obtain a piece of common strap iron (or any other that happens to be adaptable)  $\frac{1}{8}$  by 1 in., and cut from it two pieces, 3 in. long;  $\frac{7}{8}$



in. from one end bend at right angles and  $\frac{3}{8}$  in. farther bend again, making an offset of  $\frac{3}{8}$  in. in each piece. Bore a  $\frac{1}{4}$ -in. hole through the offset ends and two  $\frac{3}{16}$ -in. holes in each opposite end. Rivet the pieces to the lower saw arm, one on each side and 2 in. from the end taking the blade. These form the upper connection for the pitman.

The saw table is best built up from 1-in. yellow pine in the manner shown above Fig. 1. Cut a piece, 33 in. long, from 1 by 10-in. yellow pine, and rip another,  $2\frac{1}{2}$  in. wide and 3 ft. 8 in. long, from the same stock. Cut this last in four pieces, two 1 ft. long and two 10 in. long. Square all edges carefully with the plane, and dowel and glue the pieces, two on each side, in such a position as to get a circle of  $8\frac{1}{4}$ -in. radius about the end. Scribe a circle about the end, rounding off where it meets the center-piece; saw to the



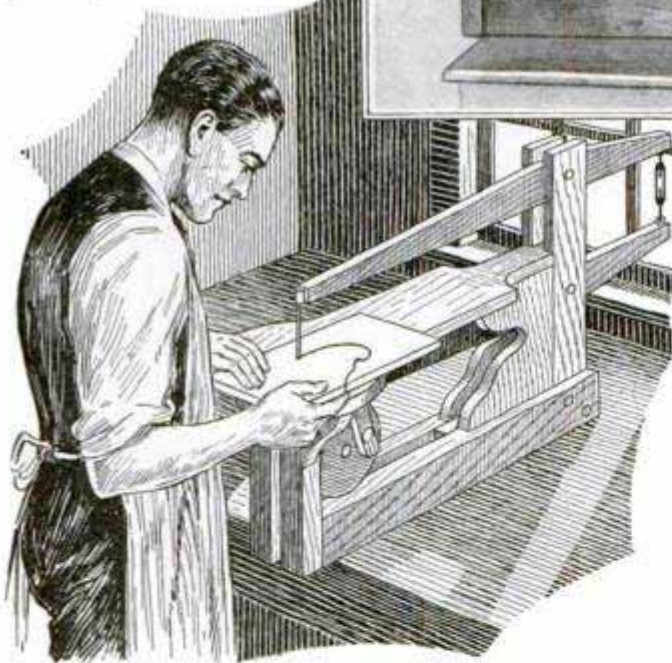
which in turn is secured to the support C. This method of construction has been found to overcome the tendency to run out of true owing to the short bearing surface of the skate wheel.

For the driver, saw two pieces of hardwood to 6-in. diameter, each  $\frac{3}{4}$  in. thick, and glue together with the grain running at right angles. Use screws to save the wait for the glue to harden. Turn out on the faceplate to  $5\frac{1}{2}$ -in. diameter and true the outer face carefully. Cut a groove for a  $\frac{1}{4}$ -in. round belt, having the center of the groove about  $\frac{3}{8}$  in. from the inner face of the wheel, so that the belt will run directly over the bearing. Sink a recess centered on the face of the wheel, to take in the skate bearing flush with the surface. Use the greatest care in this operation to have the bearing fit tightly. Sand the wheel smooth.

In the standard skate wheel with iron tread, there is a series of small holes through the inner face just below the tread. Before driving the bearing in place, bore several of these holes through both sides of the rim and countersink for screws. Center a  $\frac{3}{8}$ -in. hole in the recess for the bolt head, and bore through the wood. Take care to have it true. Drive

outline, and plane and sand smooth. Handling the stock will be greatly facilitated if the table is given two coats of thin shellac and rubbed smooth. This makes a hard surface that is well worth the extra labor.

The pitman drive-wheel assembly consists of three parts, A, B and C, Fig. 1. The drive wheel A carries the bearing and is made to run in a recess in the plate B,





the bearing in place and tighten with screws. As close to the tread as possible (in the metal), bore a  $\frac{1}{4}$ -in. hole for the bolt holding the pitman bearing. This will give a stroke of approximately  $1\frac{1}{2}$  in. The position and relation of the component parts will be readily seen from the drawings and photos.

Turn the plate B from a single disk of hardwood to exactly 6-in. diameter, and, beginning a trifle less than  $\frac{1}{4}$  in. from the edge, recess the surface  $\frac{3}{16}$  in.;  $\frac{3}{4}$  in. from the center, sink a deeper ring to accommodate the head of the pitman bolt. Drive four ordinary thumbtacks into the inner surface of the plate as shown. Mark the outline of this disk on a piece of hardwood, 1 by 6 by  $9\frac{1}{2}$  in. Saw a three-quarter circle to the line and bring the edges around in a curve as shown in the assembly, Fig. 2.

Tighten a skate wheel in the vise and, with a hacksaw, cut through the tread down to the cones that form the inner half of the ball races, and pry the rim apart. This will release the bearing. Using one of the threaded bolts, with a thin washer next to the wood, tighten the pitman bearing in place. Centering  $\frac{7}{8}$  in. over this bearing and in approximately the same arc as the wheel rim, bore six  $\frac{3}{8}$ -in. holes and chisel out the waste as in a mortise. On the average, this will remove sufficient weight to counterbalance the wheel.

The pitman is made from a piece of maple, planed to  $\frac{3}{4}$  in. in thickness,  $1\frac{3}{8}$  in. in width, and  $4\frac{1}{2}$  in. in length, into one end of which is let a 3-in. length of  $\frac{1}{8}$ -in. iron. Make two saw kerfs as closely together as possible in one end of the wood to a depth of  $1\frac{1}{2}$  in. and rivet the iron in place in this slot. Bore a  $\frac{1}{4}$ -in. hole through the outer end of the iron. Center a  $\frac{7}{8}$ -in. hole  $1\frac{3}{4}$  in. from the end in the wood, and saw down tangent to the circle, removing the piece as shown (Fig. 1). Slip the open end over the pitman bearing and insert the short piece. Hold in place with

a clamp and bore a hole for a small stove bolt, to clamp the loose piece.

Assemble the arms in the frame first, using  $\frac{1}{4}$ -in. bolts. Punch washers from tin, and shim the bearings until the saw arms move freely when the bolts are tightened. Bolt the pitman-wheel assembly together, using thin washers between the plate and the wheel, until it turns easily without binding against the heads of the thumbtacks. Bolt in place as shown in Fig. 2, and connect the upper end of the pitman to the arm, using a small bolt. If the parts have been carefully made, this assembly will be found to run with remarkable ease and smoothness, the ball bearing adding immeasurably to the elimination of friction.

Center a  $\frac{3}{8}$ -in. hole in the circular end of the table for the blade. Raise the arms to the highest point in the stroke, measure, and allow about  $\frac{1}{2}$  in. for clearance. Mark this measurement on the arm supports, and at this height fasten a small piece with screws to support the rear of the table. Measuring an equal height, cut two pieces from 2 by 2-in. stock and secure to the ends of the base with lag screws. Be sure that the pieces are even at the top. Lay the table in place, insert a blade in the holders and test with the square. If the table is square with the blade, lock it down with screws.

Mount a  $\frac{1}{8}$  or  $\frac{1}{4}$ -hp. motor just back of the pitman drive wheel and use a pulley of 1-in. diameter on the motor. The saw will make about 900 strokes per minute with a 1,750 r.p.m. motor and with a coarse-toothed blade will do clean and speedy sawing. The blade continually

recedes from the work on the upstroke, the advantage of which will at once be apparent in use, as this action precludes the annoying tendency to jerk the work upward. In machines with a blade moving straight up and down, it is necessary

to fit some kind of "foot" that will hold the work down when the blade is on the upstroke.

#### MATERIAL LIST

- 2 pieces, 2 by 4 by 28 in., yellow pine.
- 1 piece, 1 by 10 by 33 in., yellow pine.
- 1 piece, 1 by  $2\frac{1}{2}$  by 44 in., yellow pine.
- 2 pieces, 1 by 3 by 36 in., oak.
- 2 pieces, 1 by 4 by 24 in., oak.
- 2 pieces, 1 by 6 in. square, birch or maple.
- 1 piece, 1 by  $6\frac{1}{2}$  in. square, yellow pine.
- 1 piece, 1 by 6 by  $9\frac{1}{2}$  in., oak.
- 2 pieces, 2 by 2 by 16 in., yellow pine.
- 4 standard roller-skate wheels with iron treads and threaded bolts and nuts.
- 1 hand scrollsaw with 6-in. blade and 5-in. frame.

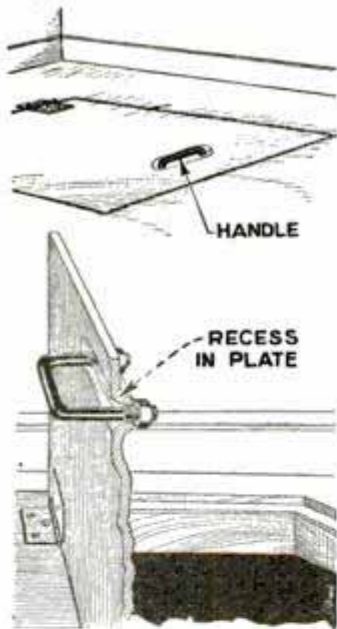


### One Way to Save Gasoline

A substantial saving of gasoline can be made by anyone having a car equipped with a vacuum windshield wiper which has a dash control. Before starting on a drive of any distance, disconnect the small hose connection on the wiper. After the car is started, turn on the dash control, which ordinarily would cause the wiper to operate. This procedure supplies the gas mixture with more air, thus thinning it and effecting a saving of gas. In some actual tests with a Chevrolet coach of the 1928 model, I averaged better than 30 miles per gallon. This idea cannot be used when the wiper control is built into the wiper, as, in this case, the amount of air entering the inlet manifold cannot be regulated.—H. L. Braly, Shamrock, Tex.

### Flush Handle for Trapdoor

In a manufacturing plant having a number of steel trapdoors, cheap, flush door handles were made and found as good as the commercial articles. Each handle is made from a piece of round stock, bent to a U-shape and threaded at both ends for



nuts. The holes in the door for the ends should be a trifle larger than the diameter of the handle, and the portion of the door between the holes is grooved so that the handle will drop flush with the surface when the door is closed. It can readily be pulled out to open the door.—G. A. Luers, Washington, D. C.

### Homemade Engine-Driven Ice Cutter

Any farmer who wishes to have an engine-driven ice cutter can easily make it himself as there is no difficulty involved in its construction. The sled is made of 2 by 6-in. stock, firmly braced and equipped with a handle for pushing. A stationary gas engine is mounted on the sled and a

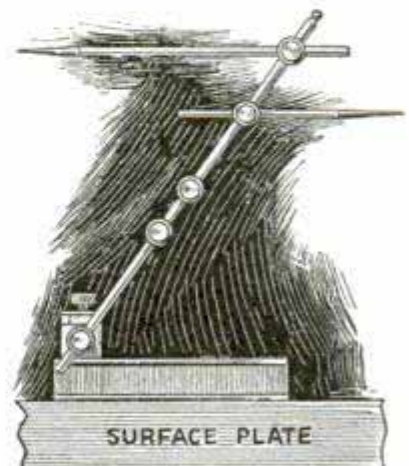


Harvesting Ice with a Simply Constructed Engine-Driven Cutter That Can Be Made at Home

suitable 2 by 6-in. frame, to hold a circular ice-cutting saw, is pivoted to the front end of the sled as shown, a lever being provided to permit raising or lowering the saw. The saw shaft is fitted with a pulley in line with the pulley of the engine, to which it is belted.—Clay L. Gorrell, Belair, Md.

### Multiple-Scriber Surface Gauge

When castings are to be laid out in lots, as they generally are in any large plant, the multiple-scriber surface gauge will be found a valuable aid. Once the scribers are set to the correct measurements, the entire lot of castings can be laid out without disturbing the setting of the gauge. This simple device will help increase production and will eliminate many errors in laying out the work.—C. Kugler, Philadelphia, Pa.





# Wood Joints for the Amateur

## PART II

WHEN the amateur, after watching the skillful craftsman make and fit a joint, starts in to do the job himself, he finds, to his surprise, that the thing is not quite so simple as it looked. In spite of the most careful work with the tools, the joint is not exactly right when it is finished. The fact is that there are many little things done by the craftsman while he is making a joint which go unobserved by the amateur, yet are essential to the success of the work. In addition to this, the professional, by long practice, has acquired a degree of skill in handling his tools that the amateur cannot hope to duplicate for some time, and consequently he must modify his methods to make up for his lack of facility in tool handling. Let us take the making of a cross-lap joint for example.

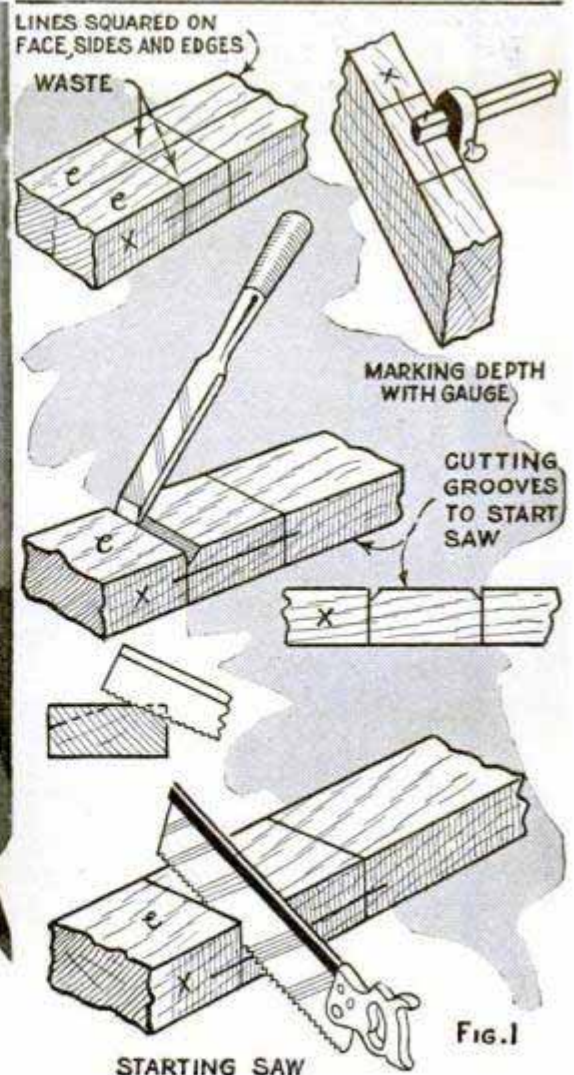
The first step is to square up a face side

ing them together, and square the marks across the face edges. Now square across the other edge, singly, keeping the stock of the square against the face side. Set a marking gauge to half the thickness of the stock, and gauge the depth of the recesses, gauging always from the face sides.

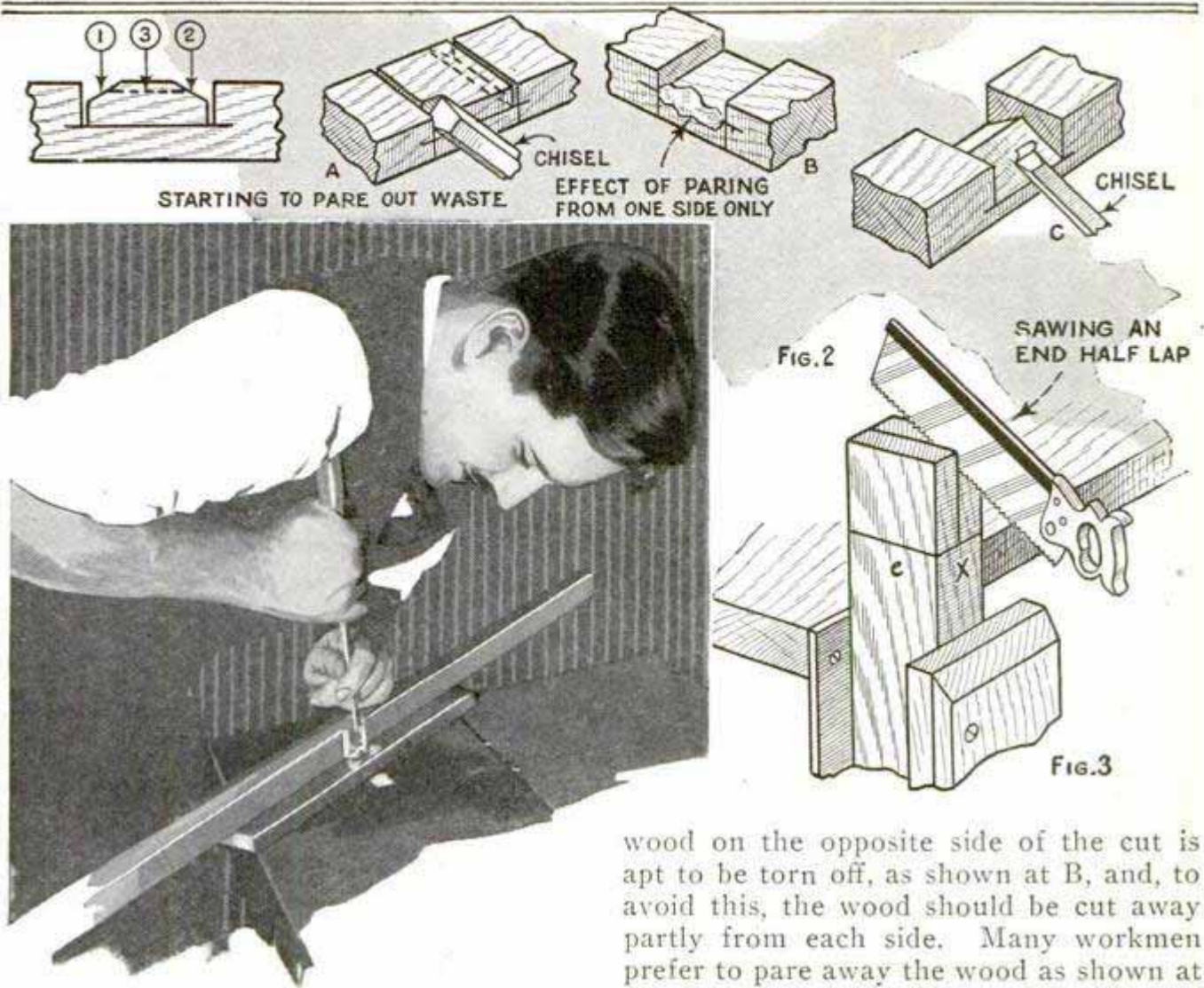
Now comes a little trick that the amateur will find of use. Take a chisel, and, slanting it toward the waste, as shown in Fig. 1, cut a little groove right up to the line on either side. If the knife marks have been made fairly deep, severing the fibers of the wood, the chips will come away clearly, and the groove will make it possible to start the saw square across the work, and just inside the line. Another tip is to start the saw as shown in the lower drawing in Fig. 1, holding it slanting, and sawing down on one side until the saw teeth just touch the line marking



and edge on each piece, and mark them (see Fig. 1). After measuring and marking the position and width of the joint on one, lay the pieces side by side, as shown, and square the marks, with the knife, across both faces. Turn them edgewise, keep-







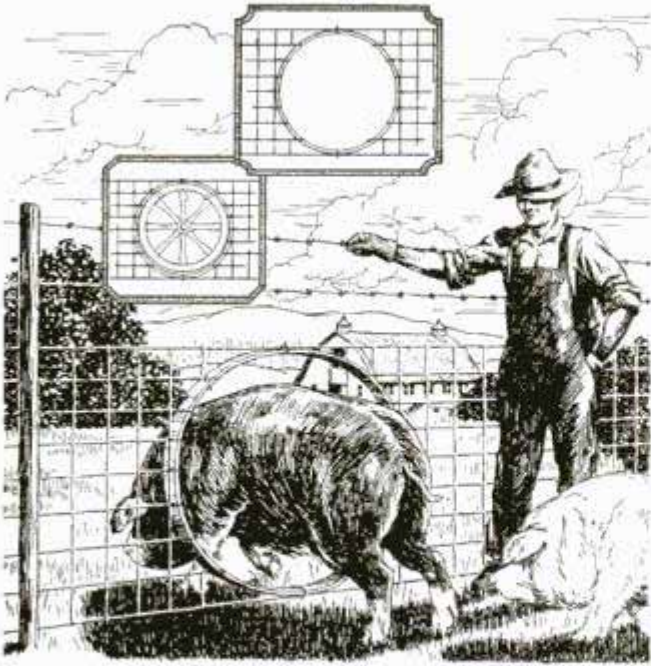
the depth of the recess. The saw can then either be brought up gradually until it is horizontal and the cut continued, or else the work may be reversed, and a similar slanting cut made from the other edge; if this is done, the two saw kerfs will keep the saw straight, and it will become easy to cut down horizontally and keep the cut square.

The next thing is the paring out of the waste. Some workmen like to do this sort of paring horizontally, as shown in the photo accompanying Fig. 1; others, again, prefer to pare vertically, as shown below Fig. 2. The amateur will probably find the first method the easier. With either method, the procedure is the same. Sharpen the chisel; good work cannot be done with a dull tool. Pare away the wood on a slant at one saw kerf, as at A, Fig. 2, then take a similar cut at the other kerf, and next cut off the top of the "hill"; these cuts are numbered 1, 2 and 3 at A, Fig. 2. If the chisel is thrust all the way across the work, from one side only, the

wood on the opposite side of the cut is apt to be torn off, as shown at B, and, to avoid this, the wood should be cut away partly from each side. Many workmen prefer to pare away the wood as shown at C, slanting the chisel upward, and paring halfway from each side, so that the cuts end in the center; there is then no danger of wood being broken off at either edge.

When sawing an end half-lap, or any similar, joint, mark off as described before, then fasten the piece endwise in the vise, and, starting the saw as in Fig. 3, saw down along the depth line until the saw teeth touch the line marking the length of the lap. Turn the work around in the vise, and saw similarly on the other side. Finally hold the saw horizontally and cut down the center. It will be found a great deal easier to keep the saw to the depth line by using this method than by sawing straight with the saw down horizontal while trying to keep the saw square in two directions. Of course, with either method, one must watch the line on the end of the work as well as that on the side, but it is decidedly easier by the first method than by the second. With normal care, using this method, it will be found unnecessary to employ a chisel to make the parts of the joint fit properly.





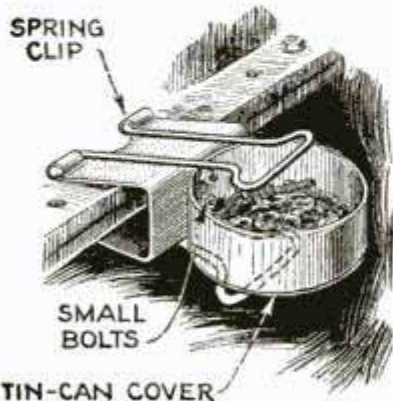
Circular Passage in Fence Consists of an Iron Wagon Rim Wired in Place Securely

### Circular Passage in Fence

When it is necessary to cut an opening in a fence as a passage for hogs, sheep or calves, you will find the idea indicated in the illustration of exceptional merit, as it makes a neat job and does not cause the fence to sag, as often happens when the fence is cut vertically and two posts are set up a few feet apart. Get the rim of a wagon wheel and cut a circular hole in the fence so much smaller than the wheel that the wire can be turned around the rim, and the ends twisted securely to hold it in place and to prevent scratching the animals.—Luther Strosnider, Onaga, Kan.

### Cover Attached to Clip Aids Mechanic

While working on an auto, or other piece of machinery, I have frequently



TIN-CAN COVER

dropped small parts on the floor and spent quite a bit of time in recovering them. I now use a small tin-can cover, attached securely to a strong spring

clip as shown in the drawing. The container thus made can be clipped to any convenient part of the machine where it

is handy for the worker to reach, and will hold small parts without risk of losing them.—Ross J. Plaisted, Cleveland, Ohio.

### Safety Hook on Well Digger's Rope

When digging wells, the bucket used for hauling up the earth sometimes slips off the hook on the end of the rope and may cause serious injury to the worker in the pit. To avoid this danger, a Nebraska well digger provided a safety hook as shown in the illustration. It is really a large snap hook from which the bucket, full or empty, cannot be dislodged when there is a slack in the rope, and the snap can only be opened intentionally. Hence the man in the pit can work in safety without worrying about the bucket over his head. If a snap hook of this kind cannot be obtained, fasten a strip of spring steel to the hook, which is done by drilling and tapping the hook and spring for screws to hold the latter securely in place on the shank of the hook. It may be necessary to remove the temper from the end of the spring where the screw holes are to be drilled, then re-tempering it. The spring must be arranged so that it closes the hook when pressure on it is released.—Frank S. Reynolds, Fort Morgan, Colo.



### Taking Care of Your Oilstone

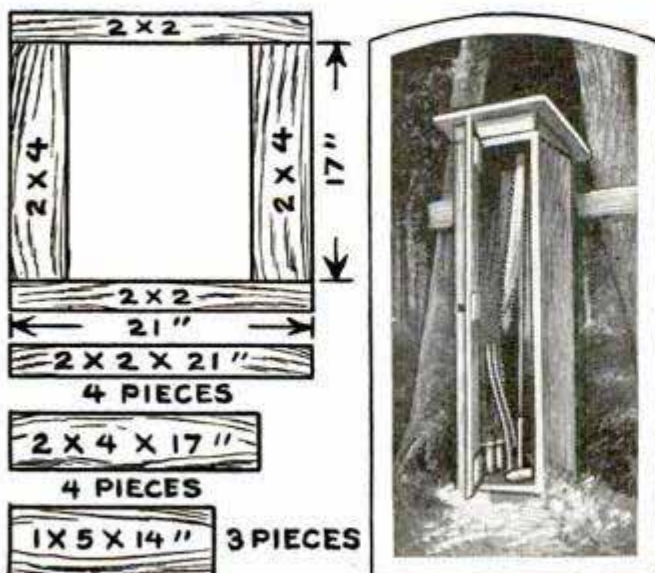
A good oilstone, whether it is natural or of the artificial variety, commands a good price and is therefore worth proper care. The surface of the stone must be kept uniformly flat and even, and a glazed condition must be prevented. To let an oilstone become dry will harden it. It should be clean and moist, and, if kept in a dry place, a few drops of fresh, clean oil should be left on the surface, to prevent glazing. The fluid floats off the particles of steel removed from the tool. If no oil or water is used, these will become



lodged in the pores of the stone, greatly impairing its efficiency. All coarse-grained natural stones should be used with plenty of water, while medium and fine-grained natural stones, and all artificial stones, should be used with oil. In order to prevent further glazing of a stone, that is already more or less dirty, wipe the surface clean after using it. If this is not done, the oil soaks into the stone and carries with it the particles of steel. A glazed stone can usually be restored by a thorough cleaning with gasoline or ammonia. If this does not entirely remedy the condition, the stone can be scoured with loose emery or a sandpaper block. A new oilstone should be soaked in oil for several days before it is used.

### Field Toolbox for the Farm

To eliminate the trouble of taking farm tools home after each day's work, because they cannot be left outdoors in wet weather or during the winter months, it is a great convenience to have a portable box of sufficient size to accommodate a large saw besides other tools. When working for several days on one spot, the toolbox is brought there and left until the work is finished. The box is built to stand on end, as shown in the photo, instead of being laid on the ground where it would soon be snowed under. The hinged door is fitted with a hasp and padlock, to minimize the risk of having the tools stolen. The outside is covered with roofing paper.—J. R. Koontz, Bremen, Ind.



Portable Field Toolbox for the Farmer Keeps Tools on the Job and Protects Them against Weather



Window-Raising Mechanism Taken from Auto Door Makes Good Bottle Tipper

### Handy Tipper for Distilled-Water Bottles

The window-raising apparatus from an old auto door, built up on a wooden box as shown in the photo, has been used to make a convenient device for holding and tipping 10-gal. distilled-water bottles for filling storage batteries. Turning the crank tilts the bottle to any degree necessary for filling a small container, without the risk of spilling any water. The crank mechanism is arranged on a strap-iron frame, which is screwed to the box and supports the bottle.

### Repair for Door-Lock Keyhole

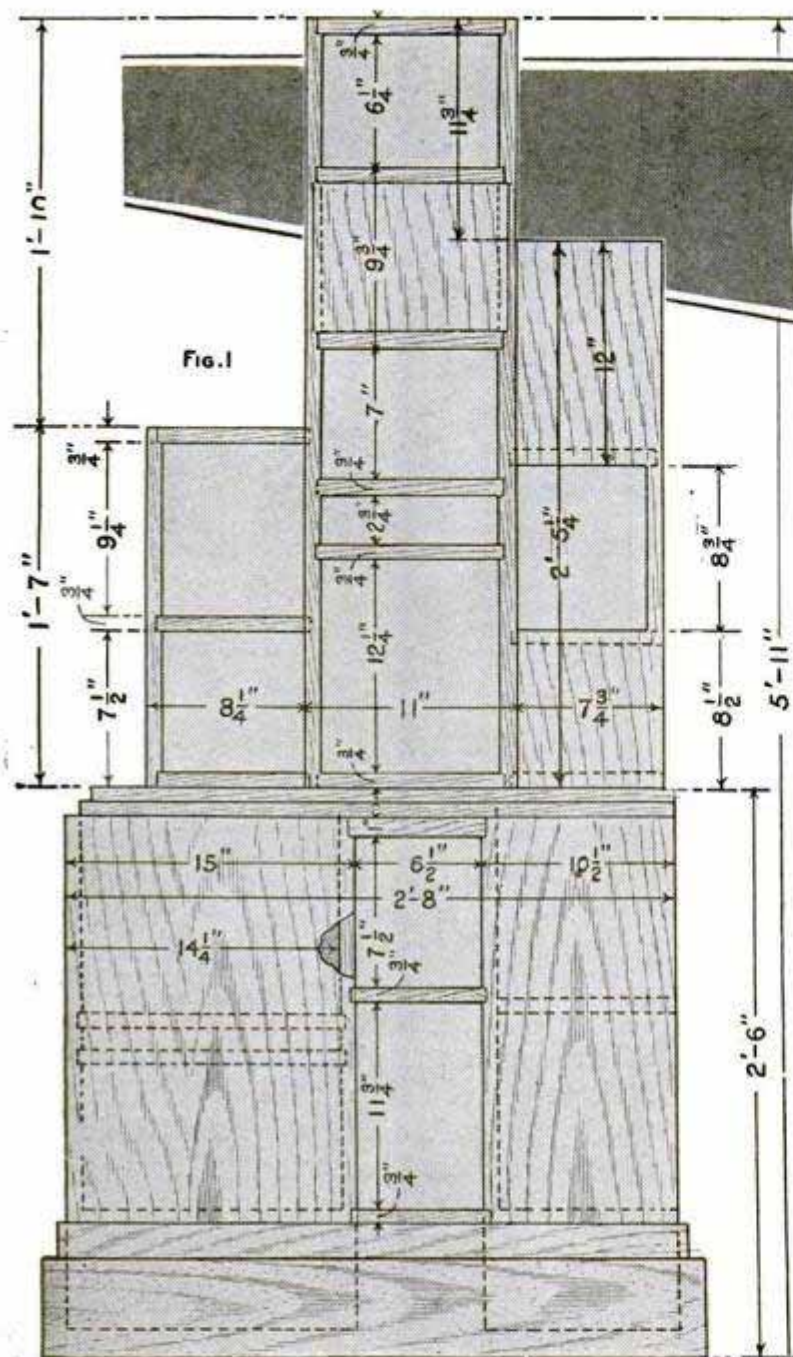
Frequently a good door lock is discarded because the keyhole is worn to an oval shape, which allows the key to drop out of its correct working position. An easy way to remedy this trouble is to obtain two thin washers, with holes the same size as the shank of the key, file a slot in each washer from the edge to the hole, the slot being of sufficient width to take the web of the key. Clean and tin one surface of each washer and sweat them to the plates of the lock.—John Bell, Alton, Eng.

☐ A guard for a circular saw can be made from a discarded auto-brake drum.



# MAKING A

By ~



## PART I

**L**ARGE capacity and economical use of space are features of the modernistic bookcase described in this article. It is 5 ft. 11 in. high, 2 ft. 8 in. wide and 1 ft. 9 in. deep. Not only is it an interesting piece complete, but the base, if desired, can be used alone as a stand.

Since solid stock, through shrinkage and warping, would rack the case apart in a few months, five-ply  $\frac{3}{4}$ -in. material should be used.

There are many joints dependent for their appearance on the squareness of the ends of the various parts, so the use of a template in the form of a square block held against the saw blade is advised.

Elevations of the base are shown in Figs. 1 and 2, and details in Fig. 3. The top is a rectangle, 2 ft.  $6\frac{5}{8}$  in. by 1 ft.  $6\frac{7}{8}$  in. Rabbet the underside edges,  $\frac{1}{4}$  by  $\frac{3}{4}$  in., on sides and front, to receive a  $\frac{3}{4}$  by  $1\frac{3}{8}$ -in. strip glued and nailed in for a nosing. This, however, extends around the left side and front only, ending  $\frac{3}{4}$  in. from the right side. Miter the corner joint.

Make the back 2 ft. 8 in. by 2 ft.  $5\frac{1}{4}$  in. Notch the left upper corner  $2\frac{1}{8}$  by  $\frac{1}{2}$  in., and cut a  $\frac{1}{4}$  by 1-in. rabbet in the bottom of the notch. The right upper corner is rabbeted  $\frac{3}{4}$  by  $1\frac{3}{4}$  in.,  $\frac{1}{4}$  in. deep. (See Fig. 4.) The inner face is then dadoed  $\frac{3}{4}$  in. wide and  $\frac{1}{4}$  in. deep, to take the back edges of the left partition, and the left rear and bottom shelves. The partition groove is 1 ft.  $2\frac{1}{4}$  in. from the left edge of the back, and the bottom dado is 7 in. above the lower edge. The upper shelf dado is  $10\frac{1}{2}$  in. above the lower.

The laying out and cutting of the dadoes are somewhat tedious and exacting, but there are a few tricks that simplify the labor. First, square the piece accurately, and mark an edge and side from which to measure and square. Next, lay out a stick with the necessary dimensions, marking the points with a knife (not a pencil). Make the end marks  $\frac{1}{4}$  in. or more from the ends of the stick. By using this as a pattern, all pieces belonging to the same assembly can be laid out.

Mark the long dadoes with a straight-edge, scoring the lines with a knife point. Clamp a straight strip of wood to the work, the edge centering on the line, and



# MODERN BOOKCASE

E.M. Love

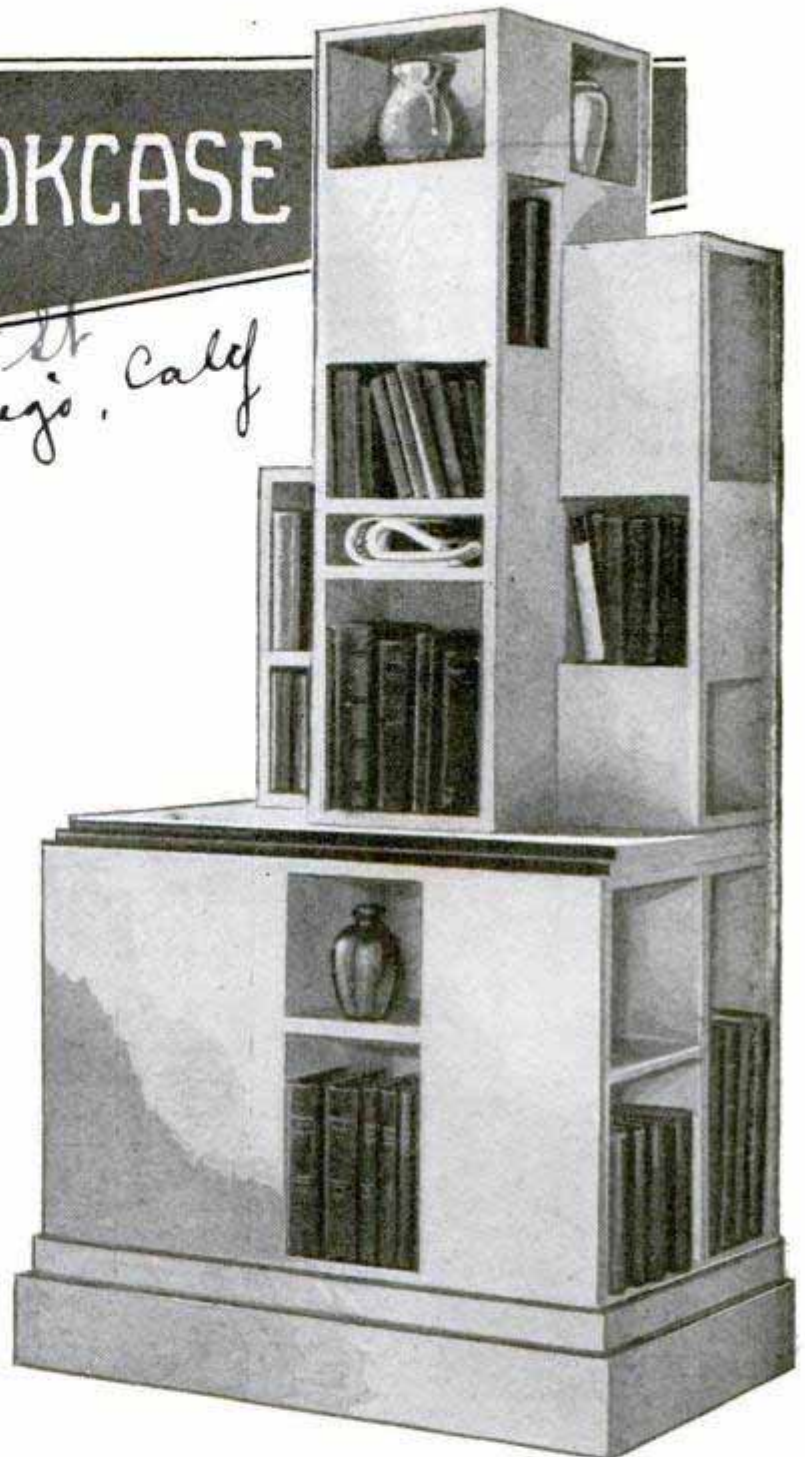
*3607 Luyana St. Calif  
San Diego.*

guide the saw against it, holding the blade with the thumb, or a piece of wood. If the dado is across the grain, start with a crosscut saw. When the surface is cut through, the use of a rip-saw will expedite matters. Instead of a single strip of wood clamped to the work, a guide consisting of two strips bolted at the ends can be used. This is slipped in place with one strip above and the other below and cinched tight with bolts.

Chisel the waste wood out to as uniform a depth as possible. This can easily be done with a router, but if one is not available, the depth can be fairly accurately regulated by means of a nail driven squarely through a block, the point projecting  $\frac{1}{4}$  in. With this tool scratch the high spots, leaving only shreds of wood for the chisel to pare.

The left upper shelf is  $11\frac{1}{4}$  in. by 1 ft.  $2\frac{1}{4}$  in. The bottom shelf of the lower section assembly is in one piece, 2 ft. 8 in. by 1 ft. 8 in. Near the center, the front edge projects  $\frac{1}{2}$  in. for a width of 8 in., 1 ft.  $2\frac{1}{4}$  in. from the left edge, bringing that part flush with the front of the cabinet when it is put together. Cut the left side partition 1 ft.  $2\frac{1}{4}$  in. by 1 ft.  $9\frac{1}{2}$  in. To allow for the top nosing, notch the left upper corner  $2\frac{1}{8}$  by  $1\frac{1}{4}$  in. Dado the front face full width,  $7\frac{1}{2}$  in. above the lower edge, and the back face  $10\frac{1}{2}$  in. above the lower edge.

The left front shelf is  $8\frac{1}{2}$  in. by 1 ft.  $2\frac{1}{4}$  in. The left center partition is 1 ft.  $8\frac{1}{4}$  in. by 1 ft. 9 in. A vertical dado,  $\frac{1}{4}$



by  $\frac{3}{4}$  in., is made on the left side,  $8\frac{1}{2}$  in. from the front edge, and one on the right face,  $11\frac{1}{4}$  in. from the front. The lower dado on the left is  $7\frac{1}{2}$  in. above the lower edge, and the other is  $10\frac{1}{2}$  in., while the dado on the right is  $11\frac{3}{4}$  in. from the lower edge.

The right center partition is  $11\frac{1}{2}$  in. by 1 ft. 9 in., with a dado full width of the left face,  $11\frac{3}{4}$  in. from the lower edge. The right side partition is 1 ft. 6 in. by 1 ft.  $9\frac{1}{2}$  in., and extends back to the left center partition. It has a vertical dado on the front face,  $10\frac{1}{2}$  in. from the front edge, into which the back edge of the right center partition fits.

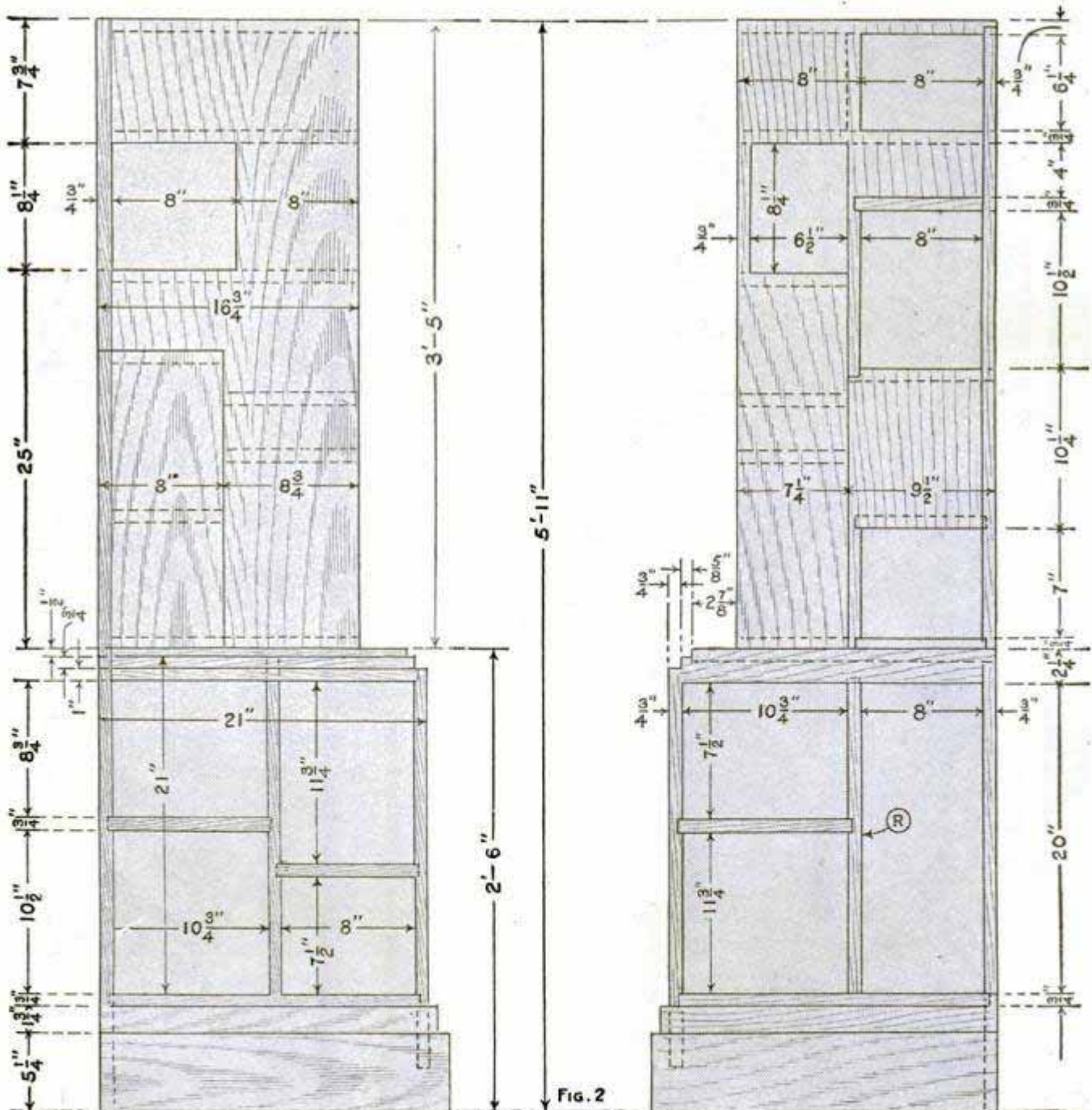


Make the front center shelf  $8\frac{1}{2}$  by  $11\frac{1}{4}$  in. The left front side is 1 ft. 3 in. by 2 ft.  $2\frac{3}{4}$  in. Rabbet the upper left corner  $\frac{1}{4}$  by 1 in. by  $2\frac{1}{8}$  in. on the inner face, and notch the right upper corner  $\frac{1}{4}$  by  $\frac{3}{4}$  in. Rabbet the right edge inside,  $\frac{1}{4}$  by  $\frac{3}{4}$  in., and cut a dado across the inside,  $12\frac{3}{4}$  in. below the upper edge, and another  $7\frac{1}{2}$  in. below this. The rabbet must be notched  $\frac{1}{4}$  by  $\frac{3}{4}$  in., to fit the center shelves. The right front side is  $10\frac{1}{2}$  in. by 2 ft.  $2\frac{3}{4}$  in., with the left edge rabbeted  $\frac{1}{4}$  by  $\frac{3}{4}$  in. The lower dado on the inner face matches that on the other front piece, and the upper groove is  $9\frac{3}{4}$  in. from the top.

Before attempting to assemble the section, try all joints separately. They should

go together snugly, yet without need of undue pressure, since it is possible to use clamps very little. If a shelf is too thick to go into the dado, take a shaving or two off the lower side. If the joint will not close tightly, a shaving or chip in the groove may be to blame, or the dado corners may be so rounded that they interfere. Much final cleaning up can be avoided if the parts are sponged with warm water to raise the grain before assembling. When dry, sand smooth.

In putting together, smear glue on both meeting members. The following is a good order to follow: Lay the back on the floor; enter first the bottom shelf, and then the small upper shelf and the left center partition. Bring these joints up









tight, nailing through back and partition into the shelf edges with six-penny finish nails. Next add the left partition and the right side partition, following with the small center shelf, nailing all solidly to each other. The partitions merely butt against the lower shelf, so their distance from the back and sides must be carefully checked. Put in the right side shelf, and nail and glue on the fronts. The left top is joined with a rail, 1 by  $2\frac{1}{8}$  in. by 1 ft. 8 in., and the right with a  $\frac{3}{4}$  by  $1\frac{3}{4}$ -in. rail placed vertically in the rabbets provided. Fit the top next. The assembly should be rigid and square by this time. If it is seriously out of square, see if the joints have sprung open.

Notch the right upper rail end, making it flush with the top nosing. Put a 1 by 1 by 7-in. rail at the top of the front opening, clean off all glue squeezed out of the joints, and fill the nail holes with plastic wood.

The base is put on in two members. The upper is a  $\frac{3}{8}$  by  $2\frac{1}{2}$ -in. strip mitered

the left side, cutting the piece a little longer than necessary and mitering the front end. Nail in place. Fit the mitered end of the front strip to that already on, and tack it up, so that the length can be accurately marked. Then cut the other end and glue and nail this front strip to the cabinet. The piece on the right side is fitted in the same way. The ends projecting beyond the back are sawed off. In

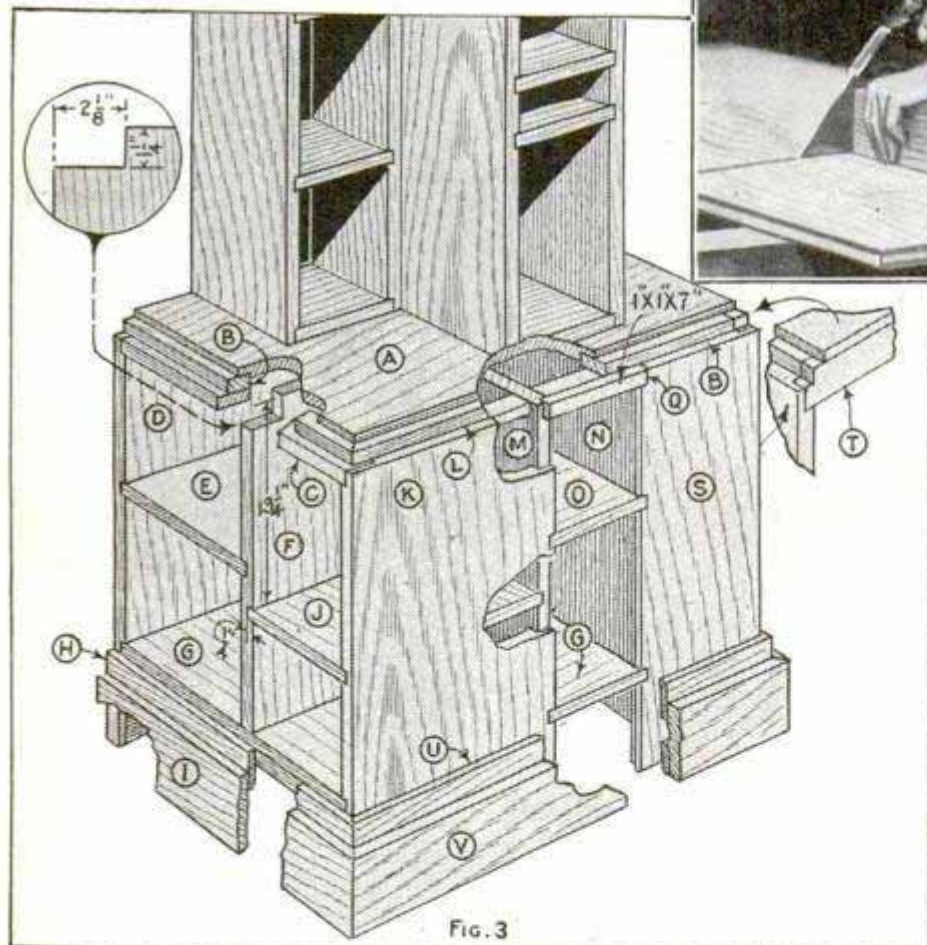


FIG. 3

around the case, the upper edge being flush with the lower side of the bottom shelf. To give it backing, glue and nail a wooden cleat under the shelf. Begin at

the same way add the heavier lower member, a piece  $\frac{3}{8}$  by  $5\frac{1}{2}$  in. The lower edge should be backed with blocks tacked to the front pieces and the back edges.

#### Worn Shackles Cause Backlash in Auto

When searching for the cause of backlash and knocking in the Ford rear axle, do not neglect to examine the rear-spring shackles, since these, when worn, allow

the whole axle to move forward and backward as the speed changes. The ball joint on the front end of the drive-shaft tube also wears and adds to the knocking.

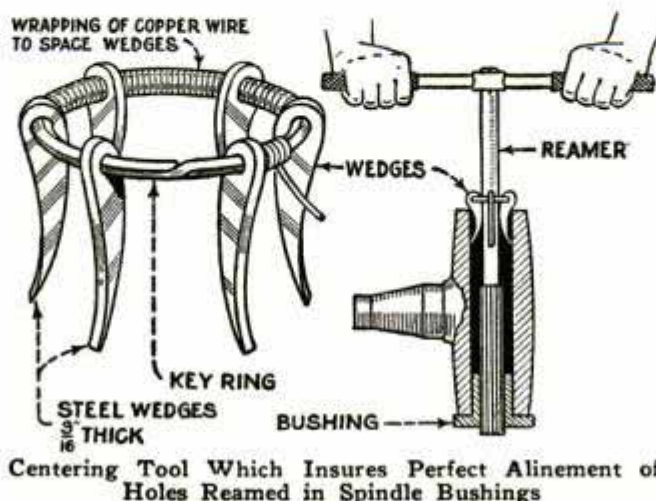


## Preparing Concrete Lintels for Trim

There is often more or less trouble in the building of brick or hollow-tile walls where solid concrete lintels are used to attach inside trim. The drilling of holes in the concrete and setting in of plugs to hold the nails takes much time and is not entirely satisfactory. The use of solid blocks, placed at intervals on the inside of the form, has been tried, to the regret of the builder, for the wood expands or contracts, and in some cases cracks the concrete. The problem was solved by cutting laths into 4-in. pieces, then fitting a strip of composition roofing between two pieces of lath and tacking them together with small nails. The roofing material, being pliable, allows for the contraction and expansion of the wood and keeps the concrete from cracking. These pieces are tacked on the inside of the form, about 18 in. apart, so that, when the forms are removed, the pieces will be left imbedded in the concrete lintel. Before the plastering is done, the frames should be marked to show the position of the blocks. This method has been used successfully in lintels from 4 to 9 ft. long, and not only were time and money saved, but the lath and felt blocks seem to grip the nails that hold the trim much better and tighter than plugs or wood blocks.

## Wedge Tool Centers Reamer

When it is necessary to hand-ream two bushings in line, the illustrated jig for centering the tool will be found useful. It consists of six steel wedges of the shape shown, drilled and slipped on a key ring. They are spaced evenly on the latter, and copper wire is wrapped around the ring between the wedges to keep them in position. When reaming the spindle bushings of automobiles, the lower one is reamed out first, using the centering tool as indicated.—Dick Cole, Los Angeles, California.



Centering Tool Which Insures Perfect Alinement of Holes Reamed in Spindle Bushings



Weighting End of Saw Blade with Lead Disks Makes It Cut Faster

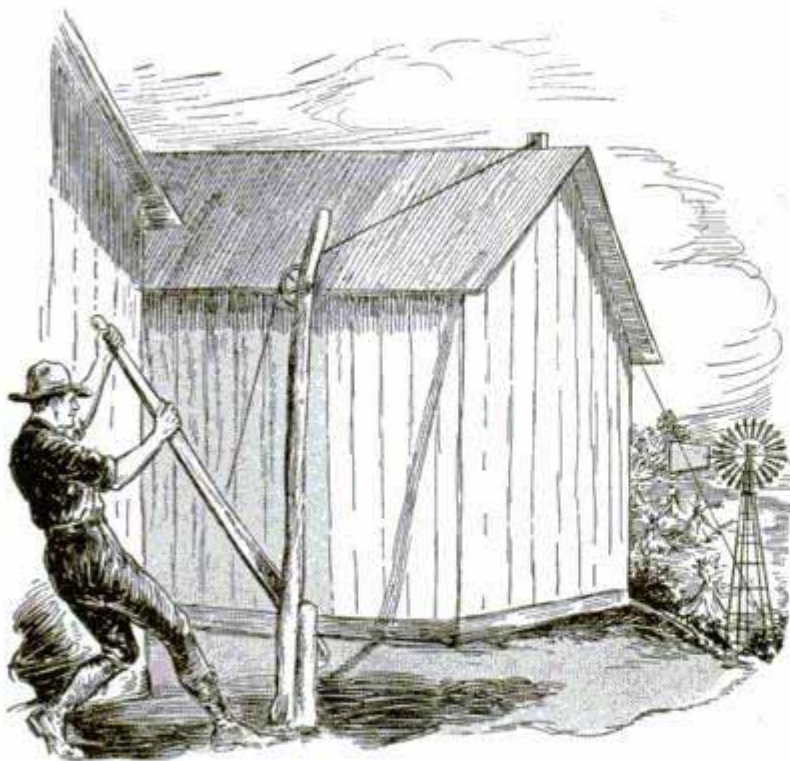
## Weighted Saw Cuts Faster

In cutting logs, which I do with a 3½-ft. saw, I found that lead disks, weighing about ½ lb. and fastened to the end of the blade, as shown, made the saw cut faster. The disks are held on the blade by means of a bolt and nut. Weighted in this way, the saw cuts about one-third faster than it did before, and without any more effort.—Sam Weidman, Lowell, Wash.

## Permanent Linotype Line Gauge

Having had quite a bit of trouble in keeping a line gauge available for immediate use on the linotype machine, I duplicated the gauge graduations on the fulcrum bar. The graduations were laid out carefully by means of a pair of dividers, and the lines were made with a knife-edge file. Numbers were stamped with a steel punch.—Jas. H. Rodgers, Toronto, Can.





This Remote Control for Shutting Off Windmill on a Nebraska Farm Has Proved Successful

### Simple Homemade Arrangement for Remote Control of Windmill

On a Nebraska farm, the windmill was erected quite a distance from the farm buildings in order to avoid a stratum of hard rock. This location was, of course, rather inconvenient, but the trouble was partly overcome by providing a control by which the windmill could be shut off from a position near the house. A length of heavy galvanized-iron wire was run from the lower end of the shut-off handle at the mill, over one pulley mounted on the machinery-shed roof, and another at the top of a 10-ft. post, to a 2 by 4-in. lever pivoted near the bottom of the post as shown. This arrangement has given satisfactory service for two years, and in that time has required no repair.—Dale R. Van Horn, Lincoln, Nebr.

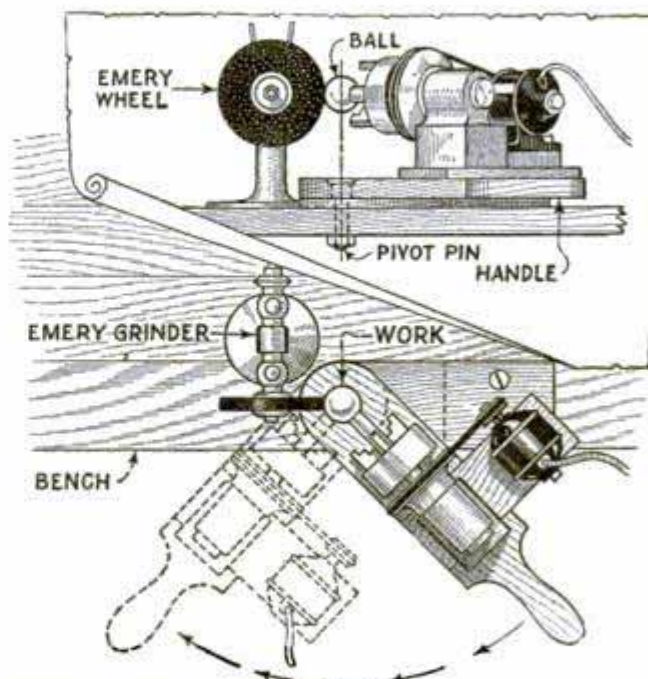
### Scrapers on Busses Eliminate Ruts

Several times during last winter, complaints were made to the Canadian government that the interurban busses cut deep ruts in the ice and snow on the country roads. After trying out several ideas, a mechanic suggested attaching a heavy piece of angle steel by means of two lengths of chain to the rear of each bus. The chains were attached to the chassis by clevises and were sufficiently long

to prevent the angle steel from getting caught under the rear wheels when the bus was backed up. Hooks were attached to the rear bumper to sling the bar up out of the way when not needed. After a whole season's use, it has been found that the bars removed nearly every rut in the roads. In fact, the appliance was found so successful that it has been made part of the winter equipment of several bus lines.

### Grinding a Sphere

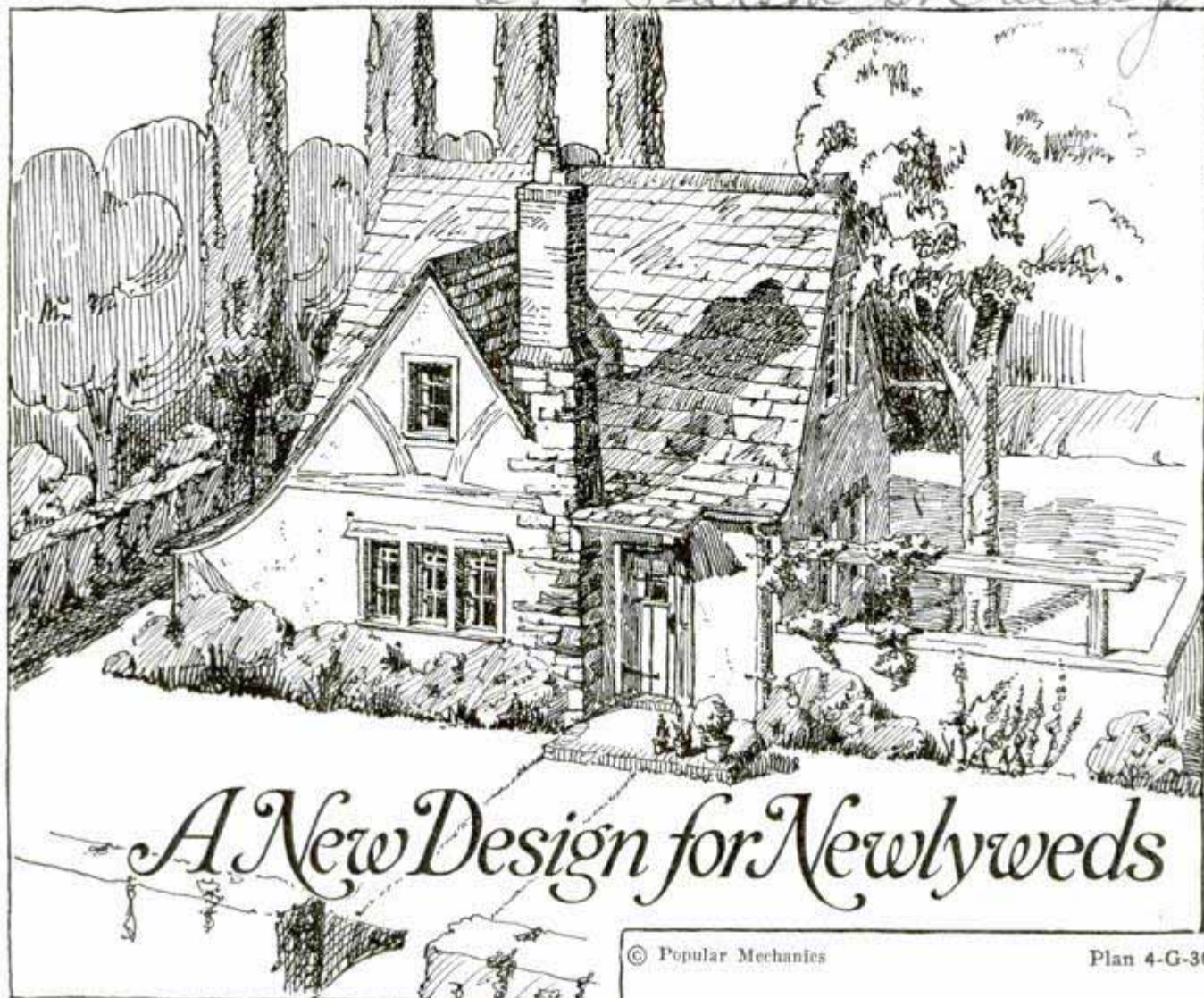
A novel method of grinding a sphere on the end of a shaft, devised in our shop, is illustrated in the drawing. A tool grinder was used for the purpose, the work being rotated on its surface by means of an improvised jig as shown. The jig consisted of a lathe chuck driven by a small motor, both being mounted on a wooden base, which was pivoted at a point directly beneath the center of the ball to be ground. The shaft on the end of which the ball was to be ground, was first turned down in the lathe to the proper size, and was then set in the chuck of the jig. By rotating the base with a handle provided for the purpose, the end was ground to a perfect sphere.—C. Kugler, Philadelphia, Pa.



Novel Method of Grinding a Sphere on the End of a Driving Shaft



The U. S. Hotel  
249 Pearson St. Chicago



## A New Design for Newlyweds

© Popular Mechanics

Plan 4-G-30

**N**EWLYWEDS planning a stepping stone to home ownership, and others trying to make a small amount of money buy a large amount of comfort, service and convenience in a small house, will be interested in this tabloid plan.

Two thousand dollars should build this miniature English cottage under average conditions, according to estimates by the designer. That's a cost so low you may wonder if the house can possibly contain more than "standing room only." Studying the plan will show how cost has been cut.

Compressed into space hardly larger than a two-car garage, there is all the efficiency, time and labor-saving equipment equivalent to the latest type of scientifically designed city apartment, the difference

being that you have it in a detached home of your own on ground level and at the surprisingly low rent of around \$25 per month under normal conditions. In a city skyscraper apartment, you might have to pay the landlord anywhere from \$75 to \$175 for the same service up fifteen or twenty floors in the air.

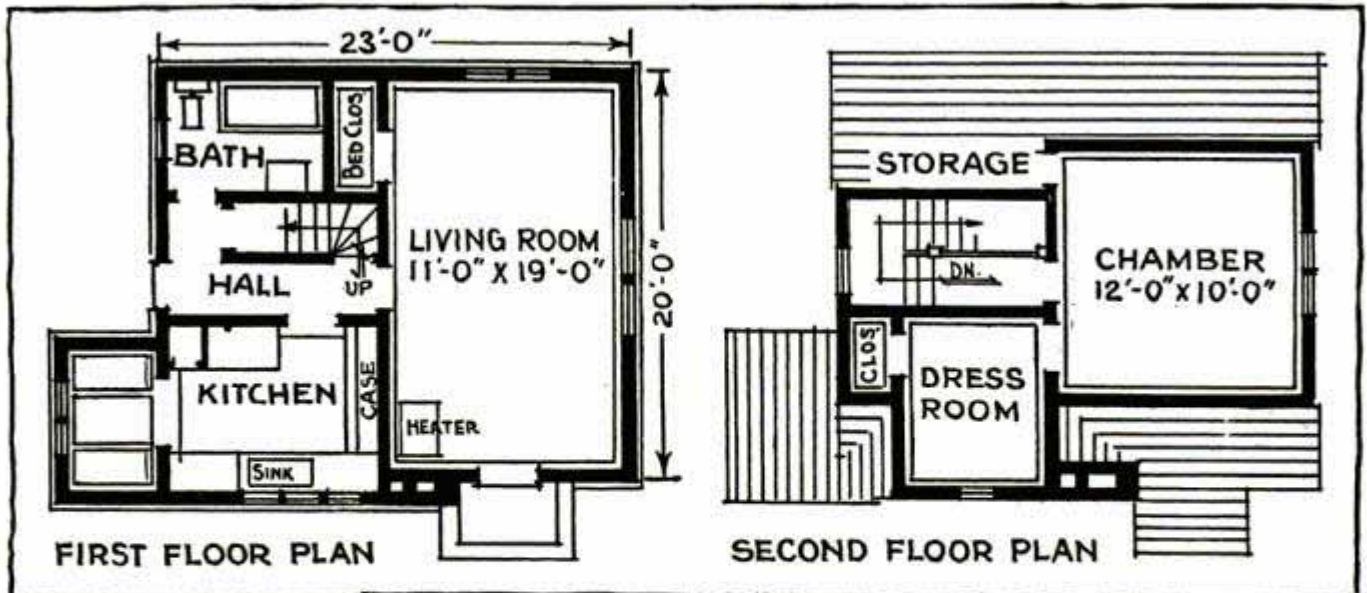
If this appears too grand and glorious a picture for renters or raises high hopes in the hearts of cliff dwellers, then take the time to inspect the plan and see how ingeniously the designer has clipped corners, saved space and used every device

possible to "split pennies" and pull the cost down to considerably less than the average cost of the average house in more than sixty principal cities, which, according to statistics, is \$3,750.

### A NEW SERVICE

To help our readers get started on one of life's most glorious experiences—building and owning a home—Popular Mechanics Magazine will supply readers a one-sheet blueprint of the house here illustrated for \$2. This blueprint does away with the necessity of first purchasing a complete set of plans to find out whether you can afford to build. It contains floor plans, elevations, a section, detail, size of joists, studs, etc., and also a brief specification. Submit it to tradesmen and dealers for building estimates.





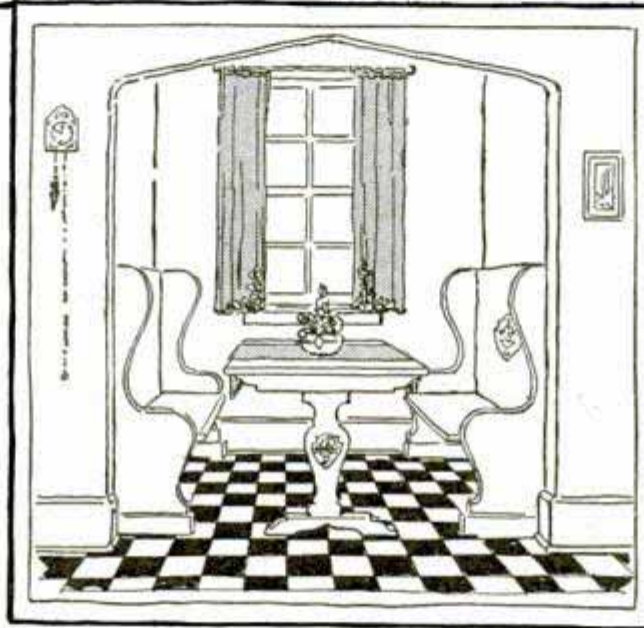
Here is how costs have been lowered. There is no basement. This means a saving of \$300 to \$500. A breakfast alcove replaces the customary dining room. Here's another \$500 to \$700 saved. A concealed, or closet-type, bed in the living room not only provides complete bungalow service on the lower floor, but clips off \$500 to \$1,000 which wall-bed makers say is the cost for an extra bedroom.

Wallboard with plastic-paint finish, or, in fact, any of the rigid forms of board insulation nailed directly onto the studs, gives you satisfactory interior finish and three operations at little more than one price. You not only get a substitute for lath and plaster, but insulation at the same time, and also a decided saving in labor.

Stock kitchen fixtures, linoleum floors and fiber tile for bathroom walls, replacing more costly ceramic tiles, save still more money. Simple but attractive bathroom fixtures and inexpensive stained-fir trim complete the interior equipment.

Savings like these may net you a total of from \$1,800 to \$2,000, possibly more.

Getting back to how rent money may buy this home, suppose your lot cost \$500. To be conservative, let us say the house, under average conditions, will cost \$2,500.



There is a cash investment of \$3,000. This sum of money put into six-percent income-producing securities would yield you \$180 per year. This amount is properly charged to yourself as rent. In addition, there are taxes, upkeep, insurance, depreciation, etc. A fair average in most communities would be \$130 per year to

cover these items. You have therefore a total yearly expense of \$310, or a monthly rental charge of \$25 in round numbers.

No doubt you can finance a little house like this through local building-and-loan associations.

A word or two about building costs; they vary with localities, choice of materials, labor, etc. Recent figures show that a \$5,500 house in Chicago costs less than \$3,000 in St. Louis. In some communities costs may be lower than these figures; in others, somewhat higher.

**EDITOR'S NOTE:** Popular Mechanics Magazine has prepared a new plan book, "Twenty Popular Low Cost Homes and Ten Commandments for Home Builders." These are selected homes and show labor, space and time-saving ideas. They are \$5,000 homes and less. Send 10 cents in stamps to cover postage. Address Building Editor.





# Every Blade Tested

"... a long row of experts, who test 'Yankee' screw-driver blades—each and every one of the hundred of thousands."

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The "Yankee" Screw-driver you buy from your dealer has a tested blade. The *very* one you get!

Every "Yankee" blade is tested by "Yankee" toolmakers. Individually tested—and *twice* tested!

Blade won't twist, crack, break, or bend on the edge; and it can't be loosened in the handle by use or even abuse.

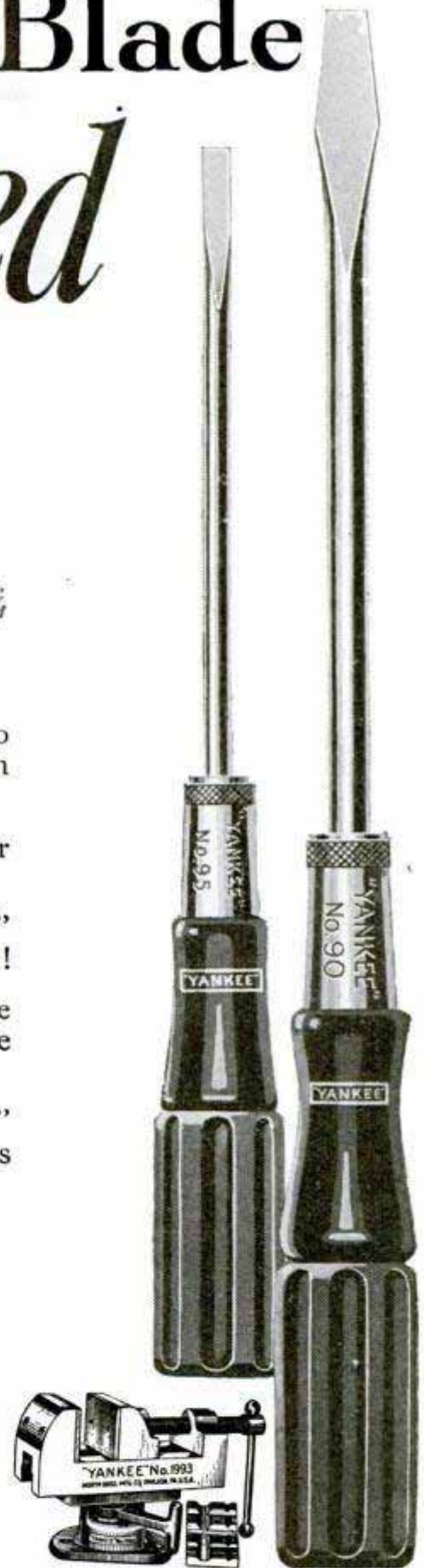
Dependable, well balanced, and with "Yankee" comfort-grip handles "Yankee" Plain Screw-drivers make work easier.

**No. 90.**—Standard Style: Fifteen sizes, 1½" to 30" blades. Price for 5" blade, 50c; 6", 55c; 7", 65c; 8", 75c; 9", 85c; 10", 95c.

**No. 95.**—Cabinet Style: Eleven sizes, 2½" to 15½" blades. 4½" blade, 40c; 5½", 45c; 6½", 50c; 7½", 60c; 8½", 65c; 9½", 70c.

WRITE for "Yankee" Tool Book, showing uses of tools that are unlike any other tools—such ingenious tools as this "Yankee" Vise (No. 1993), which lifts off its base, and, holding work, goes from bench to press drill or other machine.

North Bros. Mfg. Co., Philadelphia, U. S. A.



**"YANKEE"** — "*That's the best there is!*" says the tool dealer

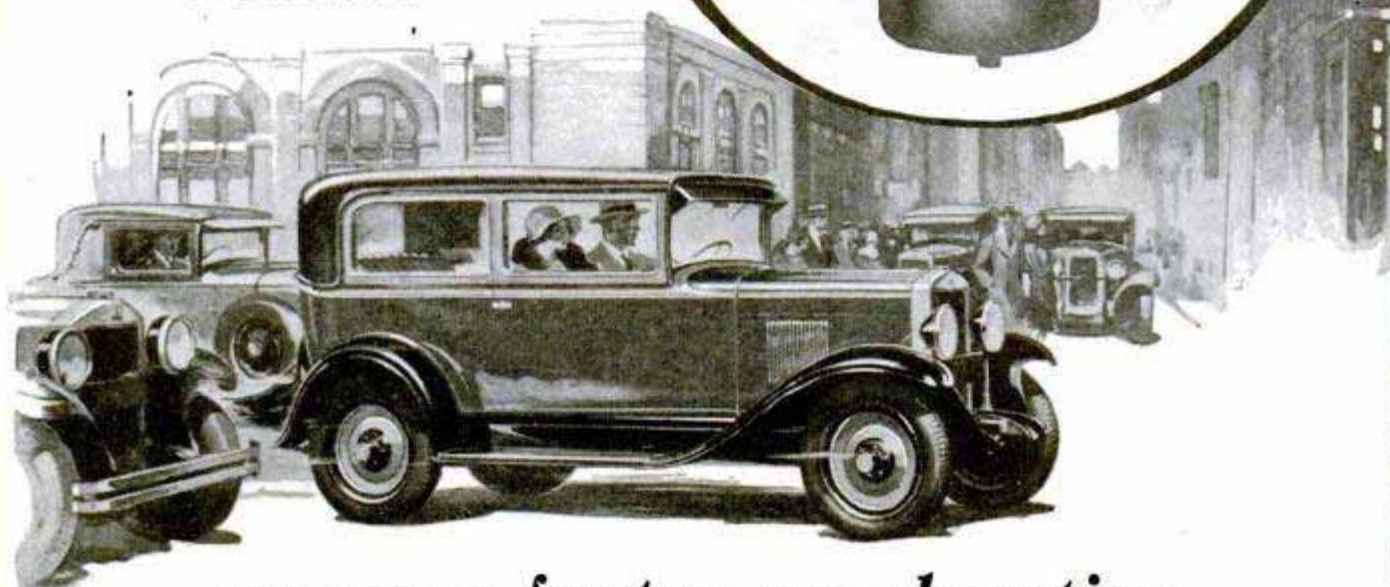
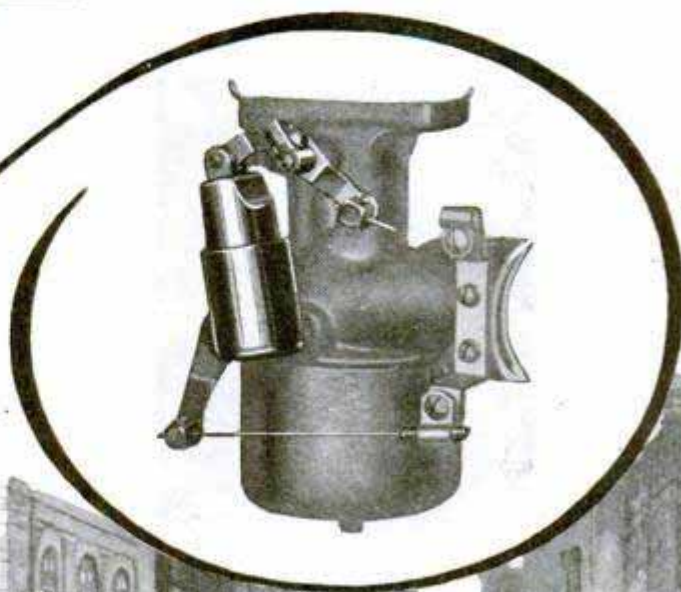


for Economical Transportation



# This

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The remarkable acceleration of the new Chevrolet Six amazes everyone who takes the wheel. This exceptionally smooth, fast getaway is one of the outstanding features afforded by the brilliant performance of this remarkable new car.

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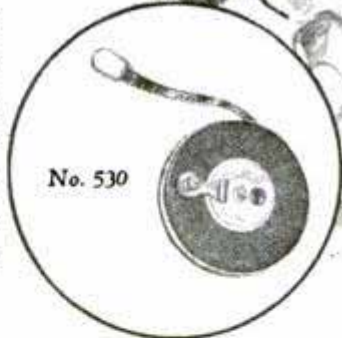
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## What a cigarette meant there

*Ten seconds to go—* and raw nerves fighting wearied muscles, driving them on into that fearful unknown beyond the wire. What man will *ever* forget the steadying solace of that last sweet stolen smoke?

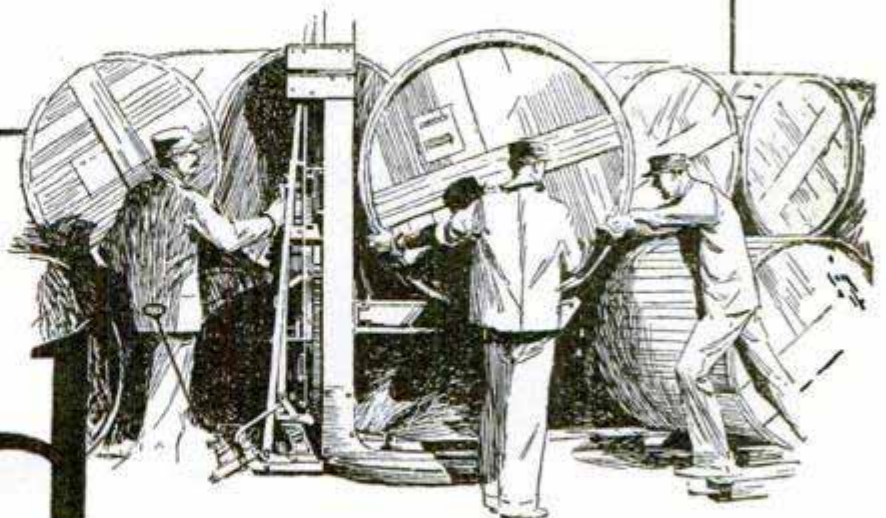
## What a cigarette means here

*Two years to go—* the slow "ageing" by which tobaccos for Chesterfield lose all bite and harshness ...

Mysterious, this chemistry of Nature! Endless rows of great hogsheads, stored away in darkness; choice tobacco, tightly packed ... just waiting. And as if on signal, twice each year the leaf goes through a natural "sweat"—steeps in its own essences, grows mild and sweet and mellow.

Selected leaf, costly patience, endless care—that's what a cigarette means *here*. But right there is *exactly* the reason why Chesterfield means what it does to you!

*Liggett & Myers Tobacco Co.*



Millions of pounds of choice tobacco from each crop are stored away in great warehouses to "age."

# field

.... and yet **THEY SATISFY**



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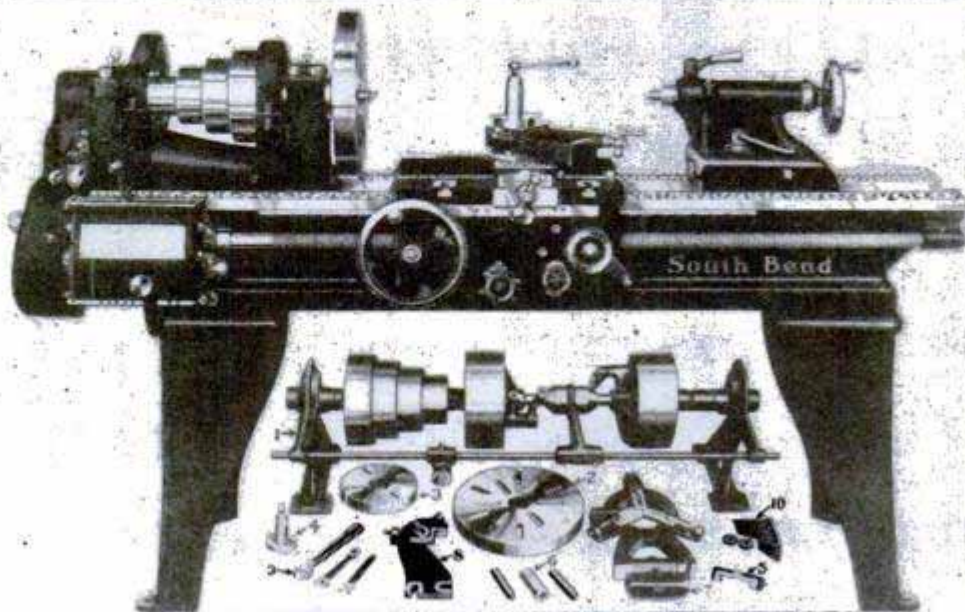
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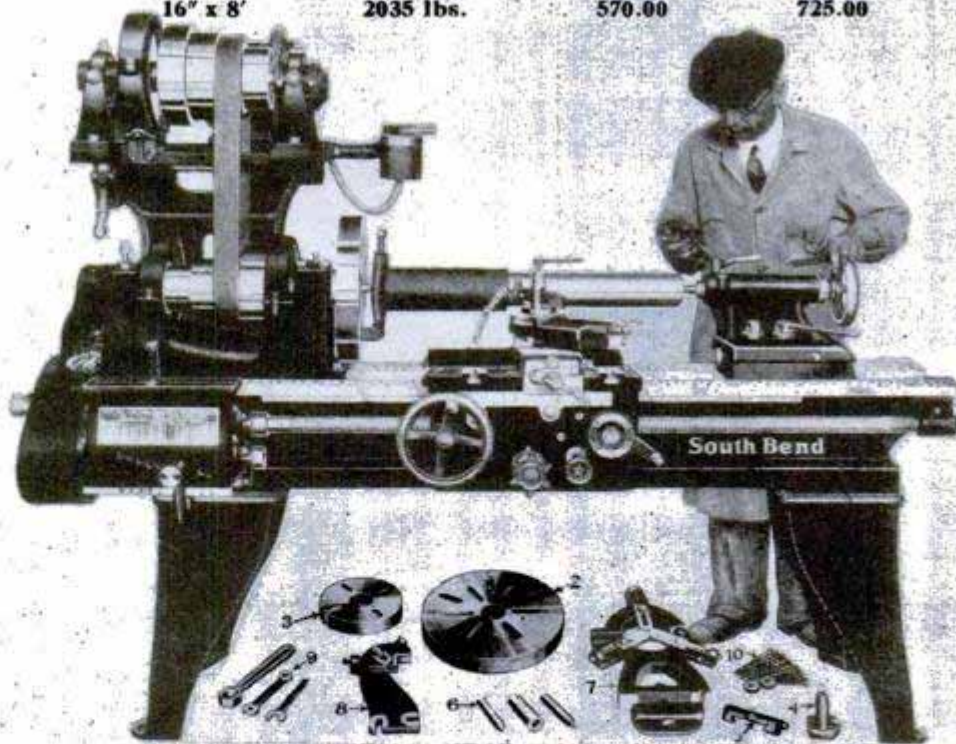
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| Size of<br>Lathe | with Lathe Equipment<br>Shipping*<br>Weight | Countershaft |                             |
|------------------|---|--------------|-----------------------------|
|                  |   | Drive        | Silent Chain<br>Motor Drive |
| 9" x 3'          | 490 lbs.                                    | \$270.00     | \$371.00                    |
| 11" x 4'         | 725 lbs.                                    | 335.00       | 455.00                      |
| 13" x 5'         | 1110 lbs.                                   | 402.00       | 537.00                      |
| 15" x 6'         | 1550 lbs.                                   | 490.00       | 643.00                      |
| 16" x 8'         | 2035 lbs.                                   | 570.00       | 725.00                      |



18" x 8' Quick Change Gear Silent Chain  
Motor Driven Lathe.....\$908.00

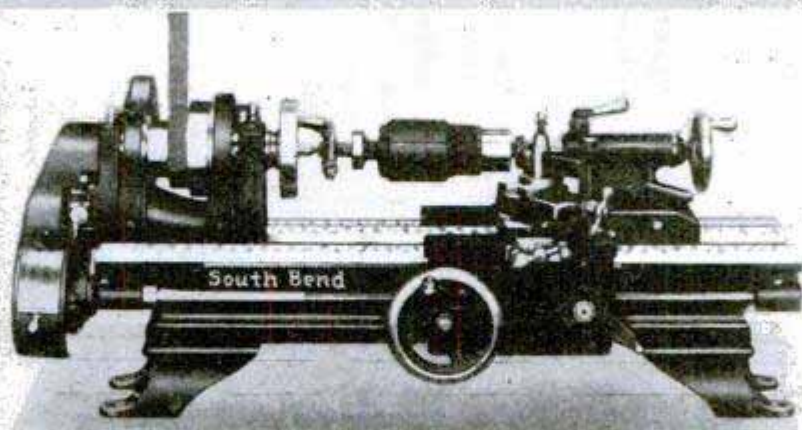
# SOUTH BEND

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New York City, J. E. Beggs Co., 183 Center Street



# SCREW CUTTING LATHES

OVER 43,000 LATHES IN USE



Weight  
375 Pounds

**9" x 3'**

Junior New Model  
South Bend Bench Lathe  
with Countershaft and Equipment

**\$155**

## Easy Payments as low as \$12.40 a Month

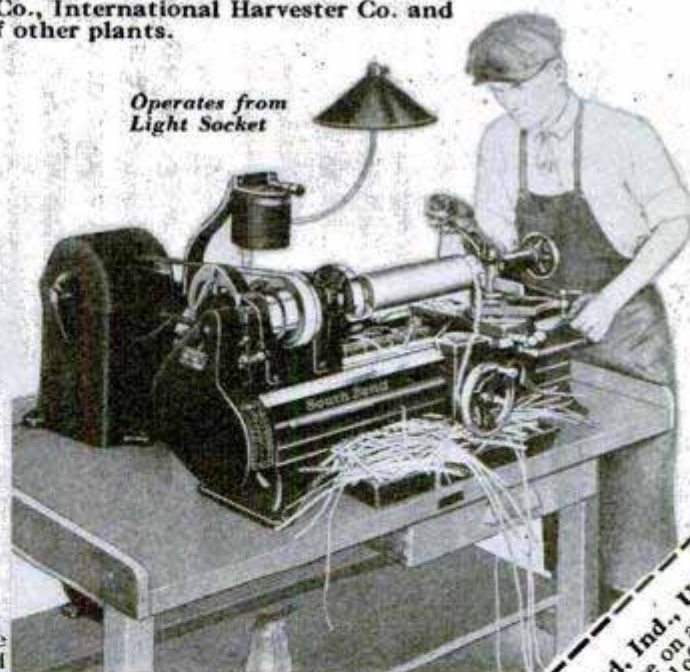
Our Easy Payment Plan allows you to install a South Bend Lathe in your shop, by making one payment with the order; the balance to be paid month by month, the amount depending upon the size of the Lathe.

Write today for Catalog No. 89-P, which describes the Easy Payment Plan. Mention size of lathe desired.

The New Model South Bend Lathe is a remarkable tool and is practical for handling the finest and most accurate work. 96 sizes from 9" to 18" swing are available in various types and drives.

These New Model Lathes are used in the plants of the Western Electric Co., General Electric Co., Victor Talking Machine Co., Packard Motor Co., Oldsmobile Co., International Harvester Co. and thousands of other plants.

Operates from  
Light Socket



## Other 9-inch Junior Lathes

The Prices include Lathe Equipment

| Size of Lathe | Shipping Weight | Counter Shaft Drive | Horizontal Motor Drive |
|---------------|-----------------|---------------------|------------------------|
| 9" x 2 1/2'   | 350 lbs.        | \$150.00            | \$221.00               |
| 9" x 3'       | 375 lbs.        | 155.00              | 226.00                 |
| 9" x 3 1/2'   | 400 lbs.        | 160.00              | 231.00                 |
| 9" x 4'       | 425 lbs.        | 165.00              | 236.00                 |
| 9" x 4 1/2'   | 450 lbs.        | 170.00              | 241.00                 |

Write for this 20-page booklet, illustrating and describing the 9-inch Junior New Model South Bend Lathe in all sizes and types. A copy mailed free on request.

9" x 3' Junior New Model  
South Bend Horizontal  
Motor Driven Bench  
Lathe complete,  
\$226.00.



# LATHE WORKS

South Bend, Indiana, U. S. A.

Chicago, Ill., C. B. Burns Mach. Co., 541 Wash. Blvd.

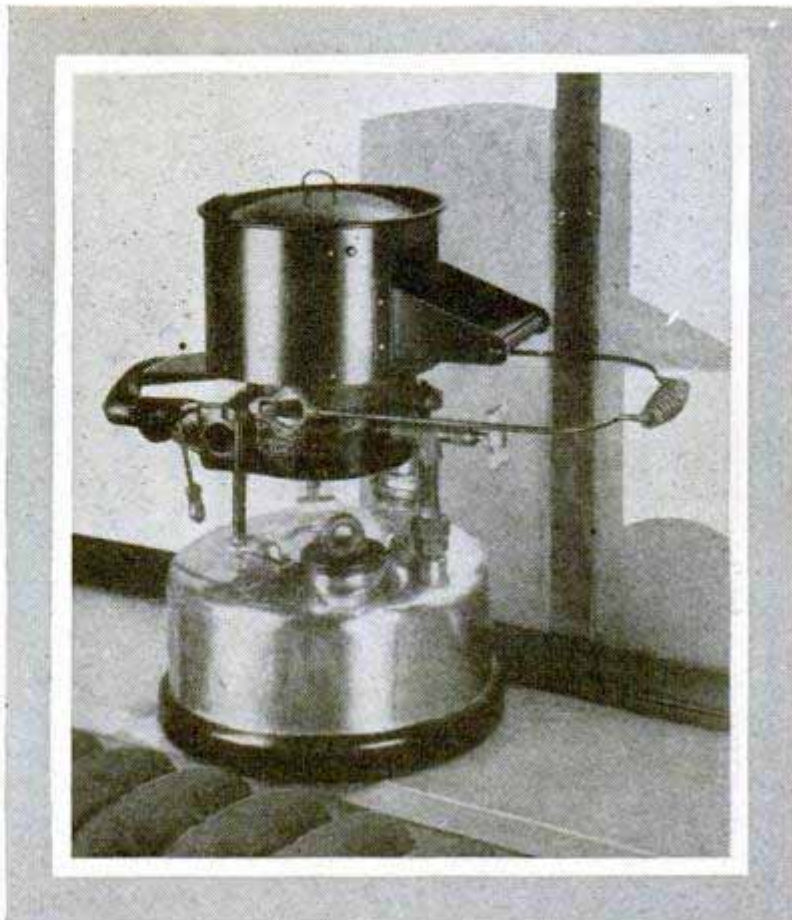
SOUTH BEND LATHE WORKS, South Bend, Ind., U. S. A.  
603 E. Madison Street, for (check kind of work)  
Gentlemen: I would like your net factory price on a Screw  
Cutting Lathe, Size \_\_\_\_\_ Send me  
 Manufacturing  Machine Shop  Garage Work  
 Electrical Work  Catalog 89-A  Catalog 89-P  Catalog 23

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_



**C & L 70**

*This is the C & L 70 fire-pot with tinner's hood. Produces a working flame in ninety seconds. The burner orifice cannot be enlarged by tightening the needle valve. Heats a pair of coppers and melts a pot of metal at the same time.*



# Always on its toes

A CLAYTON & LAMBERT won't cry for time-out—it's always on its toes. Its solid construction and ingenious mechanism withstand rigorous, long-time use. You get years of service from a Clayton & Lambert fire-pot—it's the product of constant improvement.

An example of that is the spider construction welded to the tank. It keeps the top structure properly aligned and firm. A Clayton & Lambert takes a mighty hard jar without being the worse for wear. And the multi-ribbed flame plate is another part almost indestructible. It's made to last a lifetime. If an extreme accident should occur—the plate is easily replaced.

The method of mixing air and gas vapor is a unique Clayton & Lambert feature.

The proper proportions are always assured. And that, with the exclusive baffling-cup, gives you *ninety seconds* starting. There's no "popping" or back-firing with a Clayton & Lambert. No matter how windy or draughty or unfavorable the conditions—your Clayton & Lambert performs just right! Certain types have a patented orifice that can't be enlarged by carelessness. Such exclusive improvements as those keep your Clayton & Lambert fit for action.

Be particular about your next fire-pot. Insist on a Clayton & Lambert. You can identify it by the bright red protective band around the base of the tank. You'll be buying the most popular fire-pot in the world. Sold at nearly all hardware stores.

**C & L 22**

*No. 22 is deservedly popular because of its easily understood design and powerful blast. Recent improvements make No. 22 particularly desirable. It has a door in the coil cup to easily remove the coil and burner for cleaning.*



# CLAYTON & LAMBERT

MANUFACTURING Co., Detroit, Michigan

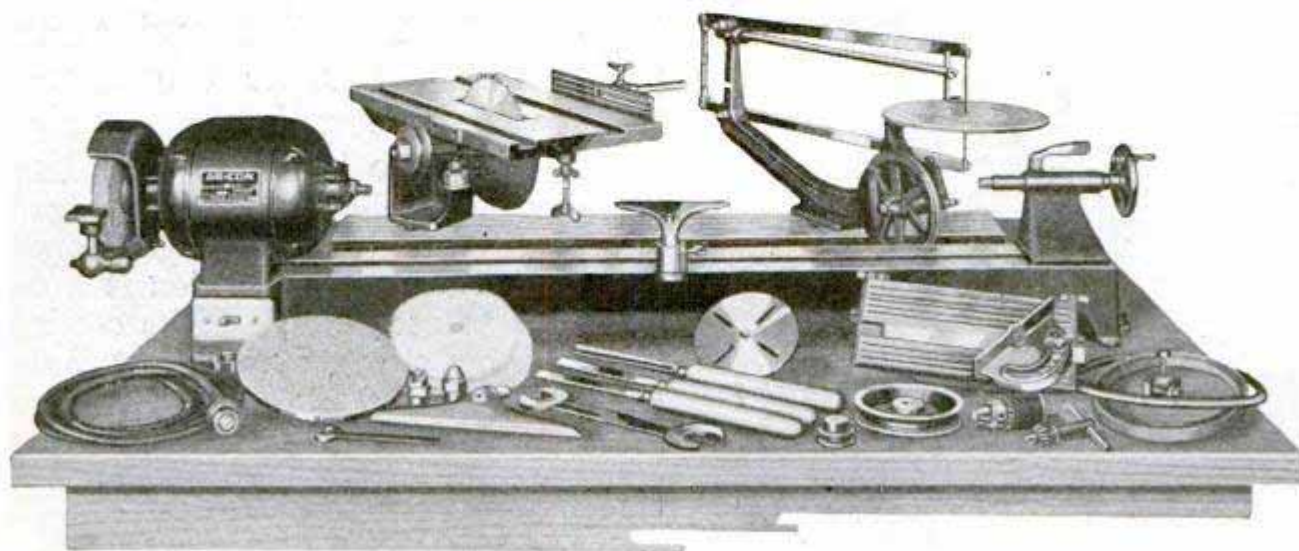




THE KING OF THEM ALL

# AR-CON

## UTILITOOL



## All the Qualities a Work Shop Should Have

It takes more than mere profusion of tools and equipment to make a work-shop that will bring complete and lasting satisfaction to you. Back of this must be well-thought-out design and high manufacturing standards to assure, in every unit and part, the strength, the rigidity, the accuracy and the operating efficiency **essential** to quality workmanship.

With the Ar-Con Utilitool you have an outfit that will prove equal to every demand you put upon it. From the  $\frac{1}{2}$  HP, ball-bearing, repulsion-induction type motor—the most efficient type built—to the wing screws and lock nuts of drop-forged steel, every detail of the Ar-Con Utilitool is designed and built to assure an ample margin of power and strength and the maximum of accuracy and dependability. Truly it is deserving of the title "King of Them All."

Send for the circular which illustrates and describes this super-efficient work-shop in detail. Compare the specifications, point by point, with **your** ideals of what a work-shop should be. Note the workmanlike design and sturdy construction of the lathe—31 inches between centers—which serves also as the foundation unit for circular saw, jig and scroll saw, and sander. Note the equally substantial construction of these units, the ease with which they are mounted or dismantled, and the powerful, positive drive. Note the completeness and quality of accessory equipment.

Then, if you are one who takes pride in speed and accuracy of workmanship, you will be content with nothing less than the full measure of satisfaction which the Ar-Con Utilitool brings to you.

**THE AR-CON TOOL COMPANY, 500 Fassett Street, TOLEDO, OHIO**

### Easy to Buy!

Ar-Con Utilitool units may be purchased singly or in any combination of units if the complete outfit is not required at the start. Moreover, purchase can be made by convenient time payments, if desired. Mail the coupon **now** for fully-illustrated descriptive circular and complete information on prices and terms.

The Ar-Con Tool Company  
500 Fassett Street, Toledo, Ohio

Mail descriptive circular on Ar-Con Utilitool, with prices and terms.

Name .....

Street Address .....

City and State .....

M





## nurses know

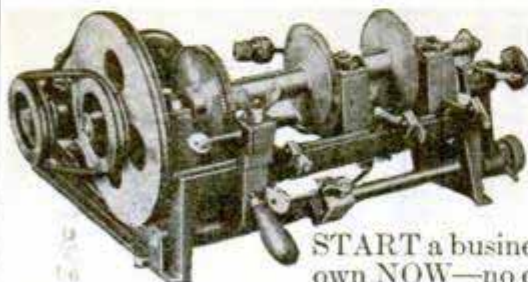
Capable—and careful—the trained nurse administers our comfort. If there is pain, she gives a tablet to relieve it. That tablet is Bayer Aspirin. Experience has taught her it is quickest. The doctor has told her it's quite harmless. So it is safe to use in everyday life, any time you have an ache or pain. Take Bayer Aspirin at the first sign of a headache, cold, neuralgia, etc. Don't wait until the suffering has become severe. Be sure, though, to get Bayer. *There is only one genuine Aspirin.*



# ASPIRIN

Aspirin is the trade mark of Bayer Manufacture of Monoaceticacidester of Salicylicacid

## Establish a Good Future



**DON'T  
BE A  
SHOP  
WORKER**

**START** a business of your own **NOW**—no experience necessary. The only key machine that cuts ALL kinds of keys. No hand-filing. Make first keys by number without taking locks apart. Instructions furnished free. **WRITE TODAY.**

**BEISSER KEY MACHINE COMPANY**

407 Fort St. East

Detroit, Mich., U. S. A.

# Soothes irritated eyes!

Men whose work exposes their eyes to irritation and strain will find *Murine* a godsend. Applied several times daily, it rids the eyes of irritating particles, relieves strain and prevents an unsightly bloodshot condition. This harmless lotion is a delight to use because of its cooling, soothing, strengthening effect. Write Murine Co., 9 E. Ohio St., Chicago, for valuable free book on the care of the eyes.

## MURINE FOR YOUR EYES



## MOTORCYCLES

**WE WILL TRUST YOU**  
Pay As Low As \$2.00 per Week  
Hendersons, Harley-Davidsons, Indians

Slightly used and rebuilt. Hundreds to select from.

Send 10c for list today.

MYEROW BROS. CO., 15 Berkeley St., Boston, Mass., U. S. A.

## Get Half Your Gasoline Free

Amazing invention gives from 25% to 100% Increase in Gas Mileage. 9 other valuable results guaranteed.

**AGENTS Make \$250 to \$750 a Month**

in profitable territories. Get new plan and Free Test Offer. Act Quick. Write **Blanche Auto Devices Co., Dept. 805-CB, 154 E. Erie St., Chicago**



## FREE RADIO CATALOG

Since the dawn of Radio, Barawik has been known the world over as headquarters for radio set builders and fans. Here, under one roof, is everything you need—sets, parts, supplies—thousands of products—ready to ship to you the same day your order arrives. Barawik prices save you money. Barawik service saves you time. Barawik merchandise always pleases. A quarter million satisfied customers say, "Barawik is Best." Let us send you the Big Barawik Book free and prove it to yourself.

**BARAWIK CO., 103 Canal Sta., CHICAGO, U. S. A.**

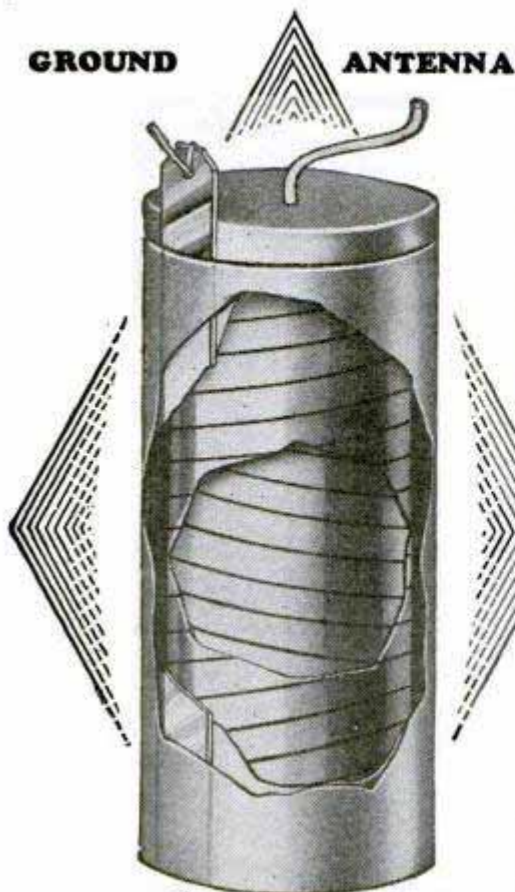


Mail This Coupon Now for Free Radio Guide

Name \_\_\_\_\_

Address \_\_\_\_\_





# NEW

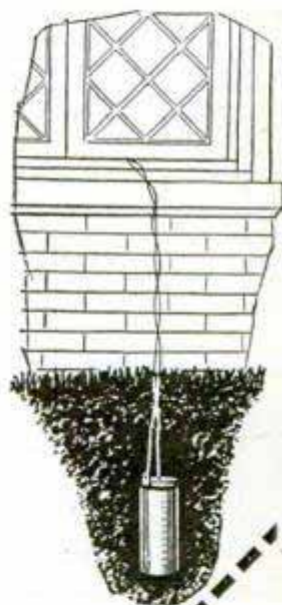
## ANTENNA and GROUND *Combined in one convenient Unit*

A wonderful thing has happened in radio! Convenience never before dreamed of! Clearer, sweeter-toned reception! Radio pleasure with less interruption! These things are brought to you by the amazing, tested, approved EARTH ANTENNA.

Many set owners have come to realize the importance of using a dependable antenna, also the value of perfect grounding in getting good reception. Now science has gone a step further; it says that the LOCATION of the antenna is an equally important factor in getting best results. Because the radio wave goes right into the earth—where obviously there is less atmospheric disturbance and interference—it is claimed the logical place for the antenna should be the EARTH, not the air. This important conclusion allowed Radio Engineers to work out the EARTH ANTENNA.

### SHIELDED ANTENNA GETS BETTER RECEPTION

The antenna is insulated or "shielded" against electro-static disturbances as are the most advanced, expensive receivers and their various parts. Science declares that the earth itself "shorts" the electro static capacity before it reaches the Antenna. This acts as another shield. The ground element is constructed of copper, undisputed as the most effective material for obtaining a perfect ground connection. This section of the unit is separated from the antenna by the insulation which shields the antenna. So in the EARTH ANTENNA you have a scientific ground and an antenna of modern shielded construction combined in one compact unit. You can test it yourself right now at our risk. Hear the wonderful results!



**Reduces Static**

**Gets Clearer, Sweeter Tone**

The new Scientific successful EARTH ANTENNA is designed to give you clearer, better, more dependable reception—and it costs no more than the old inefficient aerial—in fact less than many.

EARTH ANTENNA is so easy to install that soon people will wonder how they ever put up with the old, dangerous, slow methods. You simply dig a small hole only two feet below the surface of the ground, drop the EARTH ANTENNA into it and attach the lead-in wires to your set.

Now you are ready to listen to earth-clared, sweeter toned ground wave reception. You never need to touch the EARTH ANTENNA again.

## Test EARTH ANTENNA at Our Risk

Don't remove your old aerial and ground until you've compared the old and modern methods and hear the vast improvement with the new. If possible pick a time when static is bad. Then if you are not convinced that EARTH ANTENNA is the greatest discovery you've ever found for your radio—if not enthused over the improvement—you don't pay us a cent. The thrilling details of this important development—illustrated—will be sent immediately on receipt of this coupon. Mail it NOW!

The Modern Antenna Co., Dept. 805-C.E., St. Clair Bldg., cor. St. Clair and Erie Sts., Chicago, Illinois

Rush literature on EARTH ANTENNA and Free Trial Offer. No obligation.

### THE MODERN ANTENNA COMPANY

Dept. 805-C.E., St. Clair Bldg., cor. St. Clair and Erie Sts., CHICAGO, ILLINOIS

Name.....

Address.....

City.....

State.....

**EARTH ANTENNA**  
THE MODERN  
COMBINED ANTENNA AND GROUND





## Where's the can of PLASTIC WOOD?

(Reg. U. S. Pat. Off.)

The North Wind doth blow, and keeps blowing right through the edges of the window casing. Stop the drafts with Plastic Wood—force it in the cracks around the frame. No matter what the house construction—wood, tile, brick, stone—Plastic Wood will hold permanently fast. It handles like putty and hardens into wood.

Use it for cracks around the baseboard, too—under door sills, in floors, in doors—wherever the cold air seeps in. It is waterproof and weatherproof, and takes paint or varnish perfectly.

### Plastic Wood Solvent

When working, it sometimes is desirable to soften or thin Plastic Wood, and because of its adhesiveness it will stick to tools or fingers. To soften or remove it use Plastic Wood Solvent, in 25 and 50 cent cans.

Handles Like Putty



Hardens Into Wood

1 lb. can \$1.00

1/4 lb. can 35 cts.

At Hardware and Paint Stores

ADDISON-LESLIE CO., 413 Bolivar St., Canton, Mass.



On a new principle—keeps both needle and lead vertical—no digging in the paper. Accurate settings right on the beam. Makes circles up to eight inches across—yet fits easily in your vest pocket.

Only 50c—at your stationer's, or direct prepaid, from Esterbrook Pen Company, Camden, New Jersey.



## YOU CAN EARN \$15 to \$25 DAILY

Representing Manufacturer

Simply take orders from Stores, Homes, Garages, Vulcanizers, Miners, and Farmers, for INSTANT WELD, the marvelous chemically prepared rubber repair for tubes, rubber boots, hot water bottles, etc. Saves Auto owners 900%! ONCE ON—ALWAYS ON. Guaranteed to outwear the article repaired. Big Repeater! Get sub-agents working for you! No experience necessary. Write quick for free sample, and territory.

ASK ABOUT OUR OTHER BIG MONEY MAKERS

**TOURISTS PRIDE MFG. CO.,** Dept. 25-C, Minneapolis, Minn.

## KINKADE GARDEN TRACTOR AND POWER LAWNMOWER

A practical, Proven Power Cultivator for Gardeners, Suburbanites, Truckers, Florists, Nurserymen, Fruit Growers, Poultrymen.

**AMERICAN FARM MACHINE CO.**  
1058—33rd Ave. S. E., Minneapolis, Minn.



Catalog Free

## NEW AUTOMATIC WINDOW WASHER

Washes-Cleans-Dries-Polishes in ONE Quick Operation.



Amazing new invention completely revolutionizes window washing. Carries its own water supply! It eliminates all the drudgery and unpleasantness.

Five times as fast as old methods! No pail. No brush. No sponge. No chamois. Your hands never touch water with the NEW AUTOMATIC.

Can be used with or without pole. Every housewife, auto-owner, storekeeper and factory owner a live prospect. Sensational demonstration. Sells at sight. Big repeat business. Year 'round-seller.

**MAKE \$90 TO \$150 A WEEK!**

Agents coin tremendous profits. Going like wild-fire. Sells for only \$1.95. Liberal profits for agents. \$10 to \$25 a day easy; \$200 to \$300 a week possible.

Patent Pending

**WRITE FOR OUR FREE SAMPLE OFFER**

You risk nothing. Don't delay. Write for money making proposition today.

**NATIONAL INDUSTRIES, 67 E. Lake St., Dept. 153, CHICAGO**



# Doubles Light on Road Penetrates Glare

**NEW INVENTION** Throws Light of **38,000 Candle Power**  
without Glare, Dimming or Tilting

**Most Powerful Auto Headlight Known**



**NEW TRIPPE REFLECTOR** throws a light 100% to 300% MORE POWERFUL which CUTS RIGHT THRU ONCOMING LIGHTS, and penetrates far down the road.

**ORDINARY HEADLIGHTS** throw light not only DOWN by reflection from TOP of reflector—but also UP and INTO THE EYES of approaching driver from low part of reflector.

Here's the only REAL IMPROVEMENT in Electric Headlights for Autos—the invention of Graham Trippe, an Illuminating Engineer. It doubles the light on the road, yet is so non-glaring to cars approaching that the lights seem to be dimmed. It throws a powerful light of 38,000 candle power 300 to 500 feet ahead that makes the road as light as day. It CUTS RIGHT THRU ONCOMING LIGHTS and clearly shows up the road and pavement edge instead of leaving it "DARK" ahead. Night driving is now made as easy and safe as day driving.

## Two Sizes Fit all Cars—Easily Installed

Comes complete; made in just two sizes; fits any size headlight. Instantly replaces the entire headlight reflector even to the bulbs—no focusing necessary—any one can easily install.

## Makes Night Driving Safe

Thousands are killed every year by plunging into ditches or crashing head-on due to weak lights or glare. Scientists tried for years to banish the blinding glare but they only succeeded in eliminating the light.

At last, Mr. Trippe, after years of work, hit upon an optical principle. This wonderful scientific principle of two offset parabolic reflectors—one a full reflector, and the other a semi-circular reflector—so positioned in respect to each other that they project a long, low, level beam of powerful light, not only ELIMINATES THE GLARE and DOES NOT BLIND oncoming motorists, but INCREASES THE LIGHT on the road 100% to 300%. Legally adopted in many states. MAIL COUPON today for FULL DETAILS and make night driving safe and a pleasure.

# Mail Coupon Now!

**FREE TEST OFFER** Try a pair of Trippe Offset Reflectors on your own car AT MY RISK. See for yourself how Trippe Light CUTS RIGHT THRU ONCOMING LIGHTS, floods the road and side ditches with the LIGHTNESS OF DAY, YET GIVES NO GLARE to bewilder approaching drivers and MAKES NIGHT DRIVING SAFE and ENJOYABLE. If it does not IT COSTS YOU NOTHING, you're to be the judge. Mail coupon NOW. Wonderful opportunity for Agents, Salesmen and Distributors to make \$350 to \$1500 per month introducing it. Know the full details about this greatest and most necessary auto accessory ever brought out. Man alive, here's the opportunity of a life time—nothing like it! Get my FREE TEST and BIG MONEY MAKING OFFER NOW. Mail Coupon Today.

Graham Trippe, President

**AERIAL ELECTRIC CO.**

331 W. Ohio Street

Chicago, Ill., U. S. A.

**\$273<sup>00</sup>**  
**made in 1 Day**

25,000,000 Auto Owners need this strongest non-glaring auto light ever known. Livewire distributors and heman hustlers are grabbing it.

A. E. Martin clears \$275.00 First Deal.  
Absolutely must have 2,000 sets a month to fill orders. Please advise about prompt deliveries.

NORTHWEST HEADLIGHT CO.

By F. R. HAMILTON

"Wired you \$420 today on account. Ship J. J. Kane 200 sets Trippe Reflectors." A. L. BRADLEY

"Cramer & Kirkwood took entire first shipment of 100 sets today. Rush another 100 sets at once." C. E. BEVILL

"Just closed Public Service Company to equip 500 cars." MCLEAN

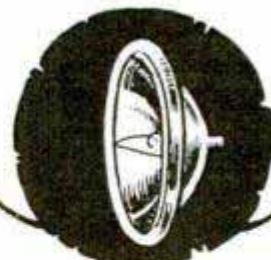
"Got 18 orders first two afternoons." JONES

"Closed deal today to equip 62 New Ford Model A for Dempster Mfg. Co." H. C. FOSTER

"Every set I have installed leaves perfect satisfaction and have sold three more sets for every one I have installed." D. E. WARREN

Get the full details—and FREE TEST OFFER. Act at once—MAIL COUPON NOW.

Wonderful Demonstration of Trippe Light Makes Sales & Money Fast



Graham Trippe, President.

Aerial Electric Co.,  
331 W. Ohio Street, Chicago, Ill., U. S. A.

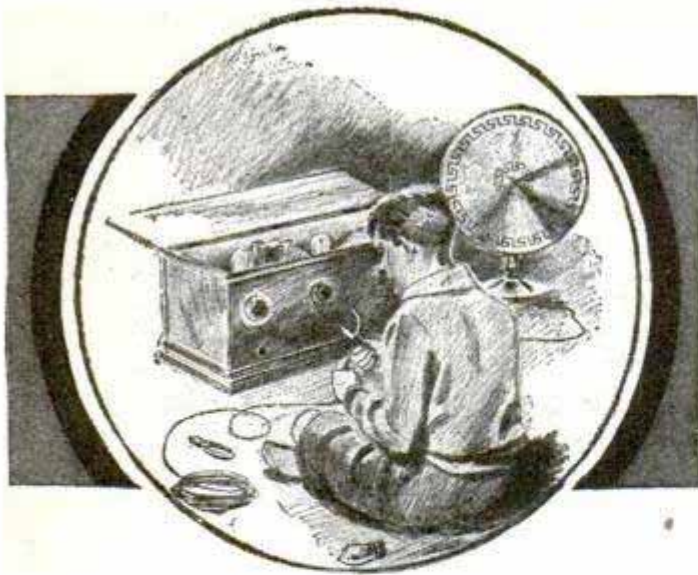
Please send me your Trippe Offset Reflector FREE TEST and BIG MONEY MAKING OFFER.

Name.....

Address.....

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





## The Radio Knife Electrician's Favorite

**H**ERE'S a fine practical tool for the professional electrician or mechanic, and for every man or boy who tinkers with a radio or other electrical equipment.

The screw-driver locks in place when open. It can't shut on your fingers. This blade has an edge for scraping the insulation off wires.

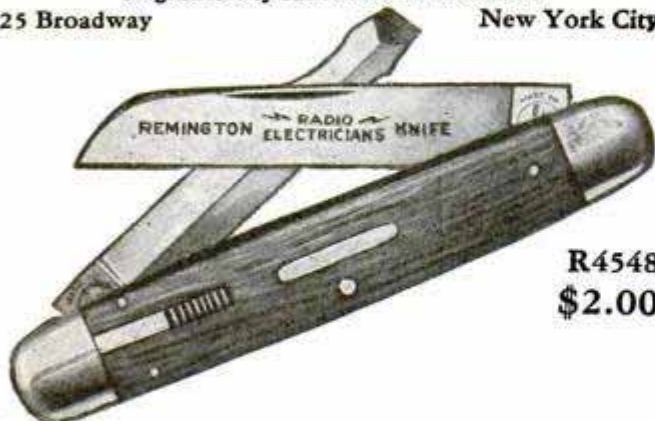
Then there is a good sturdy sheepfoot blade for all 'round use. It's razor-sharp—hand-honed at the factory. Made of high-carbon steel that holds a biting edge. Handsome Cocobola handle — nickel-silver bolsters and shield.

This knife belongs in every tool kit. At your dealer's. If he hasn't it in stock send us his name and \$2.00 for R4548. It will be mailed promptly.

REMINGTON ARMS COMPANY, Inc.  
Originators of Kleanbore Ammunition

25 Broadway

New York City



R4548  
\$2.00

# Remington



## OXO-GAS Oil Burners

**Will Heat** Stoves, Ranges, Coffee Urns, Steam Tables, Tanks, Boilers, Vulcanizers, Water Coils, Rendering Kettles, Bake Ovens, Griddles, Lead Pots, Pressing Machines, etc.

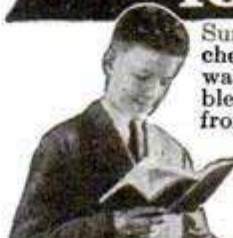
**No Noise—No Smoke—No Soot—No Ashes**  
**Require No Mechanical Skill to Operate**  
**Can be Installed in 30 Minutes**  
**Last a Lifetime**

Responsible Distributors Wanted

Write for illustrated catalog.

**DORAN OIL BURNER CO.**  
111-3 No. May St. CHICAGO, ILL.

## Chemical Tricks for Boys



Surprise and puzzle your friends with magic chemical tricks; make ink, dye cloth, test water and soil; write secret letters with invisible ink; pour blue, brown and black liquid from a pitcher of water. All these and many more chemical stunts are easy with ChemCraft Junior. It's the best box of fun you ever had! Get yours now.

**ONLY 25c POSTPAID**

**FREE Catalog**

and ChemCraft Magazine sent to every boy who writes for it now. Full of new ideas and chemical stunts. Ask for yours!

**The Porter Chemical Co.**  
113 Summit Ave. Hagerstown, Md.

## AGENTS AND SIGN MEN

Now Making \$50.00 to \$100.00 and Up Per Week Selling Our  
**GOLD LEAF SIGN LETTERS**

# R

For store and office windows, board signs, trucks and glass signs. We also make to order script signs and business emblems singly or by the thousands. A permanent business. No capital or experience required. Big demand in every city. *Samples and Literature Free.*

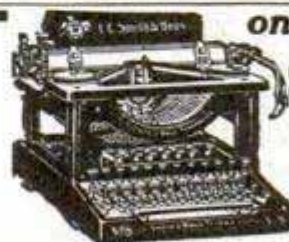
**CONSOLIDATED SIGN LETTER CO.** 71-X W. Van Buren  
CHICAGO, ILL.

## MOTORCYCLES



Price \$10 and up purchased through our Co-Operative Plan for as low as \$1.00 down and \$1.00 per week  
**Indians Harley-Davidsons Ace Henderson and Clevelands**  
Send ten cents for Bulletin A.  
*Motorcycles shipped to all parts of the world*

**WALKER-INDIAN CO., 78 Brookline Ave., BOSTON**



only

# \$1.00

**DOWN**

**10 Day FREE Trial**

You can have a genuine L. C. Smith (the world's only ball bearing typewriter) for \$1 down. Lowest price ever offered! Easiest terms. All the 1928 operating attachments. Re-newed, **GUARANTEED FOR FIVE YEARS**, \$1 down and we ship. No delay. No red tape. 10 day Free Trial. Free Typewriter Course, Tools, Waterproof Cover if you act now. Write for \$1 down offer and free manual.

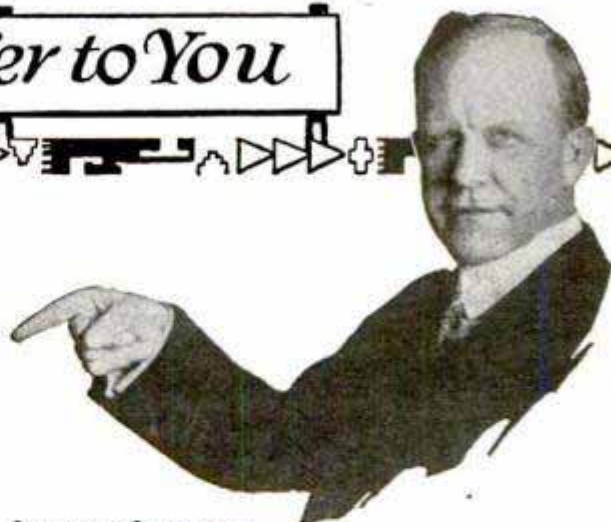
**Smith Typewriter Sales Corp., 113-469 E. Ohio St., Chicago, Ill.**



# Special! My 1929 Offer to You

## I Will Save You Money

Read my 1929 Offer to You



My sole aim, during the year 1929, shall be to place as many standard, dependable Watches as I can in the hands of men throughout the land REGARDLESS OF PRICE OR PROFIT. To do this I have cut the price to ABSOLUTELY ROCK BOTTOM. I know that if I can distribute 5,000 "Santa Fe Specials" this year on this NO-PROFIT PLAN, that every Watch will be a salesman and sell at least one more. I am making this STARTLING AND UNHEARD OF OFFER to those who will tell their friends of this remarkable Watch value, if they find the Watches all and more than I claim for them.

*Alouzo Thomas*

President, Santa Fe Watch Co.

## Save 1/3 to 1/2 of Your Money Most Liberal Offer Ever Made

Our "Direct-to-you" low wholesale terms and EXTRA SPECIAL DISTRIBUTION PLAN is fully explained in the New Santa Fe Special booklet just off the press. The "Santa Fe Special Plan" means a BIG SAVING of money and you get the BEST watch value on the market today. Watch sent to you to see without one penny down. These Watches are NOW in the service on practically every Railroad in the United States and in every branch of the Army and Naval service. Thousands of them are distributed all over the world.

### Write for FREE Watch Book Today

shows newest watch case designs in 4 colors. READ the so-called SECRETS of watch making. READ how you can save from ONE THIRD to ONE HALF of your money—Buy "Direct." The wise man will act quickly if he wants a watch.

EASY PAYMENTS TO SUIT YOU—Don't delay—Fill out and mail the coupon below for the FREE Watch Book.

### SANTA FE WATCH COMPANY

36 THOMAS BUILDING

TOPEKA, KANSAS



SANTA FE WATCH COMPANY,  
36 Thomas Building, Topeka, Kansas.

Please send me the New Watch Book with the understanding that this request does not obligate me in any way.

Name.....

Address.....

State.....



## THERE ARE THRILLS A PLENTY ON THE SHORT-WAVES

Let Hammarlund help you enjoy them. Whether you build your radio receiver for short-wave broadcast or code reception, remember that Hammarlund parts are approved by radio experts the world over.

Your dealer can supply you with Hammarlund Short-Wave Condensers, Plug-in Coils, Chokes, Shields and Equalizers. *You Can't buy better.*

Send 10c for the Hammarlund Short-Wave Manual. Chock full of useful information. Dept. PM3.

**HAMMARLUND  
MFG. CO.**

424-438 W. 33rd St., New York

For Better Radio  
**Hammarlund**  
PRECISION  
PRODUCTS

# GET THIS BIG GREEN BOOK NOW!

New!  
AERO  
KITS  
1929

The Big Green Book gives the very latest details on Aero Coils and Kits, Short Wave Radio, newest broadcast radio receivers, short wave converters, telephone transmitters, coil kits, adapters and a host of new wrinkles for 1929.

### 24 Different New Kits Shown for 1929

The kits everyone is talking about are fully described in the new 1929 Aero Green Book—Aero 7-29, Aerodyne 6-29, Chronophase, Metropolitan, Trio, International, Standard, Radiophone—in Shield Grid, A.C. and D.C. models. Be sure to send for your copy of this 25c Big Green Book—worth \$25.00 to anyone who wants to keep up with the latest radio wrinkles.

Mail coupon for your copy today—NOW!

**AERD PRODUCTS**  
INCORPORATED

4611 E. Ravenswood Ave., Dept. 439  
CHICAGO, ILL.

MAIL THIS COUPON NOW

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## A Tube NECESSITY -Not an Extra

There is no choice. You must use Amperite to automatically control variations in the "A" current supply to your tubes. A type for every tube—A. C. or D. C. \$1.10 with mounting (in U. S. A.) at all dealers.

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This symbol  
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means—



The "SELF-ADJUSTING" Rheostat

Radiall Company  
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Write Dept. PM3.

FREE "Amperite Blue Book"  
of modern circuits and  
valuable construction data.

**AMPERITE**  
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## Radio Pep!

No matter what your set—new or old, homemade or factory built, one-tube or ten-tube, head-phone or loud-speaker—you can improve it with Clarostats. There's a type for every purpose. Ask your dealer how. Or write us for literature. Better still, send a quarter in stamps or coin for "The Gateway to Better Radio"—20,000 words and 88 pictures of real radio dope!

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**CLAROSTAT**  
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METAL IN PASTE FORM



The  
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Every Electrical  
Connection needs  
Solderall for perfect reception

25c

The SOLDERALL CO., NEWARK, N. J.

## Send for WESTERN RADIO New 1929 Catalog

LATEST and FINEST, nationally known A. C. sets, consoles, cabinets, speakers and accessories at LOWEST PRICES. Catalog sent FREE on request.

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New  
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This 260 Page  
Wholesale Radio Catalog  
A Liberal Radio-Edu-  
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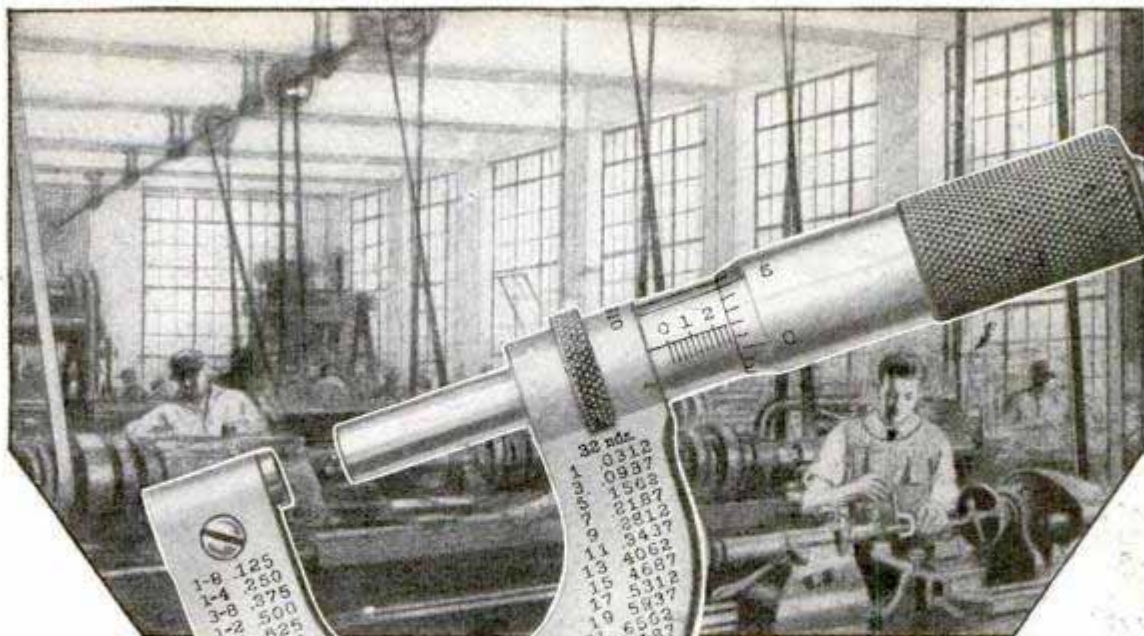
**FREE**

Containing 75 radio  
hook-ups, 1,000 illustra-  
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Build your own with Rasco parts.  
Positively lowest prices in the country.

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Modern factory methods step up the output of men and machines. One machine today does the work formerly done by many. One man does a job that used to require several. But the need for accuracy never diminishes. Rather it increases with the increased speed of production.

That is why in modern machine shops you will find more and more precision instruments—such as the Micrometer illustrated above. And the general preference shown for Brown & Sharpe measuring tools is industry's way of saying that no finer guarantee of accuracy can be obtained.

Ask for a free copy of Catalog No. 30 listing over 2300 Brown & Sharpe Tools, including Micrometer Caliper No. 10 RS (range 0 to 1" by ten thousandths of an inch) shown above. At your hardware dealer or from us direct. Dept. P. S., Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.



"World's Standard of Accuracy"



Caliper  
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Surface Gauge  
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Combination Square  
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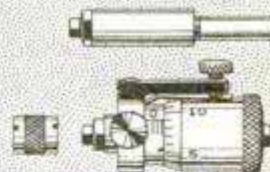
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# BROWN & SHARPE TOOLS

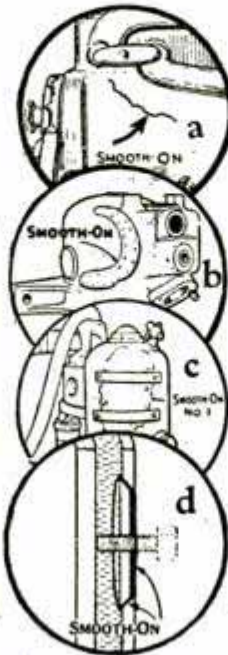


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with Smooth-On No. 1

No disassembling and no heat!

- A. **Simple crack.** Force Smooth-On No. 1 into the crack and give it a few minutes to metallize.
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Use Smooth-On also for stopping all water, oil, gasoline or exhaust gas leaks and for tight hold at screw threads of nuts, hub caps, etc.

Get Smooth-On No. 1 in 7 oz., 1-lb. or 5-lb. tins at any hardware store or if necessary direct from us.



Write for **FREE BOOK**



**Do it with SMOOTH-ON**

## FREE

**THIS** booklet tells how to stop not only water leaks in radiators, cracked water jackets, and at loose hose connections, but also how to stop gas leaks from the tank, gasoline lines and exhaust system, and oil leaks at gaskets and at cracks in crank or gearcase. It also tells how to make headlight posts, nuts, hub caps and bolts and grease cups stay tight, and shows dozens of simple money saving Smooth-On repair jobs. Sent free if you return the coupon.

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Please send the free Smooth-On Repair Book.

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# Old Cars Made NEW in 30 Magic Minutes



**NO POLISH-NO PAINT-NO WORK**

**Amazing KoTAL** gives the **BEAUTY** and **LUSTRE** of an Expert **REPAINT JOB** at **1/20th the Cost**

This Amazing New Liquid, discovered in a famous industrial research laboratory has startled the Motor World. Just flow KoTAL on with a cheesecloth pad as easy as wiping a car with a chamolis. **NO Rubbing** — **NO Hard Work.** Results are Amazing — with one sweep of your hand you restore

**BOTH the COLOR and Original Bright Mirror-Like FINISH to Dull — Drab — Faded Cars.** Gives a glass hard protective coat that does not hold dust and the Lustre Lasts for months. Makes shabby OLD cars look like the day they were driven NEW off the dealer's floor. Words cannot describe the startling transformation. Warranted harmless to any finish. Manufactured by a long established highly rated, financially responsible concern and sold under the **STRONGEST GUARANTEE** ever put on any product.

**\$1000 Would Not Buy the Start We Give You FREE. Get the Facts**

We furnish **FREE** every sales help conceivable. We back you to the limit. *Man Alive!* Here is the **Biggest** thing in the motor industry today—it's going over like a house afire. Everybody claims big money—**KoTAL men** actually make it. Hustlers laugh at \$100 per week. Millions of cars need this Quick — Economical — Magic finish which adds

**AGENTS EARN \$5 to \$10 Every Hour You Work \$200 a Week is Easy Money**

25 to 40% to resale values. Demonstrates itself instantly. No Talking Needed. Men who have tried to sell everything on earth and failed are making good with KoTAL. Even inexperienced country boys make money hand over fist. Strike while the Iron is Hot. Get the facts and get them now. We will send you our **Big FREE BOOK** illustrated in colors, and Agents' **FREE TRIAL OFFER.** Good territory is going fast. Act **NOW**—Act

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Direct from the manufacturer. Completely wired, including glassware. Send for new catalogue No. 29. Just Reduced Prices. *Special Proposition to Dealers.*

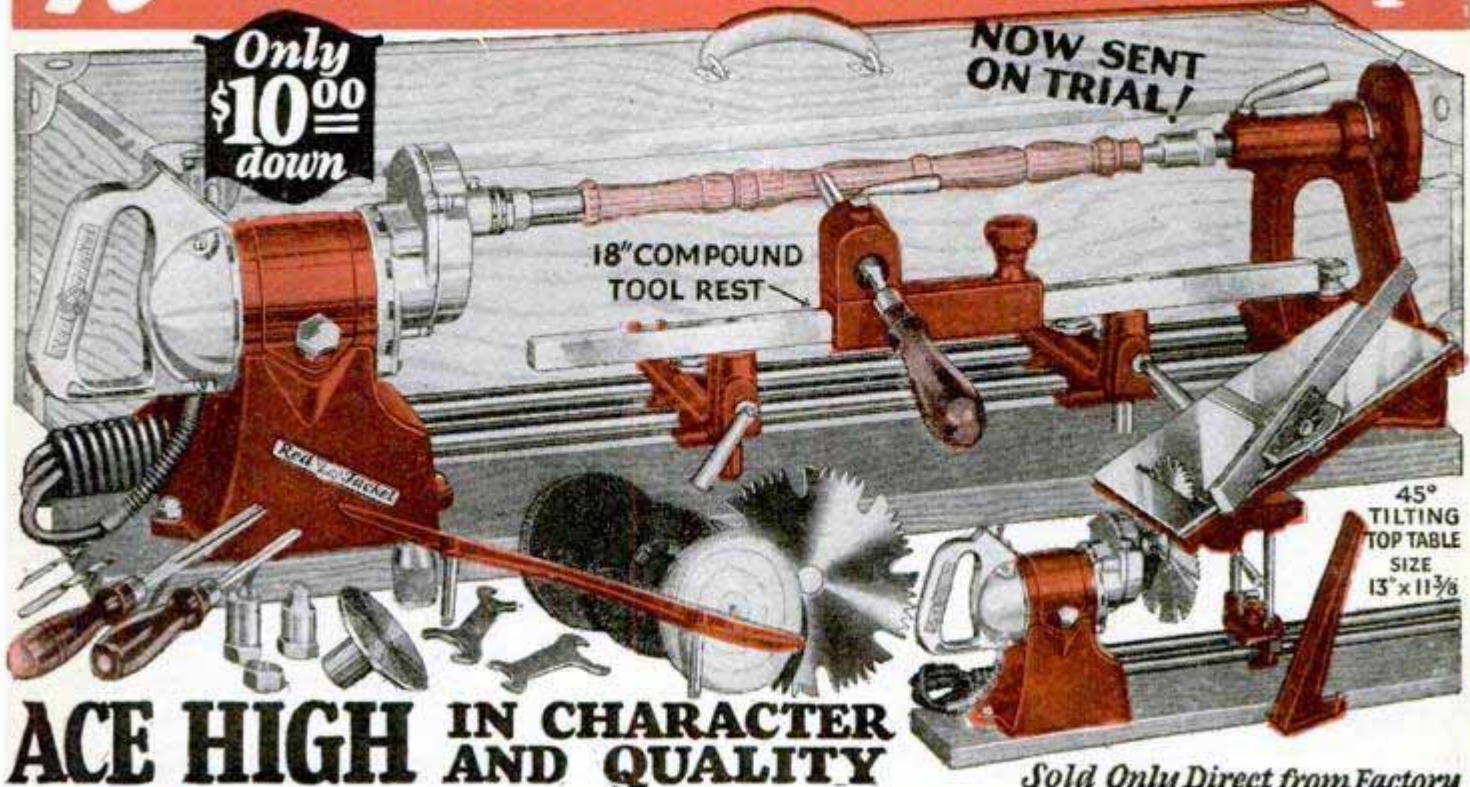
**Erie Fixture Supply Company, Inc.**  
Station A  
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# Auto Runs 40 Miles on Gallon of Gas

Automobile engineers who worked for years in an effort to reduce gasoline consumption have found the solution in a marvelous invention that fits all cars. An actual test made by one of the engineers showed forty miles on a gallon of gas. Thousands of car owners have already installed this new invention. They not only report amazing gas savings, but are also surprised to find quicker pick-up, instant starting, smoother running motors and disappearance of carbon. E. Oliver, 999-879 Third St., Milwaukee, Wisc., for a limited time is offering a free device to those who will help introduce it. They also need men everywhere to make over \$100 weekly in their own territory taking care of local business. Write him at once for free sample and big money making offer.—Adv.



# Now - Make Things at Home with this Wonder Working Shop



**Only \$10.00 down**

**NOW SENT ON TRIAL!**

18" COMPOUND TOOL REST

45° TILTING TOP TABLE  
SIZE 13" x 11 3/8"

## ACE HIGH IN CHARACTER AND QUALITY

*Sold Only Direct from Factory*

3 years of testing, experimenting and improvement is wrapped up in each new Red Jacket Home Work Shop. The finest tools and accessories that can be made go with each assembly order. Red Jacket equipment is designed, tested, approved and guaranteed by Wm. L. Aylward, a nationally known craftsman and manufacturer, who has developed his hobby into a co-operative association of thousands of craftsmen.

### Portable - Interchangeable - Complete RED JACKET Home Work Shop

The new Red Jacket Combination of Electric tools brings you a Red Jacket Band Saw and in addition the powerful Red Jacket Master Drill Motor with direct drive to the Waco Craftsman's wood turning lathe (capacity 9"x36"), also compound and 18" rests, a tilting top mitre saw with both depth and side gauges, scroll and jig saw, and all accessories for both portable and stationary power drilling, buffing, grinding and cleaning. Attaches to light socket and converts your work bench into a complete private tool and machine shop. It is a complete chest full of electrically driven tools designed for the private use of tool lovers and men who create, repair and appreciate handy tools at home.

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Exclusive Features with WACO-

- All Aluminum Master Drill Motor
  - Perfect Tilting Saw Table 13 x 11 1/8 in.
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- Read Our Code of Business Ethics—  
Ask 7000 Happy Waco Owners



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Send coupon at once for information valuable to those interested in beautiful handiwork. It is FREE. It tells you now easy it is to operate a Red Jacket set of tools and lists the advantages and privileges that are free to member craftsmen. Don't miss knowing all about Waco. You are invited. **Look out for imitations.** There is only one Red Jacket—one Waco—you will not find WACO TOOLS sold by retailers. All sales made direct from factory.

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If it is not what you want when you get it—send it back.

**SPECIAL CRAFTS COURSE FREE**  
SPECIAL CRAFTS COURSE and blueprint service is free to Red Jacket Shop owners—all there is to know about handicraft methods, raw materials, woods, carving, sawing, turning, designing, carpentering, decorating, is taught by special correspondence.

**BUY ON YOUR OWN TERMS** Only \$10.00 down. Liberal discount for cash. Easy monthly payment plans. It is no hardship to own a Red Jacket.

**SEND THE COUPON--Interesting Literature Free** You will be surprised with all it contains. Beautiful, Instructive, Fascinating, Interesting. Fill In and MAIL TODAY.



Loving Cup Won by Waco Grand Prize of American Master Craftsmen's Assn.

45° Tilt Top Table



The most elaborate and unusual drill motor ever designed for driving power.

**free BLUE PRINTS**



This Headstock furnished where no electricity is available.

**Red Jacket MASTER DRILL**

**WACO TOOL WORKS, Inc.,**  
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Manager, Dept. 103. Please send me all free information and literature on Red Jacket Assemblies and FREE Services.

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Reliable  
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Genuine Diamonds Guaranteed **CASH OR CREDIT**

For 71 years Loftis Bros. & Co. have served the American public with better gifts at lower prices. Let us help you make some loved one happy. Our Diamonds are exquisitely beautiful gems set in solid 18-k white gold hand engraved rings. Buy from a house of established reputation—our prices defy competition.

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No. 883 \$75 **\$1.75 a week**

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No. 824—The "Elite" \$8.00 solid 18-k white gold  
Set with 3 Diamonds, \$22.50; 5 Diamonds, \$32.50; 7 Diamonds, \$42.50; 9 Diamonds, \$52.50; 13 Diamonds, \$67.50.  
Men's strap watch, nickel, cushion shape, high-grade movement, fine leather strap ..... \$8.50

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Solid 14-k white gold. High grade 15-Jewel movement. Fancy corners; \$15.00. \$1.50 down and \$1.50 a month.

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Solid 18-k white gold—finest white Diamond. Special bargain! \$75.00. \$1.75 a week.  
All makes of Railroad Watches, guaranteed to pass inspection. Credit at Cash Prices.  
All standard makes thin model watches, green or white gold to suit your needs—\$10 and up.



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Eel, Mink, Muskrats etc. with my New, Folding, Galvanized **STEEL-WIRE TRAP.**

It catches them like a fly-trap catches flies. Made in all sizes. Big money-makers for trappers and fishermen. **Get One Free to Introduce Our Goods.** Write today for price list, and my special free trap and bait offer. **J. F. GREGORY, Dept. 208, Lebanon, Mo.**



**Hoist Anchor!**

and you'll find prize parts for your ship. Imagine the joy of building Donald McKay's real clipper ships. Quality parts and full rig from top spars to keel. "Flying Cloud" in 20" model with hull block, wheel, bell, anchor, capstan, flag, rails, cabin and deck house, complete with drawing \$10. Sanded hull \$1 extra. Figure head 50c. Or "Constitution," "Mayflower," Galleons.

Also rigged sailboats ready to race! Will not sink or capsize. Main sheet steered. Sloop "Captain" or schooner "Bowdoin," 30" beam, are sure winners of regattas.

**ROY HANCOCK**  
323 Douglas Ave., Portsmouth, Va.

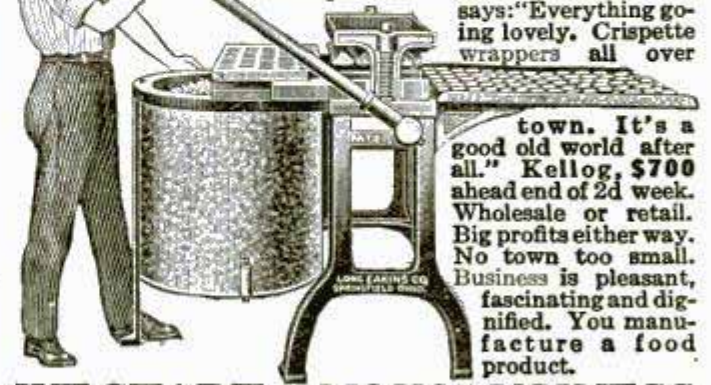
- Here's 10c for illustrated catalog
  - Send "Flying Cloud." Enclosed \$.....
  - Mail "How to Paint Ship Models," 10c enc.
- Name.....  
Street.....  
City.....State.....



**\$351.00 CLEARED IN ONE DAY**

So writes W. H. Adams of Ohio. Letter from California man reports \$11275 sales in three months; New Jersey \$4000 profits in two months; Pa. \$3000

profits in four months. Ira Shook \$365 sales in one day. Bram bought one outfit April 5 and 7 more by August. Iwata bought one outfit and 10 more within a year. J. R. Bert says "only thing I ever bought that equaled advertisement." John Culp says: "Everything going lovely. Crispette wrappers all over



town. It's a good old world after all." Kellogg, \$700 ahead end of 2d week. Wholesale or retail. Big profits either way. No town too small. Business is pleasant, fascinating and dignified. You manufacture a food product.

**WE START YOU IN BUSINESS**

Furnish secret formulas, raw material and equipment. Little capital required; no experience needed.

**Build a Business of Your Own**

No limit to the sale of Crispettes. Everybody likes them. It's a delicious food confection. Write for facts about a business that will make you independent. Start now, in your own town.

**PROFITS \$1000 MONTH EASILY POSSIBLE**

Send postal for illustrated book of facts. It contains enthusiastic letters from others—shows their places of business, tells how and when to start, and all information needed. Free. Write now!

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**BABY STANDARD**

**MOVIE CAMERA**

Make your own action movies of events, trips, parades, etc. Takes 25 feet of standard film. Equipped with F.5 universal lens. Loads in daylight. Films developed free. Film can be projected from any standard projector.

**\$13.50**  
F.O.B. Phila.

Send 10c in stamps for illustrated booklet.

**VICAM PHOTO CO. 1224 Belmont Ave. PHILA., PA.**

**22 Cal. Blank Automatic**

**\$4.99**

**Free!**

WITH 100 shot Automatic. Use for CART-tun or self-defence. Keeps away tramps, RIDGES. Frightens thieves, scares away dogs—a real home protector. Fool your friends. Same as an expensive automatic in construction, finish, appearance. Customer satisfaction magazine loading and ejection of cartridges instantly and powerful report. Guaranteed absolutely safe. Send no money. Pay expressman \$4.99 for automatic with 100 cartridges. **JENKINS, 621 Broadway, New York, Dept. 3-J-23**

**No Permit Required**

**6 SHOT**

**\$23.50 FOR ALL WOOL SUITS**

**BIG PAY**

Make big money showing Pioneer all-wool, tailored to measure clothes. Amazing values at \$23.50 and \$33.50. Big commissions in advance with liberal bonus. Customer satisfaction assures fast growing repeat business. No experience necessary. We train you. Ambitious men who want to make money steady, send for our attractive sales outfit. Most complete and effective double size swatch line ever offered. **FREE.** Write now for full details of this unusual opportunity.

**Pioneer Tailoring Co. Dept. Congress and Throop Sts. Chicago**

**SPARE OF FULL TIME**



FACTORY TO YOU—SAVE 50%—COMPARE WITH COSTLIEST OUTFITS BEFORE YOU BUY

# Enjoy a powerful new Miraco <sup>set or complete outfit</sup> 30 DAYS FREE

AC Electric or Battery

Get Our  
Send No  
Money  
9th  
Anniversary  
Offer!



View of marvelous new, 3-year guaranteed, lighted 1-dial control. All Metal Super Shielded AC-9 chassis with front switch, built-in AC power section, phonograph pick-up connection and all latest features removed from cabinet. AC tubes and cabinet extra.

**NEW LOW FACTORY PRICES**  
**SAVE 50%**

**Choice of Cabinets AC or Battery Sets**  
30 Days' Trial

Richly designed genuine walnut console of finest type. Electro-dynamic or magnetic power speaker.

Graceful Spinet console, genuine walnut. Choice of speakers. Also comes in Radio-Phonograph Comb'n.

A Lo-Boy Console that costs little. Dynamic Power Speaker.

Popular inexpensive combination. Set on table speaker.

New-type arm-chair console of genuine walnut—latest speakers.

**MIRACO Radio gets 'em Coast to Coast**

Latest • Powerful • New

# MIRACO

TRADE MARK REGISTERED

Cathedral Toned, Super Selective, Long Distance Getters

## Battery or Electric AC Sets

Celebrating its 9th successful year, America's big, old, reliable Radio Corporation springs a genuine sensation in high-grade sets. With its latest, Super-powered, 1-dial Miracos—the All Electric wholly self-contained, hum-free, AC-8 and AC-9, using AC tubes or the new 8-tube Ultra for batteries or Eliminators—you are guaranteed the greatest values and savings in the fine set field.

Compare a Miraco with highest-priced radios, for 30 days in your home. Surprise and entertain your friends—get their opinions. Unless 100% delighted, don't buy it! Return everything—the complete outfit—at our expense. Your decision is final—absolutely!

Only exceptionally fine radios, of the very latest approved type, at rock-bottom prices, could possibly back up so liberally unconditional a guarantee. Send coupon now for Amazing Special Factory Offer!

### Don't Confuse with Cheap Radios

With its rich, clear Cathedral tone, hum-free operation, tremendous "kick" on distant stations and razor-

edge selectivity—with its costly sturdy construction, latest features, including phonograph pick-up connection, ease of tuning, beauty, and economy—a Miraco will make you the envy of many whose radios cost 2 to 3 times as much!

### BIG DISCOUNTS

Exclusive Territory to User-Agents on BATTERY OR AC ELECTRIC Outfits

Many thousands of Miracos—bought after 30 day home comparisons—are cutting through locals and getting coast to coast, Canada, Cuba, Mexico, with the tone and power of costly sets. Miracos are laboratory-built with finest parts, and embody 9 years' actual experience in constructing fine sets. Approved by Radio's highest authorities.

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Everything reaches you splendidly packed and rigidly tested to insure your instant enthusiasm. Enjoy the outfit 30 days—then decide. Liberal 3-year guarantee on each set. Play safe, save lots of money, and insure satisfaction by dealing direct with Radio's old, reliable builders of fine sets—9th successful year

Ultra 8  
**\$49<sup>88</sup>**

Electric AC-8  
**\$71<sup>50</sup>**

Electric AC-9  
**\$83<sup>75</sup>**



Metal or wood compact style cabinets. Wood cabinets in walnut or new shaded silver-chrome finishes. Cathedral Electro-Dynamic or Magnetic-Power Speaker to match!

**MIDWEST RADIO CORP'N, 407-RM Miraco Bldg., Cincinnati, Ohio, U. S. A.**  
**BEAUTIFULLY ILLUSTRATED CATALOG, AMAZING SPECIAL FACTORY OFFER**

Testimony of Nearby Users—All the proof you want—of our honesty, fairness, size, financial integrity, radio experience and the performance of our sets—including Amazing Factory Offer—sent with catalog.



**Free!**

**MIDWEST RADIO CORPORATION**  
Pioneer Builders of Sets—9th Successful Year  
407-RM Miraco Bldg., Cincinnati, Ohio

**THIS COUPON IS NOT AN ORDER**

WITHOUT OBLIGATION, send free catalog, Amazing Special Factory Offer, testimony of nearby users, etc.  User  Agent  Dealer

Check here if interested in an EXCLUSIVE TERRITORY PROPOSITION  
NAME ADDRESS



**Champion X**—For Model T Fords—Packed in the Red Box—60c. **Champions**—For all other cars, including Model A Ford, and trucks, tractors and stationary engines—75c.



## A New Improved CHAMPION for Every Type of Engine

**DESIGNED** and made to meet the stresses of the most advanced modern engines the new improved Champion is far in advance of the Champion Spark Plug of even six months ago. The new and exclusive sillimanite insulator is as vast an improvement over all previous insulators as the original sillimanite over porcelain. A remarkable new sillimanite glaze remains practically impervious to carbon and oily deposits.

The advanced new solid copper gasket seal remains absolutely gas-tight against the much higher compression of today's engine. The special analysis electrodes have been greatly improved to resist pitting and burning.

**Remember**—it is a genuine economy to install new Champions every 10,000 miles. A complete new set of improved Champions installed in your car will show actual savings in gas and oil which will more than offset their cost.

# CHAMPION

## Spark Plugs

Toledo, Ohio

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**Thompson**  
**BEATS**  
the World  
on **BOATS**

**THOMPSON**  
**BOATS**

**CATALOG**  
**FREE!**



**OUTBOARD MOTOR BOATS**—A complete line of strictly up-to-date racing models. Also some entirely new models for general pleasure use with speed of a racer. Built strong, staunch and durable, and absolutely safe.

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\$44.00  
and up—

The most complete line ever offered, at real money-saving prices.

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\$48.00  
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Some all wood, others canvas covered. Light, swift, safe, strong and durable. Choice of many distinctive color combinations.

**Motor**  
**Boats**—

With or without Engine. Fast, handsome craft at money-saving prices.

**CATALOG FREE — SAVE MONEY — ORDER BY MAIL**

Please state the kind of boat you are interested in (30)

→ **TWO LARGE FACTORIES** ←

**THOMPSON BROS. BOAT MFG. CO.**

213 Ann St.  
PESHIGO  
WISCONSIN

(Write to  
Either Place)

113 Elm St.  
CORTLAND  
NEW YORK

### SPEEDO-PLANE FLYER



Rises from the ground, soars to great heights; comes down in a graceful glide to a perfect landing. Wing spread 16 in. Motor stick 14 in. 7 in. carved wood propeller. Match its performance against your \$5 plane. Fully assembled. Only 50 cents postpaid in U. S.

### SPEEDSTER AIRPLANE

Fast flyer. Rises from ground under its own power. Speeds beautifully thru the air. 11 in. wing spread. 9½ in. long. 4½ in. carved wood propeller. Only 25 cents postpaid in U. S.

**Both Models Guaranteed to Fly or Money Refunded**  
Special for this month—Snappy, live rubber, 1-8 in. flat, ½ cent per foot; 3-16 in., 1 cent per foot. Postage 5c extra.  
**SPEEDO MANUFACTURING COMPANY, Dept. M, 253 Albany Avenue, BROOKLYN, N. Y.**

## MOVIES AT HOME

Many models of genuine MOVIE MACHINES, some as low as \$3.75, all using standard size big theatre films. Our stock of films is the most complete and lowest in price—with an exchange service. Films of leading stars and religious subjects are available. **DON'T DELAY. WRITE FOR FREE INTERESTING CATALOGUE NOW!**

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Size 16x20 inches  
Same price for full figure or bust, groups, landscapes, or pet animals etc., enlargements of any part of group picture. Safe return of your own original photo guaranteed.

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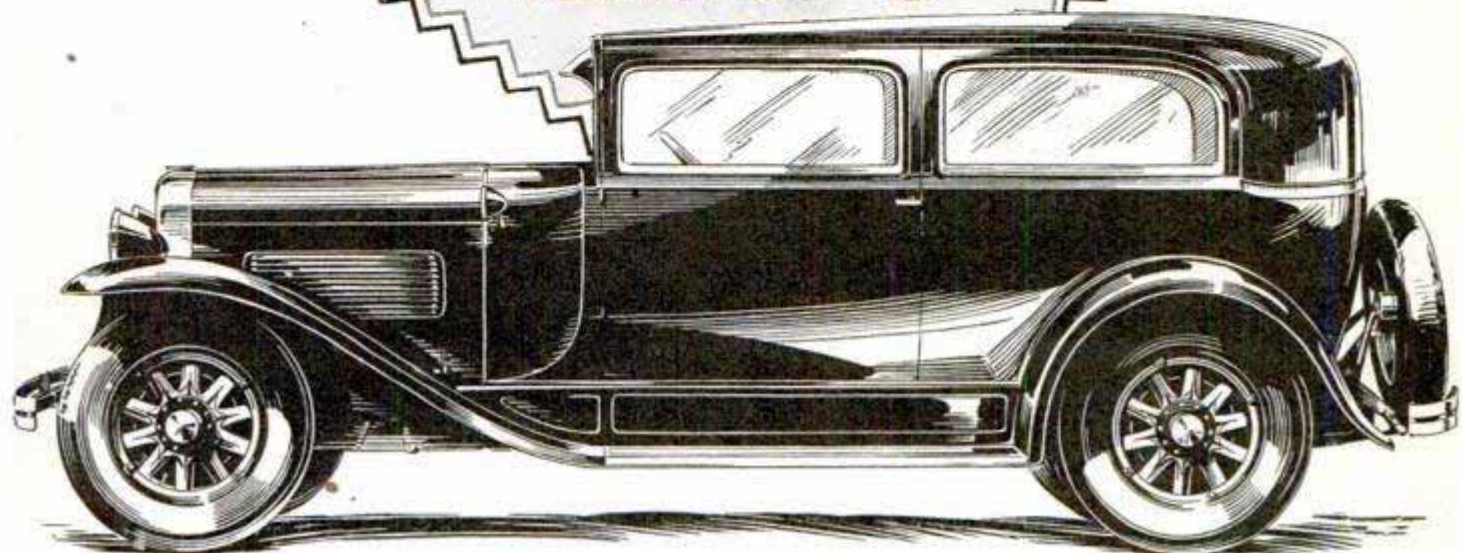




PRODUCT OF

GENERAL MOTORS

THE NEW  
**PONTIAC**  
**BIG 6**



2-Door Sedan • Body by Fisher

# An Engineering Triumph..

## A True Achievement for \$745



Progressive Americans recognize in the New Pontiac Big Six a car which reveals new horizons of accomplishment in advanced automotive engineering and body-building design. This newest General Motors product meets exactly the needs of that great class of motorists who are eager to *step up* the quality of their motor cars without departing from the low-priced field.

The New Pontiac Big Six has the big car smoothness, power and speed developed by a big, new L-head engine with a dynamically balanced, counter-weighted crankshaft, the famous Har-

monic Balancer and the G-M-R cylinder head. It has the cold weather performance advantages of the cross-flow radiator. Dirt-and-weather-proof internal-expanding four-wheel brakes provide big car safety. New, stunning, richly appointed bodies by Fisher, with adjustable drivers' seats, offer big car luxury, comfort and style.

These refinements, and many more just as important, set the New Pontiac Big Six sharply apart from all other offerings in the low-priced six-cylinder field.

*Pontiac Big Six, \$745 and up f. o. b. factory, plus delivery charges.*

OAKLAND MOTOR CAR COMPANY, PONTIAC, MICH.



# PUT THIS WORKSHOP IN YOUR HOME

## FREE For 10 Days-No Deposit!

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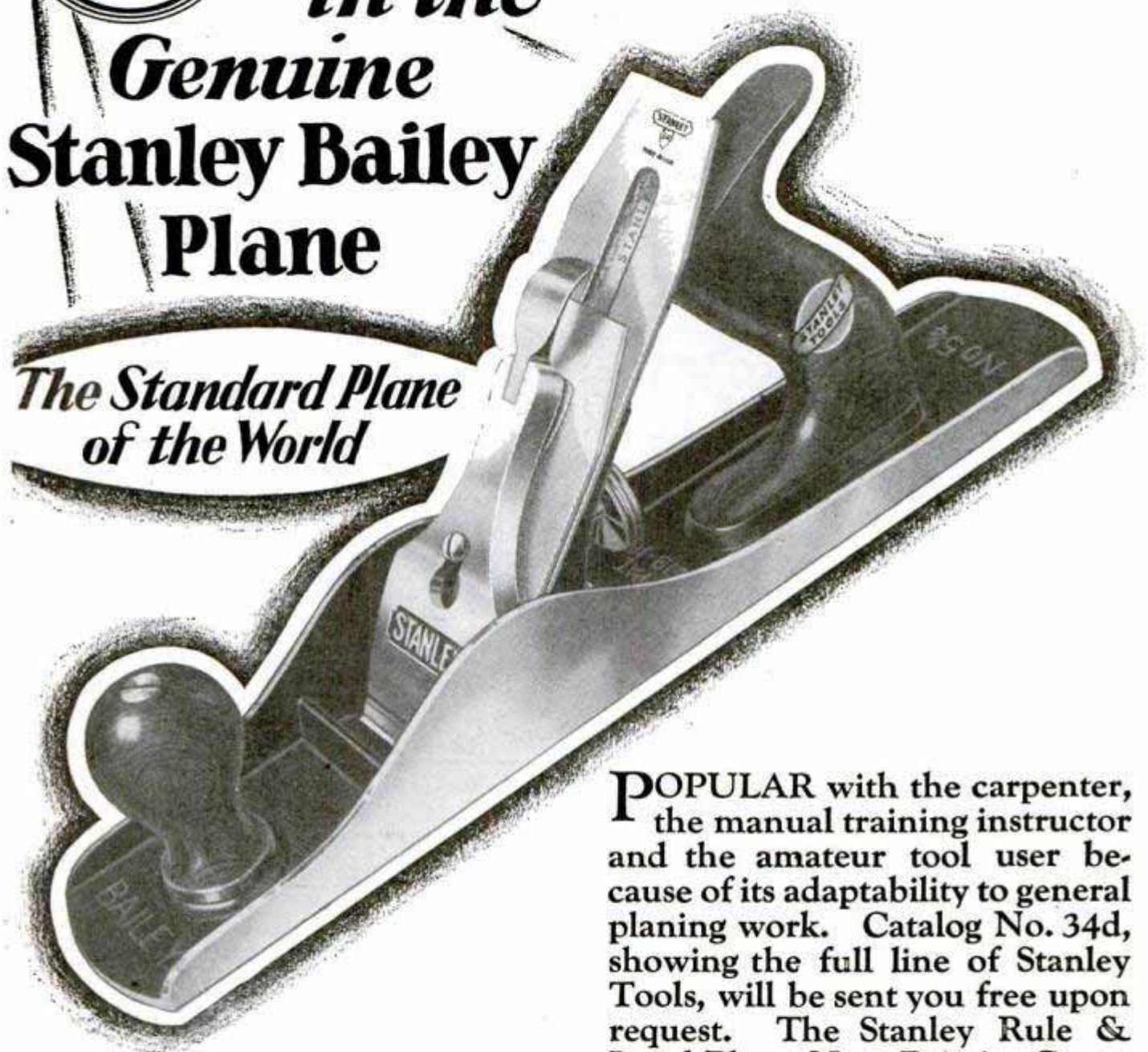


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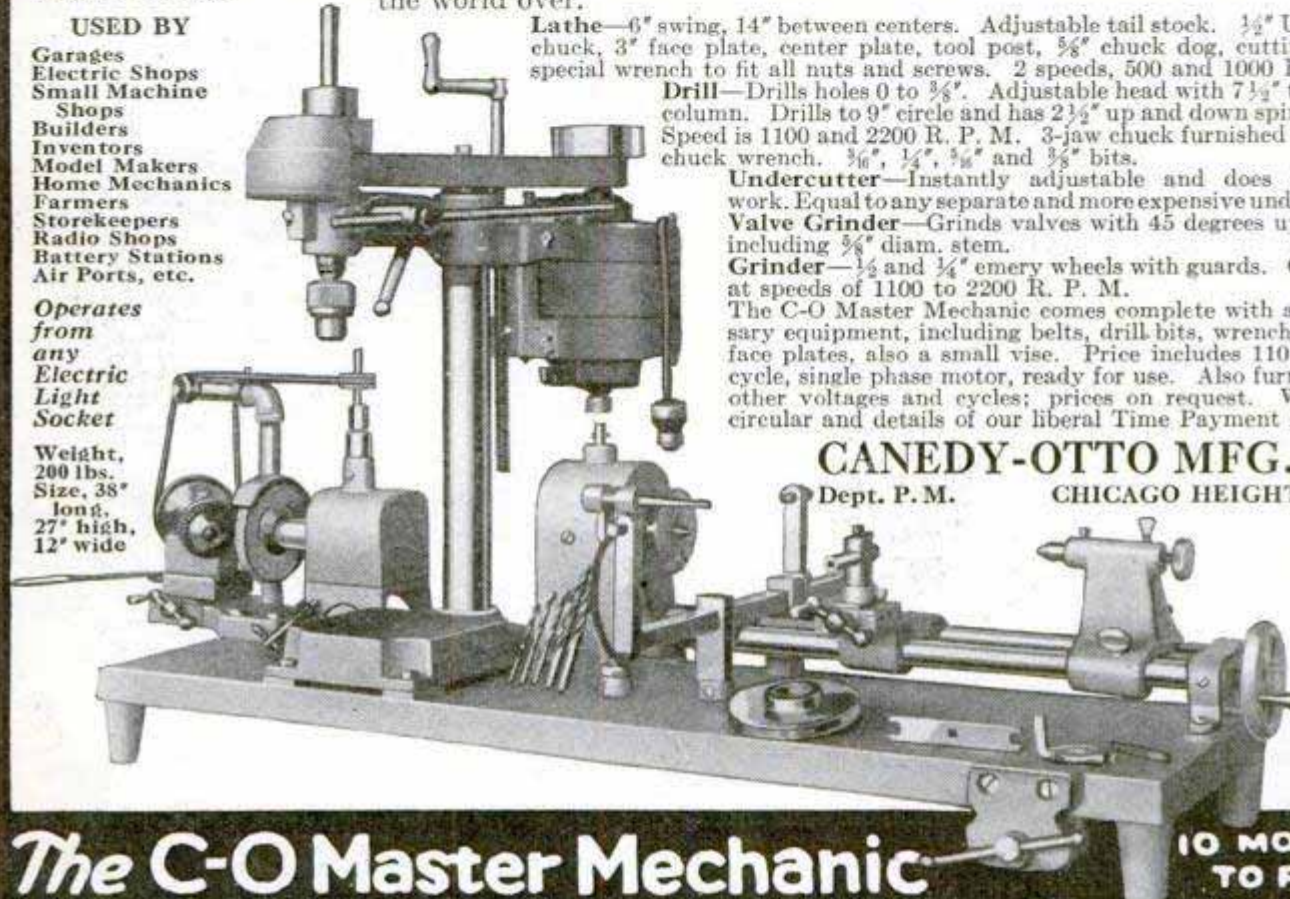
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Great curiosity. Place in water, plant opens up and starts to grow in few minutes. Taken out it dries up and goes to sleep until put in water again. **PRICE 10c, 3 for 25c, 75c dozen, postpaid.**



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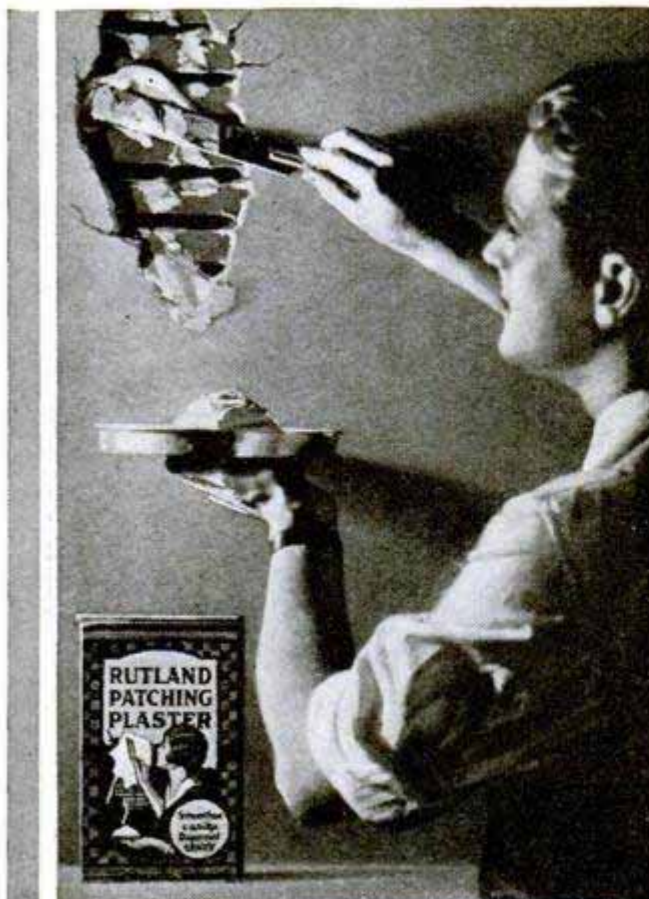
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A perfect little typewriter for \$1.50. There are thousands of persons who would like to use a typewriter but whose needs and business do not warrant the expense attached to the purchase and use of a fifty or seventy-five dollar machine. To such persons we confidently recommend our Little Giant. It is strongly made, but simple in construction, so that anyone can quickly learn to operate it, and write as rapidly as they would with pen and ink. The letters of the alphabet most frequently used are so grouped as to enable one to write rapidly, the numerals 1 to 9, and the punctuation marks being together. With this machine you can send your best girl typewritten love letters, address envelopes, make out bills, and do almost any kind of work not requiring a large, expensive machine. With each typewriter we send a tube of ink and full printed instructions for using the machine. **Price complete \$1.50 by mail postpaid to any address in the world.**



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*Astonishing* what a perfect patch — as lasting as the wall itself — you can make with Rutland Patching Plaster. And so easy to use! Just mix with water, then fill the crack or hole. Anyone can do it in a few minutes. At all paint, wall-paper and hardware stores. Rutland Fire Clay Company, Rutland, Vermont.

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A real machine tool for the home work—capacity 4" dia. x 12" length. For Metal-Wood-Composition materials. Turning—Facing—Boring—Drilling—Winding—Thread Cutting. Accurate Strong—Quiet—Compact. Slide-rest has travel entire length of bed. Leadscrew inside bed. No. 1 Lathe, plain headstock, \$28.00. No. 2 Lathe, back-gear headstock, \$58.00. Extra for lathes with 18 inches between centers, \$7.00. Complete line of accessories at equally low prices. Write for free catalog.

THE GEROLD CO.

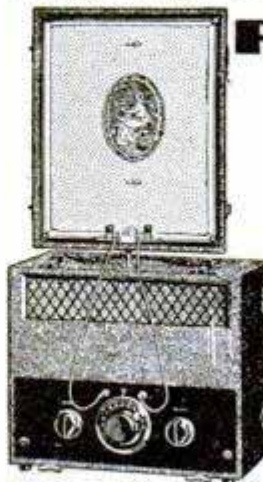
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New York

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Finest saw made. Silver Steel, Ship Point blade. Perfection handle.



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Rtgd Silver Steel blade. Apple wood handle. 8 to 18 in. lengths.



Adjustable handle with compass. keyhole and metal-cutting blades.



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"Saws in the Home" has suggestions for making things at home, and shows the best saws to use. "Saw Sense" tells about saws and their care. Both free, just use coupon.

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*Atkins Makes the Highest Grade Saws for Every Use; Saw Tools, Saw Specialties, Plastering Trowels, Machine Knives, Grinding Wheels and Files.*



Silver Steel Narrow Band Saws for small machines. All lengths.



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Please send me "Saws in the Home" and "Saw Sense," free; also information on your.....Saws.

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easily made by floor surfacing contractors who average \$40 per day. The New "American High Production" Machine does the work—makes you the money and builds you a business of your own. No dull seasons—no large capital nor experience required. complete information free without obligation—write today.

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Buy the finished completely assembled lathe. Build bed at home. A real tool. 6-inch diameter capacity. Shipping weight 21 lbs. Make radio parts, floor lamps, toys and numerous other practical and valuable articles. Also made in sizes to swing 8, 11, 13, and 16-inch diameters.

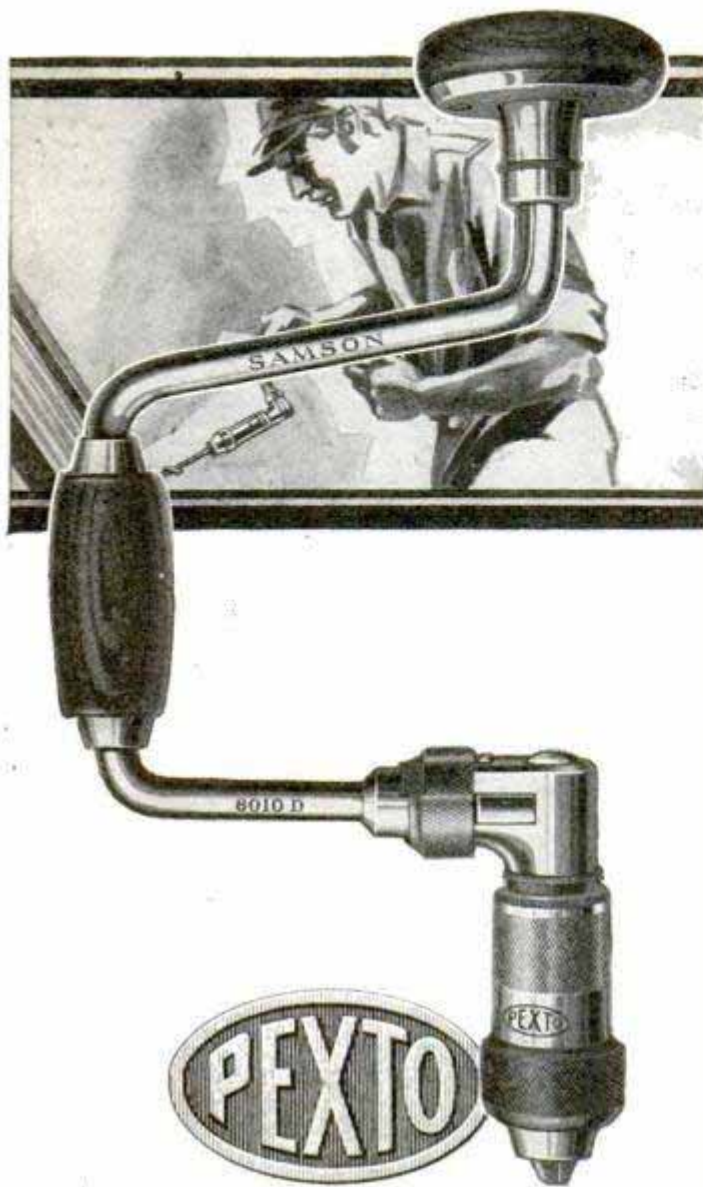
## AN IDEAL LATHE FOR FATHER OR SON

Only \$16<sup>50</sup> f.o.b. Chicago

Send today for descriptive circular.

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## Necessarily—

you choose high grade tools when you do work of a difficult and exacting nature. In the selection of tools, it is best to know something of the manufacturer. Pexto Tools are the result of many years of fine tool making, and have earned an enviable reputation for fine quality, exact balance and lasting material. Look for the Pexto trade-mark when you buy.

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Send for booklet "M"

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You've watched soft fleecy clouds in a blue sky, and wished you could drift upon a cloud bank. Floating over cool quiet waters in an Old Town Canoe is about as near as you can come to realizing that delightful day-dream. No bit of errant thistledown could rest more lightly on the stream.

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## "Old Town Canoes"



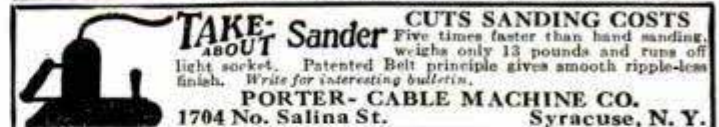
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A REAL Lathe. 9" swing; 30" between centers. Speedy and accurate. Special attachments and tools available. Write today for Circular and

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Powerful, practical. Not a toy. Prices on these and other machines, only \$30.

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Five times faster than hand sanding, weighs only 13 pounds and runs off light socket. Patented Belt principle gives smooth ripple-less finish. Write for interesting bulletin.

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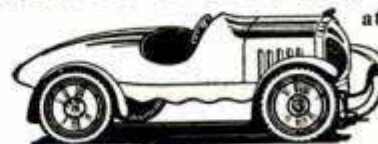
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Revolutionizes paint spraying performance and results. Constant fluid agitation, instantaneous control of spray, many other new features. Hold 1-lb. gun only—put rotary compressor unit on floor or ladder. Price \$39.50 Write for complete details.

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### SPORT BODIES FOR FORDS

at FACTORY PRICES



This Model in Grey Prime **\$38<sup>50</sup>**

Hi-compression heads, underslung parts, 3:1 gears, headlights, cowl lamps, etc. for Fords. Seat Covers for all cars.

SPORT FACTORIES, Dept. A-3, AURORA, ILL.



# PARKS

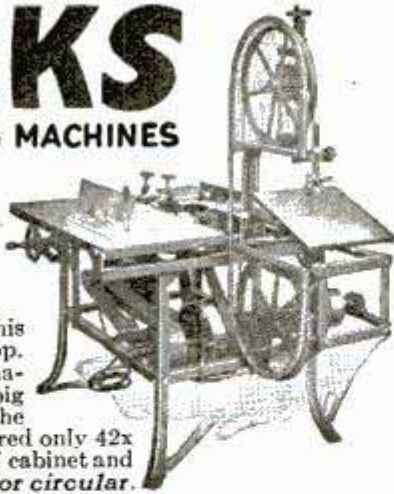
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Cabinet Shop  
Special No. 10

**\$290**

With Motor

You ought to have this handy Parks in your shop. Compact, complete machine designed like a big production outfit at 1/2 the cost. Floor space required only 42x72 in. Does any kind of cabinet and joinery work. Write for circular.



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for Machinists and Tool makers are shown in free catalog. Write to-day for a copy.

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**1/4 H. P. Electric Motor**  
for 110 V., 60 Cycle light circuit at the low cost of \$9.50. A tool that will lighten your chores, connected to your lathe, grinder, pump, washer, etc. Always ready for service.

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Uses acetylene only from a Presto auto tank. Finest thing you ever saw for Radiator and Battery Repairing, Soldering, Light Brazing, Heating, etc. Complete with 4 tips, soldering copper, hose, connections. PRICE (except tank) **\$7.50**

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Buy Welding, Soldering and Lead Burning Outfits on payment plan.

Write for particulars.

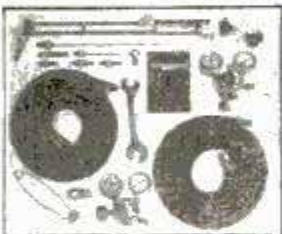
Welding Outfits . . . \$25.00 to \$69.20

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Torches, Regulators and Gauges.

Welding Supplies—Paint Sprayers.

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only **\$39**

GREATEST OFFER  
EVER MADE

PUTS THIS  
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TO WORK FOR YOU!

**Make Money!** Wood is valuable. Saw 15 to 20 cords a day. Does more than 10 men. Ottawa easily operated by man or boy. Falls trees—saws limbs. Use 4-hp. engine for other work. **30 DAYS TRIAL.** Write today for **FREE** book. Shipped from factory or nearest of 10 branch houses.

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No. 414  
\$30.00

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99% of all electric portable work . . . from light bench jobs and automotive valve grinding to heavy industrial drilling and cylinder honing . . . can be handled with the eight drills listed below.

In power output and staying qualities, these Millers Falls Electric Drills challenge every drill made.

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Ventilation in these Millers Falls Tools has been so perfected that they do not overheat.

For more value test before you invest. Write today for full information and catalog.

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| No. 678 3/8" Heavy Duty | No. 312 1/2" Standard     |
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| No. 634 3/4" Standard   | No. 514 1/4" Heavy Duty   |
| No. 658 5/8" Heavy Duty | No. 414 1/4" Standard     |



## MILLERS FALLS COMPANY

Millers Falls, Massachusetts

New York: 28, Warren St.

Chicago: 9 S. Clinton St.

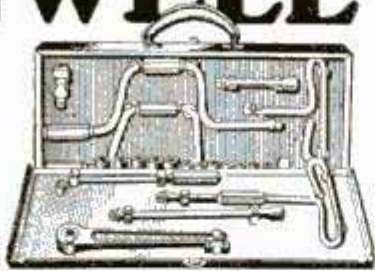
## MILLERS FALLS Electric Drills

A Complete Line from 1/4" Standard  
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# CORNWELL

## forged Socket Wrenches



THE only wrenches of their kind now being made and sold. They are forged from our special formula Chrome Molybdenum Alloy, individually hardened and heat treated. Walls are very thin, permitting use in very close places. They are of amazing strength and durability. Sold in convenient kits or separately as required.



### There Is No Substitute for Cornwell Quality

The long record of CORNWELL tools for strength and durability, for utility and practicability, and for amazing performance under the severest difficulties has convinced tool users of their absolute quality. No other tools are like them. A trial order will convince you.

*This Catalog Sent-FREE*

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Send me new illustrated catalog with prices on full line of CORNWELL Handmade Tools.

..... Where Employed  
Name.....  
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City..... State.....



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Wonderful new way of binding kodak pictures. Keep a photographic record. Sample Holland print from your negative for 10c.  
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## A BIG MACHINE at LOW PRICE!

DOES 20 DISTINCT WOODWORKING OPERATIONS

TURN YOUR HOBBY  
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No trick at all with this amazingly low price Woodworker, which you may try, and pay for, on terms, to turn idle hours into profit. Does 20 wood-working operations. Ideal size, capacity for shop, home or the job. Economical to operate. The best buy in the market!

Just  
**\$25.00**  
BRINGS IT  
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**FREE TRIAL**



### COMES COMPLETELY EQUIPPED!

Comes complete with 8-in. Cross Cut, 8-in. Rip Saw; 12 in. Band Saw; Jointer, Lathe, Borer, Sander, Guides, Electric Motor. Investigate it!

**FREE**  
with Saw

60 Working Drawings  
of Items You  
Can Make

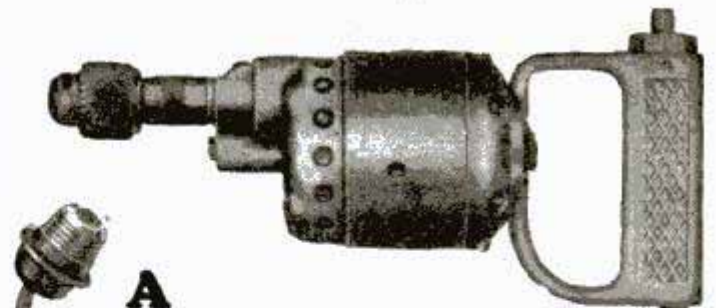
A. S. ALOE CO.  
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St. Louis, Mo.

Without obligation, send me details on the Woodworker, and the Free Trial and Easy Terms Plan.

SEND FOR FULL DETAILS!

NAME.....

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## A New Lightweight Electric Drill

Only  
**\$18.75**

Weights  
Only 4  
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Write for  
our catalog  
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complete line.

A sturdy, practical electric drill, fully guaranteed for one year. Specially designed for light and intermittent work. Weighs only 4 pounds. Built to use in even the tightest corners. Many of the large industrial plants are buying this drill by the dozen.

Uses direct or alternating current, and is supplied to you for 110 to 125 volts, 200 to 250 volts or 32 volts. Fitted with a special Jacobs Chuck. Bore up to 1/4". Stop and start switch in the handle. Comes complete with 10 feet of cord and socket. Price postpaid anywhere in the U.S.A.—\$18.75.

Send check or money order. If not satisfied return in 5 days and money will be gladly refunded. In ordering, be sure to specify voltage used.

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**PROTECT YOUR TOOLS FROM THEFT**  
Write with electricity any name or design on the hardest and finest tools and instruments, or any metal, like writing on paper with pen or pencil. **Complete Outfit \$3.50**—Prepaid Anywhere. Interesting illustrated circular free. Write today. Agents wanted.  
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## STANDARD GARDEN TRACTOR

**Plows Seeds Cultivates Mows Hay and Lawns** A Powerful Tractor for Small Farms Gardeners, Florists, Nurseries, Fruit Growers and Poultrymen

**DOES 4 MEN'S WORK**  
Walking & Riding Equipment  
Free Catalog. Does Belt Work

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**\$21.15**



9" swing, 25" centers, wt. 60 lbs. Biggest Lathe value yet. Send 6 cents for 48 page catalog on lathes, saws, etc. Largest line of small lathes in America.  
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Or \$6.85 down and \$5 a month for three months. Improved for easy, speedy, quality work. Hand crank or engine. Order now or write for particulars.

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## A NEW SIDE CUTTING SLIP JOINT PLIER



**75¢**

A thin pointed nose and narrow jaws make this plier extremely handy in awkward places. It is equipped with a keen, specially tempered side cutter and has a wobble-proof slip joint giving it great range and capacity. The LS 26 is a fine tool, heavily nicked, and fully guaranteed. 75¢ at hardware stores. Write for Crescent catalog.

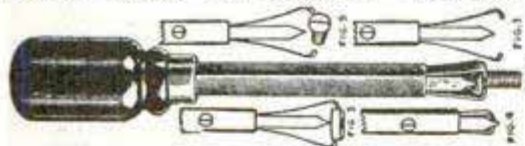
No. LS 26

CRESCENT TOOL COMPANY  
JAMESTOWN, N. Y.

# CRESCENT and Smith & Hemenway TOOLS

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SELL COX HOLDFAST SCREW DRIVERS



Sells on sight to mechanics for Auto, Radio and Electrical Work. Self Holding, Self Releasing.

Send 50c for sample and ask how to get Salesman's Outfit Free.  
S. J. COX Dept. F, FRANKLIN, PA.

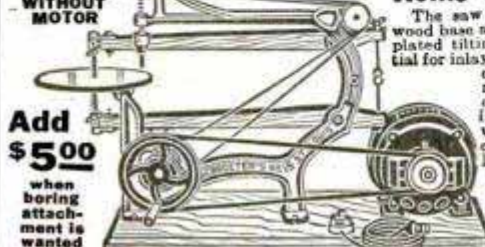
## \$25 To \$50 Make \$25 to \$50 per day and be Your Own Boss! Per Day Drilling Wells!

Cash in on demand for good wells in every community! Any man with mechanical turn of mind can easily operate one of our drills, make big money, be independent, work the year 'round! A few hundred dollars starts you in this big paying business—pay balance out of earnings! Write for FREE CATALOG describing ARMSTRONG ALL STEEL WELL DRILLS—gasoline traction or non-traction models.

Write now—today—Armstrong Mfg. Co., 810 Chestnut St., Waterloo, Iowa.



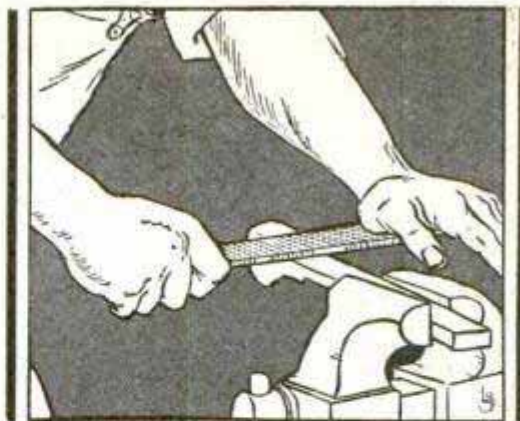
## \$1500 WITHOUT MOTOR SCHROETERS No. 15 Motor Driven SCROLL SAW for Home or Small Shop



Add \$500 when boring attachment is wanted

For More Information Write for Our Scroll Saw and Tool Catalog  
SCHROETER BROS. HARDWARE CO.  
810 Washington Ave., ST. LOUIS, MO.

The saw is mounted on a neat wood base and has a 7 1/2-inch nickel plated tilting table which is essential for inlay work. The work which can be accomplished is marvelous. Has a range of work from the finest inlay up to 7/8-inch white pine. A practical machine for sawing Radio panels such as bakelite, sheet brass, hard rubber, bone, fibre, etc. Has 16-inch swing. Weight only 21 pounds without motor. We supply a catalog of 250 miniature scroll saw designs with each machine.



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**N**O matter how much or how little you use files, you'll find a Simonds File a necessary member of your tool family.

Simonds Files are made from tough, edge-holding steel. The teeth are sharp, perfectly placed and uniform throughout the entire cutting surface. Expert workmanship plus wear-resisting steel make Simonds Files bite into the metal with snap and vigor — produce a surface unsurpassed for smoothness — retain good cutting qualities throughout an unusually long life.

Examine your tools today and make sure that your assortment of Simonds Files is complete. Good files make precious minutes count most. Tell your dealer you want Simonds Files.

"File Facts", a booklet that tells all about files, is yours free for the asking. May we send you a copy?

SAWS **FILES** KNIVES STEEL

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SIMONDS SAW AND STEEL COMPANY

"The Saw Makers" FITCHBURG, MASS. Established 1832

Branch Offices and Service Shops in Principal Cities





# "Lava-clean" hands are clean!



Men—you who love to tinker—here's just the soap you need. Cleans quickly and thoroughly the toughest-looking pair of hands that ever fussed around a work bench. Makes more lather in 15 seconds than ordinary soap in 60, and even hard or cold water won't discourage it. Millions use it. "Good old Lava," they call it. Gets hands clean! Not just "surface clean," but clean 'way down deep. As easy on your hands as fur-lined gloves—because it's made from the finest of vegetable oils. All grocers sell it.

Full size cake of Lava Soap FREE!

Mail this coupon

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Please send me, FREE, a full size cake of LAVA, the hand soap that removes all the dirt and grease.

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

## NEW VEST POCKET ADDING MACHINE



ADDS, SUBTRACTS, MULTIPLIES, DIVIDES  
Does work of \$300 machine. Guaranteed 5 years.  
NOT A TOY.  
Made of steel and indestructible. Million dollar capacity. Fits in pocket. Will not make mistakes. So simple child can operate it. Instructions furnished. Everybody should carry one for figuring.

**FREE TRIAL \$2.50**  
Total Cost

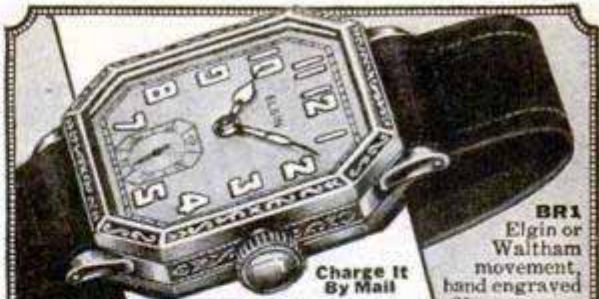
SEND NO MONEY—Just name and address. We will ship Calculator immediately. On delivery pay postman \$2.50 (Plus few cents Postage). (If outside U. S. send cash.) 10c additional in Leatherette Case. If not satisfied after 10 days trial you get your money back. THOUSANDS OF SATISFIED USERS.  
This is lowest priced practical calculator made. "Why pay more for inferior imitations?" Order from this ad.

Mail Coupon Today

BABY CALCULATOR SALES CO., (MANUFACTURERS)  
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 I am enclosing \$2.50—send adding machine prepaid.  
 Send Adding Machine C. O. D. \$2.50 plus postage. (10c additional in Leatherette Case)

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SENT FOR \$1 NO C. O. D. TO PAY

BR1 Elgin or Waltham movement, hand engraved, 20 year guaranteed gold filled case. \$2.12 a month. **\$26.50**



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Wear this standard American watch and take a full year to pay—Send \$1 with order and this watch comes to you prepaid—no C. O. D. to pay on arrival. After examination and 10 day free trial, pay balance in 12 equal monthly payments. No interest. No extras. All transactions strictly confidential. You take no risk—satisfaction absolutely guaranteed or money back. Established 1895

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## Walsh Garden Tractor and Power Mower



Plows, Seeds, Cultivates, Mows Lawns & Hay  
For Gardeners, Florists, Fruitmen—Walk or ride  
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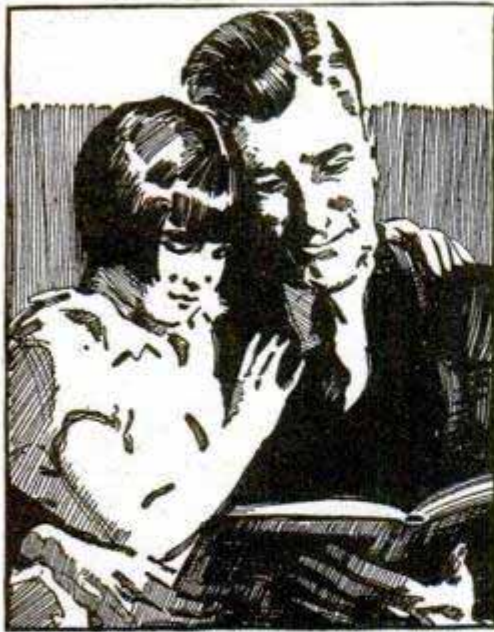
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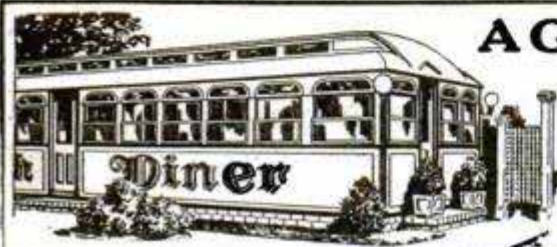
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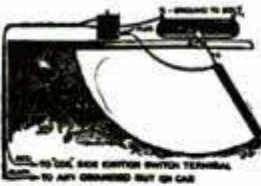
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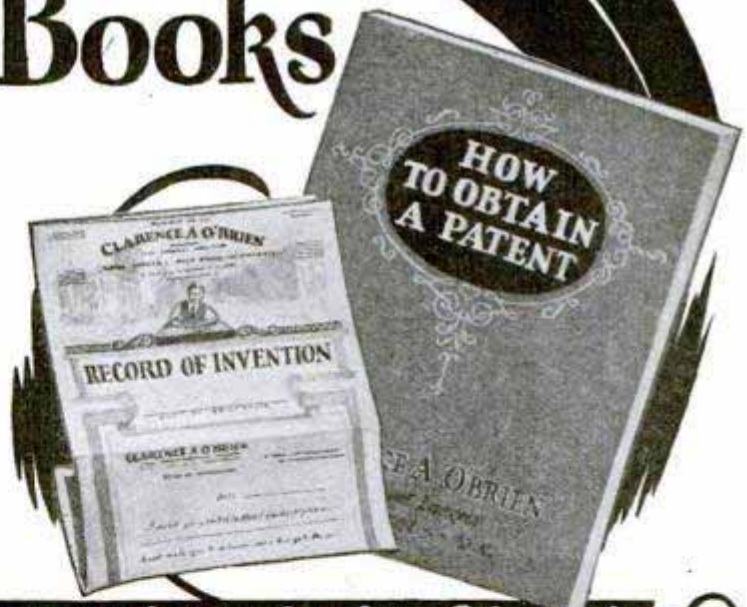
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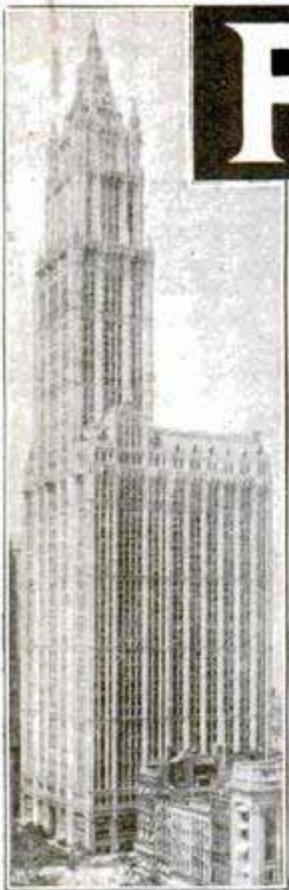
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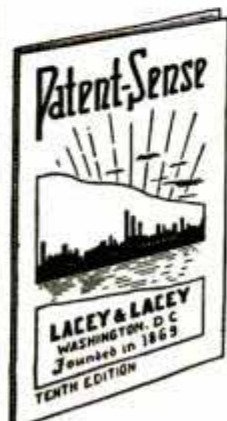
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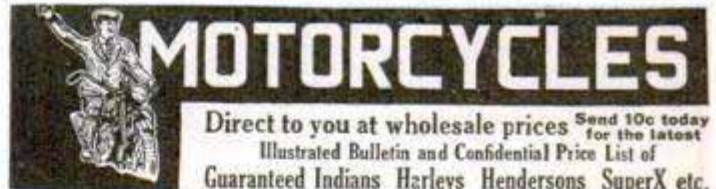
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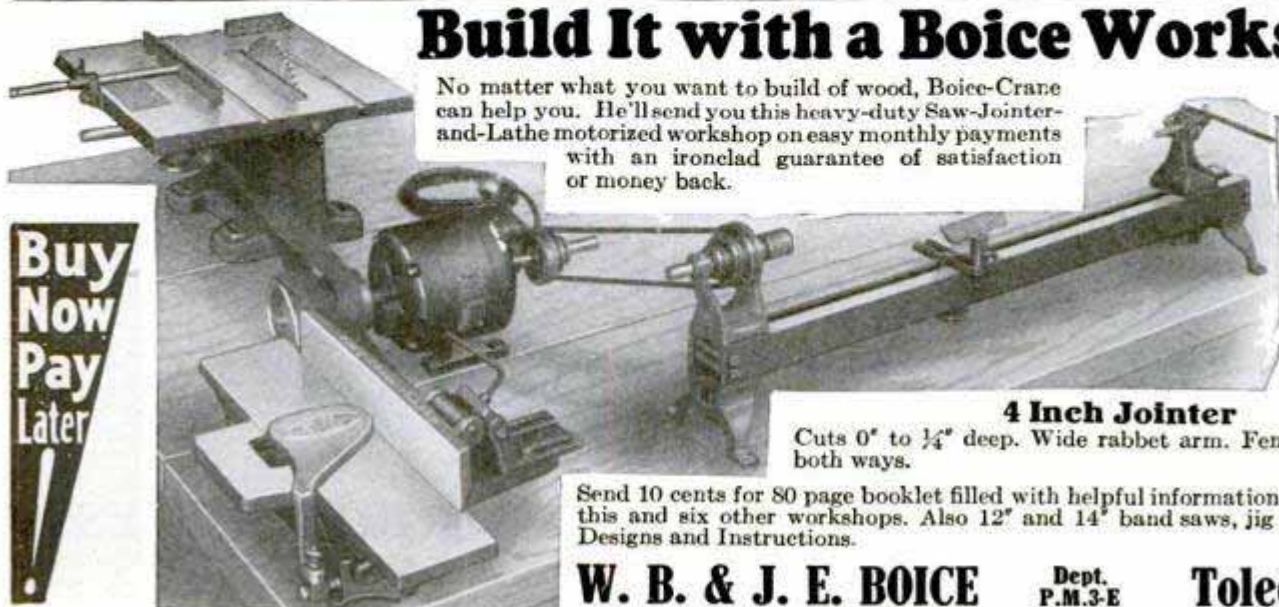
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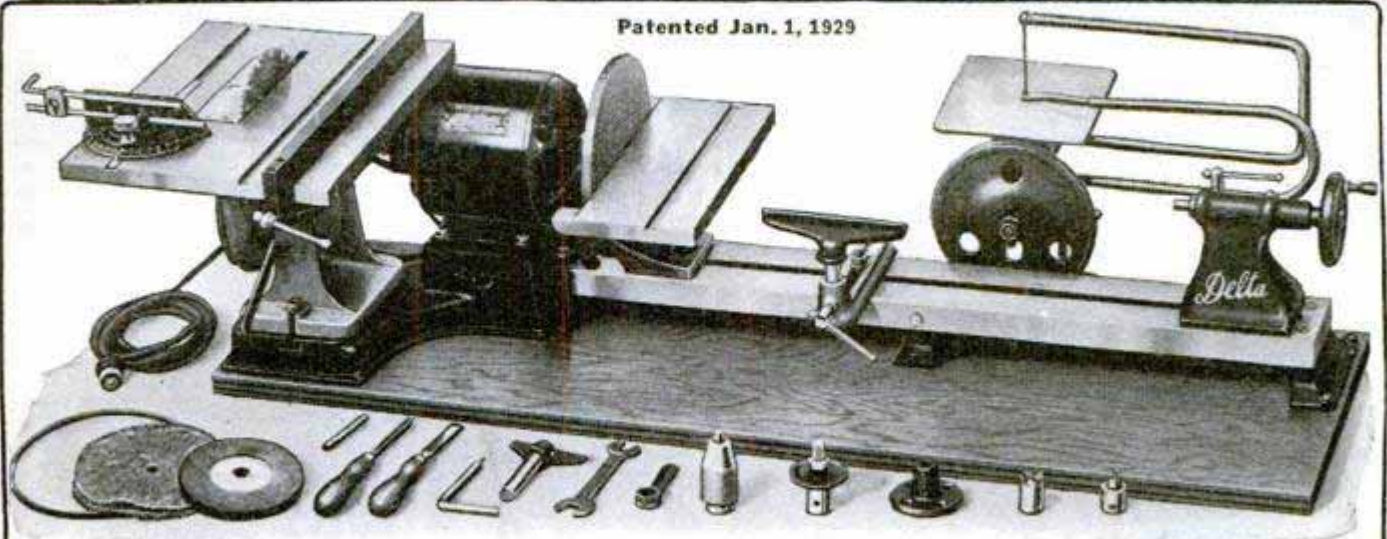
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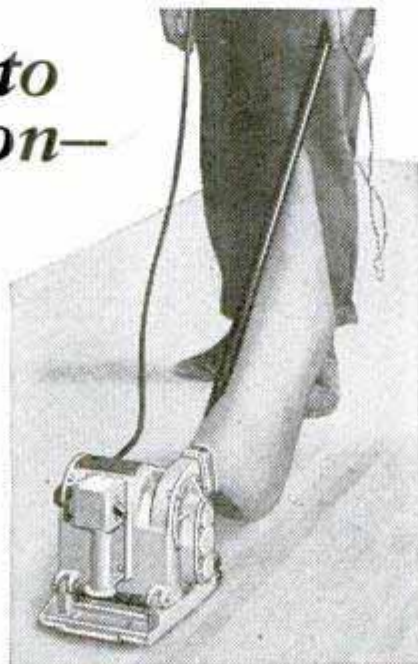
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**CLARKE SANDING MACHINE  
COMPANY,**  
Dept. T-22, 3831 Cortland St.,  
Chicago, Ill.

Tell me, without obligation, how I can make \$25 to \$75 a day as a FlorKraftsman.

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**"Play" WITH YOUR BOY**

Keep step with your boy—make him feel you are his pal—stimulate his ambition and develop his musical talent by playing duets with him. He likes to do the things you do. Your "company" and help will boost him over the rough spots and prevent discouragement at critical times.

Help your boy to learn to play a

**BUESCHER**

**True-Tone Saxophone**

In only a few weeks he'll be playing the popular airs with you and having loads of fun. Then come the classical pieces. Beautiful duets that will thrill him—the kind pianists practice years to play—operatic scores and familiarity with the real Music Masters will all be accomplished. Social opportunities are always before the boy or girl who can play a Buescher and it makes it possible to earn money on the side if desired.

**Easy to Play—Easy to Pay**

Besides being easy to play, we make it easy to pay for a Buescher Saxophone. A small amount down and a little each month if preferred.

Only a Buescher gives you these extra features: Snap-on Pads, greatest improvement, easy to replace, no cementing—Patented Automatic Octave Key—perfect Scale Accuracy—convenient key arrangement.

**6 Days' Trial** on any Buescher Saxophone, Cornet, Trumpet, Trombone or other instrument. Fill out and mail coupon for full information. Mention instrument in which you are interested.

**BUESCHER BAND INSTRUMENT CO.**  
2741 Buescher Block ELKHART, IND.

BUESCHER BAND INSTRUMENT CO., (521)  
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Gentlemen: Without obligating me in any way please send me your free literature.

I am interested in the following instrument.....

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## New—Revolutionary! ...World's Most Compact Outboard

THIS new Super Elto motor measures, folded, only 22 inches by 11 inches by 11 inches — weighs only 38 pounds — develops liberal 3 horsepower. Rugged Elto construction throughout. Easiest starting of all outboard motors. Famous Elto Battery ignition.

### It Folds!

Just a few turns on a single nut unlocks sturdy hinge (patent applied for) on shaft housing—permits lower housing to be snapped back under muffler — instantly — as simple as closing a pocket knife. Write for details on this and other Super Elto models. Elto Outboard Motor Co., Mason St., Dept. AA, Milwaukee.



**Super Elto Lightweight**

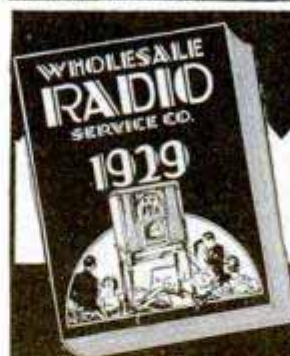
**I Pay \$18 a Day**

New proposition offers steady employment and chance to pocket \$18 cash every day. No experience needed. Simply demonstrate and take orders for new Comer Raincoats in your locality. You risk nothing. Keep present job and try in spare time. Smith, spare time worker, made \$14 in 2 hours. No investment. Sample outfit free. Write today.

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WHOLESALE PRICES on nationally-known merchandise! Biggest discounts on standard equipment. TREMENDOUS SAVINGS. Everything shown in our newest 1929 Catalog Guide—just out! Nothing to compare with it. Immediate personal service on all your orders.

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Dealers and Agents—Write for this book of money-saving bargains, showing confidential price lists and special proposition on the famous Lafayette All-Electric Radio Receivers. ABSOLUTELY FREE. But you must act at once as supply is limited. Print name and address in coupon. Mail TO-DAY!

Mail to WHOLESALE RADIO SERVICE CO., Dept. 305, 6 Church Street, New York City.

Name

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Town

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## POINTING THE WAY TO FINANCIAL INDEPENDENCE

An amazing investment opportunity for those with a little money and some spare time.

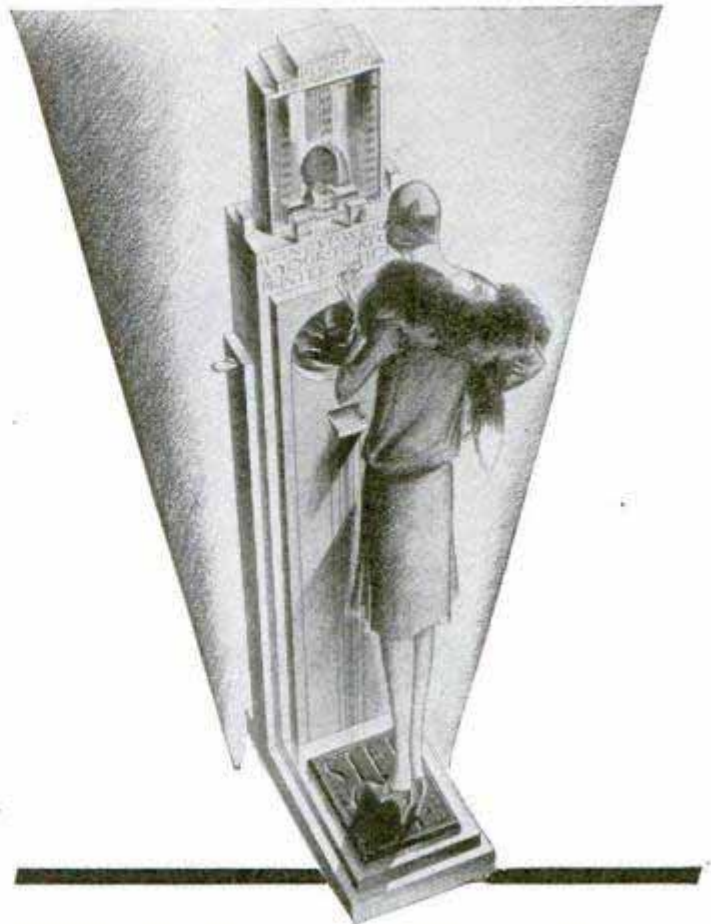
The ownership of a chain of International Ticket Scales on location in drug and cigar stores and other places, constitutes what is to all intents and purposes a real investment, yielding a handsome return.

You put out to work for you 50 or 100 or 1000 highly developed mechanical workers. There is chain store safety in that each hundred scales have a hundred different locations. There are chain store profits in that the average profit per scale is multiplied by the number of scales in your chain. Unlike the chain store, you have no payroll. Scales neither eat nor sleep. They take no days off. Day and night they work and serve you, smiling at interested passers-by, holding their coats while they step on inviting platforms, and then give them, printed on a neat ticket, their weight and fate for a small copper penny. They earn and earn and earn while you sleep or play.

Chains of International Ticket Scales should earn 40% to 50% of their cost annually. Purchased on the deferred payment plan, the scales should readily pay for themselves out of profit, and show in addition, a return of 25% on the down payment until paid for in two years.

Not only is this business profitable and safe, but it is easy and simple. There is little to learn, and little to do. An evening or two a week will care for the average chain of scales. The necessity for mechanical knowledge or the knowledge of scales

To Chain Store Executives: An International Ticket Printing Scale in each of your stores will add a substantial amount to your net profits. For full information, write the Chain Store Manager of the International Ticket Scale Corp., 17 E. 45th St., New York, N. Y.



has been eliminated by our provision for a national service organization with service men in every city and town of importance in the United States.

The owner of a chain of International Ticket Scales operates under an unusual franchise plan, and is furnished with every possible co-operation. We have prepared a booklet which tells the full story concerning the profit possibilities in a chain of International Ticket Scales. It tells step by step how a chain of these scales may be acquired and operated. It tells how you, if you have the necessary qualifications, can with the greatest ease, assure your financial future. It is a booklet for those with a little money and some spare time; for the capitalist; for the individual or group who can control capital.

Write for it today. The coupon below is for your convenience.

International Ticket Scale Corporation, Dept. 103,  
17 E. 45th St., New York, N. Y.

# International

TICKET SCALE CORP., Department 103,  
17 East 45th Street, New York, N. Y.

Please send me your proposition.

Name \_\_\_\_\_

Address \_\_\_\_\_





## FLIES STRAIGHT UP!

SEE THIS HELICOPTER—75 feet high, coming down in a parachute! The boys below have just sent it up and are waiting to catch it when it comes down.

### PARACHUTE OPENS AUTOMATICALLY

Wind it up—let 'er go—straight up, 50 to 75 feet or more, then, when it starts down, and not before, the parachute opens automatically, permitting the model to float gently to the ground, thus protecting it from the fall. Get the thrill of a vertical flight and a parachute jump, all in one craft!

### LATEST INVENTION IN MODEL AIRCRAFT

"Spirit of Zenith" is a scientific achievement recently invented by a former U. S. expert aviation mechanic who made a special study of aeronautics in America and Europe during the World War. If you are of an inventive turn of mind it may inspire you to develop a new idea to meet the urgent demands of aviation. Think of the ease with which General Nobile and his men could have been rescued from the Arctic wastes, and how Commander Byrd could make a landing at the South Pole, with a perfected helicopter of a larger type! Its advantages in warfare are too numerous to mention. This model was first devised by the inventor for the amusement of his own son. It is now causing a sensation everywhere it is seen.

### GUARANTEED TO FLY

Made of aluminum, "Spirit of Zenith" has two 14-inch propellers and a large silk parachute. It will last a long time when properly handled, and is guaranteed to fly when directions are followed. You will have more thrills with it than with many model aircrafts costing from \$5.00 to \$10.00.

### ALTITUDE TOURNAMENTS

Boys have a lot of fun in seeing who can fly their crafts the highest. This is going to be a big year for helicopters. Altitude tournaments are getting popular in many places. It takes practice to make the best altitude score, so get yours now. Be the first to get one in your neighborhood.

For younger boys, under 12 years of age, we recommend that Dad fly it and let the boys catch it when it comes down.

### LIMITED OFFER—ONLY \$1.00

This offer positively expires March 30, 1929. It will pay you to get a "Spirit of Zenith" now and save the difference. This is a regular \$3.00 model which we are offering for a limited time at this special price to help introduce it. If you will get one of these, learn to fly it real well and show it to your friends, we will appreciate your order.

-----USE THIS COUPON FOR SPECIAL OFFER-----

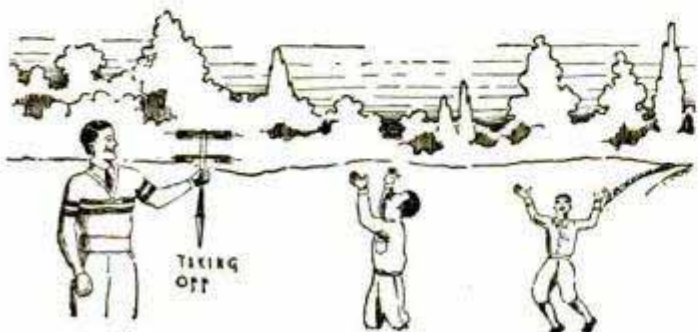
Unique Model Aircraft Co.,  
Dept. H, 5725 Oram St., Dallas, Texas.

Gentlemen: Enclosed find money order (or check) for \$1.00, for which rush me a "Spirit of Zenith," with full directions for flying.

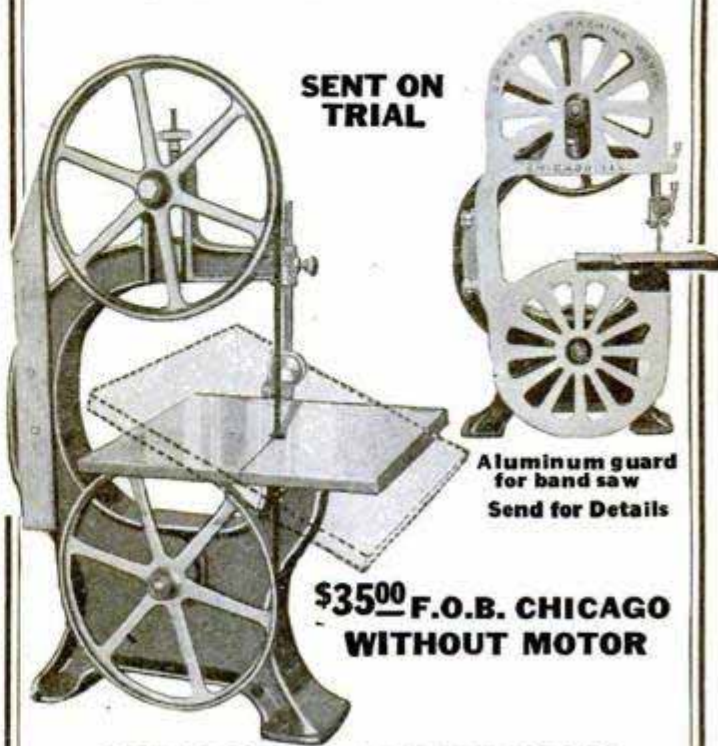
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## THE LATEST DEVELOPMENT UP-TO-DATE 12" BAND SAW



SENT ON  
TRIAL

Aluminum guard  
for band saw  
Send for Details

**\$35.00 F.O.B. CHICAGO  
WITHOUT MOTOR**

### FOR EVERY HANDY MAN

This 12" Band Saw is positively the latest thing in design and construction and is exactly the tool for which every he-man mechanic has an absolute need. It is made of one solid casting, shafts are hardened and ground. All wearing surfaces are likewise hardened. This machine is built for real work and will stand up under the wear and tear of a Home Workshop or factory. It has a 10½"x14" tilting table giving an angle of 45 degrees.

We challenge anybody to produce, on the retail market, a product so finished and perfected at the price of \$35.00. Send for details and complete description. Do it now!

Write Now to Department 31

**UP-TO-DATE MACHINE WORKS  
2915 SO. WABASH AVE., CHICAGO, ILL.**

## Remarkable Metal Tile Offers Big Money

Beautiful tiled bathrooms and kitchens are now within the reach of all. Chromite, the astonishing tile wall covering, slashes all previous costs to one-third. Has all the glow, beauty, lustre and permanence of clay tile. Greeted by exclamations of surprise and praise wherever shown. The sensation of the building material industry. No other product like Chromite ever offered before through direct selling. Homes, stores, institutions are eager buyers. A big money-making opportunity for a live, aggressive salesman. Write today for Free sales plan.

**CHROMITE COMPANY**  
228 N. LaSalle St., Dept. PM-3 CHICAGO

Write  
Now!



**Looks Like Clay Tile  
COSTS 1/3 AS MUCH**

## FREE

This handsome selling kit of actual samples is given Free to men who qualify as Chromite representatives.



# A Successful Method of Drugless Gland Stimulation *Has Been Found*

A pioneer scientist . . . in the field that has recently achieved discoveries of world wide importance . . . now offers an amazing new treatment for men past forty. Already fifty thousand men have used this treatment . . . victims of prostate trouble . . . bladder sufferers . . . victims of other symptoms common to men past forty. Not a medicine, vibrator or violet ray. Remarkably easy to secure for a no-risk trial in your own home.



**A** NEW type of treatment is now being used by physicians, specialists and health institutions in all parts of the world for those torturous symptoms so common to men past a certain age.

A noted sanitarium has advised a wonderful new appliance—the discovery of an Ohio scientist—for home use.

This revolutionary treatment is simple and easy to use, harmless and convenient. Fifty thousand men have used it. While going to the direct region of the trouble, it also acts as a general tonic for the whole body. Unlike certain drugs, it has no harmful effects on the heart or other vital organs. Men 90 years old have used it successfully.

Thousands of users say they feel 10 and 20 years younger. Many tell of having avoided a painful gland operation. Score upon score tell of relief from the painful conditions that reach to every part of the body when the prostate gland goes wrong—often when all other methods had failed. Millions of men suffer with prostate disorder without knowing it. Your chances are 6 out of 10 of having prostate disorder if you are past a certain middle age, say medical authorities. Many wrongly attribute their suffering to disordered kidneys or bladder.

Are you aging too soon—getting up 5 to 10 times at night . . . is vitality ebbing steadily away? Are you on the down grade, half living, blue, nervous, subject to chronic fatigue, constipation? Weakness in back, legs or feet? You should not delay a minute in finding out full details of this remarkable discovery—so easy to use in your own home, so remarkable in its results.

You incur absolutely no obligation by mailing the coupon now. It will bring you full information including an interesting illustrated free book. The edition of this vitally interesting little book is limited so mail the coupon at once to be sure of getting a copy.

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2115 Morris Ave. Steubenville, Ohio

If you live West of the Rockies, mail your inquiry to  
The Electro Thermal Co.  
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**LOS ANGELES, CALIF.**

**W. J. Kirk, President,**  
2115 Morris Ave., Steubenville, Ohio.

Please mail at once a **FREE** copy of the booklet, "Why Many Men Are Old at 40," and all details about the new treatment. I'm not obligated in any way.

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

**SAVE 1/2**  
on plumbing, heating, hardware, paint, roofing and millwork supplies. Large quantity buying enables us to offer Grade "A" merchandise at great savings. Send today for free catalog—over 120 pages of enormous bargains.

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400 N. 12th St. Philadelphia, Pa.

## Own This Better H & A Saw Table



A sturdy, powerful, large capacity machine that will handle wide material. Accurate, speedy, reasonably priced. Use it for ripping, cross-cutting, mitering, grooving, rabbeting or dadoing. Equipped with tilting fence for bevel sawing; 1/2 or 3/4 H. P. motor; ball bearing spindle. Write for catalog of wood-working tools.

**HESTON & ANDERSON, 603 Market St., Fairfield, Iowa**





## JAPANESE ROSE BUSHES

### The Wonder of the World

Japanese Rose Bushes bloom all the year round. Just think of it. Six weeks after planting the seed, the plants will be in full bloom. It may not seem possible, but we positively guarantee it to be so. They will bloom every ten weeks, Summer or Winter, and when three years old the bush will be a mass of roses, bearing from five hundred to a thousand roses on each bush. The flowers are in three shades—white, pink, and crimson. The plants will do well both in and out doors. We guarantee at least three bushes to grow from each packet of seed. Price, 10c packet, 3 pkts. for 25c postpaid.

### Chinese Fragrant Tree Fern



Just introduced; noted for its rapid growth. An exceptionally pretty ornamental plant. Foliage rich dark green. Forms grand pyramidal bushes about 5 feet high. Branches very desirable for decorative purposes, wreaths, etc. Seeds 15c pkt., 3 for 40c.

### Weather Plant



NATURE'S WEATHER PROPHECY By mysterious changes that take place, this remarkable plant accurately forecasts the weather many hours in advance. Will grow anywhere all the year around. An interesting house plant. Bears large, fragrant, pink, butterfly shape flowers. Seeds, 15c packet, 3 for 40c, postpaid

## GROUND ALMONDS

Amazingly Prolific—Easily Grown From Seed The Ground Almond has a flavor that is MOST EXCELLENT, resembling the cocoanut. The meat is snow white, covered with a shell or skin of brown color. It grows close to the surface and anything from 200 to 300 Almonds may be expected from a single nut. There is no trouble whatever in growing anywhere and in any kind of soil. May be planted any time, and in eight or ten weeks from time of planting you will have an ENORMOUS CROP of the MOST DELICIOUS ALMONDS YOU EVER TASTED. Seeds 15c Pkt.



### Perfume Plant

Blooms only at night, giving forth the most delightful scented fragrance for quite a distance. Causes much comment. For house or garden. Also valuable because of rare perfume made from it. SEEDS, 10c pkt., 3 for 25c.

### Calabash or Pipe Gourds

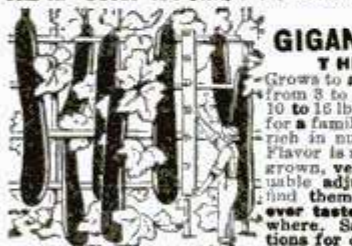
A luxuriant and rapid growing climber; thrives anywhere. Produces the ornamental gourds from which the famous African calabash pipes are made. Grow this interesting vine and make your own. Seeds, with instructions, 15c pkt., 3 for 40c.

## MAMMOTH PEANUTS

Peanuts can be easily cultivated. Their culture is very simple and exceedingly interesting. Mammoth Peanuts grow to an astonishing size. It is a good producer, very prolific, and the giant nuts have a thick, heavily ribbed protecting shell. The plant is very attractive, the leaves being of odd shape and a handsome green shade, tinted through the center with white. You will derive much pleasure cultivating this interesting species. Seeds 15c pkt., 3 pkts. for 40c.

### Musk Plant

A universally admired favorite for house, flower garden or greenhouse. A very fine house plant. Lives for years. Is of the sweet scented variety, giving forth much fragrance. Also valuable on account of the perfume that can be made from it. Seeds 15c pkt., 3 for 40c.



### Japanese Climbing Cucumber

Unusually strong and vigorous growing vine. Attains twice the size of ordinary varieties. Grows readily on fences, poles, trellises, etc. One hill will keep an entire family supplied all summer. Seeds 15c packet, 3 for 40c, postpaid.

### GIGANTIC BUTTER BEANS

THE NW EDIBLE VEGETABLE WONDER Grows to an astonishing size, the Beans measuring from 3 to 6 feet long, and weighing anything from 10 to 15 lbs. and even more. One Bean is sufficient for a family for several meals. Very palatable and rich in nutritious material. The delicate Buttery Flavor is much appreciated. The Vines are easily grown, very prolific, and a most welcome and valuable adjunct to your garden. Try them; you will find them the most delicious vegetable you have ever tasted. Imported direct. Unobtainable elsewhere. Sample package of Seeds with full directions for cultivating and cooking. 25c, postpaid.

### Yard Long Bean

Produces enormous crop of long, slender, round pods, of excellent quality for snap beans. Pods grow from 2 to 3 feet in length. Very tender and fine flavor. The Vines are rampant growers; an interesting curiosity. Seeds 15c pkt., 3 for 40c.

Kudzu Vine Most rapid growing vine known. Will grow 20 feet in one week. Luxuriant foliage, lovely purple flowers, very fragrant. Nothing to equal it for shade purposes and quick growth. Seeds 15c packet, 3 for 40c.

## THE REMARKABLE FIREFLY PLANT



A Vine that Blooms at Night Fills the Atmosphere with Fragrant Aroma One of the most rapid growing vines known. Under favorable conditions this vine has been known to grow OVER 25 FEET IN A SINGLE WEEK. In a very short space of time indeed the Vine has climbed to a great height, and is covered with IMMENSE FLOWERS, from 5 to 7 inches in diameter. It is, indeed, a great novelty for, unlike other plants, the flowers OPEN IN THE EVENING, and remain open until about noon the following day. In dull weather they will remain open all day. It is a most INTERESTING SIGHT to watch the opening and closing of the flowers as the clouds appear and retire. As the flowers open they give forth the most DELICIOUS AROMA and the whole atmosphere around is full of scented fragrance. It is always the object of favorable comment, and much curiosity is aroused by people passing at night time as to the cause of the charming aroma, frequently stopping in an endeavor to satisfy their curiosity. PRICE, 19 CENTS packet, two packets for 35 CENTS, POSTPAID. JOHNSON SMITH & CO.

### The Great Wunderberry

A luscious berry that may be grown and ripened from seed in any soil or climate in 3 months. The flavor is fine and unsurpassed for eating raw, cooked, canned or preserved in any form. The fruit is blue-black in color, and tastes like a luscious, rich blueberry. One bush will produce an enormous amount of fruit, yielding great masses of rich fruit all Summer and Fall. Packet, 10c, 3 pkts. for 25c, postpaid.

### Bush Musk Melon

A vineless Musk Melon, grows in bushes, and thus can be cultivated in the smallest garden. The fruit is of the popular "Jenny Lind" type, but larger, averaging 5 inches in diameter. The flesh is very deep, edible almost to the rind and is colored light green, flushed with a tinge toward the center. The quality is superb, lusciously sweet and juicy. Packet of seeds, with full directions for culture, 15 cents, 3 packets for 40 cents, postpaid.

### The Great Umbrella Palm

A Graceful House or Conservatory Plant The Japanese Umbrella Palm is a semi-aquatic plant. It is easily grown from seed either in a bowl of water or in very damp soil. Probably the most usual, as well as the most interesting method, is to cultivate the plant in a bowl or jardiniere filled with water, with two or three inches of good garden soil at the bottom. The seeds soon commence to germinate, and the plant shoots up stems two to three feet high and rapidly assumes a most pretty palm-like appearance, as shown in the engraving. The tops of the stems are surmounted by a whorl of umbrella-shaped leaves, of a waxy appearance. We will send a package of this seed, with full instructions for culture, for only 15c or three packets for 40c postpaid.



### Butterfly's Own Bush

This plant is a veritable refuge or haven for butterflies, and it attracts all the most beautiful species of butterflies to the neighborhood. Bees, too, are very fond of it. It is a pretty plant bearing perfectly double flowers, ranging from white to rich crimson, deep red and pink lilac and other delicate shades. Packet 10 cents, 3 for 25 cents postpaid.

## FAMOUS MEXICAN FIREFLY PLANT

Beautiful hedge plant, grows 2 to 2 1/2 feet high and resembling a closely clipped evergreen. The globe-shaped bushes are close and compact, and of pleasing light green color. May be grown singly or in the form of a hedge or background. In early autumn the whole bush becomes carmine or blood red, hence the name of Mexican Fire Plant, or "Burning Bush" as it is sometimes called. Selected Seeds, 10c

## Asparagus Sprengeri

The best plant for hanging baskets. Masses of rich, gleaming foliage droop in a very graceful manner. The foliage when cut for decorative purposes will last for weeks in water. The seed pods are very pretty red berries adding to its beauty. Packet, 25c, 3 pkts. for 65c postpaid

## TREE OF HEAVEN

This splendid ornamental tree is a native of China, and is called the Tree of Heaven, on account of its great beauty. Very hardy, thrives in any soil, no matter how poor, and grows from 6 to 10 feet high from seed the first summer. The leaves are from 5 to 6 feet in any length, giving it a grand appearance. Nothing outside the tropics can rival it for lawn decoration. Large panicles of bloom, followed in season by great clusters of colored seed pods, make the tree a real thing of beauty. Packet, 15c; 3 packets 40c

### CROWN OF THORNS

A very curious clover-like plant, can be cultivated indoors or outdoors, the three red blotches on the leaves representing the three wounds of Christ. Has curious thorny seed ball; if loosened at tip the hull is found to consist of a long prickly-edged band wound spirally around the seed cluster, giving the plant its name. Seeds 15c packet, 3 for 40c.

### "Wong-Bok" Chinese Cabbage

Novelty from China and should be grown in every garden. Seems to be a cross between Celery and Cos Lettuce. Flavor is more mild than any other cabbage. Can be served on the table and eaten raw or cooked like cabbage, spinach or lettuce or made into salad. Grows very rapidly, easy to cultivate. You can create quite a sensation by cultivating this remarkable novelty. Seeds, 15c packet, 3 pkts. for 40c.

## SURPRISE FLOWER GARDEN

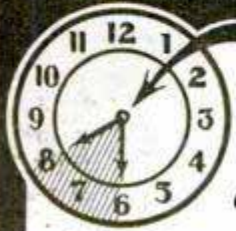
Over Hundred Varieties of Mixed Flower Seeds MANY RARE AND CURIOUS NOVELTIES An Abundance of Flowers Assured Throughout the Season A mixture of easily grown annuals that bloom very soon after sowing the seed; others vary in their time of blooming. Those who cannot give the constant care necessary for finely arranged flower beds will be delighted with the Surprise Wild Flower Garden. Will prove a continual surprise and pleasure, as new varieties and the old garden favorites flower successively throughout the season. There are over a hundred varieties of seeds. Many of the plants may be taken inside as house plants and will bloom during the winter. Fine for children, also teachers for school gardens. Packet, 15 cents, three packets for 40 cents, postpaid. J. S. & CO.



# Making Real Money!

## \$4.00 to \$6.00 an hour

You can do it too with the **IDEAL** Lawnmower Sharpener



A days pay ~  
for  
2 hours work!

### And That's What You Can Do!

Herman Barber, 1505 E. Carter Ave., Ashland, Ky., writes: "I have sharpened to date 459 mowers, receiving \$988.30. These were sharpened in evenings and in spare time. I have seen other machines, but this is the most perfect one I have seen yet."— And hundreds of others are cashing in with this efficient machine. **OUR FREE BOOK TELLS YOU HOW**—It tells how others have made themselves a business of their own—built permanent businesses on spare time work which has helped to buy the extras for the home, etc., that everyone wants. Send for this book—It's Free.

**Use Your Spare Time** If you work at a trade, put an Ideal in your basement and earn \$4.00 to \$6.00 an hour evenings and Saturday afternoons. E. W. McCormick, Saginaw, Mich., writes: "Five years ago I bought an Ideal Sharpener on which I have ground over 5,000 mowers. In the last few weeks I worked at my trade, machinist, full time 9 hours a day. I also ground 97 mowers which netted me \$114.10 clear gain."

**A Nice All Year Business** S. E. Raup, 1312 N. Cameron St., Harrisburg, Pa., writes: "I have been using two Ideal and one Peerless grinders for four years with fine success and have been able to build up a nice all-year business. At present I am employing one man and a boy to help me."

**Same Customers Each Year**— D. N. Wood, Winchester, Ky., writes: "This is the third year I have been using your machine and I have built up a nice repeat trade. Evidently the work is satisfactory or I would not get the same customers each year; also each one generally sends a new one."

**Profits Year After Year** C. S. Coburn, Little Rock, Ark., writes that his "Ideal" Sharpener earned enough in 18 months to pay for itself and \$1857 worth of additional machinery.

Zeno Brandon, Middletown, Ohio, writes: "I have made \$820.70 in 55 days with my 'Ideal'. Have made as high as \$38.70 in one day."

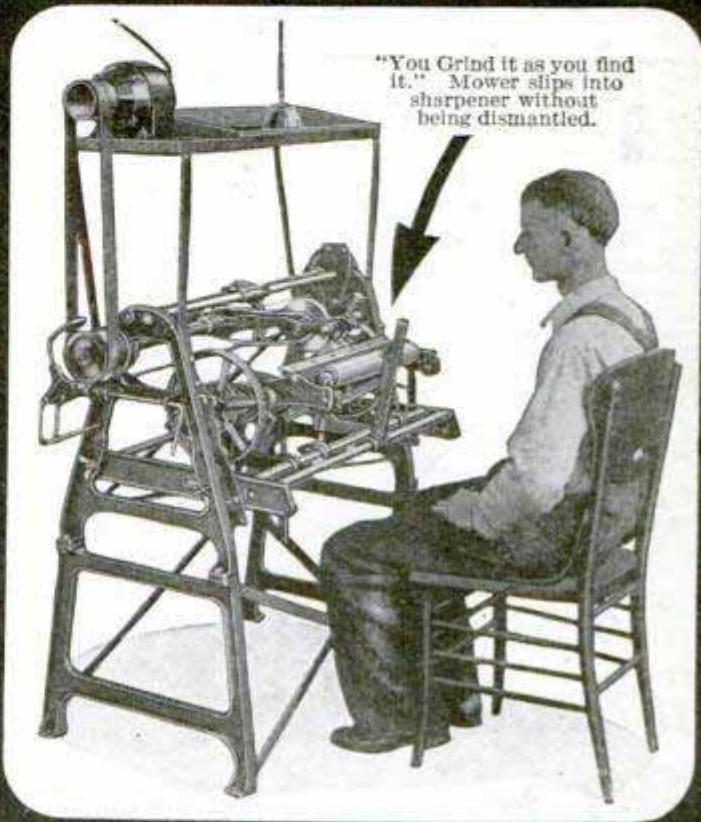
W. F. Kendt, Buffalo, writes: "I have sharpened 994 lawnmowers last season and the receipts were nearly \$2100—not bad for a side line."

### Hundreds of Dull Mowers Waiting For You

to sharpen them right in your locality—and no town is too small. William G. Mercier, 178 E. Mohawk St., Oswego, N. Y., writes: "We have our shop on a truck and we travel all over the county." W. W. Dresser, Sanford, Florida, writes: "I live five miles out of town so have no rent to pay. Collect and deliver mowers. Get \$2.00 or better. Buy up old mowers and repair same and therefore make from \$4.00 to \$10.00 on same, which counts up in a season. Am well pleased with the machine."

**Here Is Your Chance** Send for the book. "Let George Say It"—It's the proof of what we advertise. We also show you the best ways to get the mowers to sharpen.

**THE FATE-ROOT-HEATH CO.**  
Dept. M. Plymouth, Ohio, U. S. A.



#### Sharpens Lawnmowers to Razor Edge

The Ideal Lawnmower Sharpener is a wonderful, but simple, machine that sharpens lawnmowers perfectly, scientifically, without dismantling the mower. Sharpens them as emery dust, files and obsolete methods never could.

#### Sharpens Any Mower in 20 Minutes

Just pick up any mower, set it in the Ideal, make a few simple adjustments and proceed to sharpen. In 15 to 20 minutes after you pick up the mower it is ready for the lawn, and you have made \$1.50 to \$2.00, depending on the charge you fix.

#### No Training Required

You don't have to be a mechanic to use the Ideal. Its operation is simple and practically automatic once you start to grind.

#### Set Up Ready to Grind in a Few Minutes

Shipped practically completely assembled. Uncrate it, place in position, plug into a light socket and it is ready to start earning for you.

#### Special Grinding Wheel Attachment

For sharpening grass shears, hedge shears, sickles, scythes, axes, etc., etc. Will add many dollars to your income.

#### Skate Sharpener Attachment Included

Sharpens all makes of skates—including hockey with shoe attached. The "Ideal" earns money all the year round.

#### Uses Little Power

Operated by 1/4-H.P. Motor attached to light socket or can be run direct from line shaft.



Here's what you'll want to read  
Send for it NOW!

Sign and Mail This Today

**The Fate-Root-Heath Co.,**  
Dept. M, Plymouth, Ohio.

You'll have to prove that I can make real money with the "Ideal" Sharpener. Send me your FREE BOOK.

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# Don't Have Colds Flu...Anemia Rheumatism!

Let Sunshine Protect Your Family From Tonsillitis, Bronchitis, Catarrh, Nervousness, Rundown Condition, Rickets, Asthma, Pleurisy, Boils, Skin Diseases, Neuralgia, Sciatica, and Sinus Trouble. Doctors Say Our Sunlight Starvation Causes Lack of Energy and Vitality, and Our Ready Surrender To Colds, Flu and Pneumonia.



## A Genuine Ultra-Violet Lamp

AN amazing new low price on the new Twin-Arc Ultra-Violet Lamp developed by one of the country's leading manufacturers of electrical equipment for physicians. A new engineering feat makes possible this remarkable low price—only 1/2 to 1/3 usual cost. Produces health-giving Ultra-Violet and Infra-Red Rays, especially needed by babies and growing children.

for Only  
**\$48<sup>50</sup>**  
Easy Payments

Send at once for details of our FREE Trial Offer which enables you to use this amazing new Twin-Arc Sun Lamp for Ten Days in your own home without obligation. We also will send you our FREE Book *Health, Vitality and Beauty Thru Sunlight*. Just mail the coupon.

National Health Appliance Corp., 1676 N. Claremont Ave., Dept. C-160, Chicago.

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Our representatives make \$200 to \$1500 a month taking orders for this marvelous lamp and our splendid low price Body-Building Vibrator. If you want a permanent position with exceptional earnings check coupon below.

National Health Appliance Corp.,  
1676 N. Claremont Ave., Dept. C-160, Chicago.

Please tell me how I can secure the new Twin-Arc Sun Lamp for FREE Trial. Also send me your book.

Name.....

Address.....

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( ) Check here if interested in becoming our Representative.

# Used RADIOS

as low as

**\$9.90**

UNHEARD of  
VALUES!

5 tube

Here it is! Positively the greatest offer ever made in Radio. For only a few dollars, you can own a set that will prove amazing for quality and performance. Our low prices are made possible only because we buy for spot cash—because we have exclusive contracts for all sets taken in trade by dealers—because we buy manufacturers surplus merchandise—and because we are dealers in bankrupt stock.

### TAKE YOUR CHOICE

**LOT 1** Here are included many famous make radios. All have been thoroughly tested and are guaranteed to be in perfect condition. Can hardly be told from new. Formerly sold at very high prices. **\$1490**

**LOT 2** In this lot are some very excellent receivers, all in perfect working order. You'll agree they are worth far more and could not be duplicated at twice the price. **\$1290**

**LOT 3** If you are handy with tools, you can make a still greater saving. Just a few minutes of your time in making some minor adjustments and you'll have a set that you will be proud to own. This lot sold as is. **\$990**

### 100% MONEY BACK GUARANTEE

As one of our customers you must be satisfied. If upon receipt of your set, you do not feel that it is the biggest bargain you ever bought, return the set and we will promptly refund your money. Could anything be more fair?

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Take advantage of these amazing values now! Orders filled in order of receipt. We ship promptly. Upon arrival pay price of set ordered plus a small delivery charge. (Foreign countries send Money-Order with order)

**CHAS. HOODWIN CO.**

**4240 Lincoln Ave., Dept. AC. Chicago**

Dealers in Bankrupt Radio Stocks

## Add \$150 to \$300 Monthly PROFIT

Johnson added \$125 monthly with 8-Hour Battery Charging. Wayne's Test Bench brought him \$275 month. Bruce doubled battery sales with

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**Only \$16 Monthly**

Try HB 30 days at our risk on absolute money back guarantee. Also make Air Compressors, Car Washers and Paint Sprays — all money makers for you. Underline the item you are interested in and mail for full particulars without obligation to

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## It's Easy

YOU PLAY tunes the first day with an easy-playing Conn instrument and the fascinating new instruction methods. No long drudging over scales. Conn gives you the exclusive features found in no others. Choice of famous artists.

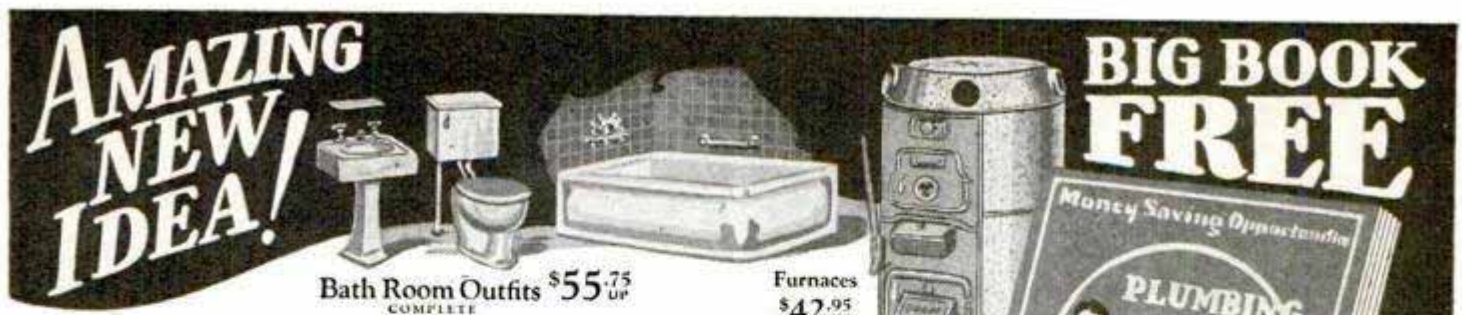
**FREE TRIAL, Easy Payments.** Write now for literature; mention instrument.

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331 Conn Bldg. Elkhart, Ind.

# CONN

BAND INSTRUMENTS





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Bath Room Outfits \$55.75  
COMPLETE UP

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**Save 1/2 on Material  
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We Show How You Save Hundreds  
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**MAIL** the coupon today and get this wonderful, Big FREE Book that lists 4000 great bargain offers and shows every little detail for installing your own plumbing and heating. Nothing like it ever printed before. Everything new, modern and up-to-date. Homes everywhere follow our instructions and save hundreds of dollars. You can do it too!

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If you can use a wrench you can be your own plumber. Our amazing, simple and easy plan explains everything. No experience necessary. We help you in every way possible. Thousands of our customers do their own plumbing and heating work.

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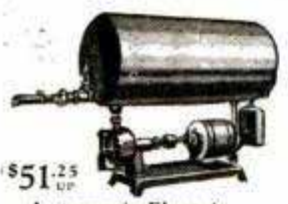
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Largest Stock of  
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BOOK  
Now**



\$51.25  
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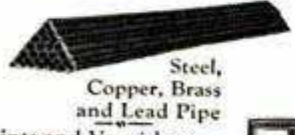
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Send your Big FREE Catalog of 4000 Wholesale Bargains explaining how I can install my own plumbing and heating. (Check subjects in which you are specially interested).

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You can make **BIG MONEY WITHOUT CANVASSING.** Our **FREE PLAN** shows you how to build up a permanent, repeat business of your own filing saws for carpenters, mechanics, contractors, hardware stores, factories and many others, with the **Foley AUTOMATIC Saw Filer.** The Foley beats the best hand-filing, and there is no other machine like it.

## \$2 to \$4 An Hour In Spare Time

Others are doing it, why don't you? Fuller made \$3 in 40 minutes. Harper made \$52 extra in one week. Smith filed 200 saws and everyone is satisfied. You can start in spare time. **BE YOUR OWN BOSS**—investigate the

### FOLEY AUTO MATIC SAW FILER

Saw users want their saws filed on the Foley because they cut better and stay sharp longer. **EASY TO OPERATE.** Files all kinds of hand saws, band saws  $\frac{1}{8}$ " to  $4\frac{1}{2}$ " wide, and cross-cut circular saws 3" to 24" diameter.

Send coupon for **FREE PLAN** and complete information **AT ONCE!**



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Foley Saw Tool Co., Inc., 237 Foley Bldg.,  
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Please send me **FREE PLAN** showing how I can make **BIG MONEY** in my spare time filing saws on the Foley.

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## "Great Sport!" Says War Ace

Major Reed Landis, former war Ace and aviation leader today, says: "Silver Ace Flying is great sport because real aero engineers design and build them. Children and grownups learn many aviation fundamentals by building and flying the fine Silver Ace. They have flown many hundred feet." It pays to insist on Silver Ace models and supplies; used successfully and endorsed by thousands.

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## AERO MODEL CO.

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### MODEL SHIPS

Would you like to build a real fine ship model?

We can supply construction sets and all sorts of parts such as semi-finished hulls, blocks, dead-eyes, special flags, anchors, steering wheels, capstans, figureheads, blue prints, books, etc., for building a Flying Cloud, Constitution, Spanish Galleon, Mississippi River Steamboat, Sovereign of the Sea, Light-

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**At Last** A real appropriate watch charm makers or boat enthusiasts. This miniature steering wheel is made of heavily plated 14-Kt. gold spokes and hub. The rim is made from coco-bola (a Porto Rican hard red wood). Made in two styles. For the charm, one spoke has a small ring attached. The lapel style illustrated, has a threaded hub and nut for fastening. Can also be worn on yachting caps. Packed in a handsome case. Price \$1.50 postpaid. Be sure to mention style when ordering.



Model Ship Supply Co.  
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### BE A RAPID-FIRE TRICK CARTOONIST

**\$2** BUYS COMPLETE COURSE, including 40 Clever Cartoon Stunts, "How to Give a Performance," "How to Originate Ideas." Fun—Profit—Popularity! Send \$2 or pay C. O. D. Educator Press, 19 Park Row, New York, Dept. O-24.

### New Model Men's Strap Watch

**\$3.85**

### CUT PRICE SALE

Two years written guarantee given with this full jeweled elegant Swiss watch. Your choice in square, tonneau or cushion shape—same price. Radium dial, tells time in dark. Accurate timekeeper, tested and adjusted. Rush your order. Quantity limited. Send no money, pay postman \$3.85. JENKINS, 621 Broadway, New York, Dept. 3-F-23





## Their vacation fare bought this fine car

**L**AST YEAR the Lymans went to a summer resort on the train. This year the family invested their vacation railroad fare in a good Pledge-backed car and will drive through Canada on their vacation—as well as enjoy short trips many week ends.

Hundreds of thousands of automobiles are

being purchased this year by second owners! For the same price, these careful purchasers buy unused transportation at a bargain price. Every car on the street is a "used" car. Don't let false pride prevent your family from enjoying a good car.

### Free Book Tells How

Send the coupon below *now* for valuable free book, "How to Judge a Used Car." Experts who buy hundreds of cars for resale tell you in plain words and pictures what to look for and what to avoid.

This free buyer's guide may easily save you \$200.00. Spend 2c for a stamp and mail this coupon **NOW!**

*130,000 people saved money by mailing this coupon*



### Pledge to the Public on Used Car Sales

- 1** Every used car is conspicuously marked with its lowest price in plain figures, and that price, just as the price of our new cars, is rigidly maintained.
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© 1928 The Studebaker Corporation of America

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Dept. 153, South Bend, Indiana

Please send me copy of "How to Judge a Used Car."

Name.....

Street.....

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# STUDEBAKER

**Builder of Champions**

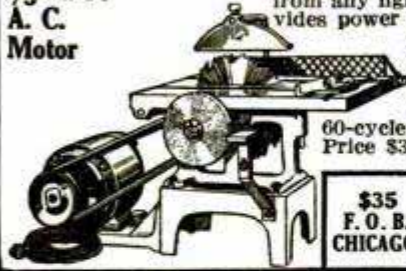


# 3 "Wonder" Outfits sent to you on 15 Days Approval *Money Back Guarantee*

**FREE** \$5.00 Book of Blue Prints, Showing 46 PRIZE PROJECTS with purchase

Price Includes 1/3 H. P. A. C. Motor

THE S&B 8 in. COMBINATION SAW (18 tools in one) is the ideal machine for the shop, factory or the home: will rip, cross cut, bevel, miter, mortise, groove, drill, tenon, grind, rabbet, buff and polish. Motor is mounted on a base that is a part of the machine proper. Run from any light socket, also provides power for other purposes when the saw is not in use. Complete with attachments and price includes 1-3 H. P. Motor, 60-cycle, 110-Volt A. C. Price \$35.00 F. O. B. Chicago. Shipping Weight 100 lbs.



\$35 F. O. B. CHICAGO

The S&B "Wonder" Lathe Outfit is the biggest value in lathes you can find. Heavy channel iron bed makes lathe rigid and prevents vibration. Head and tail stock in perfect alignment permits of fast and accurate work. This lathe is built for long service and hard use. Accessories to complete the S&B "Wonder" Lathe (as illustrated) \$16.60 extra.



\$35 F. O. B. Chicago

12" Band Saw—At this LOW PRICE you can NOW do the 1001 things you wanted quickly and easy. This 12" BAND SAW has a tilting table and sturdily built. Ideal for the shop or home. \$35 F. O. B. Chicago. Motor \$15 extra.



Write for Complete Illustrated Folder—Dealers Wanted.

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## HAVE YOU AN INVENTION?

A large American manufacturer, highest rating, equipped for producing small metal stampings, drawn articles, and screw machine products, desires new articles to manufacture. Preference will be given to products applicable to the automotive industry. Every idea submitted will be carefully considered, preference being given to patented articles. Will pay outright or pay royalty for acceptable ideas. Send complete information in first letter, and if possible a sketch or sample of your product.

Address ROOM 503, care of POPULAR MECHANICS MAGAZINE  
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**Eight Instruments In One!**

The new Regal Octofone can be tuned and played like a "uke," tenor banjo, mandolin, tenor guitar and other plectrum instruments.

**\$15.00**

**OCTOFONE**

*Uke Players*

Pick up the Octofone and play it right off! No lessons or relearning. The Octofone tunes and plays like a uke, but you get a finer, more mellow tone than a "uke" gives. The Octofone has the harmony qualities of eight instruments in one!

*FREE Instruction Booklet with Each Instrument*

**REGAL MUSICAL INSTRUMENT CO.**  
CHICAGO

Regal Musical Instrument Co.  
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I am interested in the Regal Octofone. You may send FREE complete information.

Name.....

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**600 Mile Radio only**

Works without any batteries  
**300,000 people already use them**


**\$2.95**

Write for catalog No. 18 with letters giving lists of stations heard by users.  
**LEON LAMBERT & CO., Wichita, Kans.**

**Learn the Code with Teleplex!**

Be an expert Morse or Continental code operator! **BIG PAY—TRAVEL—FUN—ADVENTURE.** After a few short weeks of practical study with Teleplex you will be an expert operator. This amazing instrument teaches you right in your own home. Works like a phonograph. No knowledge needed—beginners learn at once! **Not a school. Free 10 days trial. Write for free booklet C-10.**

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**Save 1/2 PLUMBING-HEATING**  
Install Your Own  
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Lowest wholesale prices on Highest Quality, Grade A Goods. Any Handy Man can install his own Plumbing and Heating BY OUR NEW EASY METHOD. Get the best and pay only a little each month.

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New bargain catalog just **FREE** issued. With our cut-to-fit systems you save waste material and high labor cost. 50 years of economical service to builders, home owners, farmers, and mechanics.

**FREE ESTIMATE Send Sketch**  
FREE book gives you the whole story. Write for your copy today.  
**Million Dollar Bonded Guarantee Protects You**

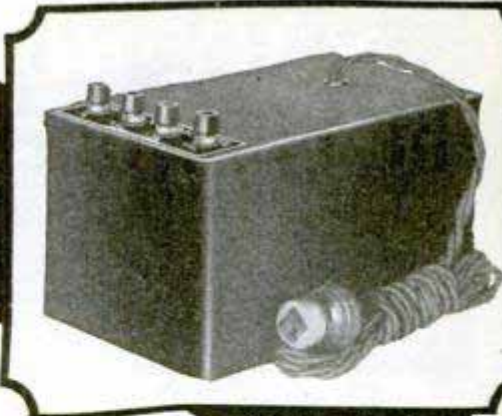
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# Enjoy the Thrill of Electrified RADIO at Small Cost!

Why discard your present good set when you can electrify it for only \$6.85, and also banish forever all the annoyance and expense of buying new "B" Batteries?



## HEAR IT! TEST IT! COMPARE IT!

### RESULTS

Your Eliminator has been in use for two years an average of six hours daily on my 5-tube Stewart-Warner and am well satisfied with it.  
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**JNO. A. GREEN,**  
*Hulls, Ill.*  
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**RUSSELL TATE,**  
*Muskogee, Okla.*  
 Your Eliminator beats any \$30.00 one I have yet seen.  
**E. M. BARRETT,**  
*West Graham, Va.*  
 Have used your Eliminator for over a year. Am well satisfied with it and have recommended it to many in this city.  
**DONALD J. SCOTT,**  
*Lansing, Mich.*

Electrified radio is what everyone wants now. Forget noisy, interrupted reception. You will see how easily you can electrify your set when you write us for proof and the truth about all electric radio.

### OVER 100,000 TOWNSEND "B" POWER UNITS NOW IN USE

Hooked up in a few minutes. Use same tubes—No changes. You will be amazed at the improvement in reception. Pure, even tones. Crystal clarity. Plenty of volume. Surprising distance. Freedom from hum and line noises. New radio enjoyment.

### TRY IT FREE!

We are so sure the Townsend will do all we claim for it that we give you the privilege of testing it out for ten days at our risk. A new radio joy awaits you. Don't put up with second rate reception any longer. You don't have to—when you can have electric reception with a Townsend "B" Power Unit for the astounding low cost of \$6.85. Mail coupon for complete information TODAY!

**Approved** and passed by the rigid laboratory tests of Radio News, Popular Radio, and Other Authorities.

ONLY \$6.85 @ Complete

TOWNSEND LABORATORIES, 3/29  
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Please send me full information on the Townsend "B" Power and Free Trial Offer.

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

TOWNSEND LABORATORIES, Dept. 15, 713 Townsend St., Chicago, Ill.

Cal. 30-40 Six Shot



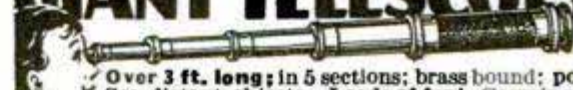
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Price \$9.75

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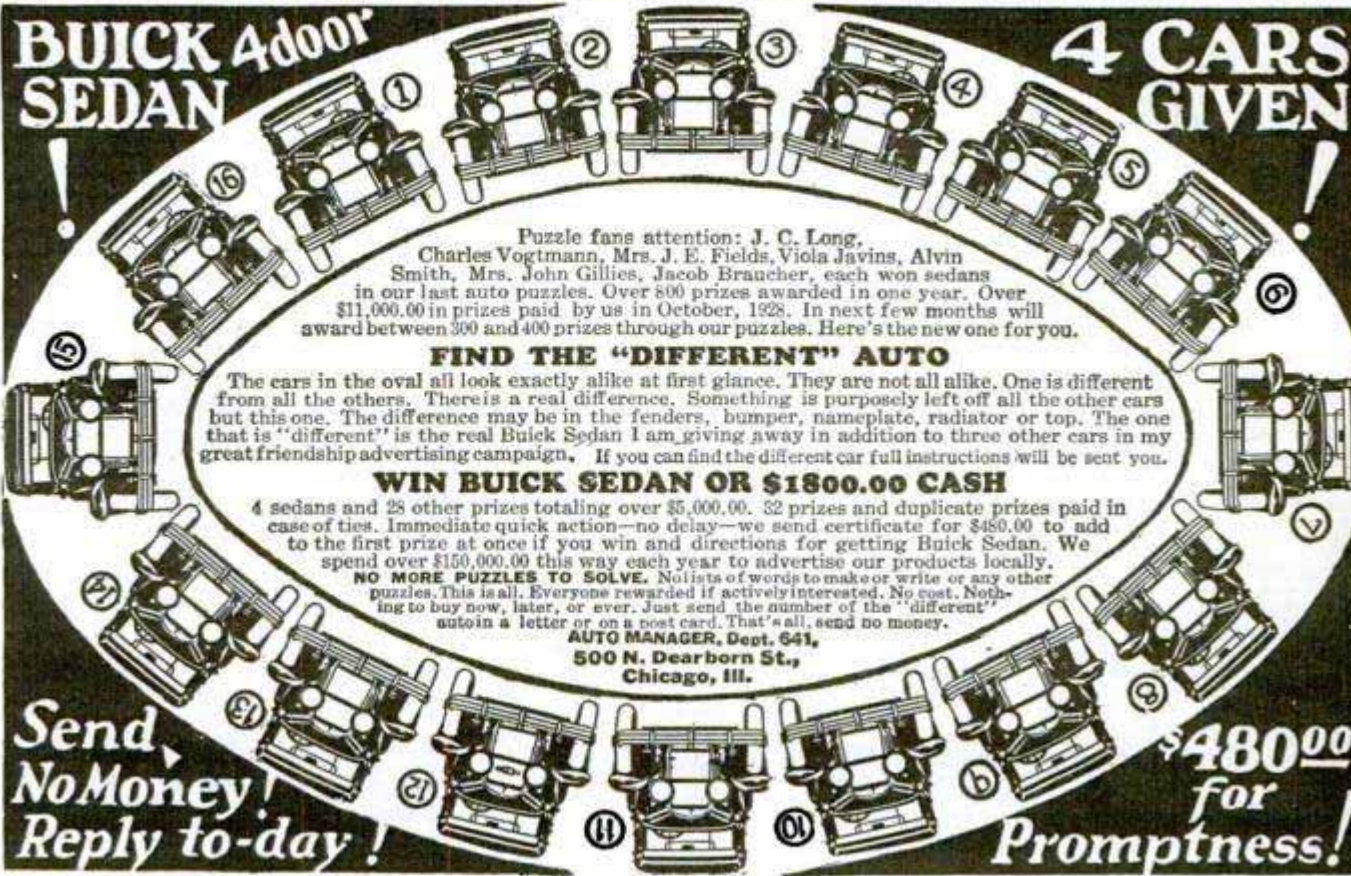
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Over 3 ft. long; in 5 sections; brass bound; powerful lens. See distant objects. Loads of fun! Carrying Case FREE. Send No Money Postpaid only \$1.85 or C. O. D. plus postage. Satisfaction guaranteed or money back. Ferry & Co., Dept. 9773, Chicago.

## BUICK 4door SEDAN

## 4 CARS GIVEN



Puzzle fans attention: J. C. Long, Charles Vogtmann, Mrs. J. E. Fields, Viola Javins, Alvin Smith, Mrs. John Gillies, Jacob Brancher, each won sedans in our last auto puzzles. Over 800 prizes awarded in one year. Over \$11,000.00 in prizes paid by us in October, 1928. In next few months will award between 300 and 400 prizes through our puzzles. Here's the new one for you.

### FIND THE "DIFFERENT" AUTO

The cars in the oval all look exactly alike at first glance. They are not all alike. One is different from all the others. There is a real difference. Something is purposely left off all the other cars but this one. The difference may be in the fenders, bumper, nameplate, radiator or top. The one that is "different" is the real Buick Sedan I am giving away in addition to three other cars in my great friendship advertising campaign. If you can find the different car full instructions will be sent you.

### WIN BUICK SEDAN OR \$1800.00 CASH

4 sedans and 28 other prizes totaling over \$5,000.00. 32 prizes and duplicate prizes paid in case of ties. Immediate quick action—no delay—we send certificate for \$480.00 to add to the first prize at once if you win and directions for getting Buick Sedan. We spend over \$150,000.00 this way each year to advertise our products locally. NO MORE PUZZLES TO SOLVE. Notices of words to make or write or any other puzzles. This is all. Everyone rewarded if actively interested. No cost. Nothing to buy now, later, or ever. Just send the number of the "different" auto in a letter or on a post card. That's all, send no money.

AUTO MANAGER, Dept. 641,  
 500 N. Dearborn St.,  
 Chicago, Ill.

Send No Money! Reply to-day!

\$480.00 for Promptness!



# WHY NOT Be Comfortable

when you read?



**CHILDREN** are enabled by the Mitchell Table to sit upright. Harmful humping eliminated.



**INVALIDS** especially appreciate the Mitchell Table. Permits them to read without eye-strain—to eat comfortably.



**PROFESSIONAL MEN** now read, write and edit in their comfiest chair.

**5 Days FREE TRIAL in your own HOME**

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**IF YOU LIKE TO READ**, here is a convenience you have long been looking for. Now you can sit back in your favorite chair, adjust the Mitchell Lap Table to exactly the proper position, and read in solid comfort! No eye-strain. No tedious holding of the book or magazine. Your body muscles are at rest; your energy is concentrated on the message before you. One of life's most pleasant recreations is made even more pleasant!

### DOZENS OF USES

Read or breakfast comfortably in bed. Write, figure or draw in your comfiest chair. A blessing to invalids; a distinctive and useful gift. Size of panels, 12x18 in. Beautifully finished; substantially made. Felt bottom prevents slipping, protects furniture.

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Send no money. Try the Mitchell Table for five days in your own home. If not delighted, return the table; otherwise, send us \$6.50, and it is yours for a lifetime of service! The coupon is for your convenience. Won't you send it in today?

Mitchell Moulding Co., Dept. 2203, Forest Park, Ill.

Send me, postpaid, a Mitchell Lap Table in  Mahogany  Walnut Finish, complete with two book clips and detachable metal supports for bed use. Five days after receiving it, I will either return it or send you \$6.50.

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

**MORE than a BARGAIN 5 TUBE Radio ONLY \$11.95**

There's a buy that smashes all records for value giving. Think it! A brand new 5-tube receiver, tuned radio frequency circuit, a beautiful walnut or mahogany finished cabinet (25 in. x 11 in. x 10 in.), all wired and ready to put into use. A regular \$40.00 value for only \$11.95.

### MONEY BACK GUARANTEE

Buy this set in your own home and be convinced. You'll agree that this is without a doubt the biggest bargain ever offered. If you are not satisfied return the set at once and your money will be immediately refunded.

Surplus Radio Company, Dept. 100-C, 549 S. Wells St., Chicago

Send for **FREE BULLETINS**

### CRESCENT WOOD WORKING MACHINES

Crescent Wood Working Machines make money for you by turning out work accurately, fast and easily. Portable machines operate from any light socket. Big line of heavy machines for factories, all quality made, moderately priced.

Send for Free Bulletin

The Crescent Machine Co., 93 Columbia St., Leetonia, O.

## Earn 5 Men's Wages Every Day

HB portable paint spray lets one man without experience do the work of five and earn 5 men's wages every day—paints houses, barns, garages, cars, furniture, at lowest prices, with exceptionally large profits for you.

**Easy Payment Terms**  
Easy payment terms lets it pay for itself out of profits—practically no expense to you. Tear out and mail for complete information without obligation. Also ask about money-making Battery Chargers, Test Benches, Air Compressors, Car Washers. Underline if interested and mail to

**HOBART BROTHERS**  
Box M392 Troy, Ohio



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### Astronomical and Terrestrial TELESCOPE

Magnifies 30 Times

Own a genuine Astronomer's Telescope. See millions of miles away. Make sun, moon, planets, stars your next door neighbors. Moon Craters, Sun Spots, Eclipses, Comets enlarged 30 times. Strange thrill!

Price Only \$3.95

Hours of fun looking at scenery, games, bathing beauties. Great for trips and voyages. Made like telescopes used in observatories. Gerding wrote, "Moon seemed 10 yards away."

**EARN \$10 A DAY**  
Charge 25c to look at the moon.

45 inches long. Inside diameter 2 inches. Special friction adjustment for focusing. Adjustable bracket and clamp can be fastened to chair, fence, branch, etc. Finest materials. Will last lifetime.

**5 Days Free Trial**  
Rush only \$1.00 now. Pay balance (\$2.95 plus postage) when postman delivers. Keep 5 days. If not delighted, return telescope and money will be refunded.

**R. B. SPECIALTY CO.**  
Dept. J-305  
318 Sycamore Cincinnati, O.

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Make \$50 to \$90 A Week

Amazing new fast-selling invention—Crystal Home Filter for fruit juices and beverages. Patented. Nothing like it. Removes all sediment, pulp, fibres. Filters a gallon every 4 minutes. Perfect results guaranteed. Simple. Practical. Low priced. Every home a prospect. Big profits. Quick, easy sales.

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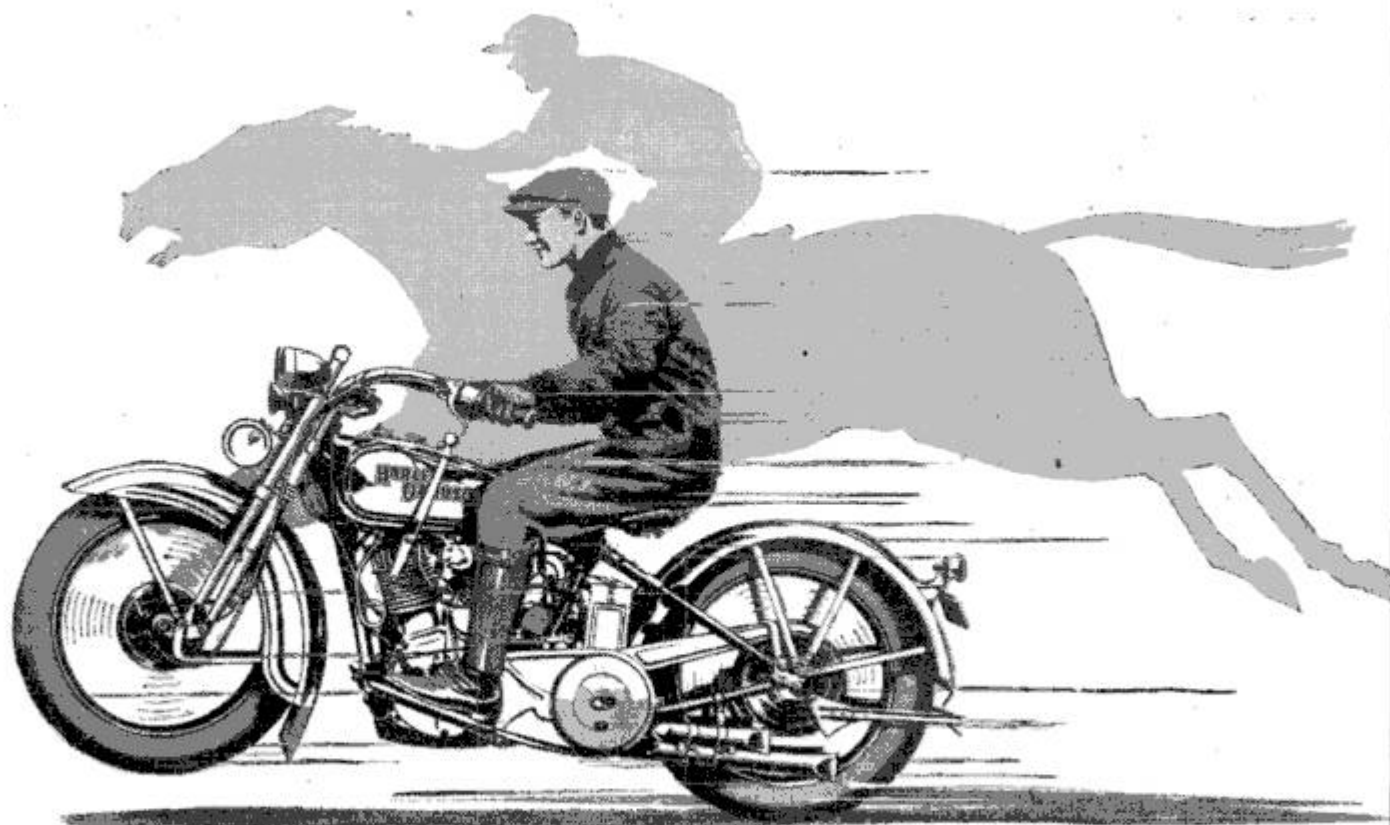
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Here's the **SANTA MARIA** One of our very popular models, 24" high, 12" wide, 27" long. Send off this coupon today to

Every part accurately made to fit perfectly. Sails, flags, etc. artistically printed. Packed complete in neatly arranged kit, for **\$5.48**

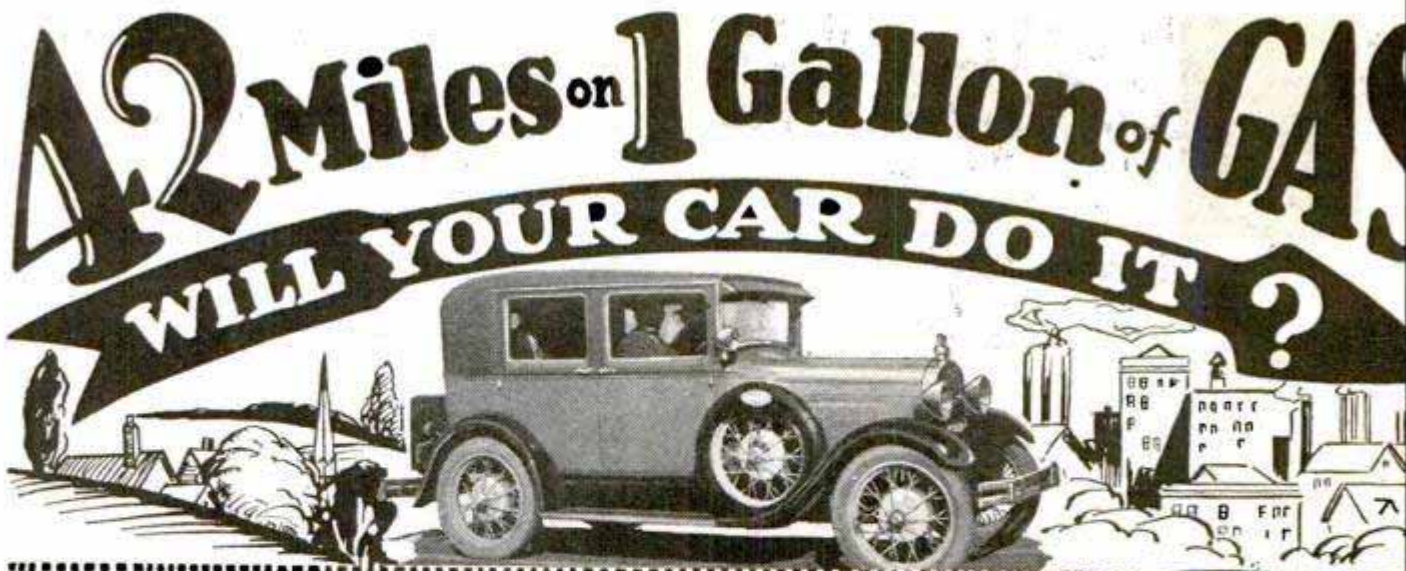
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Please send me a Santa Maria ready to assemble. I will pay postman \$5.48 plus a few cents postage.

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An amazing Scientific Humidifier has been patented throughout the World that beats any ever got out. It makes engines run ALL THE TIME with the same wonderful efficiency they do on a cool moist night. It gives MORE pep and power, HIGHER top speed, eliminates hard carbon, and gives AMAZING mileage. Fords report 28 to 42 miles per gallon. Other makes (both American and Foreign) report marvelous increases of 1/4 to double mileage. Some of the best records are:

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| Chevrolet.....41    | Hudson.....23 1/2  | Overland.....41     | Reo.....26 1/2    |
| Chrysler.....30 1/2 | Hupmobile...24 1/2 | Packard.....21 1/2  | Star.....41 1/2   |
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1 man \$4,939.66 in 3 1/2 months  
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One man sold 8 first morning  
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VIX sells itself by 8 STARTLING demonstrations—BIG, STUNNING, ASTOUNDING, DEMONSTRATIONS. Successful VIX men make MORE MONEY than they ever made before.

# Free Trial TRY This New Principle Gas Saver AT MY RISK



Pictures here and at top show Model "B" VIX attached to my own New Model A Ford. This car is wonderfully improved in performance with the VIX Moisture Humidifier. So is every Auto, Truck, Tractor, Taxi, Bus, Marine, Stationary and Aircraft Engine, both American and all Foreign makes.



Try this wonderful VIX Moisture Humidifier and Carbon Eliminator AT MY RISK on YOUR OWN CAR to prove that VAPOR MOISTURE (drawn from Radiator to Engine) gives you wonderful night driving effect ALL THE TIME with MORE mileage from gas and oil—eliminating hard carbon accumulation—gives MORE power, a SNAPPIER, PEPPIER motor, FAST acceleration, a SMOOTHER, QUIETER running engine and HIGHER top speed.

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**GUARANTEED TO SAVE** { 1/4 to 1/2 Gas  
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# There's the new Ned Tyson

He's making \$6500 a year now

USED to know him when he was a kid—we went to grammar school together. Then his father died and he had to go to work. Got a job with Brooks & Watson as a clerk, but couldn't seem to get ahead. Then something seemed to wake him up. We could see that he was doing better work. Then Old Man Brooks became interested—wanted to know how Ned happened to know so much about the business. Ned told him he'd been studying at home at night through the International Correspondence Schools. 'I'll remember that,' said Mr. Brooks. 'He did too. Put Ned out on the road as a salesman a year or so and then brought him into the main office as a sales manager. He's getting \$6500 a year now and everybody calls him 'the new Ned Tyson.' I've never seen such a change in a man in my life.' An International Correspondence Schools course will help you just as it helped Ned Tyson. It will help you to leave the happy home—the bigger salary—the comforts you'd like to have. At least find out how.

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

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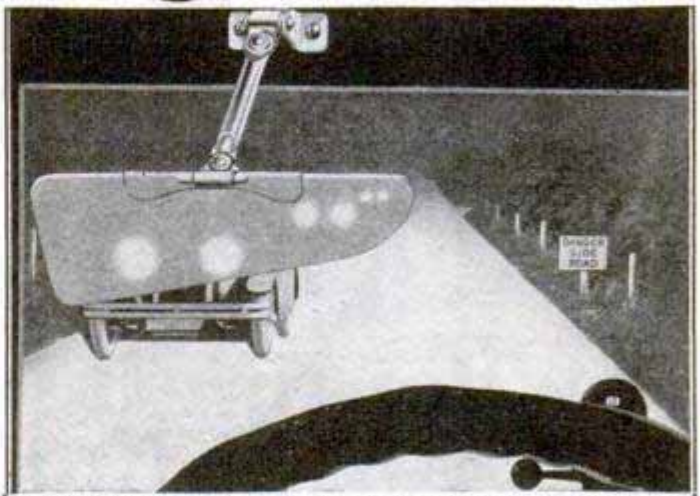
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- Industrial Management
- Personnel Management
- Traffic Management
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- Spanish  French
- Salesmanship
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- Architects' Blueprints
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The amazing new Liberty Glare Shield actually dims the bright lights of approaching cars so perfectly that it is as safe to drive at night as in the day. It is adjustable to all angles and a touch of the finger operates it. Gives perfect protection against the sun as well as bright lights. When not in use it can be folded up against the roof of the car. It is scientifically slanted and placed. Statistics show that thousands have lost their lives in auto accidents due to glaring headlights. The Liberty Glare Shield banishes this danger and makes driving a safe pleasure.

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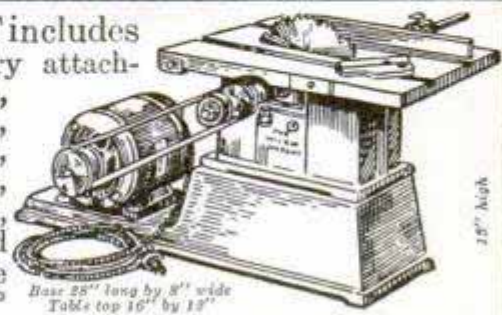
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# 8" COMBINATION SAW OUTFIT \$35 F.O.B. Phila.

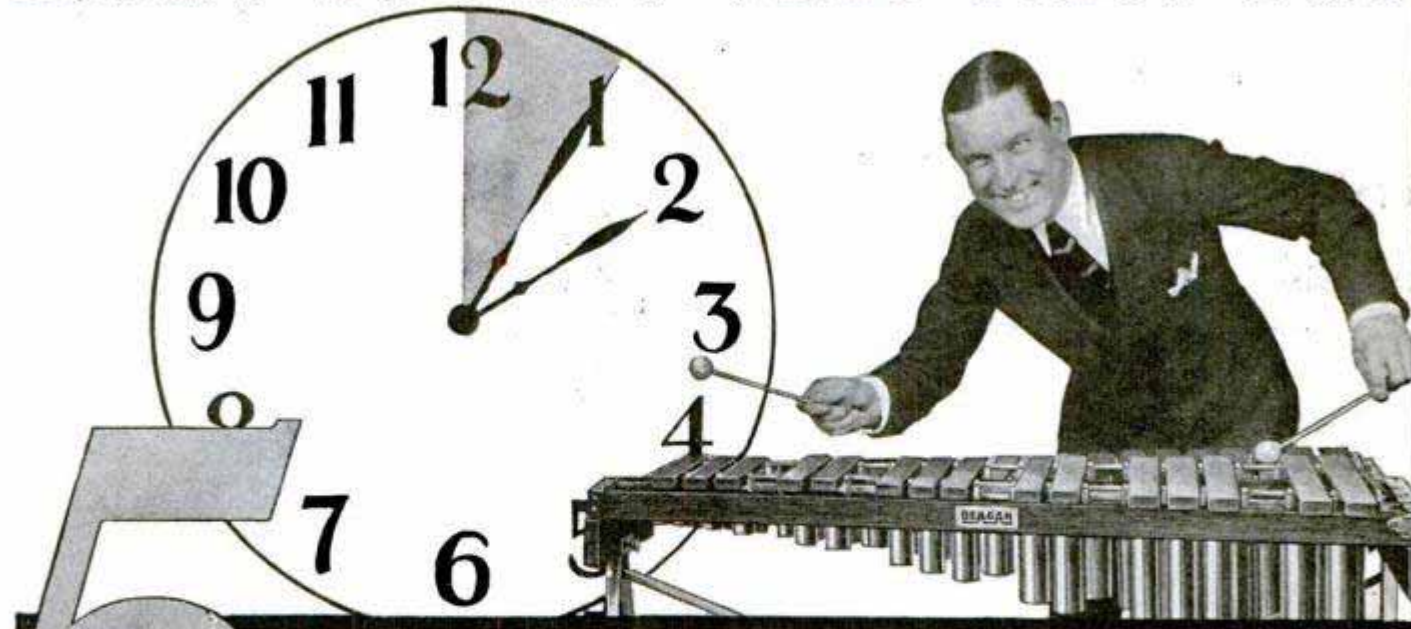
OUTFIT includes necessary attachments to rip, crosscut, bevel, grind, mitre, groove, sand, mortise, tenon, and polish. Table tilts to 45° angle. Base for saw and motor makes it portable. Makes 2 1/4" cut. 1/3 H. P. double extension shaft motor. Complete ready to plug into any light socket. Send for free folder of Saw Details, also Bench Lathes, Complete Work Shop and other Hardware specialties.



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**START TO PLAY VERY FIRST DAY**



**5 Minutes after I unpacked my Xylorimba I started playing!**

**F**RANKLY, I was doubtful. I had always wanted to play some musical instrument. To be the center of interest at parties; to make \$5 to \$25 a night for work that is "play"; to know the joy of creating music—



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**First Step Toward Musical Happiness**

Then one day I saw an ad like this one, wrote for the big FREE book, selected the instrument I liked best and ordered it on a strict 5-day trial basis—and on such easy terms that I hardly noticed the payments.

*Five minutes after I unpacked my xylorimba, I was playing the notes of "Old Black Joe."*

It was a simple melody, to be sure—but it proved that I would actually be playing *real music* from the very start, without the tiresome finger or lip exercises. How much more pleasant, under these conditions, to take up the wonderfully simple lessons, one by one, and gradually learn to play more intricate selections! How much more pleasant, too, to learn in the privacy of your own home without a teacher. Never have I had such fun—such cheery evenings—such a feeling of

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**Friends Amazed!**

Friends and relatives are amazed at my progress. To "dash off" a snappy fox-trot or dream waltz and then hear them shout for more, is a thrill that simply must be felt to be appreciated.

**BIG BOOK FREE!**

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J.C. Deagan, Inc., Dept. 1453, 1770 Berteau Av., Chicago

Send me, without obligation, full details of Free Trial offer and easy-payment plan on the Deagan Xylorimba.

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— and save yourself the jolts that rock the "ole framework"

Aren't gym floors slippery as ice, sometimes, and just as hard? And don't you come down *ker-plunk* now and then when you land off the "horse", or when you're hurdling or tumbling? Say, boy, that's when you need Keds with their specially made, "shock-absorber" soles and sturdy canvas uppers. They're unbeatable when it comes to saving wear and tear on your good athletic chassis!

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## *Keds Short-Stop*

Note the special safety-sole. Keeps your feet cool and gives them protection whether you're playing baseball or taking the jolts of the trail.



out. And you'll find that Keds lace tight, too, so your feet can't slip or chafe.

Keds offer the most complete line of models for every indoor sport and outdoor activity, and are made by the world's largest specialists in canvas rubber-soled footwear. You'll find Keds in the best shoe stores in town—at all prices, too, from \$1.00, \$1.25, \$1.50, \$1.75 up to \$4.00.

KEDS—KEDS—KEDS—Look for that name stamped on all genuine KEDS.

United States  Rubber Company

# Keds

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The more you pay, the more you get  
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## *Keds Conquest*

This handsome shoe puts lightning in your feet and protects you against slipping! Made with the popular crepe sole, famous for wear. A special toe cap reinforcement that will let you scuff to your heart's content. "Feltex" insole.





The Same  
Fast, Accurate

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for home use and  
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planer, saw, lathe  
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and many useful  
attachments

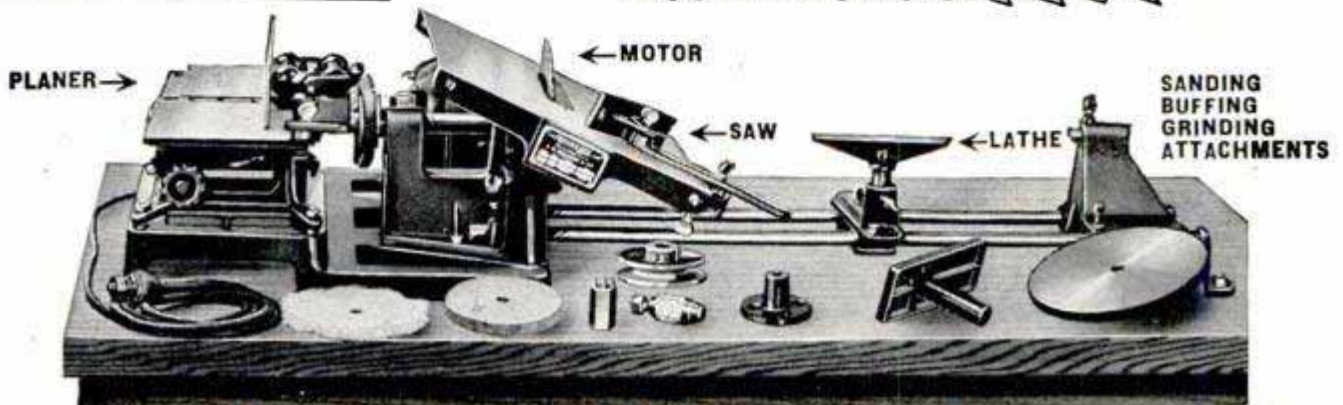
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## Make everything out of wood with the famous

# WORKACE

## Electric

# WOODWORKER



Amazing low price includes everything

This complete all-electric shop costs less than most other outfits and gives you **the biggest value per dollar!** You can prove it at home by actually using the Workace in every kind of woodworking operation, making furniture or other useful and decorative things for your own home and to sell at a handsome profit. The Workace is fast, accurate and easy to work with. Planing, sawing, turning, drilling, grinding, sanding or buffing—you save time on every operation, do better, cleaner work, too!

There's ample power, strength and capacity in The Workace Woodworker to do any job quickly and economically . . . mitering, tapering, rabbeting, beveling, slotting, cross-cutting, ripping—anything! Every unit works from the G. E. motor. All parts are sturdy and well fashioned. The regular Wallace UNQUALIFIED GUARANTEE assures replacement of defective parts for one year. This is a simple straightforward offer—no exaggeration, no red tape—just plain facts that you yourself can prove. If you want to make woodworking your real hobby—or a real source of income—send this coupon for all details of this unusual proposition.

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Our terms are all in your favor, a new and revolutionary method of purchase. Many pay for their Workace Shop out of the profits it makes . . . A small down payment brings the Workace complete and ready to set up for immediate use. The monthly payments are so small you'll scarcely miss the money . . . Send the coupon now—today—and we'll see that you get full details and a complete description by return mail!

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Includes all this:

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8' Circular Saw  
6'x36" Lathe  
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6' Buffing Wheel  
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Endless V-Belt, two  
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ft. Cable with sep-  
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The Planer and Cir-  
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may be purchased  
separately at the cor-  
respondingly low  
price of \$25.00 each.



WORKACE 14' BAND-  
SAW. Speedy, accurate,  
economical. Price, \$75.

**SEND TODAY GET OUTFIT  
RIGHT AWAY**

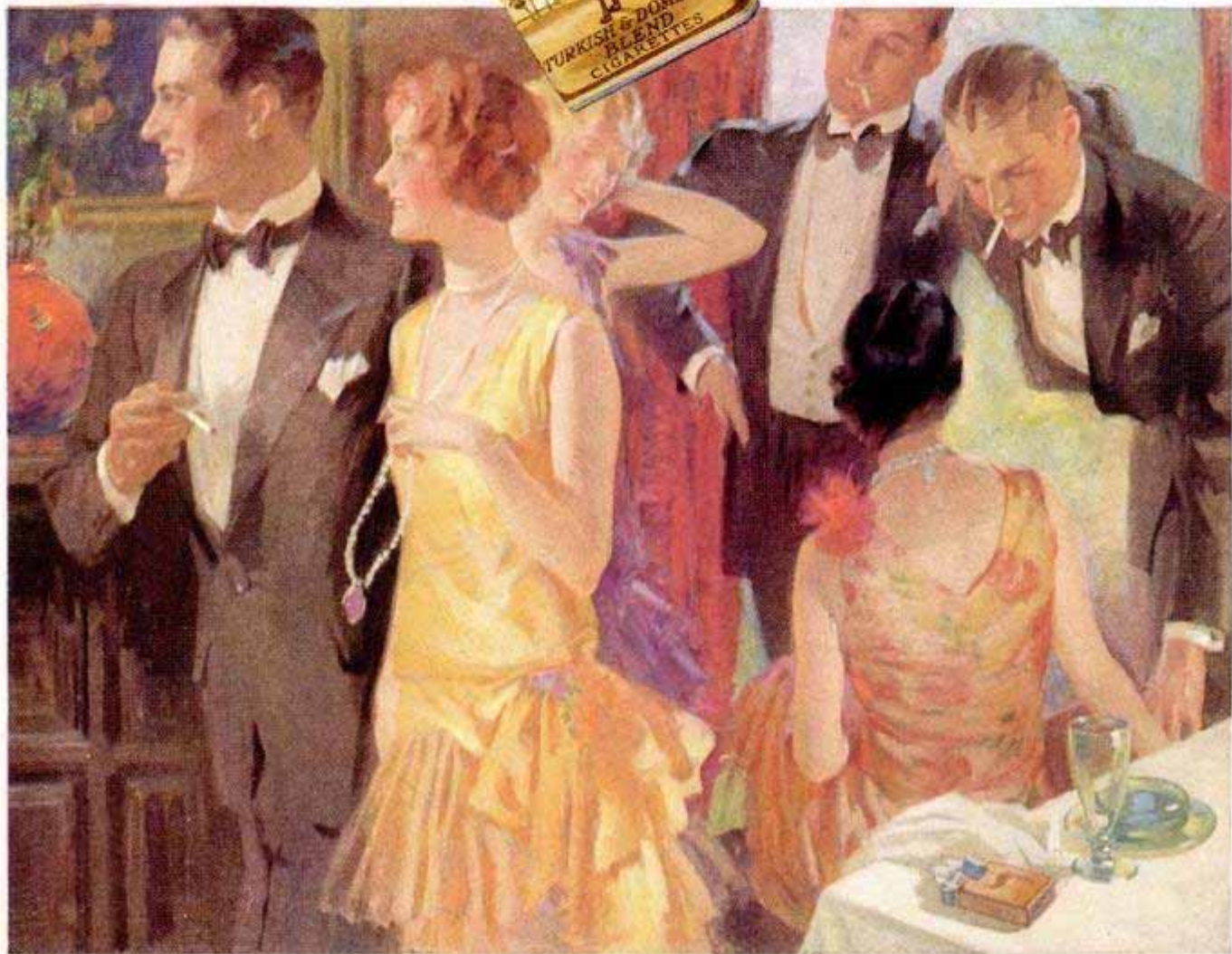
J. D. Wallace & Company,  
Adams St. and California Ave.,  
Chicago, Illinois.

That Workace Electric Woodworker sure looks good to me. I want to know ALL about it, including your easy terms, right away.

Name . . . . .  
Kind of Business . . . . .  
Address . . . . .  
City . . . . . State . . . . .



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