

POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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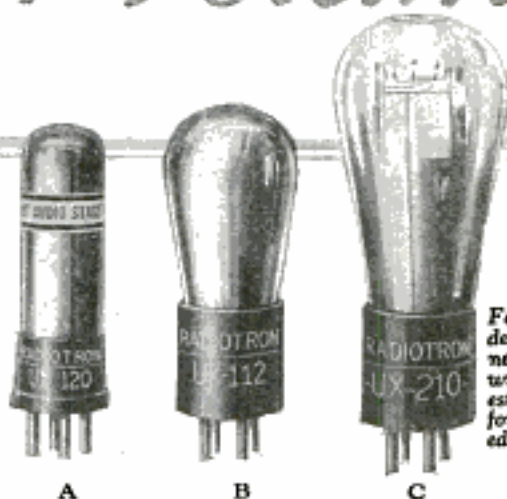
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announces

three new power tubes *for greater volume*

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*They provide unfailing, uniform
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U. S.
Patent
May 27,
1924

Balkite

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This popular battery charger is entirely noiseless. It can be used while the radio set is in operation. Charging rate 2.5 amperes. Operates from 110-120 AC 60 cycle current. Special model for 50 cycles. Also for 25-40 cycles with 1.5 ampere charging rate.

Price \$19.50

West of Rockies, \$20
In Canada, \$27.50



U. S.
Patent
May 27,
1924

Balkite

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Charges both 4 and 6 volt radio "A" batteries. Will furnish more current than is used for 6 dry cell or 2 storage battery tubes, if used only while the set is in operation. If allowed to "trickle" charge continuously will also furnish enough current for as many as 8 dry cell or storage battery tubes. Size 5 1/2 in. long, 2 1/2 in. wide, 5 in. high. Operates from 110-120 AC 60 cycle current. Special model for 50 cycles. Price \$10

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Noiseless—No bulbs—Permanent

All Balkite Radio Power Units are entirely noiseless in operation. They have no moving parts, no bulbs, and nothing to adjust, break or get out of order. Each is a permanent piece of equipment with nothing to wear out or replace. They require no other attention than the infrequent addition of water. They require no changes or additions to your set.

Manufactured by

FANSTEEL PRODUCTS COMPANY, Inc.
North Chicago, Illinois

FANSTEEL
Balkite
Radio Power Units



U. S.
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In Canada, \$49.50



U. S.
Patent
May 27,
1924

Balkite "B" II

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In Canada, \$75

The Gould Unipower is equipped with a special Balkite Radio Power Unit

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Power Series 854*

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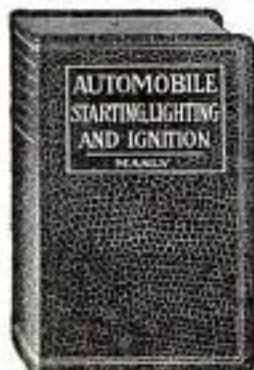
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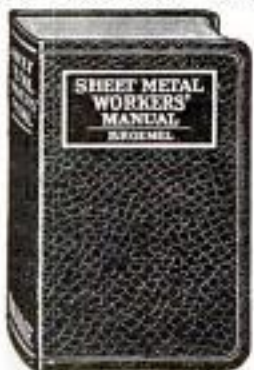
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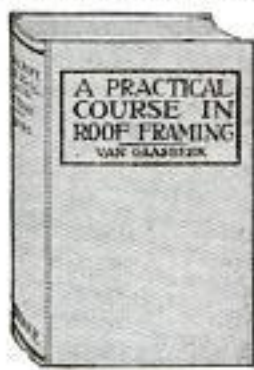
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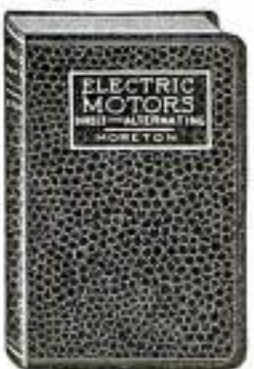
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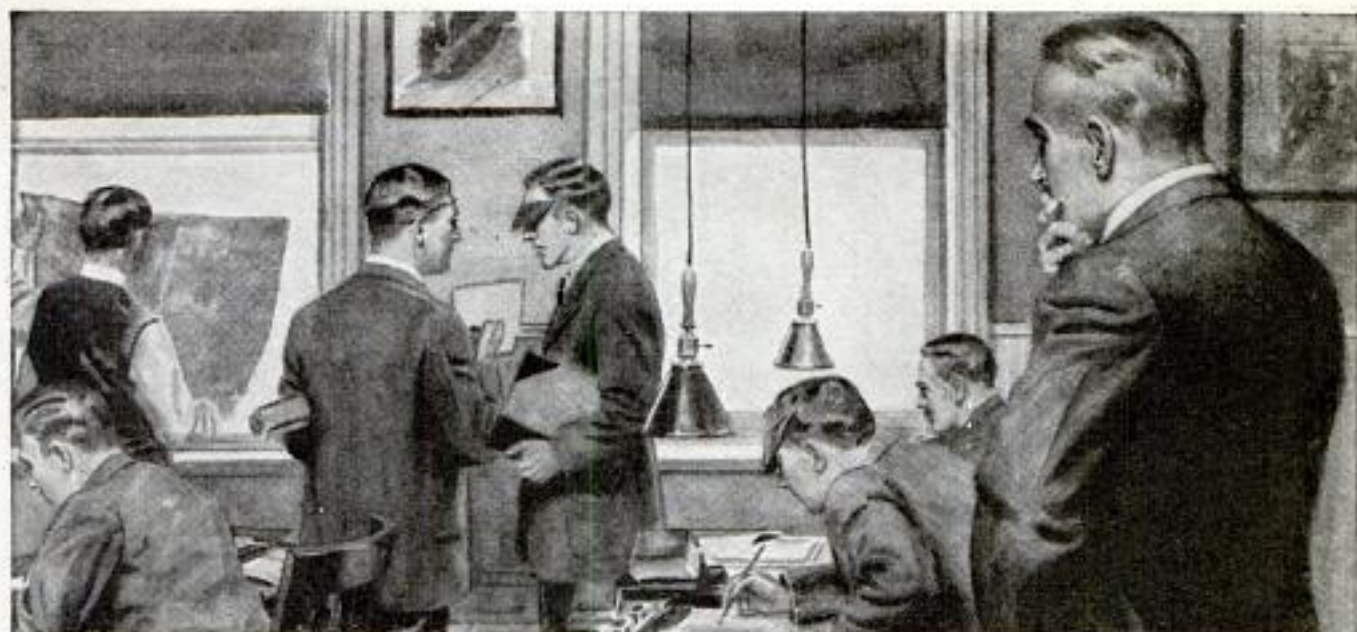
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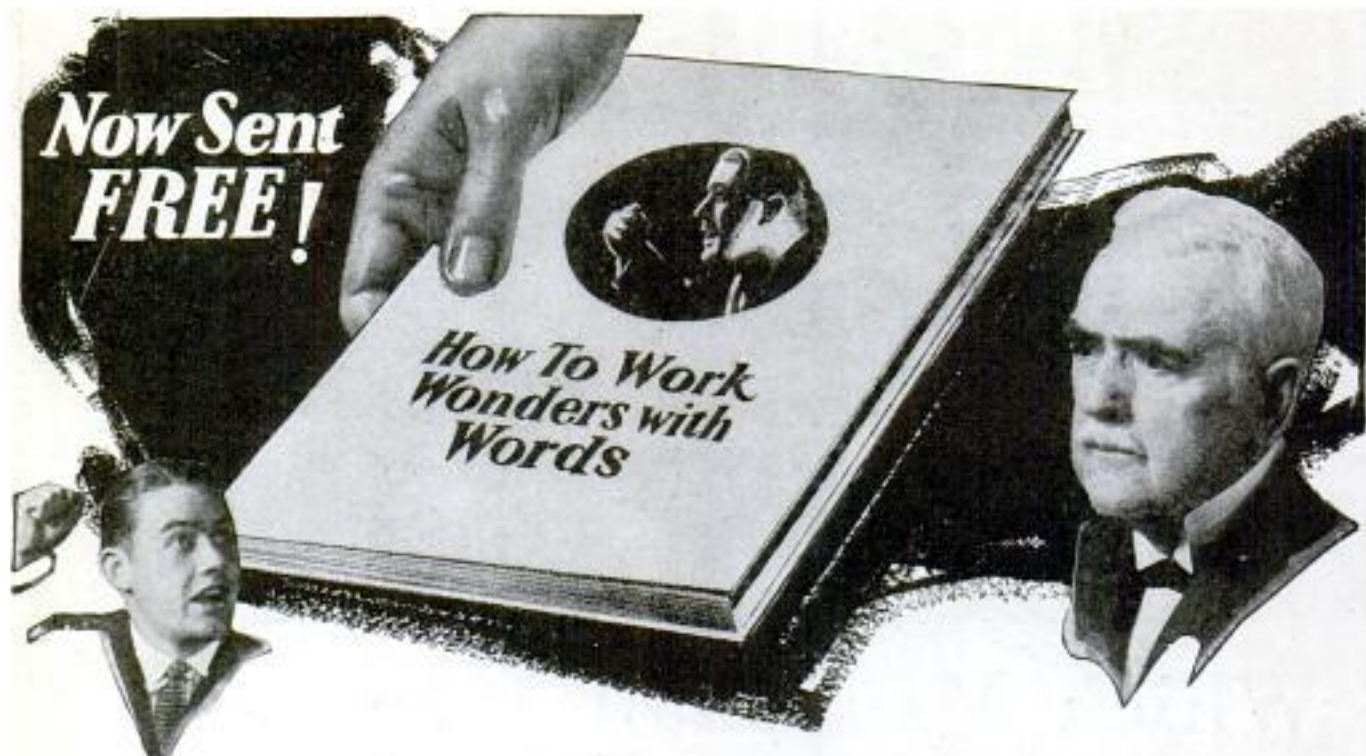
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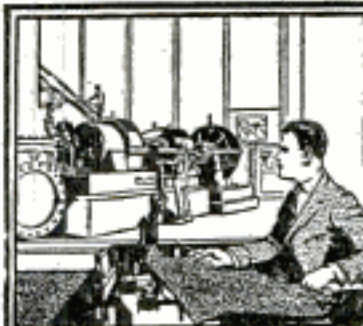
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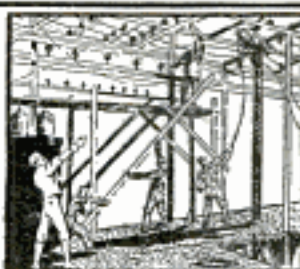
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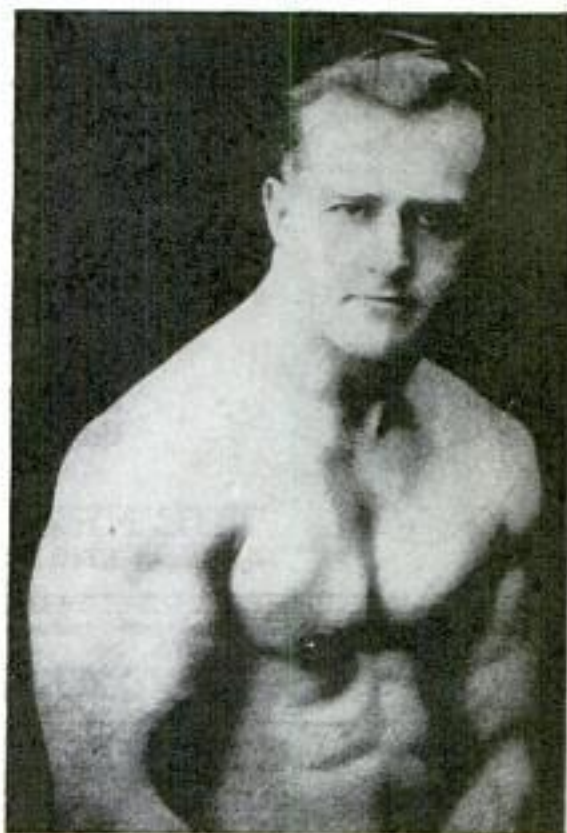
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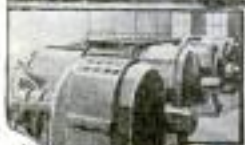
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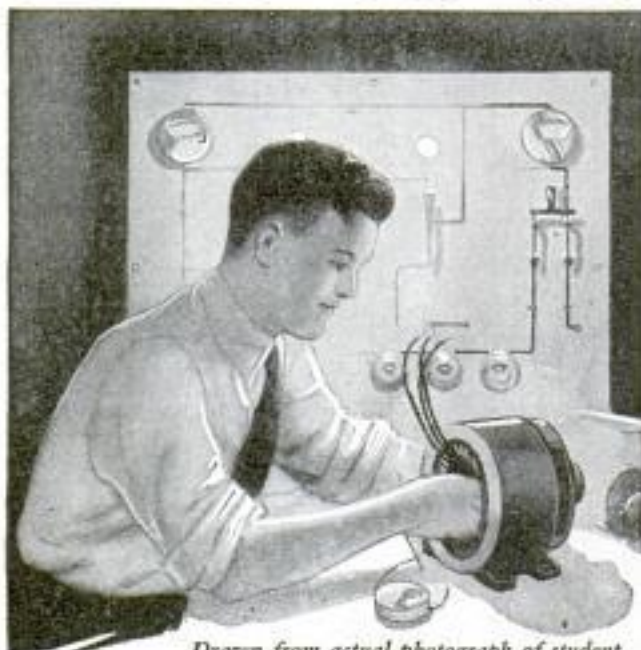
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By Albert Mead

I USED to think a fellow was crazy to try a stunt like this. It seemed positively ridiculous to think that anyone could become popular by learning to dance. And what's more, I couldn't believe that learning to dance by mail was possible—especially in a case like mine where I didn't know one step from another!

So every time I saw an advertisement like this, I just laughed. And I took great delight in poking fun at some of my friends who were taking this new course.

But it wasn't long before I saw that the joke was on me. Slowly my friends seemed to be drifting away from me. They were always "going to a party"—always having "barrels of fun." I was left out of the fun. Even the girls with whom I used to be so chummy, began to pass me by.

Well, I'm only human after all. So, the next time I saw an ad of Arthur Murray's, the famous dancing authority, in a magazine I gave it a chance. I read it through and when I saw that I didn't have to buy anything—that I could learn all about the short-cut to popularity from a Free 32-page book, I mailed the coupon.

And that started it. The illustrated free book that came by return mail was so convincing and the free test lesson was so simple that I felt sorry to have hesitated all these months. I eagerly sent for Mr. Murray's complete course.

A Great Surprise

And I received the greatest surprise of my life the day the lessons arrived. I opened the first page—and right then and there—before I was really aware of what I was doing—I was actually doing one of the steps. In a few minutes I had mastered that step. It was real fun to follow the simple diagrams and instructions.

The following few evenings I was mastering the Waltz, the Fox Trot, and other delightful new steps. It seemed so easy—so perfectly natural. And the remarkable thing about it is that I needed no music or partner. It seemed as if Mr. Murray himself were standing by my side gently directing, gently pointing out the right way or the wrong way to dance. And before I realized it, I was practically through with the course. I could hardly wait for a chance to dance at a real "affair."

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When the music stopped we found ourselves in the midst of a group of smiling, friendly, admiring faces. It was a complete triumph. And to think that just a few weeks before I couldn't dance a step!

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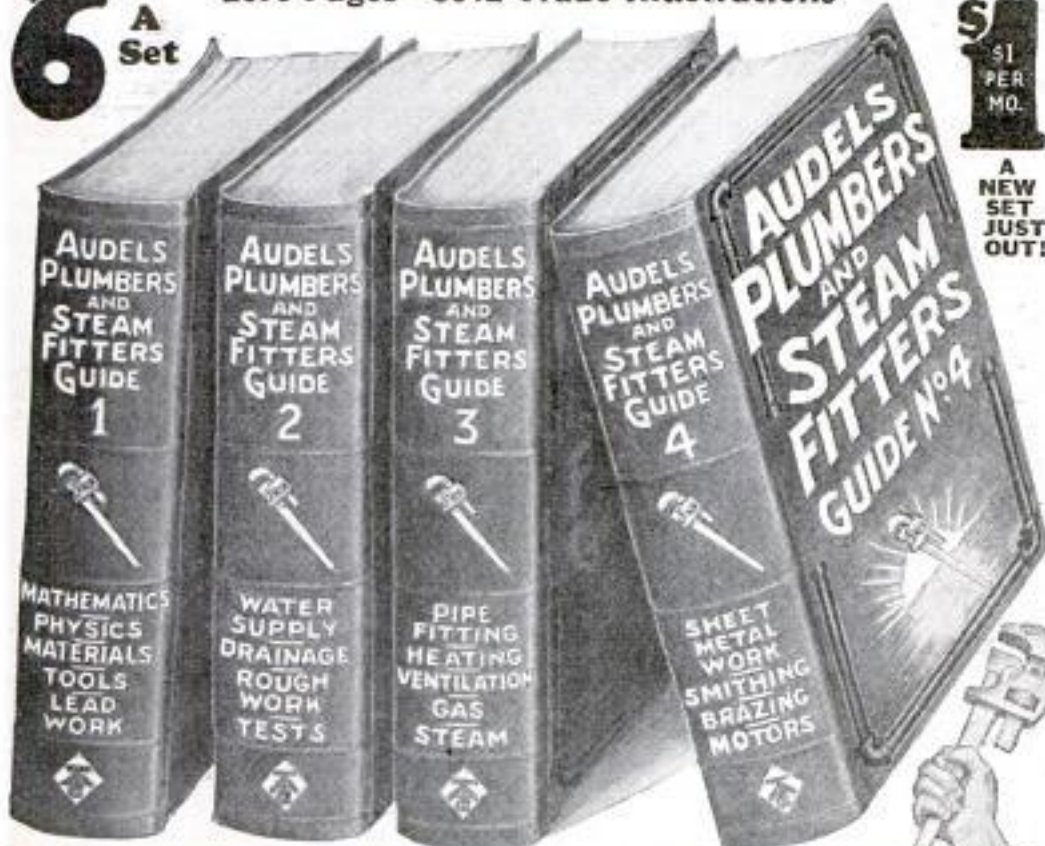
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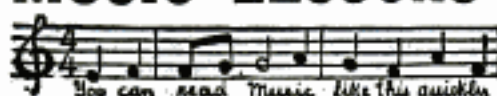
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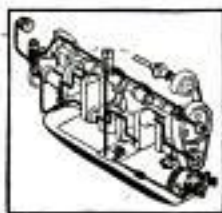
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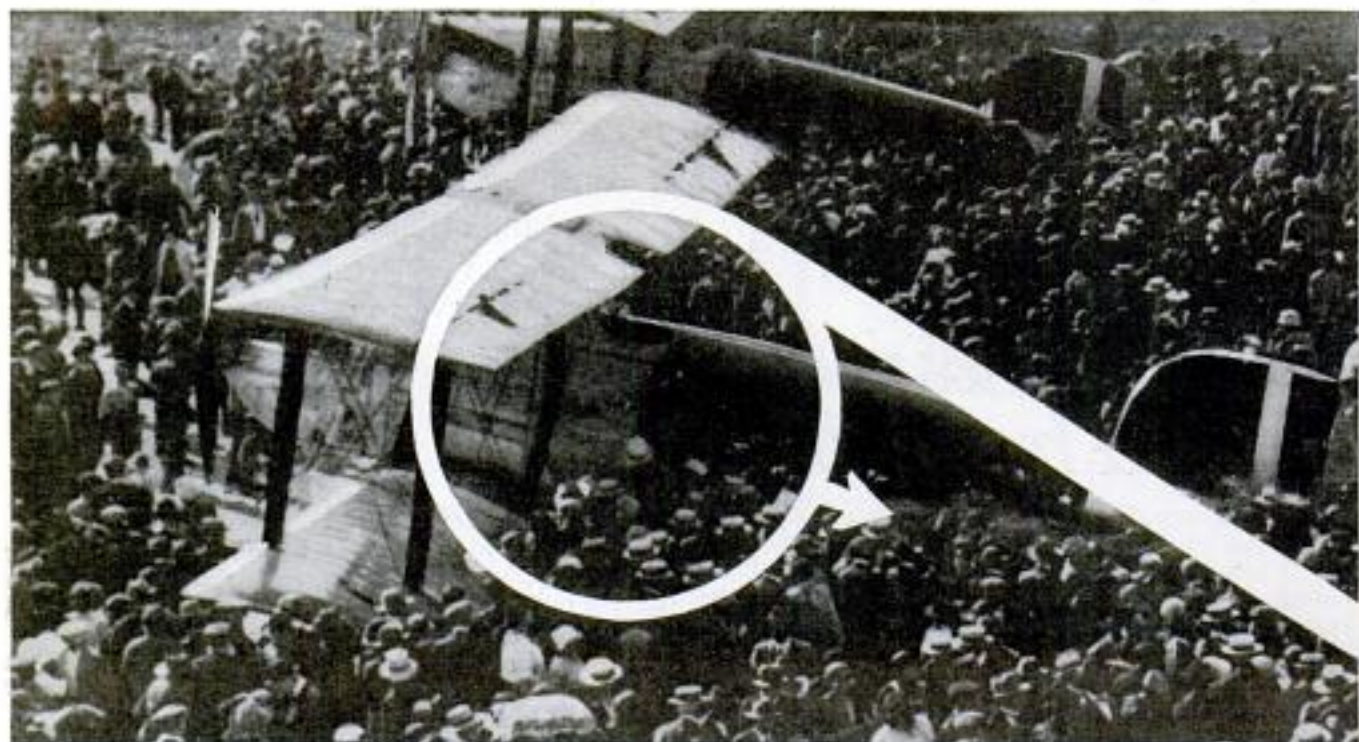
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Now—you can quickly train for one of these exciting, highly paid jobs through a new, sure, easy method of basic training. The study of Aviation is almost as fascinating as the actual work itself. That's what makes it so easy to learn. Every Lesson sent you is packed full of vital interest. You get so absorbed that you actually forget you are studying—it doesn't seem like work at all—and once you start, you simply can't get enough of it. You'll hardly be able to wait until you, too, can begin playing your part in America's great conquest of the air.

Students Learn Quickly From Experienced Men

Only an hour of spare time a day will give you the basic training in a surprisingly short time. One student, S. F. McNaughton, Chicago, says: "Your lessons are like a romance, and what is more, after one reading, the student gets a thorough under-

standing. One never tires of reading them." James Powers, of Pennsylvania, writes: "I am indeed surprised that such a valuable course can be had from such practical men at so little cost."

That's the secret of the success of the American-trained student. They learn from practical skilled men who know the flying game from A to Z. These experts guide you carefully through your training, step by step. They select your lessons, blue prints, bulletins, etc. They give you all the inside facts and details that are essential to your success. Every lesson is clearly explained and easy to understand—and they are always glad to answer special questions and help you in every way possible.

Send for Big FREE Book on Aviation

Send the coupon below for new, free book just out "Opportunities in the Airplane Industry." It is vitally interesting, reads like a romance and will tell you things about this amazing profession that you never even dreamed of. This book is so gripping, so brimful of astonishing facts that it could easily sell for a dollar. We are offering a limited number free. Get yours before the edition is exhausted. Write today.



AMERICAN SCHOOL OF AVIATION Dept. 1358, 3601 Michigan Ave., Chicago, Ill.



Aeroplane Inspector
\$75 a Week

Aeronautical
Engineer
\$300 a Week

Aeronautical
Instructor
\$150 a Week

Aeroplane
Builders
\$200 a Week

Qualify for one of these big pay jobs—the Aviation Industry will be waiting for trained men to fill them.

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\$60 to \$150 per week
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Unlimited Profits
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\$60 to \$75 per week
Aeroplane Mechanician
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Aeroplane Inspector
\$50 to \$75 per week
Aeroplane Assembly
\$40 to \$65 per week
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\$75 to \$200 per week

These are just a few of the amazing opportunities that aviation will offer to young men of daring and foresight.

MAIL THIS TODAY

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Without any obligation, please send me Free book "Opportunities in the Airplane Industry," also information about your Course in Practical Aviation.

Name

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

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YOU know how the aviator looks over his machine before taking off. You have seen the automobile racers tuning up before the get-away. At every railroad station you have observed the engineer and fireman oiling up the locomotive, and examining the bearings. In the power house and in the shops constant inspection and supervision is given dynamos and everything that runs and wears or is likely to get out of order.

How About the Human Machine —How About YOU?



STRONGFORT
The Perfect Man

What attention have you paid to your body? Have you seen to it that every part, every organ, every muscle was kept fit and strong, ready to function, either in performance or in warding off illness and the inroads of disease? Or have you, through ignorance or laziness or sheer neglect, permitted it to become rusty, faulty, weak, rheumatic, catarrhal, tubercular, debilitated, despised—a wreck ready for the junk heap—a reject such as no one respects nor admires?

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Don't stand by and see your body go on down to destruction and perdition. Stop right where you are and get your bearings. Let's get together—you and I—and see what we can save—see if we can't put you on your feet again and make a 100 per cent man out of you.—I'll make you a human dynamo. I've done it with almost countless thousands—I can do it with you. Let's look facts right in the face. You tell me your story—then I'll tell you how I can and will help you.

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It's a startling revelation of undisputable facts about the human body that will open your eyes to new visions of life and happiness and success. It will show you how to eliminate from your system, in a very short time, the distressing disorders which have made you feel yourself a misfit in the scheme of humanity; how to build up your body, strengthen ALL your vital organs, and feel the thrill of new life coursing through your veins. It will teach you how to become FIT physically and mentally; fit for business, for society, for the home, a power among men, a pleasing personality to women. What I have done for others I can do for YOU. I GUARANTEE IT.

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Please send me absolutely free enlightenment on the Promotion and Conservation of Health, Strength and Mental Energy. I enclose a ten cent piece (1 dime) to help cover postage and have marked (x) before the subjects in which I am most interested.

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| Colds | Increased | Weak Eyes |
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| Headache | Short Wind | Lung Troubles |
| Thinness | Constipation | Muscular Development |
| Rupture | Indigestion | Great Strength |
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| Flat Chest | Rheumatism | |

Name

Age..... Occupation

Street

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

STOP USING A TRUSS

Do Away With Steel And Rubber Bands

FREE TRIAL



Inner surface is made adhesive to secure the FLAPAO-PAD firmly to the body, keeping the FLAPAO continually applied and the pad from slipping. No straps, buckles or springs attached. Soft as velvet—easy to apply.

It's the Non-Slipping, yet Non-Rigid Pad and What is Within It That Counts

FREE to 5,000 Truss Sufferers

To the extent of 5,000 sufferers who may apply I will send, ABSOLUTELY FREE, a sufficient quantity of the Flapao to positively convince them that this is the only logical, commonsense way of treating rupture. Flapao is a highly astringent medication placed within the Flapao-Pad and being absorbed through the skin, creates a wonderful feeling of relief and at the same time tends to strengthen the weakened muscles and thus permanently close the rupture opening. The process of recovery is natural, so you'll have no use for a truss—you can throw it away forever! Old and young have testified under oath that the Flapao-Pads cured their rupture—many of them long-standing, aggravated cases—without delay from work. Patent allowed in U. S. and foreign countries. Awarded Gold Medal at Rome and Grand Prix at Paris.

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Can Be Restored in as short a time as 10 days. To prove that you can be rid of thinness, that tired feeling, sleepless nights, nervousness, and regain normal weight, health and vitality I send you Hilton's Vitamines absolutely free and post-paid to anyone who will write me. No cost. No obligation. If it cures you, makes you strong and gain weight, I will appreciate your telling others. That's all I ask. Simply send me your name and prove that you can feel and look 10 years younger. W. W. HILTON, 748 Gateway Station, Kansas City, Mo.

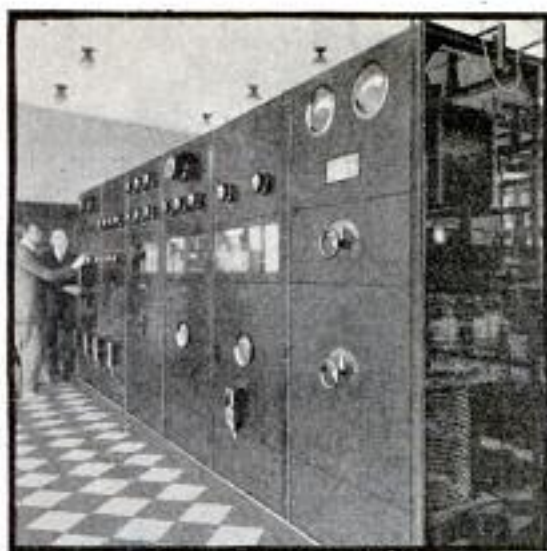
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What I accomplished on my own head, pictured above, I believe I can do for you, provided you are under 45 years of age and loss of hair was not caused by burns or scars. Anyhow, I must succeed or you pay nothing. No apparatus—my home treatment is simple, quick and inexpensive. SEND NO MONEY, just your name and address and I will mail you full information with PHOTOGRAPHS, NAMES and ADDRESSES of men and women who have successfully used my treatment for dandruff, falling hair and particularly for baldness. Write Now. A postal will do. VREELANDS, 1931 E. 40th St., Cleveland, O.



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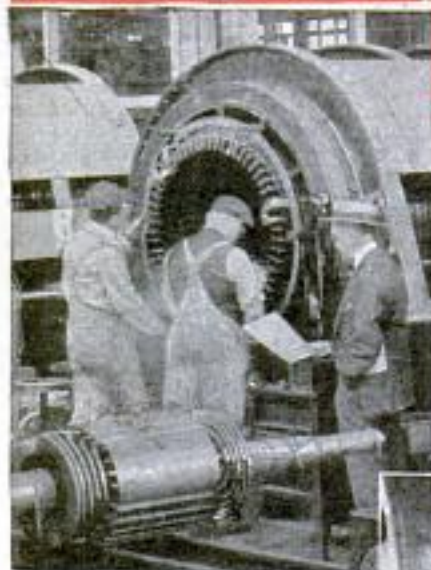
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ORIGINATORS OF RADIO HOME-STUDY TRAINING

Established 1914

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**Knew Nothing About
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\$75 to \$150 a Week**

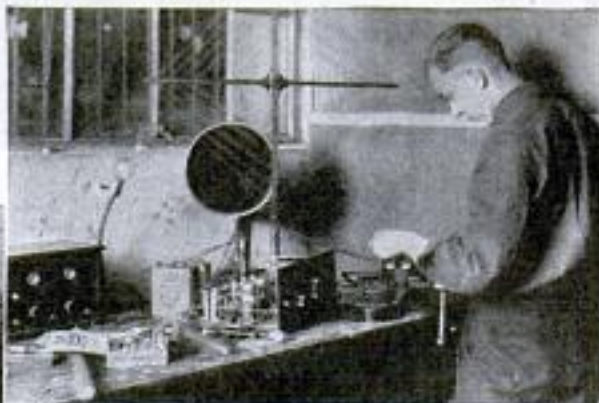
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\$90 a Week in Radio

"I am now busy in Radio, and have averaged \$90 a week clear since last February, when I started my own store. My success is due entirely to your training. I wouldn't take \$100,000 for it."
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— and Just Started**

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Thousands of Cooke Trained Men Earn \$3500 to \$10,000 a year

Be a "Cooke" Trained Man Yourself!

You want to make big money! You want to earn more than a mere \$20 or \$30 a week! Of course you do. Then get into Electricity, the field of big pay and bigger opportunities. I'll train you at home—in your spare time. You work just as you are working now—at your same old job. But you learn Electricity every day,

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simple, unfor-
gettable way
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And—

5 BIG OUTFITS to work with

NOT TOYS, BUT
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NOT A PENNY
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Every "Cooke" student will tell you he doesn't see how I can possibly afford to give so many wonderful and big outfits.

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That's the way I teach Electricity—so that you can make extra money as you go along. That's why my Course is Practical. That's why my students are successful. That's why the "Cooke trained man is the Big-Pay Man," everywhere, and always. \$40 a week is just an ordinary salary in Electricity. \$70 to \$200 a week is what thousands of Cooke Trained Men are earning.

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That's my Guarantee. And you're to be the judge and jury, all in one. If you're not satisfied you get your money back—every cent of it. And back of me in this Guarantee stands the Chicago Engineering Works, a \$2,000,000 Illinois Corporation.

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Don't confuse other Courses with mine. Don't be satisfied with anything but "Cooke" Training, the course with 10,000 boosters. There is nothing like it anywhere. It stands by itself—alone in this field. This is the Training that Electrical men are praising—the Training that Electrical concerns recommend to their employees, that the American Association of Engineers has endorsed 100% after a thorough investigation.

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Don't wait a minute! Find out today why "The Cooke Trained Man is the Big-Pay Man" everywhere! Find out how Cooke Training will help you boost your pay! Mail the Coupon for my big book of proof, pictures and Pay-Raising FACTS. Do it NOW!

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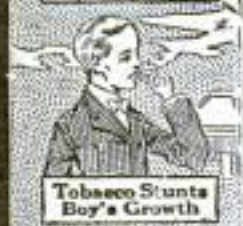
Swear Off Tobacco



Tobacco Tells on Nervous System



Tobacco Ruins Digestion



Tobacco Stunts Boy's Growth



Tobacco Robs Man of Vitality



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.

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it. Whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—Tobacco Redeemer will positively remove all craving for tobacco in any form in a few days. Your tobacco craving will usually begin to decrease after the very first dose—there's no long waiting for results.

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.

Results Absolutely Guaranteed

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.

Let Us Send You Convincing Proof

If you are a slave of the tobacco habit and want to find a sure, quick way of quitting "for keeps" you owe it to yourself and to your family to mail the coupon below or send your name and address on a postal and receive our free booklet on the deadly effect of tobacco on the human system, and positive proof that Tobacco Redeemer will quickly free you from the habit.

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A FASCINATING BOOK of Detective stories that shows how ordinary boys and men have won nationwide fame, thousands of dollars in rewards, and important official positions by solving finger print mysteries!

“... Shortly before midnight a young couple slipped away from the dance. They sought out a long, low, rakish roadster. With powerful headlights picking out the path, it moved cautiously through the parking space and out onto the high road.

“Early next morning—a farm boy found the girl’s dead body crumpled in the wayside ditch. Concealed in the bushes at the side of the road lay the boy’s lifeless body, also shot from behind.”

Who had committed the murder?

Read the rest of the story on page 15 of our new Finger Print book. Find out how the murderers were traced, tried and convicted, and how a certain finger print expert solved five murder mysteries and secured 97 convictions in less than a year.

Find out how you can become a Finger Print Expert.

Thirteen Thrilling Stories of Mystery and Achievement

Thirteen stories of crime, daring robberies, mysterious murders, thrilling escapes. You’ll enjoy “Snowflakes,” a great dope story—“The Invisible Finger Print,” a blackmail mystery.

In “Foiled,” a true account of a great political coup, you’ll read of the astounding rise of a young country photographer who saved the Mayor of his city and was later appointed to the most important identification position in the state.

You’ll read of men who achieved fame, big rewards and important positions in a short time through the study of finger prints.

Any man who can read and write can become a finger print expert.



PARTIAL LIST

Graduates U. of A. S.
Recently appointed
Finger Print Experts
of these
States, Cities and
Institutions.

State of Iowa
State of Idaho
State of Colorado
St. Paul, Minn.
Columbus, Ohio
Detroit, Mich.
Pittsburgh, Pa.
Great Falls, Mont.
Idaho Falls, Idaho
East Lansing, Mich.
Schenectady, N. Y.
Lorain County, Ohio
El Paso, Texas
Galveston, Texas
Houston, Texas
Lincoln, Nebr.
Everett, Wash.
Ogden, Utah
Butte, Mont.
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Albany County Feniten-
Albany, N. Y. [diary
Wilkes Barre, Pa.
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Finger Print Experts Needed!

More and more the detection of crime resolves itself into a problem of identification. Trained men are needed every month to fill the new positions that are created. Records show that University of Applied Science graduates get first choice at the big positions. Listed below are some of the city and state bureaus to which U. of A. S. men have been appointed.

You can learn finger print identification in a few months in your spare time—at home.

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This book cannot be bought at any newsstand or bookstore—but it will be sent to you FREE if you write to us at once. Thirty-two pages, illustrated in color with weird crime pictures. This book explains your opportunities in the finger print world—shows how you can get your training in a few months—tells how you can get a professional finger print outfit free. Write for this book today.

University of Applied Science
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Please send me free your 32-page illustrated book “Finger Prints.” I understand that there is absolutely no obligation. Also tell me how I can become a finger print expert by studying a few months in spare time—and how I can get a professional finger print outfit free.

Name.....

Address.....

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

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Be an Automobile Mechanic!

There's big money in this field—Get in on it now while you have the chance. Trained auto men are wanted!

The demand for trained men in the automobile field is far greater than the supply.

More than 15,000,000 automobiles are in use in this country now, and every week the figures grow larger.

There are not enough trained automobile service and repair men to keep up with this steady growth.

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These four practical books, written by five well known teachers of automobile practice will teach you right in your own home, during your leisure time, just what you need to know about automobile troubles and repair. They will teach you automobile construction, maintenance and repair as experts know them and will help you to earn an expert's pay.

Step up to a Big-Pay Auto Job

Hundreds of question-answering diagrams—hundreds of clearly-marked illustrations—make the books plain and readily understandable to any man with the mechanical instinct. All the explanations and descriptions are clear, simple, direct. Every chapter is packed with definite, step-by-step, how-to-do-it information.

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These books were written specially for self-instruction by men who have trained thousands of automobile operators and garage men. Examine the library for 10 days free. Just fill in and mail the attached coupon.

If you find the books what we say they are, send us \$1.50 in 10 days and \$2 monthly for only six months. If you do not want the books, send them back at our expense. It costs you only a postage stamp to take a look at the books. Act now!

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Address

City and State

Position

Employer P. M. 11-1-25

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Step out of the ranks—be a modern factory foreman. Today, the foreman who **knows** his job commands high wages and is in direct line for promotion to the big executive jobs. Samuel Vauclair, president of the Baldwin Locomotive Works and hundreds of other great industrial leaders climbed from foremanship right up to the top of the ladder.

The big leather lugged foreman is **gone**—replaced by the foreman who **knows** how to get greater efficiency from men and machines, who **knows** the **drum** and one thing that employers pay well for.

Train yourself at home for a foreman's job. Just a few minutes' study each evening is required. Robert Grimshaw, M. E., has prepared a book "The Modern Foreman." It is really a **complete course** in foremanship for it teaches in a practical way, everything you must know to become a highly paid foreman. The book is so successful in training men, that such concerns as Collier-Brammer Co., American Sheet and Tin Plate Co., Sisson Machine Co., Westinghouse Electric Co., have bought this book for their foremen and factory workers.

Just send us your name and we'll send you "The Modern Foreman." Keep it 5 days. If at the end of that time you do not think it will teach you to become a highly paid foreman with unlimited opportunities for advancement, return the book at our expense. Other- wise remit \$2.50. You can't lose. Send your name today.

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A FILE

NOT A FILE

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Make Your Mind an index from which you select facts, figures, names, faces. Develop concentration, self-control; overcome bashfulness, forgetfulness.

Write today for **FREE** memory and concentration test and illustrated booklet, "How to Remember."

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MEN ARE WANTED to enter this fascinating profession. Splendid opportunities; travel or remain near home. Pleasant, outdoor work; meet big railway officials.

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Expenses paid, after 3 months' spare-time study at home. Any average man can qualify.

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For over seven years we have secured a position for practically every graduate, paying at least \$110 per month and expenses. Those few not securing positions had their money refunded. You can succeed—advance rapidly! Send coupon at once for full details. Positions waiting for graduates!

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Send me, entirely free, Booklet No. D-63, giving full particulars about course in Railway Traffic Inspection.



Name

Street

City



Fourteen Years a Conductor— Then Salesmanship and \$700 a Month

Do you know the quickest way to make dreams come true?—It's the salesmanship way.

For out in the *selling* field, if a man makes good, "raises" come to him automatically—and many times a year. There was C. A. Thomas, for example.

Thomas, a California man, had been a conductor on a railroad for fourteen years. "One day," said Mr. Thomas, telling of his experience, "I came in on my passenger run and never went out again. Instead, I undertook to sell real estate. The first month I did not make a sale. I saw that I needed something to help me, and I believed I would find it in LaSalle's training in Modern Salesmanship. You can judge for yourself the aid it gave me when I tell you that the next month I cleared \$700, and last month I averaged better than \$67 a day throughout the month. . . ."

J. J. Graney writes of similar success. He was a mail carrier when he enrolled with LaSalle.

"I have not worked nearly so hard since I have been selling," writes Graney, "but have increased my earning power about 400 per cent. During September I earned \$225, October \$500, November close to \$700, and I expect to make \$1,000 this month."

Were these men—and hundreds of others—merely "lucky"?

Men privileged to master Salesmanship thru the LaSalle Problem Method will tell you that their success was far from luck; it was the logical result of knowing the hows and whys of their profession.

Whether or not you have had experience in selling—that is not important. The point is that any man of average intelligence who will follow the LaSalle *salary-doubling plan* can quickly multiply his earnings. And this fact applies with doubled force to the man now in the field who is sincerely

striving to increase his volume, to really *sell* in dozens of places which he is now forced to leave without an order.

The complete story of the LaSalle *salary-doubling plan*, which thousands of men have followed with such gratifying results, is outlined in a fascinating book entitled "Modern Salesmanship." This book tells clearly the opportunities in the selling field—points the way to a quick mastery of the very methods whereby the big producers top the list year after year, earn big five-figure salaries. The information contained in this book is of priceless value to the man seriously ambitious to make a real success in the selling field. And—the coupon brings it to you, *free*. If your future is worth a two-cent stamp and two minutes of your time—place the coupon in the mail TODAY.

— — — — CLIP AND MAIL — — — —
LASALLE EXTENSION UNIVERSITY

The World's Largest Business Training Institution
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I should be glad to receive an outline of your *salary-doubling plan*, together with a copy of "Salesmanship in a Nutshell," also copy of "Ten Years' Promotion in One," all without obligation.

**Modern Salesmanship—
Salesmanship in a Nutshell**

Other LaSalle Opportunities

The LaSalle plan opens the way to success in every important field of business. Check below the opportunity that appeals to you.

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| <input type="checkbox"/> Business Management | <input type="checkbox"/> Banking and Finance |
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| <input type="checkbox"/> Law—Degree of LL. B. | <input type="checkbox"/> Business English |
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| <input type="checkbox"/> Efficiency | <input type="checkbox"/> C. P. A. Coaching |
| <input type="checkbox"/> Modern Business Correspondence and Practice | |

Name.....

Present Position.....

Address.....

\$86⁷⁵ A Week or More

Be A — Detroit Trained Man!

\$86.75 is just an average weekly profit for Earl Hatfield (Dayton, Ohio) in his garage. He writes us that it is a poor week when he doesn't make **more** than that. At 19 years of age, a farmer boy, he came to Detroit, the Auto Center, and learned the auto business at this great School.

Now he has a fine business near his home, is independent, making good money. He is just one of many who have done the same. These successful "Michigan State" trained men are just plain fellows, no brighter nor better educated than you. Practical training at the factory-endorsed school started them to success.

Make Big Money Too—Learn Autos in Detroit

The Auto business offers unlimited opportunities. Autos are increasing faster than repair shops or mechanics can keep up with them. Think of the repair work on 18,000,000 cars. There are not nearly enough trained men to do this work. You too, can be a skilled mechanic and auto electrician and **EARN BIG MONEY**. Experience isn't necessary. If you are mechanically inclined come to Detroit now, to this great auto trade School, known and endorsed throughout the world. Become a trained man and go back to your home town. Work as a mechanic, or start a garage of your own. Farm managers also can increase their profits greatly by knowing auto mechanics.



Come to Detroit, the heart of this great business. Here you have wonderful advantages. Learn on up-to-date, new equipment. All types of cars, engines, axles, transmissions, electrical systems. New Packard Straight Eight with four wheel brakes, Packard Twin Six, new Buick with four wheel brakes, Oakland (four wheel brakes), Cadillac Eight, Hupmobile, Reo, Oldsmobile, G. M. C. Truck, Hudson, Overland, and many others.

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| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Common School Subjects |
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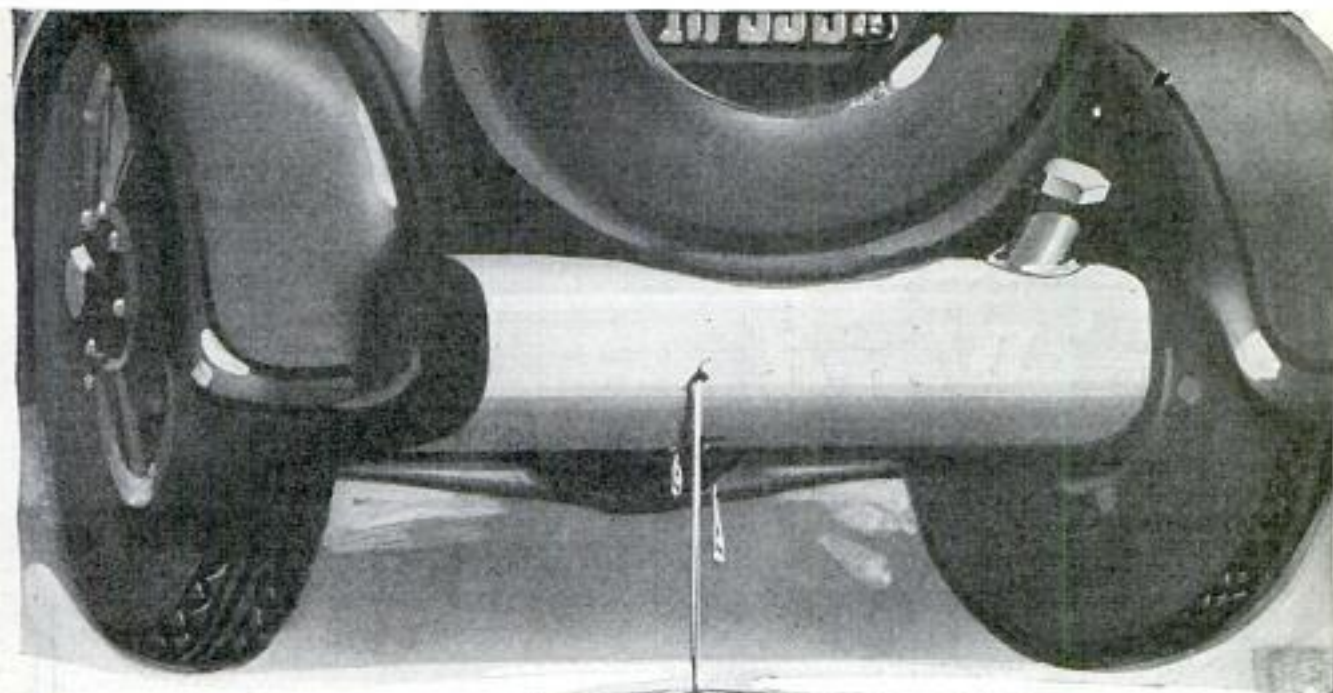
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You're Losing Half Your Gasoline!

FOR every ten gallons you buy you are losing five! That's a startling statement, but true.

You are getting just half the power, half the mileage you should get out of your gasoline! For now an amazing new invention—a ridiculously simple little device—makes practically any car give twice its regular mileage!

57 Miles on a Gallon

With this wonderful new invention auto drivers in all parts of the country have chalked up records of from 37 to 57 miles on a gallon of gasoline. Every day we hear of some new record—some difficult feat such as pulling a car through deep sand, or up a mountain, on half the usual gas.

Here's how this amazing new invention works. Your carburetor is adjusted to make starting easy—it gives a rich mixture to start a cold engine. But once your engine gets heated up, the mixture is far too rich, resulting in faulty explosion. Half the gasoline is drawn into the cylinders in a raw state and, instead of exploding, it burns. This causes a heavy deposit of carbon.

But with this startling little device in your car all this is changed. As soon as the engine warms up, this device automatically begins to admit a much larger volume of air, thoroughly vaporizing all the gasoline, giving it fully 50% more power—breaking it up so that it explodes instead of burning!

A Carbon Remover

Not only does this invention save you half your gasoline, but it also removes carbon, saving you

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The Stransky Vaporizer is absolutely automatic and self-regulating. It has no springs, shutters, diaphragms or delicate parts to get out of order. It requires no adjustment—you can attach it in three minutes. And it will lengthen the life of any car.

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\$9,000 a Year Auto Electricity pays W. E. Penos, Albany, Ore., over \$3,000 a year. 53 men enrolled for this training on his advice.

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Employment Service—No Extra Charge I will train you for a big-pay job and then help you get it without extra charge. Hundreds of employers look to me for the electrical men they hire. Last year I placed over one thousand men at big raises in pay. Hundreds of others were promoted by their employers through the help of my Vocational Service and other hundreds went into business for themselves with the help of my Special Business Training. Mail coupon for big free book which contains this service and 14 other features, many of which can't be had anywhere else.

have to be even a high school graduate. As Chief Engineer of this big 2 million dollar institution operating one of world's greatest Training Schools, I know just what training you need to make a success in electricity. Let me give you that training with my simplified complete home course—the world famous "Cooke Training"—built on my own 20 years of engineering experience with the help of nearly 50 other engineers. Learn to earn \$70 to \$200 a week; only spare time needed.

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PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instructions or write for Free book, "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, 5897 Security Bank Building (directly across street from Patent Office) Washington D. C. See pages 140 and 141.

AUTOMOBILES: 753 Ideas on repairing and improving, in Popular Mechanics three new books: Auto Repairman's Handbook, Auto Owner's Handbook, Auto Tourist's Handbook. Send No Money. Just write a postal. Pay postman the postage and \$1.50. Popular Mechanics Press, Room 811, 200 E. Ontario St., Chicago, Ill.

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DYKE'S Automobile and Gasoline Engine Encyclopedia. Latest edition contains information on repairing and adjusting every part of all motor cars now in use. Tells how to find out what is wrong and how to fix it. Mechanics everywhere depend upon this compendium to keep them up-to-date. Send No Money. Just write a post card. Pay postman the postage and \$8. Popular Mechanics Press, Room 811, 200 E. Ontario St., Chicago, Ill.

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1/2-1-1/2 KW, 110-volt Electric current from your Ford. Equipment easily attached. Write, Duplex Manfg. Co., Myerstown, Pa.

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FORMULAS The best Chemical Science can devise—Guaranteed Reliable Processes in all lines. Stamp brings big bunch valuable literature, interesting lists. Don't buy till you see what I can give you. 27 years supplying the best. Miller, Chemist, 1133 Grand Central, Tampa, Fla.

500 FORMULAS—, including Luminous Paint—Renewing Dry Batteries—Mechanics' Soap—Gas Tonic—25c. Catalog Free. Ideal Book Shop, 2511-PM, Foster Ave., Chicago.

BEVERAGES, Syrups, Extracts, Flavors, Etc. Other good manufacturing specialties. Free information. The Formula Co., 1613 Queen Anne Ave., Seattle, Wash.

BESTALL Chemical Wood Stone—For public building, kitchen and bath room flooring. Can be molded into dolls, souvenirs and novelties. Circular Free. Maxlin Chemical Co., Maxlin Building, New Castle, Ind.

1,000 SHAVES from one razor blade. Secret 25c. Barber, Box 1278, San Francisco.

FORMULAS—Reliable for manufacturing newest, long profit specialties. Baxter, 2657A Trace, Kansas City, Mo.

SAWDUST and Chemicals make Sanitary flooring. Profitable business. Directions \$1.00. Universal Supply Co., Auburn, N. Y.

10,000 FORMULAS. A real Gold Mine of money-making ideas. Tells how to make almost everything under the sun. You can make and sell cosmetics, muckilage, anti-freeze solutions, battery solutions, beverages, cheese, chewing gum, cleaning preparations, extracts, hair preparations, inks, blueing, leather polish, mirrors, perfumes, polishes, typewriter ribbons, carbon paper, washing powders, liquid soap, and hundreds of other profitable articles. Send No Money, just write a postal for "Hendley's 20th Century Book of Formulas." Pay postman postage and \$4. Popular Mechanics Press, 200 E. Ontario St., Room 811, Chicago, Ill.

MAGIC Cloth—One Rub keeps Snow or rain blurred windshield clear 24 hours. Big seller. Easily made. Guaranteed Trade-secret, 50c. Deluxe Chemical Service, Drawer "D," Park Ridge, Ill.

1,000,000 FORMULAS, 1,016 pages, \$1.98. 500 Formulas Free if you order quick. Ideal Book Shop, 2511-PM, Foster 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 as we send you our handsome \$15.00 Sample Case on Trust and 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 as we guarantee your sales, and we will not let you fail. 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, 2309 Archer Avenue, Dept. A, 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.

FREE—Get This Quick! Chicago's Wonder Shirt line. Sell newest, stylish, snappy, Stylenor Shirts. Amazing values at low prices. Make \$100.00 weekly easy. Complete assortment of large swatches makes selling Stylenor Shirts a cinch. Experience or capital unnecessary. Be your own boss. We will show you how to build a big business of your own. We will deliver and collect. Exclusive territory open. Write today, for big free outfit, Stylenor, 81 W. Van Buren, Chicago, Ill. Dept. 560.

SELL Women's Fashion Shoes. Castle-Blair representatives earn \$50 a week as side line—\$500 a month full time—\$3 an hour spare time. No sample shoes to lug around. No delivering or collecting. Most liberal commissions in cash in advance. Our 65 New York and Paris styles in pictures talk. "Automatic" sample outfit makes sales easy. Free! First to qualify from each locality awarded valuable territory right. Write at once. Castle-Blair, Inc., 318 S. Michigan Blvd., Dept. C-210, Chicago.

AGENTS, salesmen, Demonstrators, you will have the devil's own time trying to find a better seller than "Sippo." If there was such a thing we'd have it! Splendid profit on 50c "Go-Getter" repeat article that sells on ten-second demonstration. Works While You Watch It! Demonstrates value while others waste time making claims. New Discovery! Greatest scientific triumph of the age. It's the berries. Haven't room to tell our story here. Write immediately. Karam-Smith Co., 6011-P Street, Fort Wayne, Ind.

AGENTS—\$90 a Week Easy. This big pay and a great opportunity for ambitious men and women. Experience not needed. We have thousands of customers on our line to be supplied. 200 household necessities at rock bottom prices. We need representatives right here to take charge of territory and handle this business. Deal with regular customers—Make big money every day. Write quick for territory and Free Outfit Offer. Ho-Ro-Co Mfg. Co., 791 Ho-Ro-Co Bldg., St. Louis, Mo.

AGENTS Wanted—Something New—Fyr-Fyter sells easily. Makes a spectacular demonstration; car owners, homes, factories, stores, practically buy on sight. Our men make \$10 to \$50 a day. Exclusive territory to producers. If you wish to establish a business of your own with unlimited possibilities for making big money, write us today. Fyr-Fyter Co., 904 Fyr-Fyter Bldg., Dayton, Ohio.

MILLERITE: Here it is! You've read about this New Wonderful Ethyl-Super-Fuel ingredient for Gasoline—Increases Mileage—Saves Gas—Knocks Carbon—Easily Mixed from my simple Formula—profits great—\$5,000.00 to \$50,000.00 for you if you hurry! Don't pass this by you'll be sorry—but send today for full descriptive literature of this and other valuable Formula Lists describing latest, biggest, selling specialties in all lines as Mendit, Fabric Mending Cement, Marcel Permanent Hair Curling Fluid; Denta-perl Tooth Whitener; Balloons and other thin dipped rubber goods; Plynox—few drops kills roachful flies; Amazon Self Vulcanizing Repair; Pro-Tex-U only Guaranteed Fire Extinguisher; Pure Food Products; Toilet, Medical, Household, Automobile Office Specialties—latest in all lines. 27 years supplying the best in Formulas and manufacturing information. Highest References. Miller, Chemist, Tampa, Fla.

\$8.50 TO \$20.00 daily easy. Introducing New Insured Hosiery for men, women, children. 57 styles, 40 colors. Must wear or replaced free. Repeat orders sure. Nyland made \$375 in one month. Edwards, \$160.60. Mrs. Bone, \$445.25. Why not you? Even spare time work should pay you \$3 per hour. Your pay daily in advance. We deliver and collect. You spend all your time writing orders. No experience or capital needed. We furnish samples. All grades, colors, including silks. No matter what you are doing now, write for our offer. Maccabee Textile Co., Station 25611, Cincinnati, Ohio.

PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instructions or write for Free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, 5897 Security Bank Building (directly across street from Patent Office) Washington, D. C. See pages 140 and 141.

IT'S Easy to Sell a \$15 Dress for \$6.75. 75 Red-hot Paris and New York styles ready for Fall. Silk, Flannels, Kashas, Balloons. Prices \$6.75 to \$19.95. Carlton Agents are getting 30% repeat orders. Full time good for \$75 to \$250 a week. Part time earnings \$5 an hour. Biggest, fastest growing concern selling women's stylish dresses house-to-house. No deposit for sample line. Exclusive territory. Act quick for biggest money maker of the year. Carlton, Inc., Dept. 353-A, 337 S. Franklin St., Chicago.

BIG profits! General Distributors, Agents, Salesmen sell the new Wallace Combination Jack and Rim Tool! Every small car owner a positive customer. Sells on sight! Exclusive territory to workers. Act quick! Send for attractive proposition and sample tool. B. S. M. Sales Company, Dept. 1359, Wrigley Bldg., Chicago.

THREE Unmatchable Values—New novel, nickel plated. All have line, form, tone-class. Sell at either 25c or 15c each. Qualit, dainty candlestick handle—cigarette ash tray with holder—extinguisher. Combination safety match box holder and pipe holder. Combination pipe reamer and pipe stand. Sold in gross lots only—\$9.50 the gross. 3 samples for 25c silver, and 4 cents stamps. 2 strange Mystical Novelties included—Free. Caldwell Novelties, Inc., Bloomfield, N. J.

HALF a Minute Demonstrates My new patented powder puff; wonderful attention getter; no woman with 50c can resist it; gives you instant introduction everywhere, after which my automatic sales plan gives you two or more sales and profits, all with one demonstration; if your line is stale or overworked, get my plan today and put some new "pep" in your sales work. F. A. Koch, Dept. 70, 8718 Arendia Avenue, Detroit, Mich.

AGENTS—Best sellers; Jen 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—Here's a New One, "Best-ever Powdered Hand Soap." Sells like wildfire. Marvelous Discovery. Removes grease, paint, ink, oil. In fact anything from the hands. Cannot harm skin. 150% Profit. Great Repeater. Agents simply raking money. "Free Samples Get the Business." Write immediately. Besterer Products Co., 1945 E. Irving Park, Chicago.

SELL Christmas Cards. All Your Friends Use Them. Make your Christmas money. Engraved cards exclusively; best value in design, quality and price. Customer's name printed or engraved. Good commission. No money needed. Write for selling outfit and particulars at once. No replies considered after Nov. 20, or outside of U. S. Knight & Co., Box M-76, Riverton, N. J.

SELL Shirts and Overalls Direct to Wearer. Big Profits. Work full or spare time. No experience required. Big variety Dress Shirts with splendid line Union-Made Work and Flannel Shirts, Overalls, Coveralls, Work Pants, Leather and Sheep-lined Coats. Write today for free selling outfit. The Nimrod Shirt Co., Dent. 8, 4922 Lincoln Avenue, Chicago.

WHY work for others? Make and sell your own goods. We show you how. Free book explains everything. National Scientific Laboratories, 1900-A Broad, Richmond, Va.

SELL widely advertised Skat paste soaps, toilet soaps, Cleansers, polishes, etc. New allowance and commission plan insures success. Skat Company, Hartford, Conn.

AGENTS—Mosses Corn and Callous Remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Co., 253 Searle Bldg., Rochester, N. Y.

IF You Want \$96 a Week, a Big, Permanent business, an honest company and an Essex coach without a cent of expense, write now. I need 100 men and women quick to take orders for Jennings hosiery. Don't delay. Send post card now for details. The Frank B. Jennings Co., Dept. J-521, Dayton, Ohio.

AGENTS, \$45 a week. New guaranteed hosiery for men, women, children. Must give satisfaction or new hose free. Full line of silk hose, Latest styles and shades. Write for samples. Parker Mfg. Co., Sample 1178, Dayton, Ohio.

INCREASE your present earnings selling Gre-Solvent to mechanics, automobilists, farmers, housewives. Millions cans used yearly. Instantly removes grease, grime with benefit to the skin. Standard 20 years. We take risk first shipment if you are the right man. Choice territory going fast, nation-wide campaign. The Utility Co., Inc., 632 West 44th St., New York.

AGENTS. Write for free catalogue. Winter House Dresses, Hosiery, Underwear, Blankets, Flannel Nightgowns, Novelties, etc. Economy Sales Co., Dept. 473, Boston, Mass.

RADIO Calls You, Agents: \$80 to \$125 weekly all or part time selling nationally known 5-tube radio set on 30 days' free trial direct from factory. Customer saves half. Big profit to agent. No experience necessary. We want exclusive agents everywhere. Write at once. Metro Electric Co., Dept. N-1, 1243 S. Wabash Ave., Chicago, Ill.

AN Opportunity never before presented. Representatives wanted in every state in the U. S. A. and Canada, on a direct selling plan. No license required, no competition. Article a household necessity, fully guaranteed. Price within reach of all. Exclusive territory assigned. Particulars: Dundee Mfg. Co., Inc., 157 Summer St., Boston, Mass.

AGENTS—every locality—demonstrate and sell new idea in Soap for daily use. Easy sales—fast repeater. 100% profit. Make \$60-\$85 a week. Write Dept. PM, Motor Tool Specialty Co., Lytton Bldg., Chicago.

\$70.00 TO \$150.00 weekly. Ladies Smart Style Made-to-measure hats sell on sight. Latest Paris and New York models. No money required for stock. Write for samples and territory wanted. Smart Style Milliners, Dent. 55, Cincinnati, Ohio.

DISTRICT Managing Agents, every town, can earn \$15-\$25 daily, with new automobile product; quick sales; repeat orders come fast; must sell thru sub-agents, the trade and by mail; free folder explains; get it today. Everything furnished to start going business. Boone Specialty Co., Boone, Iowa.

AGENTS—Three big lines hosiery, silk underwear, men's shirts. Liberal commissions. Send for free illustrated catalogs. Helly Co., 2132a Fourth Ave., New York.

IPTHEYGO Kuff Buttons. Reduces Laundry-Bills, operates automatically, marvelous convenience to motorists, etc. Durable New Invention that sells on sight. Sample pair \$1.00. Live agents wanted. Flexo Copm, Sheboygan, Wis.

AGENTS—\$14.85 daily in advance. Send for sworn proof. Introduce Finest line of Guaranteed Hosiery you ever saw. Auto Furnished. Best selling plan known. 106 styles and colors. Beats store prices. Spare time satisfactory. No capital or experience necessary. Samples furnished. Wilkitt Hosiery Co., Dept. 2078 Greenfield, Ohio.

NEW Marvelous Self-lighting Gas lighter. Sells on demonstration. Sample 25c. Gross \$10. Rapid Mfg. Co., 799a Broadway, New York.

WHY work for others? Make and sell your own goods. We show you how. Free book explains everything. National Scientific Laboratories, 1900-A Broad, Richmond, Va.

\$110 WEEKLY selling finest guaranteed union made to measure men's suits only \$12.50, boys' two-pants suits \$10.95. Six Latest Patterns that sell on sight. Also all-wool overcoats, vests, caps, riding breeches. Big commissions advanced. Free attractive outfit. Double Service Manufacturers, 1327-35-AF, Washington, Chicago.

AGENTS: Handle a new necessity. Paintographs sell everywhere. Big Christmas demand. Write for Circular and information today. Bradford Company, St. Joseph, Mich.

AGENTS: New Selling Plan! \$1.25 premium free to every customer on a \$2.00 sale, consisting of 8-oz. Vanilla, 6-oz. Shampoo, 4-oz. Lemon Lotion. A big hit everywhere. Complete details free. Territory going fast. Write today. The C. I. Tegstad Company, Dept. 18P, 29 South Clinton St., Chicago, Ill.

65c PROFIT every dollar! Minute demonstration makes sale. Homes, stores, offices, factories, etc. Big repeater. Free sample offer. Mallard Chem. Co., A. St. Louis, Mo.

SALESMAN, Tailoring, \$100-\$150 week selling hand-tailored, union, made-to-measure suits, overcoats, \$25.50-\$28.50. Commissions advanced. Wood & Co., 451 So. Wells, Chicago.

NEW one-price line! Greatest yet! Sensational values! Finest all-wool goods. \$23.50 for suit or overcoat. Nothing higher. Big commissions paid in advance. Earnings of \$20.00 a day sure. Only a few lines left to place. Don't delay. Write at once to Dept. 646, William C. Bartlett, Inc., 850 West Adams St., Chicago.

AGENTS our new Co-operative plan, makes you a partner in our business and pays you profits, the same as stockholders; the most liberal plan in the United States today. \$25 to \$75 weekly easily made. H. & G. Rubber Co., Dept. 841, Pittsburgh, Pa.

WE pay \$48 a week, furnish auto and expenses to introduce our Soap and Washing Powder. Buss-Beach Company, Dept. A42, Chippewa Falls, Wis.

AGENTS: \$60 a week selling guaranteed hosiery for men, women, children. Must wear 12 months or replaced free. All styles and colors, including finest line of silk hose. Mrs. McClure makes over \$2,000 a year. Mrs. Schurman averages \$60 a month working spare time. Write for sample outfit. Thomas Mfg. Co., Class 5402, Dayton, Ohio.

AGENTS—Big Seller—\$20 a Day Easy selling Taylor Caps—made-to-measure—every man buys—some want 2 or 3 caps. Samples Free and Cap Free to good agents. Write quick for fast money making proposition. Address Taylor Cap Manufacturers, Dept. 8-8, Cincinnati, Ohio.

BECOME our Associate in your town. Help merchants, doctors collect their bad accounts. You get them, we collect. Pay you daily. Men and women of character make \$50-\$100 weekly. Pleasant, dignified work. Steady, increasing profits. Hundreds now doing it. Get the facts. American Collection Associates, 27 Jay St., Schenectady, N. Y.

MIRRORS re-silvered at Home. Costs less 5 cents per square foot; you charge 75 cents. Immense profits, plating autographs, reflectors, tableware, stoves. Refinishing metalware, etc. Outfits furnished. Write for information. Sprinkle, Plater 128, Marion, Ind.

\$12 FOR 2 hours spare time. New line. Wall, Auto Emblems. No competition. Every member buys on sight. Biggest money maker. Free sample plan. Write! Crafts Co., 3312-A Lawrence, Chicago.

DISTRIBUTORS wanted for the Marvelous Radio Gas Lighters and Master-Lite Pocket Clear Lighters; big money makers. Write immediately for full particulars and selling plans. M. Masterlite Co., 110 East 23rd St., New York.

FORD Owners: Guaranteed short proof magnets post oiling system forces oil higher than any other. Agents wanted in every county of every state. First order from county entitles you to territory which is now open. Make big money. Sells at sight. Send five dollars for oiler with visible dash feed; two dollars and fifty cents for plain visible at breather cap. Big discount to agents after you have secured agency. J. H. Bertram Mfg. Co., Picabo, Idaho.

AGENTS—See my money making proposition on page 161, this issue. W. F. Richardson.

AGENTS Wanted in Every County in the U. S. A. for Electric Blankets, Bed Warmers, Caps and Warming Pads, Stretching, developing and Gynasium tables. Wallace Electric Appliances, P. O. Box 147, Oakland, Calif.

\$10 DAILY, manufacturing plate glass signs, name plates, glass novelties. Outfits furnished. Barter, 3837A Tracy, Kansas City, Mo.

LARGE Manufacturer wants agents. Make \$100 weekly. Outfit free. Sell made-to-measure genuine Cravenette Gabardines, \$14.50. Whipcords, \$12.50. Reversible Raincoats, \$9.75. Standard Raincoat Co., 131 W. 17th St., New York.

CHRISTMAS Greeting Cards—Wholesale Prices. Big Profits. Manufacturer, 1215 Arch, Philadelphia, Pa.

IF We Give You shoes made-to-your measure in any one 60 leather, 50 different styles, will you keep them, wear them, show them to your friends as sample of our \$10 Made-To-Order shoes to sell at \$6.85? Advise us today. Your complete outfit will go forward absolutely free at once. Dent, 1875, Tailor Made Shoe System, 45 S. Wells, Chicago.

RED Devil Ant Exterminator. Guaranteed. Sells to every home and farm. Agents wanted. Sample to destroy four ants' beds, 35c. Covacevich Supply Co., Brownsville, Tex.

LATEST design adjustable leather link belts. Artex Company, 494 Milwaukee Ave., Chicago.

AGENTS and Distributors wanted for guaranteed 30c Crystal Radio Receiving set. Exclusive territory. Sample 50c. Write today! Tru-Bin Supply, Dept. A, 110 Lake Ave., Rochester, N. Y.

BUSINESS Guide with Free Legal Service Sells everywhere; Wells cleared \$1,185 in 35 days. Write for free outfit. Nichols Co., Nanerville, Ill. Dept. 4B.

EVERYBODY uses Extracts. Sell Duo Double Strength Extracts. Complete line of household necessities. Big repeaters. Write today. Duo Co., Dept. El, Attica, N. Y.

BENS'Discovery. New, Original, 200% profit. Get details and Free sample. Ames-Paxton, 6824 South Green, Chicago.

AGENTS: \$100 a Week Paid To Men Who will help me in spare time in local assembly of amazing new kind of 5 tube radio set. I show you how. Demonstrator set given free. No capital needed. Write quick for details of work. Frank Condon, Dept. G-N, 2032 Prairie Ave., Chicago.

WONDER fluid charges batteries instantly. Chance to make fortune selling to garages and dealers. Gallon free to agents. F. & M. Sales Co., 2069 Eastern Ave., Cincinnati.

MAGIC polishing cloth. Polishes all metals. No polish needed. Guaranteed Formula, 50c. Clover Laboratories, 2511-P, Foster, Chicago.

QUICK Seller. Foot powder thousands need. Big commission. Dr. Cordingley, Clinton, Ind.

ARE You Old at Forty? See our advertisement on page 88 of this issue. The Electro Thermal Company, 2137 Main Street, Steubenville, Ohio.

MAKE \$20 Daily selling Changeable letter Window Signs to merchants. Experience unnecessary. Send for free sample offer. Maze Company, Dept. P. O., Norwood Station, Chicago.

NOW is the time for you to make big money selling our products to Radio, Electrical, Hardware, Drug Stores, etc. Quick seller. High class goods. Melodiah Laboratories, Independence, Mo.

MARVELOUS New Invention, 400% profit. Liquid Quick Mend for hosiery and fabrics. Tremendous demand. Over hundred other fast sellers. Local and General Agents, J. E. Johnson Co., Dept. 435, 69 E. South Water St., Chicago.

AGENTS, Salesmen—Sell New Thermo-static Automatic Carburetor Control Attachment for Fords. Big profit, full or part time. Burns 95% air. Doubles Mileage. Attached in 2 minutes. No drilling. Does automatically exactly what Ford manual says do by hand. Cadillac now using Thermo-static Carburetor Control under Biameke license. Write today. A. C. Blanche & Co., Dept. 805PX 692 Lake St., Chicago.

SELLS for \$9.75. Prints ad on wrapping paper, envelopes, etc. \$4.00 commission. Send 10c for sample work. Automatic Ad-Stampers, Joplin, Mo.

AGENTS—\$14.50 Daily Easy—Your pay every day—Monthly bonus besides—Introducing and demonstrating Chiefly Guaranteed Shirts. No investment or capital needed. Just write orders. Reliable money maker. Repeat orders certain. Send for free samples and full working outfit. Cincinnati Shirt Company, Secy. 15811, Cincinnati, Ohio.

AGENTS make \$100 week placing advertising Clear Lighters with glass front. Every dealer wants one. Write for free plan. Drake Mfg. Co., Dept. M, Milwaukee, Wis.

GREATEST temper-saving device! Takes slack and kinks from telephone and electric iron cords. \$25 daily. Samples on approval if requested. Neverknot, Dept. 111, McClurg Bldg., Chicago.

\$50,000. PICTURE Man Friedman made canvassing. Beginners can make \$100.00 weekly with my sales talk. Experienced men make more. Free book "Profits in Portraits" explains. Samples Free. Picture Man Friedman, Dept. 8-A, 541 W. Lake, Chicago.

INSYDE Tires in your old casings give from 3 to 5 thousand miles more service. Positively prevent punctures and blowouts. Used over and over again. Low priced. Big money saver. Agents wanted. Write for terms. American Accessories Co., Dept. 478, Cincinnati, Ohio.

AGENTS: Two out of three buy Everette Underwear. Your chance to connect Right. Pays well. Particulars free. Artalk, 446 West 57th Street, New York.

FREE sample outfit, \$18.50 suits, \$3.00 profit. Whirlwind seller. Write Desk 9, Chicago Super-Built Garment Co., Box 433, Chicago.

MAKE \$5 daily. Whirlwind seller. Imported Bamboo Fountain Pen. Free sample. B. Mohler, 416 S. Dearborn, Chicago.

AGENTS: Signs for stores, offices. Entirely new. Liberal inducement to workers. World Signs, M, 166 W. Washington, Chicago.

MAIL Order or Local Business. New. Simple Plan gets Money Easily, Quickly, Steadily. Particulars Free. Edward Burke, 733 Nineteenth, Oakland, Calif.

300% PROFIT selling Mitchell's Magic Marvel Washing Compound. Men and women clearing hundreds weekly. Wonderful seller. Big repeater. Nature's mightiest cleanser. Free sample. L. Mitchell, D, 1302 East 61st Street, Chicago.

AGENTS—Sell every man. Over 200% profit. No competition. Write quick. P-dly Co., Dept. A. K., Miami, Ark.

AGENTS: How to get a Free Suit and real cash commissions daily selling our High Quality, Low Price Ready-to-Wear Men's and Boys' Suits and Overcoats. We undersell stores. For Free Sample Outfit, Write H. W. High Co., 306 So. Franklin, Dept. 602, Chicago.

CASH in on sensational evolution publicity. 50c book on evolution selling like wildfire. 150% profit. Write quick. Bender Press, 143 Chambers, New York.

AGENTS—Sideline Men. Sell Genuine snag-proof overall suit and work pants. A wonder garment. Sells on sight. Write for particulars. Nedmae Merc. Co., Camden, N. J.

\$10 DAILY. Foods, extracts, toilet preparations, big soap offer. 300 fast sellers. Women—men. Permanent business. New catalogue. Freight paid on \$20 orders. Western Products Co., 628 N. Oakley Blvd., Chicago.

MAIL Order Business. Excellent Side Line. No stock to carry. Details Free Hunt Co., Morrisville, Pa.

AGENTS—Sell Musical Instruments to your friends in your home town. Attractive proposition. Write Music House, Dept. P, 111 E. 14th Street, New York City.

AGENTS—Increase your Income. "Science of Selling" postpaid for 50c. Leland Publishing Company, Oakland, Calif.

AGENTS—Make big money taking orders for furniture, house furnishings on easy payments; direct to user from big catalog; full or part time. One man made \$28.00 in an hour; another \$56.00 on one order; extraordinary opportunity for few good men in small towns to represent this 67-year-old house; new plan; experience unnecessary; no collections; we furnish everything free. L. Fish Furniture Co., Dept. A9, 2337 West Pershing Road, Chicago.

\$3.50 AUTOMATIC Adding Machine. Excellent profits here for workers. No experience, but old, reliable, meritorious proposition. Year after year seller. Write us. Bassett Company, 1458-P Hollywood Ave., Chicago.

AGENTS—30% commission. Full line glove silk lingerie and guaranteed hosiery, mill to wearer; lowest prices. Get particulars. Wright Hosiery Mills, Philadelphia, Pa.

AGENTS—Sell Electric Hairclippers to barbers and hairdressers. Good sideline, easy seller. One sale, day's wages. Norstrom Electric Co., 2537 Sheffield Ave., Chicago.

BE independent. Make-sell your own specialties. Immense profits. Catalog dependable Formulas, special selected Agents best sellers, free. Lustris Co., 832 East Pershing, Chicago.

20th CENTURY Specialties. Agents for Mail Order Menus, Information 20c. F. G. Briggan, 67 Bostyn St., Rochester, N. Y.

AGENTS, sell spectacles. Big pay; experience unnecessary. I help you. Dobbins, 146 West 27th St., Indianapolis, Ind.

SELL Lock Guards. Particulars free. Sample ten cents. Dow Mfg. Co., West Lebanon, N. H.

AGENTS—Wonderful new seller. Todd Company, 19 1/2 East Second, Cincinnati.

FREE Book. Start Little Mail Order Business. Pier, 217 Cortland Street, N. Y.

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

SELL by Mail Order. at home spare time. No Capital. O. Quaint, 5142 W. 25th St., Cicero, Ill.

AGENTS—N-R-G Laundry Tablets, the old reliable moneymaker for live agents. Millions sold—200% profit—sales waiting for you. Clothes washed spotlessly clean in 10 minutes without rubbing. Free samples. N-R-G Company, 230 W. Superior, Chicago.

\$15.00 DAILY in advance. No competition. No investment. Get exclusive territory on Rhinestone Initial Buckles; clean up. Chaston Novelty Co., 600 Blue Island, Dept. 40, Chicago.

SELL By Mail! Big Profits! Books, Formulas, Novelties, Bargains, Particulars Free! Effen, 523 South Dearborn Street, Chicago.

AGENTS: \$100 Week. No experience. Genuine Gold Leaf Sign Letters and Script. Consolidated Company, 636 South Dearborn, Chicago.

GENERAL Distributors. Agents. Salesmen, wanted for quick-selling automobile specialty; can average \$75.00 to \$100.00 weekly, selling direct, to the trade, thru subagents; lifetime opportunity for men looking for a No. 1 sales proposition; permanent business that yields results right from the start. Free folder explains. Addison Co., Mfgs., Cynthia, Ky.

PRISM Binoculars 8x to 20x. Sell on Sight. Good Discounts. B. & L. Optical Wks., 208 E. 58th St., Chicago.

NO competition. Nine out of ten buy. Big profits. Nothing else like it. Exclusive territory. Write for selling plan. Speed Co., 6 East Lake, Chicago, Dept. XX.

MORE men and women sell consumers direct striking health-preserving household necessity, enamelled, nickeled, quickly demonstrated. Easily earn \$40 week. Prepaid delivery. Write for free sample plan. Tri-Caddy, Freeport, Ill.

EARN \$30 to \$100 Weekly in spare time. No experience or investment. Local or mail order. A lifetime opportunity. Joe Malek, 1269 Transportation Bldg., Chicago.

DEMONSTRATE "Outsize" aluminum hip-suspenders. Grip shirt seams without tearing. Shirt down, pants up. Belt unnecessary. Enormous seller at 25c. Five pair, \$1.00; dozen, \$1.80; 72, \$9.00; 144, \$14.40. Woods, Suite 1563, 705 Olive, St. Louis, Mo.

AGENTS. \$240 a month. Brand New Selling Outfit. Finest line Christmas Cards you ever saw. All designs patented. Nothing else like it. No competition. No selling experience needed. Write for sample outfit. Sunshine Studios, Dept. 250, Dayton, Ohio.

AGENTS—\$300 monthly easy. Everybody wants "Life of Bryan." Best terms. Credit given. Freight paid. Free outfit. Willmore Book Co., Conns Bldg., Chicago.

NATURE treatment. "Wonder Generator"; makes own electricity; no batteries; used for aches, pains, massage, falling hair; wonderful seller; sample furnished; circular free. Science, 17-A, 110 W. 14th Street, New York.

NO-WATER Hand soap. Cleans dirtiest hands without water. Great moneymaker. Simple to make. Guaranteed Trade-secret. 50c. Clover Laboratories, 2511-W. Foster, Chicago.

WHY work for others? Make and sell your own goods. We show you how. Free book explains everything. National Scientific Laboratories, 1900-A Broad, Richmond, Va.

SUCCESS With Your Own Products—Make them yourself. Formulas, Processes by experts. Trade-Secrets. Modern master methods. Catalog free. B. Thaxly Co., Washington, D. C.

BUILD splendid business making chipped glass number and name plates, signs, checkboards. Write for particulars. Simplex Utility Co., 1133 Broadway, New York.

PORTRAITS, photo pillow tops, frames, sheet pictures, medallions, merchants' signs, food products, photo jewelry, guaranteed hose, toilet requisites, luminous crucifixes. Catalog 50 specialties free. 30 days' credit. Jas. C. Bailey Co., Desk A-11, Chicago.

OPEN Toilet Goods Shop in your own home. We furnish everything. Liebig's, Beaver Dam, Wis.

REAL Money selling a great new Health Invention generating Violet Ray, Vibration, Electricity and Ozone. Exclusive Territory now open. Write today Lindstrom & Co., 30 W. Lake St., Dept. 92-58, Chicago.

PENNANTS and Pillows: Colleges, Schools, Clubs, Lodges, Students and agents get busy. American Pennant Co., 66 Hanover St., Boston, Mass.

AGENTS: Our gold-eyed Needle Cases are wonderful sellers; immense profits; \$50 to \$200 weekly; proof and particulars free; sample outfit 15c; factory prices. Paty Needle Co., 231 Davis Square, Somerville, Mass.

AGENTS—Make a dollar an hour. Sell new kind of shavers. Sharpens all knives and tools quickly. Demonstrating sample free. Premier Mfg. Company, Dept. 60, Detroit, Mich.

WONDERFUL invention eliminates needles for phonographs. Preserves records. Abolishes scratching. Day's supply in pocket. \$20 daily. Sample on approval if requested. Everday, Desk. B-11, McClurg Bldg., Chicago.

MEN or Women Agents. Full or spare time, selling Stationery. Every Man and Woman a customer. Sample outfit Free. Scheffer Stationery Company, 1308 Ewing St., Fort Wayne, Ind.

AGENTS—An Unusual Opportunity! Brand new hosiery proposition; earnings \$50 to \$75 weekly; full or spare time; you write orders, we deliver and collect. Special monthly bonus; sample outfit furnished. The Nustle Company, Dept. 1-11, Philadelphia, Pa.

300% PROFIT—Quick, easy seller. Kien-Rite. New Clothes Washing Compound. No rubbing. Women simply amazed. Free premiums makes sales easy. Fast repeater. Distributing samples free. Everybody grabbing for territory. Write quick. Bestever Products Co., 1911-K11, Irving Park, Chicago.

AGENTS: Earn \$10-15 daily; quick cash sales; free goods plan with each sale; free folder tells how. Write Eureka Rug Co., Fairfield, Ill.

EARN \$2.00 an hour all or part time selling old established line of 240 everyday necessities. Everyone guaranteed. Backed bars free. City Dept. Furst McNeess. Profits million dollar organization. Two complete lines bring double profits. Particulars, Ill.

REPLATE brass worn-off Automobile parts, Reflectors, Bath Room Fixtures, Worn Spoons, Forks, etc., with pure silver. Look like new. Use U-Kan-Plate Polish. Positively no mercury. \$1.00 half pint. Postpaid. Satisfaction Guaranteed. Agents wanted. Dept. A, U-Kan-Plate Co., Philadelphia, Pa.

AGENTS Wanted to advertise our goods and distribute to consumer; 90c an hour; write for samples. American Products Co., 4195 American Bldg., Cincinnati, Ohio.

WHY work for others? Make and sell your own goods. We show you how. Free book explains everything. National Scientific Laboratories, 1900-A Broad, Richmond, Va.

SELL direct. Shotguns, Rifles, Pistols, Revolvers, from catalog. Stoeger Incorporated, 224 East 42nd Street, New York.

BIG profits. Rapid seller. Household sample and sales plan for dime. Merry Specialties, Dent. 2, Somerville, N. J.

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-A North Clark, Chicago.

QUICK, easy sales; splendid profits and sure repeat orders handling Carefree Lingerie. Start small, grow big with tremendously successful plan. Sincere men and women seeking real money-making opportunity write Gartfeld Manufacturing Company, 119 N. Fourth, Philadelphia.

AGENTS—Steady income. Large manufacturer of handkerchiefs and dress goods, etc. wishes representative in each locality. Factory to consumer. Big profits, honest goods. Credit given. Send for particulars. Freeport Mfg. Co., 59 Main St., Brooklyn, N. Y.

AGENTS—good, steady income. Exceptionally useful household article. The Handicap Company, Newark, N. J.

FAST-SELLING. New Idea in Rugs. Women Oil Cloth. Sanitary, Durable, Beautiful colors. Send \$1.25 deposit for sample and details. Liberal profits. Guaranty Mail Order Co., Dept. PM, Clayton, N. J.

MAKE \$3.00 An Hour Taking Orders for Pie Crimpers, Nu-Style Egg Rollers, Knife Sharpeners, Wonder Wrenches, Jiffy Egg Beaters and 30 Other Big Profit Sellers. Agents' Outfits Free. Write Quick. General Products Co., Dept. T-C, Newark, N. J.

PHOTO Medallions earn \$100 and more every week for our representatives. Take orders for Famous P. & G. Photo Specialties—the quickest sellers and biggest profit-makers in the field. Includes Artful Portrait Paintings—just like genuine oil paintings—Clock Medallions, Photo Medallions, Powder Compacts, etc. Don't wait—write Now! Puddin' & Goldstein, Dept. "A," 259 Bowery, New York.

AGENTS: Make \$5 to \$10 Daily introducing Ware's Iron Rust and Stain Remover. Everybody wants it; everybody buys. Just send name; we tell you how it is done. Vege-Lene Company, Desk 22, Warsaw, N. Y.

MAKE \$10 to \$100 weekly. Spare time, at home. 20 Successful plans, many require no canvassing or capital. Steady income assured. Particulars Free. Golding Publishing Co., 461 West 118th Street, New York City.

MAKE \$15.00 daily selling "Fixit" Rubber Repair (Liquid Rubber) for tires and tubes. Sensation of 1925. Fastest seller. Big money maker. Sample free. Marquette Rubber Co., 2125BB Wolfram St., Chicago.

\$20 PROFIT daily selling self-threading needles, needlebooks; cost 3-5c each; sell 25c; three samples 25c. Catalog free. Needlehook Specialty Co., 661 Broadway, New York.

AGENTS: \$200—\$500 monthly easy taking orders for Morer Rim Tool. Automobile and trade buy on sight. M. Morry Rim Tool Company, Hillsfield, Mich.

BIG Money—fast sales; everyone buys gold initials for their auto; sell \$1.50, profit \$1.44. Ten orders daily easy. Samples, information free. World Monogram, Dept. 15, Newark, N. J.

SOMETHING new—Proto Rubber Repair for tires, tubes; all rubber goods put on cold, no heat, acid or tools; vulcanizes itself in few minutes. Sells to auto owners and dealers, sample free. Pioneer Products Co., Dept. A, Rosbling, N. J.

FREE Booklet describes 52 plans for making \$20.00 to \$100.00 weekly in home or office business of your own. Downs Co., 222A Myrtle St. Paul, Minn.

EVERYBODY buys from Gibraltar representatives all over country taking order for famous Gibraltar line consisting of shirts, overcoats, raincoats, pants, hosiery, neckwear and other articles. Outfit representing full line Free. Gibraltar Fashion Shop, 724 Roosevelt, Chicago.

NEW Specialty Costs 16c. Sells for 50c. Real \$1.00 Value. 50 Other Htz Profit Sellers. Agents' Outfit Free. Write Quick. General Products Co., Dept. 7-N, Newark, N. J.

Why work for others? Make and sell your own goods. We show you how. Free book explains everything. National Scientific Laboratories, 1900-A Broad, Richmond, Va.

USE No Liquid, Paste, Powder. New Prepared Cloth Cleans all Metals—Just (1) Rub. Retail 25c—Cost 10c. "Sample Free." NuLife Metal, Hartford, Conn.

EVERY Autoist will buy Auto Mitten Dusters. 200% Profit. Free Sample Offer. National Fibre Broom Works, St. Louis, Mo.

FURNITURE refinishing, polishing, painting, handyman shop; wonderful profits; start yours on nearly nothing. John Straceland, 1457 So. Ninth, Philadelphia, Pa.

NEW Embossed Letter Display Cards for stores and offices; quick sales, big profits, repeat orders. Embossed Letter Card Co., 2120 E. 14th St., Cleveland, Ohio.

NEW Idea Windshield Cleaner; Medicated-Felt beats rubber all hollow; one rub, presto! entire windshield stays clear 24 hours. One agency sold 40,000. Security Mfg. Co., Dept. 62, Toledo, Ohio.

A BIG income and a speedy seller are offered in our Felt Rug proposition. Write now for particulars. Newark Felt Rug Co., 276 10th Ave., Newark, N. J.

A BUSINESS of your own. Make and sell chipped glass name and house number plates, checkboards, signs. Booklet Free. E. Palmer, Dept. 512, Wooster, Ohio.

EARN \$10 daily silvering mirrors, plating and refinishing metalware, autos, chandeliers, bedsteads, headlights. Outfits furnished. E. Decle Laboratories, 1133 Broadway, New York.

AGENTS—50% cash profit every sale with \$5 to \$10 commission on sure repeat business. Live wires, men or women, build permanent income \$100 week up. Something new every man and woman uses. Write quick. Everett Co., Dept. 35, Sault Ste. Marie, Mich.

EMBOSSING Display Signs Mean Big Money, and independence for you. Sell every merchant. Make 250% profit. This proposition is different. Write and see why. Artistic Sign Works, 799 Broadway, New York.

EVERYBODY Buys Davis' Nifty Toilet Goods Assortments. Useful, handsome gifts free to our customers. Over 250 high quality products. All repeaters. 100% profit. 25 years of success. Write! Davis Products Co., Dept. 56, Chicago.

AGENTS—\$60 to \$200 weekly putting up our furnished Genuine Gold window letters; scripts. Experience unnecessary. Free samples. Premier Letter Co., 121 N. Francisco, Chicago.

WONDERFUL! Startling! Amazing! Our Ex-Cel Luminous Crucifix and Medal (Luminous) Necklaces shine brilliantly in the dark. Sell on first demonstration. Big profits to you. Write for further particulars, or better still, send for sample and territory protection immediately. Crucifix \$1.50, Necklaces \$1.00, postpaid. W. G. Hannan Co., Dept. B, 2589 So. State St., Chicago.

\$300 FIRST Two Weeks—made by Weiland, Johnstown, Pa., selling "Slide-O-Graf Jr." Novel, effective—sidewalk advertisement projector. Sells fast, big non-competitive field. \$14 Profit every sale. Stand-out Slide Corp., 207 W. 48th St., New York.

LIVE Agents Make \$10 Day selling Eureka Strainer and Splash Preventer for every water faucet. Takes on sight. Widely advertised and known. Get details today. A. B. Seed Filter & Mfg. Company, 73 Fremont, New York.

WTO owner tire agent wanted each locality to use and take orders for handmade Mellinger fabric and cord tires; guarantee bond 8,000 and 12,000 miles (no seconds); shipped prepaid on approval; get your tires free; no capital or experience required; make \$100 to \$300 weekly. Write for wholesale prices and sample kit. Address, Mellinger Tire Co., Dept. 300, Kansas City, Mo. or Dept. 300, Philadelphia, Pa.

EARN big money fast applying gold initials to autos. Every owner buys—\$1.35 profit on \$1.50 sale—particulars and samples free. Write quick. Lithogram Co., Dept. 17, East Orange, N. J.

ROBT. H. INGERSOLL of \$1 Watch fame wants good men to sell his Dollar Scrooping outfit, an ingenious invention for sharpening all makes of safety razor blades. Great Economic value. Meeting with nationwide approval. Easy to sell. Big repeat business. Agents having remarkable success. Full particulars. Robt. H. Ingersoll, 470C Broadway, New York City.

BIG Money Selling New Household Cleaning Set. Washes and dries windows, Sweeps, scrubs, mops. All complete only \$2.95. Over half profit. Write Harper Brush Works, 132 3rd St., Fairfield, Iowa.

\$31.00 PROFIT—with \$1.50 Outfit—Big Money—Easy Work. Selling Gold Monograms for Automobiles, Luggage, Windows, Wagons. No Experience. No License. "Samples Free." NuLife Monograms, Hartford, Conn.

AGENTS: \$65 to \$100 a week. High grade all wool suits made to measure \$25 and \$30. Biggest comm. in advance. Money back guarantee. Free sample outfit. Write A. B. Ferrin, Mgr., Box 1097, Chicago.

SELL the Latest, Quickest Selling Specialties Ever Known—Famous "Hahway" self-lighting pocket Cigar Lighters and Gas Lighters. Low Prices. Easily Demonstrated. Sell to Dealers. Employer Sub Agents. Exclusive Territory. Make over 100% Profit. P. Bernhardt, 148 Chambers Street, New York.

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

MOST Wonderful Seller. 96c Profit every dollar. No stock to carry. License unnecessary. Sample free. Mission Factory PM, 519 No. Halsted, Chicago, Ill.

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.

SELF-THREADING Needles. Needle Books, Machine needles, find sales in every home. Fine side lines, easily carried, big profits, sample and catalogue free. Practice Lee, 145 East 23rd St., New York.

AT Last! Diamond Rival Discovered! Amazing blue white Rajah Gem astounds jewelry world and deceives experts! Beautiful Sample case Free! \$100 weekly! Write Quick! Rajah Diamond Co., Dept. F-7, Salisbury, N. C.

YOU can be your own boss with our Key-Check outfit. Good for \$5 a day stamping names on pocket key checks, fobs, etc. Sample check with your name and address, 20 cents. Pease Die Works, Dept. 34, Winchester, N. H.

AGENTS, Distributors, Crew Men average \$60-\$100 with Harker Products; 10c brings sample of leader; money back if you wish; free folder shows how to start small and grow big. Act; Send today; big surprise awaits you. Harker Co., Bridgeport, Conn.

AGENTS make 500% profit handling auto monograms, window letters, transfers, novelty signs. Catalog free. Hinton Co., 1133 N. Wells St., Chicago.

NEW camera takes and finishes photos in one minute. Make money selling cameras or taking photos. Exclusive territory. Crown Co., Dept. 251, Norwalk, Conn.

WILLIAMS' No-Water Hand Soap. In tubes, has taken Auto owners by storm; washes dirtiest hands perfectly clean without water; easy demonstration makes quick sale. 150% profit. Williams Co., Dept. 265, Montclair, N. J.

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.

SELL Lightbrite Electric Signs. They make you big money. We finance you. Price kills competition. Write for information. Modern Sign Co., Inc., 5721 Woodward Ave., Detroit, Mich.

ARTICLE costs 5c, sells quickly for 60c. Particulars free. Bags, 3229 Archer Ave., Chicago, Ill.

GOLD-LEAF Sign Letters; make and sell; 1,000% profits. Particulars. Johnston Co., Quincy, Ill.

ONLY one sale a day means \$200 per month! Marvelous new adding machine. Retail \$15.00. Work equals \$350 machine. Adds, subtracts, multiplies, divides, automatically. Computes feet and inches. Speedy, accurate, durable, handsome. Five-year guarantee. Offices, Stores, factories, garages, lumbermen buy one to dozen. A fortune for live agents. Write quick for protected territory and free trial. Lightning Calculator Co., Dept. F, Grand Rapids, Mich.

AGENTS, both sexes, we manufacture and control new household article. Fast seller. Big profits. Exclusive territory. Write Now. Connolly, 123 Liberty St., New York.

AGENTS—Write for Free Samples. Sell Madison "Better-Made" Shirts for large Manufacturer direct to wearer. No capital or experience required. Many earn \$100 weekly and bonus. Madison Mfgs, 511 Broadway, New York.

AGENTS: Big Money Monogramming by Transfer Method. Catalog Showing Over 50 Styles and Particulars Free. Motorists' Accessories Co., Mansfield, Ohio.

INSTANT Weld. Repairs largest punctures without cement or heat. Lem's profit one day. \$50. Write quick. Free sample; territory going fast. Tourists' Pride Mfg. Co., Desk T, Minneapolis, Minn.

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

200% PROFIT selling Gem kettle bottoms. "The article with a dozen uses." Housekeepers buy on sight. Columbia Specialty Co., Box 130, East Liverpool, Ohio.

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

To secure agents or salesmen or for selling (want) ads in largest newspapers and magazines. Price list No. 30 sent free. Ankrum Advertising Agency, 20 W. Jackson Blvd., Chicago, Ill. The largest classified advertising agency in the U. S.

POLMET—The Wonderful Polishing Cloth that cleans all metals without fluid, paste or powder. Approved by "Good Housekeeping" and "Modern Princes"—sells fast at 25c. Sample free. Gale & Co., Inc., 15 Edinboro St., Boston.

WASH Clothes the new way. Use the Torrent Automatic Washer. You will be delighted. Special offer to one in each locality. Storm Royalty Co., 3610 Enright Ave., St. Louis, Mo.

WE Start You Without a Dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., Dept. 201, St. Louis.

GET Our Free Sample Case—Toilet articles, perfumes and specialties. Wonderfully profitable. La Derma Co., Dept. A, St. Louis, Mo.

AGENTS: 500% profit. "Happy Home Maker Shampoo" builds your own big business. Martin of Indiana made \$75.00 in one day. Missouri man made \$750.00 one month. Exclusive territory. Geo. A. Schmidt & Co., 236 W. North Ave., Chicago.

EASY, pleasant work for Mechanics. Shop Men. Clerks, during spare hours; will add many dollars to their salaries. Also want persons who can give full time. Big wages secured. Novelty Cutlery Co., 67 Bar St., Canton, Ohio.

MAIL-ORDER Houses and Distributors: We pack French made beauty creams, face powders, perfumes, toilet preparations with your label. Chemist, 944A North Clark, Chicago.

AGENTS \$1. Retail \$3. Your Profit \$2. Wonderful, pocket Adding Machine with Magic Writing Pad. Particulars Free. Typewriter Supply, 905 Hersch Bldg., Pittsburgh, Pa.

If you want good live agents—follows who can get the business—ask me how others are doing it. I'll gladly render the necessary assistance. Geo. P. Baker, Mgr. Classified Advertising, Popular Mechanics Magazine, Chicago.

"How to Sell Patents" free. Patent News-O, Washington, D. C.

EASY Money Applying Gold Initials, Monograms on automobiles. Anyone can do it. Simply transferred from paper; takes 5 minutes. Make \$1.50, cost 5c. Samples free. "Ralo," 1043 Washington, Boston, Mass.

FREE Sample—"Rain Shield Wiper" Retails \$1.00—cost 25c. Just invented. No Cloth—No Paste—No Attachment. Sold Clear and Rainy Days—(1) Rub keeps Windshield Clear 24 hours. Automobiles buy quickly. Riley made \$198—three days. Experience Unnecessary. Wonderful Sideline. Nullife Corporation, Hartford, Conn.

CALIFORNIA Rosebuds selling like hot cakes. Agents earning money; new stuff. Big profits. Catalog free. Mission Factory P.M. 519 No. Halsted, Chicago, Ill.

10,000,000 FORDS need "Greater Grip" Fan Belts. Big Profit selling Dealers. Write quick. Teuscher Belting Co., St. Louis.

MANUFACTURE Chipped Glass Numbers; particulars Free. Beveridge, 166-22 Lecest Avenue, Jamaica, N. Y.

AGENTS—Make \$100 weekly selling nationally advertised "Cathaspirin." Large demand. Big repeater. Easy sales. Write today for special offer. Cathaspirin Co., Chillicothe, Ohio.

DUSTLESS Sponge Cloth. New Invention. (1) Rub—Dusts. Cleans and Polishes Automobiles, Furniture, Pianos. Retails (50c)—Costs (16c). "Sample Free." Nullife Sponge, Hartford, Conn.

HIGH GRADE SALESMEN WANTED

AUTOMOBILE Ash Tray Free. No other tray like it! Puts out fire by conduction. Better, handsomer. More useful, than higher-priced ones. We do not send this tray free unless it accompanies samples of several other articles that we wish to introduce to earnest, producing salesmen. All samples that we will send are either nickel plated or colored glass, with nickel plated attachments. All of these, including the free automobile tray, are packed in a dollar package. This package contains the following: The Caldwell Automobile Tray—(free). Three new style ash trays, for home or office use. The sizes are 5, 4 1/2 and 2 1/2 inches in diameter. "A Wipe-pats out the fire" on all three. One dainty 2 1/2 inch. Candlestick handle ash tray. One Combination pipe stand, and pipe reamer. One protector, for coffee pot, and percolator handles. Two spoon holders, for holding different sized spoons, on hot cooking utensils. Handy while stirring. All the foregoing sent for a one dollar bill. (Wrap securely.) Satisfaction guaranteed or money back. Do not send the dollar unless you are a seller desiring to sell and make unusual profits. Caldwell Novelties, Inc., Bloomfield, N. J.

SALESMEN—Get this big sensational, order-getting shirt outfit free. Sell Style-mor Shirts all year round. It's Chicago's Wonder shirt line. Advanced fall showing of smartest, snappy patterns. Large double swatches, low prices, quick service, makes shirt selling easy. Bellard of Texas made \$48.00 in two days. We deliver and collect. Write today for big free outfit. Stylemor, 81 W. Van Buren, Chicago, Ill., Dept. 660.

MR. BRUSH Salesman—Old established New York Brush Manufacturers require the services of men in all territories to sell their extensive line of Sanitary Twisted Wire Brushes. We pay larger commission than any other Brush House in the country. Write immediately for our proposition. Wire Grip Sanitary Brush Corporation, 15 Mercer St., New York.

SALESMEN sell phenomenal advertising specialty. Metcalf's commission \$72 one sale. Another man made \$120 in 3 hours. Change on auto dash with oil change warning. For sample, write Klapp Printing Company, Omaha, Neb.

BEST Seller. Jem Rubber Repair for tires and tubes; supersedes vulcanization at saving of over 800%; put it on cold. vulcanizes itself in two minutes, guaranteed to last life of tire or tube; sells to every auto owner and accessory dealer. Get particulars how to make big money and free sample. Amazon Rubber Co., Philadelphia, Pa., Dept. 563.

WANTED—Tailoring Salesmen, make \$60 to \$125 per week. Biggest merchants in many towns have started with our line. We are the largest made-to-measure tailoring house in the country, furnishing elaborate sample equipments, including 500 all-wool fabrics. You make your own profits from \$8.00 to \$15.00 on each order. Guaranteed absolute satisfaction, perfect fit, best workmanship, or no sale. Write for our line and all accessories to be sent free. Tell us all about yourself. Address N. O. Perry, Sales Manager, Box 483, Chicago, Ill.

SALESMAN—I have an opening for the best boiler compound and belt dressing man in the country to fill position as sales manager. Must be able to show he has successfully sold both products himself, and evidence that he can procure salesmen that can market these specialties. The right man can make a permanent and profitable connection with a substantially rated corporation manufacturing these two products. Address in confidence, H. H., 1246 W. 74th St., Cleveland, Ohio.

"YOUR Opportunity in a Great Industry." That is the title of a book we have just prepared. It gives the full facts about one of the greatest money-making opportunities in the selling field today. Every specialty salesman in America owes it to himself to get and read this book. A copy of it is yours free for the asking. Write for it to Dept. 872, Goodwear Chicago, Inc., 844 West Adams Street, Chicago.

MAKE \$100 Weekly in spare time. Sell what the public wants—long distance radio receiving sets. Two sales weekly pay \$100 profit. No big investment, no canvassing. Sharpe of Colorado made \$953 in one month. Representatives wanted at once. This plan is sweeping the country—write today before your county is gone. Ozarka, Inc., 128-Q West Austin Ave., Chicago.

SALESMEN: Become Independent. Own Your Business, experience unnecessary selling our \$7,500 Accidental Death, \$50 Accident, \$25 Sick Weekly Benefits, \$12.50 Yearly. Other amounts proportionate. Guaranteed steady income from renewals, \$250,000 Deposited Insurance Department, Universal Policy, Dept. A, Newark, N. J.

\$20 DAILY selling "World's Greatest Foot-Comfort Shoes" direct to men or boys. Quick sellers everywhere. Low priced. Just take orders; we mail shoes direct. Big cash profit and repeats. Territory protected. Best season now. Write quick, Dept. 229, Easy-Wear Shoe Co., Indianapolis, Ind.

TIME Saver Rubber Half Soles becoming popular as rubber heels. Something new. Big Seller. Quick money. Sells on slight all retail trade and direct. Outwears leather. Cost Half. User attaches. No nails. Best season now starting. Timesaver Co., 771 Arcade, Cleveland, Ohio.

SALESMEN for new patented padlock—no keys—cannot be picked—combination easily changed—steady position—future. Write Defender Lock Co., Dept. P. P., 68 Cliff Street, New York.

SALESMEN—35c article eliminates automobile accidents; over 400% profit. Sample free. French, 625 Buder Bldg., St. Louis, Mo.

SALESMAN: If You Think In Terms Of \$6,000 The First Year Write Me Personally. Strong line for retail stores. Nationally advertised. Established concern has unusual opportunity. Liberal weekly advance to producer. Geo. R. Williams, Mgr., Dept. 200, 1922 Euclid Avenue, Cleveland, Ohio.

SALESMEN earn \$10,000 this year with fast selling auto device. Business with big future. Mashken, Indiana Harbor, Ind.

SIDELINE Salesmen—Earn \$100 a month. Every merchant uses salesbooks. Commission 20%, payable in full on acceptance of order. Write for samples, Crane Co., Box 305, Canistota, N. Y.

SALESMEN Wanted—To interview furniture and department stores in their locality on a special proposition for reliable manufacturer. You can earn \$100 a week or more in full or spare time on commission. Interesting, steady work. Write today for full particulars. The Marvel Company, Hammond, Ind.

COLLECTS Money from the Dead-Beats. Retails \$5.00—Cost \$1.00—Profit \$4.00. "New Method." Every Storekeeper, Doctor buys Quickly. Wonderful Money Getter. Federal Association, Hartford, Conn.

\$20.00 DAILY. New patented auto radiator shutter. Real winter proposition. Fastest seller ever invented. Quantity price 45c; retails \$1.50. Jones, 800 N. Clark, Chicago.

MEN—Working Garage Trade For brake reeling machine, new invention; costs one-fifth other devices. Does perfect job in half usual time. Sells on demonstration; big money making opportunity. Write Bear Manufacturing Co., Rock Island, Ill.

\$10.00 DAILY easy. We start you in auto accessory business. No investment, no experience necessary. Exclusive territory. Motor Products Co., 1760 Lunt Ave., Chicago.

GASOLINE Cost Cut 50%. Car owners can now get just twice the mileage as formerly by using a new type vacuum feed invented by Robert Martin of Chamberlain, S. D. This invention automatically doubles mileage for Ford cars and trucks and adds tremendous power. It filters all gasoline used and removes all carbon. Put on or taken off in five minutes. Any owner can secure free trial of this new device by writing Robert Martin, 819 Somers Bldg., Chamberlain, S. D.

SALEMEN—\$10 to \$20 a day easy. No experience necessary. Big fall shirt line now ready at prices to meet competition everywhere. Everything from work shirts to silk shirts, including latest plain and knitted bottom flannel shirts and blouses. Also complete Boys' Line, 24-Hour Service. Wonderful opportunity spare or full time for live workers. Sheridan Shirt Co., Dept. 14, 702 W. Roosevelt Rd., Chicago.

SIDELINE Salesmen—To sell an instant toothache relief remedy. Sold to druggist, restaurants, poolrooms, etc., 25% commission. F. J. Leopold, Adrian, Minn.

WHY work for others? Make and sell your own goods. We show you how. Free book explains everything. National Scientific Laboratories, 1909-A Broad, Richmond, Va.

SALESMEN Make Big Money Selling Our Business Blotter Cards. Free Information. Kelly Specialty Co., Dept. A, Fairbault, Minn.

SIDELINE Salesman—To introduce newest thing in fountain pens. Free sample. Sells on sight. \$3 an hour easily. Write for particulars. Liberty Co., Dept. S, Great Northern Bldg., Chicago.

SELL Men's High Top Boots and Waterproof Quality Work Shoes Factory to Wearer. Our new sales manual will put you in the big earning class in twenty-four hours. Write for free copy today. Carson Shoe Co., Essex Station, Boston, Mass.

SALESMEN—Four Square Suits reduced to \$9.99. Deposit \$3.00. Four patterns. Guaranteed two years. Write quick for free outfit. Stone-Field, LK2554 Wabash, Chicago.

EARN \$100 weekly in advance. Beautiful free Pocket size outfit. Superior \$12.50 Union Made Clothing—best on the market. Fit guaranteed. Also raincoats and wool overcoats. Experience unnecessary. Presents everywhere. Write P. Long, Superior Clothing Co., 1908 W. North Ave., Chicago.

ADVERTISING Salesmen, write for particulars. Auto Accessory. Our name describes the article. Liberal commission. The Atalgance Battery & Oil Guide Company, Fargo, N. Dak.

ADVERTISING Pencils—High grade, big line ready; sight sellers. Big commissions. Pocket samples. Main or sideline. North American Pencil Works, Dept. 2, 126 So. Clinton, Chicago.

MEN, stop chasing rainbows. Sell something which every one must have. Sell shoes. Experience not necessary. Write now. Dept. 53, Acme Shoe Company, Hudson, Mass.

EASY Selling Specialty. Beautiful. Attractive. Appealing. Luminite Window Bulletin. Increase merchants' business 50% to 100%. Protected territory. 88 commission on each \$20 sale. Thousands being sold; sells itself on demonstration. Display Products Co., Ltd., 106 Gibraltar Bldg., Kansas City, Mo.

OUR Legal Guide and Salesman's Instructor will mean money to you. One Dollar. Geo. Stewart, 157 W. Santa Barbara, Los Angeles, Calif.

SELL and operate Sales Board. Write for particulars of this interesting and profitable business. Square Hole Board Co., 120 Scheerer Ave., Newark, N. J.

TAKE orders for coffee, sugar, flour, meats, canned goods, staple groceries; also paints, radio sets, tires, auto and tractor oils. No capital or bond required. We deliver and collect. Permanent business. Big pay. Write at once. Hitchcock-Hill Co., Dept. 50, Chicago.

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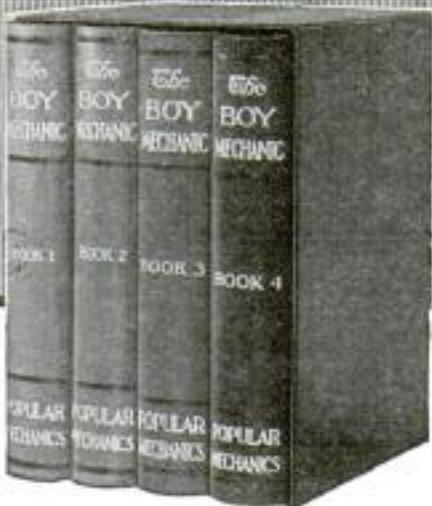
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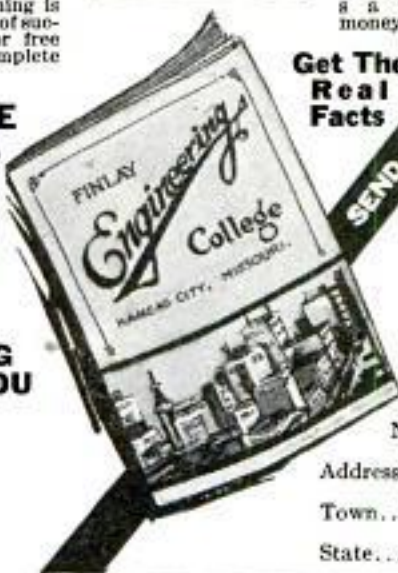
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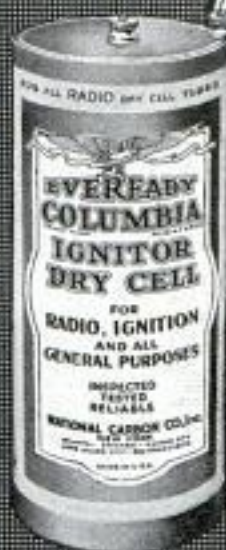
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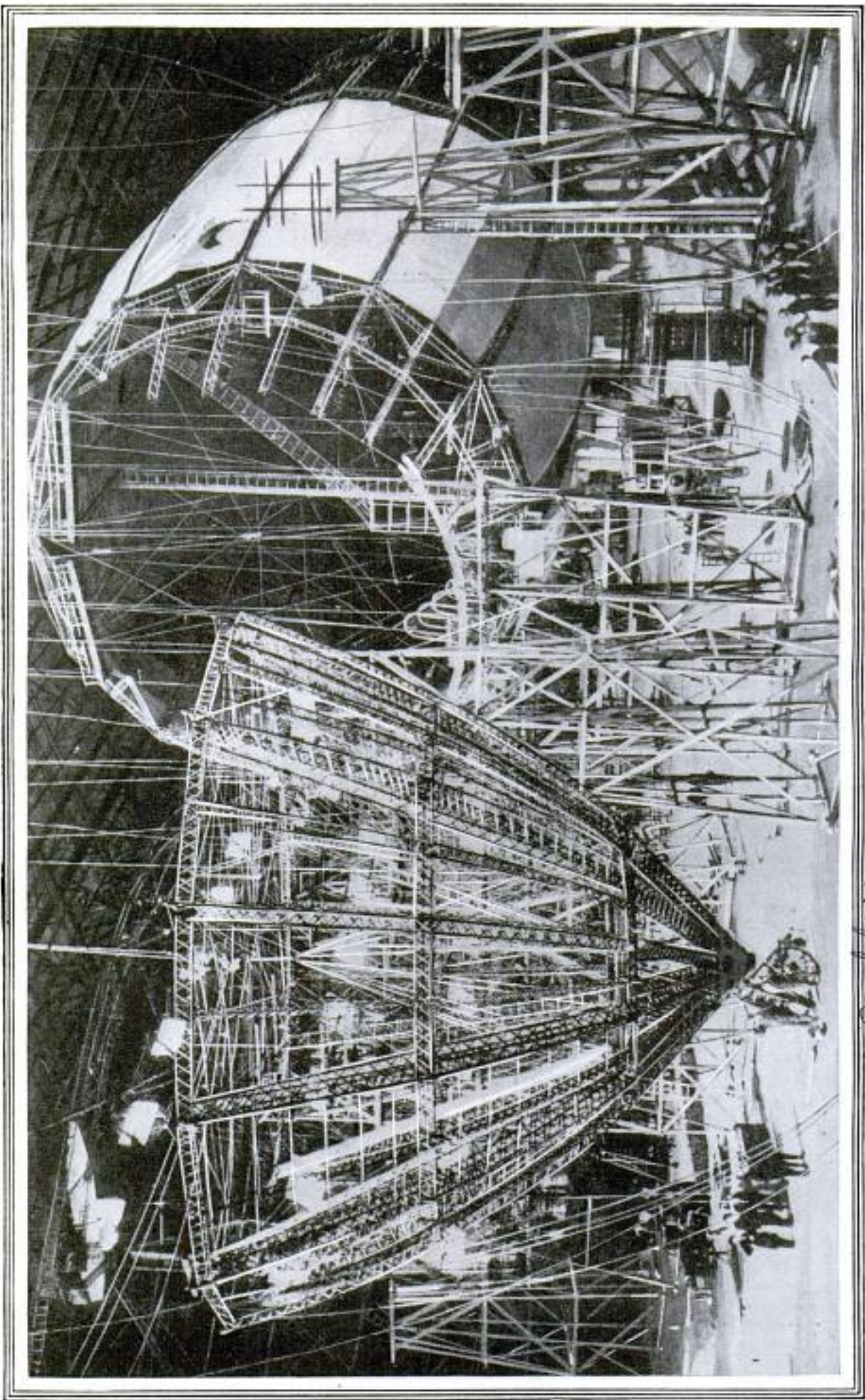
*No. 766
22½-volt
Large
Horizontal
Price
\$2.00*



*No. 486
45-volt
Layerbilt
Extra-
Large
Vertical
Price
\$5.50*

812

Wide World Photos, 229 W. 43rd St., New York City.



A New Nose for the Great British Dirigible "R-33," Which Was Torn from Its Mooring Mast and Blown to Holland in a Gale, Was Assembled on the Ground and Then Raised by Cables and Riveted to the Main Frame of the Airship—See Page 711

Military

1519 Connecticut Ave
Washington, D. C.

Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 44

NOVEMBER, 1925

No. 5

Radio Vision of the Future

331

Experiments Forecast the Time When You Will Both Hear and See by Wireless

By S. R. WINTERS

"WE will now broadcast the 'Follies'." This terse announcement, in the near future, will mean that you will not only hear the singing and comedy but see the actors and actresses amid all their splendor of stage scenery.

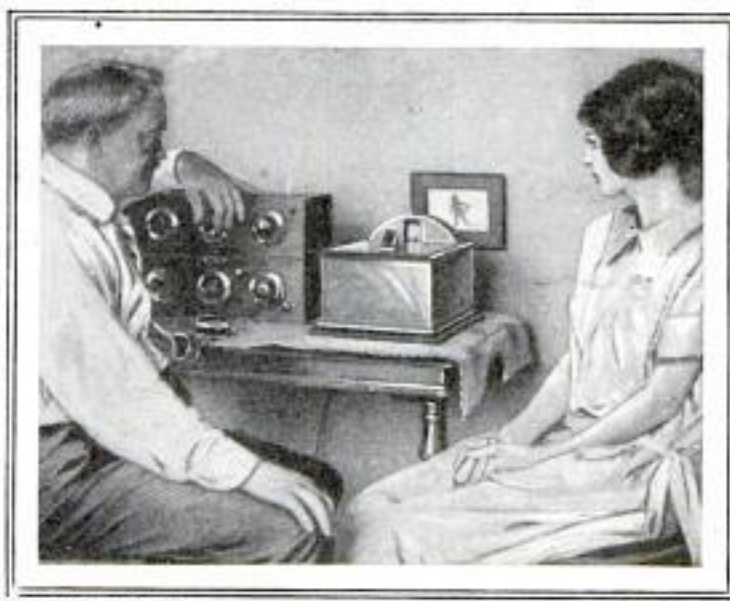
The attachment of a special lamp to the radio-vision machine of C. Francis Jenkins, whereby a living subject is illuminated, signifies that a dancer, speaker or other personality may now be seen as well as heard by radio. The Jenkins laboratories, having recently successfully demonstrated the transmission and reception by radio of a Dutch windmill from a standard motion-picture film, it was but a single step to the sending and receiving of the direct image of a living subject.

In his original demonstration of radio vision, Mr. Jenkins had planned to transmit the scene of a dancing girl from his laboratories to the homes of Secretary of Commerce Herbert Hoover and Col. Paul Henderson, former second assistant post-master-general. However, these plans were thwarted at that time, chiefly because he was not equipped with the special type of lamp which he has just installed. Now, it is possible to place a person before a motion-picture camera and transmit the likeness of this individual by radio with quite the facil-

ity that a scene from a motion-picture film is sent and received by the invisible radio waves.

The transmission of the reflection of light from living subjects in action differs from still pictures only in that they are more rapidly formed, that is, sixteen pictures are transmitted in one second instead of one photograph within five or six minutes. Therefore, with the addition of the special lamp referred to, the radio-vision machine remains unchanged. The combination lens-disks-prismatic rings for drawing the lines of the picture and the use of a rare metal for converting light values into electrical values are necessary, just as in the case of the transmission of the motion picture of the windmill.

Similarly, at the radio-vision receiving station, the equipment used is identical with that employed in the original demonstration. For instance, there is a multi-tube receiving set, together with a cabinet,



© Harris & Ewing
Compact Radio-Movie Outfit for Home Can Be Attached to the Regular Radio Receiver to Pick Up Broadcast Movies

in the top of which is found a miniature white screen upon which the motion picture is projected. Then, too, there are the usual prismatic rings or lens-disks, duplicating those in use at the transmitting station. The "cold-light" lamp, invented by Prof. D. MacFarlan Moore, serves the highly es-

Harmon. 92 (see Sept. 1925. 410)

C. Francis Jenkins, 1519 Connecticut Ave
Washington, D. C.

705
Copyrighted material

sential function of changing the electrical values back into picture values, after which they are outlined on the miniature screen.

Upon the threshold of this remarkable achievement of the direct transmission and reception of the likenesses of living subjects by radio, Mr. Jenkins indulges in a bit of prophecy: "When this radio service to the eye has been developed to the extent now attained by radio service to the ear, a new era will, indeed, have been ushered in, when distance will no longer prevent our seeing our friend as easily as we hear him.

"President Coolidge may then look on the face of the King of England as he talks with him; or upon the countenance of the President of France when exchanging assurances of mutual esteem.

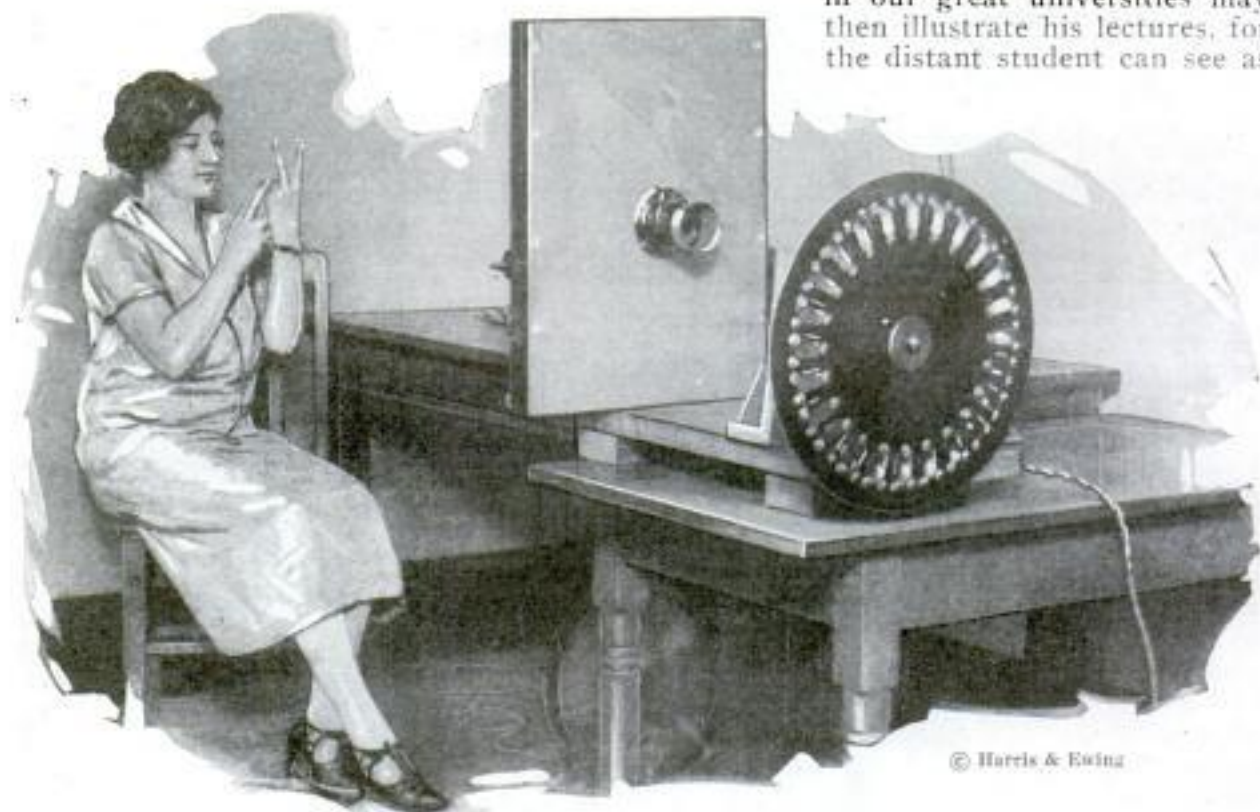
"The general staff of our navy and army

waves, but they can look upon these unfamiliar places by means of this same instrumentality.

"And from our cozy firesides, we stay-at-homes can watch the earth below as a great dirigible, like the 'Los Angeles,' carries our flag and radio-vision machine on a transcontinental flight over the mountains and plains, the cities and farms, the lakes and forests, of our wonderful country.

"In due course, then, folks in California and in Maine, and all the way between, will be able to see the inaugural ceremonies of their president, in Washington; the army and navy football games at Franklin field, Philadelphia, and the struggle for supremacy in our national sport, baseball.

"Educationally, the extension worker in our great universities may then illustrate his lectures, for the distant student can see as



Radio Vision, by Which Reflection of Young Lady Demonstrating Deaf and Dumb Language Is Caught by Big Camera Lens, Projected through the Revolving Lens, Changed to Electricity and Broadcast

may see at headquarters all that a lens looks upon as it is carried aloft in a scouting airplane over battle front or fleet maneuvers.

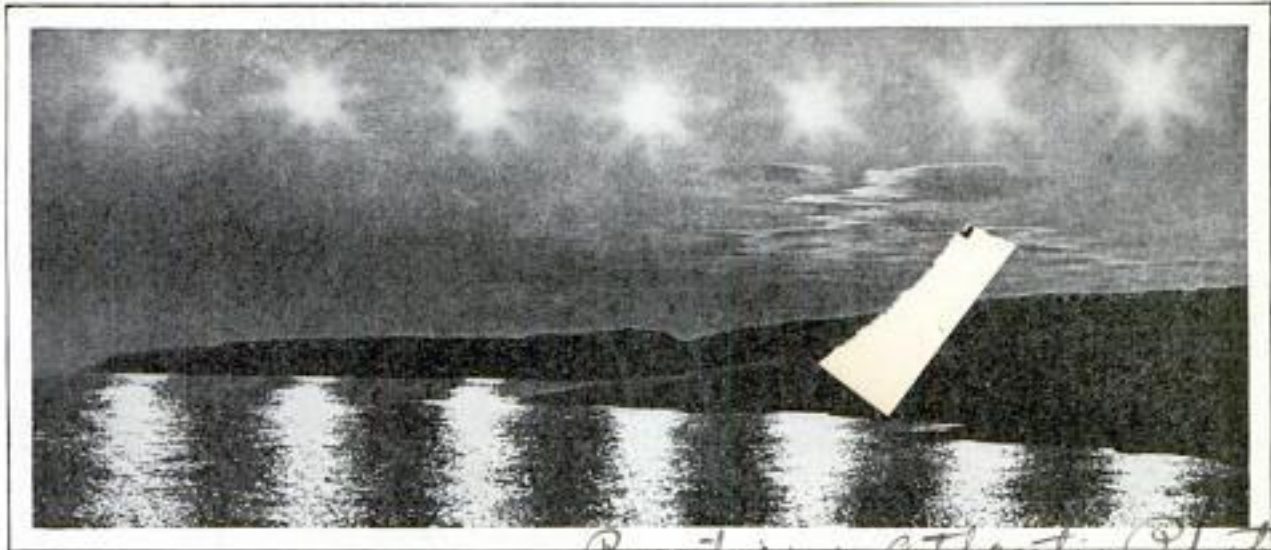
"Radio amateurs may see as well as hear verbal description of the bleak, desolate regions in the vicinity of the North Pole, as Donald MacMillan searches for strange and undiscovered lands. That is, radio amateurs will not only be able to converse with members of this polar expedition by means of the invisible radio

well as hear him by radio. It is not a visionary, or even a difficult thing to do.

"The radio-vision machine, transmitting and receiving living and moving objects, will come to the fireside as a fascinating teacher and entertainer, without language, literacy or age limitation; a visitor to the old homestead with photoplays, the opera, and a direct vision of world activities, without the hindrance of muddy roads or snow blockades, making farm life still more attractive."

Taken over Ellesmere Island.

GLORY OF ARCTIC MIDNIGHT SUN SHOWN BY PHOTO



Pacific & Atlantic Photos.

Footlights of the Northern Sky, Successive Stages of the Midnight Sun Taken on Single Plate by Making Seven Exposures at Intervals of Twenty Minutes Each

By making exposures at twenty-minute intervals, a photographer with the Mac-Millan expedition obtained seven successive views of the midnight sun. A body of open water in the foreground heightened the effect, as the reflections were clearly registered although the hills in the scene were reduced to black masses because the exposures obliterated all details.

380

CATERPILLAR PLAGUE IN PARK LAID TO FEEDING BIRDS

Because too many persons fed the sparrows, the birds failed to eat insects' eggs, and a plague of caterpillars resulted in a London park. That was the explanation given by one of the keepers, who with several associates, was kept busy during the months of June and July fighting the pests. Each morning, attendants visited the park and swept up the caterpillars. Six bucketfuls were gathered in half an hour from one small section of the park.

Hyde Park

FOUR-TON CAMERA SNAPS FIVE THOUSAND MOVIES A SECOND

370

More than 150 times as fast as the human eye, a movie camera used by the British government in studying the effects of armor-piercing shells can record pictures at the rate of 300,000 a minute. It weighs four tons, took four years to build and cost approximately \$70,000. Forty lenses on a revolving disk turn before the camera aperture, the disk itself whirling 125 times a second. The actual time exposure of each picture is one sixty-thousandth of a second. Highly sensi-

tized film is run on a drum at the rate of 18,000 feet a minute. One of the problems that faced the builders of the instrument was how to keep the film on the holder at such high speed. The solution was found by perforating the drum with small holes and placing an apparatus inside to suck the film tightly to the drum. Intense light is necessary to take pictures at such high speeds and difficulties encountered at speeds above 3,000 exposures a second have not yet been solved completely. Not long ago, a film taken by this camera was exhibited in a private theater in London. It depicted a glass globe breaking under a charge of powder. Each minute particle was seen plainly.

144.

AUTOMATIC MAIL BOX SIGNALS DROPPING OF LETTER

Because rural-mail carriers are no longer required to raise the signal flag when they deposit letters in the farmer's roadside box, a southern postmaster has invented a box which automatically signals the arrival of mail and saves useless trips from the house to the box. When the postman inserts the letter through the swinging flap, the lower end of the flap presses a trip which operates springs. They raise the white flag as a signal.



Rural Mail Box Signal Co., Burlington, N. C.

*New York Tribune 9/19/25
Quoted from The Daily Mail, London, Eng.*

160 State St.
Boston, Mass.

**ECHO SOUNDER
SHOWS DEPTH
UNDER SHIP**

343 Adopted first as a somewhat doubtful experiment, the echo method of sounding is reported to have proved successful on many different kinds of vessels. Big liners like the "Leviathan" and the "Mauretania," as well as small coast-guard ships, are using it regularly, and scientists declare that it has several distinct advantages over older methods, such as, increased rapidity, lower operation cost and greater accuracy. The outfit employs

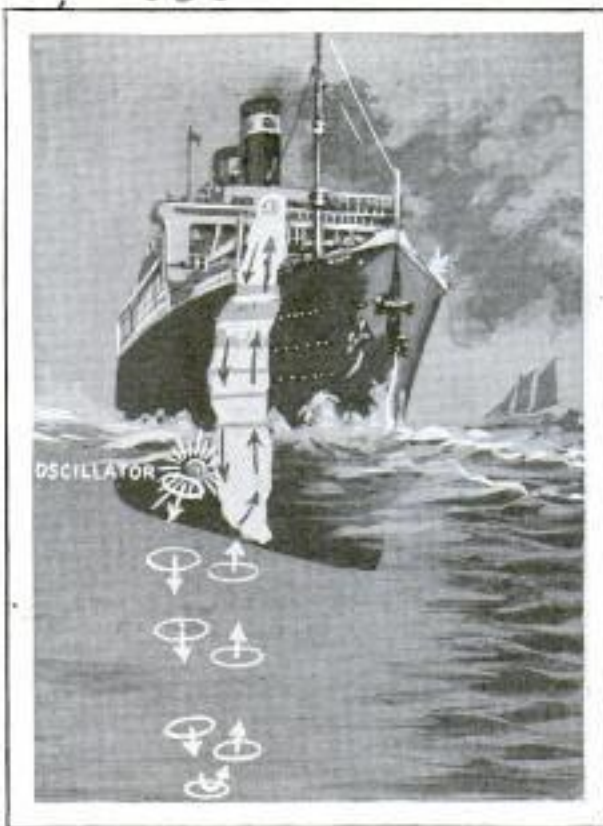


Diagram of Echo-Sounding Installation; Arrows Indicate Impulses Striking Bottom and Returning

no lead or line and consists chiefly of an electric transmitting unit which sends sound vibrations through the water. As they rebound from the ocean's floor, they are registered on a receiver in the ship. The depth of the water is determined by noting the lapse of time between the sending and receiving of the signals. The apparatus is set into operation simply by pressing a button. The results are registered visually so that the navigating officer can determine the depth as easily as he can tell time by looking at a clock.

**AUTOBUS, TRAMWAYS, BATEAUX DE LA S.T.C.R.P.
RAYONNENT DANS 52 DIRECTIONS**

The image shows a large, rectangular map of Paris with a complex network of lines representing transit routes. Below the map is a list of destinations, each with a corresponding button. A person wearing a hat and a fur-lined coat is shown from the side, pointing at one of the buttons on the list. The list includes various locations like 'Gare d'Orléans', 'Gare de Lyon', etc. There is also a small inset box with text in French and English.

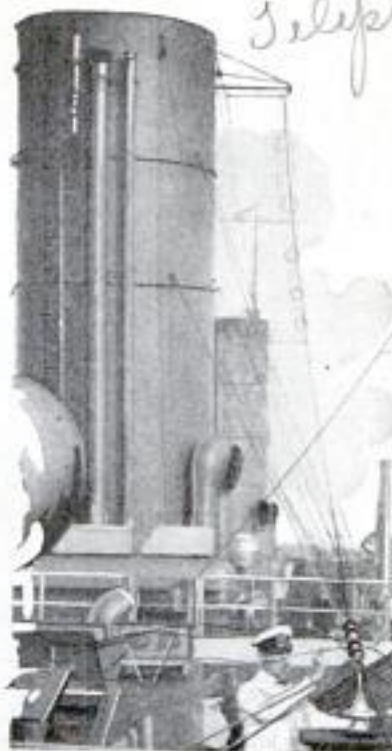
Using the Animated Map That Directs Paris Visitors; a Push on the Button Opposite Name of Intended Destination, Lights Up Section Where It Is Located and Shows the Route

356 *Electric*
**PUSH ON BUTTON
LIGHTS MAP THAT
SERVES AS GUIDE**

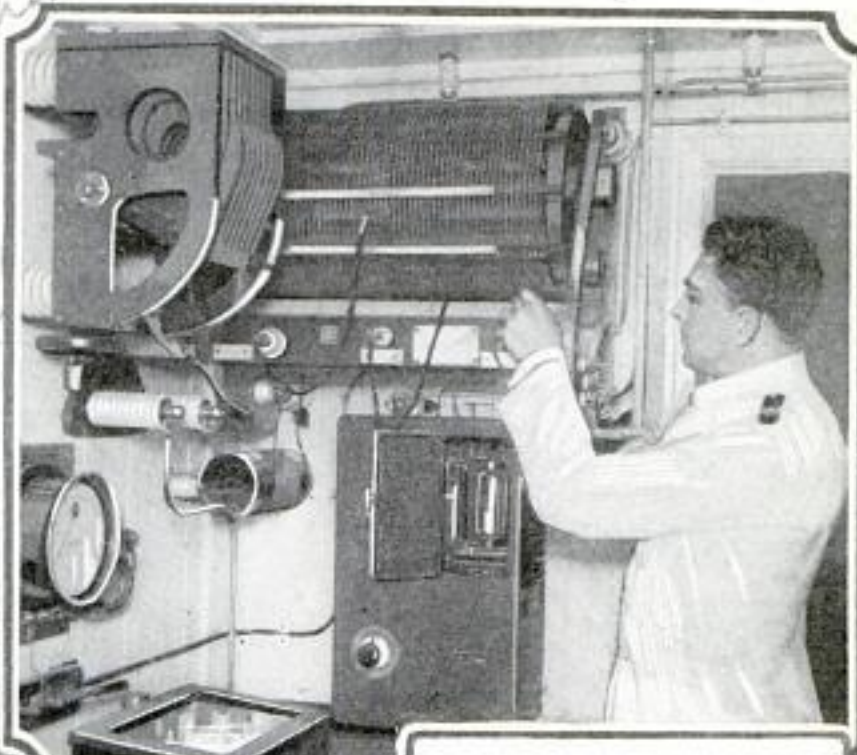
By simply pressing a button, strangers in Paris are directed to their destinations by means of an animated map. It is painted on translucent glass and is illuminated with electric lights. A list of the principal points of interest is shown at the bottom, and opposite each is a button. When this is pushed, the section of the map in which the place is located, lights up, showing how it can be reached. The guide gives directions for more than fifty different points. They are indicated by symbols in the left-hand corner of the frame and corresponding letters on the map. Besides these, there is a schedule showing when conveyances leave for the various places.

*Edw. J. Landras
Inventor, Paris Rapid Transit System*

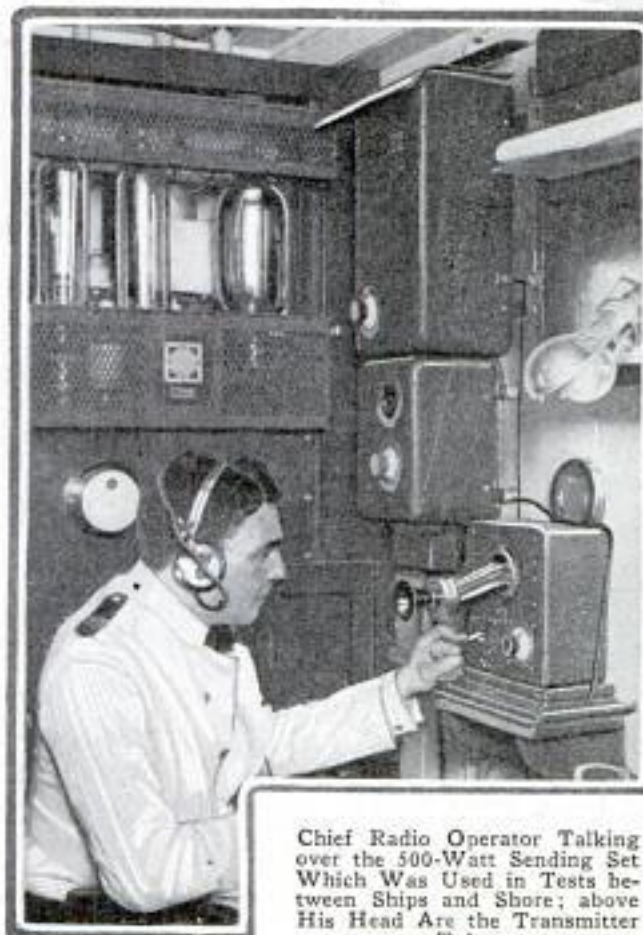
North German Line Columbus. 286
 Chief Radio Operator
 Radiophone Carries Voices over Ocean
 Telephone



Wireless-Phone System of S. S. "Columbus" Has Four-Wire Aerial, Running Length of Ship



Steamer's Antenna Tuning Coil Is of Tapped Construction and, to Afford Greater Selectivity, a Huge Specially Designed Condenser, Seen at the Upper Left, Is Employed



Chief Radio Operator Talking over the 500-Watt Sending Set Which Was Used in Tests between Ships and Shore; above His Head Are the Transmitter Tubes



Receiving Set Used Four Tubes, One Stage of Tuned Radio Frequency, Detector and Two of Audio; Sending and Receiving Were Done Together, Interference Being Avoided by the Use of Wavetraps, Taking In - Coming Messages a Few Meters above or below the Transmitter

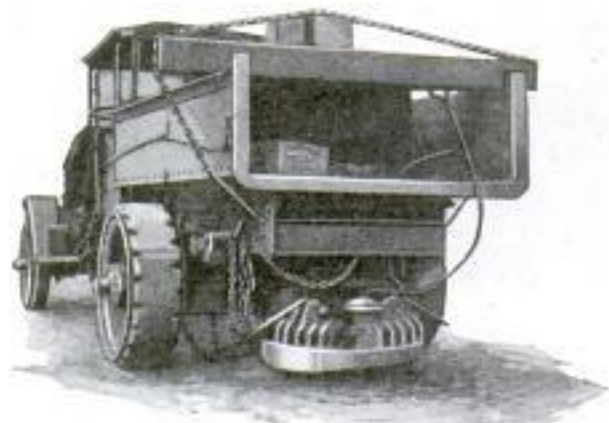
Electric Controller Mfg. Co.
2700 E. 76th St.
710

New York
Herald Tribune
9/10/25

POPULAR MECHANICS

GIANT MAGNET ROAD SWEEPER PICKS UP NAILS AND IRON

With a powerful magnet suspended from the rear of a five-ton automobile



Powerful Magnet on Motor Truck for Clearing Roads of Nails and Pieces of Metal

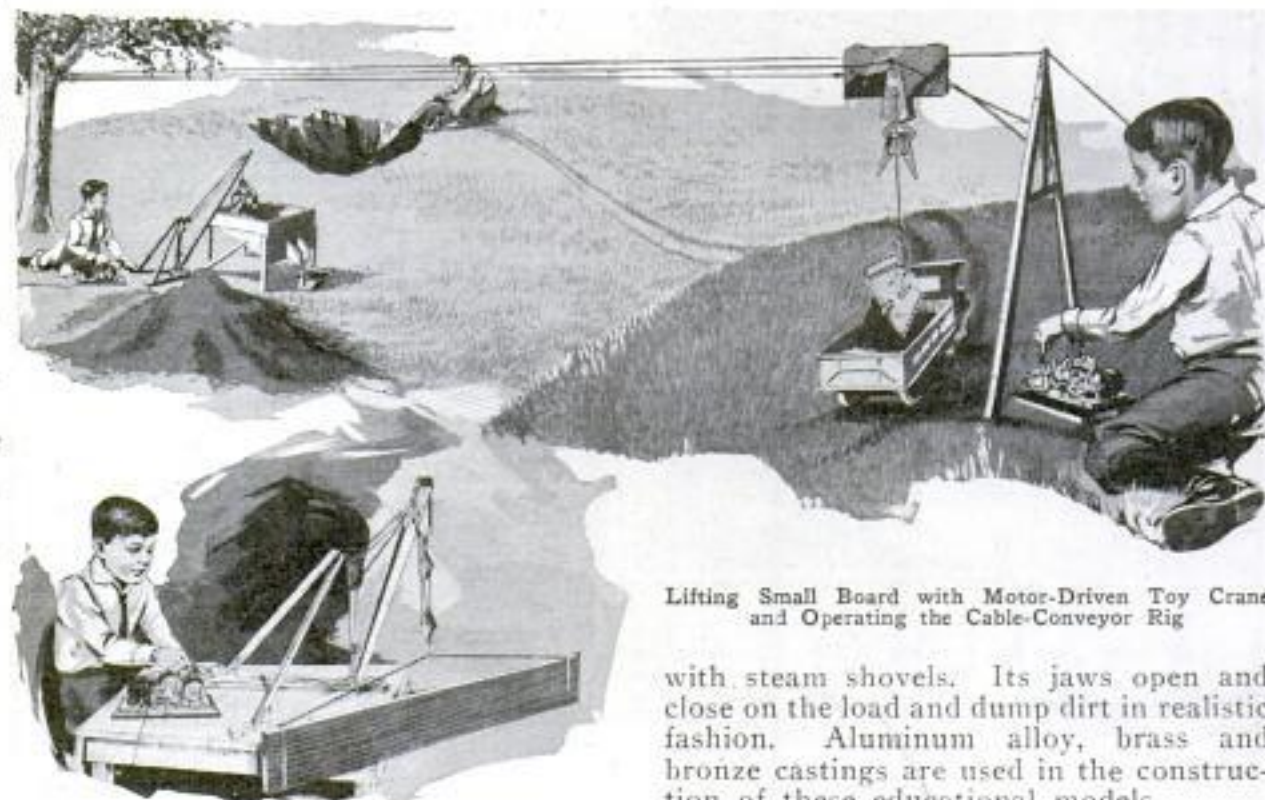
truck, more than 600 pounds of nails, tacks, bolts and pieces of scrap iron were removed from a seven-mile stretch of the Yellowstone trail, affording motorists great saving and relief as the puncture hazard was eliminated. The truck was driven back and forth, the magnet, four inches above the surface of the roadway and supplied with current from seventy-two cells of the locomotive storage type, lifting jagged bits of metal from the loose stone covering with ease. Many of them were so small that persons walking slowly along the road could not see them.

FORECAST OF SEVERE WINTER BASED ON WEATHER CYCLES

Basing his prediction on a study of writings before scientific records were kept as well as the weather reports over a long period, Father Gabriel, the astronomer-priest of France, declares that the winter will be as severe as those of 1553 and 1740. The lunar-solar cycle of 744 years, he says, is divided into two periods of 372 years each and four of 186 years. The weather follows these periods, he thinks. He made researches in ancient writings to learn of the seasons before official weather bureaus were established. Other astronomers also have observed that hard winters seem to occur in cycles.

MOTOR-DRIVEN BUILDING TOYS HELP DEVELOP TALENT

Model hoists, derricks, cable carriages and other construction units, operated by a tiny electric motor that obtains power from the lighting circuit, are intended to develop a boy's mechanical genius besides amusing him, since they actually function. For instance, the hoist has brake bands and lever, ratchets, pawls, gears and guards like those of the unit a contractor uses. The motor requires no transformer and ball bearings are grease-packed, providing for automatic lubrication. Included in the assortment, is a model clamshell bucket like that used



Lifting Small Board with Motor-Driven Toy Crane and Operating the Cable-Conveyor Rig

with steam shovels. Its jaws open and close on the load and dump dirt in realistic fashion. Aluminum alloy, brass and bronze castings are used in the construction of these educational models.

Iron model - Noble Mfg. Co. Hartford, Conn.
249 Pearl St.

339

261



The Three Parts into Which the "Shenandoah" Broke When the Great Airship Was Torn Apart by a Terrific "Line" Squall While Flying over Ohio on Her Ill-Fated Western Trip

What Happened to the "Shenandoah"?

Navy Still Believes in Usefulness of Lighter-Than-Air-Craft and Will Continue Experiments to Develop Them

UNDAUNTED by the wrecking of America's first native-built Zeppelin, the "Shenandoah," with the loss of fourteen lives, the navy is prepared to continue experiments with the huge airship "Los Angeles" and to build another and bigger fighting craft to replace the lost "Daughter of the Stars," provided congress appropriates the necessary funds.

While two investigating boards were still delving in the ruins of the big ship, wrecked by a "line" squall over the hills of southeastern Ohio, Secretary Curtis D. Wilbur declared he had not lost faith in the ultimate triumph of lighter-than-air ships as adjuncts to the fleet.

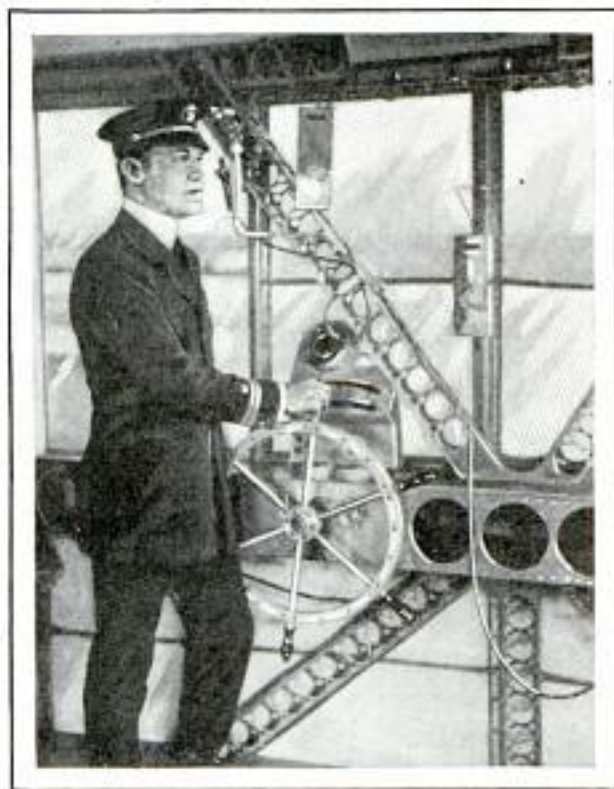
"They have shown too much promise to be discarded," he declared, "and at the same time have not altogether proven themselves. Further experiments, along the lines of those already made, are necessary before we can say

that the Zeppelin-type ship is or is not a success."

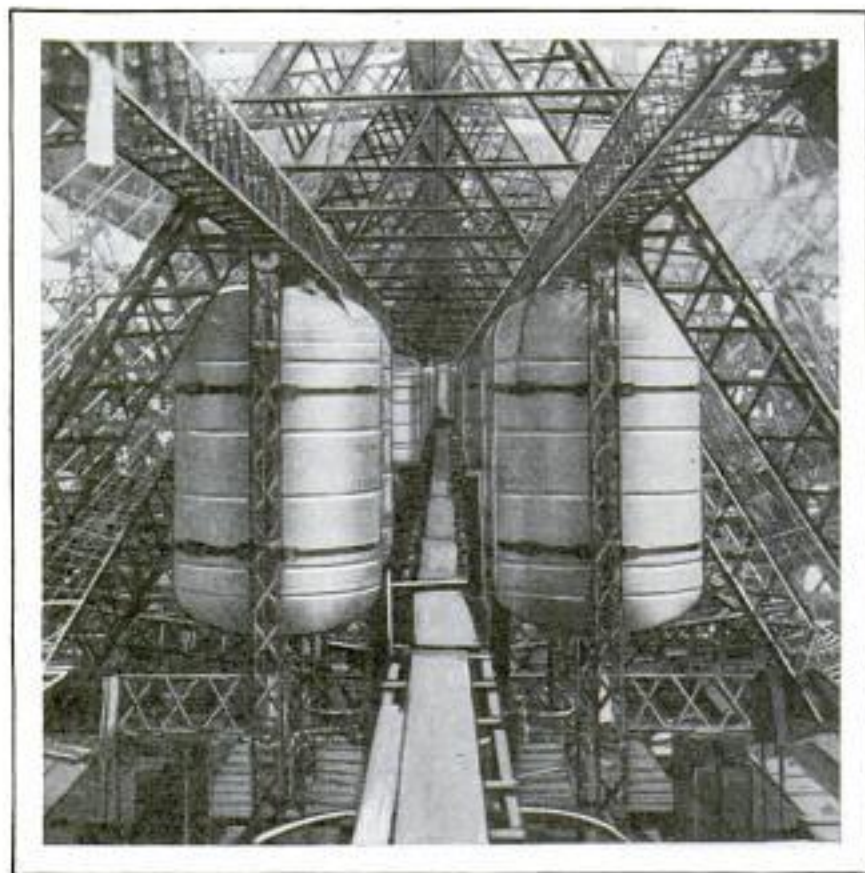
Weeks before the "Shenandoah" disaster, plans had been made to build a second great naval air station at San Diego, Calif., and transfer both the "Shenandoah" and the "Los Angeles" to the west coast.

Specifications also had been prepared for a super-ship, more than 100 feet longer than the "Shenandoah," and with nearly three times her gas capacity, to cost about \$6,000,000. If congress provides funds for this program, these plans will be modified to take advantage of the lessons learned in the loss of the first American-built Zeppelin.

Contrary to all newspaper reports about the accident, the "Shenandoah's" failure, in the opinion of the navy department, was due neither to a change in the water-recovery system nor to the elimination of ten of the original eighteen helium-gas escape



The Control Car in Which Twelve Men Perished When It Was Wrenched from the Bag



The Narrow "Cat Walk" down the Keel, and Some of the Huge Duralumin Gasoline Tanks; Bunks for the Crew Were Interspersed between Them

valves, a theory suggested by Capt. Anton Heinen, German adviser in the construction of the ship.

Instead, according to reports made to Secretary Wilbur by Rear Admiral Charles W. Dyson, naval constructor and head of an independent investigating board representing the navy secretary, the ship broke because of the failure of the lugs used to fasten longitudinal brace wires to the girders of the frame. While the ship was cigar-shaped, she was not round, but was formed by connecting the longitudinal ribs, running the length of the ship, with short girders, so that the exterior, after the aluminum-painted cotton cover was in place, presented a series of flat facets. The space between each pair of ribs and each pair of adjoining girders formed a rectangle, and this was braced by two crossed steel wires, attached at the ends by duralumin lugs of a somewhat broad V-shape. Duralumin, the material of which the girders and ribs, gasoline tanks and other metal parts of the ship was made, is a composition of aluminum, copper and manganese, with the tensile strength of mild steel and only one-third of its weight.

Survivors testified that as the ship plunged up and down in the terrific cur-

rents of the line squall, rising and falling from 3,000 to 7,000 feet at a single pitch, they heard several sharp sounds, which they described as resembling the breaking of fiddle strings. Examination of the wreckage disclosed that a number of the lugs holding the steel brace wires had torn out the four rivets which held them to the frame, while the ends of others, where they were drilled for the wire fastening, had snapped off.

With these wires gone the rigidity of the frame would have disappeared and the ribs and girders might as well have been hinged together, since there was nothing left to prevent their folding up like the sides of a paste-board box after top and bottom have been removed. Whether the

wires snapped before the control car dropped off, carrying Commander Lansdowne and eleven others of the fourteen victims to their death, may never be known, but the actual breaking up of the

DIRIGIBLE FATALITIES

Other airship accidents included in aerial history are:

December 21, 1923, French dirigible "Dixmude" fell in the Mediterranean after having presumably been struck by lightning, and the officers and crew numbering fifty-two men, were lost.

February 21, 1922, the giant army dirigible "Roma," crashed to earth in flames near the Hampton roads army base.

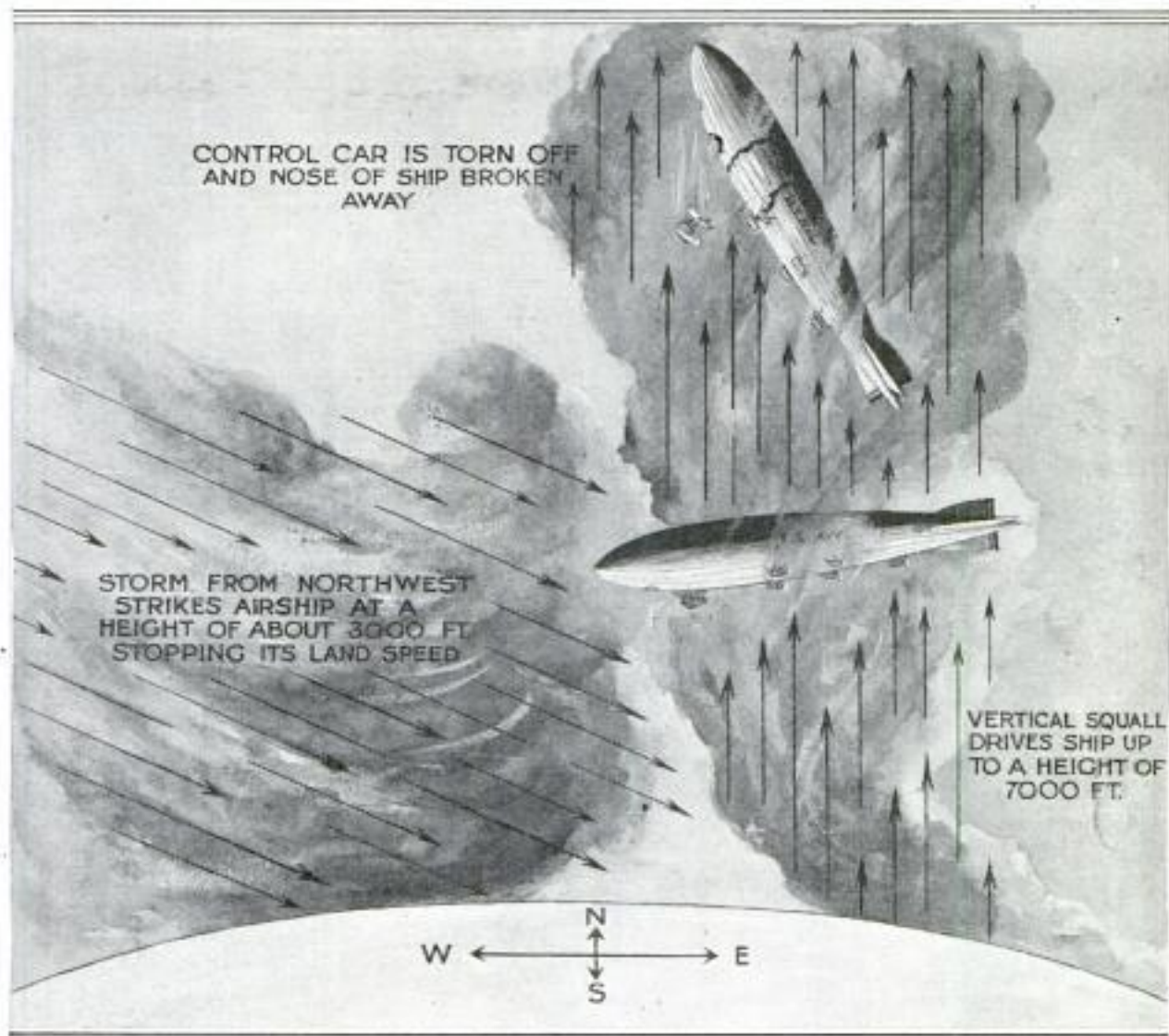
January 29, 1921, the British dirigible "R-34," was wrecked at her base by a strong wind. No fatalities.

August 24, 1921, the dirigible "ZR-2" met with disaster over the Humber river, England. Forty persons, including sixteen Americans, lost their lives.

July 15, 1919, British airship "NS-11" fell into the North sea with a loss of twelve lives after being struck by lightning.

September 9, 1913, Zeppelin "L-1" destroyed off Heligoland with loss of fifteen lives.

October 13, 1913, Zeppelin "L-2" exploded over Johannisthal airdrome, killing twenty-eight.



Artist's Diagram of the Line Squal, a Vertical Fountain of Air Moving at Tremendous Speed, Which Hurled the 680-Foot Ship 7,000 Feet above Ground and Broke Its Back

hull and the loss of the control car, were separate and distinct accidents, though both were due to the same causes.

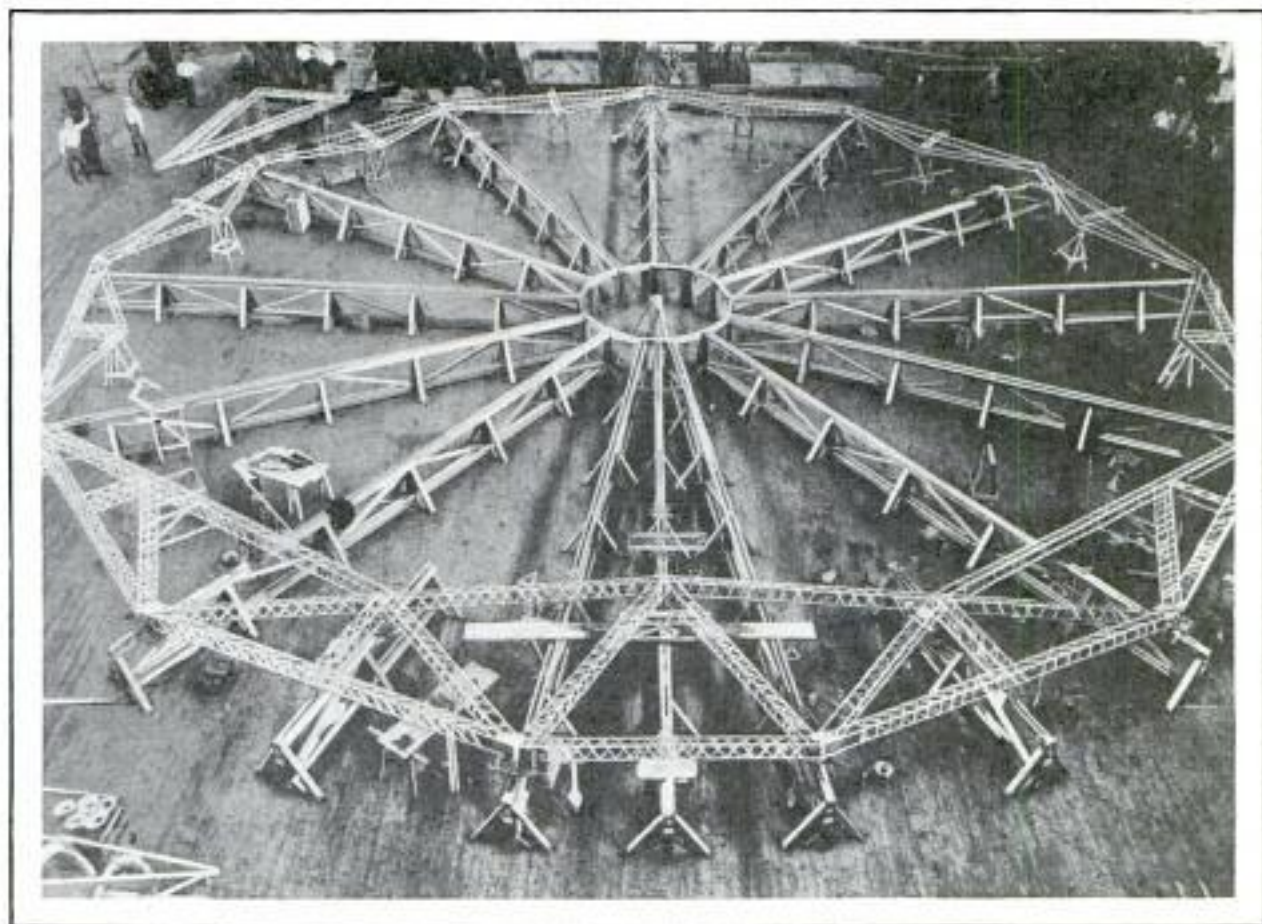
The recording barometer, which was recovered after having been taken away by the souvenir hunters, shows that the hull broke up at an altitude of 7,000 feet, after shooting 5,000 feet into the air at a terrific pace.

The construction was designed to take care of average flying conditions, and had proved successful in several storms, but it was not built to stand the strain of plunging almost straight up in the air, or straight down. When the ship got more than twenty or thirty degrees out of level, the strain on the control-car guy wires became too great and they tore loose, and the struts quickly followed.

Newspaper reports quoting members of the crew as saying that the water-recovery system had been changed, over the protests of Commander Lansdowne,

and that in making the change two tubular girders were cut, are denied by the navy department and by Capt. Steele, commander of Lakehurst air station. A new water-recovery system, which extracts water from the exhaust gases of the motors and returns the liquid to canvas ballast bags to offset the loss in weight through the burning up of the gasoline consumed, was being tested out on the forward engine on the starboard side, but the other four engines all were operating with the old system, which had been in use on previous flights.

The elimination of ten of the original eighteen escape valves for helium gas likewise was not a factor in the accident, in the opinion of naval officers. As built, each of the eighteen gas bags had its separate safety valve, which released gas when heat or rapid ascent expanded the helium to the point where there was danger of bursting the bag. To get away



Assembling a Midship Frame of Duralumin Girders; These Frames, Spaced at Short Distances, Were Linked by the Longitudinal Ribs, and the Whole Braced by High-Tension Steel Wires

from the high rate of leakage incident to so many valves, ten were eliminated and eight left. The eighteen bags were all connected by tubes, however, and those without valves exhausted through the tubes into the bags which had valves. The system had been thoroughly tested, and worked successfully, according to Capt. Steele and other officers.

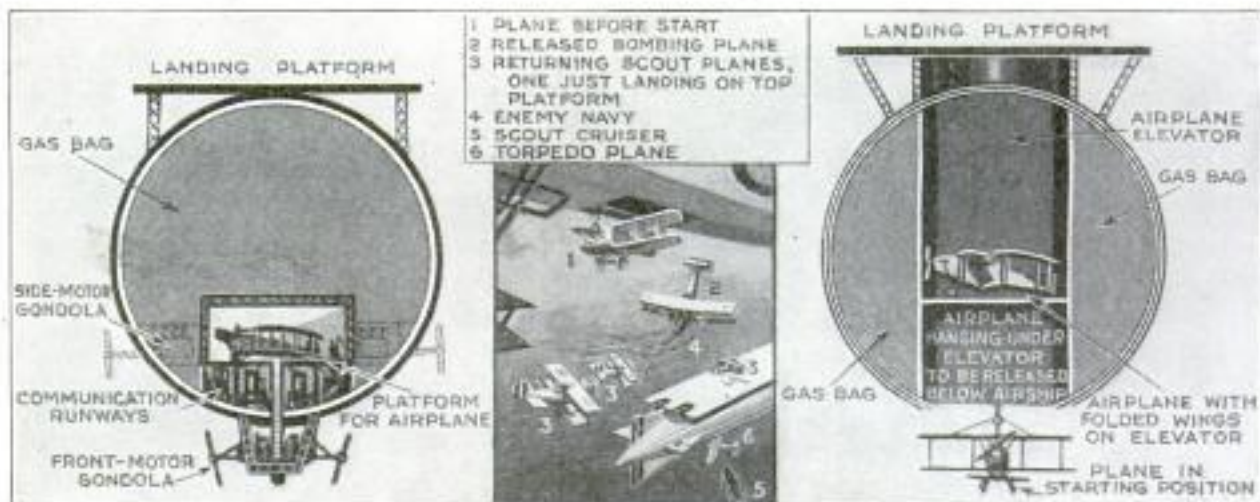
When the ship broke up, the forward end, some 150 feet in length, rode away as a free balloon, and was navigated to the ground by the seven men who had been in their bunks along the "cat walk," the narrow runway down the keel. With the assistance of a farmer, who snubbed a trailing rope around a tree, the nose section was tied down, with all gas bags intact, upsetting reports that some had burst. In fact, it was necessary to borrow the farmer's shotgun and shoot the bags full of holes before the ship could be safely secured to the tree.

After the control car had broken off and the nose departed on its wild ten-mile cruise, the remainder of the ship, 530 feet in length, began to break up. A section of about eighty feet amidships crumbled and dropped away, carrying with it the two forward power cars, to one of which

the new water-recovery system had been fitted. That left some 450 feet still in the air, with three power cars and engines running. Despite the fact that three propellers were working, the storm was so great that this section, after blowing some distance, swung around and started toward earth, moving backward or tail first. It swept down through the trees on a wooded hillside, and eventually struck in an open meadow. As it grazed the ground two of the power cars, situated on either side not far back of the broken end where the midship section had torn away, were knocked off and fell some distance from the wreckage. The other power car, situated near the tail, remained under the ruins.

Lieut. W. W. Richardson, chief photographer of the bureau of aeronautics, was the senior officer on this section. When the storm struck the ship, he was asleep in his bunk at frame eighty, or about 300 feet from the stern of the ship. In his testimony before the investigating board he told how the 680-foot craft began to pitch violently, shooting down at an acute angle into the trough of the giant air waves, and then pitching, nose up, for thousands of feet on the crest of a rising

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Details of Plan Proposed by British Admiralty to Use Zeppelins as Motherships for Planes, Launching Them through Bottom, with Broad Landing Platform Built on Top of Gas Bag

air current. He crawled out of his bunk and had started to make his way toward the stern when the break-up began. The angle at which the ship was rising and falling was so acute that, as he clung to the bunk rods with both hands, at times his feet were hanging in air, and at others, as the stern sank, he was flat on the cat walk, holding his body back with hands braced above his head.

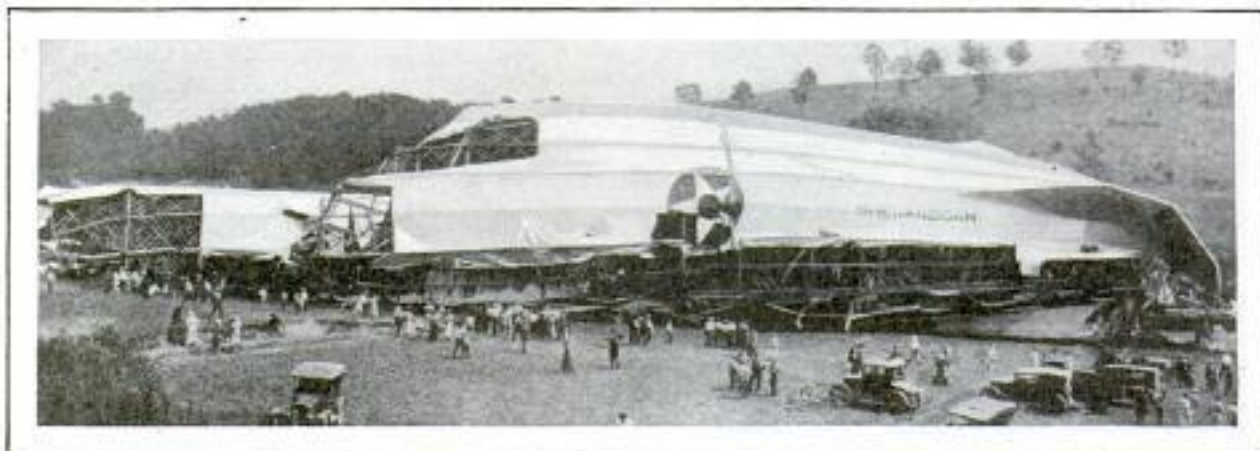
Whether the accident could have been avoided may always remain a mystery, since every one in the navigating cabin, where the control instruments were located, perished. Aviation experts agree, however, that the ship was not built to withstand the strains she encountered. The only thing that might have saved the "Shenandoah" would have been a better weather-report system, which would have announced the storm in time for the ship to steer around it.

The ship, officials admit, was out of date and actually obsolete before she was built, but represented the best that was available to the navy at that time. She

was based on plans made by American officers from a German Zeppelin brought down in the American sector in France, in 1918. The German ship in turn represented German craft of about the year 1916, and the Zeppelin builders had already, at the time of that vessel's loss, progressed considerably beyond her design, and have gone even farther in the passenger-carrying ship "Bodensee," built after the armistice.

The navy, however, took the German designs, improved on them in so far as possible, and with the assistance of Capt. Heinen, a German Zeppelin builder brought over for the purpose, built the "Shenandoah." The German builders who came over with the "Los Angeles," built for the navy in Germany, declared the "Shenandoah" was too long and unwieldy, and pointed out that the "Los Angeles" was a bigger ship, though shorter, because her greater diameter gave her a larger gas capacity.

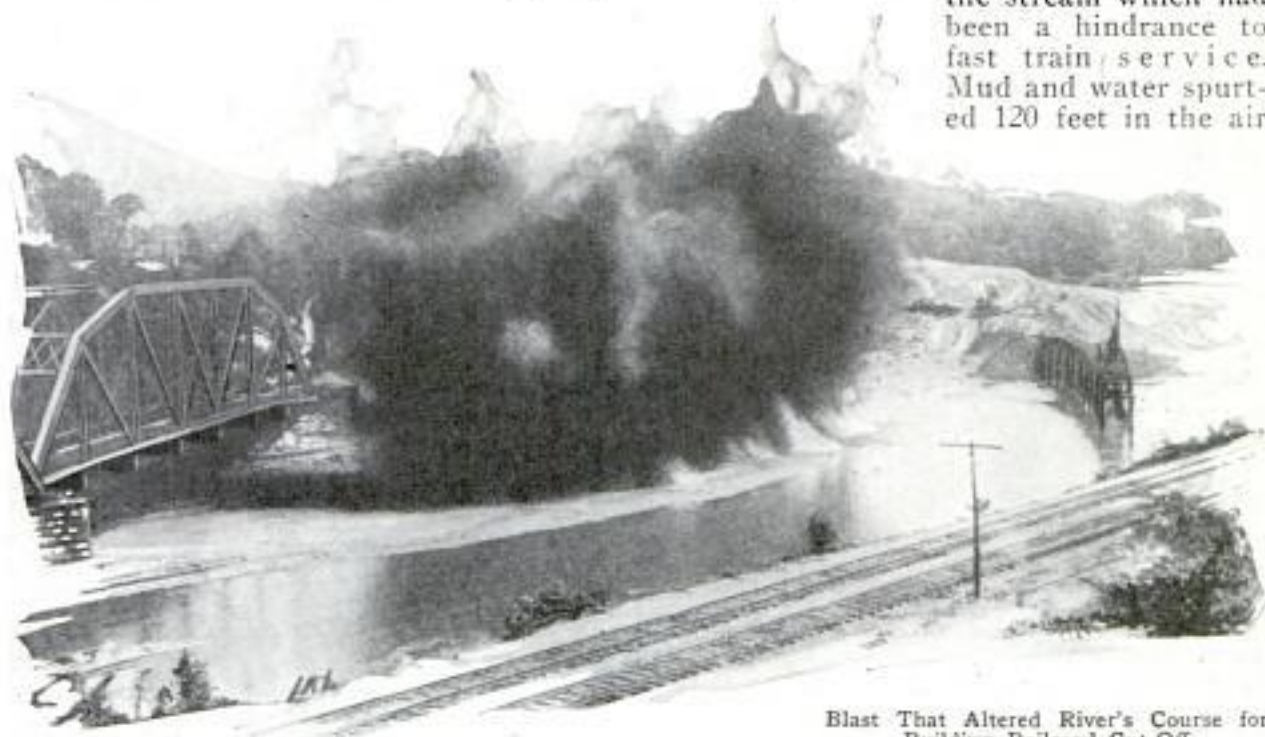
Summing up the defects of the ship, the aircraft engineers agree in general



Wreckage of the 450-Foot After Section of the "Shenandoah," Which Landed Safely with More Than a Dozen of the Crew After the Nose Broke Loose and the Center Section Collapsed

that, while more graceful than the "Los Angeles" because of her longer and slimmer lines, her length was too great in proportion to the diameter, and too unwieldy for the same reason. They also agree that, in the future, control cars should be rigidly attached to the hull, and that the longitudinal bracing should be improved.

What effect the loss of the navy ship



Blast That Altered River's Course for Building Railroad Cut-Off

will have on projects for commercial aircraft lines remains to be seen. Negotiations were on foot at the time of the disaster to lease the "Los Angeles" to a private company, headed by John Hays Hammond, Jr., the inventor of the wireless-controlled boat.

In accordance with the terms by which the "Los Angeles" was built in Germany, she cannot be used for military purposes but only for experimental work; so it was proposed to rent her to the private company for a commercial air line between New York and Chicago, the navy supplying the operating crew and benefiting by the experience gained.

Plans also are on foot for a ship of the "Shenandoah's" size, or larger, built entirely of metal, even to a metal skin, instead of the cotton covering of present Zeppelins, and designs have been brought to America by Capt. Karl L. Leps, of Munich, Germany, a former associate of Count Zeppelin's, for a non-rigid airship, 950 feet long, equipped with ten motors and carrying a 700-foot Pullman-like gondola, with room for 300 passengers.

GIANT BLAST TURNS A RIVER INTO NEW CHANNEL

How explosives aid in the conquest of nature was graphically illustrated when a 1,700-pound charge of dynamite, in a few seconds, altered the course of the Schuylkill river at Port Clinton, Pa., permitting a railroad access to the town. The blast helped cut off a U-shaped curve in the stream which had been a hindrance to fast train service. Mud and water spurted 120 feet in the air

when the charge was fired; then the river obediently turned into the new path cut for it. The man-made channel is 1,200 feet long and reduces the length of the river nearly 2,000 feet.

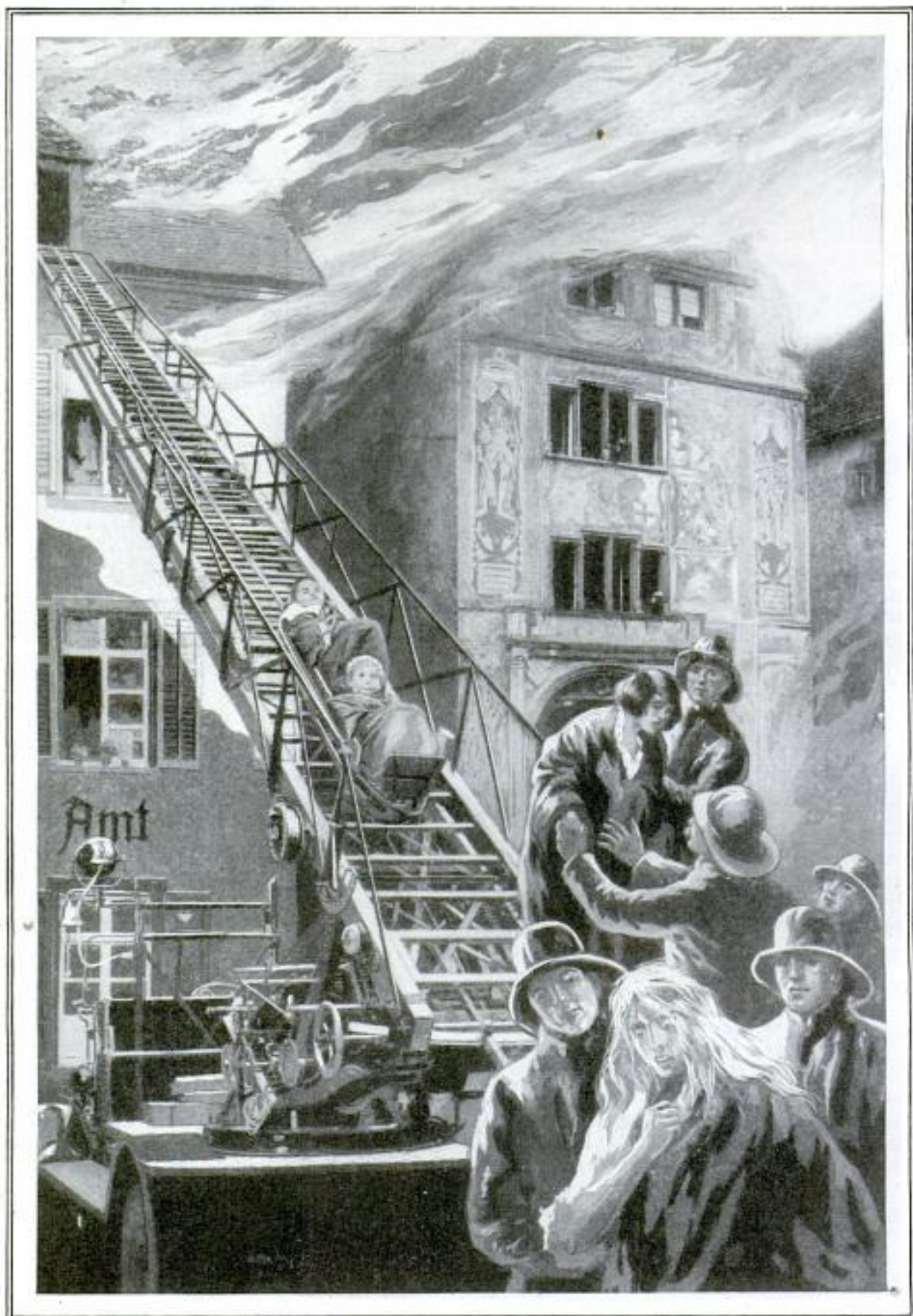
REDWOOD LOG FOUND IN SAND AS GOOD AS GOLD MINE

Lumber valued at \$3,000 and thirty circular dining-table tops, each worth \$75, were cut from a redwood log found partly buried in the sand by an Oregon man, who declared that the discovery was almost as good as a gold mine. Two days' work with team and scraper were required to unearth the huge log, which was eight feet in diameter and fifty feet long. According to the rings, it was 527 years old and had lain in the same place for many years before anyone had thought it worth the trouble to remove it.

☐ In certain parts of Africa, the locusts attain a length of four inches and feed on mice.

20 miles north of Reading, Pa.

George Walker Cannon Beach, Ore.



Ending the Difficulty of Getting an Invalid or Fire-Crazed Person down the Tall Fire Ladders, a Newly Invented Cable Car Uses the Ladder Rungs for a Runway

SLIDING SLED ON FIRE LADDER AIDS IN RESCUES 16

Attachable to any ladder but specially adapted to that used with the fire apparatus, a sled and cable arrangement quickly assists persons to the ground and may also be used for hauling up water buckets or fire extinguishers. The car has side guards, straps and footboards and may be used for two children or one adult. It slips down the ladder and is drawn back and kept from falling by means of a cable controlled at the top. In a test, a family of four persons was taken from a floor nearly seventy feet above ground in seven minutes.

283

CENSUS OF RELIGIONS TO SHOW CHURCHES' GAIN OR LOSS

How many men and women in the United States are church members; how many children are enrolled in Sunday schools; the number of ministers; value of church property—these and many other facts are to be gathered next year at the taking of the religious census for the entire country. This is done every decade, just as the general census is taken, years ending in six being chosen for the task. To get the desired information, the government sends out two sets of questionnaires through the census bureau. One calls for data concerning the church itself, and the other relates to the minister, priest or rabbi in charge of each congregation. The report of the last religious census taken in 1916, is available in the larger libraries.

New York Times 8/23/25

SHIELDS TO MARK ALL ROADS AS AID TO AUTOISTS 236

After many years in which state and city governments and automobile clubs have borne the principal burden of highway marking, the United States has now started to mark most of the chief roads in the country with a uniform shield sign. This will usually bear the number of the road, the name of the state and the initials "U. S." The public-roads commission is in charge of the installation and maintenance of the signs.

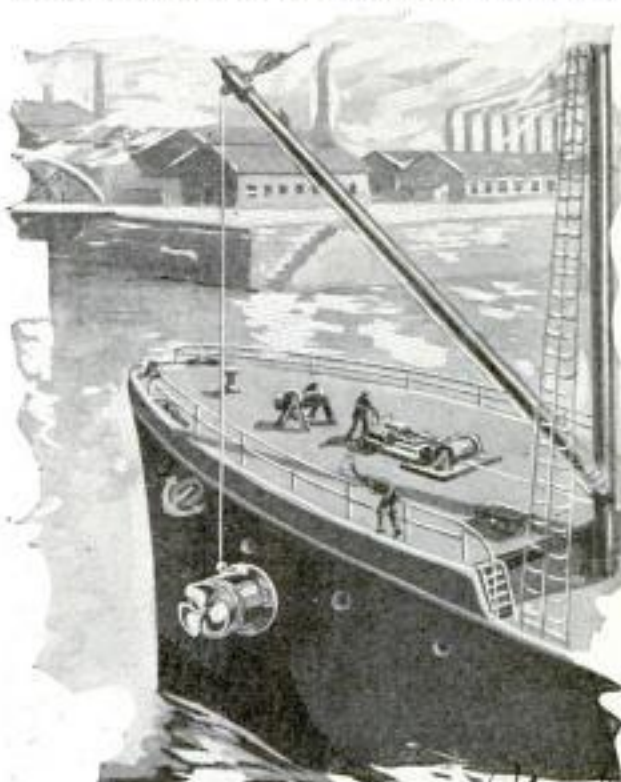
Sample Shields Government Is Preparing to Mark Principal Auto Highways for Guidance of Motorists



Es. E. Mac Donald, Chairman Joint Board Inter. State

MAGNET-FIXED MOTOR ON HULL TURNS SHIP IN DOCK 220

Steering ships into narrow slips or docks frequently results in damage to the



Courtesy T. Bernard Percy, Propeller Attached to Iron Side of Ship by Magnet for Use in Docking

397a - bridge

hulls from bumps against the wharfing of sidewalls. A remedy, called the "limpet," has been devised. It consists of a small propeller, with a portable motor, which is attached to the iron hull with an electromagnet under the water line. With several of them in use at various points of the ship, the craft can be steered easily.

Road U.S. London Eng

SNOWSHOES BUILT FOR HORSES TO CROSS MOUNTAINS

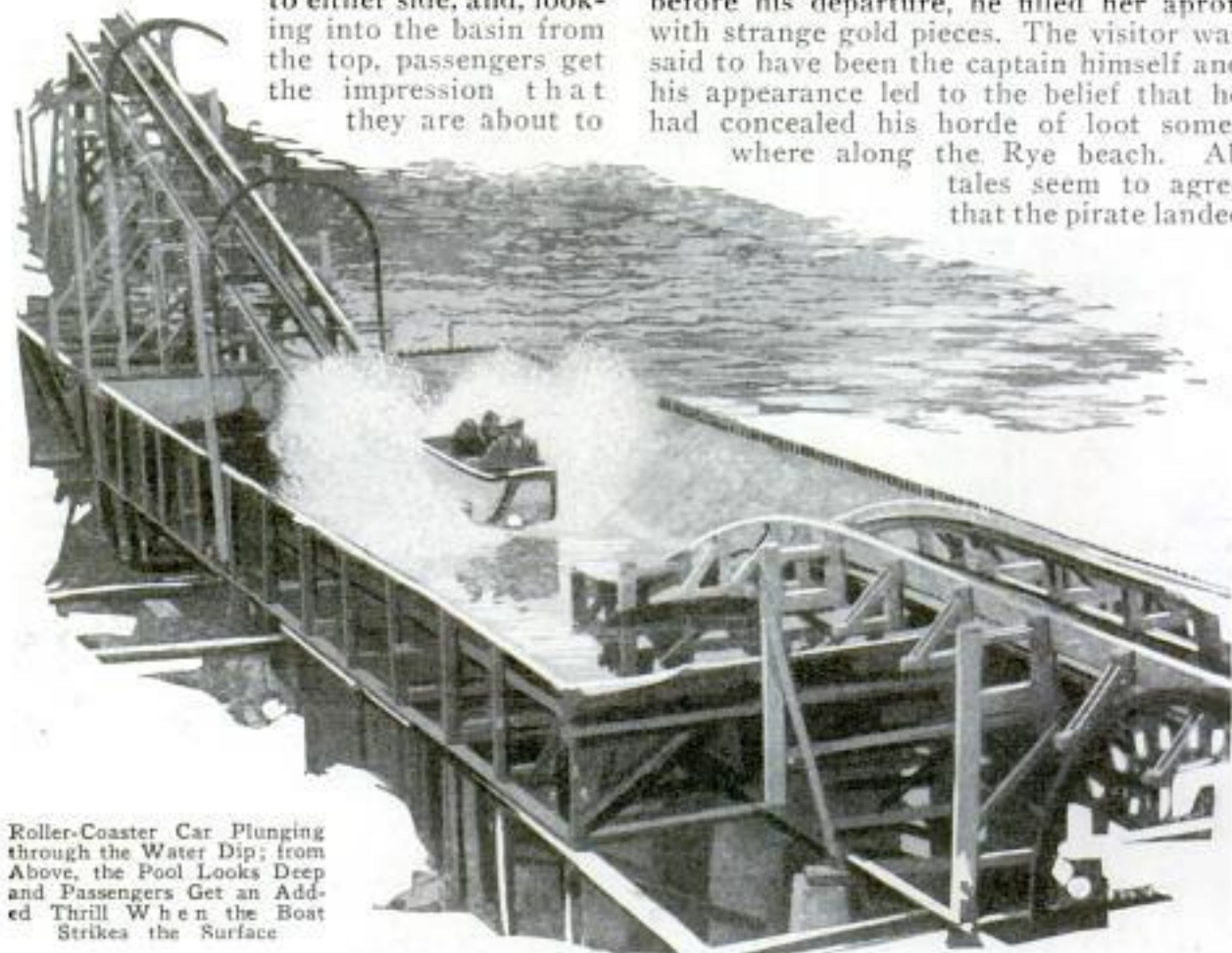
Boards about a foot square were fastened to horses' feet to serve as snowshoes while the animals were being taken over the mountains for construction work on a highway between Idaho and Montana. The shoes prevented the horses from sinking into the drifts, enabled them to travel with less fatigue and they learned to use them quickly.

new York Times 5/17/25

Chambers Highway

346 ROLLER-COASTER WATER DIP — ADDS THRILL TO RIDE

Delights of the "chute the chutes" and the scenic railway are combined in a roller coaster at Wembley, Eng., in a pool of water placed at the bottom of one of the steep descents. The car shoots down the incline and across the tank before ascending the next grade. Spray is thrown to either side, and, looking into the basin from the top, passengers get the impression that they are about to



Roller-Coaster Car Plunging through the Water Dip; from Above, the Pool Looks Deep and Passengers Get an Added Thrill When the Boat Strikes the Surface

fall into a deep pool. In reality, the tracks are placed just a few inches below the surface so there is no danger of the car leaving the rails.

329 MYSTERY OF PIRATE'S TREASURE IS STILL UNSOLVED

Although some historians maintain that Capt. Kidd did not bury any treasure, but spent all before his death, the popular belief that one of his chests of gold lies imbedded in the sands somewhere near New York persists in spite of the fact that repeated searches have disclosed no trace of it. All stories agree that a Negro slave helped him hide the box and was then killed and buried on top of it by the fierce pirate. Several years ago, laborers

digging near the Andre monument in Sleepy Hollow, unearthed the headless skeleton of a colored man that had been long interred. The bones were reputed to be those of Capt. Kidd's murdered slave, but the treasure was not found. Another tradition relates that one stormy night, a mysterious stranger, evidently a sailor, begged shelter from a farmer's wife near Rye, N. Y. The next morning, before his departure, he filled her apron with strange gold pieces. The visitor was said to have been the captain himself and his appearance led to the belief that he had concealed his horde of loot somewhere along the Rye beach. All tales seem to agree that the pirate landed

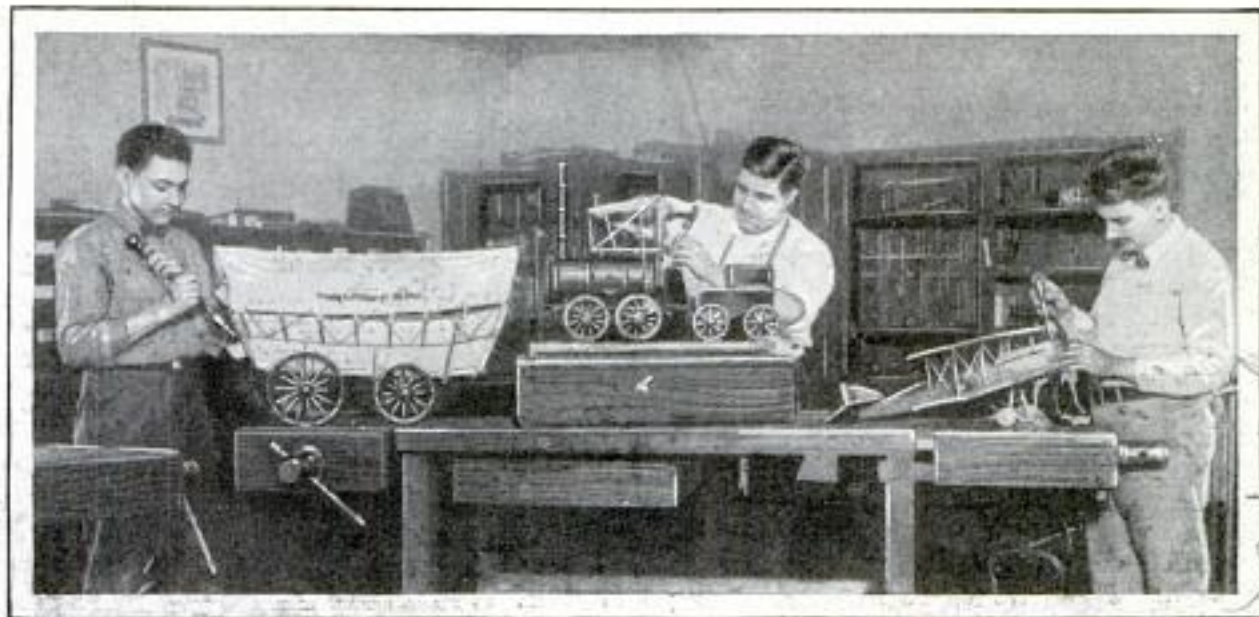
on a "dark and rainy autumn night" and that the black slave carried a stout coffin in which was inclosed the treasure. Another account has it that a fisherman of Great South Bay, L. I., dreamed three successive nights that, at a certain spot near by, Capt. Kidd's doubloons lay buried. He arose before daybreak and rowed his boat to the place. Next morning, he was found lying unconscious across his own doorstep. His boat was never found, but the spade, still wet and with sand clinging to it, was discovered in a graveyard miles away. When revived, he declared that he had no recollection of what had happened after he started to dig, or how he returned to his home. The notorious adventurer's gold is said to have been hunted more frequently than any other hidden treasure.

Chicago Daily News

8/31/23

Copyrighted material

Washington, D.C.



Preparing Models of Prairie Schooner, Early Locomotive and Airplane for Display at Smithsonian Institution to Illustrate Progress in Methods of Transportation from Pioneer Days to the Present Time.

STORY OF TRANSPORTATION TOLD IN MODEL DISPLAY

Man's progress in developing better ways of transportation is graphically shown by a display of models in the Smithsonian Institution. The exhibit goes back to the days of the plodding prairie schooner, carries the story through the evolution of the locomotive from the first crude types, and shows modern methods by a diminutive airplane. Each model has been constructed with a view to accuracy and emphasis on important stages in the history of travel.

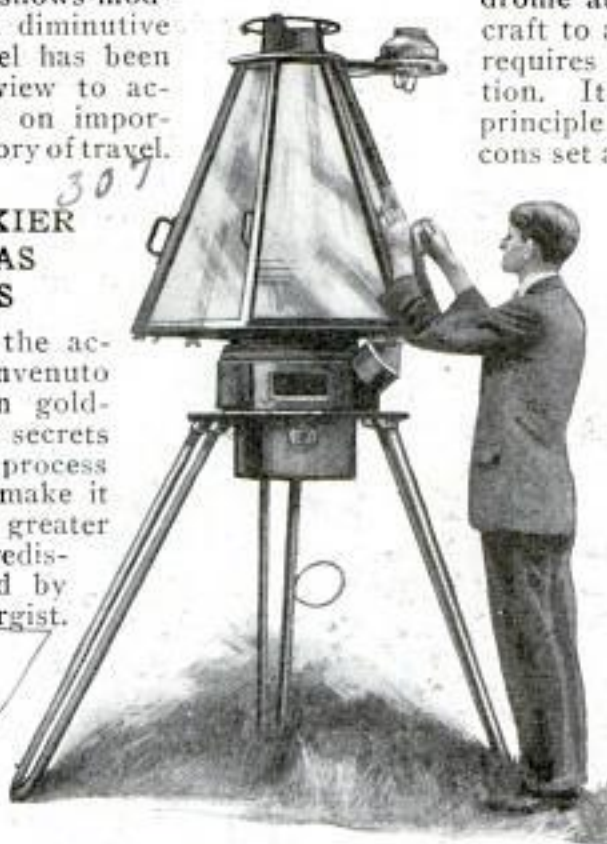
LIGHTER, BULKIER GOLD SEEN AS AID TO ARTS

Credited among the accomplishments of Benvenuto Cellini, famed Italian goldsmith, and one of the secrets that died with him, a process for treating gold to make it lighter in weight but greater in volume has been rediscovered and patented by an eastern metallurgist. The method, it is expected, will effect a saving of eight to eighteen per cent in the weight of articles manufactured of gold, and the metal will also withstand tarnish and

stains. Greater use of gold in jewelry and a saving in millions yearly are anticipated from the process.

WONDER LIGHT FOR AIRWAY IS REGULATED BY SUN

Lighting automatically at sundown and going out at dawn, an acetylene beacon installed at the London terminal aerodrome at Croydon, helps direct craft to and from the fields and requires practically no attention. It operates on the same principle as the smaller beacons set along the airways in this country to guide flyers with the night mails. A so-called sun valve controls the supply of gas which is taken from a storage tank in the base. This valve is so sensitive to light that it closes in the morning and opens again at night or whenever darkness occurs for some other reason. Renewal of the gas tank is about the only work that need be done and one container holds a supply sufficient for several weeks.



Automatic Beacon at English Air Field; Light-Sensitive-Control Valve at Right

Irish wolfhounds are the tallest dogs in the world.

no other information

*Victor Navignon,
General Plate Co.,
Attleboro, Mass.*

To Make Your Work Easier

8-11 A. M. Washington D. C. Sunday, W. C. 2

New Science Aims to Reduce Fatigue, Fit Square Pegs in Round Holes and Remedy Faults in Human Mechanism

By FENN SHERIE

London, Eng.

102

SINCE history has shown that many a poor student has attained greatness in the world, a new science has been developed in England designed to make work easier, fit "square pegs in round holes" and remedy the faults of the human mechanism.

In the past, the list of illustrious dunces includes such names as Napoleon, Wellington and Cecil Rhodes. It is obvious, therefore, that the school report is of comparatively little value in determining ability. Realizing this, the scientist has approached his subject from a new angle. His tests are to learn not what a youngster has done in the past, but what he is capable of doing in the future.

Some young persons develop a distinct leaning toward a certain trade or profession at an early age, while others, though revealing no definite bent, may have their talents hidden beneath the surface. Generally speaking, it is fairly easy to ascertain whether a youngster possesses what is known as a literary mind or a mechanical mind (these are the two main classifications into which most people may be divided), but when it comes to testing specific abilities the task is more difficult.

Here, for instance, is a young man about to start on a career. He has shown no particular aptitude at school, but thinks he would like to be an engineer.

Now it may be that he has a natural talent for things mechanical; his imagination may have been fired by something he has seen or read about the romance of engineering; or he thinks he ought to be an engineer because his father was one.

The scientist has to find out whether the boy is a potentially successful

engineer, and, if so, what branch of it he should take up. Having studied the youngster's school report and interviewed him in a friendly manner concerning his hobbies, the examiner now endeavors to ascertain his standard of general intelligence.

He sets him a number of questions, each of which has a definite purpose. Some of them are such amusing "posers" that readers may like to try them on their friends.

For example, to test the youngster's clearness of thought, a typical problem is this:

"Draw a triangle unless there are more days in the week than there are months in the year, in which case draw a circle."

The average boy of fourteen should be able to do this with ease.

As a test of common sense, the youth is asked to examine a number of statements and see if he can find anything wrong with them. Here are two examples:

(i) "The horse obeys his master because his eyes magnify, so that his master seems to the horse to be much larger than himself."

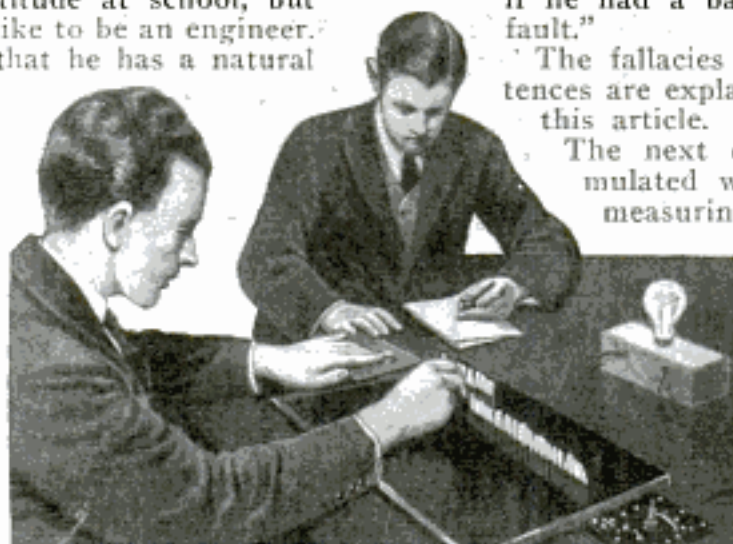
(ii) "John James, who had married his widow's sister, used to say that if a man had a bad sister it was his misfortune, but if he had a bad wife it was his fault."

The fallacies in the above sentences are explained at the end of this article.

The next questions are formulated with the object of measuring imaginative power. Here is one:

"If people had no teeth, how would their life be different from what it is now?"

One bright youngster replied to this: "All of us would have to use scissors to cut our nails!"



Divided-attention test for locomotive engineer in which he taps rapidly with two fingers of the left hand, the taps being automatically recorded, while with the right hand he endeavors to move a number of pegs quickly from one place to another; at intervals the examiner lights the electric light and the examinee is supposed to stop all work while he extinguishes it by pressing a switch with his right hand.

Of the several ingenious questions propounded as a test of ability to reason, the following is a typical one:

"My brother writes: 'I have walked from Byford wood today, where yesterday I had the misfortune to break a limb.' Can you guess from this which limb he probably broke—right arm, left arm, right leg, or left leg?"

The intelligent answer to this is, of course, "probably the left arm—since he walked and wrote a letter so soon after the accident."

According to his answers to a large number of such questions a youngster's ability to think, reason, and act can be gauged with remarkable accuracy.

In order to make the intelligence tests fair to those who have not the gift of expressing themselves in words, there are also a number of non-verbal tests, similar to those illustrated on page 726.

Next the examiner passes on to tests by which physical and mental capacities are measured together. For example, he produces a tray and a number of oblong strips, as illustrated on this page. He spreads the strips upon the table and informs the youth that, at a given signal, he has to pack the

strips into the tray. If the boy is casual, careless, hasty or unsystematic, he will probably commence to pack the strips as shown in (a). The examiner then waits to see how long it takes him to realize the futility of this method—or, rather, lack of method—and remedy his mistake.

The boy of normal mechanical intelligence will probably set about the task with some sort of system, trying first to fit each strip, in turn, into a given space

until he finds the right one. The boy of high mechanical intelligence, however, will commence by laying the strips upon the table in a row. He may then discover that they are graded at different lengths—see (b)—and this will enable him

to fit them into their positions with great rapidity.

Here is another interesting test. The boy is handed a tray containing a number of simple mechanical objects—such as a bicycle bell, a door lock, and so on—in pieces, and he is requested to assemble them. By watching his methods of going to work and timing the various operations, a great deal of valuable information may be obtained.

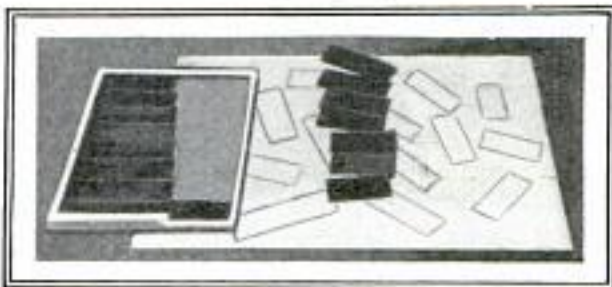
Similar tests have been devised to assist employers. Hitherto the selection of a worker has been decided by a brief interview, and his natural ability gauged by guesswork. The scientist supplements this inter-



A TEST FOR "MECHANICAL INTELLIGENCE"
The applicant is required to stow the ebonite strips into the tray as neatly and quickly as possible.



(a) An unsystematic worker usually commences the task in the manner depicted above.



(b) A worker of high "mechanical intelligence" moves the apparatus to within easy reach, and stows the strips in order of size.

view with practical tests which have been tried and proved by experience. A famous firm of dressmakers recently had occasion to select a number of "learners" and began by studying the special abilities required, and then proper tests were devised. In the case of embroidery workers, one was for judgment of equal distances. It was carried out by means of cards upon which were printed a number of lines, some parallel and others diverging. Another consisted in showing the applicants a number of colored drawings of flowers and asking them to sort them, according to their personal tastes, into good, bad and indifferent.

To test the co-ordination of hand and eye and hand and image (or, in other words, to find whether a girl could aim straight with regularity), the candidate was given a sheet of squared paper and a pencil. A metronome was set in motion, beating one stroke to the second, and the girl was told to make a dot at the corner of every other square, keeping time with the "ticker." Next she was given a pin and the test was repeated—only this time she had to prick upward from beneath the paper.

To measure speed of movement and determine a girl's resistance to distraction (the latter is an important quality, for work girls will chatter to one another), a perforated zinc sheet was used. The girl was given a needle to which was attached a string and told to sew through the holes,

up and down, with one hand above and the other below the frame. After a little preliminary practice, the girl was told to carry out the operation as fast as possible and the time occupied in completing a line was noted. The test was now repeated in exactly the same manner, except that the examiner, after giving the word "go,"

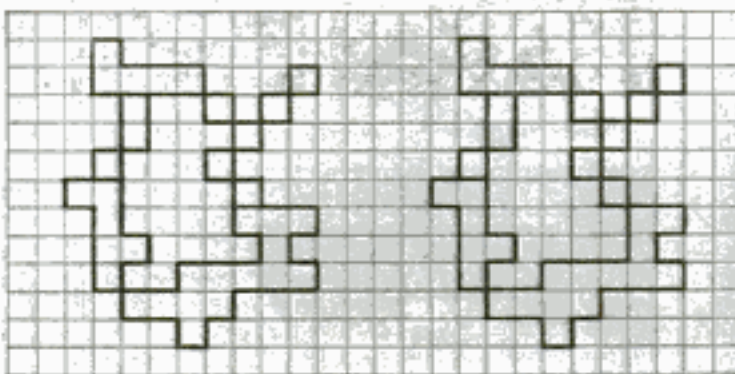
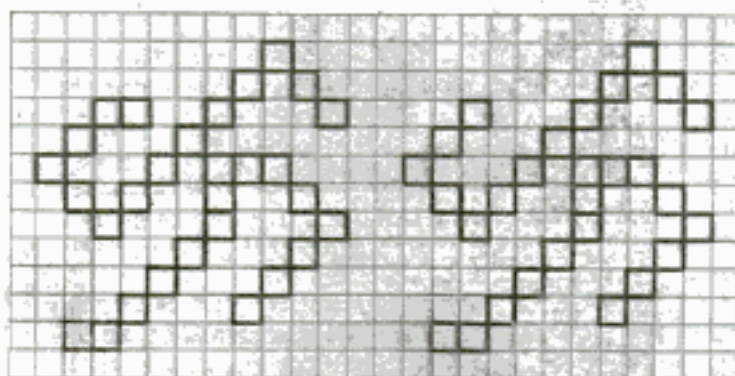
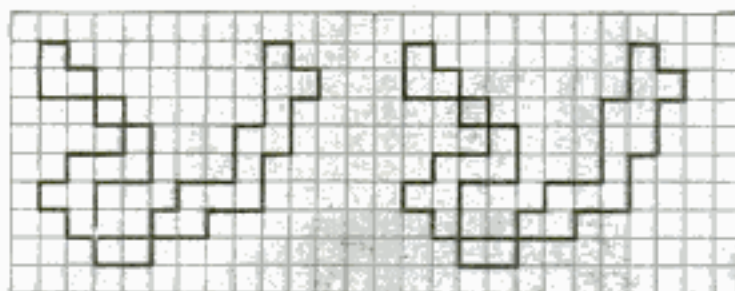
commenced to converse with the girl, asking her questions about her school, her hobbies and so on. According to the increase in the time taken, her resistance to distraction can be measured.

For each different branch of industry a special set of tests has to be devised. In dressmaking, the test for speed of work consists of tying a number of knots in a piece of wool in a given time (twenty knots a minute is good speed), while that for lightness of touch consists of folding fine tissue paper, making as few creases as possible. One of the most im-

portant tests for weavers is to ascertain their ability to notice discrepancies in patterns. This is carried out by means of a series of cards bearing designs similar to those shown on this page.

Some of the common-sense tests may be formulated so that they have a direct application to the particular job for which the candidate applies. Here is an example: A big laundry recently had a vacancy for a girl clerk to deal with orders which came by post and telephone. Among the questions put to her was this:

"Ten minutes after the van has left to



ALMOST AS BAD AS "CROSS-WORDS"!

A test applied to weavers. In each of the above pairs of patterns there is a slight difference. Can you find it? Nine seconds are allowed for each pair.

collect the washing in a certain district you receive a telephone message from an important new customer on the round, requesting that some linen be collected on that day. What would you do?"

Comparatively few applicants thought of the correct answer to this, which is: "Telephone to the house of one of your regular customers where you know that the roundsman is due to call and ask them to oblige you by telling him, when he arrives, to ring you up."

Another branch of the new science is that which aims to study workers and working conditions with a view to remedying faults in the "human mechanism" of industry. Big employers often feel that there is something wrong in their offices or workshops, yet are unable to trace the cause. For example, a firm of caterers recently complained that they were suffering very heavily from breakages of crockery at their various branches.

The cause was noise and nerves. The investigators found the key to the whole situation when during a rush period, in which there was a babel of voices calling and repeating orders, the girls began to show signs of irritation. In the hurry and scurry some of the orders were forgotten or mistakes were made, and consequently the shouting from one department to another increased in volume and the nervous tension grew worse.

Now there is nothing more infectious than irritability, and it was found that it was almost invariably at the time when the girls' nerves were "on edge" that they suffered from involuntary—and sometimes unconscious—dislocation of mind and muscle. In other words, they dropped things, and were not always able to understand how these accidents occurred. The trouble was remedied by the installation of a system of indicators. The worker requiring a particular article now

simply presses a button, and a signal appears in the service room indicating what is required. Not only have the breakages been reduced (in some cases by as much as seventy-five per cent), but the workers are happier and suffer far less fatigue. Moreover, the amount of goods handled has increased over thirty per cent.

However simple or elementary a job may be, there are always right and wrong ways of doing it, and the scientist aims to discover the best methods. Industrial workers are like golfers. Some of them take to the game naturally; others require a lot of training, but all of them have a better chance of success if they take a few lessons from an expert. At any rate, they will find a shorter cut to the right way without a great

deal of experiment, and they will avoid the many pitfalls which arise from the formation of bad habits.

The best method of doing a specified job is found by studying scientifically the movements of the first-class operator and teaching these motions to those who are less deft. This is done, in many cases, by making what is known as a "chronocyclograph." A small

electric light is attached to the wrist of the best worker and his movements are photographed by means of a special camera. The resultant picture shows the movement of the hands as a series of lines. These are copied in the form of a wire model, which in the hands of a teacher can be used for instructing the other workers.

The importance of eliminating waste movement, and thereby reducing fatigue, may not be generally realized. Yet, to quote a single instance, investigations made recently in the packing department of a margarine factory revealed that while the best worker was able to wrap a pat of margarine in four distinct motions, another girl, though not the poorest worker among them, seemed to find it necessary to make over twenty-four motions in the same process.

Much has been said and written about the monotony of certain tasks. But, says



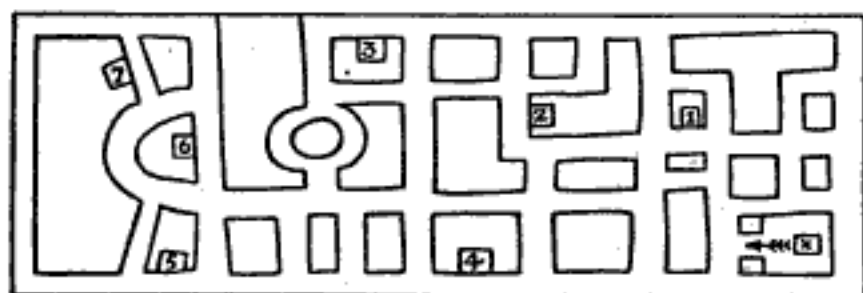
MOVING THIMBLES RAPIDLY FROM ONE PEG TO ANOTHER

A test for speed of larger movements as required in wool embroidery.

18.2 the scientist, it must be remembered that monotony is not always disagreeable. Walking is a monotonous exercise, but many people derive pleasure from the rhythm it provides. Similarly, if rhythm

for dirt, another for coal, and so on. Similar experiments and improvements have been made in other industries with surprising results, but it is pointed out that unless the new science is applied

under the direction of an expert, the results will probably be unsatisfactory and may even be harmful. It is said that a certain laundry proprietor introduced a phonograph to keep his workers lively and happy. As he had anticipated, the girls instantly began to work in time with the music. But he had overlooked the fact that they were engaged on a number of different



ARE YOU ABLE TO PLAN AHEAD?

Here is a street map, with houses indicated by numbers. Imagine that you have to drive the car "X" from the garage in the right-hand lower corner to each of the houses in numerical order. It is imperative, however, that you must always turn to the LEFT (never to the right), and must pass each house on your left.

can be introduced into working movements, monotony will be greatly reduced. This theory has been tested and proved in a number of different spheres of activity, perhaps the most remarkable of which was a coal mine.

Careful observation of the methods of the best workers revealed that they used a comparatively slow stroke of the pick in getting coal, and a faster one when working upon dirt. The best workers were those who instinctively employed a steady rhythmic movement. But these steady plodders were in the minority, and there seemed very little likelihood of their fellow workers discovering their secret—or even taking the trouble to do so.

The examiners, therefore, set out to train the less expert workers to use their picks in time with a metronome. As soon as they got into the swing, the metronome was withdrawn, and it was found that the rhythmic beat was maintained. The result was that, apart from the reduction of fatigue and the awakening of a new interest in a hitherto monotonous job, the output actually increased by sixteen per cent.

The mining association has taken the matter up. Investigations are now being made to discover improvements in miners' lamps in order to avoid eye strain. Scientists have also ascertained the average weight of material that the average worker can lift on a shovel with regular motion and a minimum of fatigue, and are now having the shovels made in accordance with these findings, that is, one size is designed

occupations each of which required a different natural rhythm. What suited the washers did not please the ironers, and what the ironers liked nearly sent the folders frantic. The scheme is now abandoned, and each girl is encouraged to make her own music.

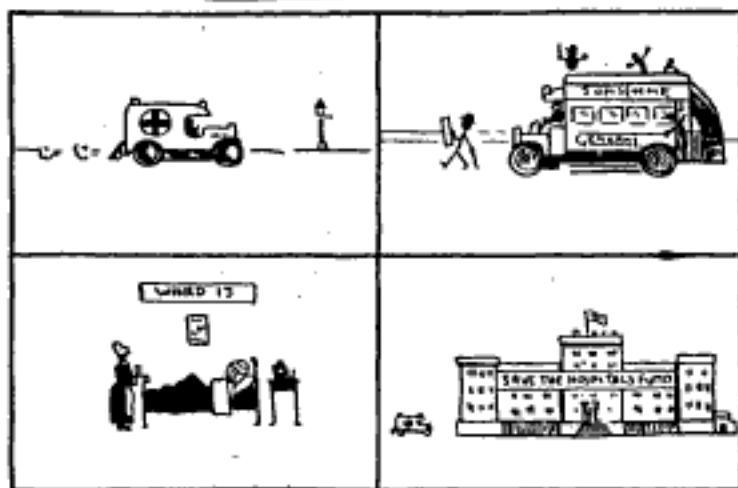
The fallacies in the sentences on page 722 are as follows:

(i) If the horse's eyes magnify, they magnify everything else in the same proportion, so that if he sees a man big he also sees another horse big, and sees his own body big.

(ii) If a man has a widow he is dead.

348 SPEEDING UP PATENTS

Although 1,900 more applications and 30,000 more amendments were received at the patent office during the last fiscal year as compared to the year before, 16,000 fewer cases were awaiting action at the close of the period, according to the patent commissioner's report.



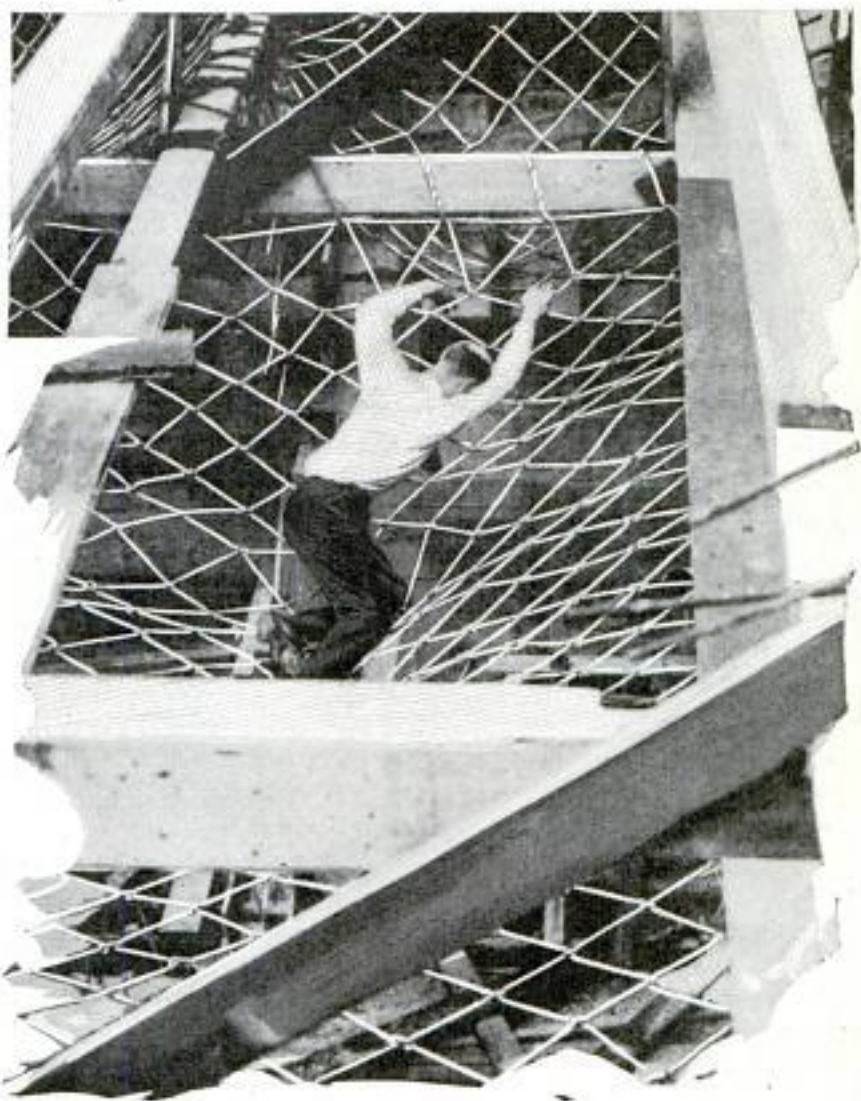
A SIMPLE INTELLIGENCE TEST

Indicate the logical sequence of the above set of pictures. You should be able to do this in six seconds.

**FILM FOR TYPE
 USED IN PRINT
 PROCESS**

267

By a special application of the principles of photography, two London men have devised a printing process which eliminates the use of metal type. The basis of the invention is a "master" film on which the different characters usually carried in the printer's font or produced by a machine, have been photographed. Using a keyboard like that of a typewriter, the symbols can be projected rapidly to a sensitized base where they are rephotographed, and another film is the result, resembling the original but bearing only the matter which is to be published. The printing then may be completed by various methods already in use. The camera which projects the symbols from the master film is focused automatically, and by adjusting the lens, an infinite variety of type can be obtained as well as a wide range in column widths, spacing and other details, all of which may be decided upon and executed in a few seconds by the manipulation of small levers.



Saved from Death by a Life Net Stretched between Beams during Work on Lofty Philadelphia-Camden Bridge to Protect Builders

**NET GUARDS BRIDGE WORKERS
 FROM SERIOUS FALLS**

277

Following the recommendation of the coroner, life nets have been attached to the Philadelphia - Camden suspension bridge at various places where workmen are engaged, to protect them from fatal falls, should they slip from beams or girders. The nets are constructed of stout mesh and can easily be moved to different locations as work on the bridge progresses.

Patton, Phila.

CARPETS FROM STRING BEANS

227

Fibers beaten from string-bean pods are being spun into a coarse thread by Austrians and placed in competition with hemp and cotton for many commercial purposes. The yarn is described as hard and very strong. After being bleached and printed, it is being employed in making carpets, curtains, upholstery, etc.

Patented in Budapest

**WATCH ON STEERING WHEEL
 PROMOTES AUTO SAFETY**

264

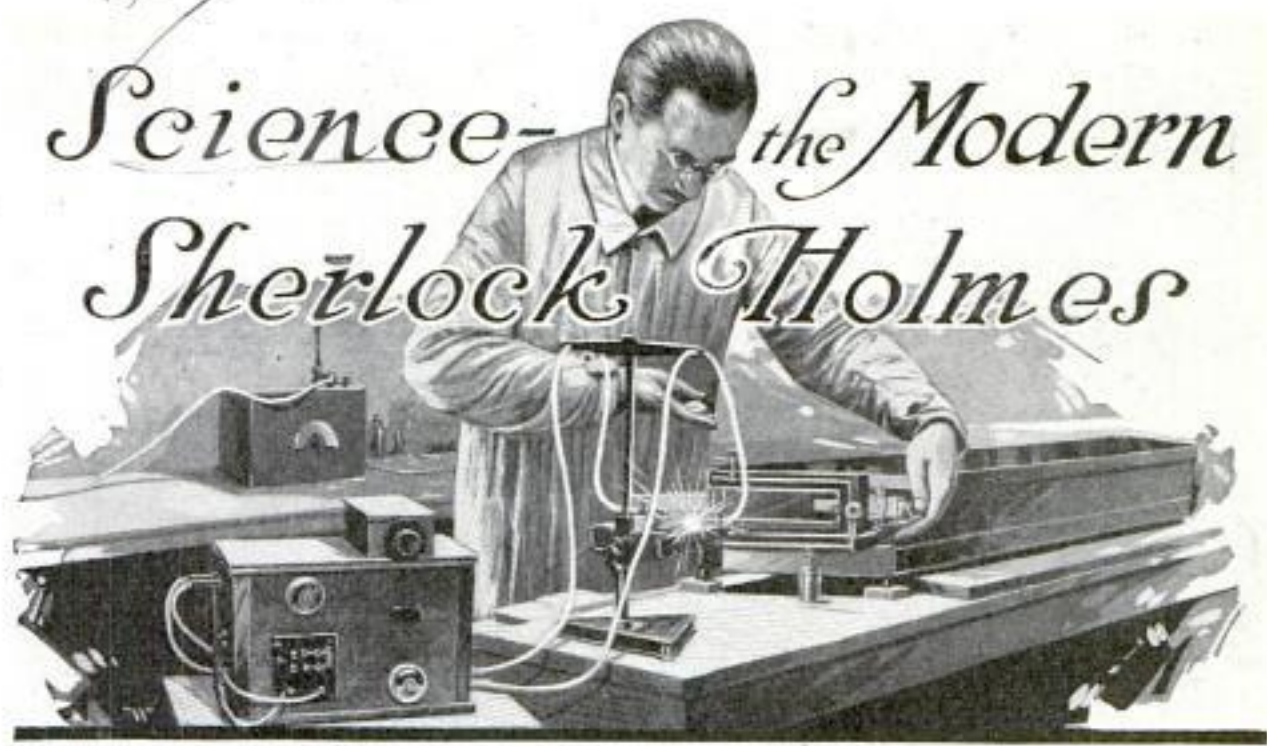
For the motorist whose car has no clock, a watch holder clamped to the steering wheel keeps the timepiece in plain view and eliminates the hazard that attends one-hand driving while removing the watch from the pocket and putting it back. Spring fasteners on the sides of holder permit easy insertion.



*Coffey Mfg. Co
 Centralia, Ill.*

Crime

Science—the Modern Sherlock Holmes



Paris Detective Analyzing Material by Reducing It to Ashes, Placing These between Two Electrodes, and Photographing with the Spectroscope the Spark Passing through the Gap

By NORMAN C. McLOUD

*St. Paul St
Baltimore, Md*

WHEN the housebreaking assassin of Paris pauses in his work and places his coat on a chair, he starts a chain of research which may lead to the gallows. In this simple act, the criminal fails to reckon with the spectroscope, with which the French police follow the blindest trails.

In placing his coat, the malefactor disregards the possibility that lint from the garment may cling to the upholstery of the chair. To the Paris police the fine threads supply a clue of the utmost worth. Under the mystic eye of the spectroscope, the thread may reveal the identity of the garment from which it came. If the threads match the coat of the man under suspicion, the police have made a forward step in placing responsibility.

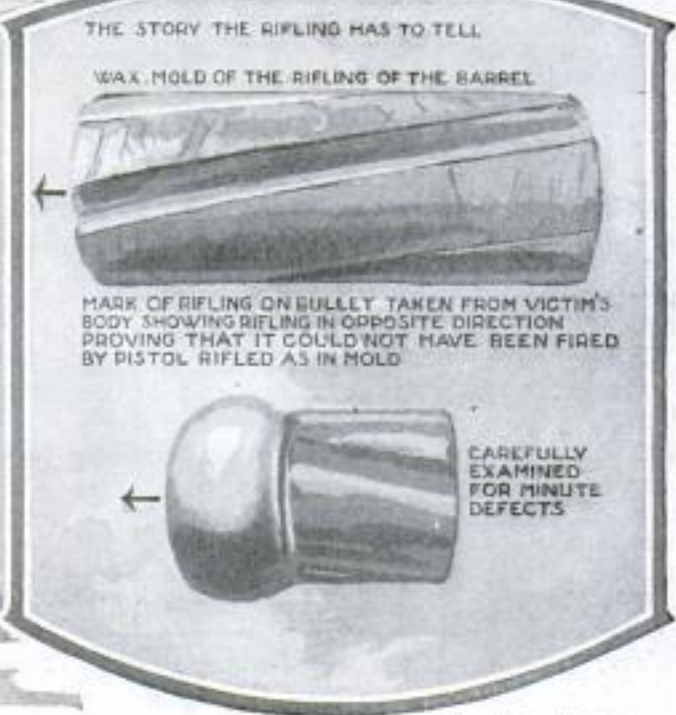
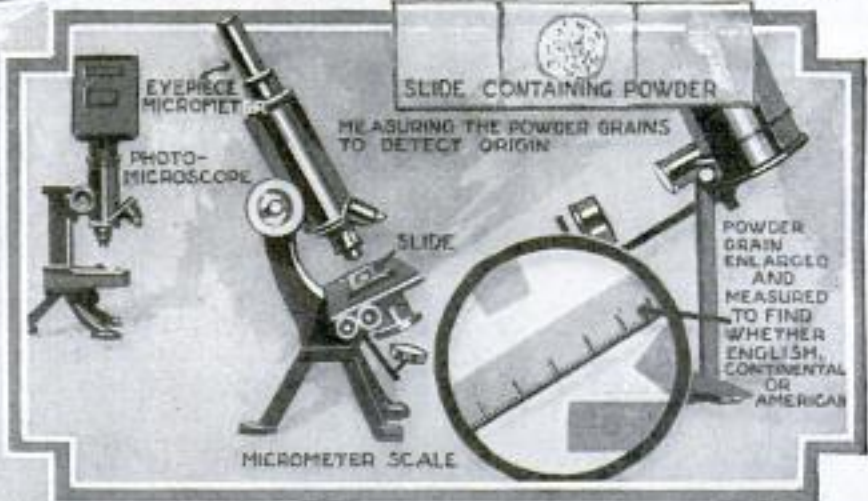
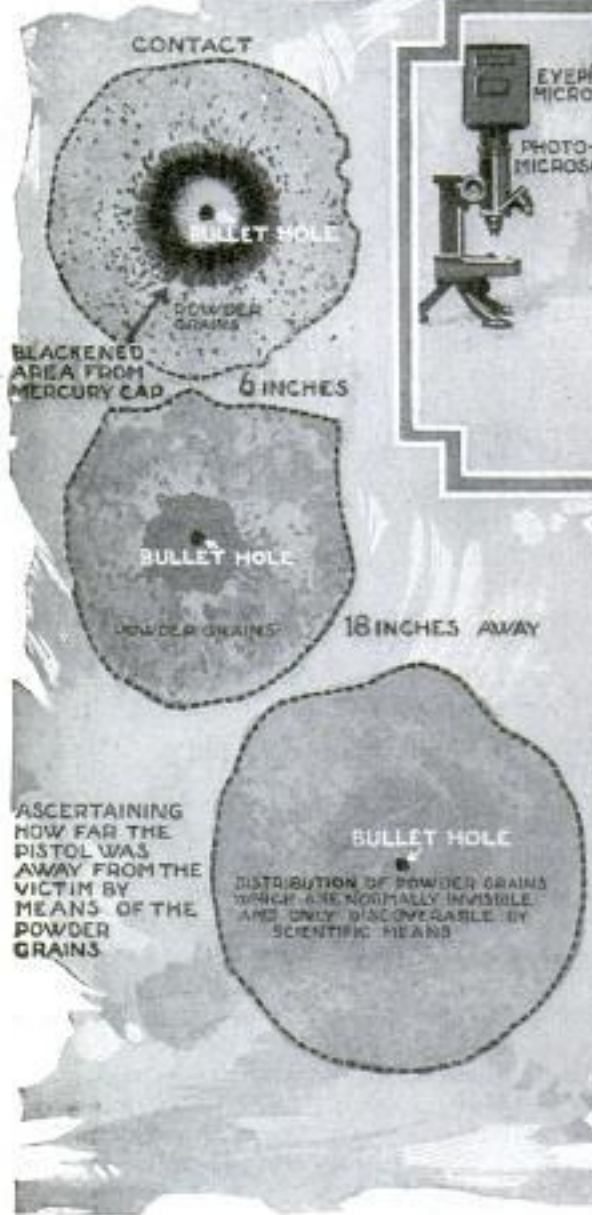
In essential details, the spectroscope is composed of a dark chamber containing a prism and a plate holder. On the outside, there is a lens for projecting images through a narrow crack at one end of the chamber. Gathered by the lens and passing through the crack, the light crosses the prism before reaching the photographic plate. The action of the prism causes the rays to be produced on the plate in the form of a spectrum, with bands of varying width which correspond to the individual colors.

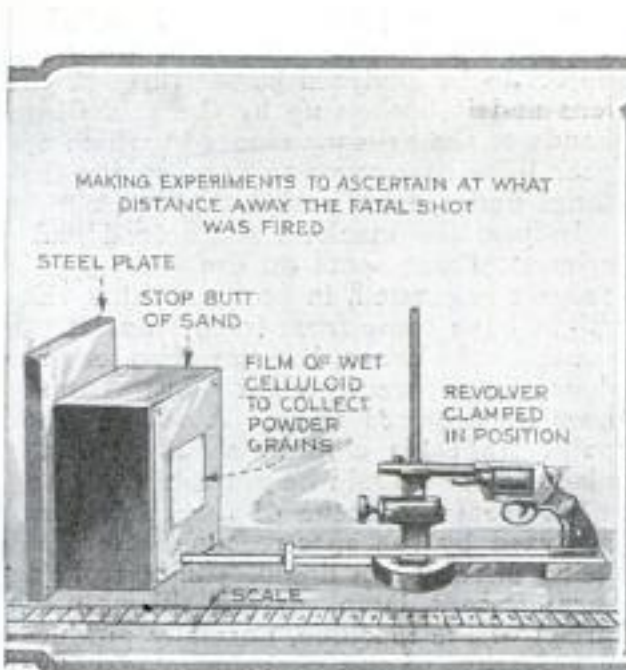
The uses of the spectroscope are manifold. An assassin fires a bullet, which

passes through the body of his victim and is lost. The only record of its passage is a hole in the window shade through which it disappeared. Two suspects arrested both possess pistols, but one uses copper-covered bullets and the other plain lead. The Paris detectives cut a square from the window shade, reduce it to ashes, and with the spectroscope analyze the ash to determine whether the hole was made by lead or copper. Any fragments of the bullet attached to the edges of the hole are too minute to be seen even with the most powerful microscope, but the spectroscope detects their presence and determines the kind of material.

France, and Italy, lead the world in the application of new scientific discoveries to police work. The higher police officials are all college graduates and specialists in certain lines of work. The advancement of scientific criminology on the continent has proceeded much farther than in America because of the custom of requiring a suspect to prove his innocence, rather than forcing the state to prove his guilt, still prevails in some of the old-world countries. The system gives the police officers wide latitude in introducing any kind of evidence, and the continental courts have helped them by accepting every new advance in scientific work. The Bertillon system was adopted abroad

75





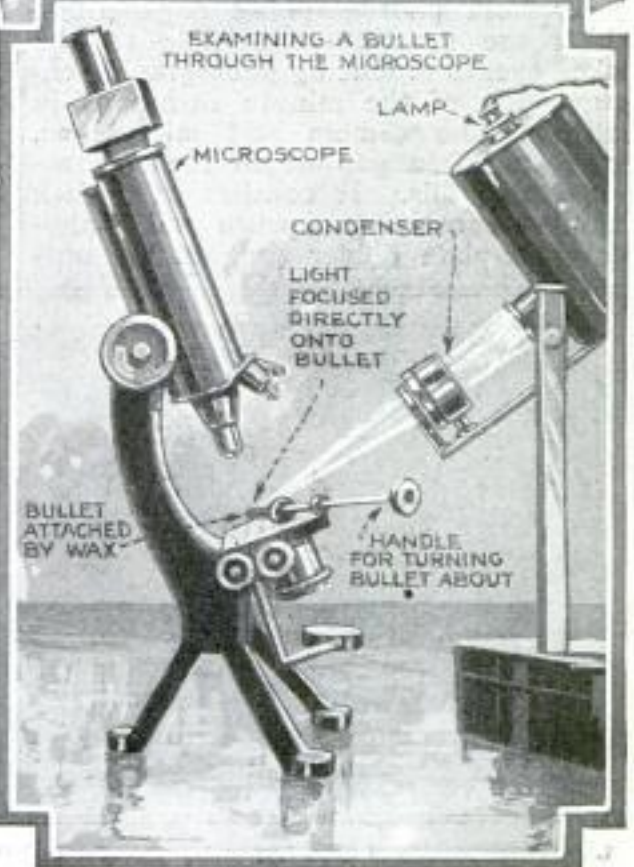
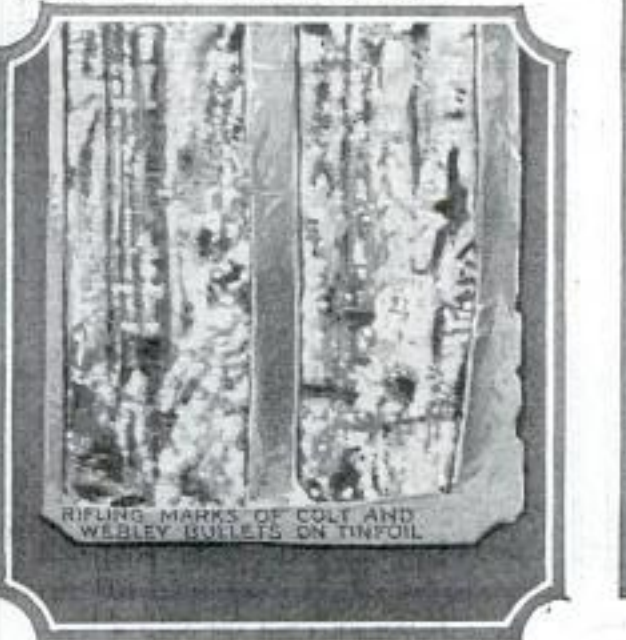
SECTION OF CAST OF PISTOL BARREL

| | |
|---|----------|
| A | 1 .050" |
| | 2 .1025 |
| | 3 .0515 |
| | 4 .1025 |
| | 5 .0525 |
| | 6 .105 |
| | 7 .053 |
| | 8 .103 |
| | 9 .050 |
| | 10 .1045 |
| | 11 .0475 |
| | 12 .102 |

SECTION OF BULLET FROM CORPSE

| | |
|---|----------|
| B | 1 .050" |
| | 2 .105 |
| | 3 .040 |
| | 4 .103 |
| | 5 .050 |
| | 6 .106 |
| | 7 .045 |
| | 8 .100 |
| | 9 .050 |
| | 10 .1027 |
| | 11 .055 |
| | 12 .105 |

MEASUREMENTS OF THE BARREL PROVE THE BULLET COULD NOT HAVE BEEN FIRED FROM IT





Photograph of Wanted Man Reconstructed on Ruled Paper from Numbers Transmitted by Telegraph

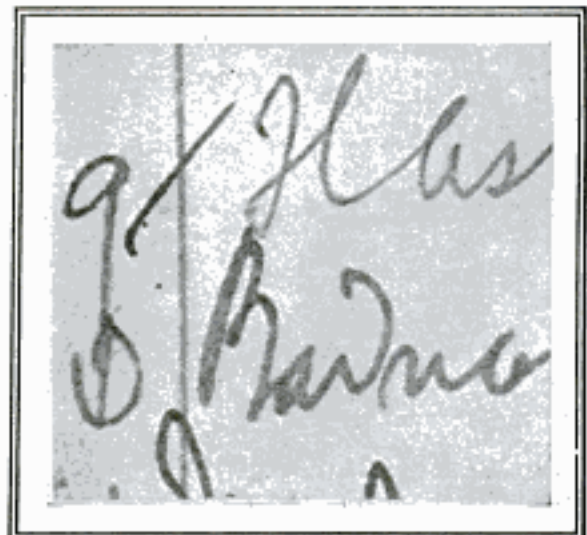
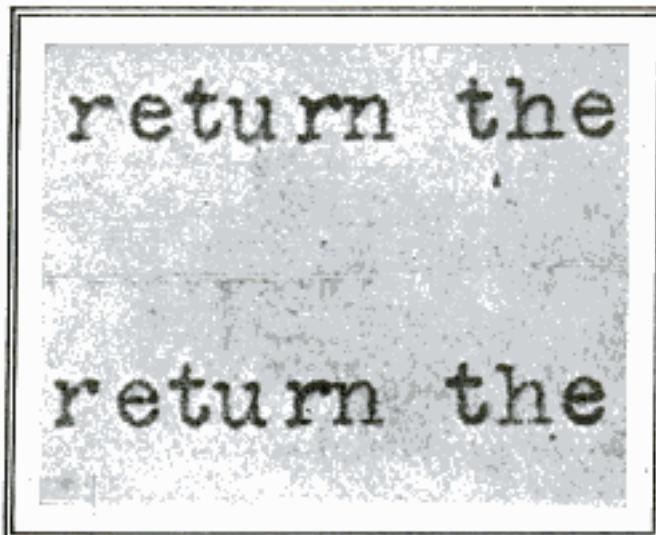
years before it was first recognized by American courts.

One of the most important parts of Paris police headquarters is the large chemical laboratory and photographic department. Special cameras have been developed by experts for every kind of work, from photographing fingerprints, which are practically invisible to the naked eye, to producing photographic enlargements of the minute variations in bullets. The camera and microscope, however, left a gap which the spectroscope now fills. It consists of a dark chamber containing a prism and a photographic-plate holder and, on the out-

side, a lens for projecting light through a narrow aperture. The light from the object to be analyzed passes through the lens and is broken up by the prism into bands of the primary colors in which appear lines that serve to identify the material under examination.

In use, the machine has solved many crimes. Paint spots on the clothes of a suspect suggested, in one case, that they might have come from fresh paint at the scene of the crime, but the prisoner produced an apparently good alibi to explain how he acquired them. A small bit of paint from his clothes, a bit from the place where he said he got the spots, and a bit from the scene of the crime were analyzed by the spectroscope, after first being dissolved in liquid. Light from an incandescent lamp, passed through the prism of the machine, normally produces a spectrum of the seven primary colors, but as each paint vial was inserted between light and prism there were changes in the spectrum to correspond to the nature of the color in the paint. The samples from the scene of the crime and from the prisoner's clothes produced the same spectrum, while the sample from the spot where the man claimed he rubbed against the paint showed an entirely different appearance. Faced with the irrefutable evidence, he confessed.

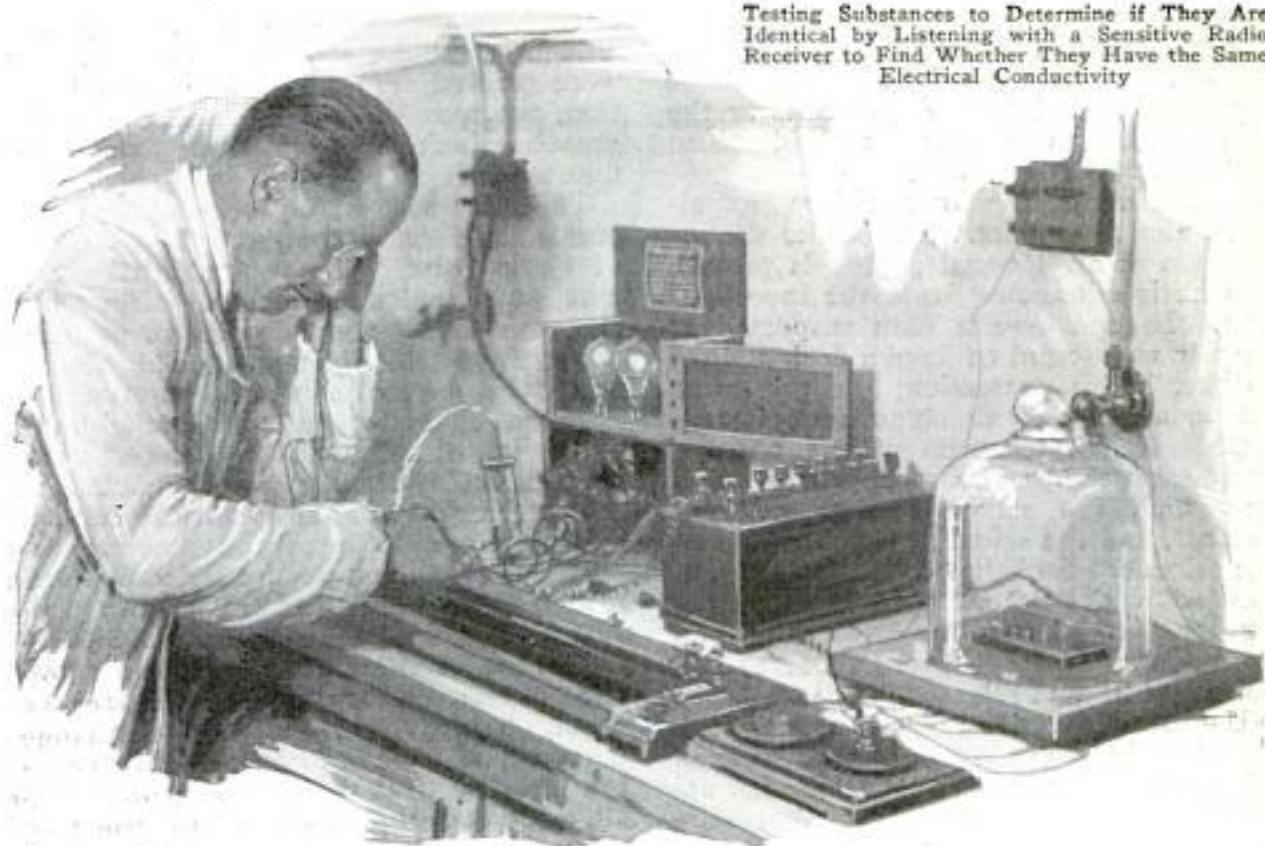
One of the interesting stories in the Paris police records concerns the attempted sale of a painting fraudulently attributed to a famous artist who had died some years before. Members of his family brought suit to stop the dealer attributing the painting to the dead painter, charging it was unfair to his memory to call the work his. Art critics agreed the style was similar and that the painting



Left, Enlargements of Two Typewriter Samples in Which the Same Mechanical Fault Convicted a Black-mailer in England; Right, Chemical Ink Tests Which Saved an Accused Doctor from Conviction

75

Testing Substances to Determine if They Are Identical by Listening with a Sensitive Radio Receiver to Find Whether They Have the Same Electrical Conductivity



either was the work of the man named or a very good imitation.

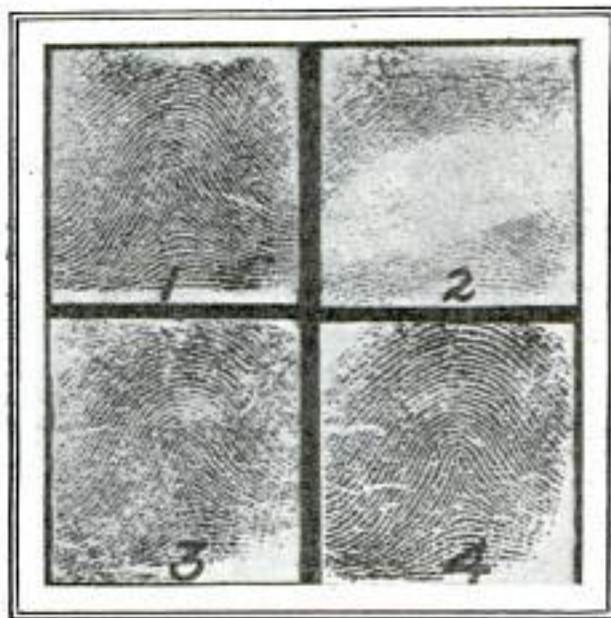
The police were called in, and after investigation, learned the dead painter always used yellows of special composition in which the foundation was antimony of lead. With the point of a knife they lifted a tiny yellow fleck from the questioned painting, dissolved it in liquid, rendered it volatile by inserting two electrodes in the solution and passing a current through them, and then submitted it to the spectroscope. The resulting photograph disclosed a spectrum that was indisputably that of cadmium, with antimony of lead totally lacking, and the sale of the painting as the work of a famous master was prevented.

News that a murder has been committed in Paris brings a special squad to the scene from the police. Until they reach it, nothing is

touched. In the squad are five men, three of them photographers, one a specialist in searching for fingerprints and the fifth a draftsman skilled in reproducing the scene of the crime in exact detail. Upon arrival one investigator examines the lock of the room before they enter and another photographs any fingerprints he finds. Inside, they photograph everything that may be important, both in ensemble and in detail. One of the three cameras is a

special outfit for fingerprints alone, another takes the broad views of the room and surroundings, and the third is for close details. While the photographers work, the draftsman is busy measuring and sketching an exact plan of the house or apartment, with positions of every piece of furniture, the body, weapons and other objects shown.

Every object in the room which the criminal might



Proving Fingerprints Are Permanent; (1) Original; (2) after a Burn; (3) While Healing; (4) Healed

45 have touched is carefully examined for fingerprints, and if any are found, is photographed. In a single year the police bureau obtained 2,300 fingerprints at the scenes of various crimes and identified 123 criminals from them.

The work of the bureau does not always aim to convict. Sometimes the innocence of an accused person is proved, and he is eliminated from the investigation. In one case, a man suspected of murder was found to have a flesh-stained hatchet in his possession, and the crime was committed with some such instrument. Near the scene of the murder, however, a scrap of newspaper was found on which the slayer had cleaned his hatchet, and the scientific examination of the prisoner's tool showed it had last been cleaned with cloth. The examination further showed that the flesh stains on the prisoner's hatchet were those of salt pork, and he was released.

Use of ultraviolet rays in police work also has been perfected by the French scientists. These rays, outside the normal spectrum revealed by a prism, have the property of exciting certain substances into fluorescence, or causing them to illuminate themselves. Thus the rays, ordinarily invisible to the eye, become visible. Because of their peculiar properties, they can detect forgeries which defy the usual methods. In one case where French government bonds had been paid, then stolen from the government vaults, altered and presented for payment again, the rays disclosed where the original date of payment had been washed out with

chemicals and a new date substituted. The original ink with which the bonds were printed responded to the illumination, whereas the forged date contained grease which kept it from becoming fluorescent.

This first test merely showed that the bonds had been altered, and the necessity of finding the criminal remained. One man was under suspicion. The only clue was an ink-stained piece of blotting paper, found in his home. The blotter and stains were dissolved in water, and a fragment of the forged bond date with the greasy ink dissolved in another test tube.

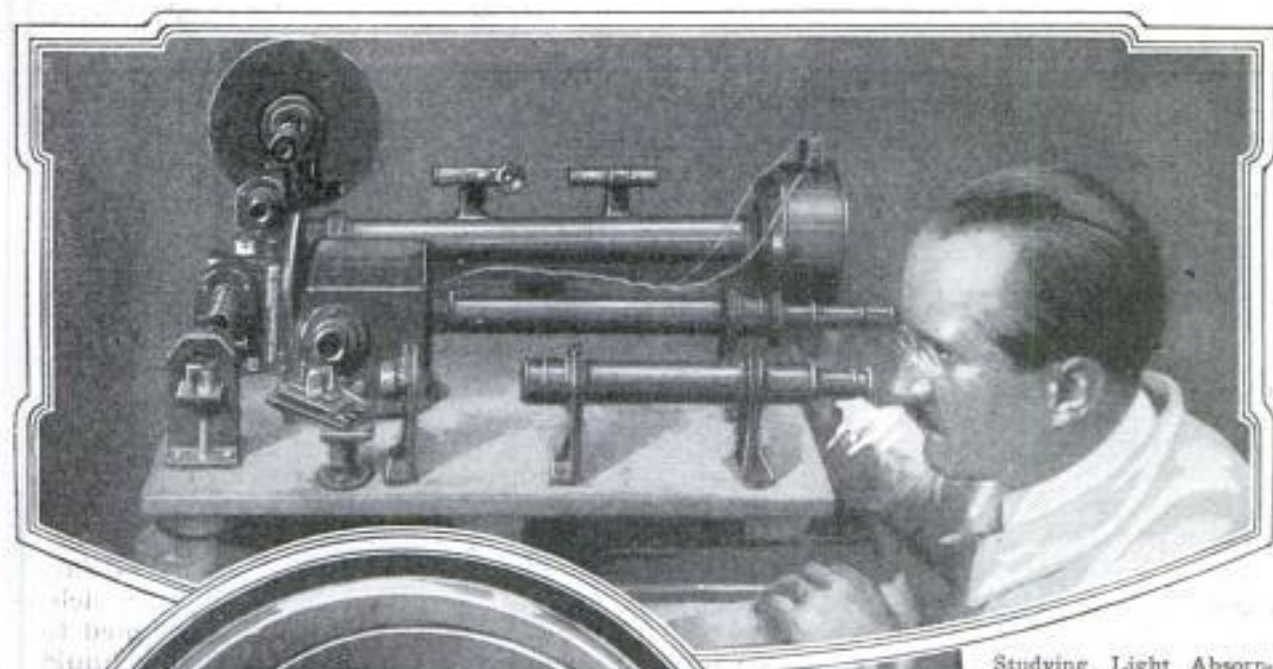
Platinum electrodes were inserted in each tube and a small electrical current passed through them, the amount depending, of course, on the resistance furnished by the dissolved ink. With delicate headphones, the scientist listened to the sound of the current. If one liquid had offered more resistance than the other, proving the inks were not the same, there would have been a singing sound in the phones. But there was no sound at all, since both liquids offered the same resistance, and this proof that the ink found in the blotter in the suspect's home and the ink used on the forged bonds were the same, was accepted.

One of the most unusual of modern developments owes its origin to New York, where a special plastic material has been used successfully to reconstruct the features of a skeleton.

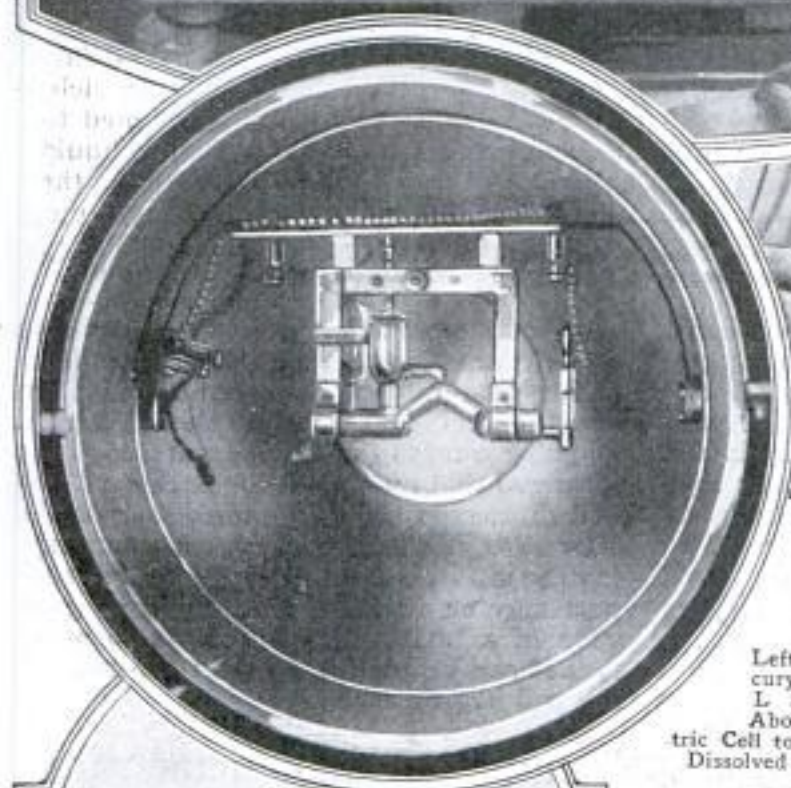
Recently, the police in this manner, restored a dead man to such lifelike reality that friends recognized and named him.



General View of the Chemical Laboratory of the Paris Detective Bureau Where Many of the Amazing Crime Solutions Which Have Made the French Police Famous Were Worked Out



Studying Light Absorption of Two Samples of Paint, the Operator, Above, Determines Whether the Stain on a Criminal's Clothes Was Made at the Crime Scene

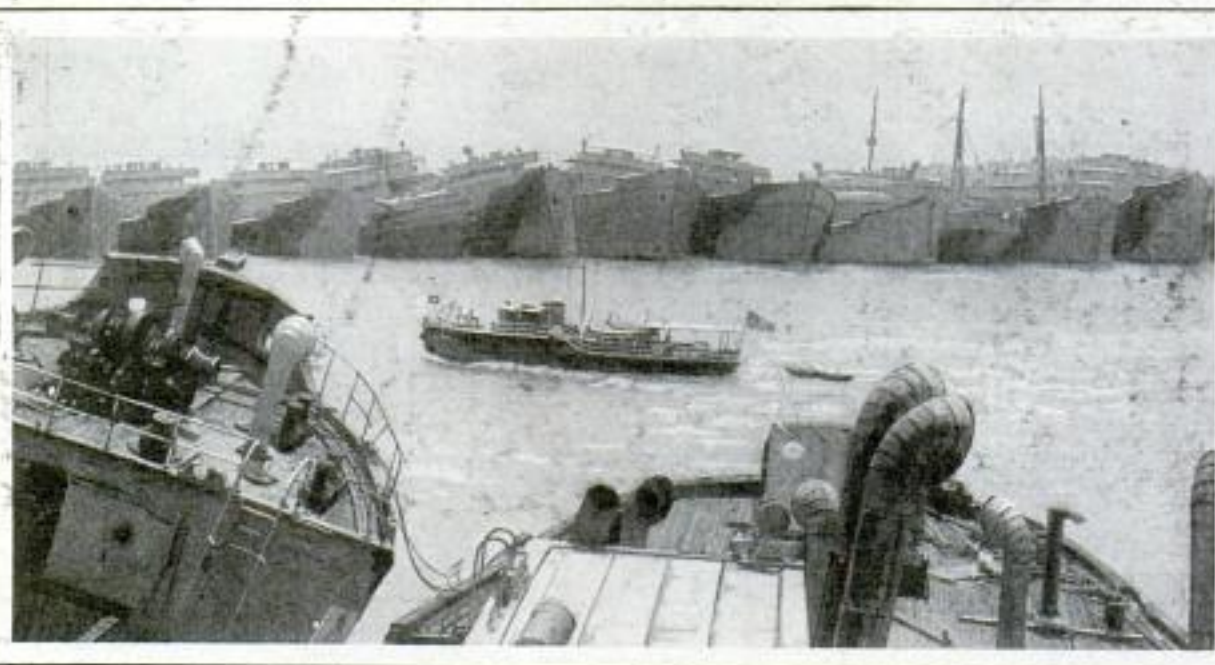


Left. Mercury - Vapor Lamp; Above, Electric Cell to Identify Dissolved Samples



Face Reconstructed with Plastic Material on Skeleton Found in New York, Leading to Identification of the Murder Victim; Above, French Detective Examining Falsified Bonds under Ultraviolet Rays, a Method Which Proved They Had Been Stolen

FIRE ENDS CAREER OF USELESS WAR-TIME FLEET

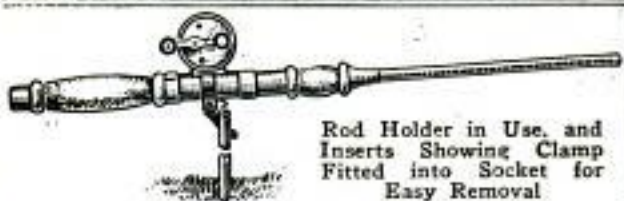
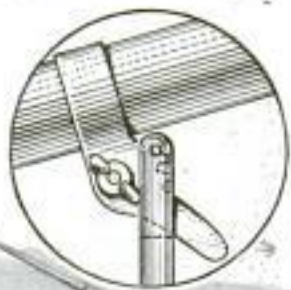


Rotting Hulls of War-Time Emergency Wooden Fleet in Potomac River Before Torch Was Applied to Clear Passage; a Government Inspection Boat Passing between the Rows of Ships

Built to meet emergencies of the World War, but never in service, a fleet of wooden ships in the Potomac river near Tidewater, Va., was burned to clear the passage. Inspection showed that the hulls had rotted and fallen into such disrepair that restoration was impractical. Much of the equipment was salvaged, however.

ADJUSTABLE FISH-ROD HOLDER
KEEPS REEL FROM MUD

Fitted with a clamp that holds the fishing rod in angular or horizontal positions,



Rod Holder in Use, and Inserts Showing Clamp Fitted into Socket for Easy Removal

a spiked support that is easily thrust into an earthen bank, keeps the pole from falling into mud or sand that might damage the reel, and relieves the fisherman when he wants to rest. The fastening is so arranged that an upward or backward pull will disengage the rod immediately while a forward jerk has no effect. Accompanying the outfit, is a clamp by which the support may be attached to the seat or gunwale of a boat. The holder is so small that it can be tucked away in a corner of the rod bag or case.

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GERMS ARE GROWN ON FARM
TO SUPPLY SCHOOLS

Germ farming is the business of a Dallas, Tex., citizen. The minute organisms are grown in cultures and sold to scientific bodies, hospitals, druggists and schools. The owner of this singular enterprise spent several years studying and teaching in a medical school, but ill health compelled him to give up his position, so he started the business of germ culture as a means of livelihood. Nearly all the commoner species are kept on hand, and rare ones are grown to order. Students frequently visit the laboratories to study these organisms.

*Mr. Atty's Saunders
Especially of the material
Letter retd*

*Kiefer Kempt Rod Holder Co
1626 Carll St. Cincinnati Ohio*

Moore lease near El Paso,
drilled by N.W. Co.

COLD-AIR FLOW FROM OIL WELL RUNS PUMPS AND ENGINES 29 **SKILL OF DERRICK MEN TESTED IN PLACING BRONZE STATUE 26**

Searchers for oil in Scurry county, Tex., failed to find the cherished flow after digging a deep well recently, but a blast of intensely cold gas rushed out at a reputed rate of 4,000,000 to 6,000,000 cubic feet daily at a pressure of 250 pounds. At first, it was thought that a new supply of helium had been found, but analysis showed that the gas was mostly nitrogen. But the owners harnessed the flow, directed it into an ordinary steam boiler and obtained pressure sufficient to operate an engine used in drilling other wells near by. As a precaution, the boiler was buried, leaving only a pressure gauge showing. A line was tapped off from the main conduit and led to a shallow well not far away which was producing only a small quantity of oil. The pressure of the air stream was directed down into the casing and the well was thus made to "pump itself." Some of the air was used to operate a turbine generating electricity for the works. The gas was so cold that workmen quickly cooled water for drinking simply by holding a cup at a leaky joint in one of the pipes.

Hoisting a heavy bronze statue of Gen. Sam Houston upon a high base erected at



Swinging Huge Bronze Statue of Gen. Sam Houston to Its Position on High Stone Pedestal Arch with Strong Derrick

the entrance to a park in Houston, Tex., enabled derrick operators to demonstrate their ability to perform exacting as well as rough tasks. Care had to be taken not to damage the masonry, and the huge figure, said to be the second largest equestrian statue in the United States, also demanded skillful handling of guide ropes and derrick before it was finally lowered to the correct position on its support. Two men, stationed on the arch, directed the operators below.

Popular Mechanics Magazine does not publish the name of maker or seller of any device described in its pages, but this information is kept on file and will be furnished free by addressing our Bureau of Information.

RUBBER PURSE FOR BATHERS FITS ON WRIST. 175

Bathers may carry money, keys or other articles with little danger or inconvenience in a small rubber purse that fits snugly about the wrist. It fastens with a strong snap, is watertight, the manufacturers declare, and has no parts that are likely to catch and tear.



Nepstune Rubber Mfg. Co.
Ch. Wington

*Entrance of Hermann Park
Houston, Texas.*

3442

Keystone View Co. Inc
91-7th St New York

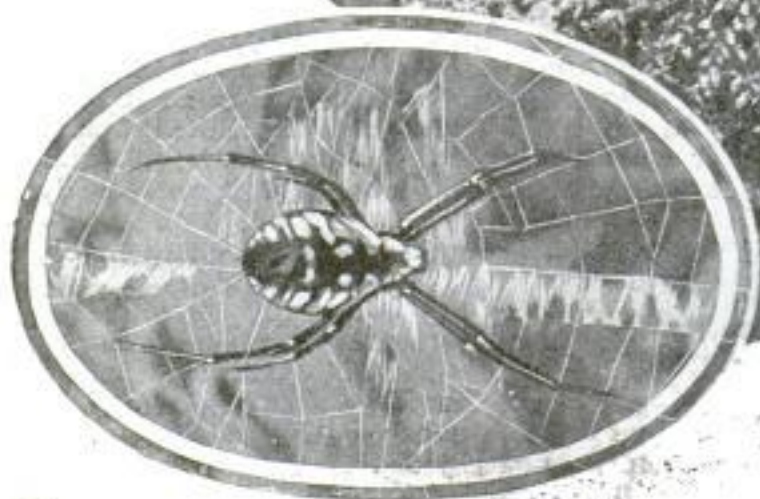
Engineering Feats of Nature That Rival



The Lightning Grasshopper, Above, Is South America's Glorified Version of Our Lightning Bug; It Has a Wing Spread of Three Inches

The Spider Web, Above, Glistening in the Morning Dew, Is a Triumph of Engineering; No Two Webs Are Ever Alike, Since Their Shape Is Always Determined by the Location of the Twigs to Which They Are Fastened; the Bees Are Equally Skilled Engineers; the Angles of a Comb Are So Exact They Use the Least Possible Material

A Rook's Nest Built on the Lightning Rod of a Lofty Church Spire in England and Anchored Only to an Ornamental Ball; It Has Survived the Hardest Wind and Rainstorms

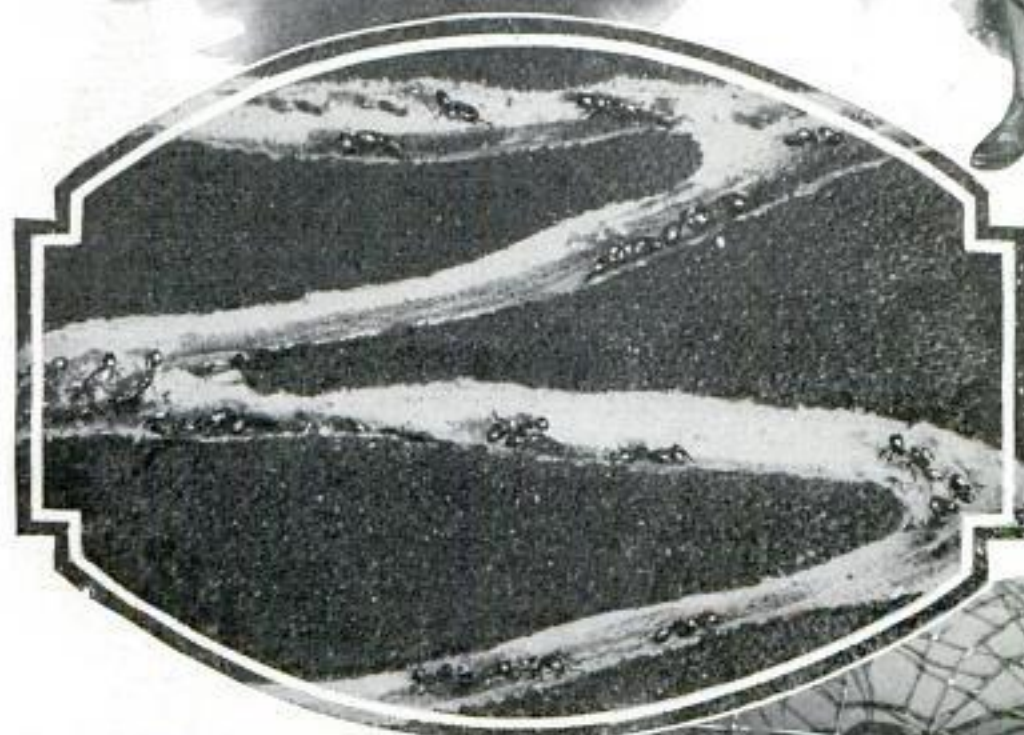


An Orb-Weaver Spider with His Cart-Wheel Web, Pronounced by Scientists to Be Geometrically Perfect; It Consists of an Outer Web of Untretchable Silk and an Inner Web of Sticky Material on Which Insects Get Stuck

the Greatest Achievements of Mankind



Mason Wasp, a Pottery Master Building a Jug of Clay in Which to Hatch Its Eggs, Top Left, and, Above, the Nest of the Social Wasps, Which Live in the Columbia Jungles; It Is Three Feet Long and White



Minute Insects, Magnified Hundreds of Times, Become Movie Actors before a New Micro - Photographic Camera Which Turns Them into Giants on the Screen; Right, a Caterpillar Suspending Itself by a Thread from a Leaf Weaves a Basket Home



SMOKE SCREEN USED TO AID BOOTLEGGERS' FLIGHT

Bootleggers have adapted the smoke screen, an efficient weapon of war, to the

Test of an Auto Smoke Screen at Boling Aviation Field, illustrating how it would aid fleeing bootleggers

automobile so that dense white clouds of vapor can be ejected from the rear of a speeding car, obscuring the vision of pursuers and giving the fugitives time to dart into side streets or lanes. The dispensing apparatus is concealed in such a way that it is entirely unnoticeable except when in operation.

SURVEY OF PACIFIC IS SOUGHT TO ENLARGE FOOD SUPPLY

Coasts and waters of the Pacific ocean can feed the world, scientists estimate, and partly to conserve this huge food supply and to learn more about the vast wonderland under the waters, it is urged that a thorough survey of the Pacific be made. The undertaking is in line with the project in which various nations of the world are now engaged—that of making a new map of the globe. A seagoing vessel, with a wide cruising radius and with a specially trained crew and personnel, would have to be provided for the task. One of the most important phases of the work would be sounding the ocean's bottom so that an accurate map of its bed could be prepared, the location of fishing grounds determined and the rights to use them fixed. Variations of

temperature, the density, acid and salt content of the water, and other factors, are known to affect the migrations of fish, and all these matters would be studied during the survey. Col. E. Lester Jones, director of the United States coast survey, points out that the Pacific was not known to the nations of Europe until about four centuries ago and that today it is in a sense a "new world" 10,000 miles wide at the broadest part, with an area of 70,000,000 square miles, in places over five miles deep, lined here and there with active volcanoes, swept by currents that act as a "climatic balance wheel" for many regions and that flow a third of the

circumference of the world. With the aid of the latest instruments for deep-sea surveying, it is believed that the submarine plateaus, ridges and valleys of the Pacific could be exactly mapped.

BRAKES FIXED TO SLED RUNNERS PREVENT COASTING ACCIDENTS

Automobiles have made the sport of coasting more hazardous in many communities and to prevent accidents, an effective brake attachment has been invented that can be fitted to almost any sled. It consists of a pair of sharp, curved spikes, one for each runner, and fixed to the rear. They rest flat when not in use but turn downward toward the surface by pressure on a lever arrangement in front. This may be operated either with the feet or hands and at the same time acts as a brace to keep the coaster from sliding off at a sudden stop.



Coaster with Brakes, Lever in Front, and Bottom View of Protruding Spikes

314

Washington, D.C.

284

2631

New York Times

8/23/25

and ...
 195 County Road, N.Y.

PRICE OF DIAMOND IS RAISED BY HIGH LABOR COST 320

Diamonds are sold at an average price of \$16 a carat at the mines in South Africa, while purchasers pay from fifteen to twenty times as much for the cut gem in this country. The rarity of fine stones, an expert says, is but one factor of the high price. The great amount of high-grade labor expended to turn the raw stone into a finished gem, is the main item. The cutting process involves the constant risk of spoiling the entire stone. A first step consists in cleaving the specimen with the grain, and requires great care and skill. Small ends are recut into brilliants, while the gem itself is faceted on top and bottom. The next process involves the lapping of the remaining facets, which requires more time than the cutting and causes the stone to lose from one to two thirds of its weight.

Tribune 8/30/25 New York

NON-EXPLOSIVE OIL TANK DEFIES INTENSE HEAT 345

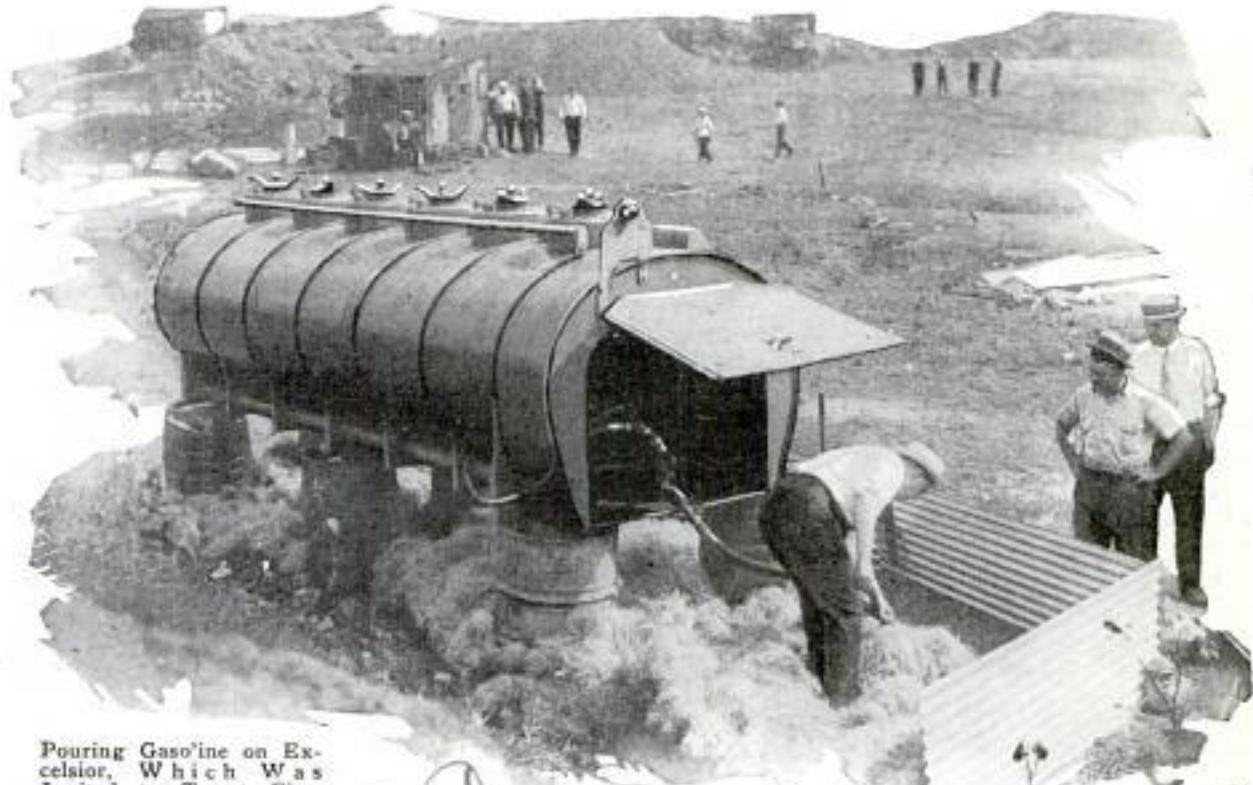
To demonstrate the fireproof qualities of an oil tank, the inventor built a fire of excelsior packing soaked with gasoline beneath it. Although the tank contained inflammable liquid, it did not explode. The container was fitted with special valves and was thoroughly insulated. Its use promises greater safety in shipping oils.



Hudson Maxim with Rock Bearing Dinosaur Footprint Probably Made 10,000,000 Years Ago

FOOTPRINT OF DINOSAUR FOUND ON ROCK THIRTY FEET DEEP 351

A footprint of a dinosaur, plainly outlined in a piece of soft rock, was discovered recently thirty feet below the surface, where workmen were excavating on the property of Hudson Maxim, the famous inventor, at Lake Hopatcong, N. J. Mr. Maxim estimated that the impression must have been made something like 10,000,000 years ago.

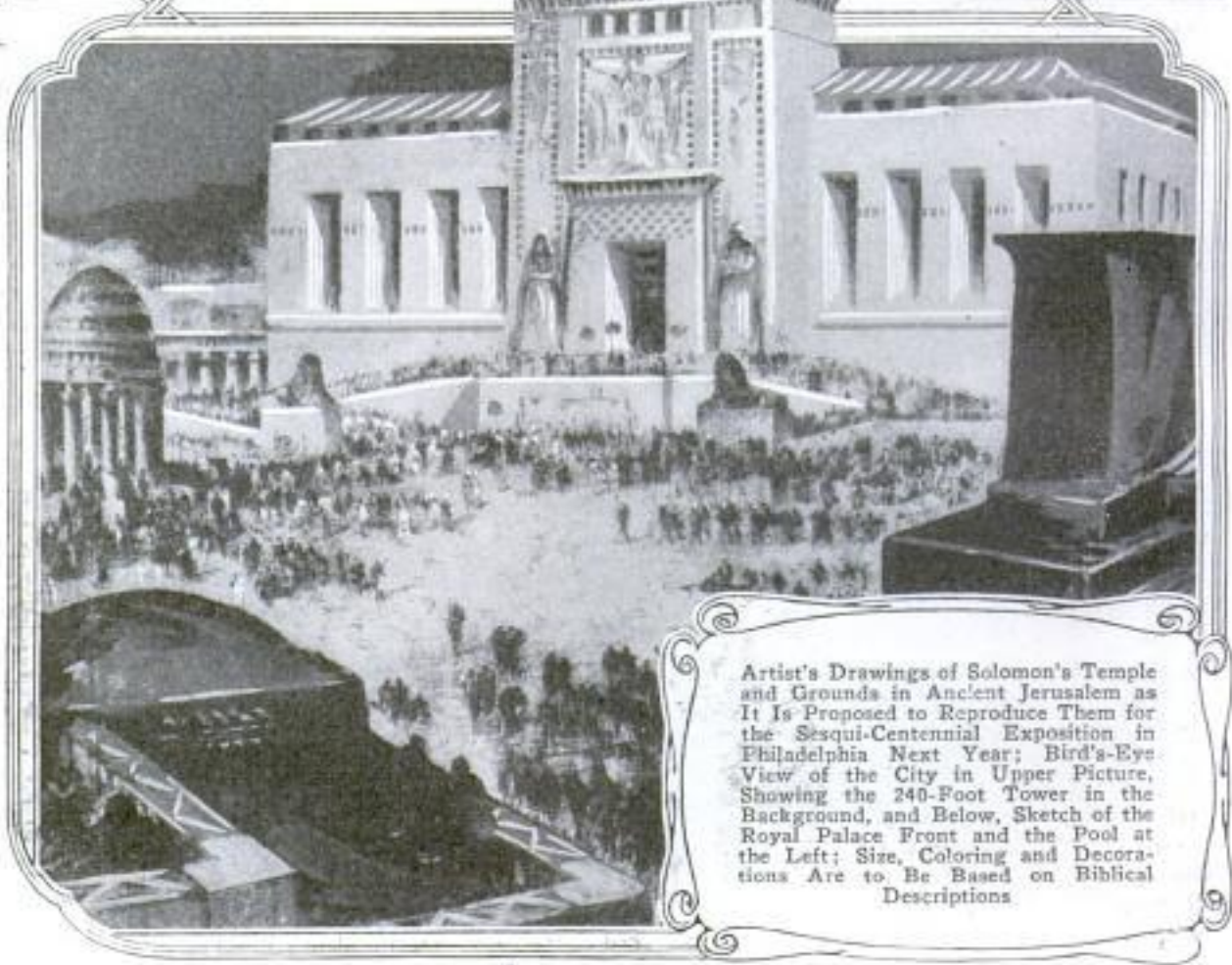
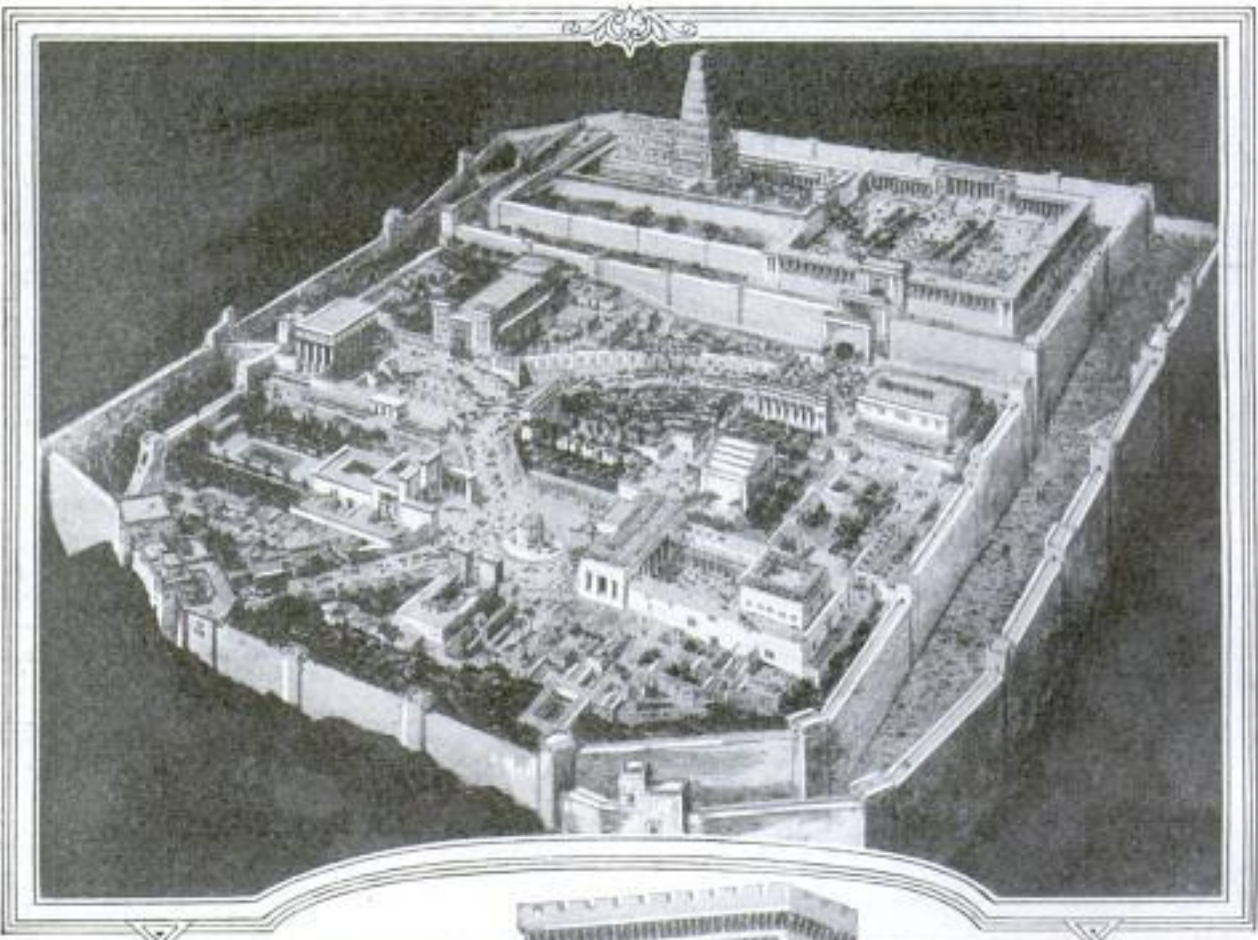


Pouring Gasoline on Excelsior, Which Was Ignited to Test Fireproof Qualities of Tank

Rev. A. W. Scripps - no address

Demonstrated at Corona - Queens - N.Y.

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Artist's Drawings of Solomon's Temple and Grounds in Ancient Jerusalem as It Is Proposed to Reproduce Them for the Sesqui-Centennial Exposition in Philadelphia Next Year; Bird's-Eye View of the City in Upper Picture, Showing the 240-Foot Tower in the Background, and Below, Sketch of the Royal Palace Front and the Pool at the Left; Size, Coloring and Decorations Are to Be Based on Biblical Descriptions.

Pacific & Atlantic

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**GLORIES OF OLD JERUSALEM
TO LIVE AGAIN AT FAIR**

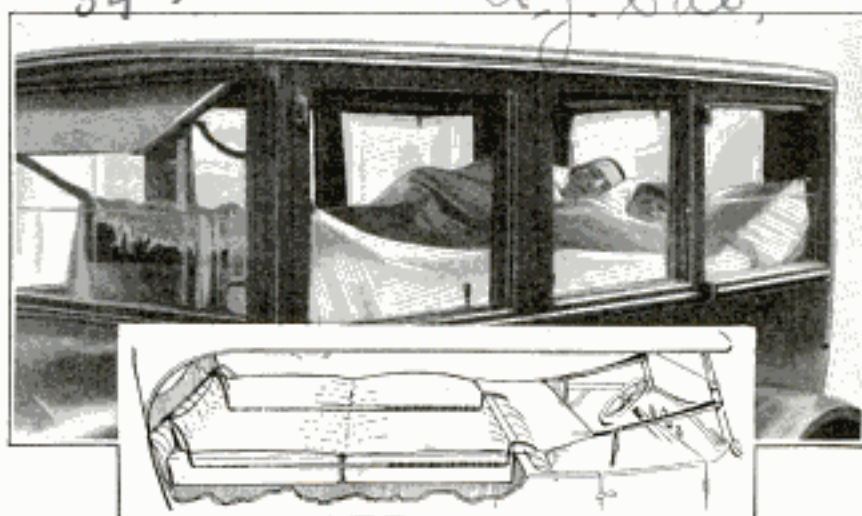
Modeled closely after Biblical descriptions and other data scholars have discovered, reproductions of King Solomon's temple, the pool, the palace he built for one of his wives who was the daughter of a pharaoh, and other edifices that graced Jerusalem in ancient times, are to be shown at the Philadelphia exposition in 1926. One of the outstanding features of the city will be the 240-foot tower of the temple. The entire project is expected to cost nearly \$3,000,000.

**MYSTERY IN BUTTERFLIES' TREK
FROM TROPICS TO ARCTIC**

Each year swarms of butterflies, known as "painted ladies," are seen crossing the sea from France to England on a 4,000-mile journey from northern Africa to Iceland. How they find their way and how fresh broods appear yearly, although the butterflies never have been seen traveling back from the north, are mysteries. It has been suggested that they return in swarms at night or fly back alone as individuals, thus escaping notice, but there is no evidence of this. Another curious feature of the migration is that the butterflies which begin the flight probably are not the same that reach the northern destination for eggs are laid on the way, these hatch into caterpillars and become butterflies that move on toward the north, maintaining a sort of relay race. They arrive in France in May, then cross the channel into England, and, still heading northward, reach Iceland in July.

**ADJUSTABLE BED FOR TOURISTS
FITS OPEN OR CLOSED CARS**

Easily put up or taken down, a full-sized bed utilizes the auto cushions for a mattress and may be used with touring or closed cars. Two rails support the bed and are fastened to the back of the seats. A canvas extension, attached to the front of the car by straps, provides room for the feet. The bed is high enough to give the occupants the benefit of ample ventilation through the windows of the car.



Bed in Use, and Diagram Showing Rails



What Typewriter Keys Will Do under an Artist's Fingers—a Dutch Scene in Letters and Figures

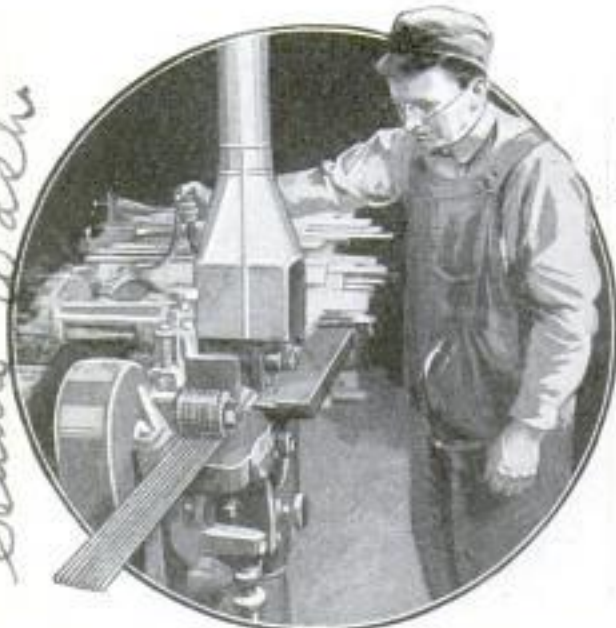
**ARTISTIC SCENE IN HOLLAND
DONE ON TYPEWRITER**

Executed entirely on a portable typewriter, a scene in Holland is the work of a Dutch artist. Figures and letter characters both were used, and contrasting shades were achieved by superimposing a number of symbols to make lines of the heaviness required.

Rotterdam, Holland.

C.B. Williams, Chief Entomologist
Egyptian Ministry of Agriculture

Waterloo Specialty Mfg. Co.,
108 E 5th St. Waterloo Iowa.



Finishing "All-Day-Sucker" Sticks on Cutter with Capacity of 50,000 an Hour

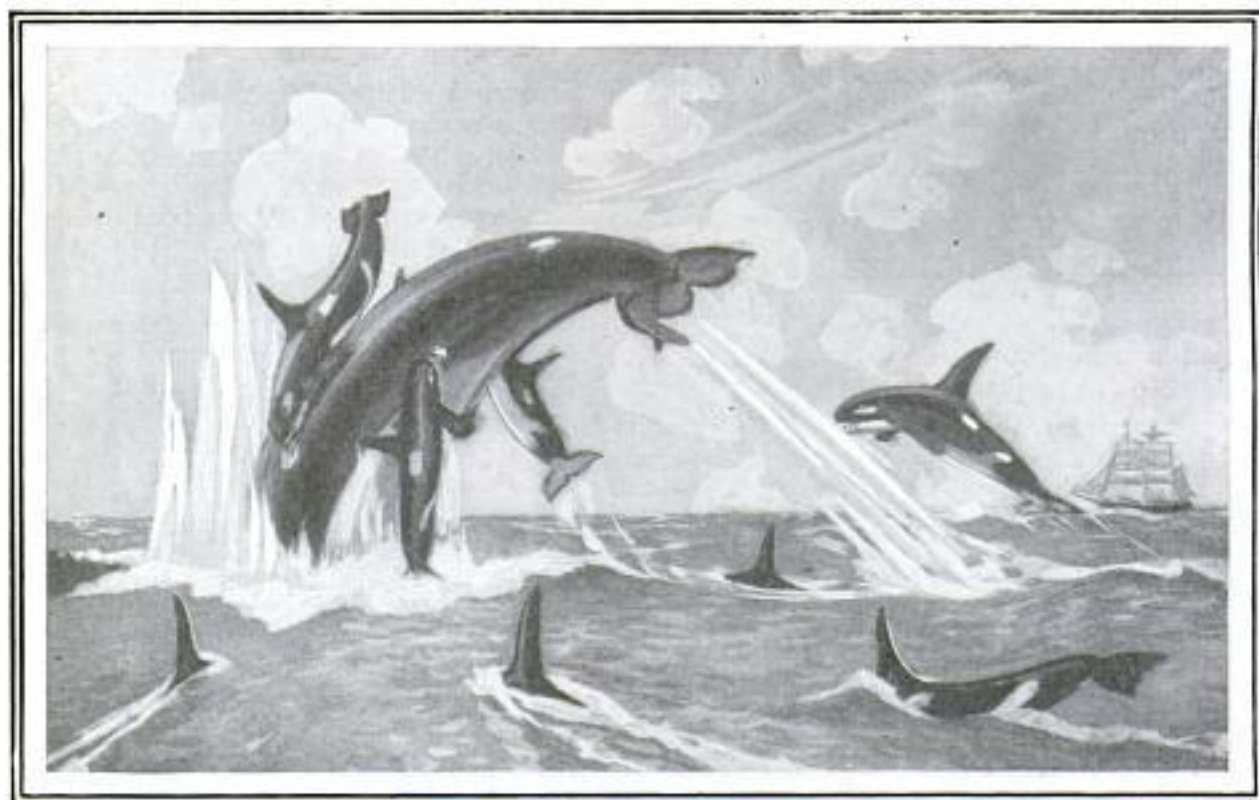
MAKING OF "ALL-DAY-SUCKER" STICKS IS NEW INDUSTRY

To meet the demand for sticks to hold the popular "all-day sucker" and similar confections, an automatic cutter which converts boards into sticks at the rate of 50,000 an hour has been devised. By a simple adjustment, it can be turned into a saw mill for the manufacture of skewers, leadpencil stocks, spools, rulers, tags and

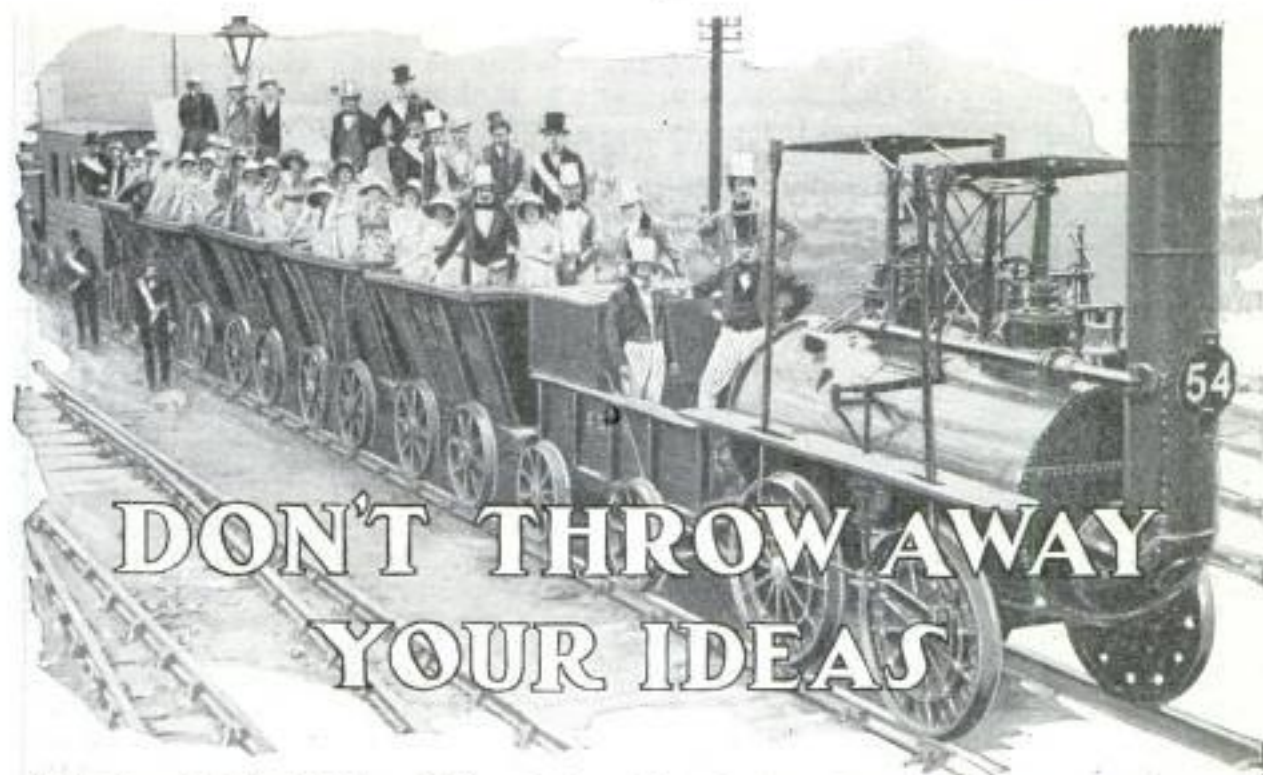
other wooden articles. It uses wooden strips three inches wide and a quarter of an inch thick. These are reduced to fourteen thin round pieces which are cut into four and one-half-inch lengths and packed for delivery to confection makers.

WHALE BATTLE IN POLAR SEAS WITNESSED BY EXPLORER

During one of Scott's antarctic cruises to study the finback whales, the rare appearance of which in the waters near the Falkland Islands, threatened the existence of the islanders, one of his assistants witnessed a stirring battle between a sixty-foot finback and a number of killer whales. The smaller species are armed with strong, sharp teeth, grow from twenty to thirty feet long and are exceedingly ferocious. They tear pieces of flesh a yard long from their larger adversary, slash its lips and enter its mouth, ripping out its tongue. The ocean's surface becomes red with blood over long stretches after such a conflict. The killer whale usually lives on smaller fish and remains around the mouths of rivers lying in wait for its prey, but occasionally is found miles out to sea, hunting and attacking the largest whales without fear. One scientist found parts of thirteen dolphins and fourteen other victims inside a killer seventeen feet long.



Artist's Drawing of Savage Battle between Killer Whales and Monster Finback in Antarctic Sea; Attackers with Their Sharp Teeth, Ripping Blubber from Their Larger and Almost Helpless Adversary



DON'T THROW AWAY YOUR IDEAS

Early Type of Railroad Engine, Hauling Replica of First Train on Hundredth Birthday of Railroading, Celebrated in England This Year

By LEO T. PARKER

MANY of the most valuable patents have been issued on little things, the courts having held that simplicity is the highest trait of genius.

For example, the rubber-covered button of an ordinary hosiery supporter was, during the life of the patent, the source of a princely income for its inventor. This invention merely consisted in covering the commonly used metal button with rubber. Ordinarily the mere change of the material from which a well-known article is made, is not the subject of a valid patent, but in this instance new and useful results were accomplished by the substitution. Not only was the inventor granted a patent, but it was upheld in later legal controversies.

The rubber-tipped lead pencil netted its inventor something over \$100,000 before the patent was, for technical reasons, finally declared invalid. This invention consisted merely in securing an eraser to the end of a lead pencil. Previous to this invention lead pencils were common, as also were rubber erasers, but the use of the two articles in combination with each other was new.

Another valuable patent on an exceedingly simple invention was that of the metal shoe-heel plate which was used so extensively a few years ago to prevent "run over" heels. This invention is the simple application of a curved metal plate

to the outer edge of the heel of a shoe. The selling price of the plate was trifling, but its cost was saved many times over by eliminating the shoemaker's bill for repairing worn heels. Its use, therefore, was economical and for giving it to the world, the inventor received the sum of almost \$150,000.

Paralleling the heel-plate patent, from the viewpoint of large profits as well as similarity of usage, is the metal toe-plate invention, by which boot and shoe wearers were benefited because the toe of their footwear was not so quickly "kicked out." This patent netted its inventor about \$75,000.

The glove and automobile-curtain snap fastener that is in universal use today, was fought through the courts to the ultimate victory of its inventor, who reaped a golden harvest of many thousands of dollars. It is a simple invention, but saves time. The anti-skid chain for automobiles ran its full seventeen years as a valid patent and a very conservative estimate of the earned profits from its sales, in this country alone, is \$5,000,000.

Another interesting fact is that so many inventions have sprung from hobbies. The father of photography was an army officer; of the electric motor, a bookbinder's clerk; the inventor of the telegraph was a portrait painter; of the Jacquard loom, a dressmaker.

Attorney-at-Law
905 Burke Alley, 123 E 6th St.

Examine this.

A farmer tinkered up the typewriter; a poet, the sewing machine; a cabinet-maker, the cotton gin; a coal miner, the locomotive. The telephone was the after-school work of a teacher of the deaf; the well-known disk talking machine, the result of a clothing salesman's night work; the wax-cylinder phonograph, the work of a lawyer's clerk; the type-casting machine, of a grocer. A physician made the first pneumatic tire because his small son was a wheel-chair invalid. The hand camera was invented by a bank clerk; the film roll, by a country preacher; the motion picture, by a stenographer.

The steam automobile was the plaything of a photographic-dryplate maker; the dry-blast steel process, the brain child of a preacher's son; the tunneling shield, of an editor; the stock ticker, of a dentist.

The long-distance telephone loading coils were figured out by a professor of mathematics; bicycle-repair men made the first man-carrying airplane; a soldier, the wireless telegraph; a druggist's clerk, the audion tube for broadcasting daily news, stock quotations, grand opera, etc., and of the loud-speaking telephone.

That has been the story of almost every

great invention. Each has been the result of some one's riding a hobby—a kindly soul tinkering around with what the neighbors were pleased to call his "crazy" idea.

It is noticeable that a new thing, in most cases, originates in a single brain, usually the brain of a poor man. It is not the product of great wealth and a great laboratory. Money only develops; it never originates because money never works in a woodshed. Not infrequently an invention has been suggested by some trivial event which would have passed unnoticed had not a man with an observant mind pondered it.

It was an accident that gave us the telephone. Dr. Alexander G. Bell twisted a screw one-fourth of a revolution and thereby gave us one of the marvels of all ages, but he had no idea at the time what it meant. Dr. Bell was at the time seeking some method of making speech visible by means of light flashes. He was working with a contrivance another man had invented with the idea of carrying speech to a distance by means of an electric current and a wire. The current used was intermittent. When Dr. Bell turned the screw, he closed the gap and made the current constant, which is the principle of the telephone.

He did not realize the value of what he had done until he was demonstrating to some friends that he could talk from the garret to the cellar. The next morning, in order to protect his discovery, he obtained a patent on his invention. At three o'clock the same day another man appeared and sought a patent for the same idea. The difference of a few hours lost him a hundred million dollars.

It was an accident that put George Westinghouse on the track of his chief invention. While on a railway journey he was importuned by a poor woman to buy a magazine. He read in it an article describing a compressed-air borer used in a mountain tunnel, which gave him a clue to his automatic air brake.

Bath towels were accidentally discovered by a towel manufacturer whose machinery got out of order and tangled the threads intended for a smooth product. After readjusting his machine, the man picked up the spoiled material, wiped his hands on it



Alexander Graham Bell, Inventor of the Telephone, Opening the First New York-Chicago Long-Distance Line in 1892



One of the First Automobiles to Cross the Continent Halts in a Mountain Valley to Be Inspected; the Lady at the Left Wears the Motoring Cap Which Was Chic in That Day and Age

and found it more effective than the smooth, so he patented it and made a machine which would tangle the threads.

Sometimes a patent can be obtained on an extremely simple invention which apparently does not present patentable features but which nevertheless has large money-making possibilities. Generally a patent may be obtained on any new device capable of performing new and useful functions. Furthermore, inventors may rest assured that simplification of any well-known invention or device, whereby it is rendered capable of performing its work with greater efficiency, is practically a safe foundation for a valid patent. It pays to protect your ideas and therefore it is advisable to carefully prepare detailed drawings and descriptive matter from time to time at every stage of improvement of the invention, so that priority rights may be proved in any later legal controversies. Moreover, it is good policy to secure two or more trustworthy friends to sign and date the papers, and as further proof, the inventor may appear before a notary public and have the papers sealed.

These are very important protective methods, particularly while an inventor is proceeding to bring the invention to a state of perfection, but simply to have drawings and descriptive papers of an already perfected invention signed, dated and witnessed and then "pigeonhole" the invention is not good practice.

The courts have repeatedly held that an inventor cannot obtain a patent if, after perfecting and reducing an invention to practice, he fails, for an unreasonably long period, to take steps to give it to the public or file an application for a patent,

until some other inventor proceeds in good faith to invent and patent it. It is true that an inventor is entitled to a reasonable time to perfect an invention before applying for a patent, but what period of time may be decided by the courts to be reasonable, depends entirely upon the circumstances of the case. Sickness, poverty and other similar excuses have been held to be insufficient.

In other words, an inventor who secretes his perfected and operative invention, ordinarily cannot obtain a patent against a later inventor who acts in good faith and diligently proceeds to patent and market the invention. But, of course, so long as the invention is new, and is not patented by any other person, it may be hidden away for an indefinite period without destroying or in any way affecting the inventor's chances of obtaining a patent.

If, however, an inventor permits his invention to be described in a printed publication or to be placed on public sale for two years prior to filing an application for a patent, a valid patent cannot be secured. Such public use or sale for two years is an absolute bar to a patent, unless it can be proved that the public use is an experimental one.

Patents may be subdivided into classes of machines or improvements, articles of manufacture, compositions of matter, chemical processes, mechanical processes and designs.

A new composition of matter is patentable. For example, a housewife may invent a new salad, cooking recipe, clothes whitener, baking powder, flavor, candy recipe or any mixture of old and well-known ingredients by which new and ad-

vantageous results are accomplished. All of these things are patentable, and many fortunes have been accumulated from incomes received through just such inventions. But the average individual is not familiar with this phase of the patent laws, and, therefore, very often has a comfortable income within his grasp without profiting by the opportunity.

The courts have held that a valid patent may be obtained on a mixture of the identical ingredients previously and commonly mixed together, provided the proportions are sufficiently different to produce a composition whereby new and useful results may be accomplished. Furthermore, if the steps and method of mixing the ingredients are original, and never before have been applied, a process patent may be obtained as well as a composition patent.

Design patents are another source of extraordinary and sometimes unexpected profits for observant persons who have some ability to invent ornamental and attractive shapes, forms, and figures. A design patent relates to the exterior appearance of an article, which must be the result of at least a degree of inventive genius. Many persons believe that design patents issue to designers solely, but this is not true. Moreover, some of the most valuable and desirable profit-earning patents have been designs that were issued on such common articles as inkwells, dolls,

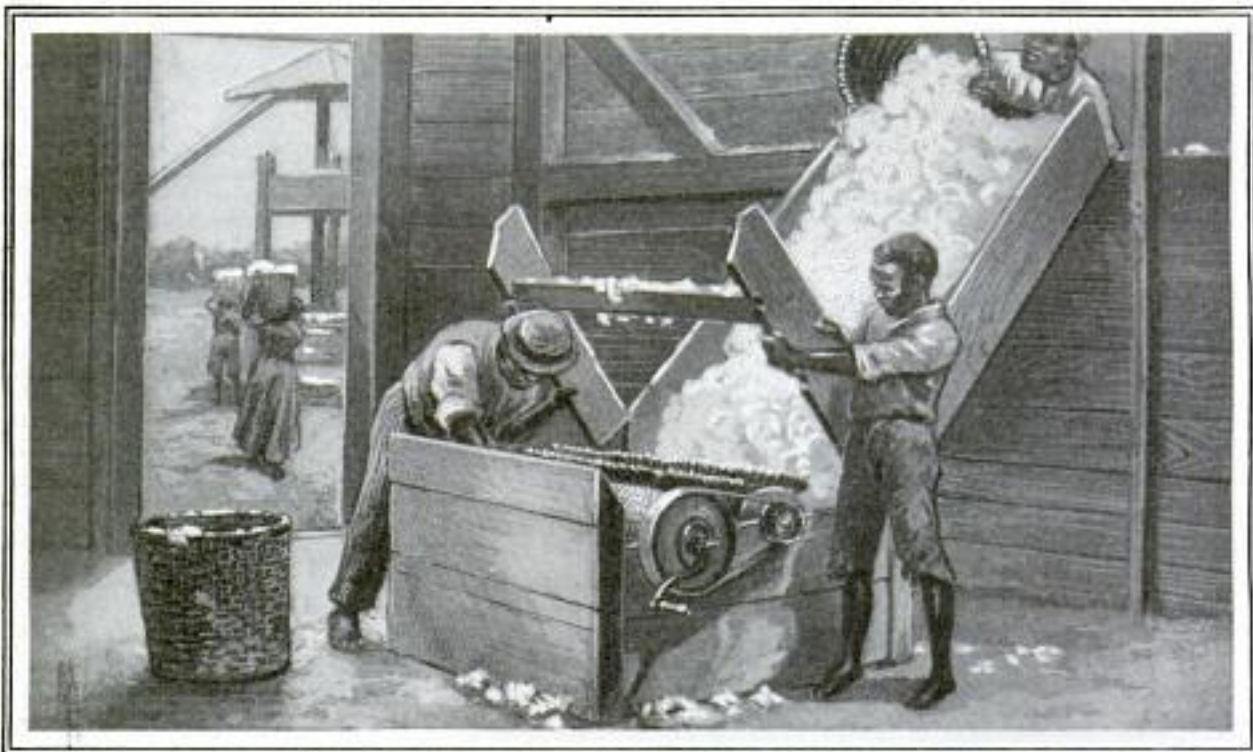
hats, clothing, etc., which may very easily have been patented by any individual possessed of average intelligence and ability combined with the knowledge that such things are patentable.

So, therefore, many valuable inventions, which might have been the means of producing a greatly needed and much desired income, have been permitted to remain unprotected and unpatented simply because the inventors were misinformed or unfamiliar with the fact that a patent could have been obtained.

Notwithstanding these facts, some of the most valuable patents are simple improvements on well-known devices, but as a rule, such inventions require considerable inventive ability to perfect and are being sought for by a large number of persons. After the invention, however, almost everybody will say, "Well, isn't that simple."

354. ELECTROPLATING FOR CLOTH

By electroplating cloth with a film of aluminum, the fabric is made waterproof without making it impervious to air as it becomes when rubber, wax or rosin is used for the coating. This process originated during the war and was first tried in treating khaki for aviators' uniforms. It has since been improved and one factory is said to waterproof 36,000,000 yards of cloth yearly in this manner.

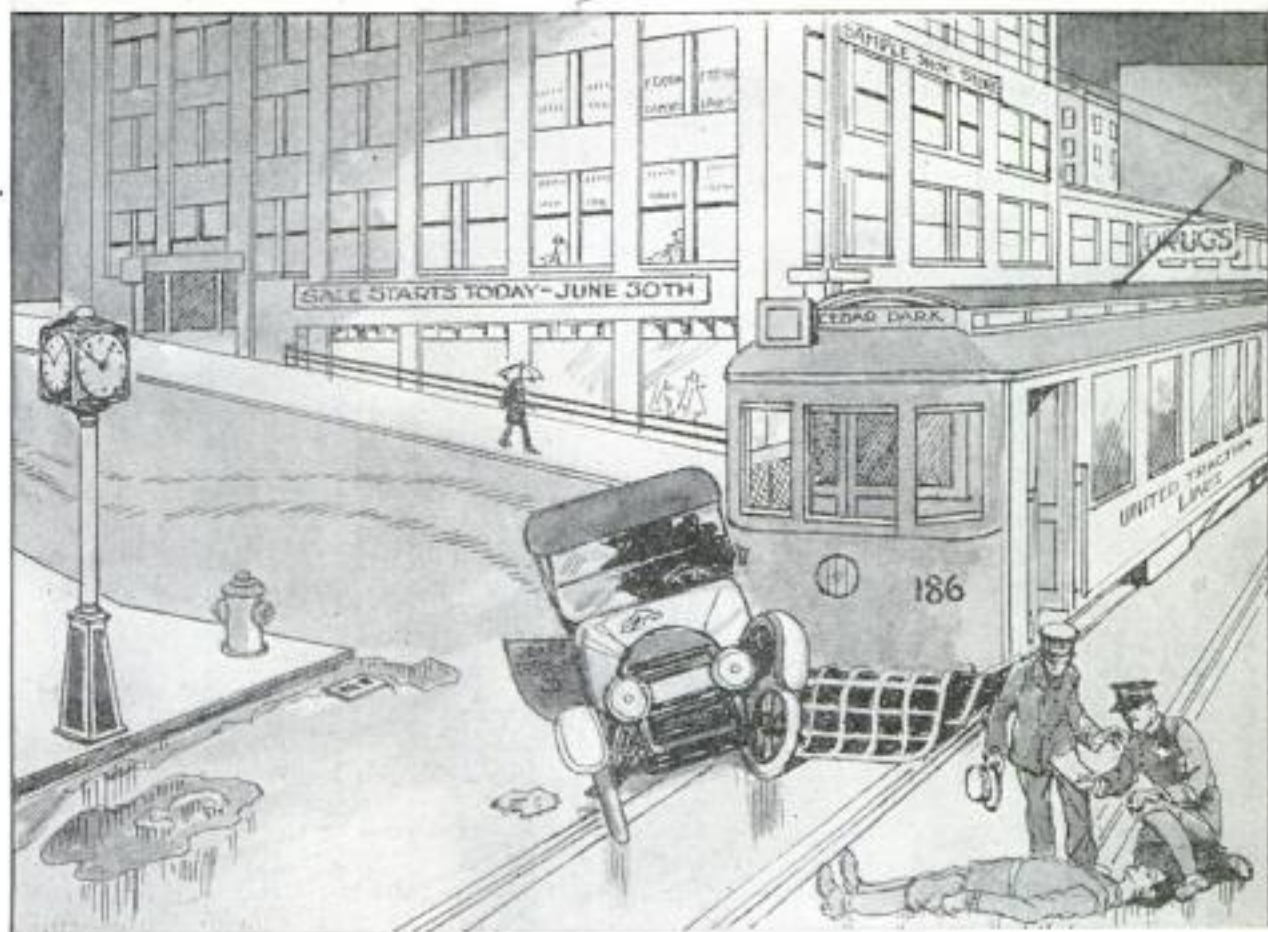


One of the First Working Models of Eli Whitney's Cotton Gin, an Invention Hailed with Dismay by the Cotton-Field Workers, Who Believed It Would Rob Them of Their Jobs

William Esorham Rice -
New York State Civil
Service Commissioner

323 749

PUZZLE PICTURE TESTS POLICE MEMORY AND VISION



After Studying This Picture for Three Minutes, Police Candidates Are Asked Ten Questions about What They Saw, to Test Their Quickness, Accuracy and Memory

To test the quickness of perception, accuracy and memory of candidates for police departments, the bureau of public personnel administration at Washington has prepared pictures showing a collision of a street car and an automobile. The would-be policeman is allowed to study the print for three minutes and may take any notes that he wishes. At the end of the time, he is asked questions about the things he saw, such as, "On what street was the auto being driven?"; "What was the number on the street car?"; "What shows reckless driving on the part of the chauffeur?" The queries, ten in all, must be answered in fifteen minutes, and the applicant is graded according to the replies. The test has been found useful in that it indicates if the candidate is naturally alert and precise or is unlikely to notice the significant facts of such an accident. Another observation problem consists in allowing the competitor a three-second glance at an automobile license plate, the average time an officer or a pedestrian has to look at a tag under ordinary traffic conditions. He then attempts to write down the number correct-

ly. In tests for automobile drivers, ten photographs illustrating dangerous or objectionable situations are shown the candidates, and they are asked to tell the hazardous feature in each.

MAGNET CHARGER ON BATTERY NEEDS LITTLE CURRENT 2788

Quickly attached to a six-volt storage battery by clips that fasten on the terminals, a simple charger for Ford magnetos can be used in the car, if the flywheel is removed, or on the magnets separately.

It requires no other connections, and is said to use less current than is required for the headlights. Hence, it may be run for several hours without weakening the battery. The usual connections do not have to be disturbed, as the clips are large enough to fit over the regular wiring. Charging can be done in five minutes, it is said, and the apparatus is constructed to last a lifetime.



Horton Electrical
Instruments
Manchester, Conn.
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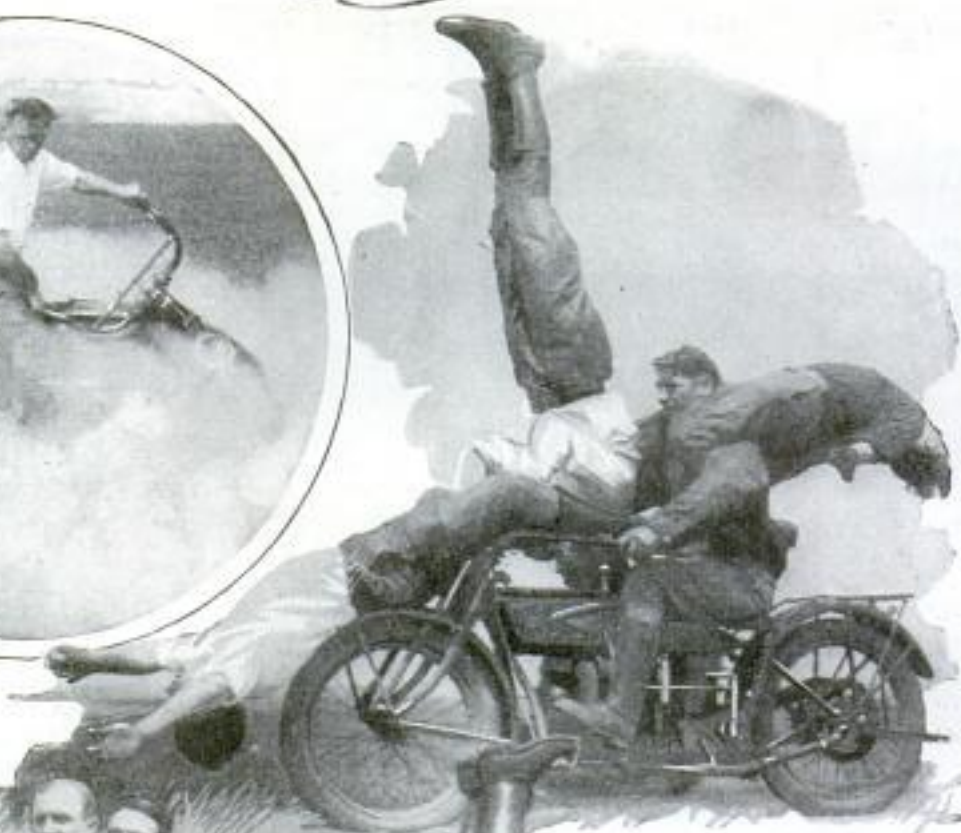
Chicago

Motorcycle Stunts by Police Thrill Crowds

276



The "Dust Spin," a Sharp Turn on Dirt Course, Done at the Risk of a Severe Fall



Although Hampered by Three Passengers in Dangerous Postures, Driver Runs at High Speed



Keeping the Balance Tests Skill in Standing Ride, but Men Are Ready to Jump If Accident Happens



Where Teamwork Counts; If Rider Swerves His Machine Suddenly, Other Performers Are Likely to Fall

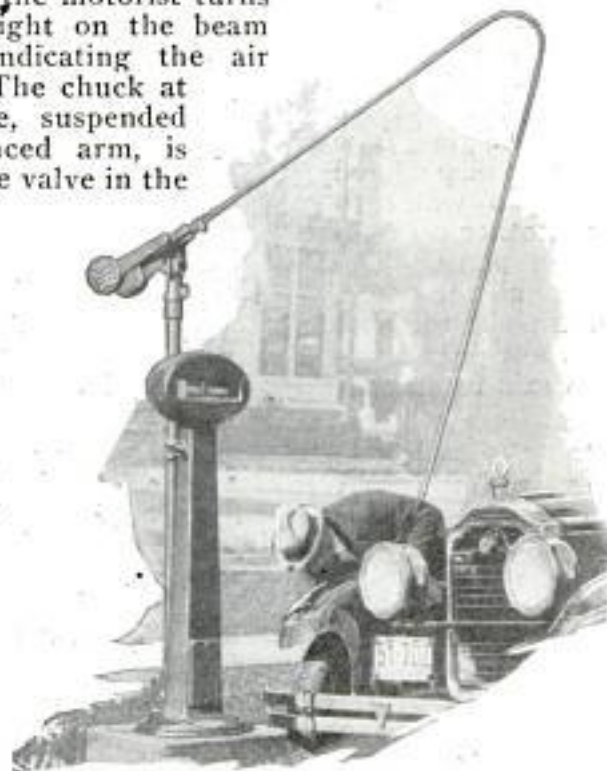
**PIANO PRODUCES ORGAN TONES
BY MEANS OF REFLECTORS**

What some musicians declare is the most remarkable improvement in the piano since it was first used in the early part of the eighteenth century, consists in the addition of a fourth pedal and a series of "reflectors," by which the vibrations of the strings can be built up into tones resembling those of an organ. Tremolo effects and the "giggle" of the saxophone can also be produced according to the inventor, who declares that the modification adapts the piano not only to better interpretation of jazz music, but also to improved rendition of the works of the masters, since it permits shadings not possible with the ordinary instrument. The notes do not fade and die away after being struck as in the usual piano, but may be sustained and even increased in volume or allowed to escape with almost any degree of softness.

— 340

**AIR SCALE FOR AUTO TIRES
MAKES FILLING EASY**

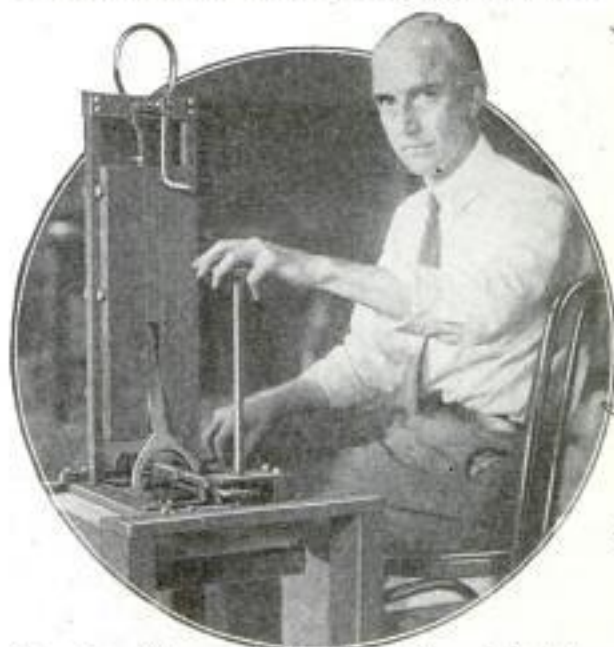
An air scale which automatically fills automobile tires to any desired pressure and then stops, is the latest filling-station device for the aid of motorists. The scale has a beam and movable weight, like any weighing machine, except that it is inclosed behind glass in a dust-proof case. To operate the scale, the motorist turns a knob until the weight on the beam reaches the mark indicating the air pressure he wants. The chuck at the end of the hose, suspended from a counterbalanced arm, is then applied to the tire valve in the usual way. When the pressure in the tire reaches the point set by the scale, the air is automatically turned off. Besides eliminating the trouble of halting the filling several times to test the air pressure with a gauge, the device is said to be much more accurate, since the large-size scale is built with the same precision as other weighing apparatus of the type employing a graduated balance.



Filling Tire from Air Hose with Scale That Shuts Off at Desired Pressure.

**TESTER FOR SLIPPERY FLOORS
TO REDUCE ACCIDENTS** — 25

More than 250 persons in the United States are killed every week as the result of falls, according to government statis-



Measuring Slippage of Sample of Floor Material on Tester at Bureau of Standards

tics, while thousands suffer minor injuries. Many of these accidents are due to slipping on sidewalks, floors and other surfaces commonly encountered in the day's work. As a means of determining the hazard presented by various kinds of materials under such conditions, the bureau of standards is testing an apparatus devised to measure slippage. It consists of a lever arrangement resting upon a sample surface which is smoothed to different degrees for the experiment. Pressure is applied by a ratchet mechanism, tending to cause the lever to slide more or less according to the amount of force exerted upon it.

One of Denmark's cabinet members is a woman; she acts as minister of education.

*U. S. Bureau of Standards
Gov. B. Hunter
lev-*

no patent number

*The Air-Scale Co., 810 B. roadway
Toledo, Ohio 810*

**SHOES HALF-SOLED AT HOME
 — WITH WATERPROOF GLUE**

259

With waterproof glue and a set of clips furnished in a small repair box, shoes can be half-soled without going to the cob-



Home Shoe-Repair Outfit with Sole Glued On, and Held by Special Clamps

bler. The old bottom is partly peeled off or removed entirely and the surface roughened for an application of glue. The new sole, cut to fit the shoe, is also coated with the adhesive, soaked in water to soften it and then given another application before being fitted in place. The special clamps attached around the edges, hold the sole from slipping while the glue is drying. The substance not only binds the sole to the shoe but is said to make it waterproof.

267

**GREATEST RAIL HAZARD ENDED
 BY AUTOMATIC SWITCHING**

Riding and braking by hand "wild" freight cars while they are being switched in the big classification terminals, is regarded as about the most dangerous job in railroading. But the perils of the "humps," as the yards are called, have been greatly minimized through an invention of a railroad official for controlling the cars by sets of levers from a tower

instead of having to mount the roofs and turn the brake wheel. Under the new system, the switches are operated by electro-pneumatic devices, and the cars are stopped or slowed down as desired by "retarders" on the rails instead of brakes. These retarders pinch in upon the wheels of the car, effecting the same result as a brakeman on top, but the whole task is performed from the security of the tower where the operator commands a full view of the yards. Increase of twenty-five to forty-five per cent in performance of a yard is possible by using the tower, the inventor declares, accidents are reduced to a minimum and the number of men to a job is reduced thirty-five per cent.

**BELT AND SNOWSHOES FOR AUTO
 FIT IT FOR WINTER TRAVEL**

2518

Traction belts, similar to tank treads, and sled runners, which can be attached to the wheels and frames of automobiles to give them a firm track in winter and to keep them from sinking into drifts, are said to enable the cars to make speeds of fifteen to eighteen miles an hour on otherwise impassable roads. Even deep snow packs that block traffic for other vehicles may be successfully traversed by machines fitted with the winter treads, which cannot be injured by contact with bare ground or wood or concrete surfaces. The attachments are also of great assistance to cars operating in country where roads are often covered with large mounds of shifting sands. In sections where ice and snow impede the progress of fire-fighting equipment, application of the traction belts to the apparatus is claimed to make possible ordinary speeds in responding to alarms. The treads can be fitted to the



Ready for Winter Trips, Auto Fitted with Caterpillar Tread Behind and Runners in Front

cars in a short time, and when in place, prevent skidding, sideslipping and racing of the engine caused by churning of the wheels in deep snow.

(C) W. George Barnum, Inc. 1918
 1000 North Dearborn St. Chicago, Ill.
 1000 North Dearborn St. Chicago, Ill.

Taken over by West Coast
 new station Wis.

West Coast
 H. H.

General Railway Signal Co., Rochester, N.Y.
 Signal Co., St. Louis, Mo.
 Signal Co., St. Louis, Mo.
 Signal Co., St. Louis, Mo.
 Signal Co., St. Louis, Mo.



Cadets in the New Aeronautical Course, in Which Every Future Naval Officer Is Required to Qualify as a Flyer, Show Their Lesson Charts to Assistant Secretary Robinson, of the Navy

FOUR YEARS AT ANNAPOLIS

IV—Finishing the Making of “An Officer and a Gentleman”

BEGINNING of a midshipman's final year at the naval academy is one of the biggest events in any boy's life. As soon as the retiring first class has received its diplomas from the hands of either the president of the United States or the secretary of the navy, the old second class becomes the first, with all the privileges and honors appertaining thereto. Every second-class man, on that graduating day, goes to the exercises with his first-class ring in his pocket, and as soon as the new ensigns are officially commissioned the entire new first class dashes to Dewey basin, the small boat harbor, and dives in en masse to baptize the rings.

The final year at the academy starts off with another summer cruise, and by the time the men return late in August from their third trip, they have seen a good part of the world, visited most of the capitals of Europe, been sight-seeing in quaint old-world ports, looked in on South America, traveled back and forth through the Panama canal, and looked over the Pacific coast of their own country.

When the academic year opens in the fall there is no relaxation in the duties of the upper class. The members still make their own beds, sweep their own floors, and must keep everything in their rooms in the same spick and span fashion as before.

The same grind of lessons, always a bit stiffer than the year before, and of drills and exercises occupy the time of the midshipman in his first-class year. But with his increased rating, he also acquires new responsibilities. He is responsible for the conduct of the men of the lower classes at his mess table, and is frequently called on to assume executive positions, such as being placed in charge of crews at boat drill and on other occasions.

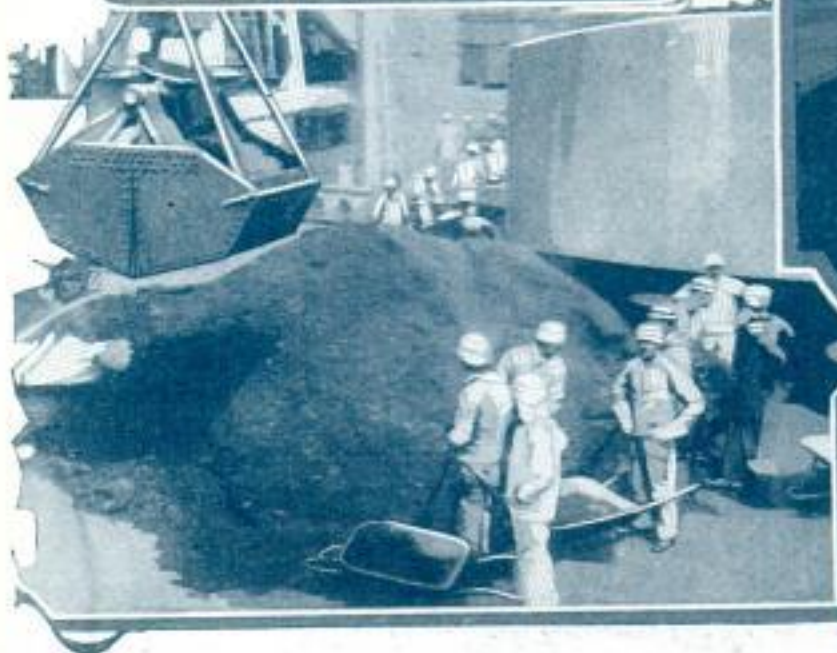
As spring nears, his final round of examinations, and “boning” to make up in studies in which he is weak, keep him busy, but not too busy to prepare for the big event of graduation. June week is an endless round of activities. There is his “farewell ball,” the visits of friends and relatives, the return of old grads, now wearing the insignia of officers of the navy, and, on the last day, with thousands looking on, the graduating class, wearing full-dress white uniforms, receives its diplomas, and henceforth are full-fledged officers too.



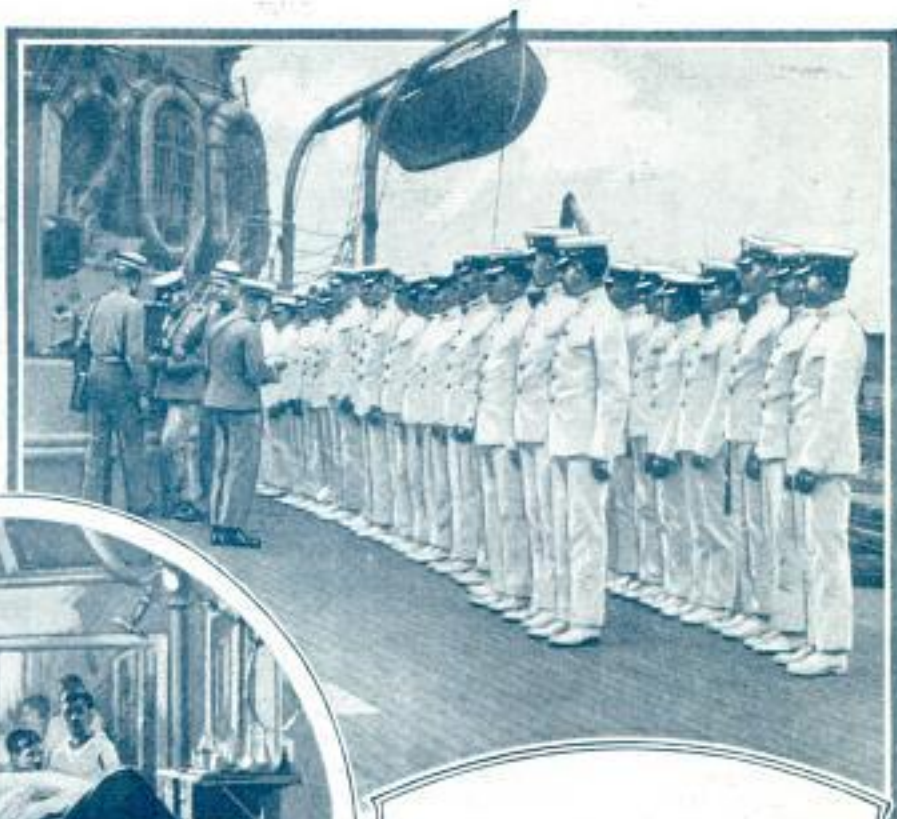
Above, Class in Navigation, on the Summer Cruise, Takes a Daily Lesson in "Shooting the Sun" to Determine the Ship's Position; Right, the Ship's Bugler Blows Taps as a Signal That Lights Must Be Put Out



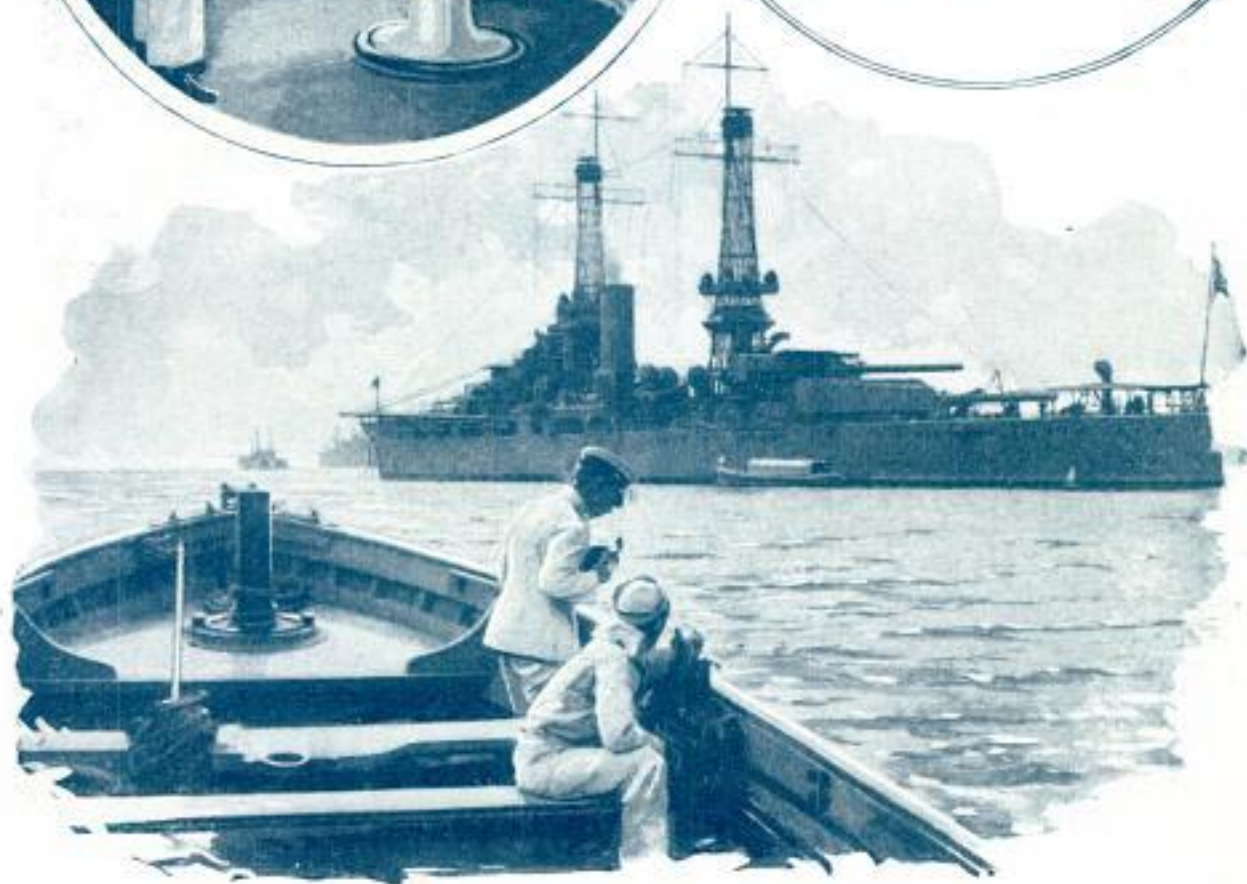
Summer Cruising to Fascinating Foreign Ports Is Not All a Pleasure Trip, for When Coaling Time Comes, the Future Officers Must All Fall To and Fill the Ship's Bunkers, Then Wash Down and Re-paint the Vessel

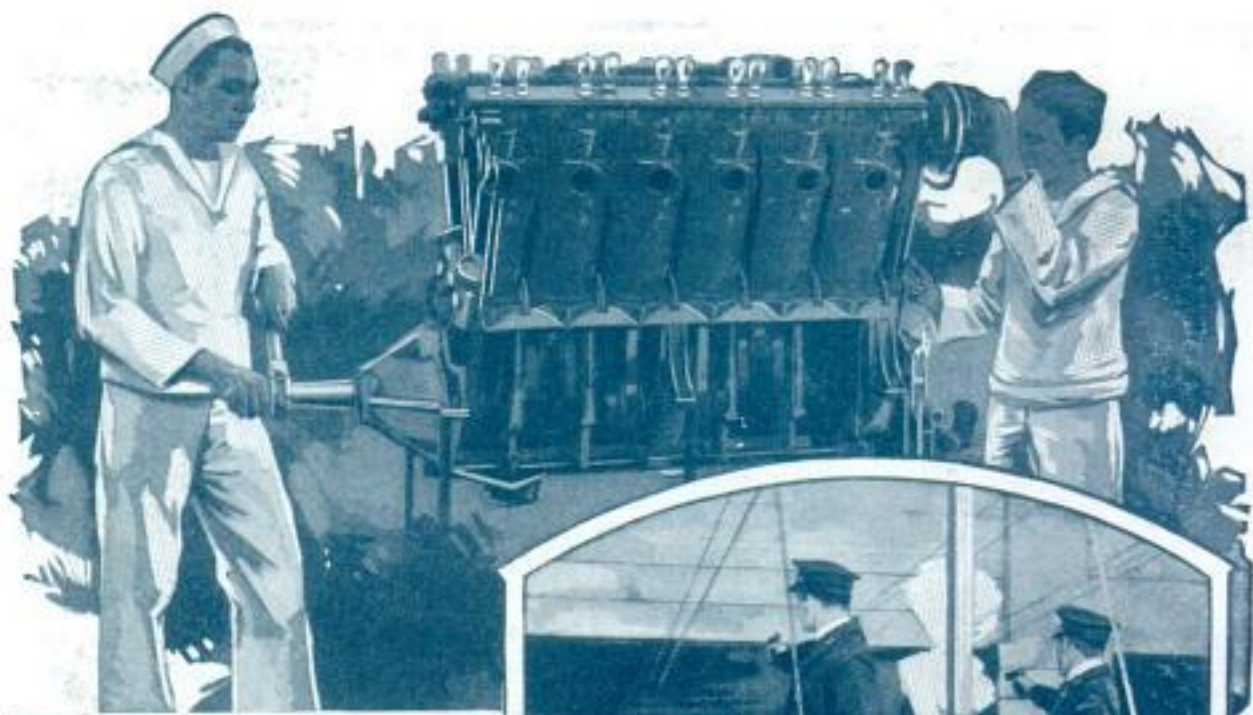


Spotless White Uniforms, Caps and Shoes Must Pass a Rigid Examination on the Summer Cruises Before Visitors Are Received Aboard or a Party Goes Ashore; the Navy Is Always Watchful of the Impression Its Men Make in Foreign Ports and Emphasizes the Necessity of Upholding the Dignity of the Service

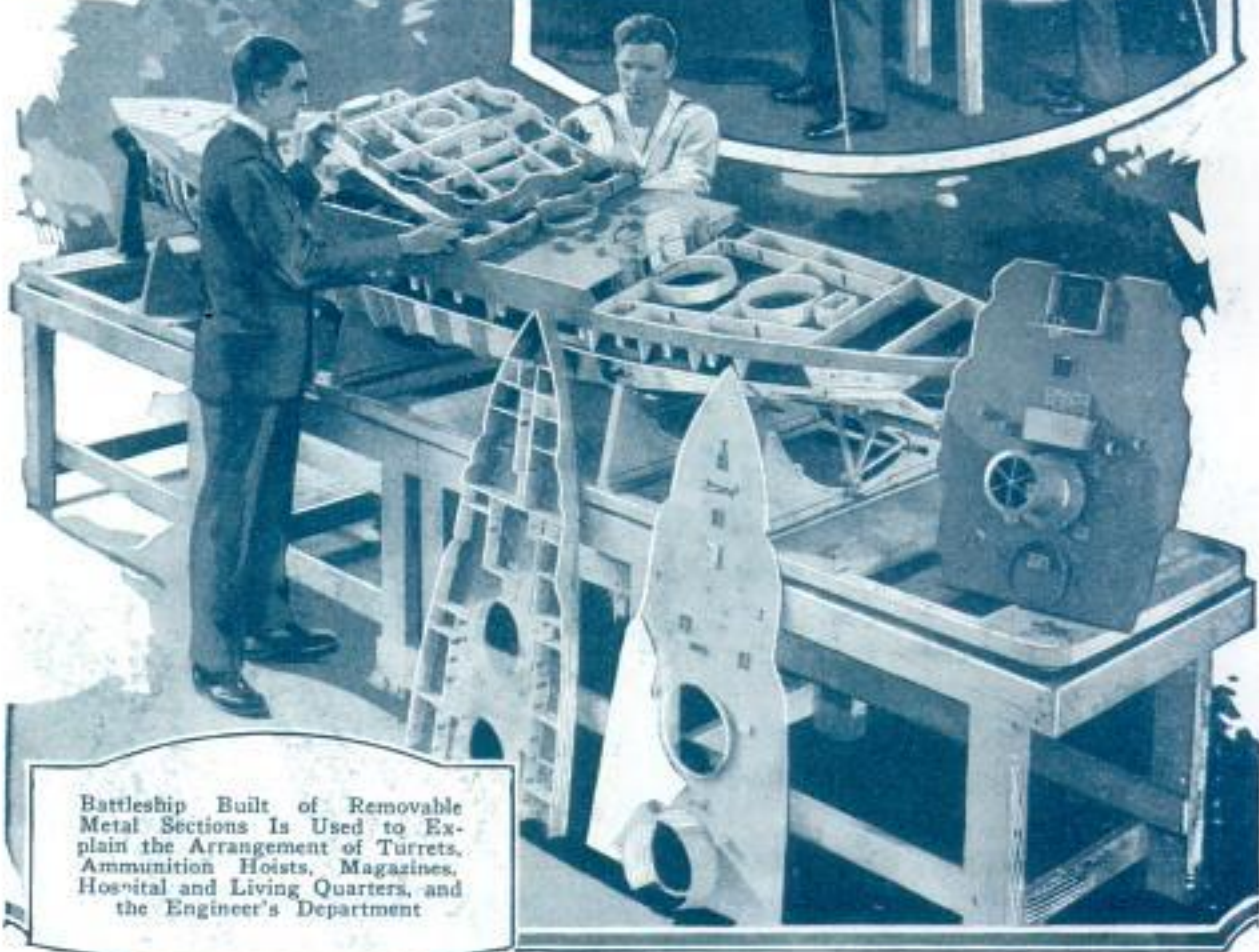


The Ship's Barber Shop, at Left, Helps the Middies Prepare for Inspection; Below, a Motor Launch, Returning to the Fleet at Anchor in Port during the Summer Cruises, Offers an Opportunity for the Midshipmen with Cameras to Photograph Their Ship as Part of the Picture Record of the Trip



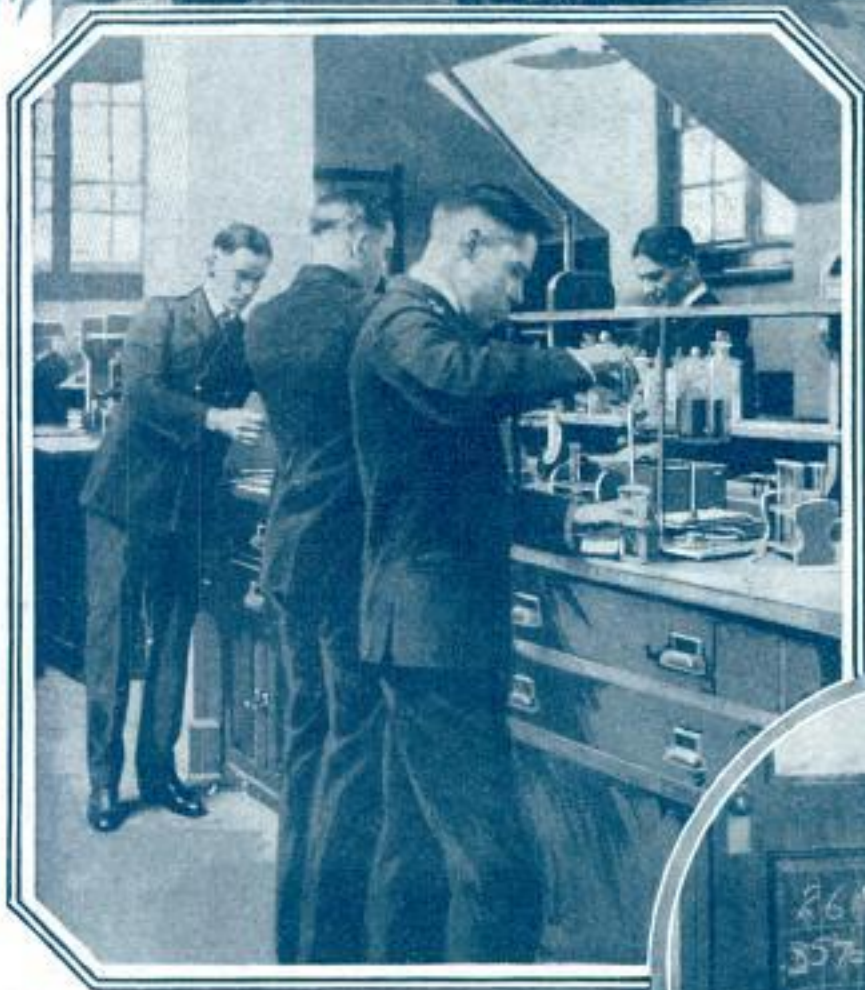
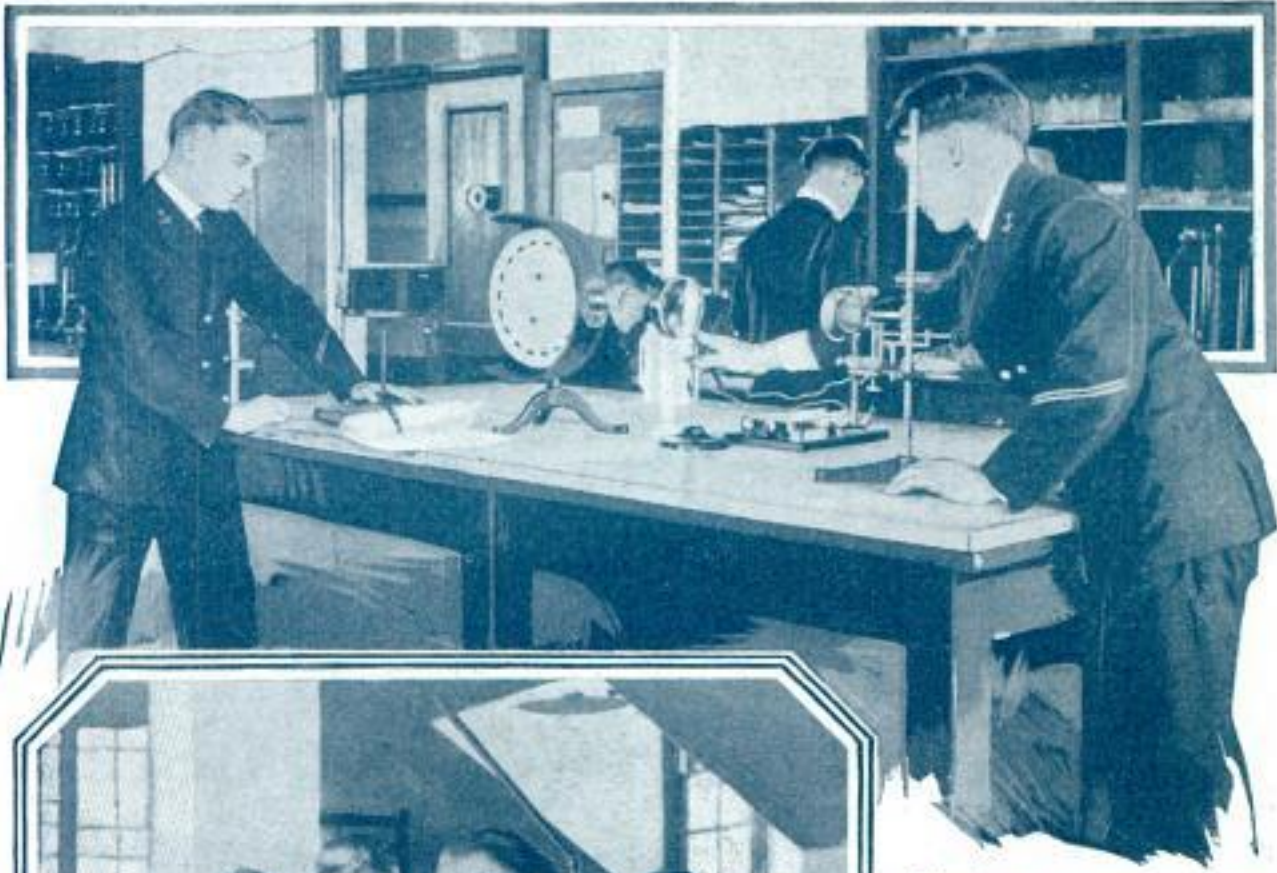


Cut-Out Liberty Engine, Above, Used in Aviation Classes, Has Electric Lights to Show the Firing Order; Right, Pistol Practice Teaches the Regulation Stance in Firing Sideways



Battleship Built of Removable Metal Sections Is Used to Explain the Arrangement of Turrets, Ammunition Hoists, Magazines, Hospital and Living Quarters, and the Engineer's Department

167

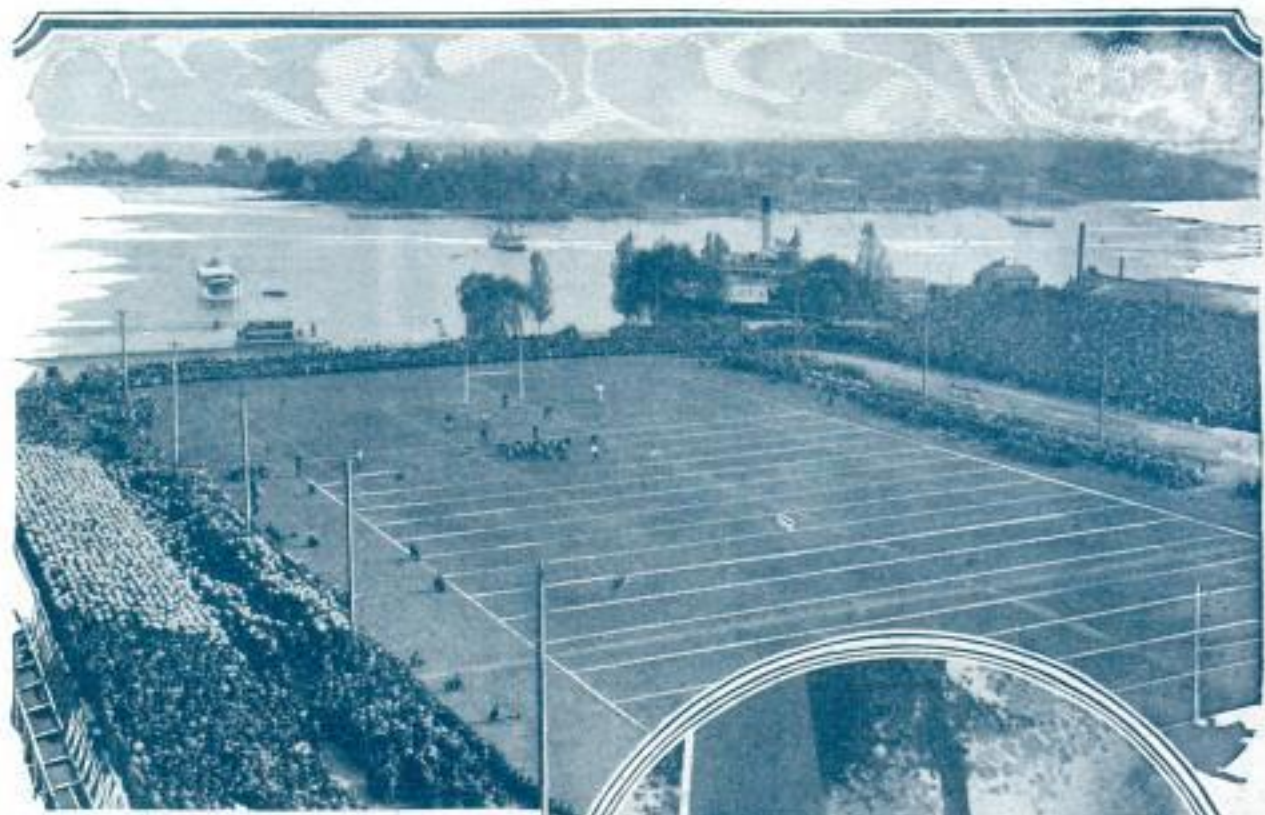


Physics and Chemistry Are Subjects in Which Every Cadet Must Qualify. Since Both Enter to a Large Degree into the Making of Ships, Guns and Ammunition, and Their Operation and Use; the Two Laboratories Are Equipped with the Latest Devices; Above Is Apparatus Used in a Study of Light Refraction, a Subject Closely Allied to the Use of Instruments in Determining a Ship's Position at Sea, and at the Left Is a View of the Chemical Laboratory, with a Group of Second-Class Men Carrying Out a Difficult Experiment

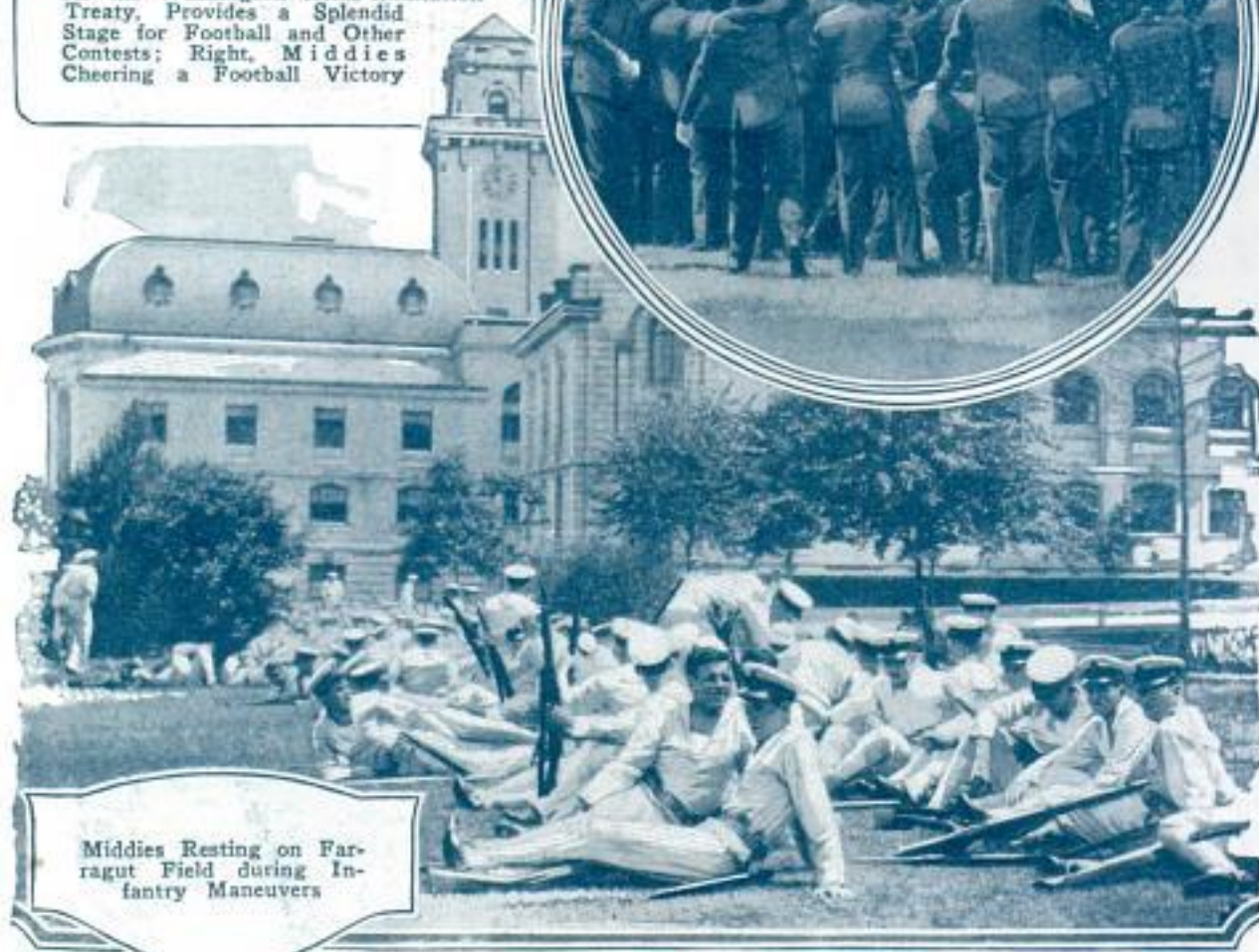
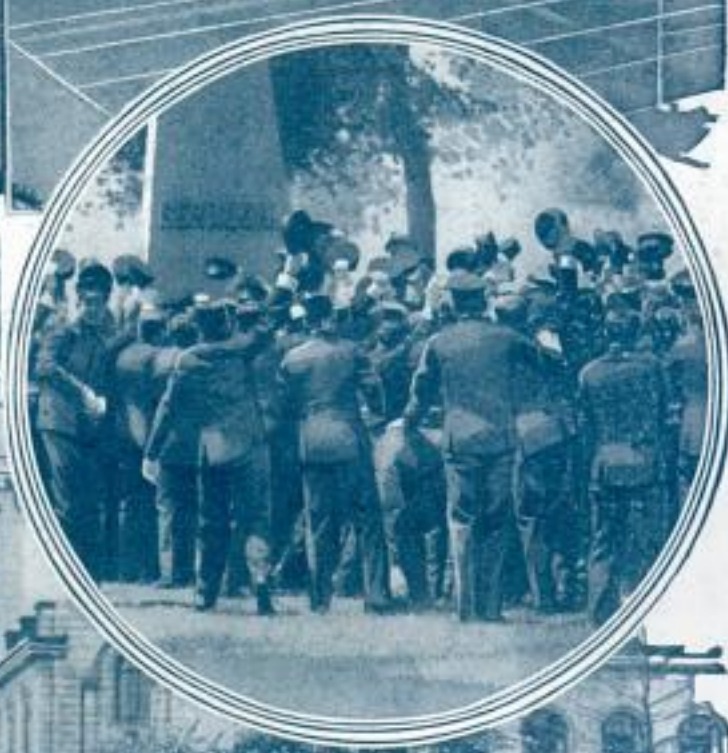


Hazing Has Been Abolished at the Naval Academy as a Result of Several Unfortunate Incidents, but There Are Certain Privileges Still Allowed the First-Class Men in the Days Just before Graduation. One Is to Order a Plebe to Appear Each Morning during the Last Month of the Academy Year and Chalk Up on the First-Class Man's Door the Number of Days Remaining until June Week and Graduation Day; to the Upper Class Also Is Delegated Considerable Responsibility over the Younger Boys during the Last Year

16^a



The Athletic Field, with Its New Steel Stands, Built from Metal Salvaged from a Battleship Scrapped under the Washington Arms-Limitation Treaty, Provides a Splendid Stage for Football and Other Contests; Right, Middies Cheering a Football Victory

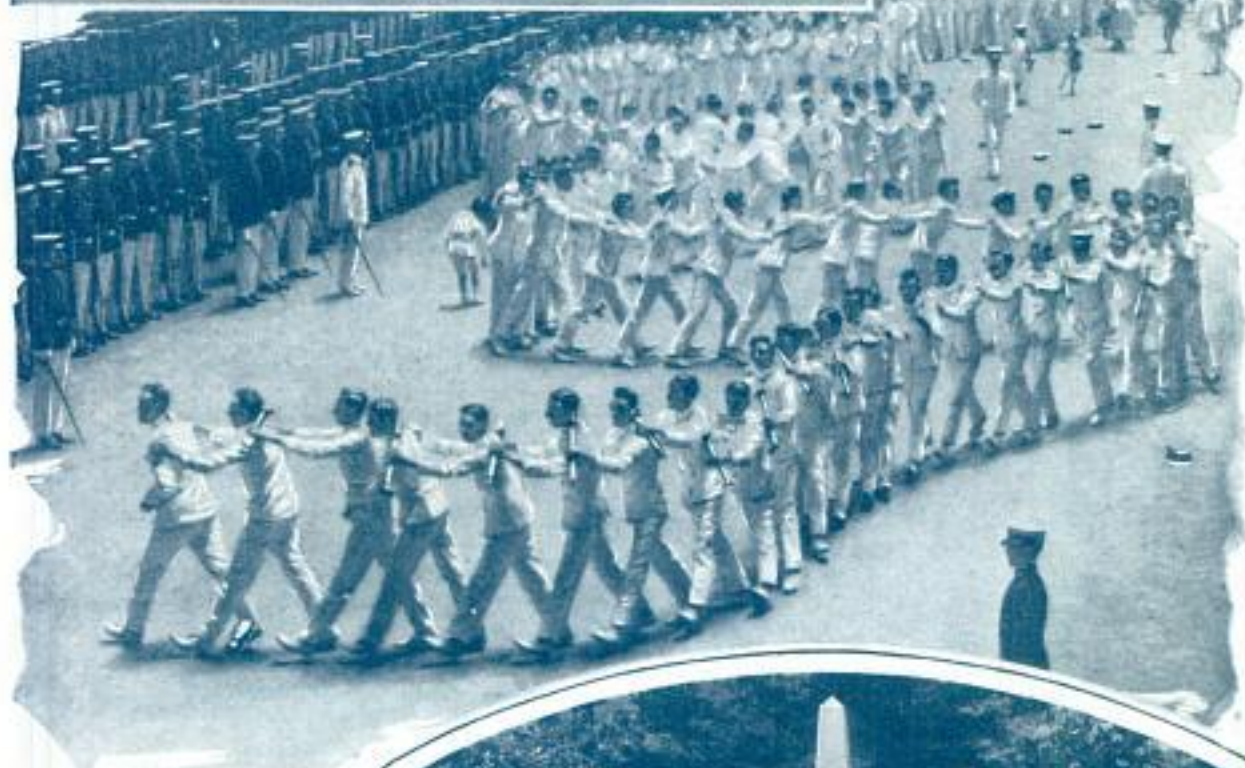


Middies Resting on Faragut Field during Infantry Maneuvers

167



With a Plebe to Wind the Phonograph, Two Upper-Class Men Enjoy a Dance in Quarters Decorated with a Picture of "THE" Girl and a "Quiet" Sign Which Apparently Has Been "Borrowed" from Some Sleeping Car.



The Snake Dance of the Happy Graduates, Diplomas in Hand, Comes Winding Out of Dahlgren Hall as the High Spot of Graduation Week; the New Ensigns Wind In and Out before the Envious Lower-Class Men, Chanting as They Go the Greatest Song in Four Years of Academy Life, "No More Rivers to Cross"; at the Right Is Another View of the Final Triumph of the Newly Made Ensigns before They Depart for a Long Home Leave While Awaiting Assignments

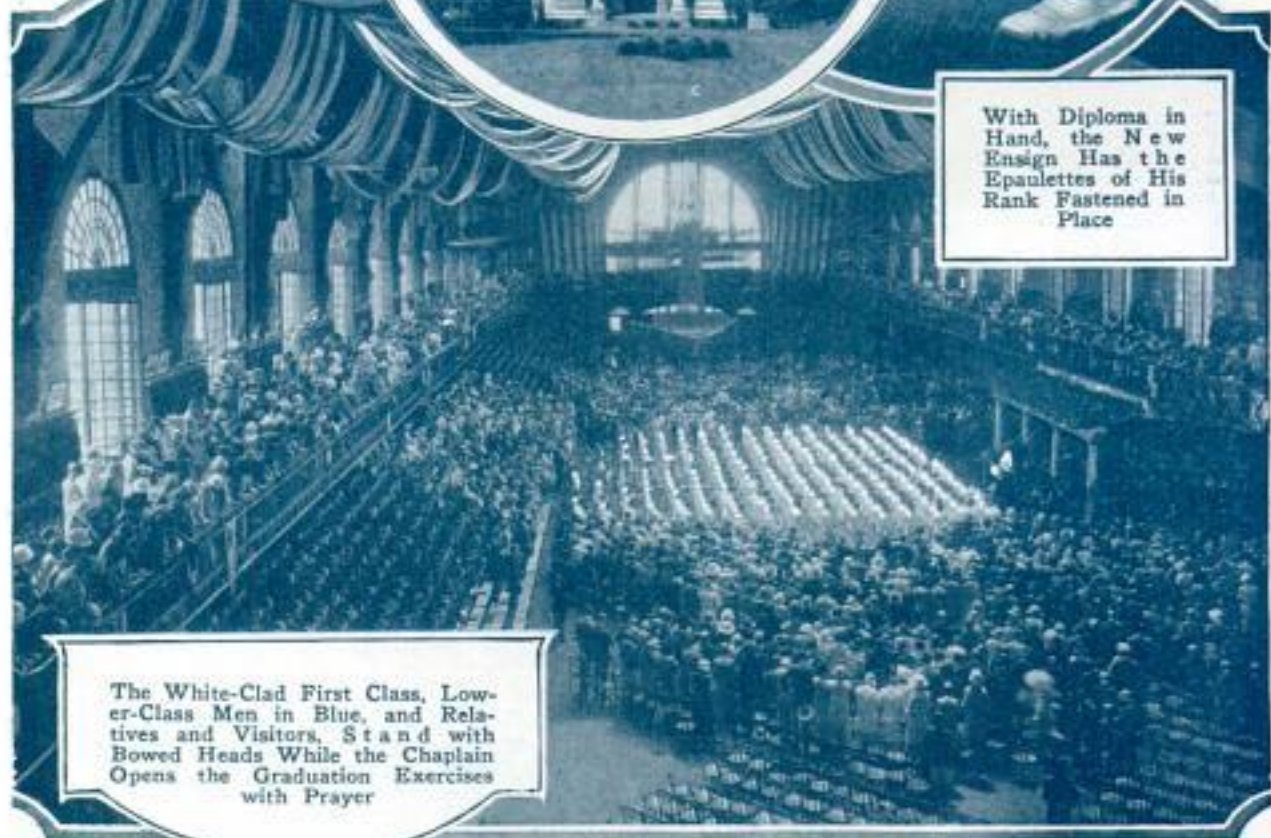




Presentation of the Colors. When a Pretty Girl Entrusts the Stars and Stripes and Academy Flag to the Company Which Has Won the Honor of Guarding Them by Being the Best at Drill; the Company Commander Salutes the Fair Donor with a Kiss; Insert, Chapel in Which Is Buried John Paul Jones



With Diploma in Hand, the New Ensign Has the Epaulettes of His Rank Fastened in Place



The White-Clad First Class, Lower-Class Men in Blue, and Relatives and Visitors, Stand with Bowed Heads While the Chaplain Opens the Graduation Exercises with Prayer

New York Times

8/21/25 POPULAR MECHANICS

761

PLANES FOR ARCTIC FLIGHTS HELD IMPRACTICAL

280

Dirigibles, not airplanes, must be used if an aerial survey of the arctic regions is to be successful, according to Donald B. MacMillan, who was compelled to abandon that part of his expedition to the north. From his and Amundsen's experience, he was convinced that the uncertainty of landing places and the unreliability of caches of fuel and food made travel by airplanes exceedingly hazardous. For that reason, and because adverse weather had set in earlier than had been expected, he advised that further exploits by naval planes be discontinued this year. "A fjord is free today and icebound tomorrow," was one of the explorer's radio messages from the far north. "A cache under such conditions, is not a help but a menace, for, if depended upon and a plane arrives out of fuel, destruction is the inevitable result. The lighter-than-air machine can do the work and should do it at the earliest opportunity." Naval officers declare that the dangers of venturing into the arctic regions with a dirigible such as the "Los Angeles" are tremendous. They point out that if the big gas bags get weighted with snow or ice from frozen mist and rain, they might never return. On their advice, the naval airships were not allowed to fly to the polar regions in search of Amundsen and Ellsworth when it was feared that they were lost last summer.

GRAINS FOUND IN EGYPTIAN TOMBS WELL PRESERVED

186

Wisps of wheat and barley placed in royal tombs to sustain the Egyptian rulers on their journeys after death, as well as flowers and funeral garlands, are often found in excellent state of preservation by scientists exploring ancient ruins. A collection of objects of this kind was presented to the University of Chicago recently by Prof. James H. Breasted. Dates, olives and pomegranates were also among them, indicating the preserving power of Egypt's exceedingly dry climate.



Prof. James H. Breasted with Centuries-Old Samples of Grain Found in Egyptian Tombs

Pacific Atlantic

FLASHING HANDS HALT AUTOS AND SPEED TRAFFIC

191

For night service especially, sets of colored-light



Traffic Policeman Using Hand Lights, and Close View of Signal Set in Position

signals, strapped to the hands of traffic police, aid in giving signals clearly. Current is supplied from a small battery. A red lamp is on one side and a green on the other, so that the policeman may flash practically all the signals displayed by the usual traffic tower.

HEATING PLANT IS PUT ON ROOF IN NEW MOVIE PALACE

A radical departure in heating systems has been made by the new Capital theater in London by placing the huge gas-fired boilers on the roof of the building. By the use of gas instead of coal, the need for fuel storage is obviated, and instead of using the basement and part of the first floor for heating equipment, this valuable space is freed for other uses. The system is put in operation by turning on and lighting the gas and starting the pumps and fans. Thereafter the plant operates automatically. Local authorities commend the innovation as an aid in reducing the smoke nuisance in the city.

mention Clarence G. Dick
 mention 'man' every night
 State Utility Bulletin
 New York Times

PEACHES ARE QUICKLY PITTED BY AUTOMATIC MACHINE

238

Peaches are pitted by a patented machine just seven times faster than by

old methods, according to Pacific-coast experts after watching tests. The peaches are run down a chute to a girl operator who feeds them into an arm protruding from the machine. From then on, there is no human touch. The fruit is ridded of its stone, which is taken away in one conveyor, while the meat is delivered by means of another.

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Letter retd. 10/20/20



Automatic Peach Pitter Seven Times Faster than Human Hands

PARIS WAR LIBRARY HAS THIRTY THOUSAND BOOKS

Started as a reading refuge for the American expeditionary force, the war library in Paris has been continued and has increased until it now has 30,000 books.

The place is a memorial to the war dead. Much research matter of commercial and political value is being accumulated. Efforts are made to clear propaganda from the facts, as an aid to Americans trying to build commerce overseas.

New York Times 8/9/20

HOW TO SAVE GAS, SHOCK AND DROWNING VICTIMS

By Dr. HERMAN N. BUNDESEN

Commissioner of Health, City of Chicago

19 *5*

DROWNING, lightning, electric shocks and poisonous gases claim more than 12,000 lives in the United States every year, according to figures compiled by the National Safety council. Drowning alone caused nearly 7,000 deaths last year, and of those killed by gas, a large number were victims of the auto's exhaust with its invisible poison that strikes a person down before he is aware of its presence. Death is often the penalty paid for the practice of running the motor in a closed garage or crawling under the car and breathing the fumes.

While carelessness frequently is the cause of hundreds of these fatalities, it is only half the tragedy, for scores of victims are given up for dead when, as a matter of fact, they are alive and could be saved by prompt and proper application of artificial respiration. In practically every case of drowning, shock or gas poisoning, there is a possibility of restoration. Therefore, artificial respiration should be continued for at least four hours without interruption.

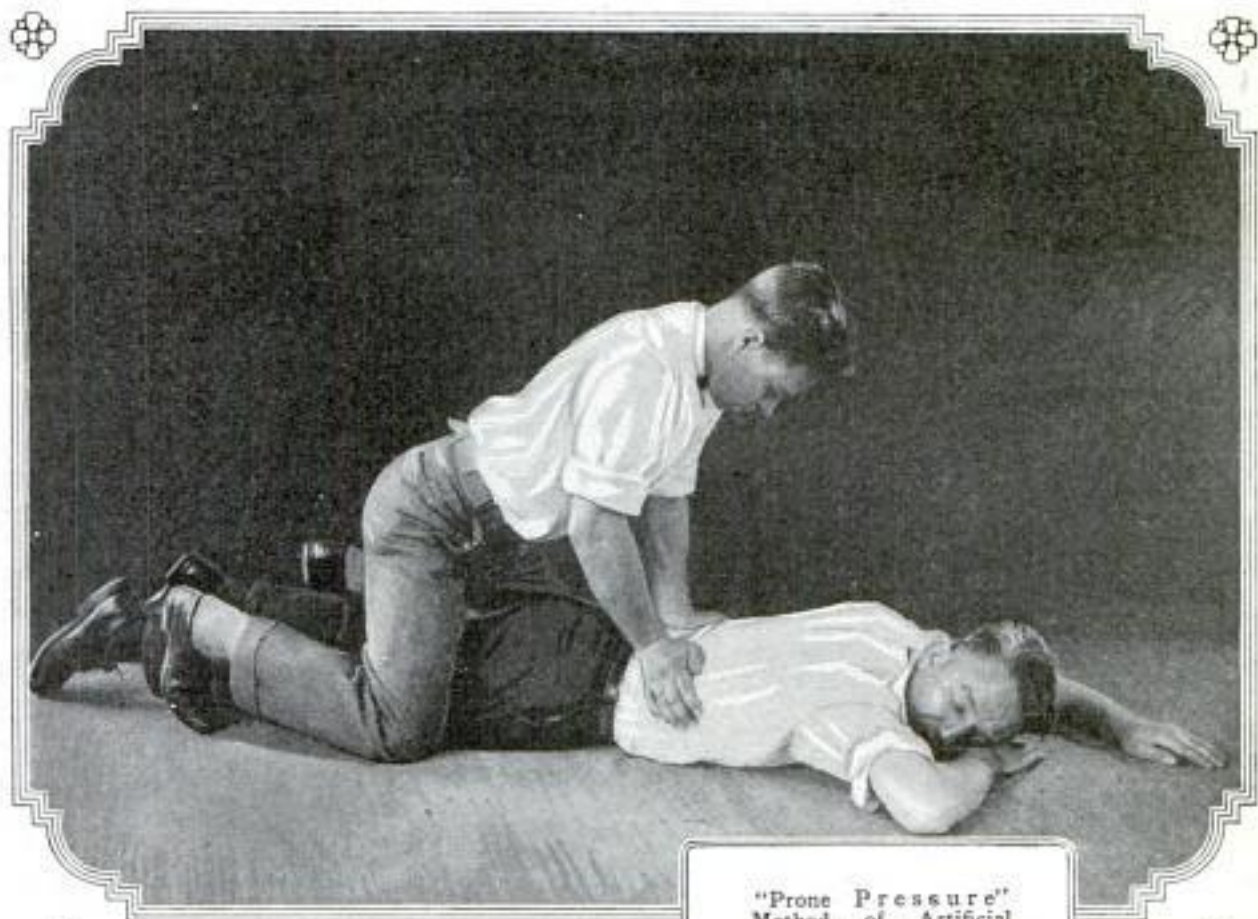
Never pause to drag or carry the patient far, or to fan him, give him

water or loosen the clothing. If it is a case of drowning, don't waste time trying to empty the water out of the victim. Start artificial respiration at once.

If the person has suffered an electric shock, carefully free him from the current, using wood, rope, cloth or rubber if necessary to touch him or the wires, and avoid contact with his skin or puddles of water. In gas-poisoning cases, carry or drag the person to fresh air. Do not expose him to cold outside atmosphere or try to walk him about. The method of artificial respiration to be followed is the same in all three situations.

Even after natural breathing has been started, the patient should be carefully watched, for in gas and shock cases, especially, there is a likelihood that the breathing may stop before full restoration. Strong, black coffee may be given when consciousness has been regained. Whisky or brandy should not be used. Above all, do not get excited. It's a good plan to count ten before you do anything. That gives you an opportunity to collect your wits. Keep calm, start artificial respiration immediately and keep at it.

Bringing "Dead" to Life After Four Hours



"Prone Pressure"
 Method of Artificial
 Respiration; Victim Is
 Laid on Stomach, Head
 Propped on Arm and
 Turned So Mouth Is
 Unobstructed; Rescuer
 Presses Downward,
 with Palms Close To-
 gether, on Victim's
 Back, and Counts
 Slowly While Pressing;
 at Count of Four, He
 Releases Pressure,
 Giving Lungs Oppor-
 tunity to Take in Air;
 Then Repeats Process



New York Times

PHOTO DONE IN SEVEN MINUTES ON SPEEDING AIRPLANE

In seven minutes, after the exposure was made, a finished print was prepared,

and Eastman, Kodak Co.,
Rochester, N.Y.



Aviators Examining Print of Exposure Developed in Seven Minutes on Airplane; Two of the Cylinder Carriers in Foreground.

dried and ready for mounting, by photographers in the army air service recently. They used a special paper, which has been devised for quick results in aerial work. The entire job was done while the flyers were aloft, and when the print was developed, it was placed in a cylinder and dropped on the front lawn of an interested witness of the performance. An ordinary airplane camera and other equipment were used.

MANY KINGS STILL IN POWER DESPITE WORLD WAR

While the world's eighty-three governments employ thirty-six presidents, some fifteen reigning kings and queens are left in spite of the changing styles in rulers

produced by the World War. In Europe, kings retain their thrones in England, Italy, Spain, Belgium, Holland, Jugoslavia, Norway, Denmark and Sweden, while Iceland is ruled by King Christian X and Egypt by King Fuad I. Cambodia, a French protectorate, Mesopotamia, the Hedjaz, Nepal and Siam are also governed by kings. Only two emperors, George V of England, who bears that title as ruler of India, and Yoshihito of Japan, survive the evolution in governments. Among other exalted personages are the viceroy of India, a regent in Hungary, a state head in Esthonia and a chief executive in China. Bulgaria has a czar, an amir is the head of the Afghanistan state, a maharajah presides over Bhutan, a bey in Tunis and a sultan in Zanzibar. Although many of the titles are ancient, practically all present-day rulers are new at their jobs. The oldest, in point of reigning time, is Prince John II of Lichtenstein who ascended the throne in 1858. Queen Wilhelmina of the Netherlands succeeded to the throne in 1890 and King Alfonso XIII of Spain in 1886.

Heads of all other governments came into power in the twentieth century, and only in the United Kingdom, Norway, Sweden, Denmark, Italy, Belgium, Japan, Bhutan, Cambodia, Morocco, Nepal, Zanzibar and Siam, had the present rulers ascended to the throne before 1914.

3350

LOBSTERS COLORED TO TASTE BY DYEING THEIR FOOD

Lobsters may be colored to any hue desired, to suit the particular scheme of dinner decoration simply by putting coloring matter in their food, according to a well-known German scientist. He discovered that they turn red after they are boiled because of the action of the heat upon a chemical in their shells.

Dr. Kornfeld.
Berlin, Germany

Experiments conducted by U. S. Army Service Engineering Division, McCook Field, Dayton, Ohio.

American-Grown Bamboo for Every Purpose

Government Scientists Find Many Species of It May Be Profitably Cultivated in United States

By UTHAI VINCENT WILCOX

Washington, D. C. Jackson Park

BEFORE so very long, bamboo may figure largely in the life of the average American. It will not be an imported bamboo; it will come from newly planted forests, from farms and from the back-yard garden. This is the prediction of government scientists who have started the ball rolling through experimental plantings and cultivation. They have found a large part of the United States ideally suited for the growing of many species of bamboo.

This strange grass has an almost unlimited number of uses. The manufacturer, the sportsman, the contractor and builder, the engineer, the paper manufacturer, and the epicure who loves good things to eat, all will derive benefits from it. Bamboo grows wild in China, Japan, India, Ceylon and Java. In the last-named country, only a little larger than Cuba and with a population of 30,000,000, bamboo is so much a part of the life

with long stringers. It also lends itself to artistic trellises, for bean poles, pea stakes, fishpoles, fruit poles and hay-curing racks. Down in Florida, where much of the experimentation has been carried on, one grove is a mecca for fishermen.

Home-grown bamboo can be used for tool handles and clothes-drying poles and clothes-line props. It can be used as well for water-carrying pipes running from a well or



Glimpses of Three Widely Different Uses to Which the Strange Grass Is Well Adapted; Picnic in Bamboo Grove; Top, Reinforcing Concrete with Split Stalks; Bottom, Edible Shoots

of the natives that it is doubtful whether they could long exist without it. One of the proved possibilities of American-grown bamboo is light fences made of the poles and then tied together

poles for rugs, carpet beaters and reinforced-concrete posts. The government is starting boys' and girls' bamboo clubs for the growing of the grass. Bamboo and poultry were

a spring. By punching out the cross walls with a sharp tool, ten-foot pipe sections can be obtained and with a bit of bicycle tubing they can be easily joined together, thus giving a flexible water pipe. There are many miscellaneous uses, such as chicken coops, chicken yards, spray rods for orchards, tool and book racks, portiere rods.

*Barbour Lathrop Lyon Playd contrapuc; isos
iron traiden, Saramach, isos*

228 766

found to make an ideal combination. A grove not only furnished protection from

aid the science. Not long ago, it was thought that a rigid-wing glide, such as



Bamboo Roots Ready for Planting Contain What Corresponds to Potatoes' Eyes, and Shoots Come Out Thickly

the sun and wind but easy roosting places. Hawks and other birds do not molest the chickens that run about in the groves. It is also true that the poultry are sympathetic toward the giant grass, the bamboo growing where the chickens are found to do the best, thirty-five feet and higher.

In the far east, it was early discovered that the tender shoots of the bamboo tasted good. They are eaten very much the same as asparagus and taste sweet and delightful. Bamboo shoots are known to most persons who are familiar with the chop-suey dishes, but there are many other methods of preparing them.

In almost all parts of the south and the west bamboo will grow well. Extreme cold and frost are its enemies. It is able to stand a little of the latter but hardly any of the former. In Georgia, where bamboo also has been grown experimentally, the groves, like the redwoods of California, have a strange fascination for all who come near. They seem to whisper of the mysteries of the east.

AVIATORS SEEK KEY TO RIDDLE OF HOW BIRDS GLIDE

Will man ever be able to glide through the air on artificial wings as easily as the eagle? Is the low-powered airplane feasible or is the conquest of the sky to be written in terms of faster and faster motors? Following the second aviation meeting in France where gliders and craft with tiny engines were demonstrated, airmen asked these questions again, and the study of birds' flight is being renewed to

various birds employ, could never be imitated by man. But in 1922, Boussoutrot remained in the air five minutes without a motor and almost immediately afterward a German aviator, Hentzen, astounded the world by circling in the air for three hours in an engineless plane. In the spring of 1924, another German, Schultz, flew without motor for eight hours, forty-two minutes and nine seconds on the Baltic coast. Besides these tests of endurance, distance records also have been made. In 1923, Botsch, a German pilot covered nearly twelve miles by utilizing the effect of ascending

air currents and carefully manipulating his motorless glider. The "internal structure" of the winds is still a mystery to man. By means of further experiments, aviators hope to make greater progress in harnessing the breezes without the aid of engines, just as birds do in soaring.

AUTO SIGNAL LIKE HUMAN EYE WINKS ITS WARNING

Modeled after the human eye, a stop-and-turn signal for the rear of the auto



winks rapidly, calling the attention of an approaching driver to the proper sign. Controlled by the brake pedal and switch buttons on either dash or steering wheel, it has a brilliant red center, corresponding to the pupil, and rolls in the direction of the letter "R" or "L" as desired, these symbols being placed below to indicate right or left turns. For instance, if the driver is to steer right, the "R" is illuminated by pressing one button, the eye looks at the signal and at the same time begins to wink rapidly, which cannot fail to attract immediate notice. If a stop is to be made, the word lights up and the eye gazes straight ahead.

Insulin is now being extracted from certain fish at a cost one-fifth of that of the product a year ago.

Calif.
Bakersfield
201

296

**NON-SINKABLE BOAT
CANNOT TIP OVER**

Air chambers arranged as a series of steps form the bottom of a new safety boat, preventing tipping and reducing friction. The spaces are divided into six independent compartments, each of which has a brass deck plate that may be lifted off so that a pump can be inserted for removing water or when



Boat Carrying Party of Four, and View of Stern Showing Arrangement of Air Chambers

repairs are necessary. An outboard motor fits in a specially designed well, which also holds the gasoline tank and batteries. The boat is built in various sizes and is said to be capable of carrying a relatively heavy load in spite of its light draft, and is practically non-sinkable. From twelve to fifteen miles an hour against wind can be made with a four-horsepower motor, the manufacturers declare.

PLAY IS MADE AN ACHIEVEMENT IN WORKMANSHIP

Besides having the fun of building their own playhouses, children are given training that improves their mechanical and domestic instincts with patented wooden blocks used in an outdoor kindergarten in California. Some of the pieces are a yard long. They are slotted and cut so that they interlock with little trouble and are suited to the erection of little houses of two or three rooms with windows, doors and roofs like those of

a real home. Besides the houses, furniture is also constructed from the blocks. The units are light in weight, smoothed to prevent splintering, thus avoiding hurts to the youthful builders, and cannot easily be broken. An added point claimed in their favor is that they teach young children to overcome fear and give them valuable physical exercise, as in building the playhouses, they have to climb up to put on the roof.

Broad Oaks School, Pasadena, Calif



Kindergarten Children Lay Mental Foundations That Aid in Future Home Making While Building Their Own Three-Room Playhouse and Furniture with Interlocking Wooden Blocks

no information available on makers of blocks.

Acme Newsfeatures, 461 - 8th Ave, New York City

HITCHING POST FOR DIRIGIBLE IS PADDED TO PROTECT BAG

Lined with soft padding and attached to an outer framework by means of

Padded "Scarf Mount" for Top of Mooring Mast to Secure "Los Angeles" Nose; It Connects with Buoy on Dirigible



springs, the top of the mooring mast for the "Los Angeles" at Fort Leavenworth, Kans., is intended to ~~simplify~~ simplify the task of anchoring the huge bag and to protect the envelope from jars and scratches. The piece is called a "scarf mount" and a buoy on the airship is fastened to it when making a landing.

Chicago Evening Post, 8/25/15

SOLOMON'S GOLD MINE IN PERU ACCORDING TO EXPLORER

Ophir, land of rich gold mines that supplied metal for the decorations of King Solomon's temple, was in South America according to Dr. von Hauch of Vienna, who has been exploring the forests of Peru. The fabled country has been the subject of speculation for years and has been variously located in Arabia, India or South Africa. In support of his theory, the Vienna explorer declares that he found an Indian tribe of 300 whose features bore a Jewish cast and whose language contained many words like those of the ancient Hebrew. The name

Solomon had been given to a number of men in the tribe, and legends were told him of a race of seafaring men who landed on the banks of the river Hualla and carried away quantities of gold ore.

They called the region around the river Ophira. Dr. von Hauch believes that the strangers may have been King Solomon's sailors and that the three years' absence of his fleet mentioned in Biblical accounts is explained by the long journey to Peru. Columbus believed that he had found the source of Solomon's riches when he set foot on the West Indies. The African theory is based on the discovery of ancient mines among ruins south of the Zambesi river and a seventeenth-century writing to the effect that one was the Abyssinian mine from which the Queen of Sheba obtained most of the gold she gave King Solomon.

AUTO STOP SIGN OF PRISM GLASS SAVES LIGHTS

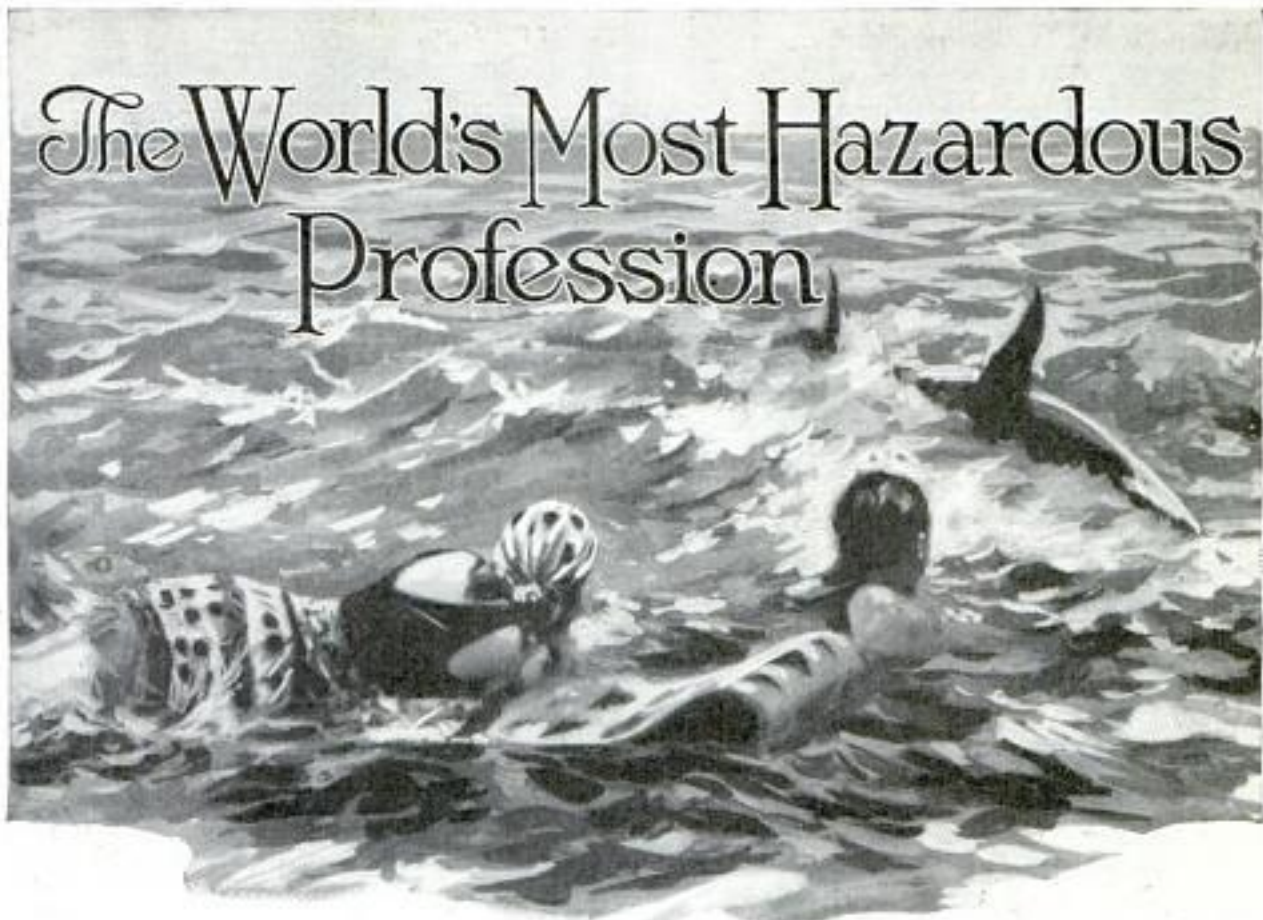
Self-illuminating traffic stop signs installed in Washington, D. C., are lettered in prismatic glass so that they reflect the light that shines on them and need no electric bulbs. They are said to be more conspicuous in the daytime than the usual marker with its dark-red sign.



Stop Sign Lettered in Prism Glass Is Intended to Reflect the Light, Requiring No Electric Bulbs

Inspector. G. W. Brown, Washington Police

Standard



Attacking a Shark with Only a Knife to Save the Star from Death, Is All in the Day's Work for a Movie-Stunt Man, Doubling for a High-Priced Male Actor

By FRED GILMAN JOPP

*Picture 207 S. Berendo to
Los Angeles
Calif*

SPEEDING across the screen, flickering pictures had been unfolding the story of an auto chase and the leap of the hero into the villain's car.

"Good show," commented one as he left.

"Great," rejoined his companion, "but that fellow who leaped into the car—I wonder if he wasn't hurt?"

"Hurt nothing," the other scoffed. "That leap was impossible even for a man who was fool enough to try it. What you saw was just a good piece of trick photography, nothing else."

What the last speaker didn't know, and what the other sensed, was that the scene was not only real, but that the actor who staged the leap had broken his neck doing it. But the camera had shot the scene, the film went to the cutting room, and the actor to the hospital. Trimmed and titled, the scene showed nothing of the serious accident, and the film went out to the theaters while the stunt man's broken neck slowly knit together again, held by a leather harness.

Trick photography has been credited with many a death-defying scene for

which some unknown stunt man, doubling for a famous star, has paid with bruises, broken bones and even death. The stunt which cost Richard Talmadge his broken neck was classed as simple, so easy that it went off perfectly through two rehearsals, only to fail in the actual taking of the picture. As Talmadge later described it, the jump was almost fool-proof, just a running leap, a left corkscrew twist in mid-air, and he would land on the seat of the speeding car, with his arms wrapped about his head to protect his neck. But when the scene was actually "shot," the car went just a bit faster than before, and all the elaborate timing failed.

Yet, despite the hazards of the calling, Hollywood is full of good stunt men, ready to take any kind of a risk to earn the high salaries the movies pay. Their ranks are recruited from aviators, auto-race drivers, professional acrobats, human flies, circus performers and just plain dare-devils who gravitate into the business. They plan their stunts carefully, analyze the risks and plot, and time every movement in advance, yet often the



A Calculated Fall Which Will Be a Success if the Rehearsed Plan Has Allowed for All the Unexpected Dangers; Right, a Stunt Man Getting off a Motor Bus, a Method Not Recommended for the Average Passenger

unforeseen happens, and another actor goes to the hospital or the morgue.

Omar Locklear, famous aviator and one of the greatest stunt men the movies ever had, was likewise one of the most careful. He figured his tricks out in advance on paper, charting every move every moment, and then rehearsed them carefully. Yet, in his final stunt, he neglected to reckon on the glare of the powerful arc lights in which he was to spin his plane, and the machine crashed and literally buried its nose in the ground.

"Curly" Stecker, famous as a trainer of movie animals, braved death thousands of times in the cages of lions and tigers, yet, at last, "Charlie," a meek-mannered but gigantic elephant, sat down on him, and he finally died of his injuries after battling for a year in the hospital.

Sometimes the accidents are not fatal. Then the actors are patched up and come back for more. George Carrossella, a lion trainer in a movie zoo, is literally covered from head to foot with scars of scratches raked by the animals' claws, yet still carries on. Day after day he dives through trapdoors only inches ahead of his five lions, and with attendants standing ready with revolvers and specially designed crowbars made to pry the lion's jaws from a human meal.

Dick Grace, one of the Hollywood stunt actors, last winter was hired to double for a famous woman star in a scene where he was to have a flimsy ballet dress, soaked with gasoline and alcohol, burned off his body.



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The first step in staging the episode was to call Grace's doctor to the lot and have him lay out his tools and bandages, preparatory to patching up the actor's forthcoming burns.

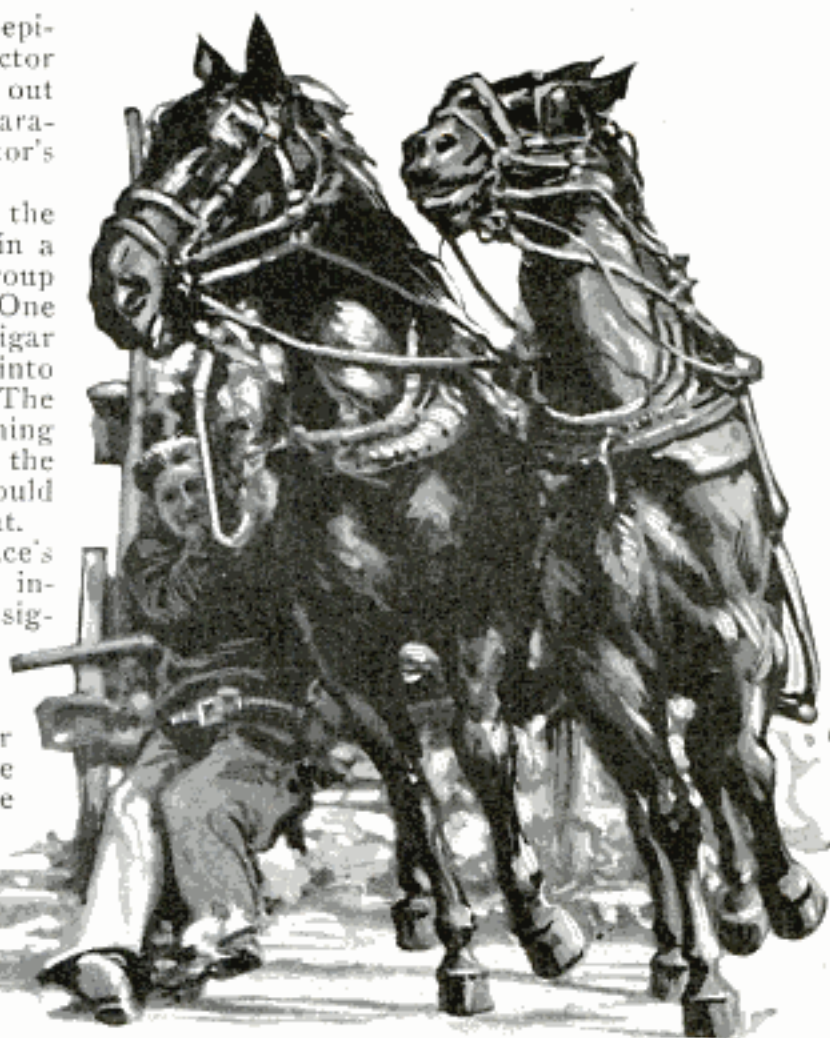
The scenario called for the star to be seated at a table in a dance-hall balcony with a group of intoxicated men near by. One of the men was to light a cigar and toss the flaming match into the folds of the ballet gown. The star was then to run screaming across the balcony and down the stairs where the hero would smother the flames in his coat.

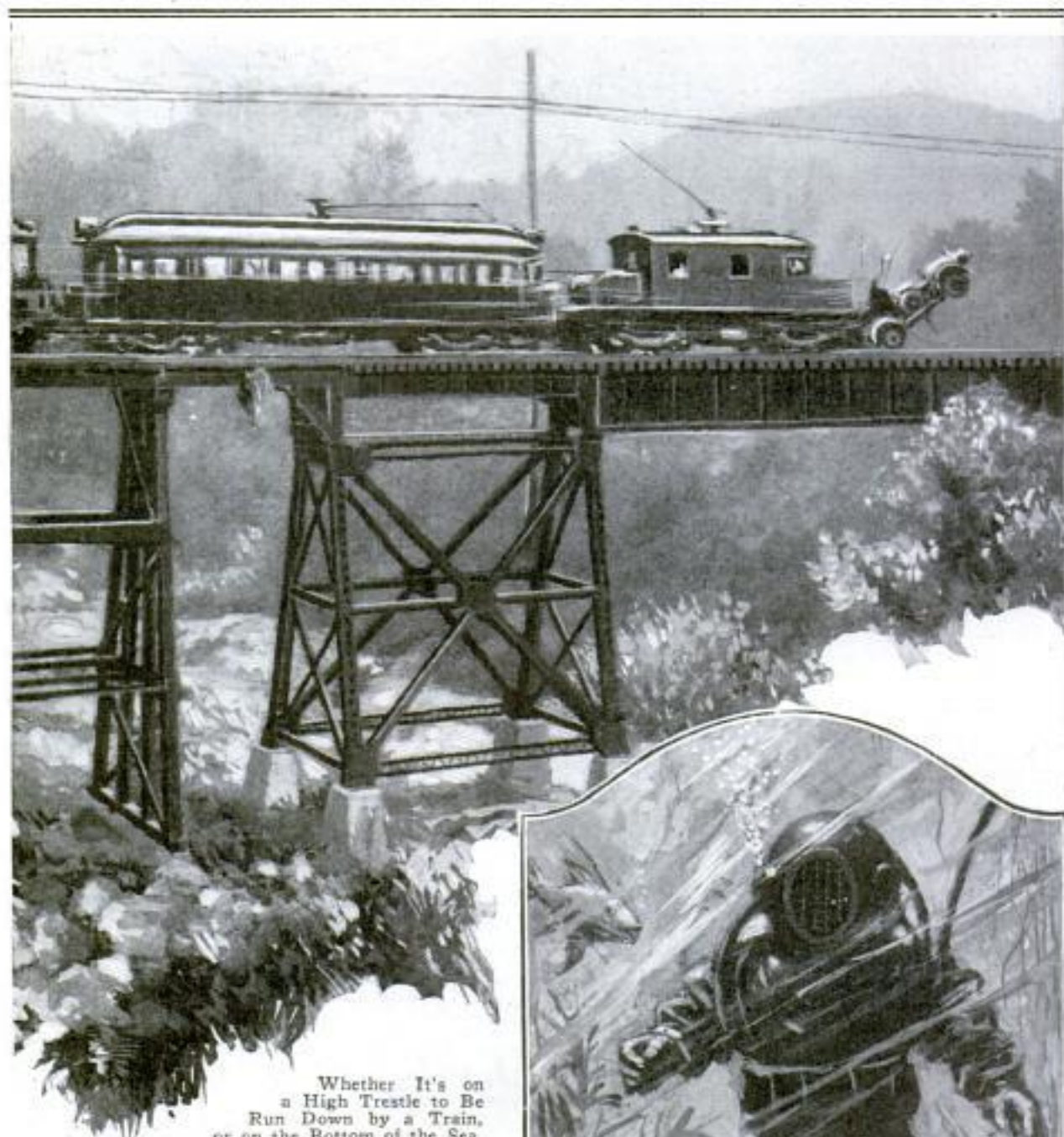
When the time came, Grace's costume was soaked with inflammable liquids, and at the signal of cameras, the property man threw the match. In an instant Grace was a human torch. The fire spread faster than had been anticipated, the flames leaping ten feet above his head. With an agonized bound he cleared the balcony stairs and raced for the open, all thought of the scene gone in the desperate desire to run away from the torturing flames.

An assistant director grabbed him and threw him down, rolling him in an overcoat and beating out the flames with his hands. The ballet costume was completely burned away and most of the stunt man's body was black and charred. From the neck to the waist, his back had lost all skin

and was seared through the flesh. Aids hurried him to the room where the doctor stood ready with a pail of gasoline in which to wash the burns. The gasoline burned with such intense pain that the victim twice fainted before the washing was over. He had lost 720 square inches of skin, and most of the burns were of the third degree—the worst imaginable. Yet, in eleven days he was out of the hospital and in a few weeks was again working.

Many Have Stopped a Run-away Team under the Spur of Necessity, but a Stunt Man Must Do So Deliberately; Below, a Method of Escape Good When a Film Is Needed, but Unpleasant to Actor

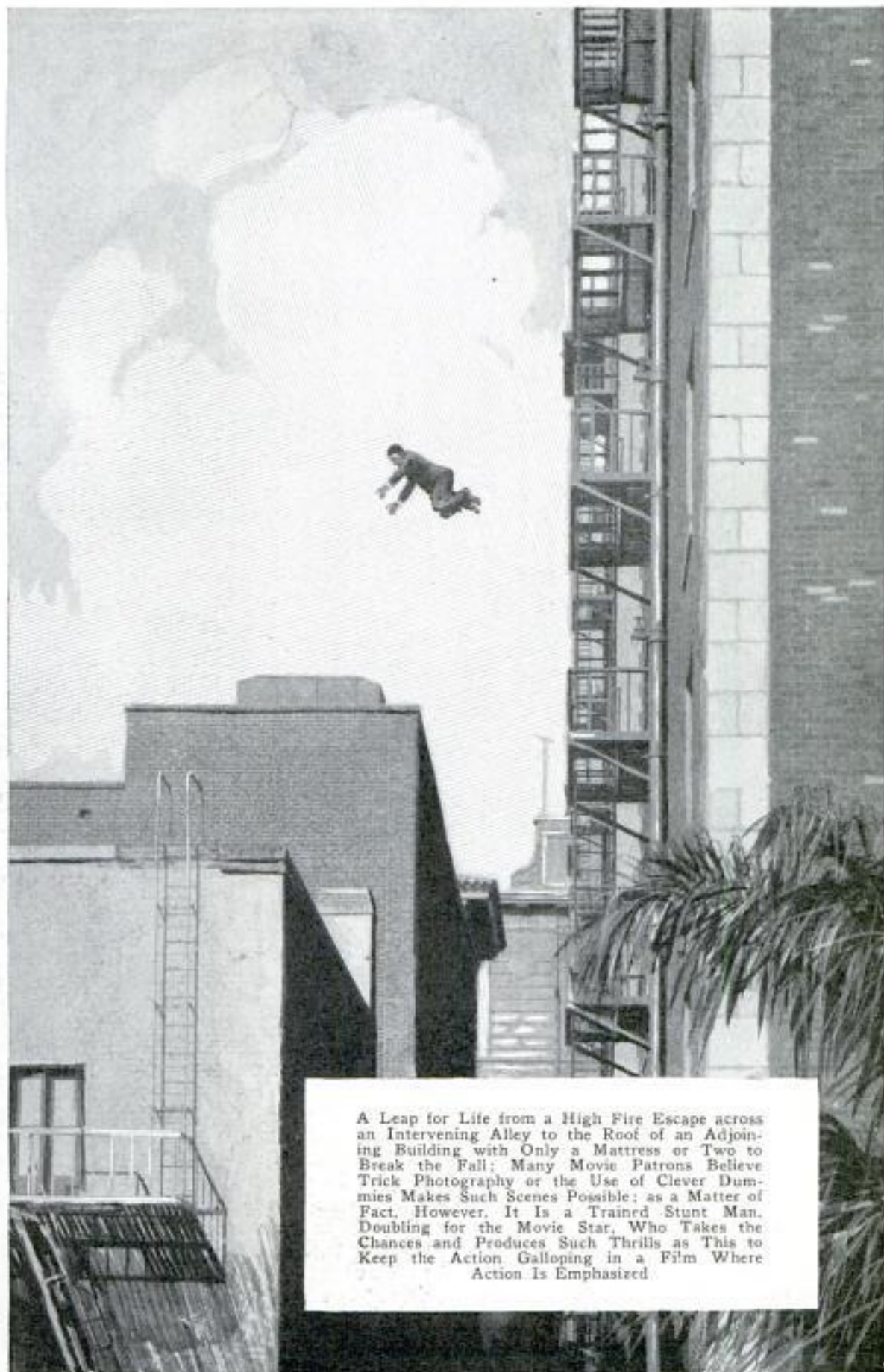




Whether It's on
a High Trestle to Be
Run Down by a Train,
or on the Bottom of the Sea,
the Stunt Man Is There

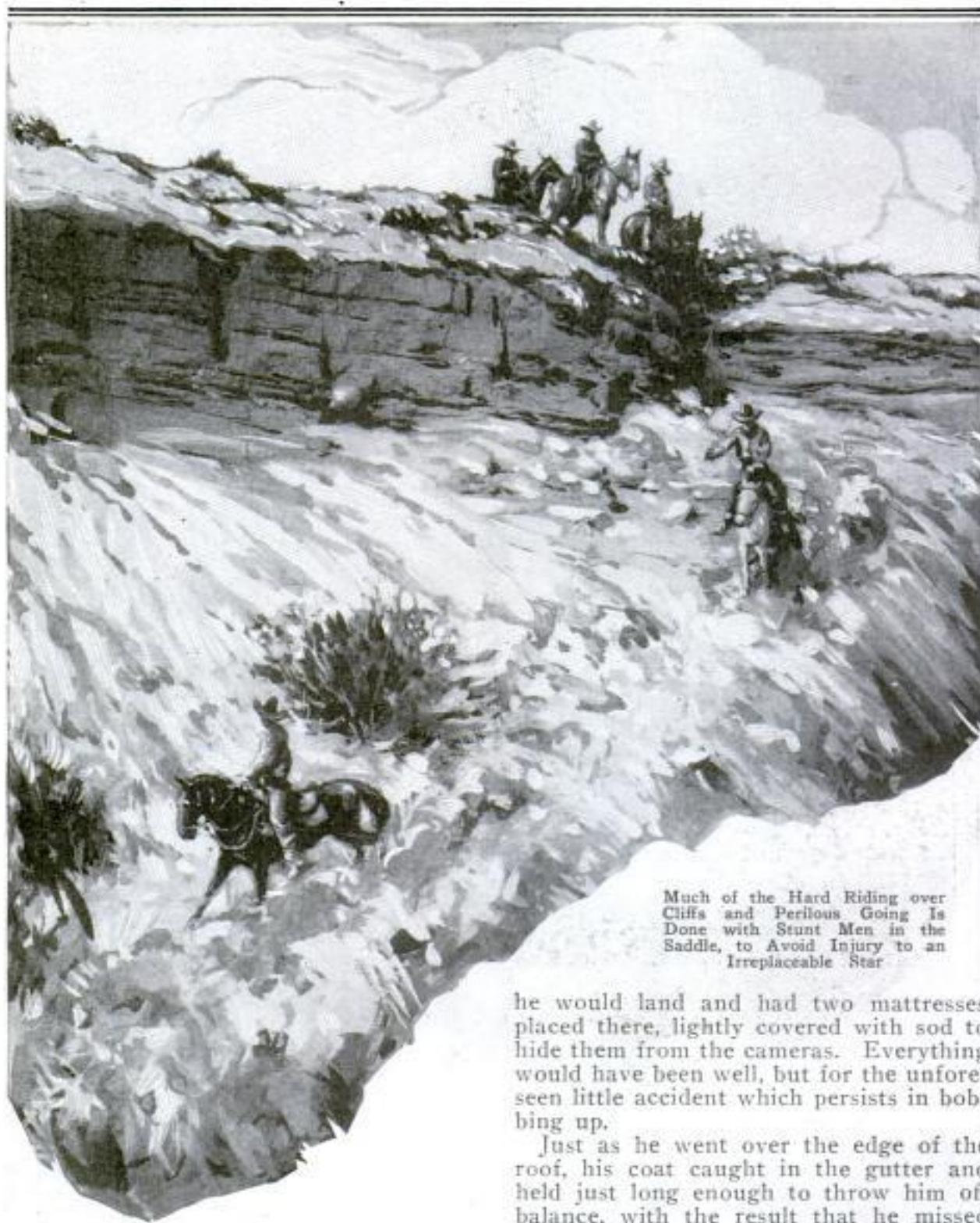
Bob Rose, another "careful" stunt man who calculates every risk in advance, on one occasion barely escaped with his life in a runaway dash with a six-horse stagecoach on a steep mountain road. The horses obtained for the scene were wild and only half-broken. Rose started the drive and the picture was going well, when the onlookers saw him climb down from his seat and edge out onto the whiffle-tree, where he tried to guide the horses with one hand and replace a partly slipped bolt with the other. At that very moment one of the leading horses stumbled and the entire team of six piled up in a struggling, kicking heap, with





A Leap for Life from a High Fire Escape across an Intervening Alley to the Roof of an Adjoining Building with Only a Mattress or Two to Break the Fall; Many Movie Patrons Believe Trick Photography or the Use of Clever Dummies Makes Such Scenes Possible; as a Matter of Fact, However, It Is a Trained Stunt Man, Doubling for the Movie Star, Who Takes the Chances and Produces Such Thrills as This to Keep the Action Galloping in a Film Where Action Is Emphasized.

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Much of the Hard Riding over Cliffs and Perilous Going Is Done with Stunt Men in the Saddle, to Avoid Injury to an Irreplaceable Star

Rose somewhere beneath. Yet, when the animals were untangled, the stunt man crawled out, badly bruised and cut but able to stand.

"Well, that's that," he remarked, and, walking to his car, climbed in and drove home.

Gene Perkins, hired to slide down a steep corrugated-iron roof and fall forty feet to the ground, had an equally narrow escape from death. He figured out where

he would land and had two mattresses placed there, lightly covered with sod to hide them from the cameras. Everything would have been well, but for the unforeseen little accident which persists in bobbing up.

Just as he went over the edge of the roof, his coat caught in the gutter and held just long enough to throw him off balance, with the result that he missed the mattresses and landed, head first, on the hard ground forty feet below.

He was picked up unconscious and started for the nearest doctor, but on the way recovered consciousness, called for a drink of water, and then insisted on being driven back to the lot to complete the day. Not long afterward he lost his life trying to drop from an airplane to the roof of a moving train.

Bert Grace, who is not only a stunt man, but an airplane pilot as well, handled a

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plane for Tom Mix last year in a forest-ranger picture. Flying over the dense redwood forests one day, with no landing spot within many miles, the engine suddenly cut out and went dead. The only place to come down was a small forest glade, and Grace headed for that, yelling to Norman Devoe, the cameraman, who was standing in the rear cockpit cranking his

A Leap like This, into a Moving Auto, Cost a Stunt Man a Broken Neck, Which, Happily, Later Healed; Animal Men, Center, Risk Life Daily in the Cages with the Lions and Tigers; Below, Jumping Cliffs or from Peak to Peak Is All in the Day's Work



camera, to sit down and prepare for the crash. Devoe refused and kept on turning the crank until the plane struck. Both were thrown clear of the wreckage, and Devoe still had the crank of the camera, which had been torn off by the impact, in his hand. The film box escaped damage with the only pictures ever taken from a place of a crash.

Another famous stunt man, staging a movie fight with the star, went through two rehearsals and the filming of a scene in which he was thrown from a platform, a mattress below breaking the fall. During a continuation of the fight, he tripped and plunged over the edge, missed the mattress and broke his neck.



STATUE STRUCK BY LIGHTNING MENDED BY STEEPLEJACKS

Following damage by a bolt of lightning, a stone statue of Miles Standish, fourteen feet high and several tons in weight, at Duxbury,



Head of Miles Standish Statue after Its Removal by Steeplejacks for Repairing

Mass. was taken down by steeplejacks for repairs. The figure was removed in sections, as the head and the left arm already had been broken off by the bolt.

NAILS ARE MOST DANGEROUS IMPLEMENTS IN INDUSTRY

That nails are the most dangerous implements in industry is indicated by figures gathered in New York. In one year, compensation was made for 1,338 accidents due to nails and, using New York City's average of thirty mishaps daily from this cause, there are nearly 18,000 such injuries yearly in the state. From a list of 150 reports, thirty-seven such accidents were classed as infections with loss of time and forty-five, while not involving poisoning, compelled the sufferers to stop work. Thousands of accidents, it is believed, are never reported. According to officials, the nail hazard is becoming serious, and its importance is increased by the fact that almost every part of the human body is liable to "attack." This is illustrated by reports such as, "stepped on nail in floor"; "nail in guardrail tore his scalp"; "nail flew from box while loading

truck, infected wound on nose"; "nail in bench tore leg"; "fell down and nail punctured stomach." A nail-elimination week has been recommended by the labor department during which all loose nails and those protruding where they are likely to endanger persons, would be removed.

WIRELESS PHONES ON TRAINS SEND WAVES FROM ROOFS

Passengers using a wireless-telephone system installed on trains in Germany literally talk through the roof. Electric waves are radiated through the tops of the cars and are communicated to telegraph wires along the track. The messages then speed to receiving apparatus at a terminal or way station and are relayed by long-distance telephone to the proper person just as an ordinary conversation is handled. The procedure is reversed when a person in the country wishes to talk with some one on the train. During a demonstration of the system, a business man talked with his office in Hamburg while a train was speeding toward Berlin.

TWO-WAY AUTO VENTILATOR AIRS CLOSED CARS

An added convenience for the closed car is provided in a ventilator that both draws out the used air and admits a fresh supply through a set of openings next to the exit ducts. This arrangement is especially satisfactory when the weather is too cold to permit lowering the door panes in



Ventilator Installed: Arrows Indicate Incoming Air; Smoke Pours through Other Apertures

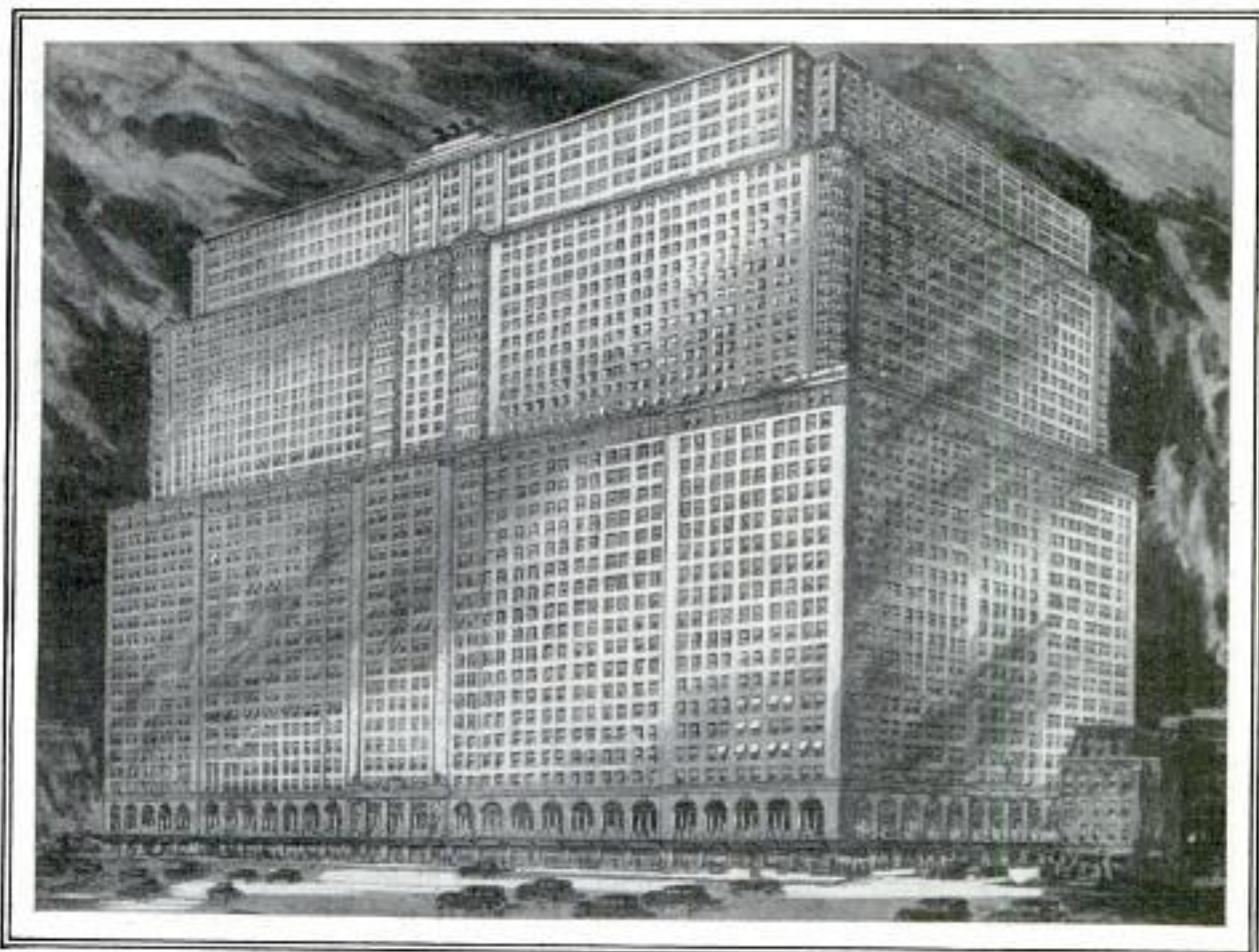
comfort and when passengers are smoking. A fine screen keeps dust and dirt from entering with the current from the outside.

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024

*new york state
department of labor*

Chicago Auto Ventilator Co. 3507 Grand Blvd. Chicago



The First Twenty-One Stories of This \$40,000,000 Building Planned for Chicago, Will Be Devoted to Offices, the Upper Floors to a 4,000-Room Hotel

HOTEL ABOVE OFFICE BUILDING TO BE FREE OF NOISE

Street clamor will not greatly bother guests of a hotel planned for Chicago, since its 4,000 rooms are to be placed on top of a twenty-one story office building, according to architects' plans. The entire structure, costing about \$40,000,000, will be thirty-nine stories high and will also contain a huge convention hall with seats for 25,000 persons and emergency accommodations for 10,000 more. It will occupy an entire block.

FEEDING AND HOUSING BIRDS HELP DESTROY INSECTS

Attracting birds by feeding, and by building houses for them, has practical rewards, according to the department of agriculture. In the eastern United States, birds average little more than one pair to the acre but in park areas and in suburban and residential districts, the number easily can be increased to ten pairs to the acre. This has been done at Golden Gate park, San Francisco, with 404 pairs to forty acres; at Olney, Ill., with seventy pairs to eight acres, and at

Chevy Chase, Md., where there are 224 pairs to twenty-three acres. Higher records have been made elsewhere. An example of the value of birds in combating insects is cited from Germany. On one estate where 2,000 nests had been provided, but few trees suffered from the oak-leaf roller.

POCKET-PENCIL IODINE HOLDER PREVENTS SPILLING 152

Iodine is carried in solidified form in a convenient glass pencil-shaped container that fits the pocket and is ready for instant use when needed. There is a small rod which slips inside the outer case and on this, the chemical is fastened so that the piece is used as a dauber and no bottle or cork is needed. This arrangement prevents spilling, and the holder, being of thick glass, will not break easily.



Boston and Chicago, 61 Hancock St. Boston, Mass.



The University of Wisconsin's Combined Bands, Season of '23-24, E. W. Murphy Conductor. Typical of the smartly Uniformed Groups of Players Whose Snappy Music Kindles College Spirit

Getting in Tune with Ourselves

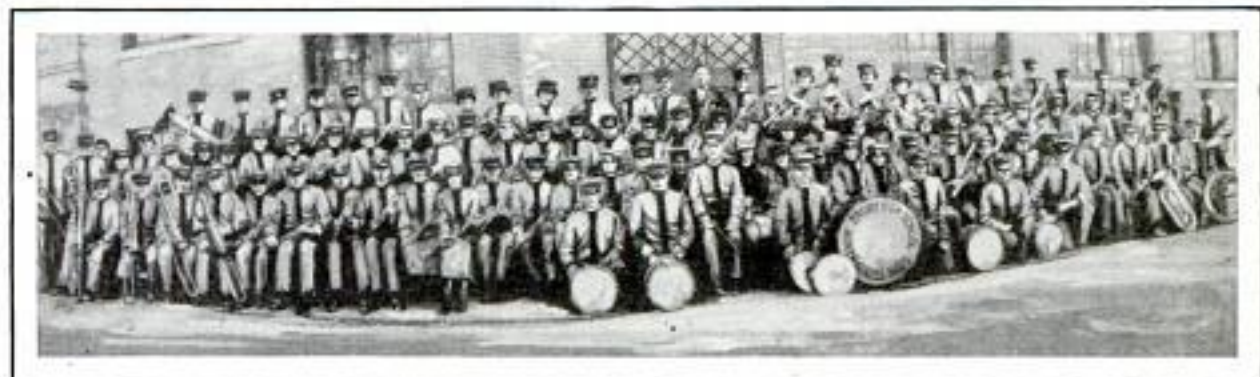
How Community, School and Industrial Bands and Orchestras Are Uniting the Nation through Music

By EARL CHAPIN MAY, *Sharon, Conn.*

YOU might not think that Gary, Ind., and Boston, Mass., had much in common, nor that Los Angeles, Calif., and Waterville, Me., were striking the same stride, but they do. They are thinking and acting on the same plane in matters musical, because public-school bands and orchestras are bending the musical twigs in the way they should grow, and the young things are growing all together.

Gary, you know, is a steel town largely inhabited by folks of foreign blood. It is one of our thousands of melting pots. But the Gary public schools are famous for many forward steps. One of these is the

selection of H. S. Warren as bandmaster. Maj. Warren knows the heart of a child, and how to make a musician out of an urchin. Any son—or daughter for that matter—of any of the 12,000 families in Gary can begin studying for a musical career when he enters grade school. He has an hour's instruction and practice, free each school day. After a few months' individual efforts he is promoted to membership in a junior band, then to a senior band and finally to the crack Gary schools band, official representative of the city and envy of all the boys and girls. That's in Gary.



Winners of First Place at Last Year's Eastern-States Exposition Musical Contest, the Drury High-School Band of North Adams, Mass., James Morley Chambers Conductor

Morton High-School Symphony Orchestra of Richmond, Ind., Directed by J. E. Maddy, Plays Difficult Classical Music with Perfect Ease



Not so long ago, about all any school was supposed to teach in New England was the four R's—Reading, 'Riting, 'Rithmetic and Religion. It's different now. There are more than 300 supervisors of music in the Massachusetts public schools. Thousands of large and small cities in various parts of the country celebrated national music week, May 3 to 9. But in Boston they wound it up with a grand New England band and orchestra conclave in which 2,000 boys and girls participated.

The juvenile bands assembled and played, severally, on historic Boston Common, then paraded, with brilliantly uniformed drum majors 'n ever'thing, to the Boston arena. There, after various individual orchestras and bands had played to an audience of 8,000, the massed orchestras and bands performed with thrilling effect under the baton of the veteran bandmaster, Frederick Neil Innes. And the silver cup donated by the Boston Kiwanis, for the organization that overcame the greatest obstacles to attend the conclave, went to the Waterville, Me., high-school orchestra, directed by Dorothy H. Marden, supervisor of music. The boys and girls had raised the money to make the journey by giving a concert, and had chartered a bus for the round trip of 400 miles.

Across the continent, the supervisor of music of the Los Angeles elementary schools assembled nearly 2,500 boys and girls for an outdoor spring concert. In 131 orchestras massed on that occasion, there were 1,300 violins, nineteen cellos, fifty-two flutes, sixty-three clarinets, 115 saxophones, 171 cornets, twenty-five trom-

bones, nine French horns, 127 sets of bells, 151 drums and 291 pianos.

This public-school band and orchestra movement which holds so many possibilities for juvenile development, is found in nearly every state in the Union. "Maryland, My Maryland," is true to its traditions. Almost every county in that state has its public-school music supervisor.

There are more than 300 such supervisors in the state of New York. Boys' band contests are held in Central Park, Manhattan, each spring. The famous Drury high-school band of North Adams, Mass., has been the guest of New York city, where in one day it played three concerts, broadcast twice and was received on the city-hall steps by Mayor Hylan. About half of the young musicians are girls, and on the march the band follows the lead of a drum majorette!

Young as they are, these juvenile players are not entirely tyros. The Morton high-school symphony orchestra of Richmond, Ind., under the direction of J. E. Maddy, gave the 1922 music supervisors' national conference at Nashville, Tenn., a treat by rendering the difficult overture to Wagner's "Tannhauser" with professional skill. A little later, the same organization of boys and girls played with equally good effect Tschaiakowsky's "Symphonie Pathetique" before another music supervisors' conference in Cleveland. When a hundred high-school orchestra pupils won approval by playing the "Priests' March" from Mendelssohn's "Athalia" at a similar conference in Davenport, Iowa, they



A Competitive Spirit Encourages the Musicians to Do Their Best and Regard Practice Periods as Sport

were applauded as much for their ability as for the fact that a lot of the youngsters who sat on the chairs provided for them could not touch the floor with their feet.

Down at Winston-Salem, N. C., C. D. Kutshinski, director of instrumental music, is in charge of more than 200 trained band boys. The city has purchased 100 of the instruments they use. In 1917, a public-school instructor in mathematics decided to see what he could do about enlivening the local school-band movement in Evansville, Ind. From a standing start he developed four high-school and ten elementary bands, well equipped and well taught, in the short space of five years.

Up at St. Cloud, Minn., there exists a schoolboys' band with over 200 members. And they can play, too. Citizens and visitors to the resort town of Lake Geneva, Wis., have seen 1,100 Wisconsin boys and girls participating in a state band tournament. The sixty members of the Jordan high-school orchestra of Salt Lake City are pretty well known throughout Utah. These are only a few of many thousand examples that might be cited of the active interest in juvenile bands and orchestras. The thing is catching because it is based so largely on the psychology of competition.

There are few normal boys and girls who do not hate to practice on the cornet, clarinet, trombone or tuba in the woodshed, or on the violin, cello, flute or piano in the front parlor—if they have to practice alone. But let them get into

competition with each other and it's quite a different story. Music supervisors and public-school instructors are taking advantage of this human trait. Once get a bunch of musical youths in a practice room together and let them fight for places of honor and the trick is turned. Fishing and baseball and even skating and football are neglected for the steady bucking of scales and intervals or the one time monotonous scraping away on exercises.

Each instrumental musical organization of any size is divided into sections. There are first and second-violin sections, as well as the cello, bass, woodwind and drum sections for the orchestras. There are woodwind sections—meaning piccolo, flute, clarinet and other reed-instrument sections—and alto, tenor, baritone, trombone, bass and drum or percussion sections for the bands.

Each section has its "first chair." The first chair is the honor position for each section. Ranking these coveted first-chair positions is that of concert master of the orchestra or assistant director of the band. Above the concert master or assistant director is the supreme master, the director. The whole organization is based on the law of progression. Supervisors and instructors know this. So, at stated intervals there are competitions. Each section, then each member of each section, plays a specified selection or part of a selection upon which all have been given a chance to practice individually at home. The other members of the band

285-
782

or orchestra decide, by raising of hands, whether each contestant shall go up or down the social musical scale.

When the competition is carried into county, state and nation, the members of each organization rally around its flag, spurred on by local pride. When the members of the different Rockford, Ill., high-school bands, for example, know there is to be a national school-band contest in Chicago, and that only those selected by the bandmaster of the Rockford schools can make the first band and hence participate in the Chicago contest, they buckle down and work their hardest. That's what the members of the first high-school band of Fostoria, Ohio, did before they got into the "First," after which they won the Ohio state band contest prize and captured first prize and \$1,000 at the national contest.

That healthy normal desire to excel in any honorable endeavor kept a regiment of Wisconsin boys and girls at hard practice until the Elkhorn band walked away with a first prize and the Richland Center band with another—after which all the competing boys and girls went home and began practicing for the next annual tournament. What happens in Illinois, Ohio or Wisconsin, happens in half of these United States each year. We have a very marked and commendable attack of "banditis" in America and the results are evident on every hand.

Music can go a very long way toward Americanization of both the foreign-born and natives of this country. Music comes

pretty close to being a universal language, because it gives aspiring youth a ready means of self-expression. As one expert phrases it: "Music is invaluable as a mental disciplinarian. No subject taught in our public schools requires such promptness and accuracy in the solving of problems. All children have more or less latent musical ability and this side of their natures should be developed."

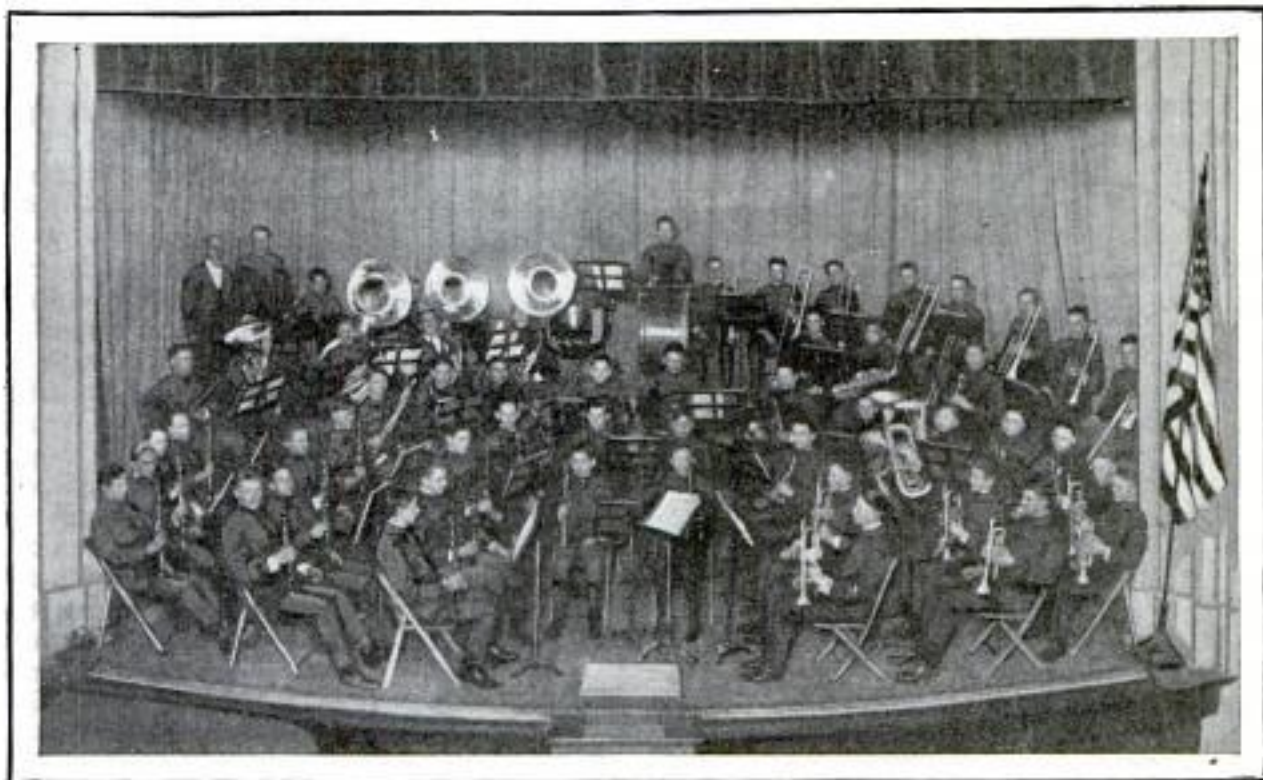
Dr. John James Tigert, United States commissioner of education, maintains that music is the first Americanizing force with which the foreigner comes in contact, and that it holds a safe and strong regenerative power during the individual's hours of rest and recreation. William Arms Fisher, who was prominent in putting over the last New England band and orchestra conclave, believes every child has a right to education in music, at public expense.

The good work does not stop with bands and orchestras. You will find it in the increased number and improved technique of choral societies, who were given new life by the community singing of the World War period. The recently organized Associated Glee clubs of America, with headquarters in New York, is perpetuating our college glee clubs, which have a decidedly meritorious mission in life although some of us may poke fun at them.

And so it goes throughout the land. The several hundred thousand members of the General Federation of women's clubs and the national and State Federa-



"Kid Band," Organized by the Author at Rochelle, Ill., in the Early 'Nineties, Was a Forerunner of the Town's Present Concert Organization of Thirty Pieces



Gary, Ind., High-School Band, a Powerful Factor in Harmonizing Diverse Elements among the Youth and Adults of One of America's Vigorous Melting-Pot Cities

tions of music clubs are sponsoring local music clubs independent of educational institutions. The several thousand Chatauqua towns have juvenile music classes during each Chatauqua week.

We cannot win wild youths to lawful ways by courts, jails and prisons, but we

can keep them in the moral familyfold, or bring them back if they have strayed away, by a love for music. Give us ten years more of the current harmony in and out of our schools, and as a nation we can go "singing to our destiny" without any fear for the future.

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CHANNEL CROSSED FIVE TIMES BEATS MOST SWIMMERS

It is about twenty miles as the crow flies between Dover and Calais, where the English channel swims have been made or attempted. The water at its warmest is usually under sixty degrees Fahrenheit. Swift tides sweep the course for over five hours in each direction, carrying the swimmer far from his objective and making the actual distance he must negotiate, forty miles or more. These are obstacles every swimmer is trained to meet, but the one, and often deciding, factor that spells defeat or victory is just luck. The channel is notorious for its swift weather changes. High waves are likely to be lashed up at any time. Those who know the demands of the undertaking declare that the best equipped swimmer would be doomed to failure if the weather is unfavorable. Waves defeated Gertrude Ederle after she had been swimming seven hours. So far, only five swimmers, all men, have swum the channel.

The first was Capt. Matthew Webb, who later lost his life in the rapids at Niagara. He accomplished the supposed impossible feat in twenty-one hours and forty-five minutes. The record was made by Enrico Tiraboschi, who did the distance in sixteen hours and thirty-three minutes.

Vac Cup
VACUUM CUP FOR AUTO VALVES LIFTS THEM FOR GRINDING

Raising valves on the motor to a position where they can be ground, is simplified by the use of a stick with a little rubber cup on the end that forms a vacuum when it is pressed tightly down upon the top of the valve. In practice, the tip should be moistened slightly with water and then squeezed on with force enough to exclude all the air from under the cup.



New York Times 8/28/25

Mr. H. J. d. goss, Greenawald
Price \$1.00.

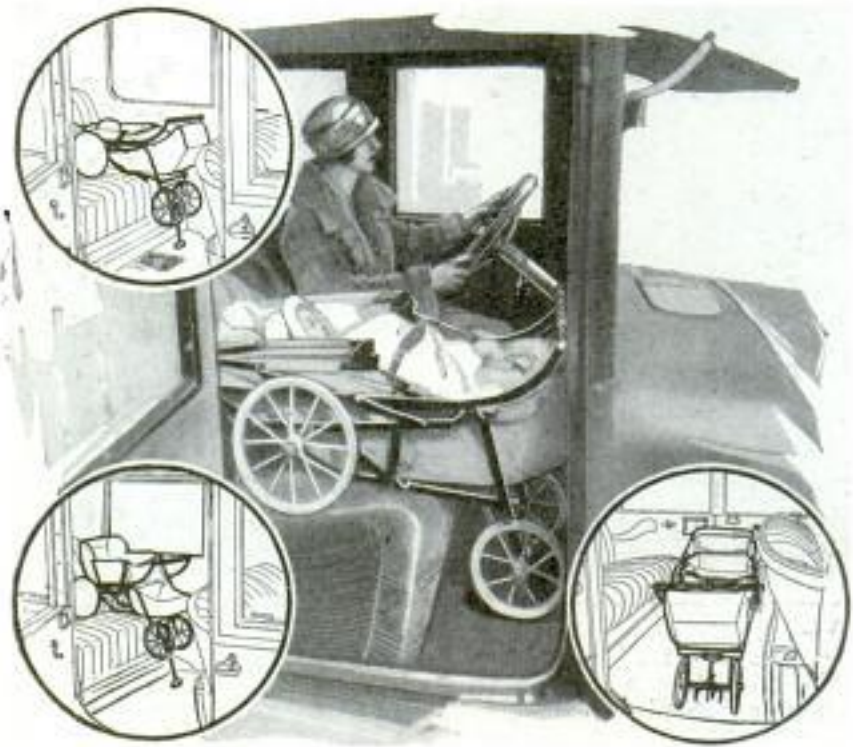
Head of Dept
of Neurology
and Psychiatry
metaphysique

**BABY CARRIAGE THAT FOLDS UP
CAN BE USED IN AUTO**

Infants ride in safety and comfort, and mothers are spared trouble and worry, by

**SOUND WAVES FROM THE BRAIN
PICKED UP BY RADIO**

Transmission of sound waves from one brain to another is foreseen as a result of experiments by Prof. Ferdinando Cazzamali



Folding Baby Carriage Inside of Auto, Arranged for Reclining, and Inserts Showing Other Ways of Disposing of It

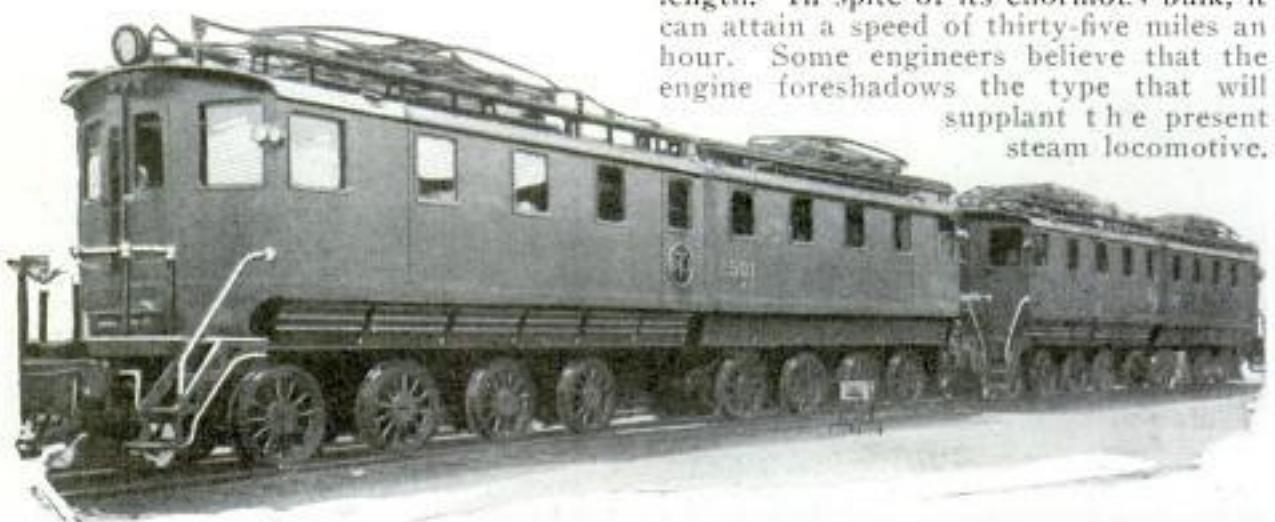
using a folding carriage that fits as a chair or crib inside the automobile or may be placed back of the front seat in a large car. It is adjusted to rest securely on the cushions, no attachments being needed to hold it in place, and the baby may recline or sit up. The cart opens up automatically to full size when it is taken out. When it is collapsed, it is said to be about the size of a suitcase and, being made of light material, is easily carried.

of the university of Milan, who is reported to have heard sounds issuing from a human brain through a radio receiver operating on short waves. Highly excited persons or those suffering from nervous diseases were used in conducting the tests. The patient was placed in a thoroughly insulated cabinet. Sounds heard through the receiver ranged from signals like those of ordinary wireless messages to whistling. Similar results were obtained by using hypnotized persons, and in every case, the noises ceased when the subject was restored to normal condition. Prof. Cazzamali declares

it might be possible for waves sent out from one brain to be picked up by another under a like stress.

**ELECTRIC LOCOMOTIVE AS LONG
AS TRAIN OF THREE CARS**

Weighing 372 tons, developing 5,000 horsepower, and 117 feet in length, a giant electric locomotive can pull a train of freight cars one and one-half miles in length. In spite of its enormous bulk, it can attain a speed of thirty-five miles an hour. Some engineers believe that the engine foreshadows the type that will supplant the present steam locomotive.



Huge Electric Locomotive Which Can Pull a Freight Train a Mile and a Half Long

L. K. K. O.

BATS AS ENEMIES OF INSECTS ARE FRIENDS OF MANKIND

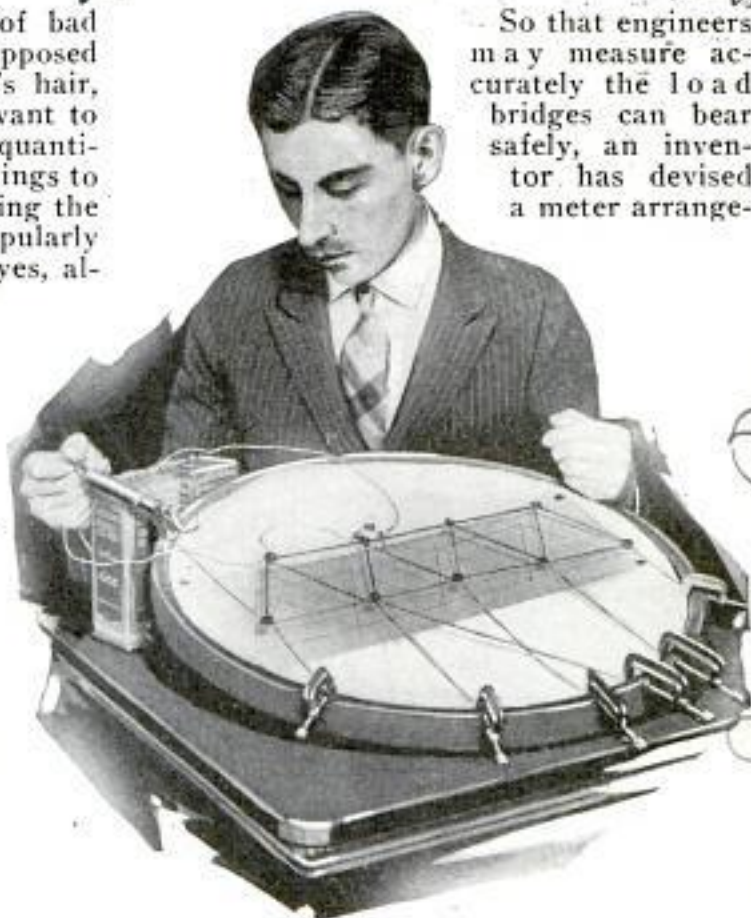
Widely regarded as an omen of bad luck, and disliked because it is supposed to become entangled in a person's hair, the bat is in reality a valuable servant to man because it devours amazing quantities of harmful insects. While it clings to walls and roofs in dark places during the daytime, it is not blind, as is popularly believed, but has small beadlike eyes, almost hidden by the soft fur with which it is clothed, and has such a highly organized nervous system that it is sometimes said to possess a "sixth sense." Its keenness of touch is extraordinary; taste, hearing and sense of smell likewise being acute. Scientists say that, if man were as highly developed in these particulars as the bat, we would be capable of marvelous exploits. They are about the only mammals that fly, and were once called "flitting mice." Comprising about 450 species, they are found in almost every part of the world except extremely cold regions. In the tropics, some kinds are so large that they attain a wing spread of five feet. The dreaded vampire variety that sucks the blood of animals and of man, is found in the warmer countries and some tropical varieties eat cultivated fruits, but the numbers of these dangerous and destructive species are small compared with the many harmless ones which benefit mankind.

328

METER TESTS BRIDGE SPANS AS AID TO SAFETY

So that engineers may measure accurately the load bridges can bear safely, an inventor has devised a meter arrange-

294



Inventor and His Meter for Measuring Strain Bridge Spans Can Bear Safely by Pulling on Models Clamped to a Rack

ment that uses models of the actual spans. A replica of the part to be tested is placed upon a surface like the top of a drum and is fastened by wires attached to clamps screwed to the rim of the board. The model is set directly over a drawing executed in exactly the same size. Strain is then applied by pulling on one end, the amount being registered on a small spring scale, and the "give" of the little span is indicated by the variation from the lines of the drawing. At the breaking or danger point, a small electric bulb in the center of the board lights up.

*Morris Berman
Inventor
638 Stone Ave. Brooklyn, N.Y.*

SLOT VENDER FOR STATIONERY AIDS LETTER WRITERS

Two sheets of writing paper and a stamped envelope are supplied from a vending machine at the drop of a coin in the slot, saving special trips to post office or drug store for stamps and simplifying the task of preparing the letter. The flap of the envelope is fitted over the sheets, so that all three come out of the machine at the same time and are easily separated.



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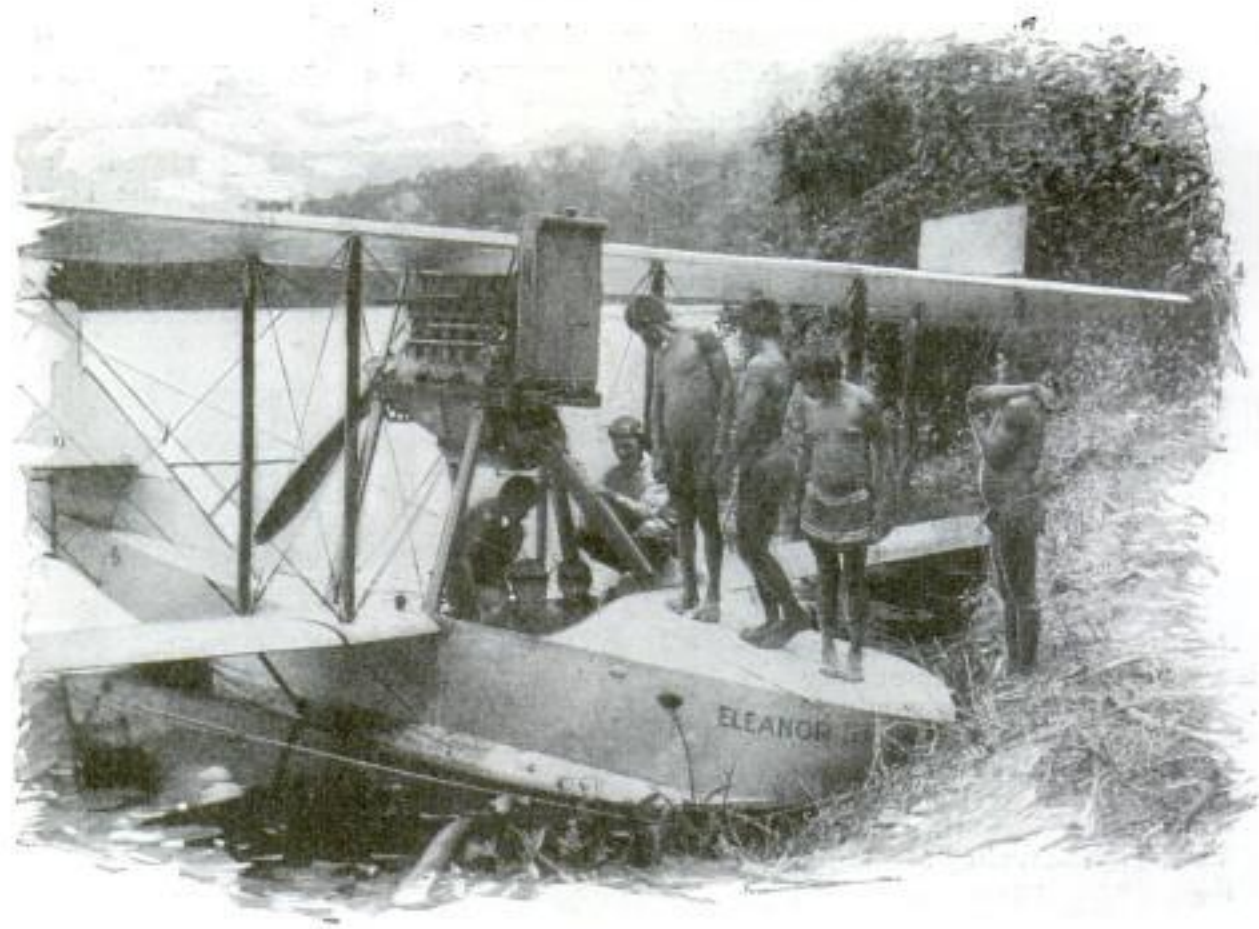
ENAMEL PRODUCED BY SNAILS WITHSTANDS AGE

As a substitute for Japanese enamel in decorating boxes, vases and imitation antiques, a gelatinous substance produced by some of the larger varieties of snails is said to resist age and give a brilliant surface when hard. It is also well suited to dyeing while in a soft state and only experts are said to be able to tell it from the more costly oriental substance.

334

Stewart Stationery Vending Machine Co., 510 W. 6th St., Los Angeles, Calif.

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Airplanes Aid Explorers in Brazil

By H. A. BRUNO

HHEAD-HUNTING Indians, who infest the Parima mountains in Brazil and are noted for their ability to shoot poisoned arrows, have been made peaceable by a "White Winged God" which showered gifts from the skies. This deity was what is known in civilized countries as a flying boat, and the gifts were glass beads, pocketknives, etc., dropped by means of small red parachutes.

Two daring airmen, Capt. A. W. Stevens of the army air service and Lieut. Walter Hinton, former naval aviator, of "NC-4" fame, who were attached to the Dr. A. Hamilton Rice expedition, have returned to America after piloting their ships so efficiently that they, practically, made possible the success of the expedition.

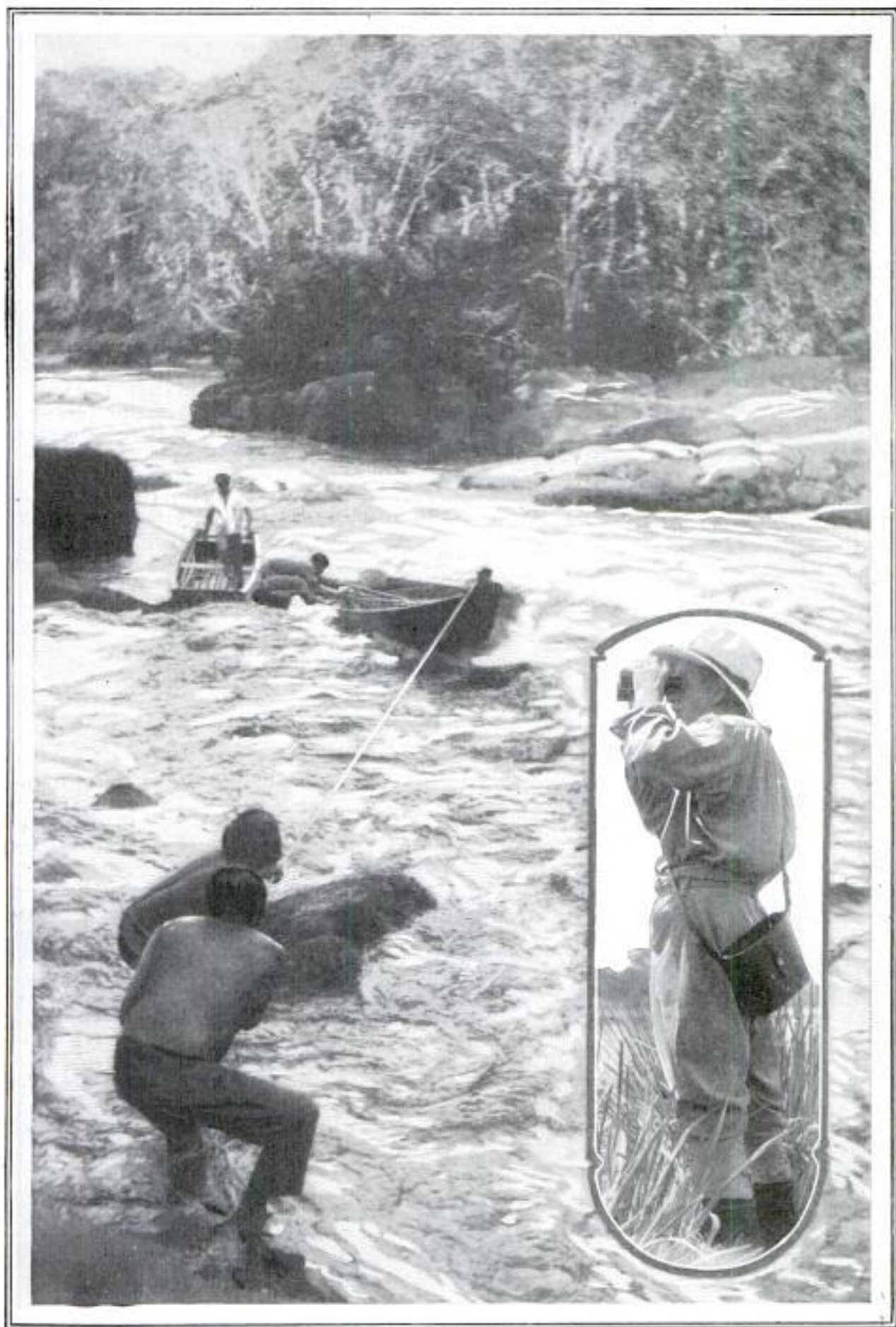
Lieutenant Hinton, racked by recurrent malaria, nauseated and dizzy, stuck to the controls of the plane and flew it to the source of the Parima river, while his associate, Capt. Stevens, using an aerial camera, photographed and mapped almost 1,000 miles of terrain, including 120 miles never before explored by white men.

It is interesting to note that the Indians

were really responsible for the use of aircraft by Dr. Rice. The eminent explorer was in the same territory in 1920 endeavoring to find the source of the Orinoco river, which rises in the Sierra Parima. On this occasion there were no planes to assist in the work, with the result that the expedition withdrew after being violently attacked by the Indians.

Upon returning to New York, Dr. Rice immediately began preparations for his recent successful trip, by communicating with aircraft concerns and with the government. Just about this time, Capt. Stevens astounded the world by breaking the two-man altitude record. He ascended in an army airplane, piloted by Lieut. John A. Macready, to a height of six miles above Dayton, Ohio, and with his aerial camera took a photograph of the entire city on one plate.

Doctor Rice had been planning to do a great deal of aerial survey work and upon his request the government willingly gave Capt. Stevens leave of absence to go on the expedition to Brazil. In an interview given out before the expedition sailed from New York, Dr. Rice said:



Hauling the Boats through the Rapids of the Rio Parima, the New River Explored by the Party, and Dr. Hamilton Rice, Leader, Looking through His Glasses to Map the Day's Journey

95

"The advantages of aerial photography as an auxiliary to exploratory and geographical surveys are the much enlarged area of territory that may be gone over in a given time and the covering of districts otherwise inaccessible. Those regions where the natives are so hostile or the physical obstacles so great as to effectually bar progress or ingress to domain which it is desired to penetrate, the airplane passes over easily and quickly."

The plane was shipped in knockdown form by boat to Brazil and was assembled at Manaos, near the Amazon river, by friendly natives under the supervision of Mechanic John Wilshusen and Lieut. Hinton, who had made an air trip to Rio Janeiro three years before and so was familiar with tropical flying.

Hard luck visited the airmen very soon after the expedition assembled. Wilshusen became ill with fever and the responsibility of taking care of the plane fell to the pilot and photographer. Almost all the members of the expedi-

tion had tropical fever. It proved fatal to Dr. Koch-Grunberg, the German explorer, who died at Vista Allegra.

The plane was used as a scout for the main expedition. Dr. Charles Bull, former Harvard athlete and classmate of Dr. Rice, went ahead of the main party with seventy gallons of gasoline, traveling naked with the natives, living on the same food, and being burned to almost their hue. He proved that a white man can live under the same conditions as an Indian.

The expedition traversed the Negro from its junction at Manaos with the Amazon to the place where its main branch becomes the Branca; followed this until the next major branch, where it becomes the Uraricoera and thence headed for the final division, where the river changes again to the Parima.

At the latter spot the last gasoline depot was established by Dr. Bull and with cheery wishes of good luck, the airmen flew 120 miles farther into the jungle than the hardest explorers ever had been. That they had laid aside their revolvers to carry more gasoline and increase the



Listening In to Music from Pittsburgh in a Camp at the Headwaters of the Amazon; the Same Set Was Used to Report Progress; Above, Dr. Rice Measuring a Five-Foot Two-Inch Maku Indian

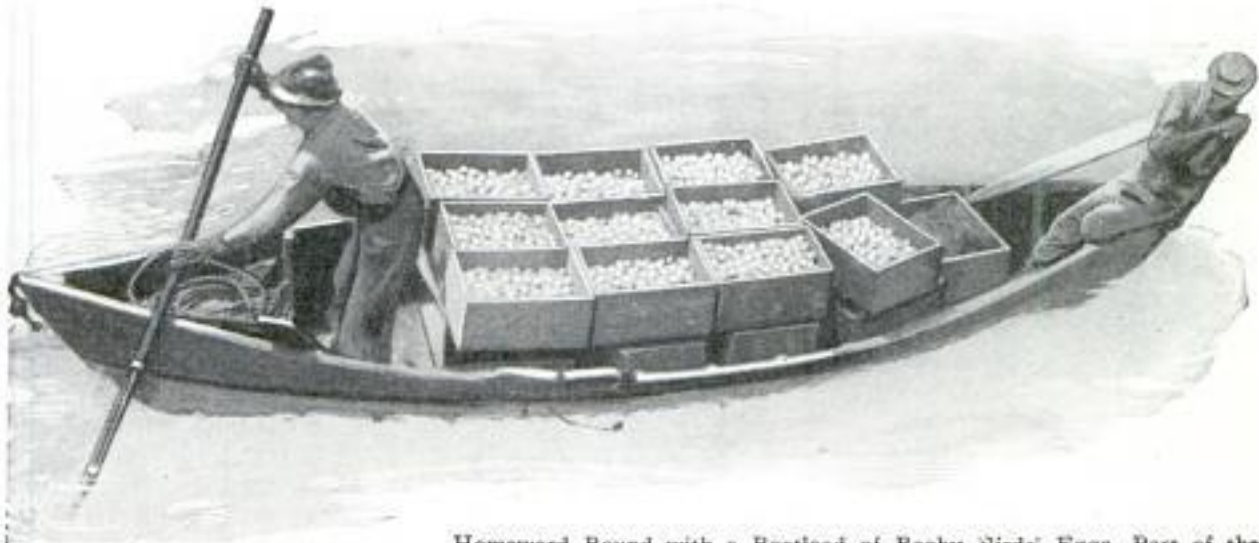
*Kingston
B. W. C.
789*

distance they might fly over a country where they knew hostile Indians with poison-tipped arrows lurked is known to few.

According to Capt. Stevens, the flying boat was in the air 174 hours and during

BIRDS' EGGS ARE GATHERED BY THOUSANDS IN ROWBOATS 3369

Natives of the West Indies reap a rich harvest once a year when booby birds, a species of the gannet, lay their eggs on the



Homeward Bound with a Boatload of Booby Birds' Eggs, Part of the Annual Harvest Gathered by Natives of the West Indies

this time covered about 12,000 miles. There were no serious accidents, but several humorous incidents connected with the air work. The friendly natives were at first very much afraid of the White Winged God, but later their curiosity overcame their fear and they stared with primitive awe as Lieut. Hinton turned on the motor and summoned a mighty wind and thunder which bent the jungle foliage before its cooling blasts. The first time this experiment was tried, the natives took to their heels and would not come back until the motor was switched off. Later both Stevens and Hinton were able to induce them to work harder during the day by promising to turn on the cooling wind at nightfall.

Snakes bothered the airmen considerably. Although the flying boat was moored in the river, the tropical foliage drooped over the wings and various poisonous reptiles found their way into the cockpit. It is quite possible that a record for an unusual air cargo was created when Lieut. Hinton discovered himself fifty miles from his base with an eight-foot boa sunning itself in the hull of the boat. The noise of the motor seemed to soothe the snake, but a quick slash with a machete ended its reverie.

Upon returning from one of their many hazardous trips, the flyers would gather around the portable radio set with which the expedition was equipped and listen to radio concerts in America.

rocks along the beaches. The birds come by the hundreds of thousands and but feebly resist the egg seekers who row their boats close to the nests. Frigate birds also prey upon the boobies, eating the fish they have caught. The stupidity of the victims under attack, earned for them their derisive name.

TIRE TOOL OF GREAT LEVERAGE FITS ALL SPLIT RIMS 3369



Drop - forged steel jaws which are held to the split rim with hardened screws are used in a patented tire tool. The leverage exerted by one movement of the long handle forces half of the rim downward and forward so that the casing may be removed or mounted. It is said that the tool will contract and expand all split rims, including those for balloon tires.

Often applying 3,000 pounds of pressure to the keys in a minute, a pianist in the same time reads 1,500 signs and makes 2,000 finger movements.

Donney Forge & Tool Works, Allentown, Pa.

WHITE CROSSES ARE WARNING AT AUTO DEATH SPOTS

As a forceful warning to reckless automobile drivers, the state of Ohio is mark-



To Remind Motorists Day and Night of the Folly of Reckless Driving, White Crosses Mark Scene of Fatal Accidents

ing its highways with large white wooden crosses wherever a fatal auto accident has occurred. So-called "death corners" are expected to have the appearance of cemeteries. Even at night, the white paint will show through the darkness as a reminder to the speeder.

LONE ADVENTURER FACES DANGERS OF ARCTIC TRIP

Relying on his ability as a hunter for food and clothing, Maj. "Lookie" Burwash of Toronto, a government explorer has started alone for a two years' trip across the northern extremities of Canada. His route will lead from the delta of the Mackenzie river along the shore of the Arctic ocean and finally to Chesterfield inlet of Hudson bay. His only aid is his rifle. He carries no supplies of food. The journey will take him through Bathurst inlet, where a number of white men were murdered by unfriendly Eskimos a few years ago. The object of his solitary expedition is to examine the conditions of the natives who inhabit that part of Canada and the varieties of wild life that are found there. He will also observe soil and mineral conditions and make a complete report to the Canadian government when he has finished the trip. In 1922, he explored Baffin island and is the only white man to have crossed it.

THRILLS IN LIFE OF MEN WHO BUILD RADIO TOWERS

145

A series of remarkably lofty radio towers have recently been erected by the British post office, at Hillmorton, to flash messages direct to Australia and India. Up the center of the main mast, which is 820 feet high, crawls a small electric elevator, and a vivid idea of the height of this tower is impressed upon the mind when it is realized that the elevator takes twelve minutes to ascend from the ground to the summit.

near Oughby Eng.

blow, the girders and latticework of the towers sway gently to and fro.

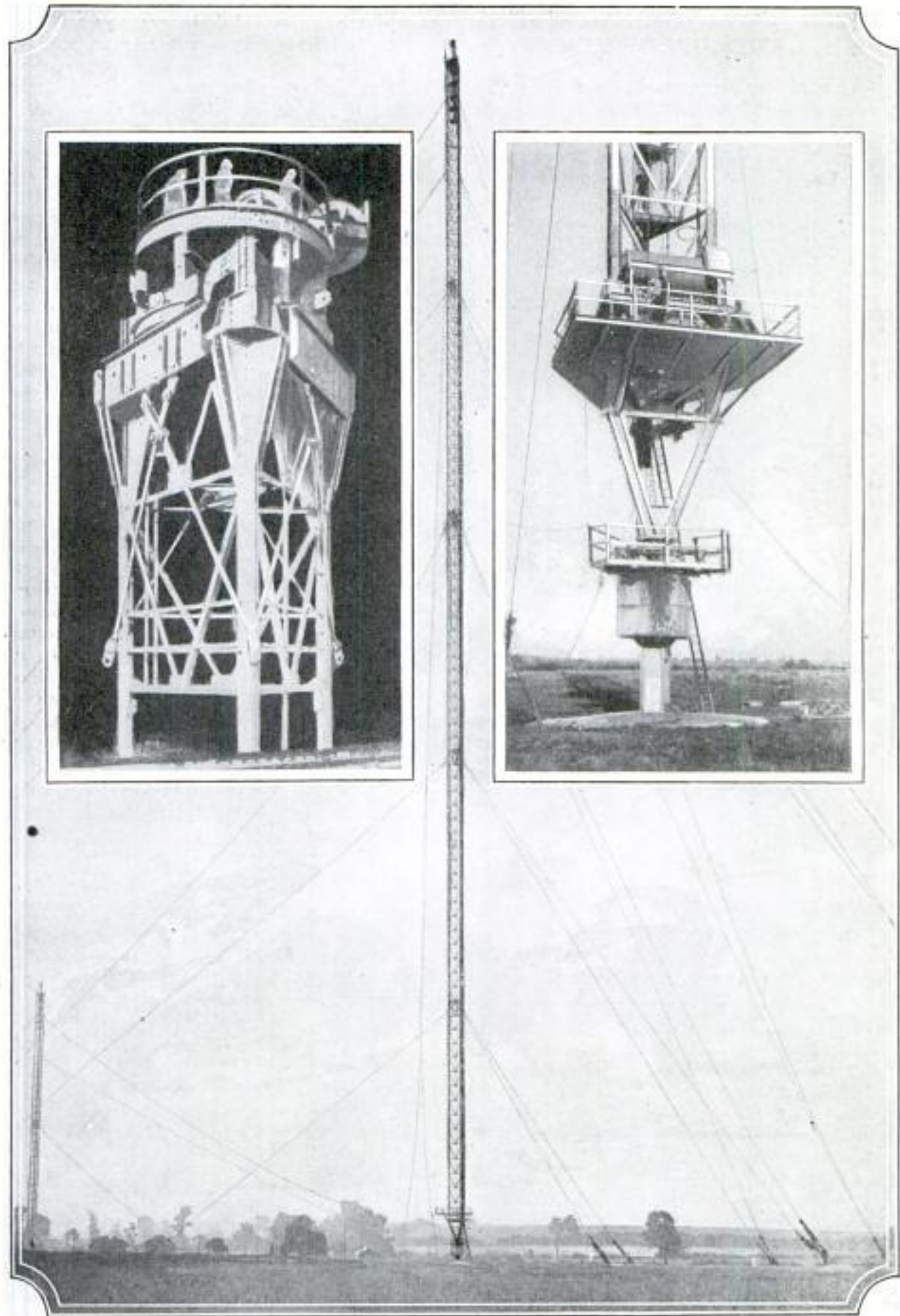
The men who built these towers of steel, far transcending in height the skyscraper, endured great physical hardship. Rains and cold winds made this work difficult and hazardous for often they could not descend from their lofty construction stage where they were hammering, riveting or painting, with only a narrow steel girder between them and death.

So far above the earth are these aerial masts, that clouds often veil the tops from the eye of the observer gazing up from below, and if he stands on the top of the tower, looking down from that dizzy height, he sees only a floor of clouds into which the slender steel mast vanishes earthward. Strangely, these tall towers are not based directly upon the earth, but rest upon a ball, so that when the winds

It cost \$75,000 to erect one only of these mast towers, and altogether, \$200,000 has been spent on the equipment of this radio station.

At an altitude of 19,000 feet, during the climb to reach the summit of Mt. Everest, the adventurers are said to have lost their sense of taste, onions and peppermints seeming practically without flavor.

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Courtesy Postmaster-General, London, England

Radio Tower, 820 Feet High, near Rugby, England; Tip of the Mast in Left Insert, and at Right, the Bottom. Showing Platform and Elevator That Climbs to Top in Twelve Minutes

Capt. H. S. Welkins, Esq., 4, Crowhurst
 Road, Brixton, S.W. 9, London, Eng.

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FINDER FOR ANTI-AIRCRAFT GUN TELLS HEIGHT OF PLANES

As an aid to determining the range on speeding airplanes, a telescope-shaped

*Tests conducted at Fort Tilden 268
Rochaway N.Y. by Coast Artillery
Co. 1st Air Service 8/17/23*



Soldiers Using Special Finder to Gauge Height of Moving Airplane Targets during Tests with Anti-Aircraft Guns

finder that records the height of the targets has been devised for use with anti-aircraft guns. It is attached to a large tripod so that it can be set up quickly and carried about and is operated after the fashion of the range finder of battleships. Its chief difference is that it measures altitudes instead of horizontal distances.

BOY'S DREAM OF "WATERLESS" LOCOMOTIVE IS REALIZED

322

Elimination of the lonely little water-tank towns of the western desert is declared possible as a result of tests recently completed with a new 1,000-horsepower locomotive built in the Baldwin shops. It is powered with a new type of Diesel engine, invented by Carl H. Knudsen, a Norwegian engineer who came to America twenty years ago as an immigrant boy. The engine differs radically from other Diesels in that it completely expels all burnt gases, leaving no dead gas in the cylinder under compression, and it likewise has a supercharger which increases the power output by maintaining a pressure on the intake above that of the at-

*Locomotive works
Broad + Spring Garden
Phila*

mosphere. The 1,000-horsepower unit stands but four feet seven inches high, is twelve feet long, and weighs but forty-five pounds per horsepower, so that it makes possible an unusually powerful railroad locomotive in much less space than the usual steam type requires. The chief field for the locomotive is said to be on hauls where the task of supplying water for steam making is difficult.

With the elimination of water, the entire tender capacity can be devoted to fuel oil. In tests, one of the locomotives pulled over 1,800 tons on a grade and handled 3,000 tons on a level road. By changing the low-ratio freight gearing, it can be adapted for passenger work with a speed of seventy-five miles.

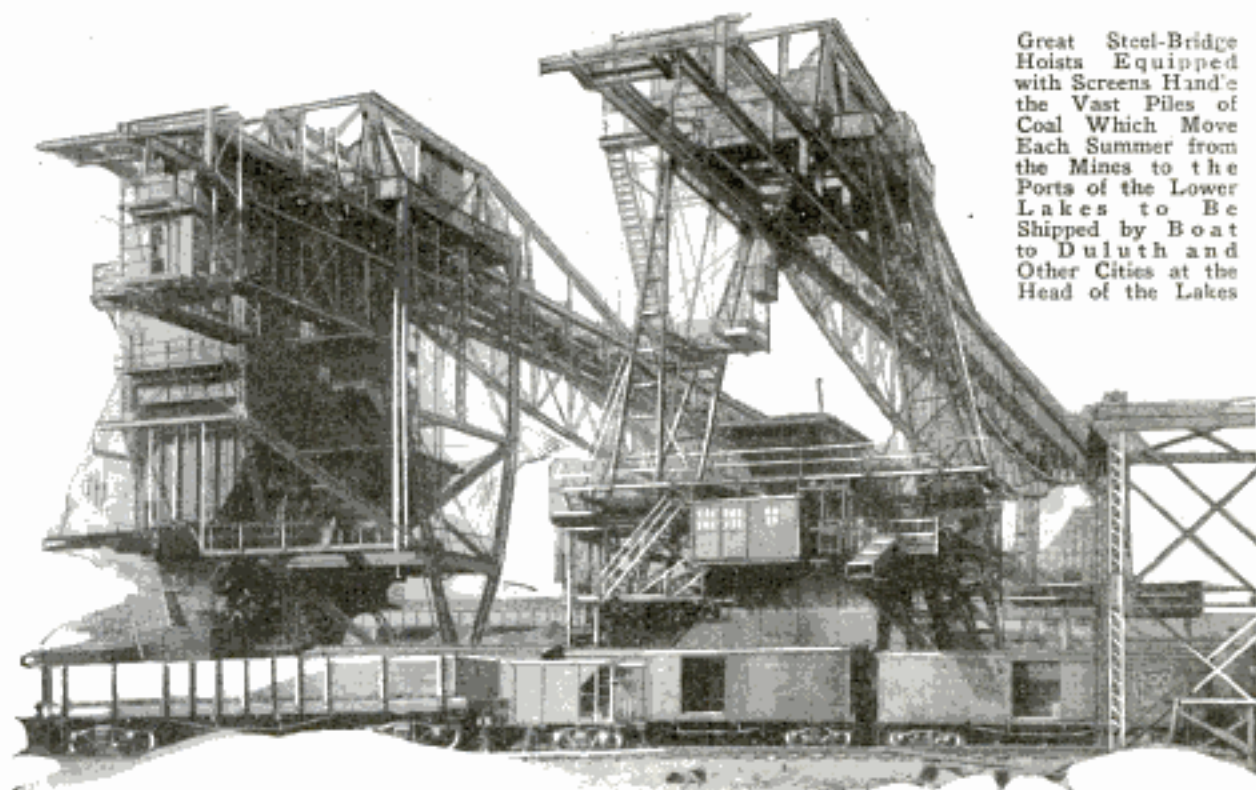
292
ELEPHANT'S COLD CURED WITH BAG OVER TRUNK

When circus elephants catch a cold, inhaling boiling vinegar sometimes proves effective as a cure. The "medicine" is administered by placing it in a canvas container, shaped like a feedbag and tied securely to the animal's trunk. Whether the elephant wants it or not, it must inhale the beneficial fumes.



Bag Containing Hot Vinegar Placed over Trunk, Compels Elephant to Inhale Fumes for Cold

Keystone



Great Steel-Bridge Hoists Equipped with Screens Handle the Vast Piles of Coal Which Move Each Summer from the Mines to the Ports of the Lower Lakes to Be Shipped by Boat to Duluth and Other Cities at the Head of the Lakes

Unwritten Tales of the Inland Seas

Adventures and Thrills Mark Lives of Sailors Who Ply the Great Lakes, and Mystery Surrounds Fate of Hundreds

By J. EARLE MILLER

OUTFITTING of several treasure-hunting expeditions on the Great Lakes during the past summer has revived interest in the many tragedies of the inland seas. Scoffed at by deep-water sailors as a "mill pond," the Great Lakes have probably claimed, in the last hundred years, a greater toll in ships and cargo than any other area of equal size.

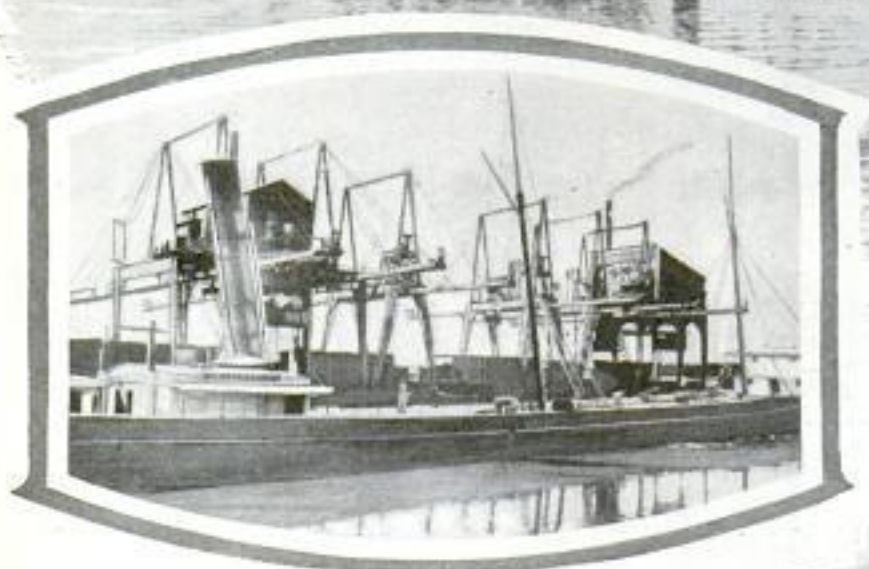
At least three expeditions are planning to hunt some of the lost ships of Lake Michigan alone. The passenger ship "Westmoreland," sunk near the straits of Mackinac several years ago with \$100,000 in its safe, is the chief prize sought.

Despite the fact that a ship is rarely more than half a day's run from land, great-lakes navigation offers perils that are not encountered on the ocean. The very narrowness of the inland seas is a danger from which the boat in mid-ocean is free, since the lake skipper in a storm is always almost on a lee shore. The famous fishing schooners on St. George's bank in the Atlantic have been featured in innumerable stories because of the danger and hardships they suffer in the path of

the transatlantic liners. But in the narrow confines of Whitefish bay, at the lower end of Lake Superior, fogs are just as bad as on the Atlantic fishing banks, and more huge steel ships, with bellowing foghorns, pass in a single hour than the ocean pathway will see in a week.

For skill in navigation, the masters of the iron, coal and wheat freighters which ply the upper lakes are said to be without a peer, yet all their sailing is done without the use of sextant or any of the usual navigating instruments. Knowing the speed of their ships, and with a good compass and clock, they will sail the darkest or foggiest night through waters so crowded that a dozen or more 600-foot freighters may be within hearing at one time. Starting from the harbor light at Duluth or one of the other upper lake ports, they can go all the way to the lower lakes with little more than dead reckoning as a guide. Given the ship's speed, they will sail a certain course for so many hours or minutes, then turn to the next, and raise lighthouse or reef buoy at the exact place and time it was expected.

*Emb. Ethel Vincent Wilson
Takoma Park, Washington, D.C.*

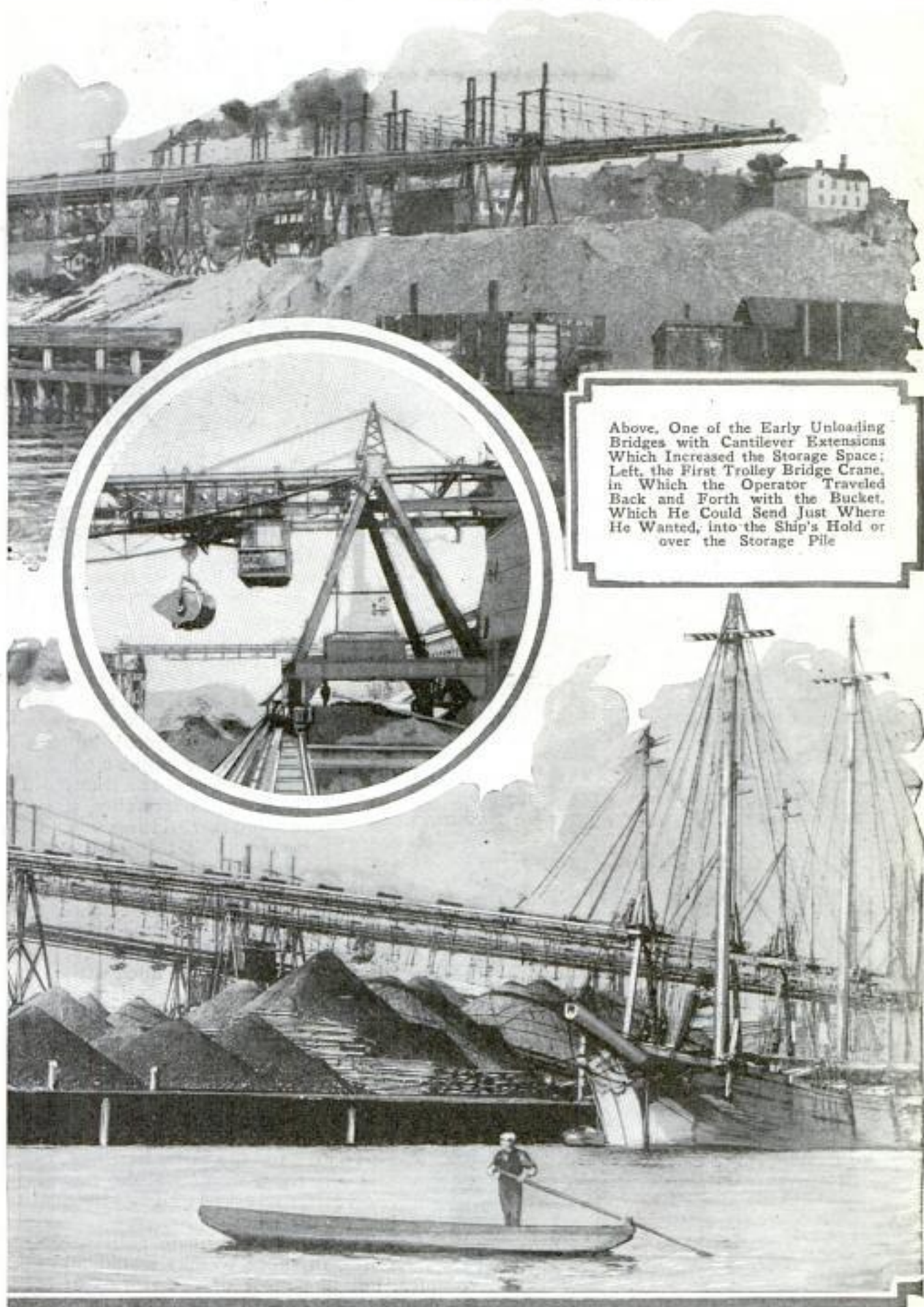


Above, the First "Fast Plant," Introduced with a New Type of Boat; the Unloading Buckets Dipped through the Hatches and Brought Up the Ore; Right, One of the Unloading Bridges Which Went Out When the Lake-Type Steamship with Its Huge Hatchways Came In

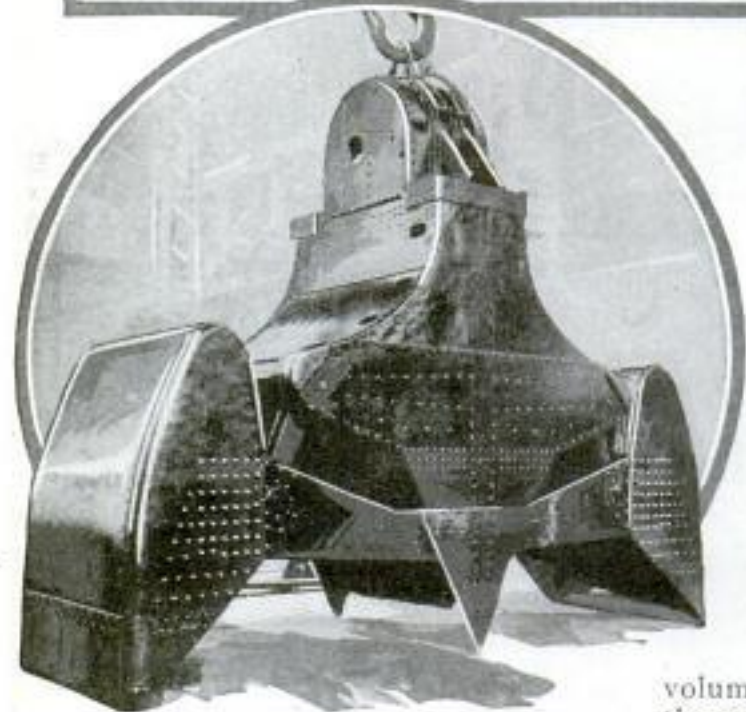
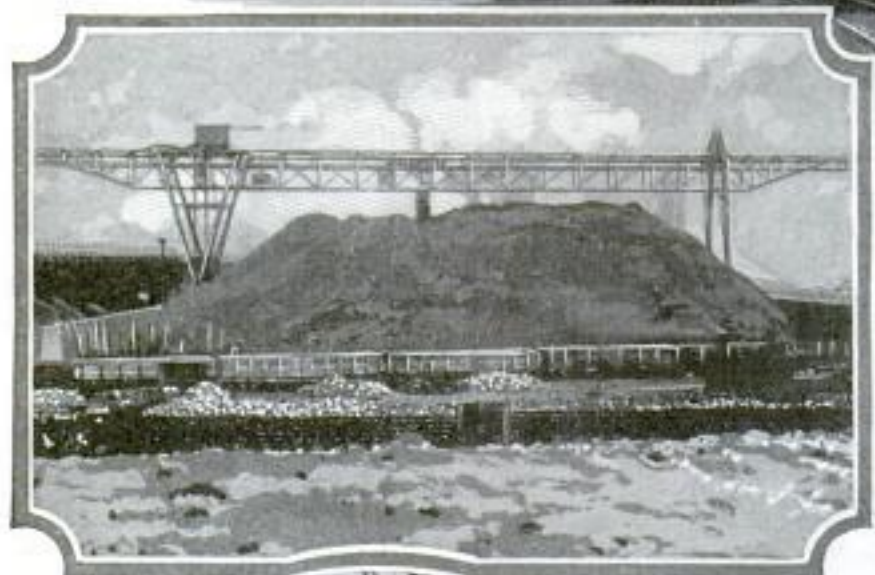
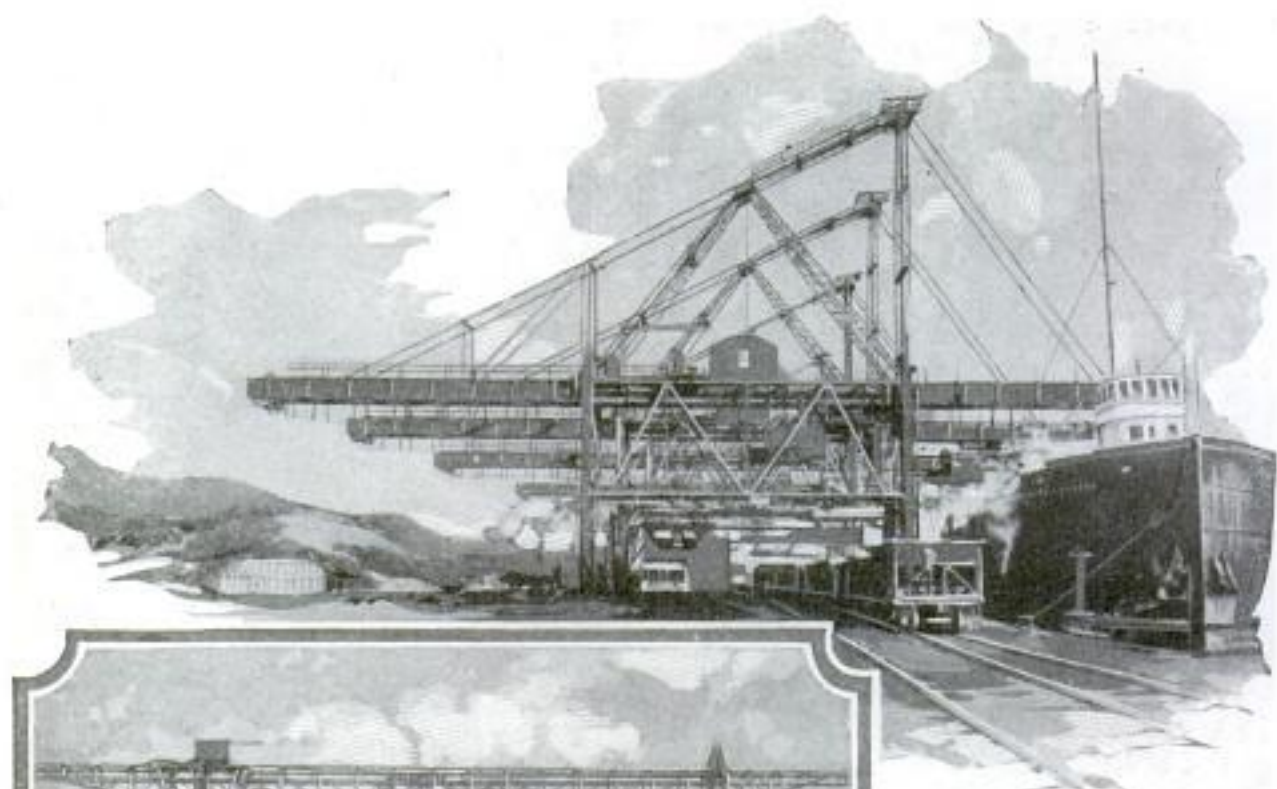
The bulk of the lake traffic is carried by the huge freighters which bring iron ore to the steel mills and carry back coal for the northwest. Next to the steel trade comes the wheat movement. The ships are peculiarly a lake development, and hold the world's records for low cost and efficiency in handling cargo. A 600-foot steel freighter, with its engines set far aft and its bridge in the very bow, leaving a long expanse of open deck between, has been loaded with more than 12,000 tons of ore in sixteen minutes, and has unloaded its cargo in less than half a day. An ocean freighter of the same capacity would have required not hours, but days to handle the same amount of cargo.

The lake boats are unique in that the loading and unloading equipment is all built on the dock, and the ship itself is





Above, One of the Early Unloading Bridges with Cantilever Extensions Which Increased the Storage Space; Left, the First Trolley Bridge Crane, in Which the Operator Traveled Back and Forth with the Bucket, Which He Could Send Just Where He Wanted, into the Ship's Hold or over the Storage Pile



Improved Unloaders and Giant Bridge Cranes, with Ten-Ton Buckets, Followed, Emptying Ships Faster

simply an enormous bin, pierced by rows of huge loading hatches, and with a propelling engine at one end and steering wheel at the other. There is no more ungainly-looking craft in the world, but they handle with such remarkable ease that, in confined stretches, a double row of them will move up and down the

stream as closely packed, in proportion to their size, as automobiles on Fifth avenue or Michigan boulevard.

As far back as the records go, the story of the lakes is filled with tales of disaster—263 vessels and seventy-nine lives lost in 1851, 100 vessels and 200 lives in 1883; 285 disasters and 135 lives in the single month of October, 1886, and twenty-nine vessels and thirty-nine lives in two days in the following month; and similar records for the years between, and since. The year 1860 saw 382 vessels wrecked and 578 lives lost on the lakes.

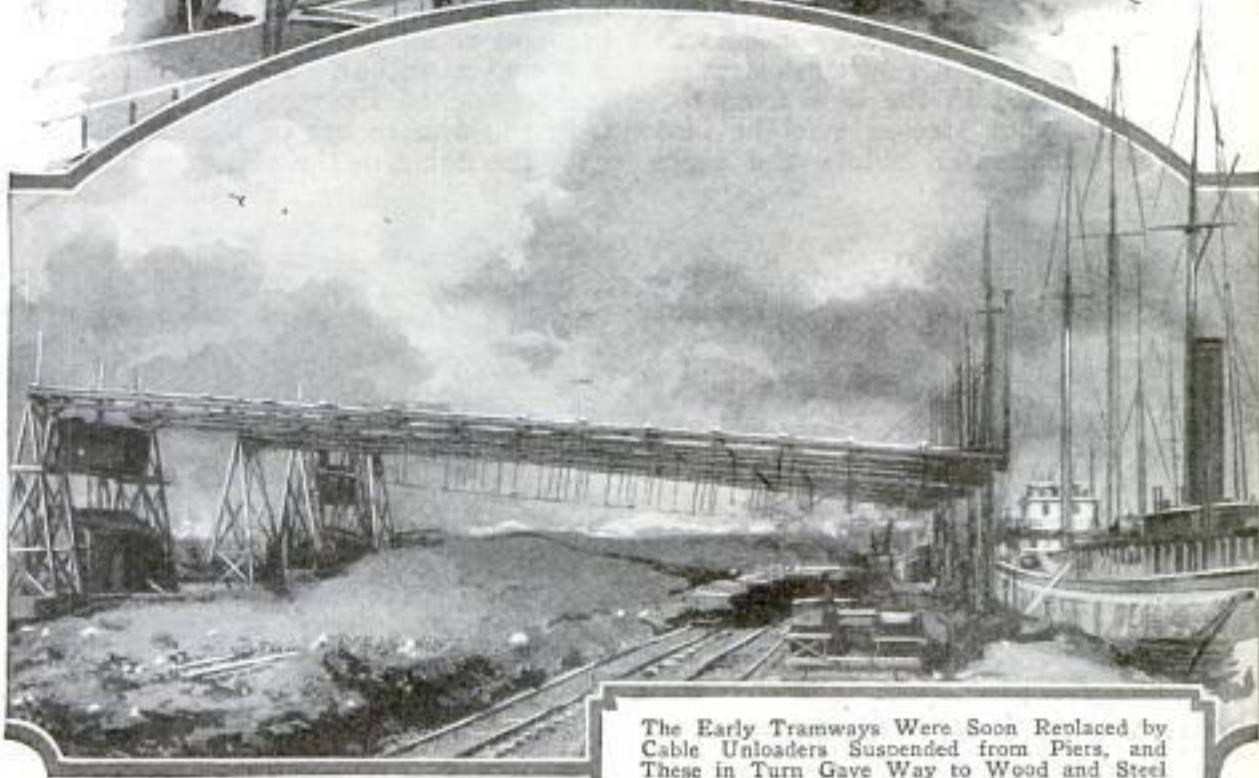
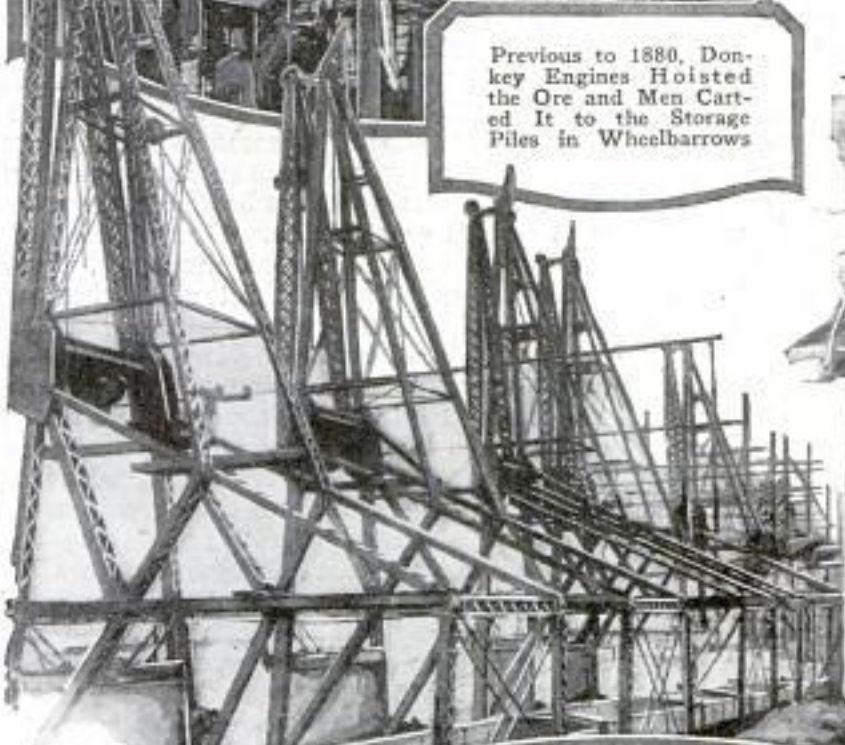
The tales of heroism and suffering in those wrecks would fill volumes, but like most of the stories of the men who go down to the inland seas, they remain unwritten. A few years ago



Previous to 1880, Donkey Engines Hoisted the Ore and Men Carted It to the Storage Piles in Wheelbarrows



Tramway Machines, to Left, Displaced the Wheelbarrows, and Sent Their Steam-Operated Buckets Direct into the Hold, to Be Filled by Shovelers; Transfer Cars, Above, Capable of Moving Many Buckets to the Blast Furnaces, Were the Next Step to Meet the Incessant Speeding Up of the Mills



The Early Tramways Were Soon Replaced by Cable Unloaders Suspended from Piers, and These in Turn Gave Way to Wood and Steel

a Chicago captain who went up the lakes each season to bring back a cargo of Christmas trees set out with his schooner, expecting to reach the city just a few days before the holiday. He was caught in a December gale. A few days later Christmas trees began to wash ashore, and from that day nothing has been learned about the fate of his ship or where she sank. Yet the next year his wife and daughter chartered another schooner, and brought back the usual cargo.

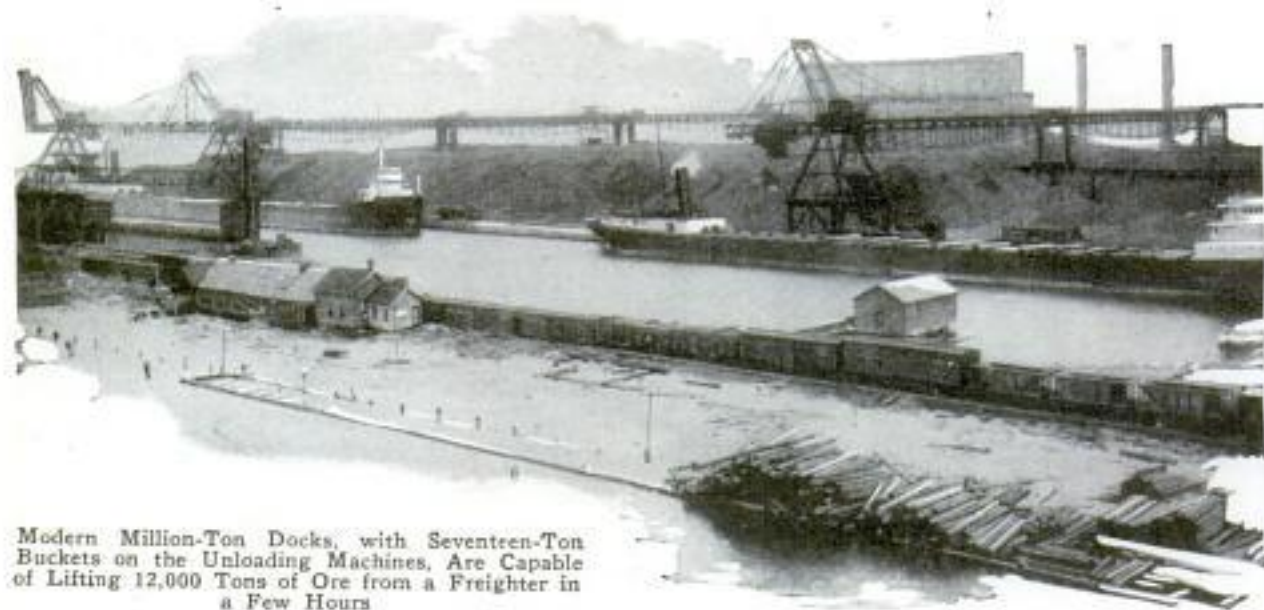
One of the most famous mystery disasters on the lakes is that of the "Chicora," which sailed from Milwaukee on January 21, 1895, bound for St. Joseph, Mich., and was never heard from. Somewhere on the trip of eighty miles across the lake she went down with her crew of twenty-four, caught in a howling gale, and only a bit of wreckage, washed ashore days later, was ever found. In the great storm of Nov. 17-18, 1885, when twenty-nine boats were lost in forty-eight hours, the crew of the steamer "Arizona" were victims of one of the strangest pranks ever played.

The "Arizona" had left Marquette, Mich., with a cargo of acid in carboys and 900 barrels of oil. Six miles out, with the gale raging, a carboy was wrenched from its fastenings and broke, the acid immediately taking fire. The engineer gave the ship full steam ahead before he was driven to the deck, and the captain turned back toward the harbor. Other carboys and the barrels of oil caught fire, and as the steamer raced into the harbor she was a blazing torch, only her speed protecting the crew gathered in the bow from the flames. The pilot steered straight into the stone breakwater, while the crew

jumped ashore, but the masterless ship then sheered off and, with flames pouring from her sides and a full head of steam turning the propeller, chased the sailors over the wall.

The growth of the freighters has kept pace with the expansion of the steel industry. Constant improvement eventually produced the freighter of today, and the unloading equipment. The ore is dumped from the mine cars into hopper bins at the loading ports and flows by gravity into the ship. At the other end huge unloading machines dip into the hold, each one biting up seventeen tons of ore at a grab.

The men who command the huge freighters grew up on the lakes, and in most cases their fathers before them were lake sailors or captains. One of the oldest in point of service on the lakes, Capt. C. E. Moody, has retired from the ore trade and in summer commands a big excursion boat on Lake Michigan. As a boy he was present when the dead from the "Lady Elgin" wreck, one of the worst disasters in lake history, were brought in, and his own father went down with his ship near the straits of Mackinac more than half a century ago. The "Lady Elgin," on a trip from Milwaukee to Chicago with 350 passengers and a crew of thirty-five, had left the latter city on her return trip in the early evening, but because of the gale, was making slow progress when, at two o'clock in the morning, a schooner, deep-loaded with lumber and running without lights, crashed into and sank her. The schooner eventually reached Chicago, badly damaged, with the first report of the disaster, but with the name of the victim unknown.



Modern Million-Ton Docks, with Seventeen-Ton Buckets on the Unloading Machines, Are Capable of Lifting 12,000 Tons of Ore from a Freighter in a Few Hours

Paper 8/18/25

Moulton Ladder Mfg Co.
790
2-40 Harding St

POPULAR MECHANICS

GERMAN ALCOHOL
CAN'T REPLACE
GASOLINE 2

While the flow of cheap, synthetic alcohol from Germany has had a pronounced effect on the wood-product industry, those who have studied the situation declare that it will not replace gasoline as auto fuel. The refiner's cost for gasoline may be as low as six cents while the manufacturing cost of synthetic alcohol is placed at not lower than ten cents a gallon. By the time the latter product bears its share of railroad freight, retailer and jobber profits, its price to the consumer will approximate that of gasoline or be higher. It has only half the heat value of gasoline and its efficiency is low with engines operating on the compressions now in use.

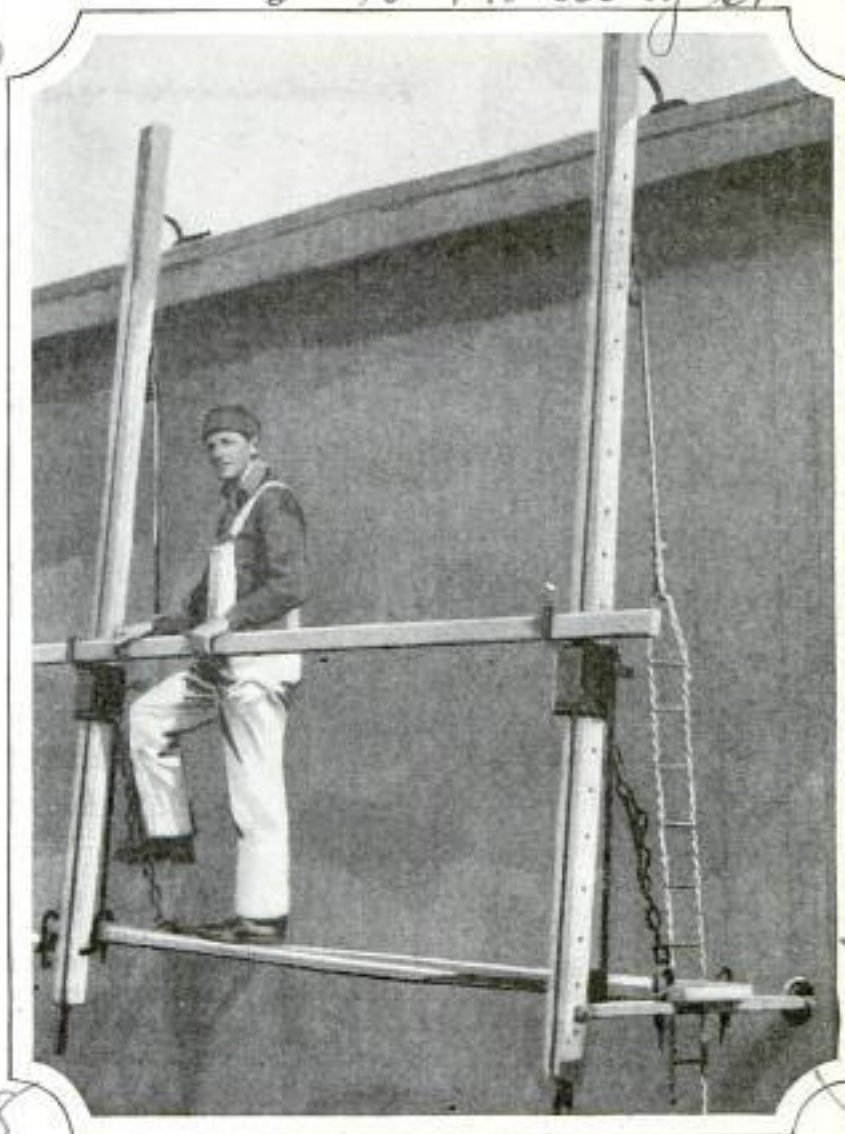
PLIERLIKE CLAMP
AID TO HOME
WORKER 258

For various mending jobs about the house, and for the use of workmen in several trades, a clamp shaped like a pair of pliers and having a strong spring that keeps the jaws together, saves time, leaves both hands free to do other work and fits in difficult positions. In gluing, for instance, it may be attached to the surfaces that are being mended and left until the adhesive is dry, and the bother of adjusting a screw clamp is saved. For upholstery and repairing furniture, building radio sets, frames and patterns, the tool has special uses. It is manufactured in several sizes that will suit light and heavy work within the range of the implement.



Mending Photograph Plate Holders Is Simplified by Using Clamp Plier to Keep Edges Together

Knape + Vogt
Grand Rapids, Mich



Workman Raising Scaffold by Foot While Supporting Weight on Crossbar Which Guards Him from Falling; Special Clamps Hold Bottom Board

SCAFFOLD IS RAISED BY FOOT
AND QUICKLY ADJUSTED 273

Fitted with a special balancing device, a patented scaffold for painters, carpenters and other workmen is raised or lowered by foot pressure. It is put up in little time, special roof connections being used which require no boards, cornice hooks, triangles or ladders. The uprights are twenty feet long and have extension parts for greater lengths. The guard rail across the scaffold and the platform on which the workers stand are so arranged that they can be locked securely at any desired height.

Wm. E. W. Clough
337 Pine St. Fall River, Mass

my
is
Dunham
Barnstable
Mass



PHOTOS TAKEN THROUGH GLASS
TO STUDY GOLF POSES

HOW far apart should the feet be in making a golf drive? Are the eyes on the ball? What happens when the club hits the sphere? These and other questions, frequently discussed by players, have been answered by the camera in various photographic studies, but some of the fine points of the game have been revealed in a more novel and helpful way

by taking the pictures through a glass platform with the camera directly below the player, so that the demonstrator's face, hand positions and feet would be emphasized. The distortions that resulted only served to call attention to the points that were to be studied especially. In addition to the "stills," a slow-motion movie, showing the swing from its start to completion, caught the player's action even to the facial expression.

NEEDLES' HISTORY TRACED FOR CENTURIES

235

Latest figures show that the United States leads the world in the manufacture of machine-made needles. Twenty-two processes are required in the making of each of these humble, but highly useful domestic tools. Needles are known to have existed long before Christianity, bronze specimens having been found in Mexican, Roman and Greek ruins. They were first made of bone and ivory and later of metals, the first type being pierced with an eye and the latter simply turned over in a loop at one end to carry the thread. A Moor, driven from Spain by religious persecution, first brought this article to England, in its wire shape. Earlier they had been imported from that country, 12,000 of them being included in the marriage portion of one king's daughter according to old records. However, as a practical implement, pins are of more recent development, but in the shape of highly-jeweled ornaments they have been known from time immemorial, and were prized gifts of the ancient rulers to their favorites.

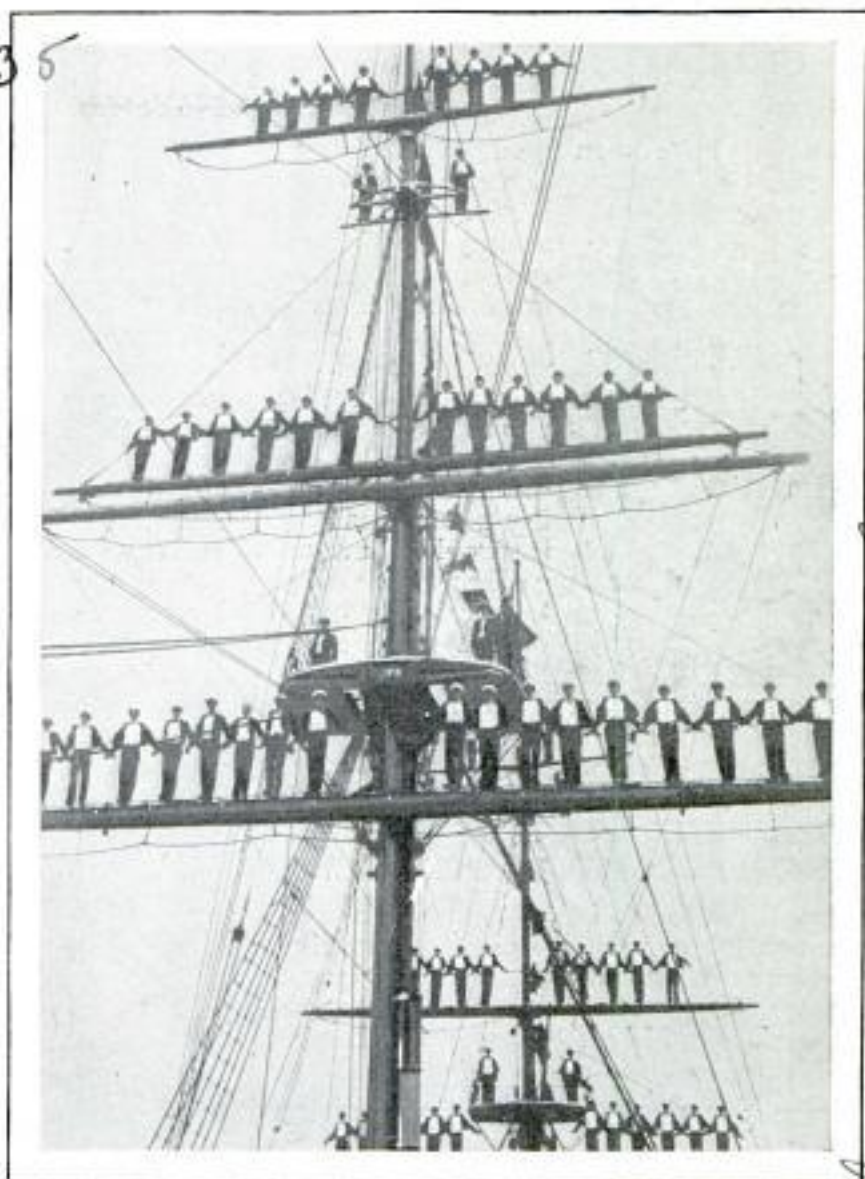
3151

BOLT CUTTER SET AT AN ANGLE REACHES DIFFICULT PLACES

With cutting jaws set at an angle of thirty degrees, a long-handled bolt clipper reaches difficult places such as the underside of an automobile mudguard with ease. Powerful leverage is easily exerted by the long grips and the tool withstands heavy service.



H. R.



British Naval Cadets Balanced on Masts of Sailing Vessel, a Training Stunt for Steadying Nerves, Testing Agility and Courage

SAILORS FORM HUMAN TREE ON SHIP'S CROSSARMS

Cadet officers of the British navy undergo a rigorous course of training to fit their bodies and their minds for the duties of their future positions. A drill was given recently on a training ship in which the embryo admirals, most of them without support other than that of the hands of their neighbors, posed on the huge crossarms of the vessel to form a "ship tree with human branches."

MATCHES ARE WATERPROOFED

Matches which can be dipped in water without spoiling have been produced, it is claimed, by putting rubber latex into the tip material. The mixture is then vulcanized. The lighting power is retained even after the matches have been in water for some time.

England. Worcester, English. Chemical Trade

18
L. W. M. M. Messay
Engineer. July. 1924.
Copyrighted material

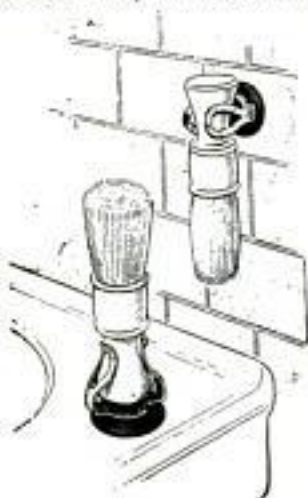
A. K. Iron Co, Inc.
 34 802 Madison Ave
 New York City

POPULAR MECHANICS

242

SHAVING-BRUSH SUCTION GRIP
 CLINGS TO ANY SURFACE

Shaving brushes may be kept upright after they have been filled with lather by thrusting the handle into a clip held at any angle by a rubber suction grip. The latter is attachable to glass, wood or metal. It is claimed for the clip that it saves much of the disorder of the shaving stand and that it provides an excellent way of keeping the brush out in the air and light where it may



dry in a sanitary manner, or standing upright without slipping on a wet surface while one is shaving.

METAL FOILS ROLLED SO THIN
 THEY BECOME TRANSPARENT

Metal can be rolled so thin one can see through it like a pane of glass, according to claims of a German scientist for a process of making foil that he has discovered. By his method, the report says, a block of gold or other metal can be reduced to the thinness of one-millionth

Dr. Karl Mueller
 Physical Research Bureau
 Berlin, Germany

part of a centimeter and still retain its elasticity. The practical value of the discovery, it is asserted, is in the radio, telephone and musical industries. An easy study of the atomic structure of metals is also afforded.

219.

SELF-UNLOADING AUTO TRUCK
 SAVES TIME AND MONEY

Time, labor and money are saved for haulers of loose loads, like coal and gravel, by a motor truck which has a conveyor fed from the side of the car. The vehicle, it is claimed, is particularly good for work in narrow and crowded streets and alleys of cities, because the driver need not back the truck into position but simply drives alongside the point of delivery. The conveyor normally is upright against the side of the motor body. When it is let down, the load pours onto it and is carried into the waiting bin or cellar by a moving pan. Power for driving the conveyor is supplied by a sprocket wheel and chain connected with gearing on a shaft driven by the truck motor.



Power Conveyor on Coal Truck Delivering the Load Direct into the Basement Bin, Eliminating Shoveling and All Rehandling, and, Above, the Conveyor Folded Up When Not in Use

Chas. Henry Parkmann
 2514 W. Huron and
 Kutscha, 5622 S. May St. Chicago

Copyrighted material



One of Daily Cloud Paintings Made by M. Pierre Fleury at Paris for Use in Future Comparisons of Sky Conditions and Colors as a Means of Predicting the State of the Weather

Painting Clouds for Weather Forecasts

Artist Sits All Day with Nothing to Do but Make Scientifically Accurate Pictures of Skies

VISITORS strolling along the Quai d'Orsay in the shadow of the Eiffel tower in Paris, may notice at any time of the day a black-bearded man in military uniform seated on a platform over the street with brush and palette in hand and easel before him, looking not at the city stretched below but at the skies above. This is M. Pierre Fleury whose title is "painter of clouds attached to the Office National Meteorologique."

His is a strange occupation, stationed on that lonely elevation with throngs of persons passing below while he executes rough sketches to be turned later into finished paintings of the white voyagers of the sky. M. Fleury is an artist of no small reputation, although but twenty-five years old, and his work has already been seen and favorably received at more than one exhibition in the French capital. Now he devotes his entire attention to fixing on canvas the delicate tints of the clouds as they pass over his head.

When completed, his paintings are used by the

weather experts to make predictions of the state of the weather, the possibilities of rain, or the chances of its being fair and warmer on the following day. The French weather-forecasting system is based on the aspect of the heavens, and meteorologists are able by comparing M. Fleury's paintings with similar canvases of the past to make their predictions. This system is said to give remarkably accurate results, and Col. Delcambre, director of the French weather bureau, is desirous not only of extending the system throughout France, but of establishing similar observatories in every country of the world in order to effect an interna-

tional organization to prophesy conditions several days in advance. But to achieve the best results in indicating the condition of the upper air, science was at a loss, for photography in black and white alters values and photography in colors—a difficult technical process—is often treacherous. So science turned to art.

M. Fleury laughs when asked the



M. Fleury at Work Painting His Daily Sky Record for the Meteorological Bureau at Paris



Photograph of a Tornado, Taken by an Alert Photographer at David City, Nebr., Showing the All-Destroying Funnel

reason for his employment in this capacity. "It is very simple," he explains, "Photography is incapable of capturing the numerous tints of every cloud. That is why science has found itself under obligation to make an appeal to art. As for myself, though scientific in effect, I am in my work none the less the artist."

A cloud passes, and he returns with alertness to his work lest one of these celestial fugitives might slip past him. The work that he is doing now will never hang in museums or galleries—scientific exactitude rather than artistic effect is his aim—but Pierre Fleury is satisfied, because he appreciates that he is aiding in a great work, that scientists in observatories await his finished canvases, and that navigators of the sea and air depend for their very lives on his technical ability.

"Nebulous masses," says an expert of the French weather office, "are not divided haphazardly. They constitute vast mobile groupings, whose organization has been well defined in four different sectors—the front, or anterior portion; the body, or central portion; the margin, or lateral portion; and the train, or posterior por-

tion—presenting characteristic aspects of the heavens. The problem of the prevision of the weather resolves itself into a study of these groupings and their evolution."

Anyone can do much of his own weather predicting by studying the clouds. Their height, size and shape are all dependent upon moisture, temperature and the motions of the atmosphere. Sighting past any fixed object it is possible to determine the direction of movement of a cloud bank and decide whether, if it contains rain, it is coming in your direction, going away, or will pass to one side or the other. High clouds are the result of much cooling, and therefore cannot contain sufficient moisture to yield any appreciable amount of rain or snow. Low-lying, dense cloud banks, on the other hand, may usually be taken to mean stormy weather. A good way to determine the height of a cloud is by its brightness. The higher they go the easier the sun penetrates them, and therefore the lighter they become.

Banks of massy clouds, of variegated shades ranging from white to deeper colors, typical of warm summer days and appearing usually in the early afternoon, are of the type called by the weather observers "cumulus," and may mean rain or thunder gusts. They are broken and irregular, and quite different from the broad, fleecy "nimbus" clouds of spring days. The more common thunderstorm clouds are the dark threatening masses called "cirrus." The cloud formations take many different shapes. Cumulus rolls, long-drawn masses which move forward with a rolling motion in advance of an oncoming wedge of cool air are one of the types which may develop local thunder showers, since they invariably contain much moisture, while their rolling movement in advance of the cold air indicates considerable agitation and changing conditions which will release the rain.

Fogs, the lowest form of clouds, offer another sign to be used in interpreting the weather. They are the result of the cooling of the ground-surface air to a temperature below its dewpoint. Then, the excess moisture forms the fog cloud. Rising fogs indicate clear weather ahead, while a descending cloud promises rain.

Rufus H. Inallinson
in Congress?
London

**INSECTS PICK OWN BIRTHDAYS
TO CONFORM TO WEATHER** 23 2

If the weather is bad, the small egger moth can postpone its own birthday for days, months or years, according to observations just made by a British scientist. The cocoon of this type of insect is ordinarily due to open in February, but if the weather is inclement the birth is usually postponed for twelve months. Moths have been known to emerge successfully after being imprisoned for eleven years. Another case of the way in which nature can suspend life is cited by the same authority. He declares that when a wood is cut over, the next season a profusion of foxglove springs into bloom, proving that the seeds have long been dormant under the heavy growth until sunlight touched them into life.

**GAS-TANK FILLER ON DASH
SAVES MOVING SEAT** 23 4

Filling the tanks of autos which have their gas containers under the front seat may now be accomplished without trouble through a dashboard appliance. This is a combination of a filling entrance and

gauge. The gasoline runs from the dash fill through a pipe under the floorboards and up into the usual opening in the tank. Conveniences claimed for the accessory



Filling the Auto Tank through Dashboard Opening Eliminates the Trouble of Lifting the Cushions

are that the driver need not leave his seat or guess at the amount of gas received.
Price - \$12.50.

LASSO CHAMPION PROVES SKILL BALANCED ON HEAD 240

In training for a recent western rodeo, a champion cowboy performed the difficult feat of standing on his head, balancing with one hand, and roping three motorcycle policemen with a lariat

wielded by the other hand. The officers then showed their prowess when seven of them rode on one cycle, a stunt they later demonstrated to thousands in a police-game program.

Standing on His Head and Balancing with One Hand, Cowboy "Roped" Three Speeding Motorcycle Policemen at Rodeo



Leonard Stroud

J.C. Evans Co. 2005 1/2 Cadby St. Dallas, Texas

536-18th Ave
New York N.Y.

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CANNIBAL PLANT EATS ITSELF IN DIET OF OUTER LEAVES



Cannibal plants from the tropics are being imported into the United States for hothouse cultivation. The

Specimen of Cannibal Plant Growing on Bark

growth, known as the "air plant," attaches itself to the bark of trees. Two leaves,

veined like those of the cabbage, first appear and grow to some length. Then a second pair sprout, and promptly start to feed on the first, which soon die, and the process is repeated indefinitely. If the outer leaves of this curious plant are torn off, it cannot live.

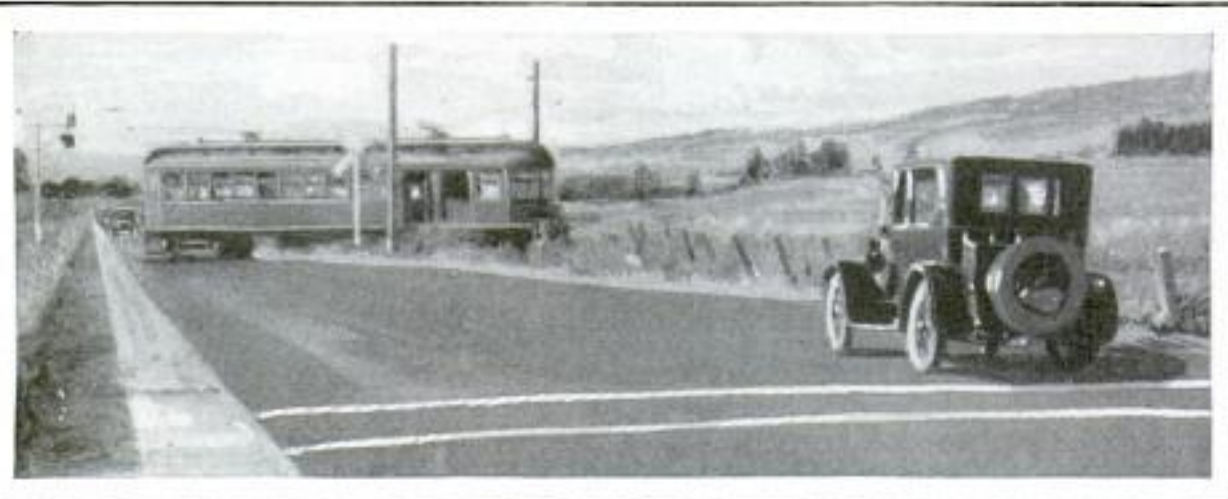
WATERPROOFED GOLF CLUBS— MAKE WOOD LIKE METAL

Wooden golf-club heads are made almost as hard as ivory and proof against water by treating them in a pressure tank with a chemical that fills the pores. First, the heads, of seasoned persimmon wood, are placed in a retort and subjected to a vacuum process to draw out the air and moisture. They are then put in a tank and the chemical, in molten state, is forced into the wood under high pressure. Then the heads are dried and hardened. It is reported that a splinter of maple, after being filled with this material, becomes so hard that it can be driven through a one-inch plank. The waterproofing process, it is said, prevents the heads from shrinking away from the shaft or plates, increases the driving power and greatly prolongs the club's life, neither rainy weather nor a winter in a dry locker having any effect on it.

HUMPS IN ROAD GIVE WARNING AT CROSSING

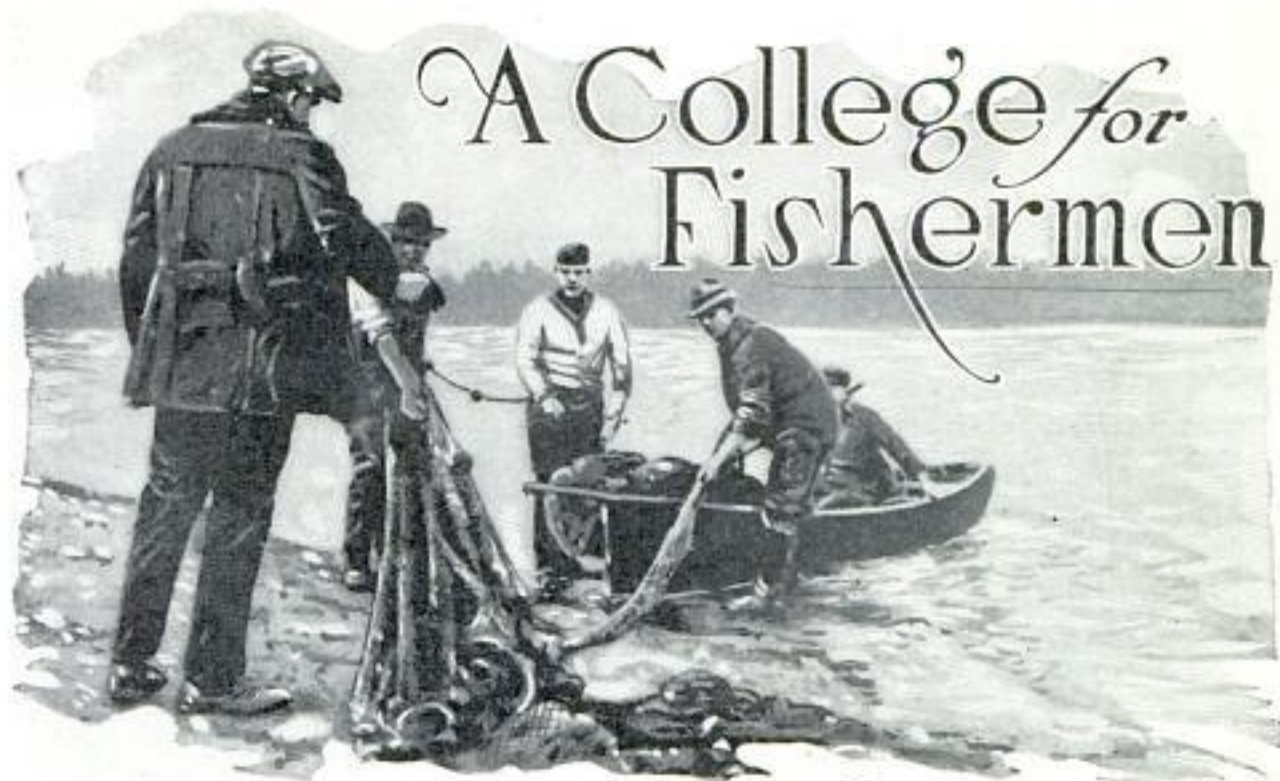
Using concrete bumps in the road to warn motorists that a railroad crossing is ahead, a new safety device being tried out on a California highway has proved highly successful. Two risers, a couple of inches high and a few feet apart, are placed across the pavement at a safe dis-

tance from the railroad tracks. As an automobile passes over them two distinct bumps are recorded as a signal to the driver that there is danger ahead. Autoists have rapidly learned the meaning of the bumps and instinctively slow down and look for trains.



Two Concrete Risers across the Pavement Warn Autoists of a Rail Crossing Ahead, for Even if He Fails to See Danger Signs, the Sharp Jars Put Him on His Guard

Between Petaluma and Santa Rosa, Calif.



Fishery Class at the University of Washington Loading Their Haul Net into the Boat Preparatory to a "Laboratory" Lesson in Fish-Catching, Part of the Course Carried Out at Seattle

By ROBERT H. MOULTON

THE business of fishing is one of the oldest in the world, and as now conducted seems a rather fixed industry. In other words, the fisherman goes out in his boat, drops his seine overboard, hauls it in, takes from it what he can use, and that is all there is to it. What, therefore, could a fisherman learn from a college whose purpose is to teach him how to fish?

This question has been answered by the College of Fisheries of the University of Washington. Established six years ago, it has already proved an unqualified success. It has shown that, while the whims of the sea and the vagaries of the always wandering schools of fish largely control the prosperity of the commercial fisherman, nevertheless the fisheries may be regulated, the habits of the fish studied, and much of the uncertainty of the harvest of the sea converted into a reasonable sureness of output every year.

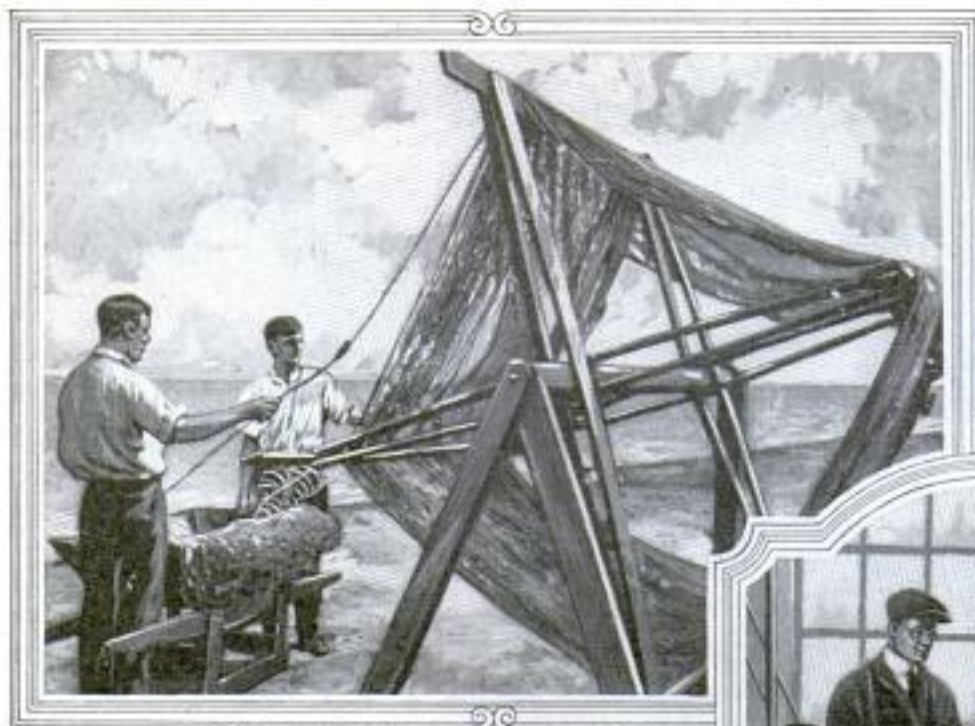
The principal justification for the establishment of the college was the fact that the fishing industry of the North American continent is the most important in the world. In the United States, including Alaska, its production amounts to almost 3,000,000,000 pounds annually, valued, as it leaves the fishermen's hands, at approximately \$100,000,000. Canada is the second most important fishing country in the

world, with products valued annually at more than \$30,000,000, while those of New Foundland total almost as much. The total value of the world's fisheries is computed at \$560,000,000. In the United States the industry uses 8,750 vessels of 240,000 net tons, and employs 191,000 men, women and children.

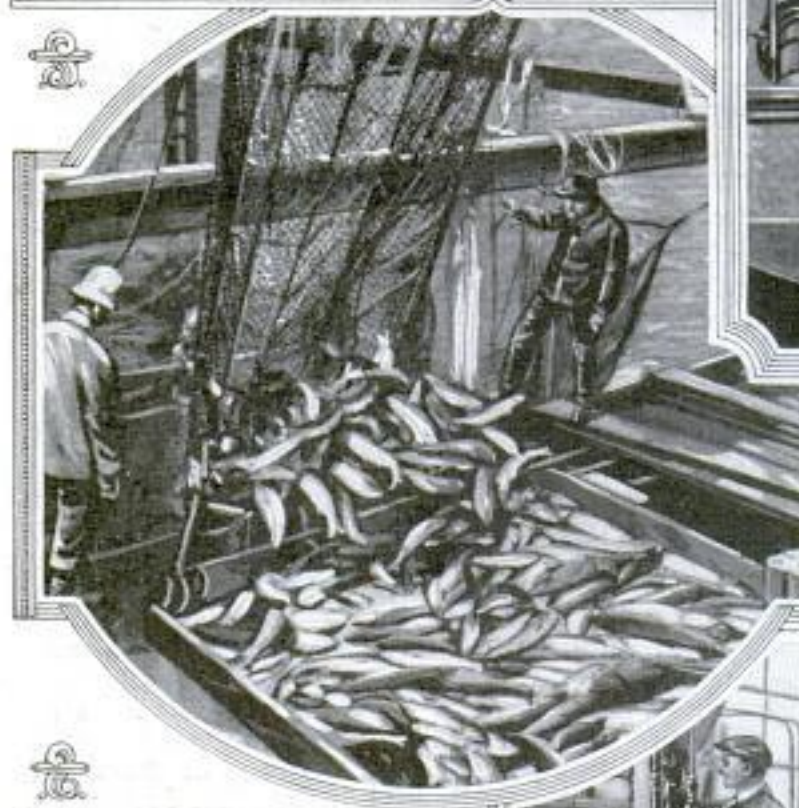
Much of our fishery resources is, however, either totally neglected or little utilized, simply because of the lack of trained men. The college supplies these men, and teaches them the best methods not only of operating the industry, but of preserving and conserving the natural product which forms the basis of that industry.

The older and more experienced students form the bulk of the salmon inspection force of the National Cannery association. Special instruction is given all who are considering engaging in the canning or packing of fish or any other branch of the fisheries industry. The four-year course leads to the degree of bachelor of science in fisheries.

Students are taught the fundamentals of commercial fisheries, how to outfit for the work, how to operate for each variety of food fish, and how to prepare the fish for market. They are also taught to conserve the resources of their own or any other state, by surveys of the available

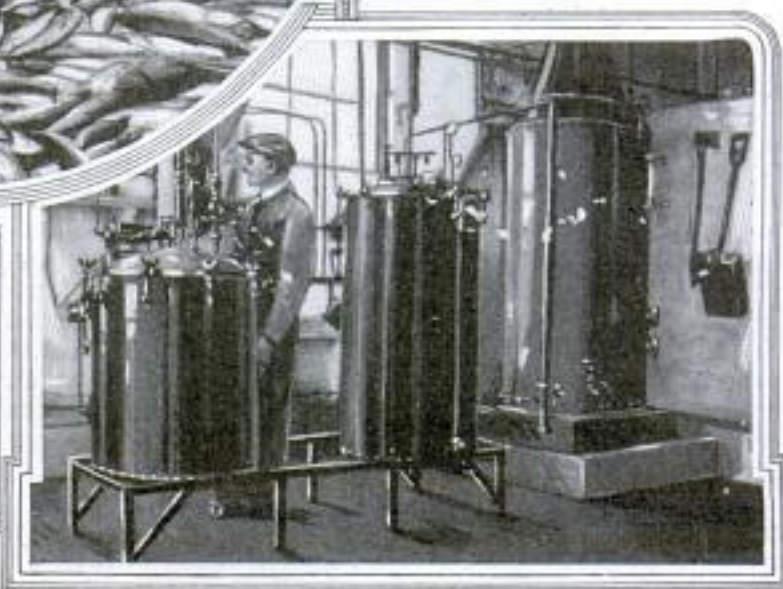


Practical Instruction in Winding a Wet Net on the Drying Reel, at Left, and, Below, a Fryer in Which Sardines Are Cooked in Oil before Being Canned, Another Lesson Taught in the Canning Plant



Left, Bailing Salmon from a Fish Trap; Students Are Taken to the Fishing Grounds to Watch and Assist in the Actual Operations, Getting Their Knowledge of the Business at First Hand

Part of the Steam Plant and Reports for Cooking Salmon; Here the Students Operate the Latest and Most Modern Devices in Preparing the Product for Market; the School is Equipped Throughout to Teach Not Only the Theory of Preparing Sea Food for Sale, but to Instruct the Pupils in Actual Work





Microscopic Animal and Plant Life Hauled Up in a Fine-Meshed Net, for Study of the Food of the Fish; Center, Seining in the College Fish Pond; and, at Bottom, Small Salmon Being Dipped from the Rearing Ponds Preparatory to Transfer to Other Waters

waters and their fish supply, by the proper planting of fish and by the establishment of rules whereby the supply can be conserved, both for the commercial fisheries and for anglers.

In the fish-culture course, instruction is given in the artificial and natural methods of hatching and rearing fishes, mollusks and crustaceans. To make this work as practical as possible, a laboratory has been fitted up with troughs for the handling of salmon and trout eggs, batteries of shad and whitefish jars have been installed, while tidal boxes and other equipment are available. Several cement ponds for rearing fish have been constructed on the grounds and are in operation all the year round.

Since its establishment, the faculty and students of the college have worked on a number of problems of vital interest in connection with fisheries. The discovery of a process for canning crab meat was the first problem taken up and carried to

a solution, the results being published in 1921. During the season of 1922 some eight or ten new plants, using this process, were established in Alaska and on Puget sound. These plants packed some 15,000 cases valued at approximately \$500,000, a clear gain in our material wealth, as the common crab in Alaska waters previously had not been utilized commercially to any extent. In 1923 more plants were working on this crab and the much larger king crab, the existence of which at various places along our coast already had been established. The king crab is the one packed by the Japanese canners, who have controlled our market for a number of

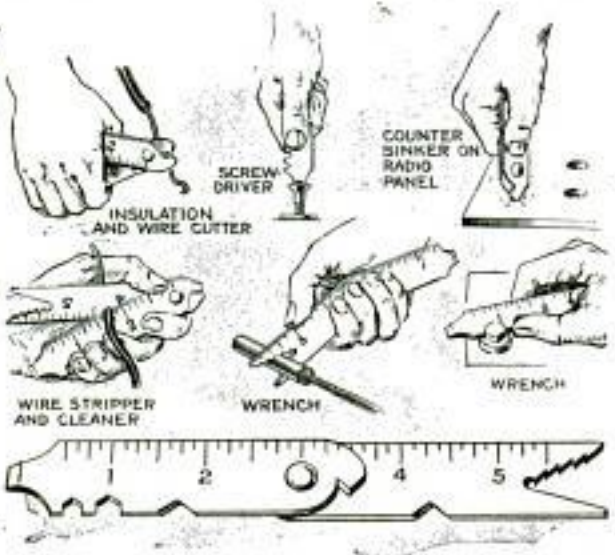


years. It is probable that the newly established plants and others projected will in the near future produce in the neighborhood of 100,000 cases a year.

Es - m - 3 mfg Co
 810 309-6th Ave
 new York
POPULAR MECHANICS
SET OF SEVEN TOOLS IN ONE
ALSO USED AS RULER.

2 made by Frank Beck,
 Highway Supervisor
 of Lawrence County
 in W. Va. & Pearfish
 ter tool being marketed to the radio,
 mechanical, electrical and automobile
 trade. Of two pieces, hinged in the
 middle, the tool is a three-inch ruler when
 closed and a six-inch ruler when opened.
 Various parts in the two sections combine
 to make a wrench for bolts, an insulation
 and wire cutter, a wire stripper and
 cleaner, a pipe wrench, a screwdriver
 and a countersink.
 24'

166
 154 in small quantities.



Versatile Ruler and Some of Its Uses

"ICE MINE" IN BLACK HILLS

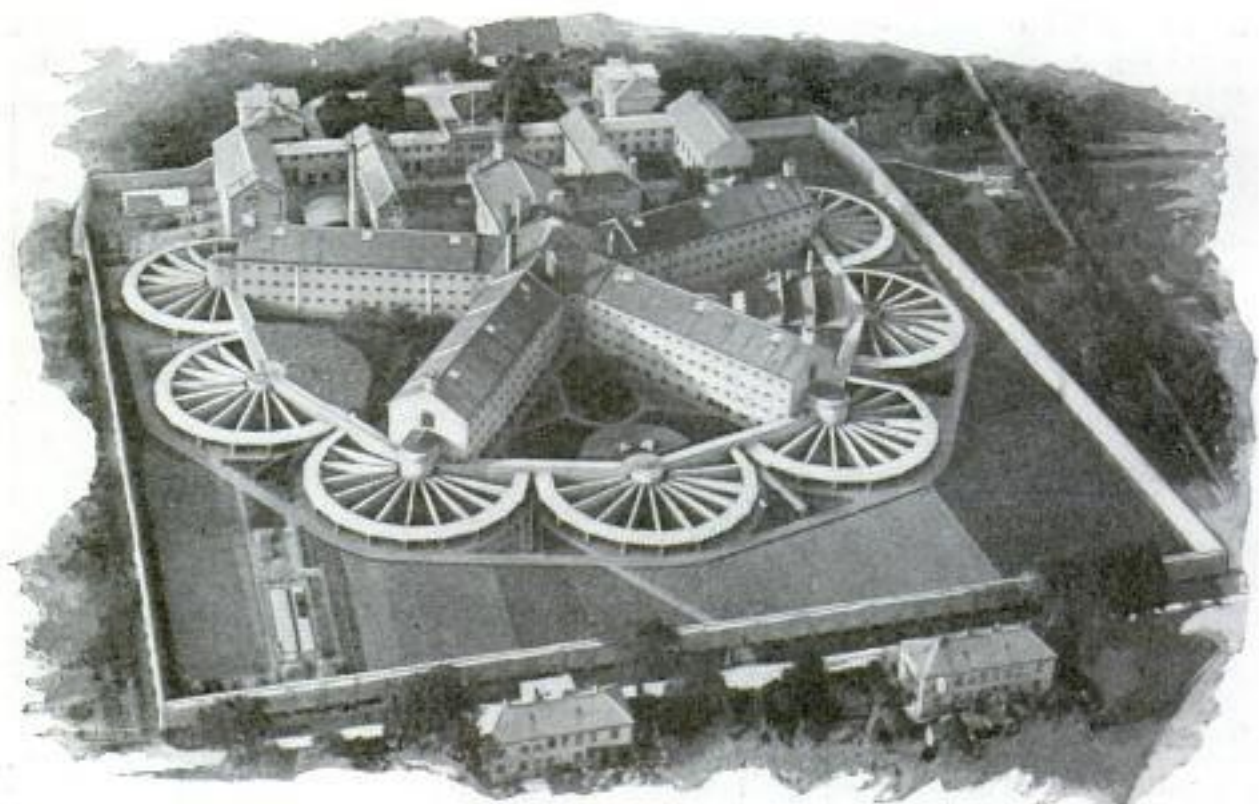
Highway workers in South Dakota have made an interesting discovery of an "ice mine." The men went to a cliff of naturally terraced limestone alongside the road they were building with the object of obtaining rock for a crusher. After digging several feet, they encountered a formation which resembles a stone wall with the mortar replaced by ice. Apparently the dirt had been washed away by some subterranean flow of water, which had since congealed.

Sanford, N.W. section

274 **PRISON SEEN FROM AIR LOOKS LIKE HUGE WHEEL**

Constructed in the shape of huge wheels, some of the buildings of the prison at Copenhagen, Denmark, resemble units of a ponderous machine when viewed from the air. The arrangement

utilizes space and also provides room for a number of small exercise yards between the "spokes." Here the inmates may take their daily walks. The small inclosures simplify handling the prisoners.



Air View of Copenhagen Prison, Where Buildings Radiate from Central Axis to Simplify Management, and Additions, Resembling Gigantic Wheels, Provide Small Exercise Yards for Inmates

8/24/25

WORLD'S RADIO 'ROOF' HELD CAUSE OF 'FADING' 298

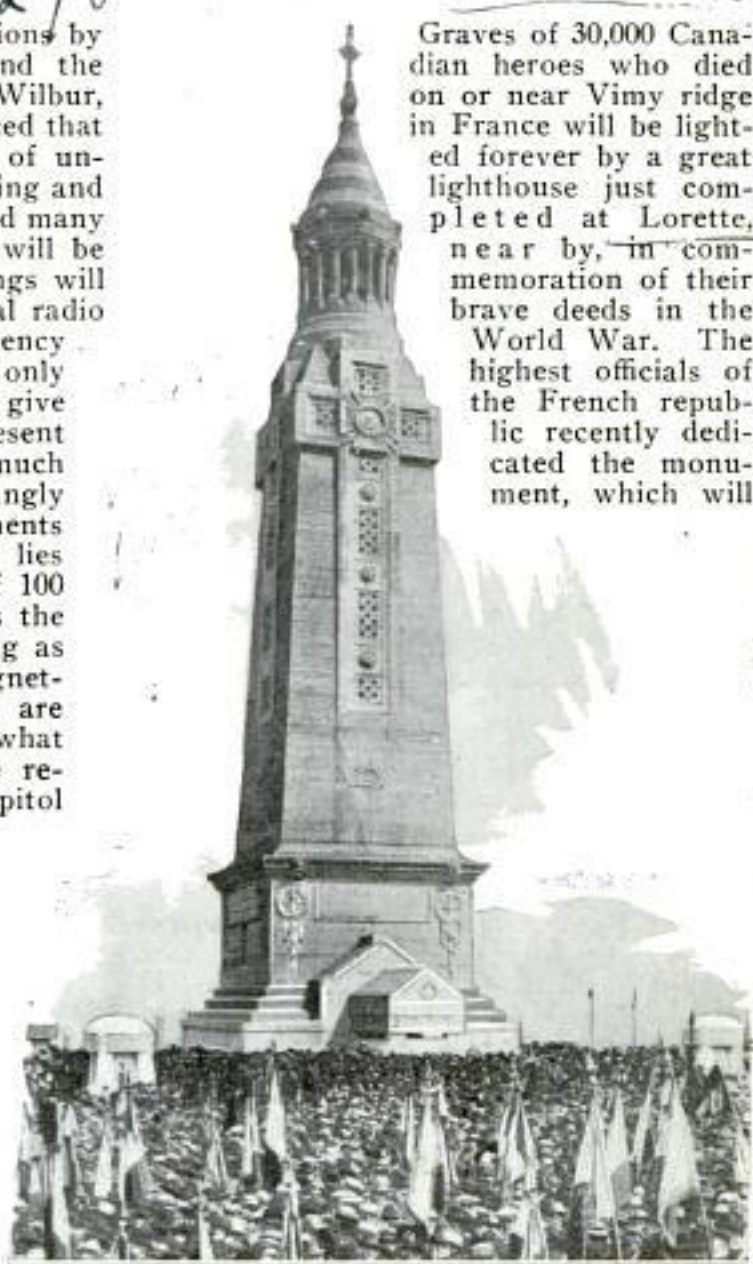
As a result of recent investigations by the naval research laboratory and the Carnegie institution, Curtis D. Wilbur, secretary of the navy, has announced that the nearest approach to the key of unsolved radio problems, such as fading and other difficulties, has been made and many of these troubles, it is expected, will be practically eliminated. The findings will be of benefit chiefly to commercial radio and indicate that a high-frequency short-wavelength station costing only \$60,000 will have greater range and give better service than some of the present high-power stations that cost as much as \$2,000,000 and have correspondingly high upkeep costs. The experiments bear out the theory that there lies above the earth at an altitude of 100 miles or more, what is known as the "ceiling" of the sky, a layer acting as a deflecting surface for electromagnetic waves and under which they are guided around the world in somewhat the same way that whispers are reflected in the domes of the capitol building in Washington and in St. Paul's cathedral in London. This ceiling rises and falls, as atmospheric conditions vary and its exact location and extent have not yet been determined. Further experiments are being conducted for these purposes. In the early stages of short-wave transmission work, it was found that signals could be picked up at distances of forty or fifty miles and then disappeared as though followed up, only to be picked out of the air again several hundred miles farther away. This zone of quiet became known as the "skip" distance. By comparing data furnished by many broadcasters, it was found that there was a relation between the earth's magnetic field, the frequency of the waves used, the skip distance and the height of the sky ceiling. Later experiments have shown the existence of two waves, it is reported, one of them arriving by way of the earth and the other by the upper layer.

3354.

Pigeon lofts have been installed at a number of towns in California by a large corporation to house homing birds that will be used by its salesmen to carry orders, etc., to the main office.

St. Joseph News Press 5/25/25

GRAVES OF CANADIAN HEROES MARKED BY LIGHTHOUSE 239



Graves of 30,000 Canadian heroes who died on or near Vimy ridge in France will be lighted forever by a great lighthouse just completed at Lorette, near by, in commemoration of their brave deeds in the World War. The highest officials of the French republic recently dedicated the monument, which will

Beacon Monument at Lorette, France, in Memory of Thirty Thousand Canadian Soldiers Who Died at Vimy Ridge

also serve as a beacon for night air service, its light being visible for sixty miles.

LIME KEEPS DIRT ROADS FIRM

Experiments of engineers have developed, it is claimed, that mixture of two to five per cent of hydrated lime with the top surfacing of country dirt roads has ended excessive rutting and clinging of the clay to feet of animals and tires of autos, after rainfalls. The clay and lime mixture does not stick. Instead it tends to smooth out and pack down more quickly than does untreated surfacing. The roads also respond more readily to dragging.

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Reported in Agricultural Lime News Bulletin, Washington, D.C. National Lime Association

3470

Time and Money-Saving Tools



Rough, Bronze-Covered Rubber Mitt Protects Hands When Scouring Pans



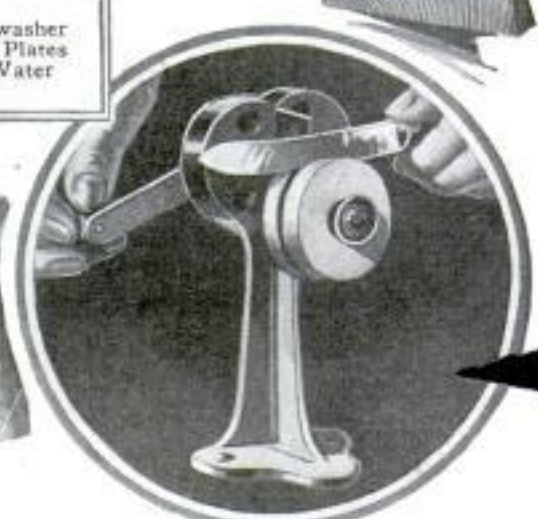
Steel Spring, Attached to Hinge, Closes Doors Quickly; at Right, a Durable, Flexible Broom That Raises Little Dust and Has Renewable Filler



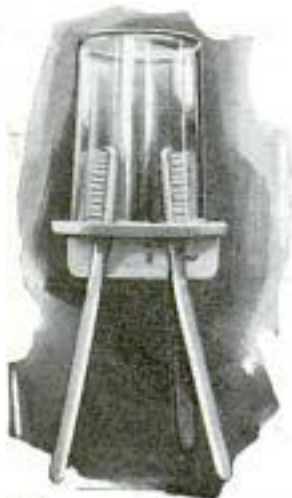
Simple Rotary Dishwasher That Spins the Dirty Plates in Boiling Soap and Water



Tea Kettle Cannot Slip off Faucet When Hung on Easily Adjusted Holder; Right, Interchangeable Bathroom Fixture and Its Socket Screwed to Wall



Grooved, Rotary Grinder That Quickly Sharpens Kitchen Knives, Shears and Other Implements



Toothbrushes Collect Germs if Left Exposed; This is Avoided in Metal Holder Attached to Wall or Cabinet with Shelf for Drinking Glass to Be Turned Upside Down over Them; Above, Fruit-Jar Sealer Straightens Caps, Insuring Air-Tight Fit



Stove Lifter, Tack Puller, Hammer, Fish Sealer and Screwdriver are Combined in This Single Tool

3470

for Woman's Workshop in Home



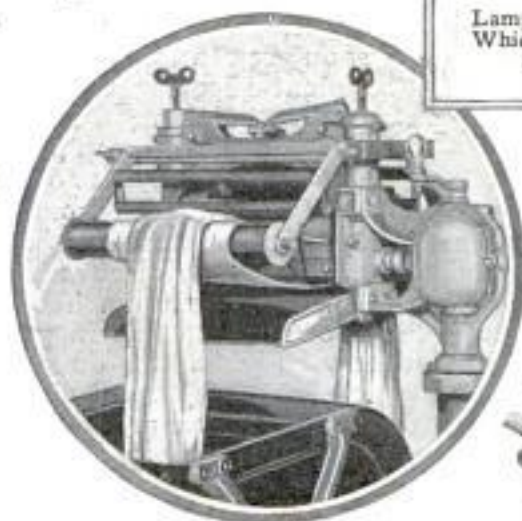
Just Twist Top of This Case for Workbasket to Proper Hole and Size of Needle Desired Is Ejected



Left, Driver for Putting Screws in Difficult Places, It Holds to Slot with Tiny Jaws; the Rope Holder Above, Eliminates Need of Knots as Ends Are Put through Holes and the Thumbscrews Secure Line



Lamp-Socket Electric Cooker Which Prepares Whole Meal at the Same Time



Safety Guard for the Wringer Carries Clothes on Endless Canvas Belt. Is Easily Attached and May Be Left On; Right, Stove Polish Is Put Up like Dental Cream Avoiding Stained Hands



Lid with Insulated Handle Fits Different-Sized Pans

© C. A. Oldroyd



Removable Heels Are Slipped into Locking Plates So That Rubber or Leather May Be Worn and New Ones Put On



A Sturdy Lining That Fits inside the Trousers Pocket and Is Attached as Shown in the Insert, for Those Who Carry Large Quantities of Loose Change



obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago.

Benneth Heater
814 Sydney

Article by Henry
Schubert - *ratios*
Business

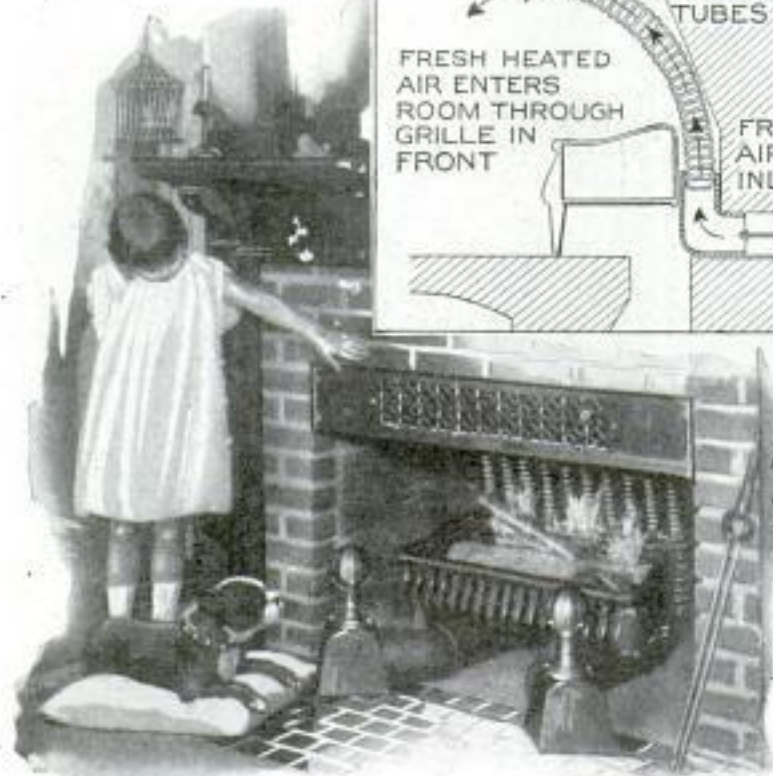
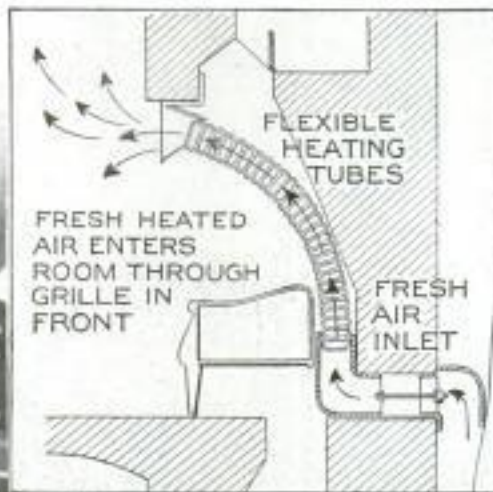
POPULAR MECHANICS

**FIREPLACE MADE AIR FURNACE
BY HEATING SYSTEM**

233

Making a hot-air furnace out of the ordinary open fireplace is the work of a

Fireplace Fitted as Furnace: Diagram Shows How Cold Air, Drawn into Tubes, Is Heated



**MIRACLES OF YEAR REVEALED
AT CHEMISTS' MEETING**

What has been done by chemists in the past year in finding new means of combating disease and extending life, improving foods, using the energy in gasoline more efficiently and making lubricating oil oilier, was told at the recent meeting of the American Chemical society.

Now it is possible at least in the laboratory, to make artificial rubber, starting with acetylene from calcium carbide, a mineral substance made from lime and coal, into a glue, and finally into a material that may some day become an automobile tire. A way to avoid deaths from illuminating gas has been found by treating it with a substance of which red pepper is the base. Gas so treated burns just as well, but anyone breathing it is soon seized with such violent sneezing that he has to rush out of the gas-laden atmosphere. A crystalline dextrose has freed America from a

sugar famine, and the raw material comes from the old corn field. New discoveries of the effect of neutral salts upon hides will mean millions of dollars in saving to the tanning industry. Five million dollars an ounce is the cost of a substance called "radon," 180,000 times as active as radium, which will make the treatment of cancer cheaper. True, it costs more than radium, but its increased activity makes its use less costly. Contrary to the popular theory that rust is caused by iron united directly with oxygen, burning just as wood or coal except more slowly, it has been definitely proved that electricity generated by the chemical action of water and air causes the corrosion. So the chemists proceeded to take the air out of water by boiling it, subjecting it to the action of a vacuum or by running it through scrap iron. The result is that the water does little harm thereafter to the pipes through which it passes. This will mean much to the steam plants of the country.

see July, 1925 p. 40.

tetraethyl lead

heating appliance recently marketed. Cold air is drawn in from the outside through pipes leading into the base and irons. Then it passes under the fire, through flexible copper tubes and a top manifold, and thence into the room. The air is never touched by flame and is kept clean and pure. The system also is said to end the heavy drafts that open fireplaces usually produce.

ALUMINUM SOLE ON GOLF SHOE HELPS PREVENT SKIDDING

241

Flexible aluminum soles are being made for golf shoes, to keep them from slipping. Punched from sheet metal, the soles are sliced in three places, to afford grip on the ground. A set weighs less than two ounces but is said to wear a whole season.



Chas. W. George Esq. 90 George St. Highfield New, Tipton View Road Chesterfield England

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Making Use of Radio in Business



Clerks in County Bank Receiving and Listing Latest Government Market Reports by Radio from Remote-Control Station of Arlington Navy Yard near Washington



Blackboard Bulletin and Radio Receiver with Loud Speaker in Country Business Office and, at Upper Right, Corner of Remote-Control Station in Bureau of Agricultural Economics Department Where Crop and Market Reports Are Broadcast



Radio Now Keeps the Farmers Posted on Daily Prices

Miss Madeleine Paver
 816 Seattle (2111) 254th St
 Wash. POPULAR MECHANICS

9/12/20

**PICTURES OF COLORED TIN FOIL
 START NEW ART FAD**

255

By combining artistic ability with colored tin foil, a western woman has



Artist and One of Her Designs in Colored Tin Foil against a Dark Background

created a new fad. Starting with a background of black tin foil, other colored pieces of the same material are cut into desired shapes and pasted on the backing. The finished pictures are said to be life-like and colorful.

BLUEGRASS AND WINGED SNAILS FOUND IN ARCTIC REGIONS

321

Explorers are correcting the popular conception of the polar areas as abounding only in ice and bleak stretches of snow. Radio dispatches from Dr. Walter A. Koelz, in charge of the scientific unit of the MacMillan expedition, state that poppies, dandelions and buttercups were gathered beside the glaciers and that within a few minutes' walk of Etah, Greenland, far north of the Arctic circle, fifty specimens of flowering plants were found. In places, Kentucky bluegrass had formed a thick carpet, while timothy grew luxuriantly. All the land plants were practically stemless, however, since any part extending above the scant snow covering would be frozen off. Even willows and birch trees grow only a few inches high. In the waters were found myriads of a species of jelly fish, and winged snails that propel themselves and float on the surface with the aid of their queer appendages. Another interesting aquatic animal was the liparis, resem-

Chief naturalist

Report to National Geographic Society

bling the bullhead. It attaches itself to the rocks with its fins, and considerable force is required to dislodge it. Varieties of rare birds; kelp that grows to be twenty feet long and is commonly mistaken for animal life, and brilliantly colored lichens in shades of orange and purple, were also found. Swarms of bullbirds were disturbed by the airplanes, their frightened cries bearing a resemblance to the laughter of maniacs.

**LONGEST PHONE CABLE LINKS
 CHICAGO AND NEW YORK**

After seven years' work and at a cost of \$25,000,000, the world's longest telephone cable has been completed. It links Chicago and New York City and is 861 miles in length. Freedom from almost all storm hazard and a lightening of present wire loads were the objects of the new line. Five hundred telegraph messages and 250 phone conversations can be handled at the same time. About 717 miles are above ground, on poles, and 144 miles in underground conduits. The total weight of the 447,000 miles of wire used is about 34,750,000 pounds. Other cables are being constructed from Chicago to St. Louis and between New York and Cleveland by way of Albany and Buffalo.

BOX FOR EXTRA AUTO BULBS PREVENTS BREAKAGE

How to carry safely extra bulbs for the headlights, is a common problem among motorists. A French inventor has offered



Auto Headlight-Bulb Carrier Has Rounded Ends and Center Holder That Keep Contents from Shaking

a solution in a small box, the center part of which contains two sockets into which the bulbs are screwed securely, so that they cannot roll around or jar. The ends of the carrier are shaped to fit the contents, and simplify packing it away among other luggage in the automobile.

Inquiries to Frederic W. Delano, '6

Inventor by L. Capeta Avenue Paris



SOLVING MYSTERIES

Wealthy Man Finds Laboratories to Explore Realms of Light and Sound and Advance World of Science

By PAUL PADDOCK

"THE world is full of mysteries and the greatest adventure is life itself," said Col. George Fabyan, to explain his reason for founding one of the most unusual laboratories in the world on his estate at Geneva, Ill. "We are faced on every hand with fascinating puzzles," he continued.

"For instance, there is a scientist in our laboratory who spends a lot of time blowing bubbles and crushing them under pressure so that he can study the shape of the resulting molecules. They seem to be of a rather fixed pattern, which is a clue that, perhaps, the 'angle of force' engineers talk so much about is one of sixty degrees.

"Do you know why a bee makes a buzzing sound? One of my staff has been working on this problem for two years but has not quite solved it. When you slap a mosquito remember this problem, for those that have empty stomachs are the only ones that can be heard."

Col. Fabyan's interest in science is

the result of his efforts to develop a secret code for use in his business. As a boy he worked in a lumber yard and rode the cattle ranges of the west. Later he became a salesman and head of a great cotton firm. In perfecting his cipher, he consulted with experts. Their explanations of how ciphers and codes were started, how they were solved and their importance in history, fired Col. Fabyan's imagination. He delved into all the literature he could find on the subject and discovered that some of the scientists of

the sixteenth and seventeenth centuries, who wrote in ciphers because they feared persecution, had performed experiments with light, sound, and other phenomena. Their apparatus was crude and their conclusions uncertain, but their efforts led Col. Fabyan to try to work out some of their experiments himself. In an old barn, he fitted up a shop, and as his tests progressed, it

Opportunity!

"THE day of the explorer did not end with Columbus and Balboa. The man with a desire to become a great discoverer has opportunities in the fields of science as great as that of the French and Spanish adventurers of four hundred years ago. There is no boundary and no limit to the awards awaiting those who solve the countless mysteries facing mankind. In medicine, chemistry, electricity, the possibilities have scarcely been even scratched. New and revolutionary sources of power and its application remain to be discovered."—Col. Fabyan.

became necessary to call in experts to help. In a few months, the barn had to be enlarged. Other buildings were erected. Men were induced to join the colony of scientists and the laboratory now occupies a score or more of buildings and more than a hundred persons are employed in its various departments. There are no bosses, time clocks or schedules.

"When I can actually see a thing work, I can understand it better," says Col. Fabyan. "Watch this flame." He



Forty Curves Representing Tone Vibrations Can Be Drawn at Once by Turning the Crank of This "Synthesizer," a Riverbank Product for Studying the Mysteries of Sound

for the undertaking is non-commercial. The utmost freedom is given the workers to pursue their studies as they wish.

This spirit of independence is reflected in the style of the buildings. One appears to be a series of separate rooms piled in blocklike fashion so that each has ample light and ventilation. In addition, this form of construction allows the entire building to be easily enlarged or altered at any time. Here is what is known as the "Parlor de Junk," a large room devoted to the collection and remodeling of articles from all over the country. The proceeds of the sale of these things go to the maintenance of the laboratory as does the income from the farm.

Near this structure is another laboratory, distinguished by its eagle-capped tower, a memorial to the late Prof. Wallace Clement Sabine, of Harvard university, who was technical adviser on aircraft to the allies during the war. In this building, is what has been called the strangest room in the world, a subterranean sound chamber where a war upon noise is now being carried on.

takes a bunch of keys, rattles them, and the light dances, keeping time to the keys' jingle and responding in the same way to the clap of the hands, a result of the effect of sound waves on a sensitive apparatus that regulates the supply of gas to the burner. Peer through a little telescope apparatus and you will see the vibrations of a tuning fork translated into waves of light. Did you know that your head was a sounding board? The visitor is invited to sit in a chair and put his fingers in his ears. A telephone receiver with a protruding metal hammer is pressed to the different bones in his skull and he hears the conversation of a man who is speaking into a transmitter in a distant room.

"Doctors know a lot about our eyes, but the ear is almost a mystery to us," Col. Fabyan points out, as he explains that this test is one that is used in connection with a special phase of the work, which has as its object discovery of the cause of deafness and ways to cure it.

In another room is a pulley-testing apparatus. It consists of a twelve-inch pulley with open sides attached to an electric motor to measure the amount of wind resistance. At 1,750 revolutions per minute, the resistance is fifty-four ounces. Then disks are fitted over the sides of the pulley to shield the spokes. At 1,770 revolutions per minute the resistance is only

three ounces. As a result it is estimated that there would be a saving of one dollar a year on every pulley of the size used in the test—if the sides were closed.

Upstairs, an army rifle has been rigged to a light-proof cabinet in such a way that, when it is fired, a picture is taken of the vibrations of the sounds as they spread over a model of a room or auditorium inserted in the cabinet. By this means, builders are able to determine the acoustic properties of churches, theaters and other structures before they are completed, saving costly errors in construction and disappointed owners.

Passing to the sound chamber, the visitor sees men at work preparing various kinds of plasters in search of a mixture that will be sound-absorbent, durable, easily applied and commercially practical. When they have made a sample, they will test it in the chamber which is entered through heavy doors like those of a refrigerator. Speech is almost impossible, for words are smothered in their own echoes that bound back from the high walls and ceiling. It is explained that the room is entirely cut off from surrounding areas by means of an air space and special insulation. The temperature

varies but a few degrees the year round although there is no artificial



Recording Turns on Pulley Tester; Dutch Windmill for Grinding Feed, and Studying Bell's Vibrations in Mercury



cooling or heating. At one end of the room is a set of organ pipes, seventy-three in all, from the big ones that make sixty-four vibrations per second to the tiny ones with 4,096 vibrations in the same period. There are also four smaller sets of pipes like miniature organs, one at each side of the room, and a wooden cabinet resembling that of a steam bath. In the center are two huge steel reflectors attached to a steel pole.

In making the tests, the observer enters the cabinet, closes the door so that only his head is exposed, that his clothing may not absorb any of the sound. By means of an electrical switchboard at his side, he can cause any one of the pipes to play. With a stop watch, he counts the number of seconds required for the vibrations to die away. If double the volume of sound is desired, or greater ratios, the small organs are used, one at a time, then two, three or four, using the same pipe on each.

The sample of material that is to be

154

E. W. Davis
Super. Mine Experiment
Station

tested has been placed in an opening in one of the walls. It is shielded by an iron door until the first readings are made. Then the door is opened, the pipe sounded again, and the difference in the time required for the vibrations to pass away indicates how much sound has been absorbed. Another observer is stationed at the opposite side of the sample in an insulated test chamber. He listens in the same way to detect how much sound passes through the sample. The men who perform these tests have been subjected to rigid ear tests, and the two work together in order that the readings of one may be checked against those of the other.

Besides the laboratories, there is the farm to superintend, a small-sized zoo, including monkeys, deer, bears and rare birds, and there is a Dutch windmill Col. Fabyan purchased from a farmer several miles away, and rebuilt both for ornamental purposes and to grind coarse meal and feed used on the farm.

The joy of scientific exploration alone is sufficient justification for his work. Col. Fabyan believes, and declares that one of the things that keeps him young is the lure of the unknown just around the corner.

"Many people wonder why we seem to be spending so much time and equipment on work that seems to have no direct relation to everyday life," he replies when asked what is the purpose of the laboratories. "The same question might be asked of every inventor and scientist. For the answer, we have to wait and see.

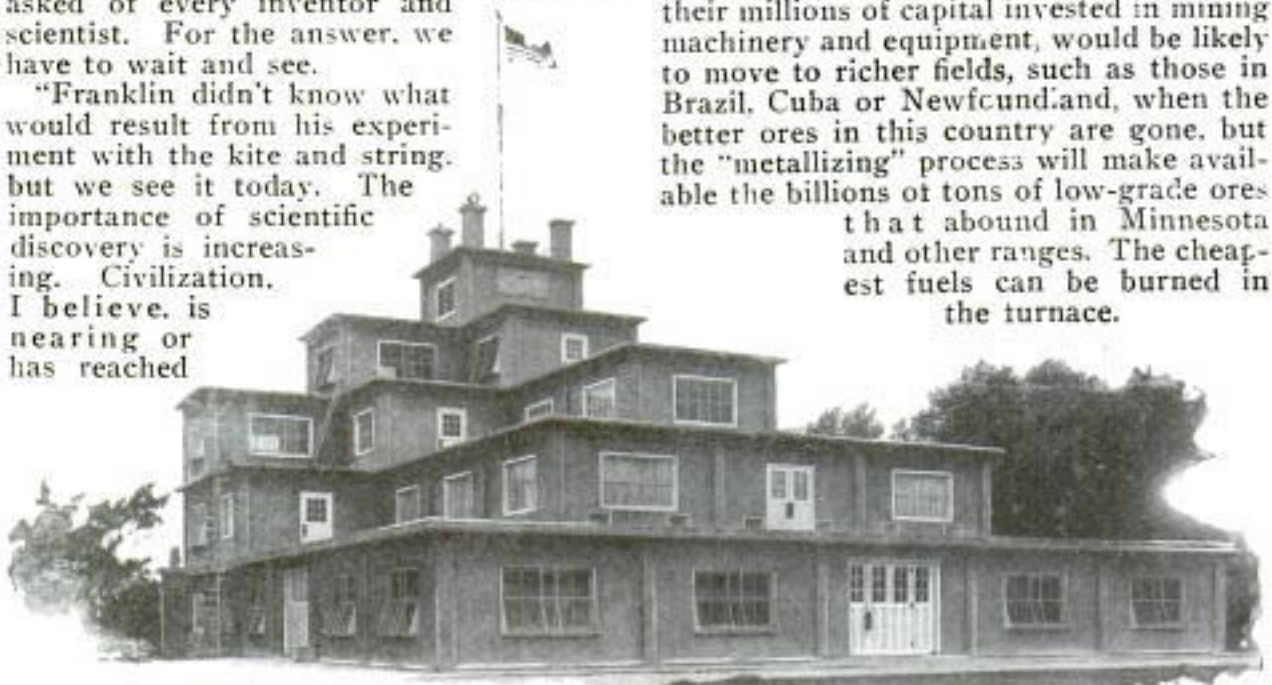
"Franklin didn't know what would result from his experiment with the kite and string, but we see it today. The importance of scientific discovery is increasing. Civilization, I believe, is nearing or has reached

a peak. My idea is illustrated in the coal industry. What is going to happen when it takes one and a half dollar to dig a dollar's worth of coal? The same situation is approaching in other industries.

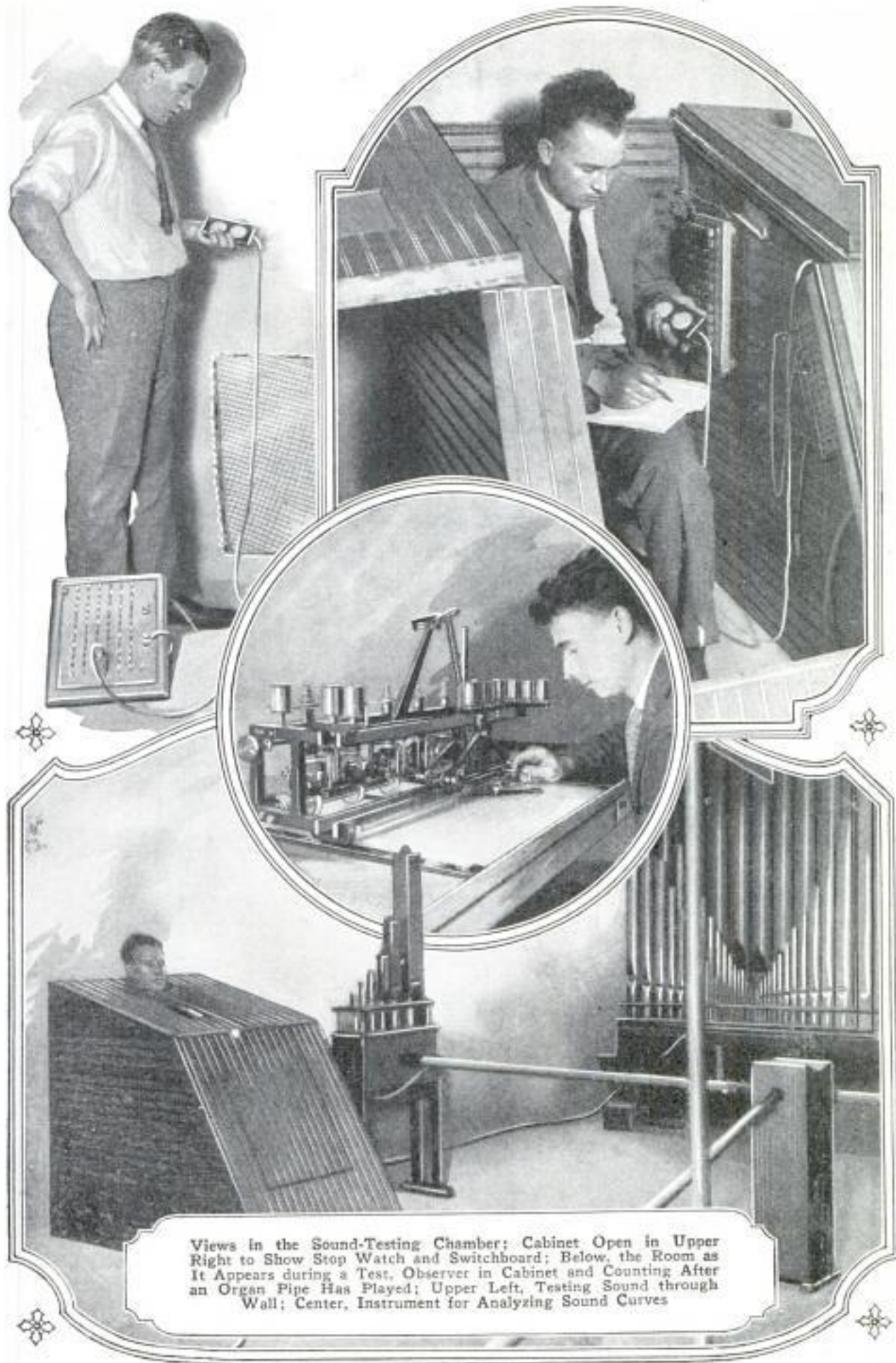
"You answer, 'science will find a way out.' Well, maybe it will. At any rate, for the future of civilization, scientists should be given every encouragement!"

WEALTH FROM LOW-GRADE ORE PROMISED BY NEW PROCESS

Regarded as of extreme importance to the future of the steel industry, an improved process for extracting iron is promised from experiments conducted at the university of Minnesota. ~~Instead of melting the ore and running the impurities off as molten slag, this method burns up everything but the iron itself and the silica in a specially modeled furnace.~~ A mechanical process later separates the materials. This system is called "metallizing" and its chief value lies in the fact that it can be adapted to low-grade ores, the kinds that carry only twenty-five to forty-five per cent iron or less. At present, only the richer ores, averaging more than fifty per cent iron content, are being shipped from the Lake Superior district. With an average consumption of from 40,000,000 to 65,000,000 tons a year, the supply cannot be expected to last much longer than thirty years, geologists estimate. Hence, the iron and steel industries, with their millions of capital invested in mining machinery and equipment, would be likely to move to richer fields, such as those in Brazil, Cuba or Newfoundland, when the better ores in this country are gone, but the "metallizing" process will make available the billions of tons of low-grade ores that abound in Minnesota and other ranges. The cheapest fuels can be burned in the turnace.



The Garage Which Grew into a Series of Laboratories; Upper Floors, "Stepped-In" to Admit Light on Three Sides, Were Added to the Lower Story Originally Built for Autos



Views in the Sound-Testing Chamber; Cabinet Open in Upper Right to Show Stop Watch and Switchboard; Below, the Room as It Appears during a Test, Observer in Cabinet and Counting After an Organ Pipe Has Played; Upper Left, Testing Sound through Wall; Center, Instrument for Analyzing Sound Curves

Salt Lake City

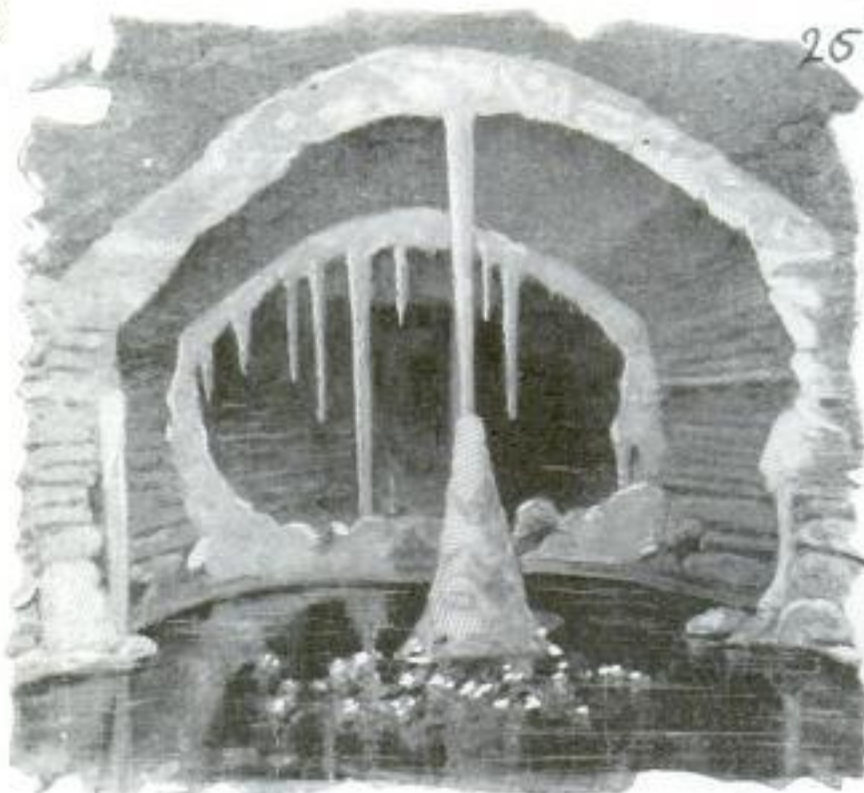
Los Angeles

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BOY NEARLY UPSETS PLANE STEALING RIDE ON WING

A seventeen-year-old boy "hoboing" his way across the continent nearly wrecked an airplane at Las Vegas, Nev., recently when he boarded the wing to steal a ride to Los Angeles. As the plane took the air, it swept around in a dizzy fashion, with one wing much lower than the other. While the pilot, Maj. C. C. Moseley, of the California national guard air service, fought for control, his passenger, Sergeant Wood, was amazed to see a boy's head stick up over the end of the wing. The lad, Jack Richman, of Milwaukee, had caught the bumper under the end of the wing as



Cave with Water Bottom and Imitation Icicles, in Which Hardy Types of Butterflies Are Hatched by a California Butterfly Grower

BUTTERFLY FARM HATCHES ITS COCOONS BY ELECTRICITY

Breeding butterflies under artificial conditions is the occupation of a California farmer. His incubator is an electric oven, with the humidity regulated to suit the type of cocoon being hatched. On the farm he grows plants and flowers suited to the palate of the flying beauties. For hardier butterflies, demanding cooler air and ample moisture, a cave is provided.

WEB STRETCHER SPEEDS UPHOLSTERERS' WORK

Straps of upholstered furniture are fastened, with a saving of time, labor and material, by a portable stretcher which is said to enable one man to do the webbing for a crew of fifty upholsterers who ordinarily must do this work themselves. The strips of material are carried on a drum, uniform tension being maintained by the operation of a wheel that locks the drum.



Web Stretcher Places Upholstery Straps in Minimum Time and Maintains Constant Tension

the plane took off. When the pilot's attention was attracted to the cause of the trouble, he motioned for the lad to crawl in toward the plane, and the boy succeeded in raising himself up on the wing and then clambered in close to the fuselage, where his weight would not destroy the balance of the machine. He rode the 300 miles to Los Angeles clinging to the wing struts. In the first few miles the terrific blast from the propeller whipped his shirt to shreds, and he arrived on the coast with his back badly sunburned. An old army shirt was supplied by the major, and the boy, who said it was his first airplane ride, announced that after looking around the coast towns, he would start beating his way back east again. His only explanation of the wild ride was that he and a chum had been put off a train at Las Vegas, and the aerial journey looked like the easiest, if not the safest or most comfortable way to continue the trip to

the coast.

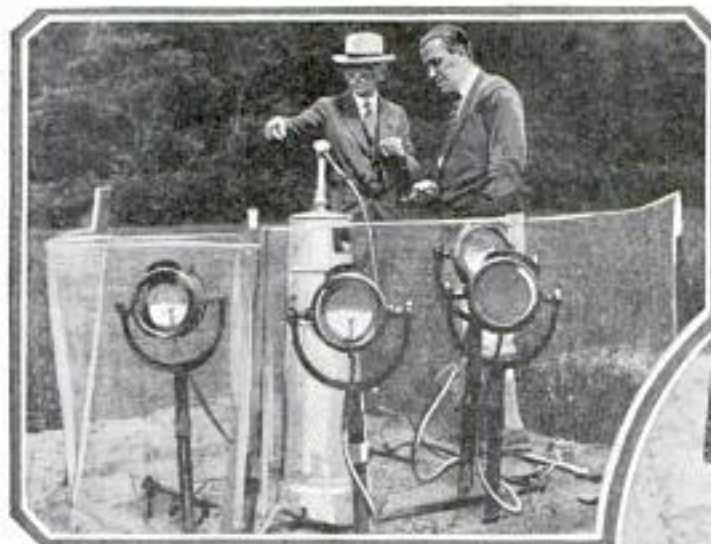
Owner: Schwader, 201 W Illinois, Los Angeles, Calif

Northwestern Upholstery Co
505

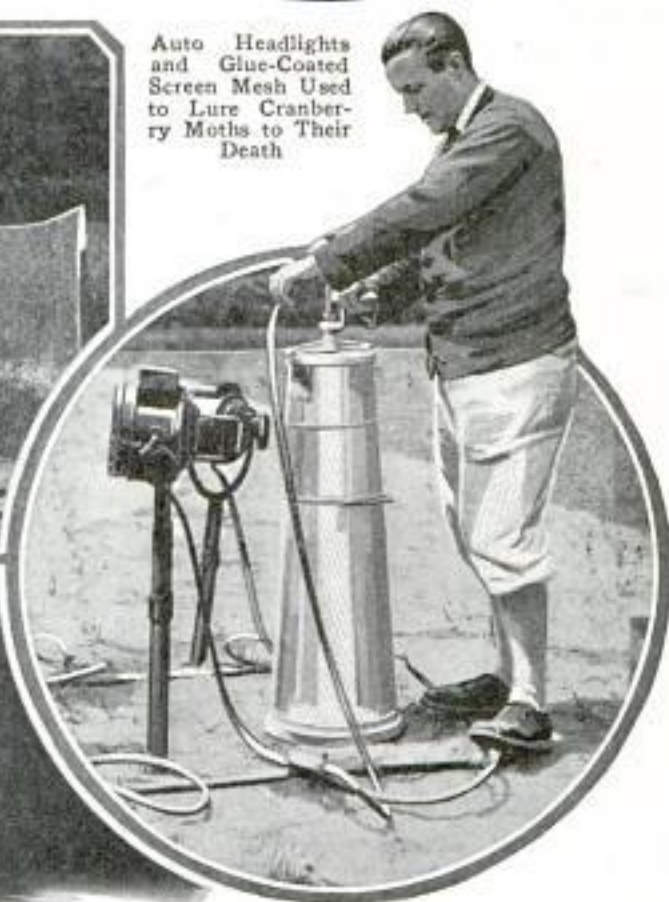
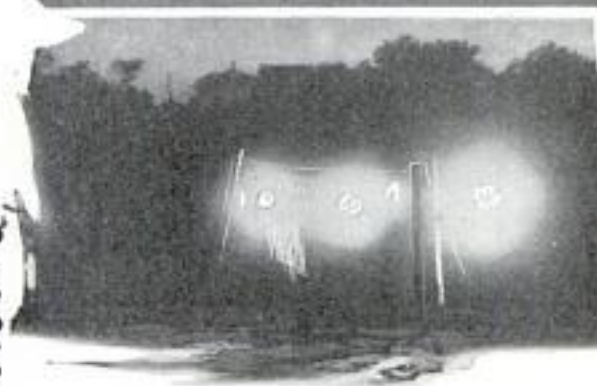
2111 W. J. E.

Minneapolis
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SEARCHLIGHTS USED TO LURE MOTHS TO DEATH



Auto Headlights and Glue-Coated Screen Mesh Used to Lure Cranberry Moths to Their Death



Pyralis and other pests killed by the searchlights
 used by the Cranberry Growers Association

Cranberry growers are using acetylene searchlights to lure fruit-worm moths to their death, as a result of the discovery of one bog owner. Like others, he had suffered great loss from the pests, which killed the budding blossoms and left their larvae to grow in the newly forming fruit. The ordinary cure is to flood the bog or spray the plants with poison, both costly methods. Four auto headlights, using acetylene gas, were set up in the center of a four-acre field. Around them was erected a mesh of fine wire, coated with glue. At sunset the lights were turned on and the moths obeyed their primitive instinct to speed to the gleam. In the morning millions of them were found sticking on the screen dead.

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pounds was suspended from the ceiling, then lifted 24 feet and allowed to swing down. It hit the front end of the chassis a terrific blow but no damage was done to the windshield. In another test, a block of wood and metal weighing three and three-fourths pounds was hurled at the glass from a few feet away. The pane was cracked badly but did not shatter.

"GUN" PROJECTOR SHOWS FILM LIKE MAGIC LANTERN

Scenes cut from any standard motion-picture film may be thrown upon the screen, without bothering with complicated apparatus, by means of a small projector supplied with current from a lighting plug. It is provided with a gun grip for easy handling and steadying. To show motion pictures, the nozzle part is detached and the lamp combined with a special camera arrangement. Reels up to twenty-five feet in length can be run.



Price - \$15.00

REINFORCED GLASS FOR AUTOS ENDS WINDSHIELD DANGER

Plate glass, reinforced with fine parallel wires two inches apart, is being tested with good results by an auto manufacturer seeking to minimize danger to drivers from broken windshields. A car equipped with the wired glass was anchored to the shop floor. A block of lead weighing 248

Stutz Motor Co.
 Capitol Ave + 10th
 Indianapolis, Ind.

Nicam Photo Machine Corp. 1224 Cambridge Ave. Philadelphia, Pa.

Made in *Vadstena*

203 CLIMBING SHOES CLASP POLE AND MAKE WORK PLATFORM

Climbing shoes are used by steeplejacks in Sweden, forming an aerial platform on which the worker stands when he reaches the height desired. Two curved irons, with leather straps attaching them to the ankles and insteps of



Climbing Irons Which Become Standing Platform When the Wearer Stops to Do Work on Pole

the climber, hug the telephone or telegraph pole in a circle. The end of each is pointed and sinks into the wood. This point of contact, plus the weight of the man on the other side, digs the irons into the pole at two points, and, it is claimed, makes climbing and working much safer and more comfortable than the old-fashioned irons.

248

PERILS IN DRINKING CUP EVOKE WARNING FROM U. S.

With a million sufferers in the United States every day from respiratory diseases which may be spread by the common drinking cup or glass, the public-health service recently issued a special warning to beware putting the lips to a container

which someone else has used, unless it has first been well sterilized.

All but two of the states have passed laws banishing community use of drinking vessels, and they have been forbidden for several years on trains and steamers in interstate commerce, but in spite of this fact, many people, the government says, defeat the law by failing to insist on its enforcement.

Some cities, the bulletin states, have passed ordinances forbidding the use of glasses at soda fountains, but in others, the receptacles are rinsed again and again in the same water until the wash itself becomes more dangerous than the used glass. Citing the Ohio laws as an excellent example of good sanitation, the public health service points out that they provide a soda-fountain glass or other publicly used container must, after each use, be first washed in cold water, then in hot water with soap or suitable cleansing powder, or exposed to live steam, boiling water or hot air for not less than five minutes, then rinsed in clear cold water and drained. If hot air is used to kill the germs, the law provides the temperature must not be less than 260 degrees. Heat is about the best sterilizer known, and boiling water will kill most germs within five minutes.

Motor tourists should provide separate drinking cups for each member of the party, the health service adds, and care should be taken to keep them clean.

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INNER TUBES OF THREE LAYERS SEAL UP PUNCTURES

Self-sealing inner tubes for automobiles and motorcycles have been placed on the



market by an English firm to eliminate the need for patching and to give longer life to the casings. They contain no fluid or sticky substance of any kind but have a tread

portion of three layers so adjusted that the hole made by a nail or similar article is automatically closed up when it is withdrawn. They are said to be little more expensive than those of the usual kind.

(Fragrant carnations have been used with success as a substitute for cheese as bait for catching rats in Los Angeles.

P. J. Cogler & Co. Ltd
Melano Works
Edinburgh

J. Cogler & Co. Ltd
Melano Works
Edinburgh

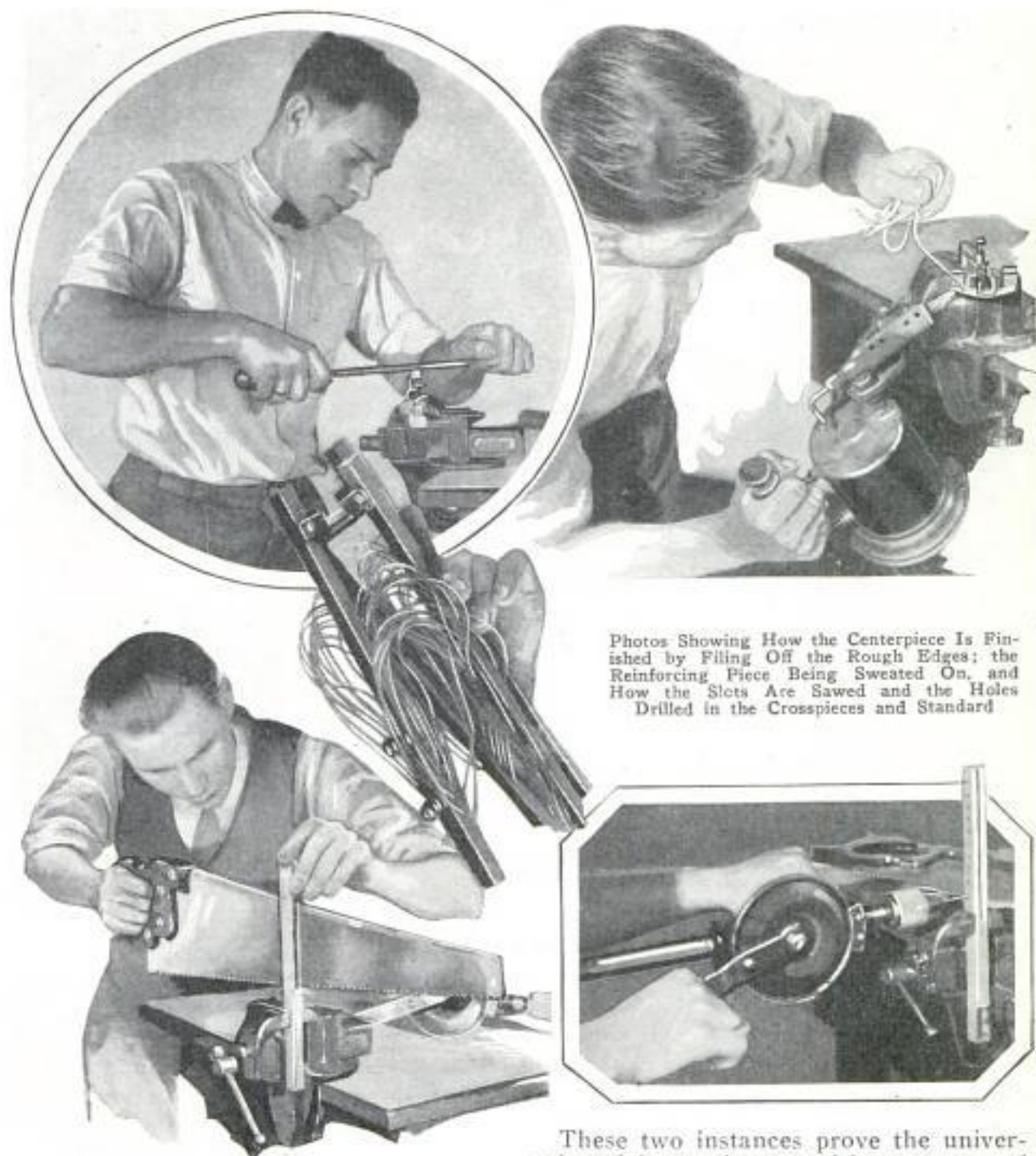
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How to Make a Tapped, Collapsible Loop

By E. R. HAAN

AFTER several unsuccessful efforts to increase the selectivity of his 6-tube radio-frequency set, located within a mile from two powerful Chicago broadcasting stations, both of which could be found all over the dial when in operation, making it impossible to tune in outside stations, the owner resorted to a tapped loop and found that this eliminated all his trouble. With another receiver having one stage r.f. amplification, the stations on lower

of standard size. This obviously meant that there was too much inductance. So a tapped loop was used, and it was found that these stations could be brought in near the center of the dial. The effect was that these stations could be separated at points farther apart on the dial than usual when they are brought in on the lower end, which gave a result similar to that obtained with the new straight-line frequency condensers.



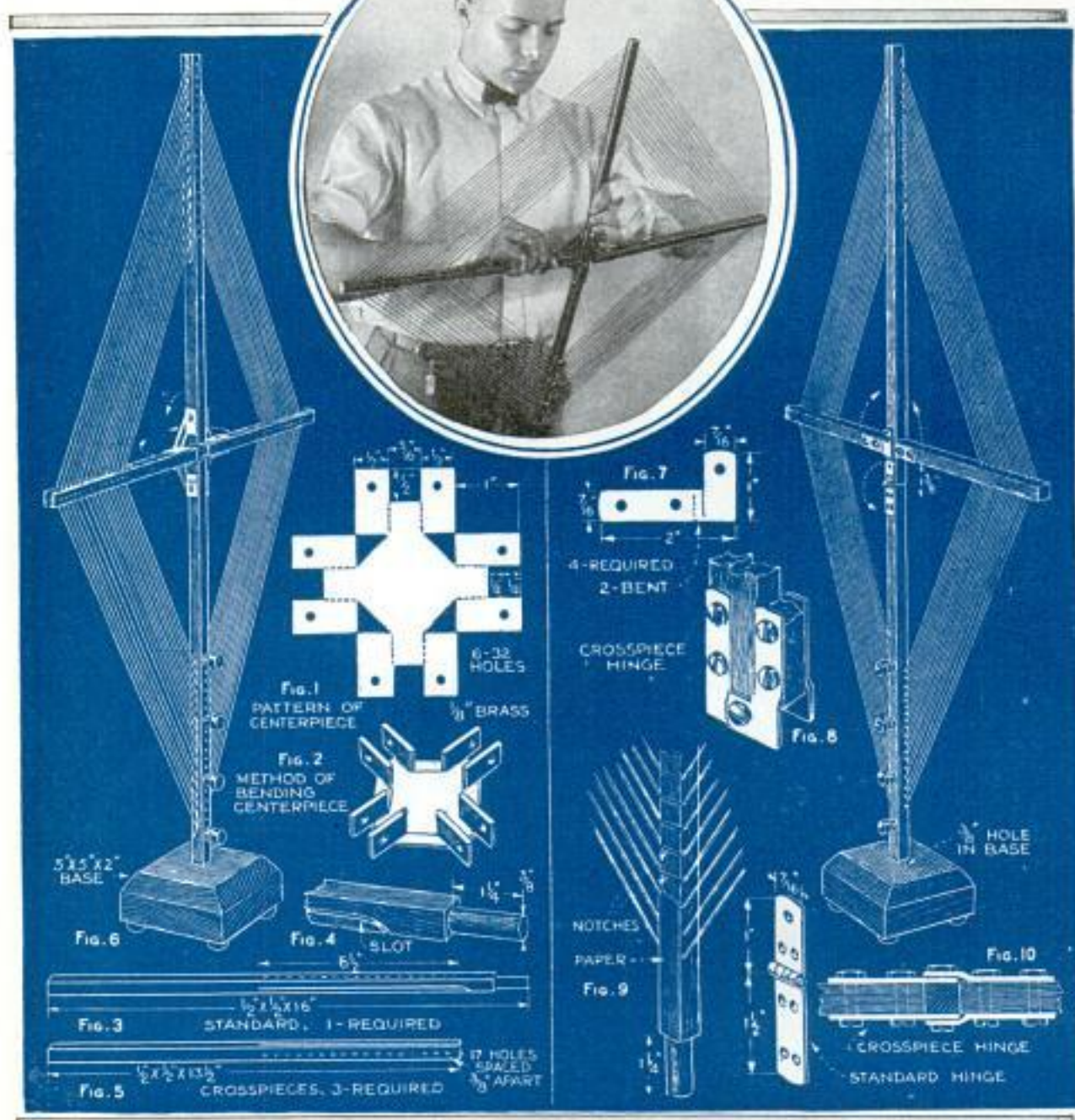
Photos Showing How the Centerpiece Is Finished by Filing Off the Rough Edges; the Reinforcing Piece Being Sweated On, and How the Slots Are Sawed and the Holes Drilled in the Crosspieces and Standard

wavelengths than 275 meters could not be brought in on the dial when using a loop

These two instances prove the universal usefulness of a tapped loop on sets of these types, so if you have experienced similar troubles, a tapped loop is the

remedy. The simplest loop to make is one having a rigid frame on which to wind

pieces with a small panel saw, as shown in the lower left-hand photo, and a similar slot



Above, the Proper Method of Opening the Loop; Each Half of the Blueprint Shows a Pancake Style of Loop with Different Folding Features and Method of Attaching the Wire

the wire, but many people desire a loop that can be folded and carried around conveniently with portable sets, and therefore consider it worth the extra trouble to make it collapsible.

The three crosspieces, Fig. 5, and the standard, Fig. 3, are made of strong $\frac{1}{2}$ -in. stock, preferably oak. A distance of $6\frac{1}{2}$ in. is marked off from one end and 17 small holes, spaced about $\frac{3}{8}$ in. apart, are drilled through them, care being taken to keep the holes in line. Saw slots, $6\frac{1}{2}$ in. long, are cut in the ends of the cross-

is cut in the standard with a keyhole saw, starting the cut about 3 in. from the end, as shown in Fig. 4. This end is rounded to fit accurately in the hole drilled in the base, shown in Fig. 6. The center-piece is cut from $\frac{1}{8}$ -in. sheet brass. Cut the pattern exactly according to the dimensions shown in Fig. 1 and bend it along the dotted lines as shown in Fig. 2. Before bending, it is heated to a dark red and cooled quickly in water, whereupon the bending can be done easily and without danger of breaking the piece. An

extra piece of brass of the same stock is sweated to the back of the centerpiece to reinforce it, as shown in the upper right-hand photo. Rough edges can be removed with a file. The three crossarms and the standard are fitted on the centerpiece and holes are drilled through both centerpiece and crosspieces for 6-32 round-head screws on which the crosspieces pivot. It will be noted that these holes are indicated in the pattern, Fig. 1, but are not drilled until the centerpiece and crosspieces are assembled.

Get a spool of 100 ft. of loop wire and proceed to wind it on, which is done in the following way: Drive a small pin, about $\frac{3}{8}$ in. long, in the inside hole on each crosspiece, put a knot in the wire about one foot from the end, slip the wire into the slot of the standard and then in the slots of the crosspieces, drawing it up tightly. Continue thus, driving a pin in each piece and then slipping the wire in and drawing it tight until the end is reached, which is knotted so as to draw the wire taut when slipped into the slot in the standard for the last time. All the pinholes can be filled up with wood filler. Four holes are drilled through the standard, between the pins, to receive binding posts. Solder lugs are put under the nuts on the underside of the binding posts, and the beginning and end of the loop are connected to the first and last binding posts, while taps, taken off at the third and fifth turns from the outside end, are connected to the other two binding posts. The taps should be well soldered to the lugs and to the loop wire, which is bared for $\frac{1}{2}$ in. The base is made of 2-in. wood, a $\frac{3}{8}$ -in. hole being drilled in its center to receive the standard, and

rubber-head tacks driven into the bottom to prevent it from marring polished surfaces. The loop can be folded as shown in the center photo, and its size when folded is indicated by the hand holding it. When

Using a Nail Set to Drive the Small Pins into the Holes



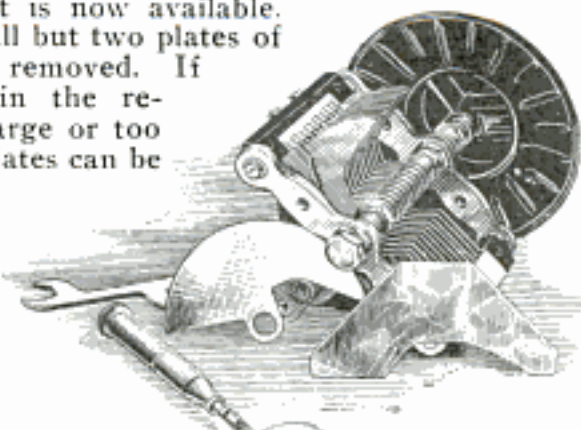
set up, the loop should have a slight bow in the opposite direction from that in which it is folded, to prevent it from collapsing. Stain should be applied

to the wood before the wire is wound on and the pinholes retouched again after they have been filled with wood filler.

Figures 7 to 10 show a similar loop, the folding arrangement of which is somewhat simpler. In this case the standard is hinged to the top with a narrow hinge and the sidepieces with the specially made hinges shown in Figs. 7, 8 and 10. Four of these are required, two being bent as indicated by the dotted lines in Fig. 7 to slip over the corresponding portion of the other two when the loop is up. There must also be a slight bow in this loop to prevent it from collapsing. The tautness of the wires keeps it up when past the center. The method of attaching the wires on the loop is shown in Fig. 9.

Condenser Suits Any Circuit

A convertible condenser that can be adapted to any circuit is now available. For a short-wave set all but two plates of the condenser can be removed. If the inductance coil in the receiver is a little too large or too small, the condenser plates can be changed so that the circuit may be perfectly balanced. In the common type of five-tube set using tuned r.f. amplification, one or more condensers may tune out of line; in such cases, the plates of

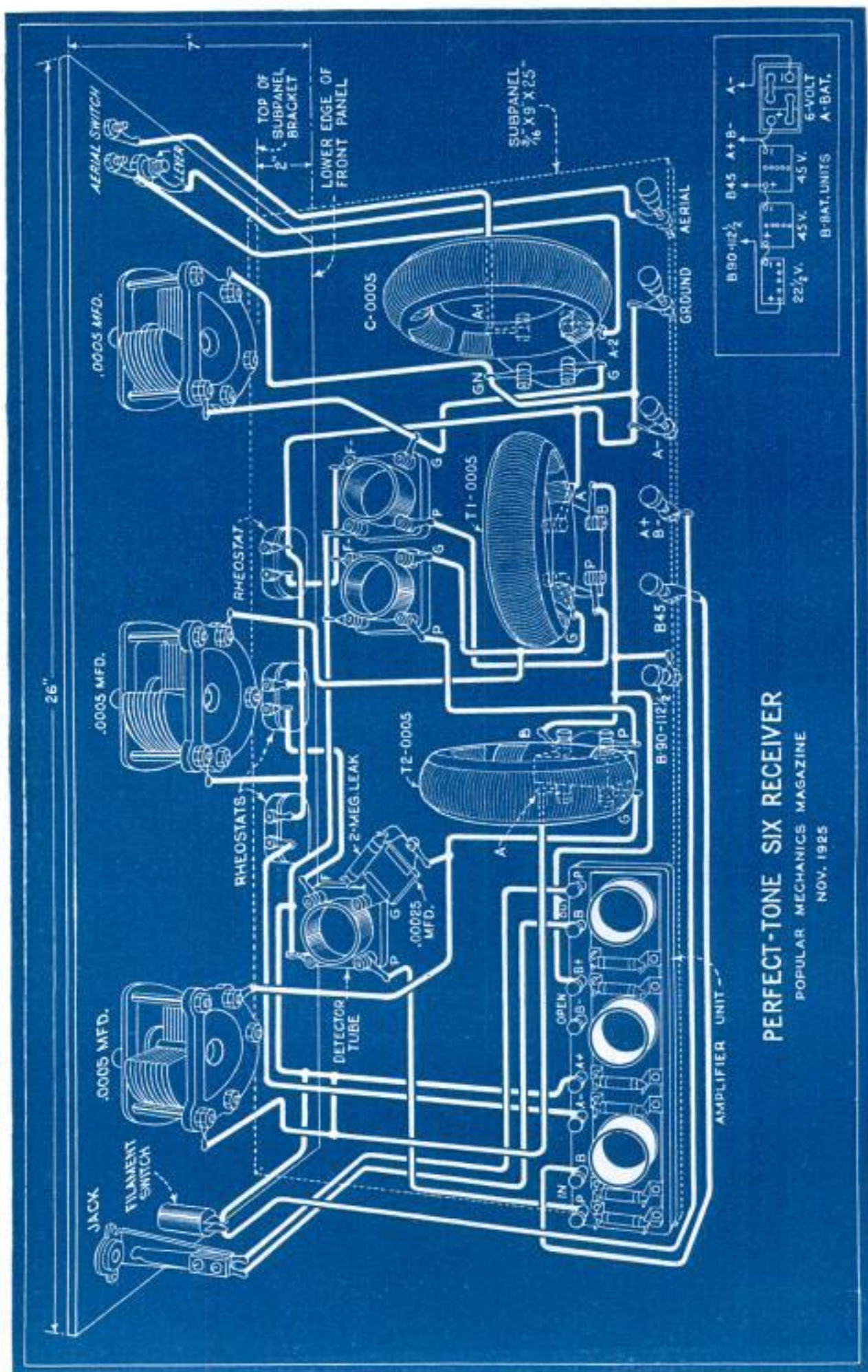


Condenser with One Plate of Each Kind Removed

this instrument can be changed to make all stages tune alike. The condensers are manufactured in the following sizes:

the 23-plate with a capacity of .0005 mfd., the 17-plate of .00035 mfd., and the 13-plate .00025 mfd. All three can be converted to lower capacities but not above their rating. They are of the one-hole mounting type, and the plates are quickly changed with a small wrench furnished with each instrument.

The Crest Radio Corp. 5 n Wabash Chicago



PERFECT-TONE SIX RECEIVER

POPULAR MECHANICS MAGAZINE

NOV. 1925

PERFECT-TONE SIX IS IDEAL FOR MUSIC LOVERS



WITHOUT a doubt the most perfectly-toned receiver we have ever listened to is the simple six-tube set recently developed in the Popular Mechanics radio laboratory. The deep, low notes of the organ and bass viol, as well as the higher notes of the flute and piccolo are faithfully reproduced with a full-throated volume and clarity that is surprising. The voice is so natural that one would believe the speaker to be in the same room.

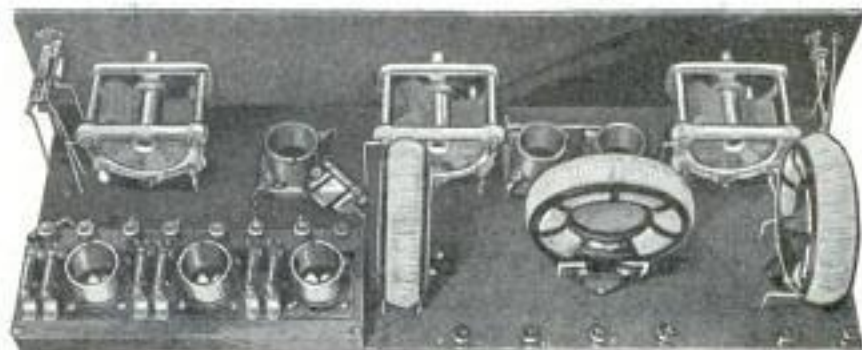
This set was developed with the sole idea of obtaining tone quality; but it is also selective, and has a range equal to that of any good six-tube receiver. The cost to build is only \$63.50, exclusive of the tubes and batteries. This cost is figured on the high-grade materials always necessary to produce good results. The instrument is easy to tune and log, as the three dials are rotated practically in step, and, once the rheostats are set, there are no readjustments to make. The standard units used, make the set easy to build, even for those who have had little or no experience. The circuit is the tuned r.f. type with resistance-coupled a.f. amplification. Close tuning is due to the type of r.f. amplification used. It is a well-known fact that the coupler and r.f. coils themselves act as pick-up devices of broadcast signals. This is the main cause of

what is known as broad tuning. The new toroidal or "doughnut" coils as they are often called, are not subject to outside influences, as the magnetic

field is self-contained, resulting in sharp tuning and less interference. The coils have proved their value in this set. The tonal quality is due in a large measure to the resistance-coupled type of a.f. amplification used. This amplifier comes in a complete unit ready to mount on the subpanel and there are only seven connections to make. Good volume and pure tone without distortion are obtained by this form of amplification. It also eliminates tube noises and is economical in its demands on the B-battery. The rear-view photo shows the simple layout of the instruments on the subpanel. This panel, of bakelite, is $\frac{1}{8}$ by 9 by 25 in. in dimensions and is mounted on metal brackets, one at each end. These brackets come flush with the front edge and are provided with holes for mounting the front panel. A third bracket is mounted in the center at the rear. As the brackets come in pairs, the builder can use a brass strip or fiber rod of the same height for the center support and save the cost of the extra pair. The brackets support the subpanel 2 in. above the bottom of the cabinet and are fastened to the subpanel with two 6-32 brass machine screws, $\frac{1}{2}$ in. long. The amplifier unit is mounted at the left rear, with the terminal posts toward the front. This

unit may be reversed if desired; it is fastened to the subpanel with four round-head 6-32 brass machine screws, $1\frac{1}{4}$ in. long.

The detector-tube socket is lo-



Rear View Showing the Instrument Layout and the Method of Running the Wires through the Subpanel

diagram, the T₂0005 coil at the right of the amplifier unit, the T₁0005 in the center, either alined with the first or at right angles to it, and the C0005 at the right. The sockets for the r.f. tubes are placed in front of the center coil. The binding posts for the aerial, ground and battery connections are mounted at the rear edge of the subpanel, behind the coils. This completes the layout of the subpanel. The bakelite front panel is $\frac{3}{16}$ by 7 by 26 in., a standard size, and the instrument arrangement is very simple. The condensers are of the low-loss type, .0005-mfd. capacity. The rheostats used are of the carbon-pile variety and take very little room on the front panel, below the subpanel. When laying out this panel, it is a good plan to make a template of bristol board. Measuring $2\frac{1}{8}$ in. from the lower edge of the panel, draw a line to represent the top



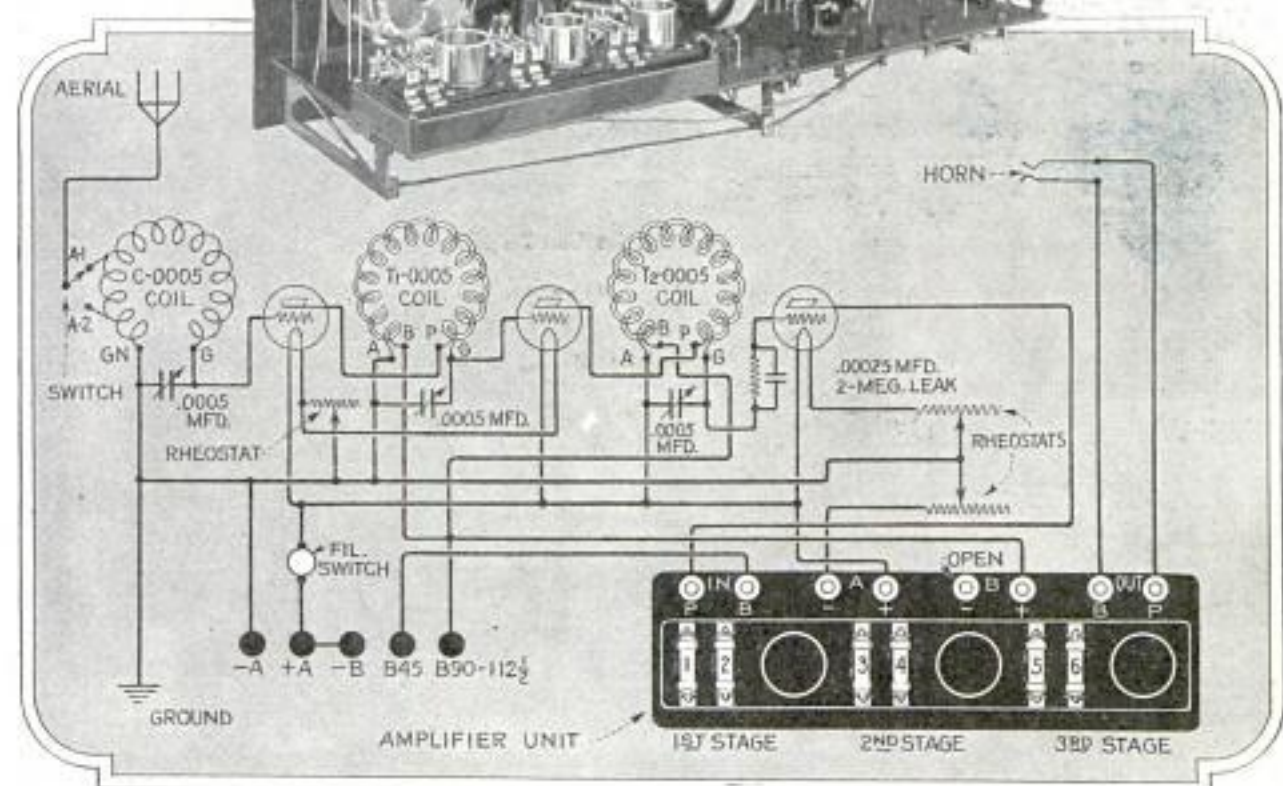
cated directly in front of this unit with the grid condenser and leak mounted on the grid post of the socket. The doughnut coils are then placed according to their type, as shown in the blueprint

of the subpanel. The holes for the rheostats are located 1 in. above the lower edge of the panel, one at the center and the other two spaced $4\frac{1}{2}$ in. on either side. The condensers are placed at a height that

will permit them to clear the subpanel; this distance will depend on the type of condenser used. The center condenser should be on a line with the center rheostat. The condensers on either side are fastened at the same height, and



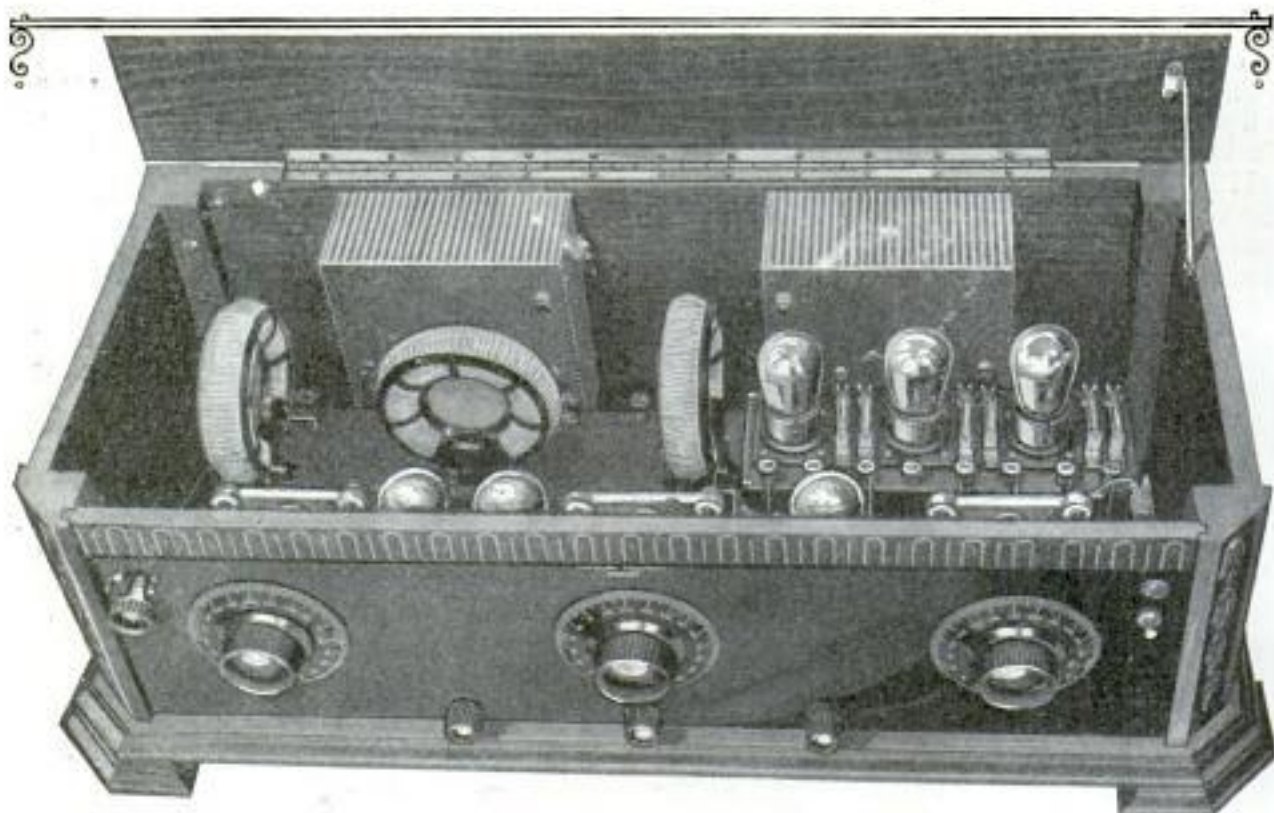
punch or scribe. When the instruments have been mounted on this panel, it is ready for mounting on the subpanel. Holes countersunk for two 6-32 flat-head brass machine screws (black-japanned if possible) are used to hold the front panel to the subpanel brackets. The set is now ready to be wired. The



Schematic Diagram Showing the Simplicity of the Amplifier Connections; Above, Rear View, Showing Sub-panel Brackets and Wiring Details

should be spaced exactly 9 in. from center. The front-view photo of the set in the cabinet shows the position of the aerial switch at upper left. This switch lever, with two contact points, is for the purpose of obtaining the equivalent of a short or long aerial. The connections are clearly shown in the large circuit diagram. The horn jack is shown at the upper right, and the push-pull filament switch below. After the positions of the various instruments have been located, cut the cardboard to the exact size of the panel. Clamp this template to the panel and point off the location of the various holes to be drilled with a center

reader will note that holes are drilled in the subpanel near each instrument terminal; the No. 14 round tinned-copper busbar wire used for the circuit is bent with a small pair of pliers so as to drop down through the holes from the terminals and run in direct line under the subpanel, coming up at the proper point to complete the connection. The large wiring diagram gives all the wires above the subpanel for the purpose of clearly showing the circuit from point to point. When the wiring is run below, the result is more direct and shorter leads, and neater appearance above. When running the wires below the subpanel, some are dropped



The Completed Instrument, Showing How the B-Batteries Can Be Included in the Cabinet if Desired

lower than others so as to prevent shorts. No insulation is used on the busbar wire, so care must be taken that the wires do not touch. Stranded rubber-covered wire is used for the lead from the positive A-battery terminal to the filament switch; this lead can be seen in the rear-view photo above the schematic diagram, as it is threaded through the supporting brackets. Rubber-covered wire is also used for the lead from the output post, P, on the amplifier unit, to the horn jack. The B-battery consists of two 45-volt units and one 22½-volt unit. They are connected as shown in the blueprint diagram. The positive A and negative B-leads are connected together and run to the A-positive terminal on the subpanel. Six UV-201A or C-301A tubes are used. For the aerial use one wire from 80 to 100 ft. long, including the lead-in, and a ground con-

nection to a near-by water pipe. A good horn should be used, as a poor one will not bring out the real value of the set.

To operate the receiver, plug in the horn and place each dial at, say 50, light the tubes, and turn up the rheostats until a faint swishing is heard in the horn. Rotate the dials in step until the station comes in clearly, then readjust the rheostats for proper volume. The rheostat on the right will regulate the volume after the other rheostats have been adjusted properly. It will be found that the dial readings will be about the same, if each dial is adjusted so that it reads 100 when all condenser plates are in.

Blueprints for this set may be obtained from the Radio department, Popular Mechanics Magazine, 200 E. Ontario St., Chicago. Inclose ten cents to cover postage and packing. Specify blueprint No. 102.

MATERIAL LIST

- | | |
|---|---|
| 1 bakelite panel, 3-16 by 7 by 26 in. | 1 Dubilier grid condenser with gridleak clips. |
| 1 bakelite panel, ¼ by 9 by 25 in. | 1 cartridge-type gridleak, 2 meg. |
| 1 pair Benjamin brackets. | 4 flat-head brass machine screws, 6-32, ½ in. long. |
| 1 set No 43 Thorola doughnut coils for .0005-mfd. condensers. | 12 round-head brass machine screws, 6-32, ½ in. long. |
| 3 variable condensers, .0005-mfd., low-loss type. | 4 round-head brass machine screws, 6-32, 1¼ in. long. |
| 3 dials, 4 in. | 2 B-battery units, 45 volts each. |
| 1 Daven super-amplifier unit complete. | 1 B-battery unit, 22½ volts. |
| 1 open-circuit jack. | 12 lengths No. 14 round tinned-copper busbar wire. |
| 1 push-pull filament switch. | 3 ft. stranded rubber-covered fixture wire. |
| 3 Bradleystats. | 38 tinned soldering lugs, long round-hole type. |
| 1 switch lever. | |
| 2 contact points with stops. | |
| 6 binding posts. | |

Fixed Condenser Aids in Obtaining Sharp Tuning

Those who have difficulty in tuning their sets sharply enough to eliminate some near-by interfering station, will find that a fixed condenser connected in series with the aerial will help considerably, although it will reduce the signal strength. Use either a .0001, .00015 or .00025-mfd. instrument. Try all three values until one is found that gives best selectivity and greatest volume. Sharp tuning is necessary in congested districts, and it is sometimes helpful to have both a short indoor aerial and the usual outdoor type, the shorter aerial being used so that sharper tuning may be obtained on local stations.

Lead-In Kept from Grounding by Bracket Insulator

A neat and effective mounting for the lead-in wire is provided by a new insulator, which is fitted with a long rust-proof



534-U.
 bracket. Almost everyone who has erected an aerial knows what a job it is to bring the lead-in down to the set without having it touch the building at some point where it might ground the aerial when wet. The usual method of keeping the wire from the side of the building is to use any lengths of stick that are available, but this makes an unsightly job, as well as a poor one

from the standpoint of insulation. The bracket illustrated not only provides a neat way to do the job, but also insulates the wire properly.

Spacing Wire on Coils

To correctly space wire on coils, start the coil with a thread or light string, winding the wire and string alongside each other on the form, and keeping a stiff tension. After the coil has been wound, the thread or string can be removed, and the turns of wire will be correctly spaced.

Unless proper grid-bias batteries are used vacuum tubes should not be operated on potentials higher than 100 volts, because there is then considerable danger of burning out the transformers.

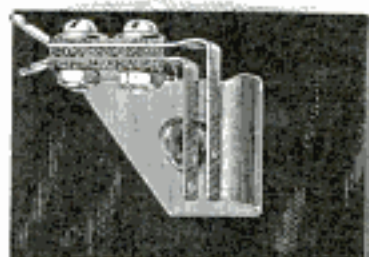
Simple Repair That Saves Tube with Loose Base

Tubes will often break loose at the joint between the metal base and the glass. Tubes in this condition will very likely be ruined when changed from one socket to another, if not repaired at once. A simple remedy is to wrap a strip of adhesive tape around the joint three or four times, carefully stretching the tape at each turn so as to fit tightly over the top of the metal base and the glass, as shown in the sketch. After wrapping, hold the tube in the closed hand, pressing tightly on the tape for a few moments, to heat the tape and make the support solid. This will save the tube for future use.—L. B. Robbins, Harwich, Mass.



Lock Switch Protects Batteries from Unnecessary Use

To prevent careless operation or tampering when the owner of a receiving set is absent, a lock switch has been devised which retains its key until the circuit is properly turned off. This arrangement eliminates needless drain on the batteries and saves the tubes from being accidentally left burning, since the operator cannot take the key with him on leaving the set



without first shutting off the current. The switch is for installation on the inside of the panel and resembles a jack. A guard is provided to prevent the insertion of a pencil, plug or similar object in attempts to work the lock without the key. Any number of keys may be furnished for the same switch, so that several persons may operate a set equipped with the device.

Kilbourne & Clark Mfg. Co
 101 Spokane St. Wash.
 Seattle, Wash.

Erecting Single-Wire Aerial on Flat Roof

Erecting an aerial on a flat gravel, asphalt or composition roof of an apart-



Simple Method of Erecting Single-Wire Antenna on Apartment-House Roof

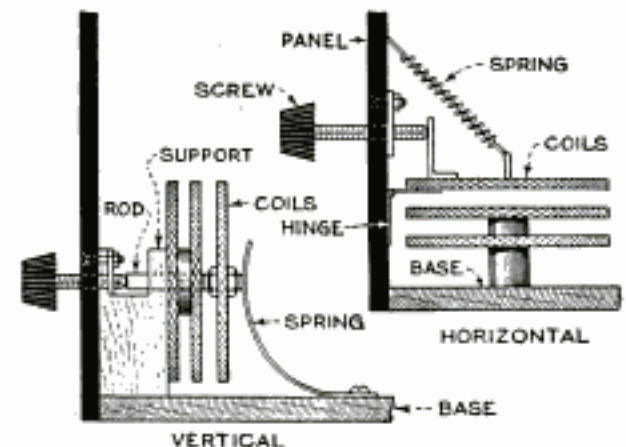
ment house is frequently a problem, as no place can be found to attach supports with nails or bolts. The problem may be solved, however, by building two A-supports of light lumber, with a crosspiece of heavy wire to hold the legs the proper distance apart. The supports should be spaced two or three feet outside the insulators at either end of the aerial, and the supporting wires led over the grooves formed by the junction of the legs of the A's, and then down to the nearest projecting plumbing vent pipe. Almost every apartment-house roof is studded with plumbing vents, and it will usually be possible to find two sufficiently far apart to wire the supporting wires to.

Adjusting Tuned-Plate Circuits

The operation of tuned radio-frequency circuits, requires selective but firm adjustments of the movable, or tickler coil, which is in the plate circuit of the detector tube. In such circuits the tuning of this coil is much more critical than is generally supposed, if the best results are to be obtained, and therefore it is necessary to provide a support which will permit the coupling to be changed very slightly when nec-

essary, and that will hold this adjustment regardless of the jars or movements to which the radio cabinet or set may be subject. The illustrations show two methods of arranging the adjustment of the tickler coil in the Roberts' scheme, which has proved satisfactory. The right-hand drawing shows a micrometer adjustment which is sufficiently rapid in its movement to meet any tuning conditions over the entire band of frequencies used in present broadcasting. This method permits the three coils of the unit to lie flat on the bottom of the cabinet in the rear of the panel. The upper coil, or the plate tickler, is adjusted by the knob, screw, springs and brass angle piece, as indicated. A few turns of this arrangement will move the coil up or down with rapidity.

The arrangement at the left shows a scheme that is somewhat slower in operation but extremely sensitive and stable. The tickler coil is attached to a brass rod which slides through a hole in the support and which is moved ahead by the screw and knob that work against the end of the rod. A piece of spring, fitting firmly against the coil will keep the tension even so that the coil will move closer to



Two Simple Methods of Fitting a Sensitive Adjustment to Tickler Coils

the secondary coil when the screw is withdrawn.—B. F. Dashiell, Washington, D. C.

☞ To avoid making mistakes when wiring a radio set it is an excellent idea to use different kinds of color of insulated wire for the A-battery leads and for the B-battery leads so that they can be readily distinguished.

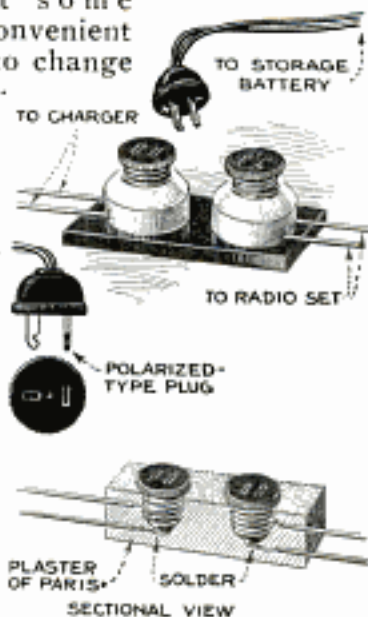
*L. S. Beach Mfg. Co.
127 Sussex St.
Newark, N.J.*

Clean Jacks Improve Reception

Clean jack contacts are necessary for good reception. These little springs gather dust and corrode slightly making a poor path for the weaker signals. Much of the frying and crackling noises can be traced to this cause. An easy method of cleaning them is to insert a small piece of fine sandpaper between the contacts and pull it back and forth a few times. Emery paper should not be used for this purpose, as it leaves a metallic deposit that will cause leakage and losses. A small camel's-hair brush will aid in keeping the jacks free from dust.

Switching Battery from Set to Charger

Everyone knows that a storage battery should be kept as completely charged as possible; to make sure this is done, it is necessary that some simple and convenient means be used to change the battery

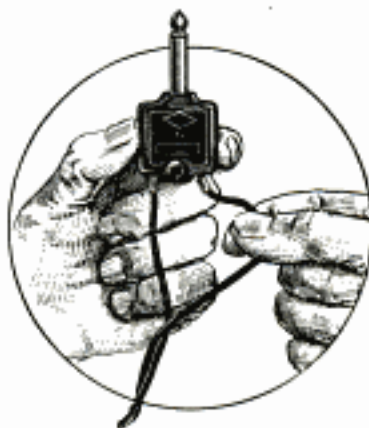


from the set to the charger and back again. A simple double-throw, double-pole switch is commonly used for this purpose, but is not altogether satisfactory, as it is unsightly, and unsafe on account of shorts. A

closed snap switch does not answer either, as it is not rugged enough and may be accidentally thrown. An ideal arrangement can be made by fastening two sockets to a block as shown in the illustration, the cap and plug being notched or otherwise marked to show the polarity if they are not of the polarized type. If no extra sockets are at hand, wires may be soldered to the screw halves of the plugs; wires and plugs are then placed in a small cardboard box and the box filled with plaster of paris. If this method is used, the polarity of the wires must be determined and marked on the outside of the box before sealing with the plaster. A switching device of this type has none of the objectionable features of the knife switch, and makes a neat assembly.—C. N. Bourgholtzer, New York City.

Shock-Proof Plug Locks Cord Tips 495-

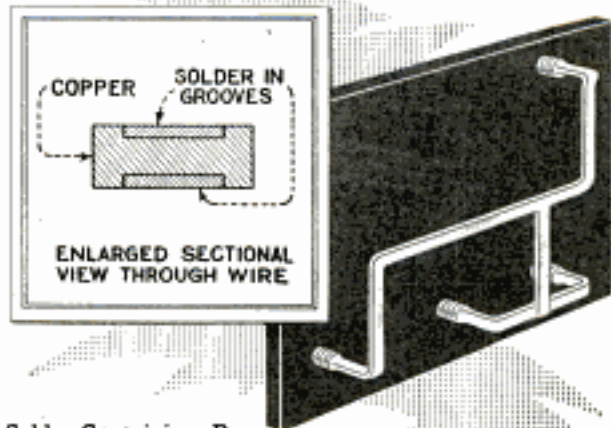
Cords from the headset or from the loud speaker are quickly and securely fastened in a plug that is designed to afford efficient electrical contact and has no metal parts exposed, thus giving protection against shock. As the tips are inserted, they are automatically locked in place, but may be released instantly simply by pulling them to one side. The plug is insulated to withstand the voltage required by loud speakers, and is said to relieve the strain on the cords and soldered connections.



New Busbar Wire Contains Its Own Solder

A new busbar wire containing its own solder has just made its appearance in England. The wire is of the tinned-copper type familiar to all radio builders, but on close examination it is found to be drawn in a double T-section, a solder compound being contained in the side grooves, as shown in the enlarged sectional view.

To form a joint, the ends are simply brought together; the point of junction is moistened with a little flux, and a hot iron applied. Under the influence of the heat, the solder coatings unite immediately and form a joint. Very neat work is the result as shown by the example of wiring at the right in the illustration.



Solder-Containing Bus Wire and Sample of Work Done with It

*555-R
Res Engineering Co. Ltd.
2 Ravenhill Square W.C. 6. Eng.*

Inexpensive Crystal Receiver

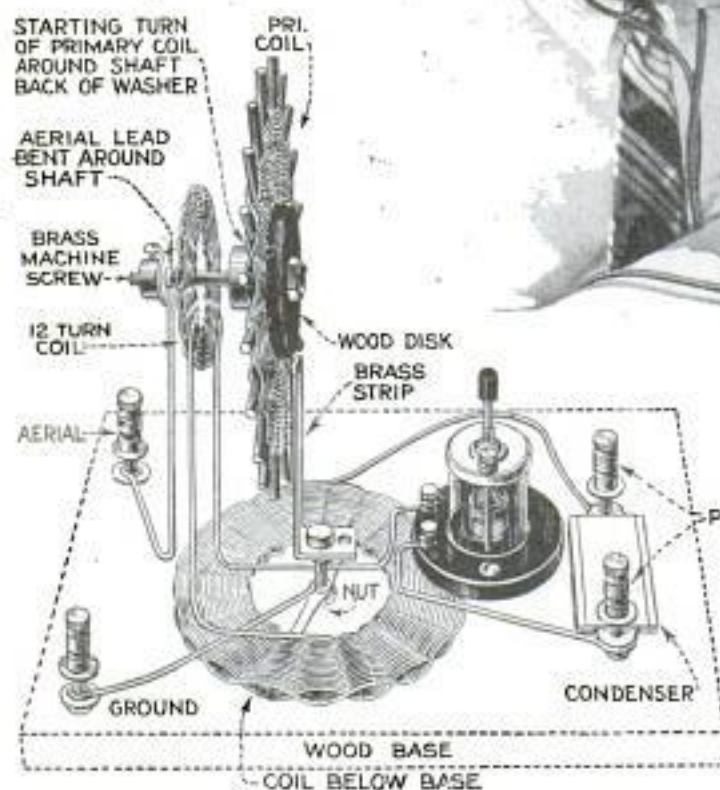
By WILL H. BATES

THIS simple, selective crystal receiver will bring in the broadcast programs within a range of 35 or 40 miles, and can be built for less than \$1, exclusive of the headphones and the aerial and ground supplies. No variable condenser is used, yet the set will separate the local stations. This is of particular advantage in the larger cities, where several stations are on the air at the same time, and the average crystal receiver will not tune sharply enough to give satisfaction.

For local stations, a few turns of bell

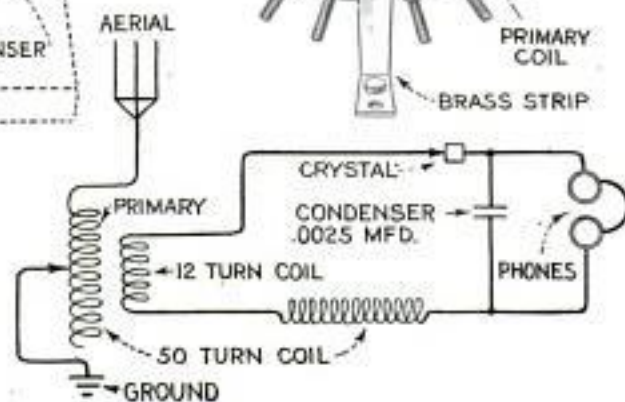
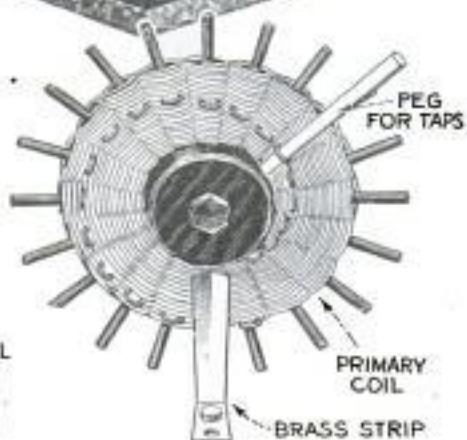
tated with the finger as indicated in the illustration. It is mounted on the wooden support, detailed in the upper left-hand corner. The shaft is a 1½-in. brass machine screw, and if an old discarded rheostat is available, its shaft, or that of a switch, will serve.

As the coil is turned, the taps are brought in contact with a thin spring-brass strip on the baseboard. The details of the primary coil are clearly shown, and the winding is very simple. The form for the coil is the sawed-off end of a large spool, 1¾ in. in diameter. Holes are drilled in the edge for 20 burned-off matches, equally spaced. For the coil No. 22 d.c.c. magnet wire is used. Leave 1 in. or more at the beginning and wind over one spoke, under two spokes, and so on, for two complete turns. At the start of the third run insert a wood wedge to form a flat



View of Receiver in Use, Details of Parts and Connections, and Circuit Diagram

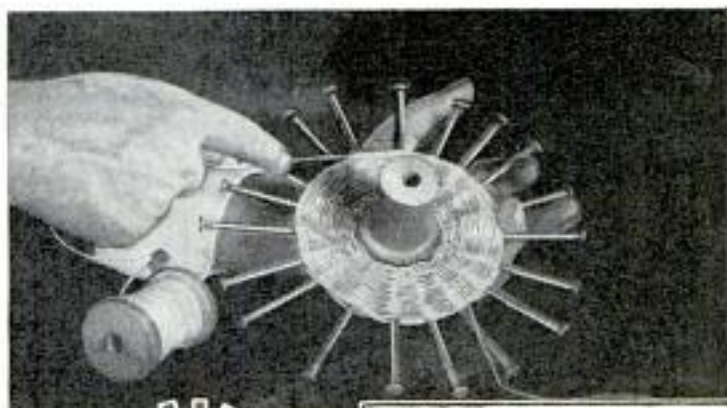
wire around the room behind the molding will answer for the aerial, and a wire clamped to a water pipe makes an ideal ground. The revolving coil makes the set easy to tune. This primary coil is ro-



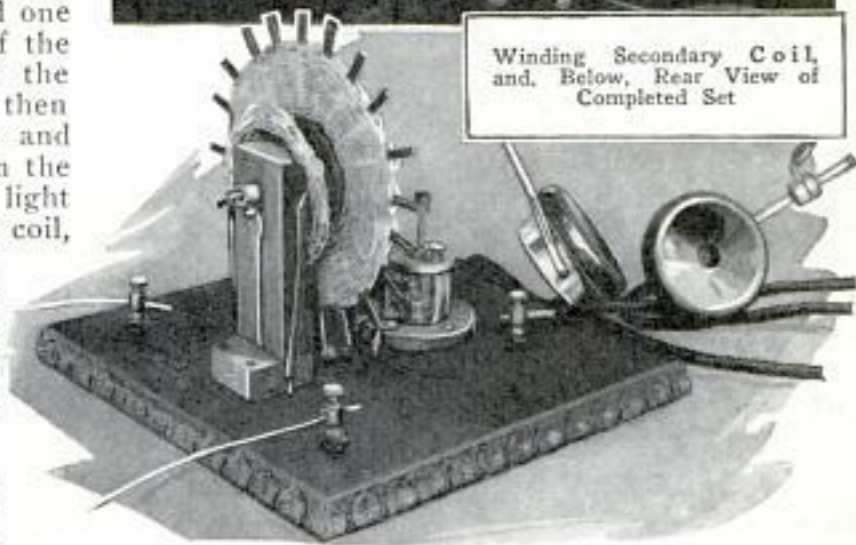
loop in the wire, as shown. When the turn is completed remove the peg. Every second turn on the coil will now bring the over-one turn on the adjoining spoke, and the peg is again inserted in the same way, thus advancing the taps in a spiral to the outer edge of the coil and forming 20 in all. The winding is then continued a part of the way around the coil, clipped and secured around one of the spokes. This end of the wire is not connected in the circuit; the loops are then scraped free of insulation and the spokes withdrawn from the coil. Heavy thread or light string is used to bind the coil, threading it in and out of the openings left by the spokes and tying the ends. The spokes are then replaced and the unit is complete and ready for mounting.

The starting wire of this coil is bared and looped around the shaft back of the wood disk, a large nut and washer holding it in place. The aerial wire is brought up through the base and looped around the shaft at the rear of the support, and held in place with a lock bearing and washer. The wooden baseboard is $\frac{1}{4}$ by 7 by 7 in. and rests on four $\frac{1}{2}$ -in. strips tacked around the outer edge, so as to allow the larger secondary coil clearance underneath it.

The secondary coil, in two sections, is wound on a form made from the remainder of the spool, the rim of which is drilled to take 19 nails, as shown. The smaller section has 12 turns and is mounted directly back of the primary, and supported by its lead wire but not



Winding Secondary Coil, and, Below, Rear View of Completed Set



taken through the baseboard to the inside turn of the larger coil, and the outside end of the small coil to one side of the crystal detector. Both sections of the secondary are wound with No. 22 d.c.c. wire, the method of winding being over two spokes, and under two. Leave a start and finishing end about 8 in. long, remove from the form and sew together as before. The second section of the secondary has 50 turns, and is made in the same way. It is supported below the baseboard by a thin strip of wood; the author used a paper soda straw. The brass machine screw that supports the spring-brass strip also holds the supporting

MATERIAL LIST

1 baseboard, $\frac{3}{4}$ by 7 by 7 in.
 2 wood strips, $\frac{1}{4}$ by $\frac{1}{2}$ by 7 in.
 2 wood strips, $\frac{1}{4}$ by $\frac{1}{2}$ by 6 in.
 1 wood block, $\frac{1}{2}$ by $1\frac{1}{4}$ by $1\frac{1}{4}$ in.
 1 piece of wood, $\frac{1}{2}$ by $1\frac{1}{4}$ by 3 in.
 1 crystal detector.
 1 .0025-mfd. condenser.
 4 binding posts.

1 piece of thin spring brass, $\frac{3}{8}$ in. wide and $2\frac{1}{2}$ in. long.
 1 brass machine screw, $1\frac{1}{2}$ in. long, with nut to fit.
 3 small washers.
 1 small bearing with set screw.
 1 large spool, $1\frac{1}{4}$ in. in diameter at ends.
 1 small spool No. 22 magnet wire.

touching the shaft, spaghetti tubing being used to strengthen the supporting leads. The inside lead of the small coil is

strip for the large secondary and forms the grounding terminal from the primary through the metal strip. The brass con-

tact strip is bent to form a $\frac{1}{2}$ -in. mounting piece drilled for the machine screw, and mounted on the baseboard so that it will make good contact with the primary taps when the coil is rotated.

The .0025-mfd. condenser is mounted across the phone posts, under the baseboard. The outside end of the large secondary coil is connected to one phone post, and the other phone post is connected to the other side of the crystal

detector, completing the instrument. Connect the ground, aerial and phones, and the set is ready for operation.

To tune the instrument, put the headphones on, turn the primary coil slowly and adjust the crystal detector until a signal is heard. When a sensitive point on the crystal is located, the station will come in clearly. Once this sensitive spot is located, other stations can be tuned in by merely turning the coil.

Automatic Battery Connector

Usually the radio experimenter finds it necessary to take a set out of the cabinet a great many times to make the changes needed to get it working right, and it is annoying and temper-trying to fish in the back of the cabinet to make and unmake the battery connections in the cramped space. There is always the danger of short-circuiting, if the connections on the batteries have not been taken off first. Also, not infrequently, soldered connections are knocked loose.

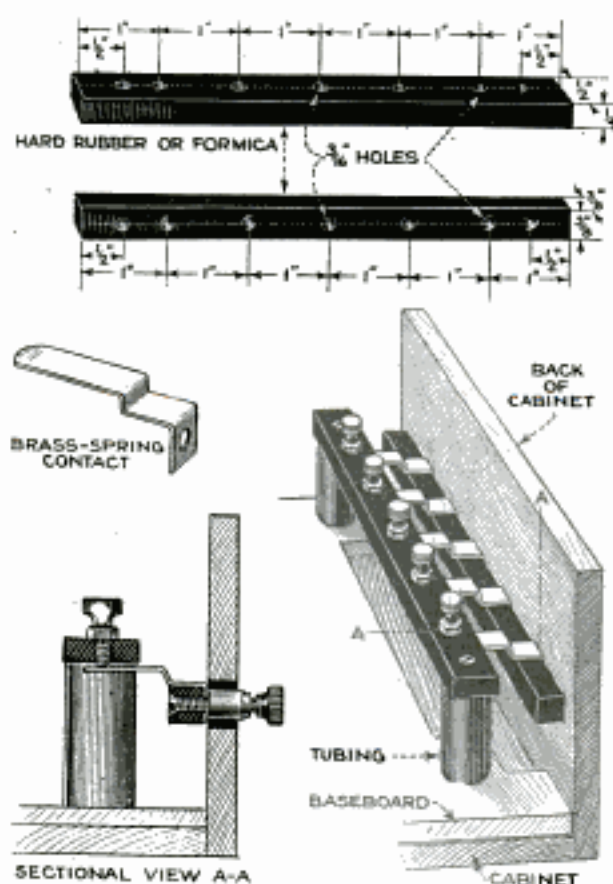
The accompanying illustrations show a simple, yet effective way of eliminating the need of disconnecting the batteries when the set is to be taken out of the cabinet.

The materials required are easily obtained: a strip of hard rubber or formica, 6 in. long, $\frac{1}{2}$ in. wide and $\frac{1}{4}$ in. thick; another piece of the same material, 6 in. long and $\frac{3}{8}$ in. square; ten binding posts; two pieces of hard-rubber tubing, $\frac{1}{2}$ in. in diameter and about $1\frac{1}{2}$ in. long, and five pieces of thin spring brass, $\frac{3}{8}$ in. wide and $1\frac{3}{8}$ in. long.

Drill the two hard-rubber strips as indicated at the top in the illustration. The holes nearest the ends of each piece are to be used in fastening them down. Mount five binding posts on top of the

wide piece as shown, with soldering lugs underneath or above, as you prefer. (Ordinary brass or nickelplated nuts and bolts can be used instead of the binding posts.)

Next drill a hole in each of the spring-brass pieces and mount them, as shown in the sectional view, on the square rubber piece, as wide as the back of the cabinet is thick, being used between the strips and the binding posts. The first-mentioned piece of hard rubber is fastened to the baseboard, being held up by the rubber tubing at each end. The other piece is fastened to the back of the cabinet, at such a height that the springs will be pressed in close contact with the heads of the binding-post screws. This position being found, holes



Simple Device for Automatically Connecting Batteries to Cabinet Receiver

are drilled in the back of the cabinet, large enough to take the binding posts and collars without touching. The binding posts will project outside the cabinet, and connections from the batteries are made there. Cut out enough of the baseboard to clear the springs when the set is taken from the cabinet. The installation of this connector means a little more work, but it will pay in the long run in time saved. There is nothing to disconnect when taking the set out. When it is put back, connections are automatically made.—Albert Chenicek, Chicago.



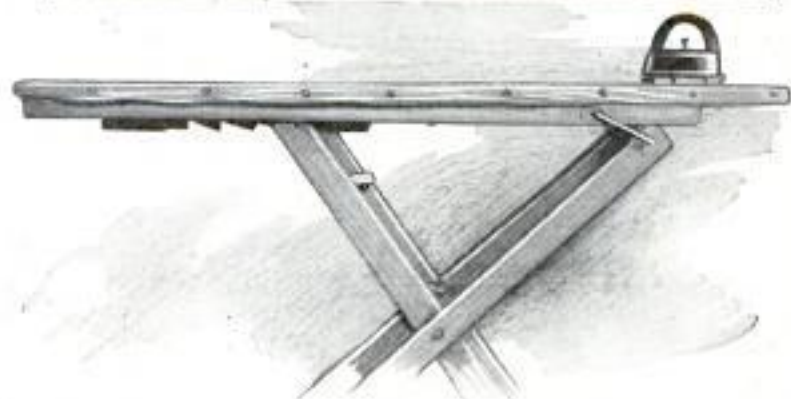
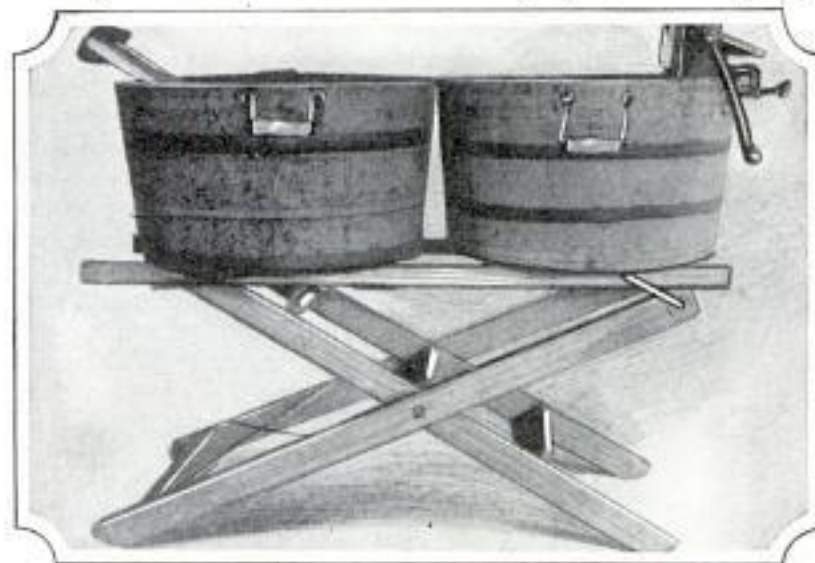
Combination Stepladder, Washtub Stand and Ironing Board

By E. E. SCOTT

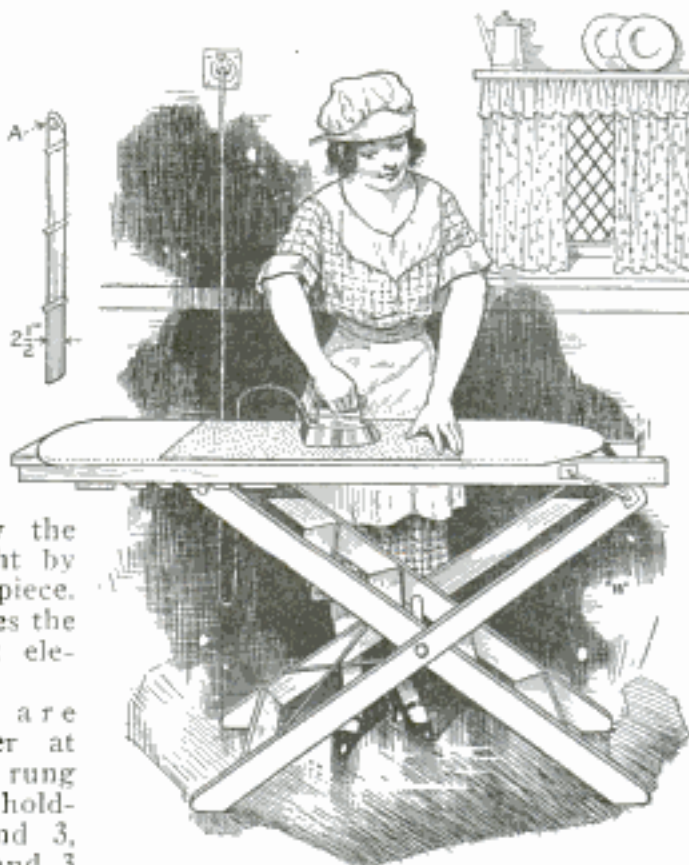
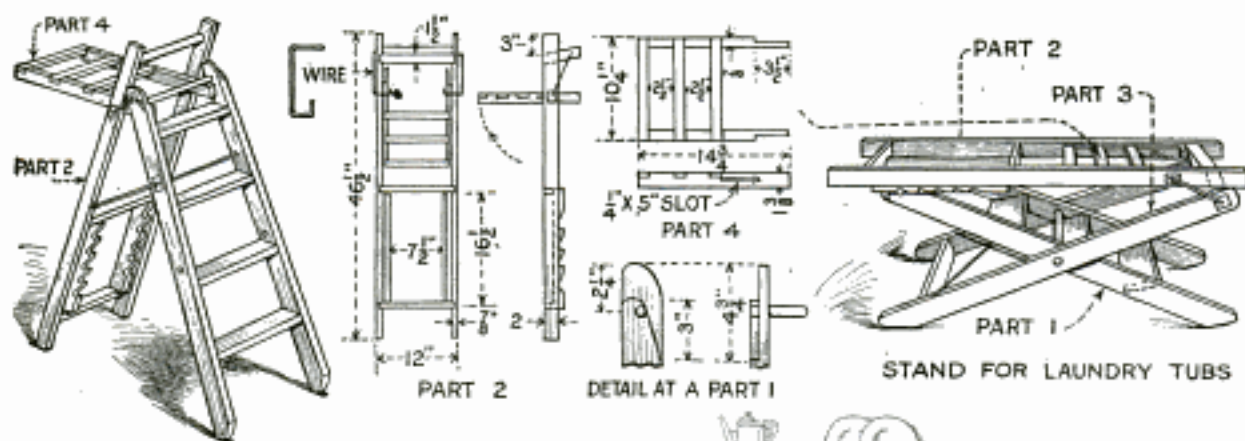
CONSIDERABLE space can be saved in the small house or apartment by combining the ironing board, washtub stand and stepladder, as shown in the photos and illustrations. The article has only four movable parts and can be folded to dimensions which permit it to be stored behind a door or in any other out-of-way place.

Spruce wood, $\frac{3}{4}$ in. thick and dressed on all four sides, is used, as it is strong and light. The sides of the ladder proper,

part 3, and the bottom of part 1 should be mortised, $\frac{1}{4}$ in. deep, to receive the steps, as it is important that they should be securely anchored to insure the safety of the person using the ladder. It will be noted that the bottom step is in part 3 and the other three in part 1. The detail of the upper end of the sides of part 1 indicates the cut-out portion of this part, while the drawing of the ladder set up as an ironing-board support shows how these sides project into the slot formed by the sides of part 2 and the inner strip having the notches,



A Three-Purpose Household Utility Which Can Be Used as a Stepladder, Washtub Stand and Ironing Board, Helping Save Space in a Small Home or Apartment



Rigid in Construction and Substantial Throughout, This Ironing-Board Support Is Very Strong and Quickly Adapted to Its Other Uses

and also how the rung is caught by this notched piece. Each notch gives the top a different elevation.

The parts are hung together at two points, the rung in the center holding parts 1 and 3, while parts 2 and 3 are connected by two links of $\frac{3}{16}$ -in. steel wire, bent as shown in detail of part 2. The straight end projects through the sides of part 3 and into the $1\frac{1}{2}$ -in. piece shown in part 2, which serves as the top step. This piece is screwed to the top of part 2 and projects so that part 3 can pivot on it as shown. It is important that each of these wires be of the same length and that they be inserted at the same distances from the end of the sidepieces, or the parts will not fold together properly nor will they stand level when used as a stepladder. The pail support, part 4, slides on these wires, and when in use, is pushed under the top rung of part 1. When assembling the various parts, it is well to use numerous screws to insure a rigid and safe ladder. Do not omit the wire braces shown at the bottom of part 3, nor those shown

in upper left-hand assembled view, which hold the legs when the device is used as a stepladder. At all points where holes for the various wire parts are made, a heavy tin reinforcement should be tacked on to reduce wear to a minimum. The finished piece should be given two coats of good

paint or valspar varnish as a protection against water that occasionally may be spilled upon it.

Using Garden Hose in Winter

Keep the garden hose connected to a faucet in the cellar to fill the water pan of the furnace quickly, and to spray the ashes before sifting them. This will keep the dust down and prevent hot coals from being thrown up against wooden partitions and starting fires. The spraying should be done while the ashes are still in the furnace pit, and only a little water is needed. Too much water will make the ashes "muddy" and make it almost impossible to properly sift them.—Stanley H. Phillips, Drummondville, Can.

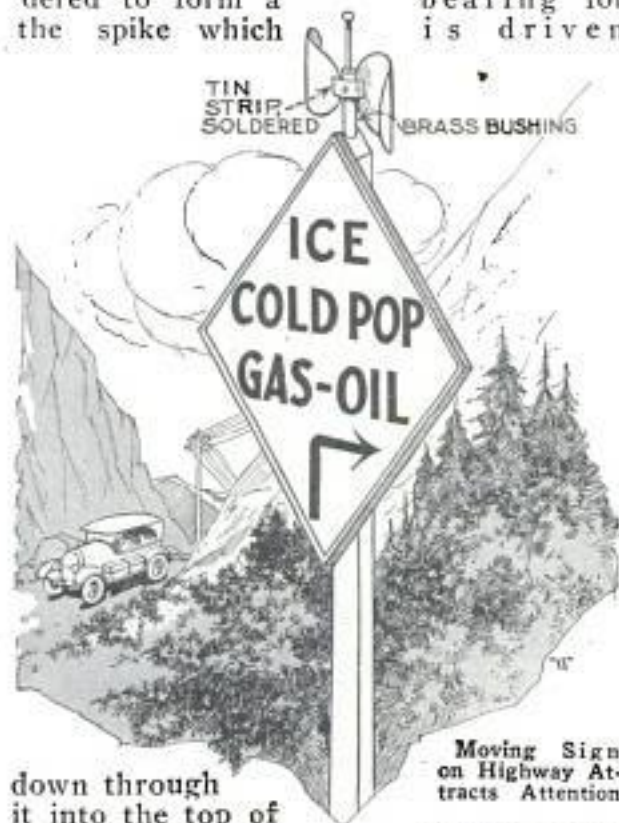
*Harry C. Lorey
of Newark, N.J.
Sunday Call
Newark, N.J.*

Making Case for Fish Rod

Get a large cane, such as is used to roll rugs on, and saw it off about 4 in. longer than the fishing rod. Split it down the center, cut out all the joints, and clean and smooth the inside with sandpaper. A handle can then be riveted to one of the halves. Now glue the sections together again and wrap the case with heavy thread, in the way a fly rod is wrapped. In one end of the case a cork is glued, and a loose cork is used in the other. If desired, the completed case may be enameled or varnished to make a better appearance. —Max K. Hortin, Oakley, Utah.

Moving Sign Attracts Attention

Many highways are lined with colored display signs of about every description. Growing accustomed to the more ordinary ones, it takes a decided departure to command attention. Just west of Omaha, Nebr., on one of the main roads, one may see a whirling red and black sign that announces ice-cold pop, gas and oil just around the bend. The sign itself is conspicuous, but the colors add to this considerably. Closer investigation shows the mechanism to be extremely simple. Two can covers, cut from 1-gal. cans, are soldered to a heavy strip of tin. To this a small bushing or tube is also soldered to form a bearing for the spike which is driven



down through it into the top of the support. The will turn in a light breeze.

Moving Sign on Highway Attracts Attention

curved covers

Novel Feather-Duster Incubator

A New Jersey chicken breeder has succeeded in hatching a record number of eggs in the novel homemade incubator



Novel Incubator Consisting of Feather Dusters and Electric Lamp

shown in the photo. It consists of an ordinary wooden box divided by a partition. The eggs are placed in one section covered by a board, to which four feather dusters, with the handles cut off, are attached as shown. An electric lamp, inclosed in a guard, is set centrally between the dusters, the cord passing through a hole in the cover. The heat of the lamp is retained by the dusters and, when the eggs are hatched, the new-born chicks have an artificial hen sitting on them. The other section provides an open-air yard where the older chicks may be fed and exercised.

Repairing Organ Bellows

I was called upon to clean and repair a small church organ here, and found the rubber bellows cloth worn threadbare in many places, which made the instrument very difficult to play. New cloth could not be had except at the factory in Illinois, and I knew it to be very difficult to put in place satisfactorily. So I tried the following scheme, which has proved entirely successful after two years' use: I cleaned the bellows thoroughly with gasoline, and when dried, gave it a coating of rubber cement.—M. A. Carty, Bremerton, Wash.

Newspaper Container

Newspapers are often thrown on porches regardless of the weather. A good container which will prevent them



Container for Newspaper Protects It from the Weather

from being blown away, or from being soaked, is shown in the drawing. It is simply a 1-ft. length of conductor pipe, closed at one end and fastened to the wall horizontally by means of sheet-metal straps. It is painted white and it is an easy matter for the carrier to roll up the newspaper and slip it into the container.

Assembling Battery Sets

Users of dry-battery sets for ignition on boats, gas engines, etc., commonly prefer sets contained in a metal or heavy cardboard case because they are compact and waterproof. They cost more, of course, than separate cells, but it is not necessary to discard the whole battery because one or more units are exhausted. Remove the waterproof compound, replace the dead cells by new ones, remelt the compound and pour it back into place. The owner of a fleet of pleasure boats uses this method entirely, with the result that the original battery cases last indefinitely.

Removing Sugar Stains from Clothes

Sugar spots on silk or crepe dresses are difficult for the home cleaner to remove as gasoline will not dissolve them and water leaves rings or destroys the color. To

avoid these difficulties, cut down the bristles of a discarded toothbrush to approximately half their normal length. Stretch the spotted portion of the garment over the ironing board and brush across the grain of the fabric. The brushing will loosen and remove the sugar, if this is perfectly dry, and will also raise the nap so that the spot cannot be detected. Even though some of the sugar may remain in the fabric, it will not become apparent again until the garment is dampened and pressed the next time.

Watering Honey Bees

Honey bees require much water during the hot summer months. They will fly miles for a drink, but setting out of vessels filled with water near the apiary is not quite satisfactory, as many bees will drown in them. This danger is entirely eliminated by providing the novel drinking fountain shown in the photo. A small keg is filled with water and provided with a brass stopcock. This is opened so that the water will only drip on a board and keep it moist. Of course, an air hole is drilled in the bung. The bees collect in numbers, drinking up the water without any danger of drowning. A 5-gal. keg



Drinking Fountain Which Waters Bees without Any Danger of Drowning Them

needs refilling only twice a week and will supply water for 50 hives.

An Adjustable Kitchen Worktable

A resourceful housekeeper made her kitchen labors lighter by providing herself with a novel worktable, which can be adjusted to any suitable height when sitting or standing. It also can be taken

apart in a moment and tucked away in the corner of a closet until it is needed again. Besides, it is serviceable as a bedside



holds the rod securely at any height desired. This rod is flattened at the upper end, bent over at right angles and two holes are drilled through it so that it can be screwed to the



Convenient Kitchen Table Can Be Adjusted to Any Desired Height and Is Collapsible, Which Permits It to Be Stored Away in a Small Space

table in the sick room, because the top can be slipped over the bed so that it is convenient and accessible to the patient. A strong metal tripod of the kind used for music racks serves as the base. Into the tubular upper portion of this tripod is slipped a metal rod of suitable length and a thumbscrew at the upper end of the tube

underside of the table top. The latter is built up of thin, light boards nailed to three cleats. The top should be about 2 ft. wide and 3 ft. long. The upper surface of the table may be enameled, if desired, or at least should be covered with a washable fabric such as oilcloth.—P. C. Grose, Lakewood, Ohio.

Sheet-Iron Popcorn Sheller

Shelling popcorn with the fingers becomes a long and laborious task if quantities sufficient for planting are to be removed from the cob. A simple and efficient sheller is easily made from a piece of sheet



iron, 11 in. long and 2½ in. wide. It is first laid flat and perforated with a spike, a number of holes being punched and left so that the metal around them protrudes as in a grater. The strip is then bent to fit around the cob, the unpunched part of the metal serving as a handle. By turning the ear inside this holder, the kernels are easily and quickly removed.

When an egg shell is cracked, the white usually comes out when the egg is boiled. This can be prevented by wrapping the egg in tissue paper. As soon as the paper gets wet it will seal the crack.



Saving the Gas

By JAMES TATE

"HELLO, Bill," called John Jackson, familiarly called "J. J." by his friends, to a motorist who had just driven up to the curb in front of his garage, "I haven't seen you since you got the new car. How does she run?" "Oh, so-so," replied Bill. "Only so-so?" asked J. J.: "the Speedwell's a good boat; shouldn't have any trouble with it as early as this. You've had it about three months, haven't you? Thought so. Well, what seems to be the trouble?" "Oh, she takes too much gas," said Bill; "not such an awful lot, y'understand, but more than I figure she should."

"Wait just a minute," said John, "I'll get my coat and take a little ride with you. Need a little fresh air, I guess, and you have time to take me for a mile or two."

"But I want you to look over the car and see what you can do for it," said Bill. "All right, but let's take a little ride first," said John, "I'll look over the car when we come back." John climbed in, Bill stepped on the starter, and the car moved down the street with a whirl of gears.

After an absence of about an hour, the pair reappeared,

and when they reached the garage curb, Bill was about to shut off his engine when J. J. stopped him, reached over to the steering wheel and retarded the throttle control to the limit, listened to the engine for a few seconds, then climbed out, lifted the hood, and with a screwdriver, adjusted the throttle control until the engine was running to his satisfaction; did a few mysterious things to the carburetor, shook his head after listening to the engine and then seemed to undo them again. Finally he closed the hood. "Well, what's the matter with it?" said Bill. "There's nothing the matter with the car," said J. J. "It's your own fault if you're using too much gas." "My fault? You're crazy," said Bill; "why, I've been driving a car for five years. Think I don't know how to drive?" "Calm down, Bill,"

replied John, "you are no better or worse than a million others, but the fault none the less is yours. Come into the office, where we can be comfortable, and I'll clear up the trouble for you."

"In the first place," said J. J., after they were comfortably seated at the desk and the

blue smoke had started curling up toward the ceiling, "your engine was idling too



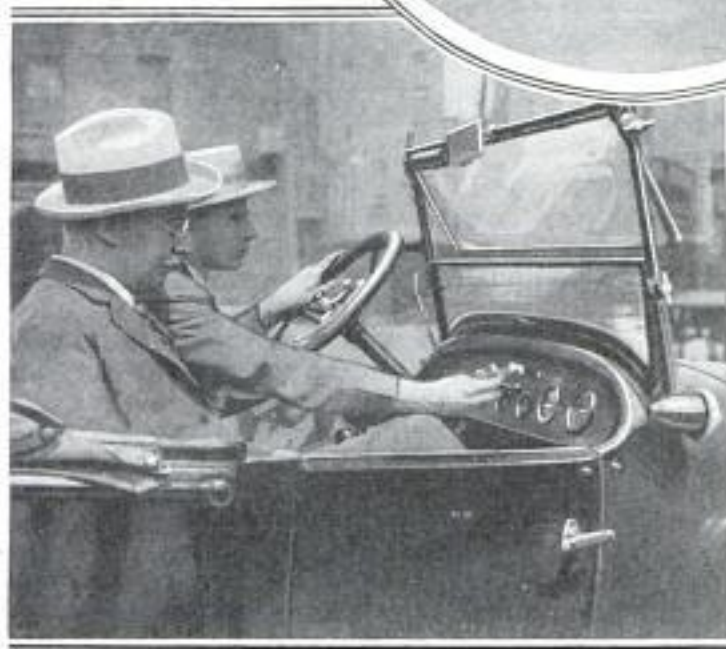
fast. You don't need to have it idling at 500 or 600 revolutions a minute. Keep it ticking over at the slowest speed possible without having it stop whenever you throw out the clutch. Of course, with a new engine, you have to idle it fairly fast for the first few hundred miles, because if you don't, it may stop whenever the clutch is thrown out, but you should have experimented with the throttle control as the engine became loosened up, and kept reducing the idling speed until you could reduce it no longer. Sometimes a new car may be getting an over-rich mixture, and one of the first things the owner of a new car should do, after the engine is pretty well run in, is to have the service station for his particular make of carburetor go over the setting of the jets and see that the mixture is not too rich. It was not so in your case; you saw me try a leaner mixture, but the original setting was about as lean as the engine will stand now. After this, however, watch your idling speed.



Adjust the Carburetor to Get the Slowest Possible Idling Speed without Letting the Engine "Die"; Let the Engine Run Quite Fast for a Few Moments While Closing the Garage, to Reach the Proper Temperature for Running Right

"Now, when you came over here, you had just taken the car out of your garage, hadn't you?"

Thought so. The motometer on your radiator showed a very cool engine, too cool, in fact. When you first take your car out in the morning, or at any other time of the day, give the engine time to warm up. Let it run fairly fast while you are closing the garage doors and keep it running so for a few minutes before you let in the clutch and drive off. A cold engine is inefficient, and is not only wasteful of gasoline, but also hard on the oil, because of excessive leakage of the gas past the pistons and into the crankcase. Another thing that not only wastes the gas, but also contributes to crankcase dilution, is the way you use your choke. You pulled the choke all the way out when you stepped on



Push the Choke In as Soon as Possible after Starting as the Engine Will Then Run Better and Consume Less Gas

the starter, then you pushed it in about halfway, which was all right, but you allowed it to stay halfway out until you had driven about five miles down the boulevard. I very often do the same thing



Just About Twenty Miles an Hour Is the Most Efficient and Economical Driving Speed for Most Cars; on Rough Roads Use the Hand Throttle Instead of the Foot Accelerator to Save Gas



—forget all about it somehow—but forgetting these little things is what wastes the gasoline. Push your choke all the way in as soon as you possibly can after starting, and you'll find it easier on both your engine and your pocketbook.

"How long have we had the new traffic lights? About two years, isn't it? Have you ever seen them before? No, I'm not foolish. Judging from the way you drove today you'd think you didn't know where any one of them was until you were right on top of it. You've been driving long enough around town to know the position of every stop sign and traffic light in it, and yet you dash up to the very corner and then slam on your brakes as though you had only seen the sign or the light one second before you applied the brakes. Four times you had just entered a block when the traffic lights at the other end turned against you, and yet you didn't slacken your speed until you had to come to a full stop in a distance of about ten feet. Good job your brakes are still good, although I don't know how long they're going to keep good, with the abuse they get. You could have coasted along with the clutch disengaged for a full half block

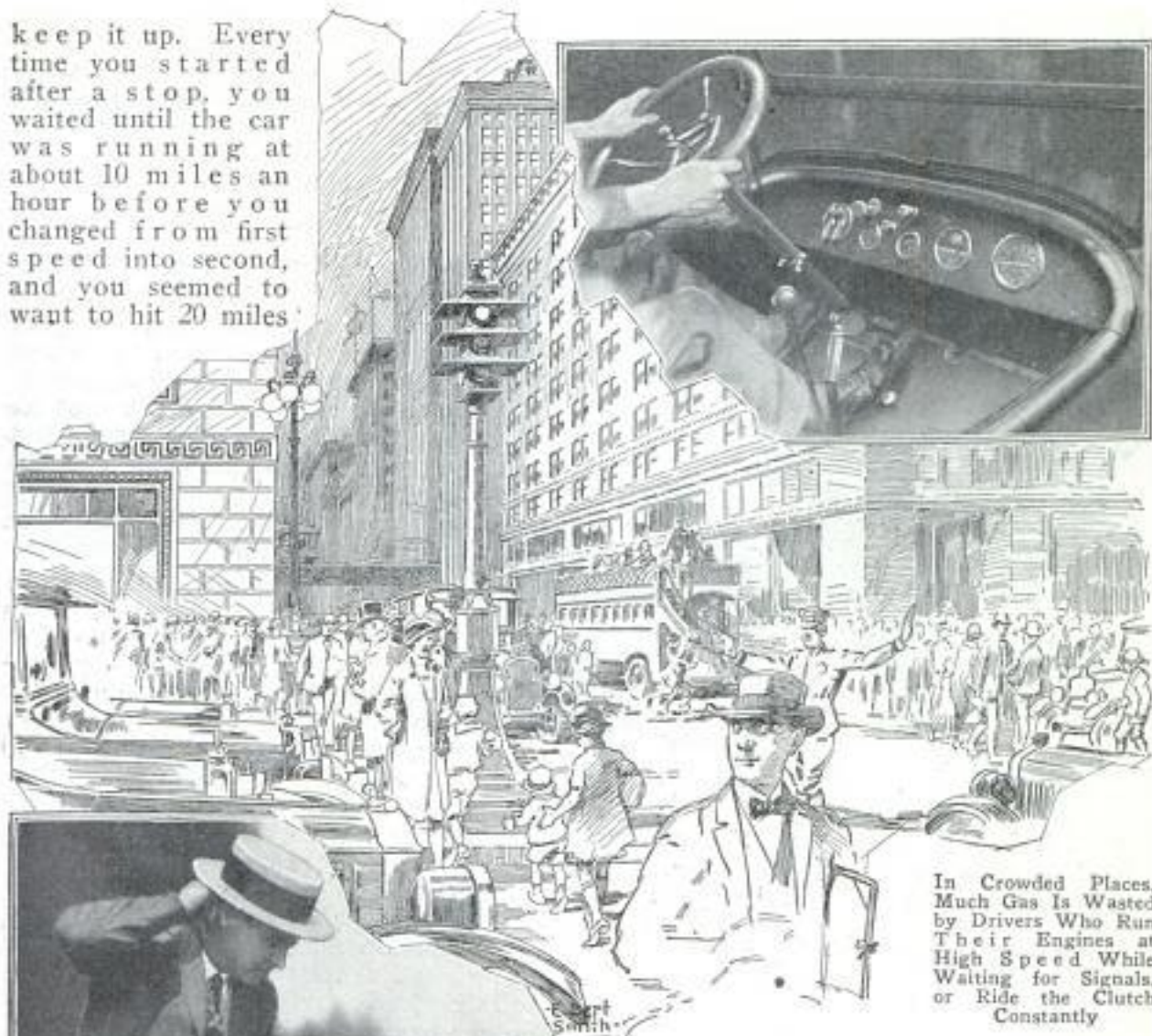
at all of those intersections. Your engine would then have been running merely at idling speed, you'd have saved some wear on your brake linings, and it would not have cost you a second's time, because you would have had to come to a stop at the corner for a minute or two anyway.

"I noticed, too, when we got in that jam down at East boulevard, that you kept applying your foot brake to keep from getting too close to the fellow ahead. Now, under some circumstances, it is good driving to apply the brake without declutching, but this time it wasn't so good. You were held behind that car for nearly three blocks, and all that time your engine with its high idling speed, was running at a rate corresponding to a car speed of about 15 miles an hour, while you were holding the speed of the car down to about 10



with the brake. Why not slip the clutch every now and then, keeping the engine running as slow as possible? That would accomplish the same result, and save gasoline as well as the brakes. When I say slip the clutch, I mean slip it deliberately, and that means throwing it out, not slipping it the way you do all the time without knowing it. What do I mean? You rode all the time we were out with your foot on the clutch pedal, and if you have been driving this car for three months in that manner, I'll bet your clutch has been slipping half the time. That means that your engine had to run faster than necessary to make up for the clutch slipping—more wasted gasoline, and a worn-out clutch in a short time if you

keep it up. Every time you started after a stop, you waited until the car was running at about 10 miles an hour before you changed from first speed into second, and you seemed to want to hit 20 miles



In Crowded Places, Much Gas Is Wasted by Drivers Who Run Their Engines at High Speed While Waiting for Signals, or Ride the Clutch Constantly

low gear to get the same speed as in high? Get into high gear as soon as possible after starting, and you'll save gas, but do not try to improve on this advice by starting always from second, as many drivers do. Low gear was not put into the car to give the maker's assembly department something to do, but for a purpose, and that is, to give the engine a 'toehold' when starting the car from a dead stop. Sure, you can start from second—I can start a car on high gear—but it isn't good for the engine nor for the clutch. Another thing; don't race the engine unnecessarily. I noticed that you did this sometimes, especially when you threw out the clutch before you eased your foot on the accelerator.

"Did the maker of your car fit it with automatic spark control? I don't think he did, or else you wouldn't have a spark-control lever on the wheel, but for all the use you make of it, it might as well not be there. Oh, I know you use it to retard the spark when you start the engine, but half the time you don't advance it imme-

He Used So Much Gas That He Thought the Gas Tank Leaked

an hour in second before you changed into high. Did you ever stop to figure that the engine has to run a lot faster in

diately, and then, when you have advanced it, you neglect it altogether. You ought to learn to adjust the spark to the speed of the engine and the road conditions. For instance, when we were going up the hill at Center street, you kept the spark ad-



Keep the Tires Inflated to the Proper Pressure to Reduce "Rolling Resistance"

vanced all the way, when the engine would have pulled better, and need not have been run so fast, with the spark retarded somewhat.

"I'm pretty nearly through now, Bill; there's only one more thing. When we got out in the country, and you saw that nice stretch of concrete road, you 'let her out' to between 55 and 60 miles an hour. Sure, you wanted to show me what she could do, but, by the way, you have to go over to Centerville every other day, don't you? That's 60 miles. You do it in less than two hours? I thought so. Let me give you a bit of advice. In the first place, that means a speed of over 50 miles an hour out on the road, taking into consideration the time you lose in traffic here in town. Now, you want to be considered a good driver, don't you? Well, the first thing a good driver remembers is, never to lose control of his car, and you have lost that, very often, if you are traveling over 50 miles an hour. Just think that over. In the second place, there is a certain speed at which an engine performs most economically, and that is around 20 miles an hour, or, say, from 20 to 25. If you stick to 25 miles an hour on your trips you'll not only save gasoline, but strange to say, you'll find that in most cases you make just as good time. Next time you go over there, just choose a moderate speed and stick to it; when you have to reduce it for traffic, or to increase it slight-

ly to pass another car, get back to it as soon as possible. Watch the speedometer and keep as close to the mark as you can, and then come in and tell me if you lost any time over your previous trips and how much gasoline you used. And say, when you run over that stretch of rough road near Centerville, take your foot off the accelerator and use your hand throttle control. The bumping jogs your foot up and down and feeds the gas to the engine in gulps when you use the foot on a road like that, while the hand throttle feeds the gas steadily and evenly.

"Another thing, Bill; keep your tire pressure up to the standard recommended by the makers. What experts call the rolling resistance of the tire depends to a great extent on the pressure carried, and even a slight departure from the proper pressure means a great increase in the rolling resistance. This means, again, that the engine has to exert more effort to start the car and keep it going, and that takes more gas.

"I guess that's all for now, Bill. No, you don't owe me anything. It took me a long time to find out all these things, and I guess I've wasted just as much gasoline in my early driving days as you have. You can pay me back by passing the dope along to the next friend you drive with, when you see him make the same mistakes. So long, old man, and thanks for the ride."

Guard for Carpet Beater

A guard made from an old piece of leather belting and fastened to the handle of a carpet beater, as shown in sketch, will protect the knuckles while beating a carpet or rug, as it prevents them from coming in contact with the rough carpet. Where much work of this kind is to be done this guard will be appreciated.



Keeping Insects from Spotting Painted Surfaces

Most amateurs usually hold off painting jobs in and about the home until warm weather. This may be good practice in one way, but at that season of the year the newly painted surfaces are very attractive to insects and if they get on the paint—as they naturally do—the appearance is ruined. A good method of preventing this and particularly valuable when painting seats, arbors and other garden furniture, especially if they are painted white or some light color, is the addition of $\frac{1}{2}$ pt. of cedar oil to every gallon of paint. This oil will not injure the paint in any way. Very little turpentine should be added to the paint, if it is ready-mixed. The cedar oil is so effective that it more than justifies the slight expense incurred. Its odor will be objectionable to the insects, and the paint will have a chance to dry before it can be spotted, which it cannot fail to be if no precaution has been taken to keep the pests away.—L. H. Georger, Buffalo, N. Y.

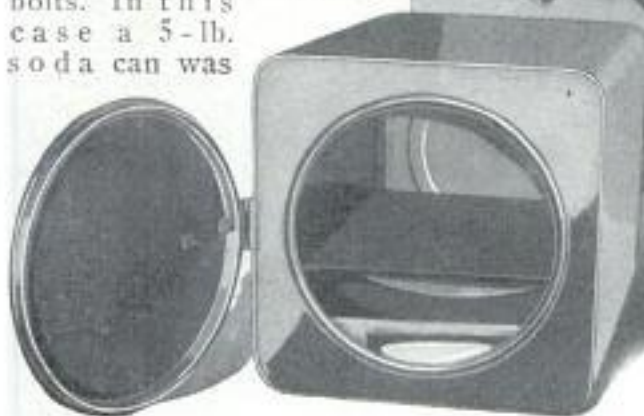
Storm Window Inclosed with Strips Makes Neat Winter "Icebox"

By using two tapered strips of wood and a board on the kitchen-window sill, when the winter storm sash is attached, considerable space can be provided for cooling food, etc. The photo clearly shows how this is arranged. The sidepieces are 8 in. wide at the base and the shelf is mortised into the lower edges. Cleats form a seat for the edge of the sash, while wingnuts hold it in place.



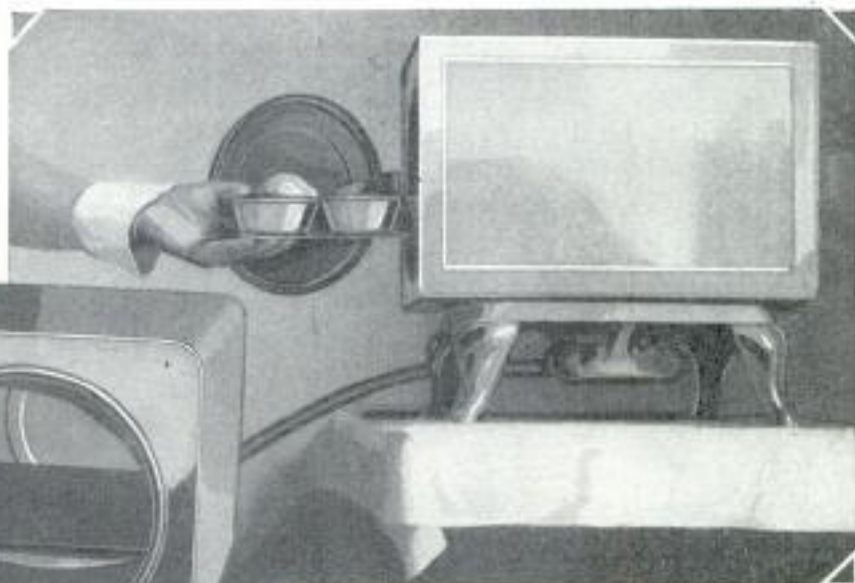
Novel Baking Oven Made from Tin Can

A small oven, which has proved satisfactory for baking pies, cakes, potatoes, apples and other things with a one-burner gas plate, can readily be made from a large tin box, as shown in the illustration. The circular cover was fastened to one side with a hinge to form a door, the hinge being bolted to both door and side with small stovebolts. In this case a 5-lb. soda can was



used, which measured $9\frac{1}{2}$ by $9\frac{1}{2}$ by $11\frac{1}{2}$ in., outside dimensions, and had an opening 7 in. in diameter. A 7-in. square hole was cut in the side to be used as a bottom.

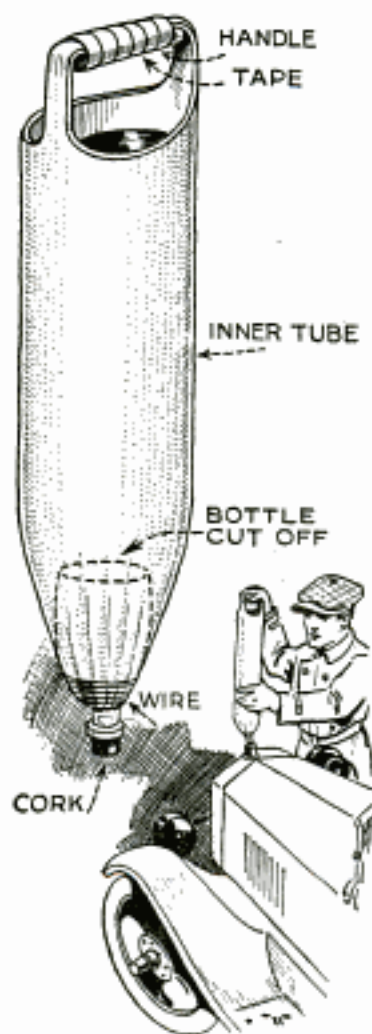
Two pieces of tin were bent over to form right-angle brackets and bolted to the sides to support a sheet-metal shelf on which the baking tins are placed. As the door opening is only 7 in. in diameter and consequently the shelf cannot be more



This Simple Oven, Made from Tin Can and Fitted with a Shelf and a Hinged Door, Is Efficient for Ordinary Baking; Heat Is Supplied by a Gas Plate

than about $6\frac{1}{4}$ in. wide, the supporting brackets should extend a little into the door opening.—H. E. Bethe, Green Bay, Wisconsin.

Handy Water Container



edge filed smooth. A short piece of wood serves to stiffen the handle, and ordinary tape is used to bind them together. The container can be rolled up and stowed under the back seat.—F. S. Root, Fall River, Mass.

Redecorating the Old Fireplace

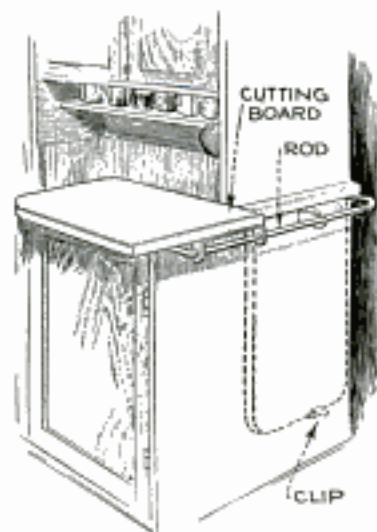
Bringing the old tile and golden-oak fireplace and mantle up to date is a problem faced in many old homes. It may be easily and effectively done by means of one of the new plastic paints now on the market. Gezzo may be used for this purpose. It can be obtained at any store selling art supplies. In the case of one fireplace with an ornate mirror over the mantle and pillars of oak on either side of the tile-faced grate, the mirror was removed and the pillars torn out, leaving the front plain. Tile, which had loosened or were out of place, were replaced. Then the wood and tile were carefully washed to remove all dust and smoke both on the outside and around the grate. The plas-

tic paint, which comes in white powder form, was mixed to a medium-thick consistency, and as a Caen-stone finish was desired, it was tinted with a yellow-ocher oil paint thinned with turpentine. The resultant mix was applied to the entire surface. While still wet, the paint was stippled with an ordinary stippling brush and marked into blocks by means of a nail and straightedge. Over this, a glaze, which comes with the paint, was applied to make it washable and also to give the effect of light and shade produced by real Caen stone. The wall around the grate was glazed to produce a smoky hue. The result was most pleasing and the work was all done by the owner of the home. Any desired shade and finish can be produced with this paint.

Cutting Board for Kitchen Cabinet

In order to avoid unsightly marks on her kitchen furniture, every housewife will insist on a special board on which to cut bread, meat, fruit, vegetables, etc. Ordinarily, this board is kept separate from the cabinet or table, but it will be found much more convenient if it is hinged to the edge of either, as shown in the illustration. The attachment is easily made and provides a simple method of swinging the board into position for use or out of the way when not needed.

A piece of $\frac{3}{8}$ -in. iron rod, about 20 in. long, is obtained; also a piece of $\frac{1}{8}$ by 1-in. flat iron, about 10 in. long. The latter is bent over at right angles at the ends and the ends then drilled to receive the $\frac{3}{8}$ -in. rod. The flat piece is attached to the underside of the cutting board by means of wood screws, and the rod to the table or cabinet, as shown. When needed, the board is swung up on the table, and after use, it is turned over and pushed back to the position indicated by the dotted lines. A spring clip on the side of a cabinet will keep the board from slamming against the cabinet and marring its finish.—Jas. H. Rodgers, Toronto, Can.



A. H. Abbot & Co., 208 S. Wabash, Chicago

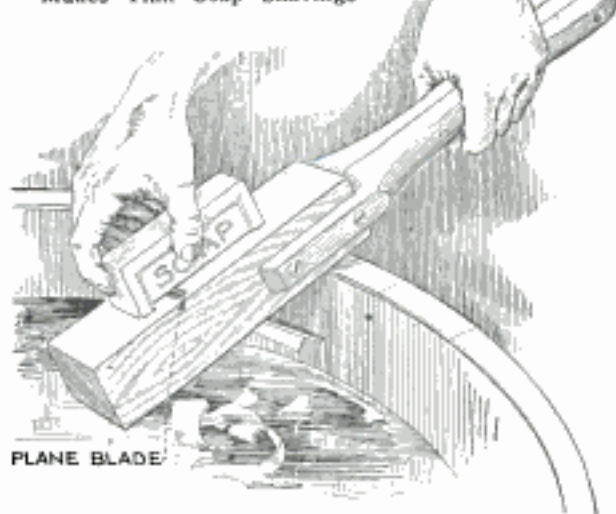
Improving the Hedge Shears

Everyone who has used the 6 to 8-in. hedge shears has found them impractical for removing canes of advanced growth, since the shears slip. This trouble may be overcome, without decreasing the usefulness of the shears for regular work, by filing notches in one blade as follows: Mark one blade, its entire length, at $\frac{1}{2}$ -in. intervals. At each mark place the corner of a flat file on the cutting bevel and file notches at least $\frac{1}{8}$ in. deep. I make a business of trimming trees and shrubs. Several years ago, while attempting to trim an overgrown privet hedge with a new pair of shears I became disgusted and applied my file, and have filed notches in every shear I have used since.—John W. Farmer, Kansas City, Mo.

Shaving Soap for the Washing Machine

It is quite difficult to cut soap shavings thin enough for the washtub so that they will soon dissolve and work into lather quickly. With the aid of the cutter shown in the illustration, however, this can be done easily. The tool is made in the following way: Get a piece of 2 by 4-in. pine, 18 or 20 in. long; drill several holes slantingly through one side, and chisel out the material between them to make one rectangular slot. Then provide a plane bit and a wooden wedge to hold the bit in place. The surface should, of course, be sandpapered smooth to prevent getting splinters into the hand or fingers. If an old wooden plane is obtainable, it can be used simply by adding a handle as shown. In

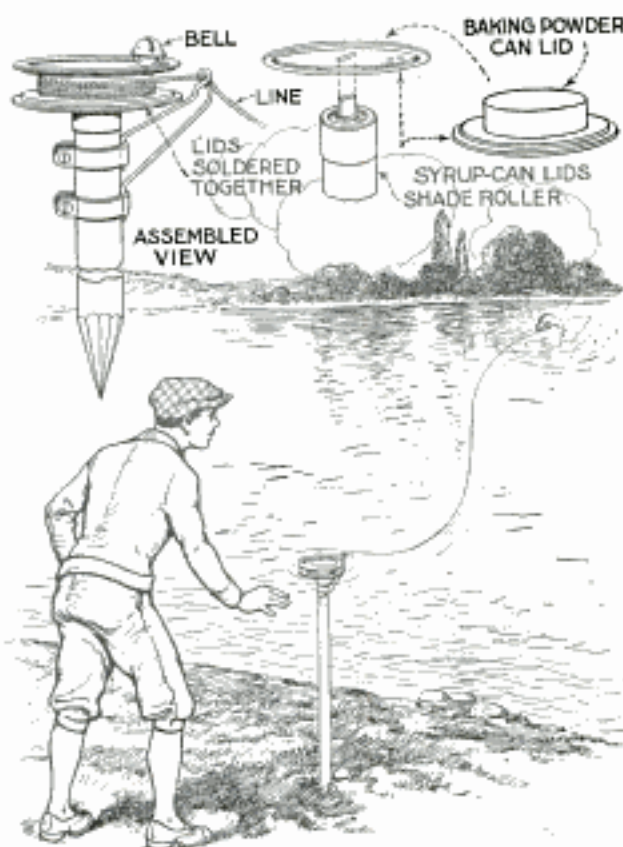
An Old Plane Fitted with Handle
Makes Thin Soap Shavings



either case, soap shavings can be cut so thin that they are nearly transparent.—E. D. Fahling, Tama, Iowa.

Automatic Mechanical Fisherman

This automatic fisherman, made from an old window-shade roller and three tin-can lids, will hook and play a fish until



With This Mechanical Fisherman the Fish Is Hooked
and Played Automatically

the fisherman gets there. Its construction is clearly shown in the upper details of the illustration. The lids are soldered together to form a reel for the fishline and this reel is in turn soldered securely to the square pin on the end of the shade roller. A little bell may also be fastened to the top of the reel to give an alarm when a fish is caught. The lower end of the shade roller is pointed so that it can be pushed into the bank to stand solidly. A wire bracket, with a small eye, is clamped to the roller just under the reel, to serve as a guide for the line, as shown in the left-hand detail.

The end of the line is tied to the reel and wound around it a few times, then pulled out until the tension of the spring is quite strong. Then the catch is allowed to lock, and the line is cast out. About one turn of the line should be left on the reel to take up the shock when the fish bites. When the fish pulls the line the catch releases, giving a sudden jerk, which hooks the fish. The catch will not lock again as long as the fish keeps on fighting.—A. Perrault, Vancouver, Can.

Handy Study Chair Is Easily Made

Almost everyone is familiar with the common type of desk chair used in most high schools and colleges. The table or



The Common Type of Desk Chair Can Be Improved by Providing an Arm That Swings Out of the Way When Not Needed

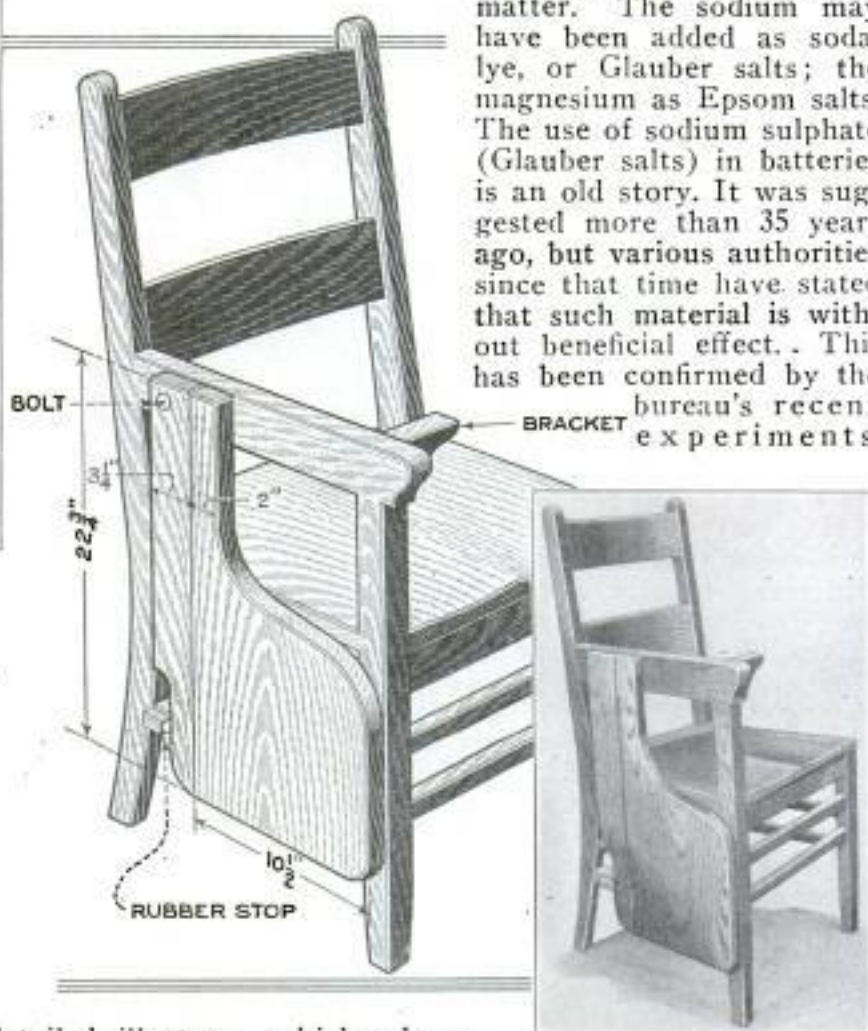
desk part is simply a flat board mounted on the right-hand side to serve as a writing board. The disadvantage of these chairs is that the writing board is made a fixed attachment and therefore is in the way when not needed. An improvement is shown in the photos and the detailed illustration. The board is hinged to a member pivoted to the chair arm so that the whole can be swung over and dropped on one side of the chair. The construction is simply and fully explained in the drawing.—W. C. Harris, Brooklyn, N. Y.

Solutions That "Charge" Storage Batteries

Changing the solution in a storage battery does not charge it. An investigation has recently been made at the bureau of standards of certain solutions which were said to charge batteries instantly, or in a short time as compared with the usual process. These tests have shown that batteries containing these solutions, contrary to the claims made for them, behave exactly in accordance with well-established laws of electrochemistry.

Analysis revealed that these solutions

contain 38 to 42 per cent of sulphuric acid which is about the amount in the ordinary electrolyte of an automobile battery when charged. In some of them were found also significant amounts of sodium or magnesium as well as coloring matter. The sodium may have been added as soda, lye, or Glauber salts; the magnesium as Epsom salts. The use of sodium sulphate (Glauber salts) in batteries is an old story. It was suggested more than 35 years ago, but various authorities since that time have stated that such material is without beneficial effect. This has been confirmed by the bureau's recent experiments,

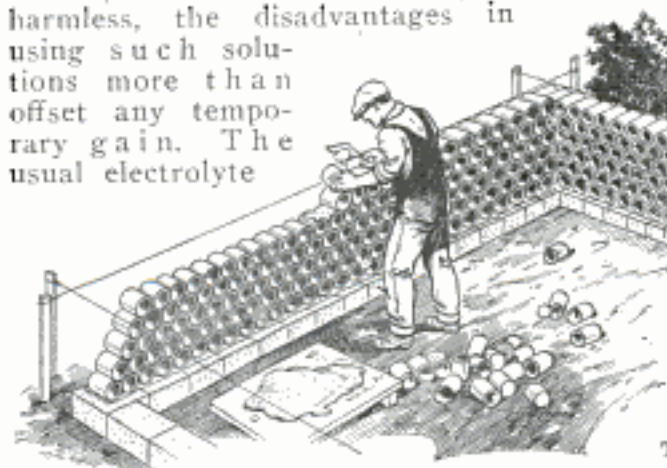


which show that the rate of sulphation of plates is entirely unaffected by even 4 to 5 per cent of Epsom or Glauber salts.

Comparison was made between batteries containing these solutions and similar batteries containing electrolyte of sulphuric acid of equivalent strength. No essential differences were shown in the charging, the voltage, the efficiency, or the temperature. When a battery is said to be charged, it is understood that the battery is fully charged. A battery which is almost completely discharged may have nearly the same voltage as one that is charged. In this condition it may be able to operate the starter of an automobile, but this fact cannot be taken as evidence that the battery is fully charged. It takes as long to charge completely a battery containing one of these solutions as to charge a similar battery containing the ordinary electrolyte.

The indiscriminate addition of these solutions to a battery is not advisable, although in some cases no great harm may be done. If the solution is used to replace the electrolyte of a completely discharged battery, as is usually the case, the battery may be spurred on to give a little more current because the plates retain a surplus of active material. When the battery is recharged again by an electric current, however, the specific gravity will rise much too high. This is because the acid formed at the plates by the charging current is added to the acid already present in the solution. In the bureau's experiments it rose to 1.365. This is not desirable, because the local action or self-discharge within the battery is materially increased. A battery containing one of these solutions lost 47 per cent of its charge in four weeks as compared with 8 per cent which was lost by a similar battery with the ordinary solution. Batteries containing solution of higher than normal specific gravity often give less capacity at high rates of discharge—as when cranking the engine of an automobile—depending upon the behavior of the negative plates. The higher the specific gravity of the electrolyte the more injurious is the action upon the separators. It is a well-recognized principle in battery operation that acid should be added only to replace that which may have been spilled, or in rare instances to adjust the specific gravity to the required standard after the completion of a full charge.

Although the materials and coloring matter, considered individually, may be harmless, the disadvantages in using such solutions more than offset any temporary gain. The usual electrolyte

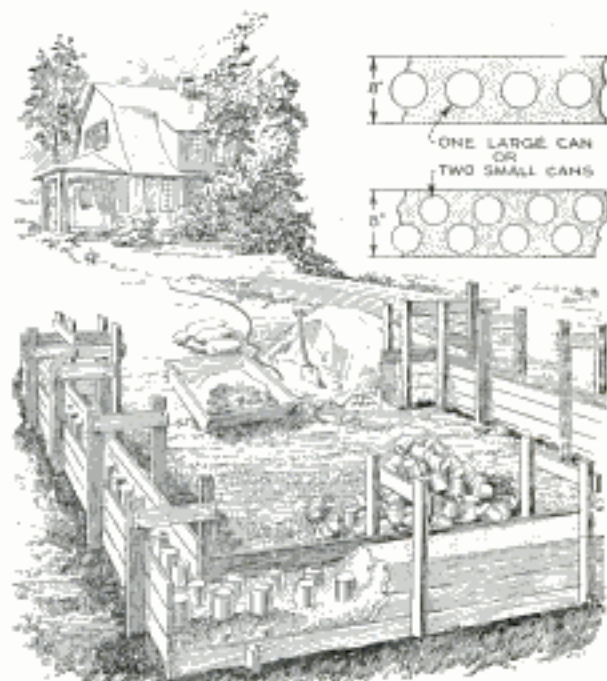


of pure sulphuric acid and water, adjusted to the proper specific gravity, is believed to be the best.

☛ When tying a number of sheets of paper together make holes with an awl and pull the string through with a hook.

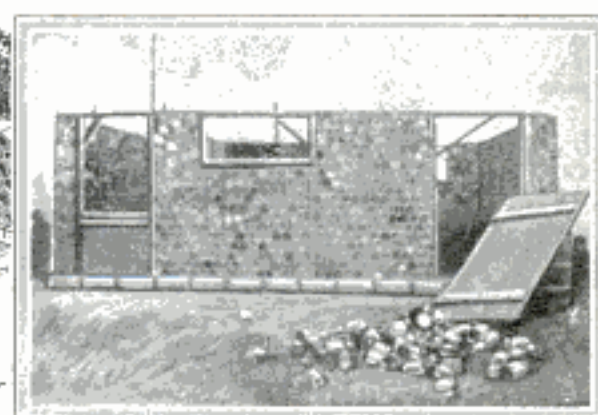
Using Tin Cans in Concrete Walls

Old tin cans, usually thrown away, can be used to advantage in masonry work,



Old Tin Cans Imbedded in Concrete Foundation of Garage Lower Its Cost

such as walls and foundations. This construction provides air spaces in the wall which mean better insulation against heat and cold, but, of course, does not make so strong a wall as solid concrete. Yet, for small buildings, it has sufficient strength. There are two methods of using the tin cans, as shown in the two drawings. In the first, only a few tin cans are



This Wall Consists of Tin Cans Laid Horizontally, with Mortar to Hold Them Together

set up vertically while the concrete is poured around them. In the latter method, the tin cans are laid horizontally and mortar is used to hold them together. When finished a coating of cement, plaster or stucco is applied to the outside.—B. D. Gause, Elkhart, Ind.

Making a Power-Driven Ice Bicycle

Latest Winter Diversion for the Youngsters with Homemade Device Found Thrilling But Safe

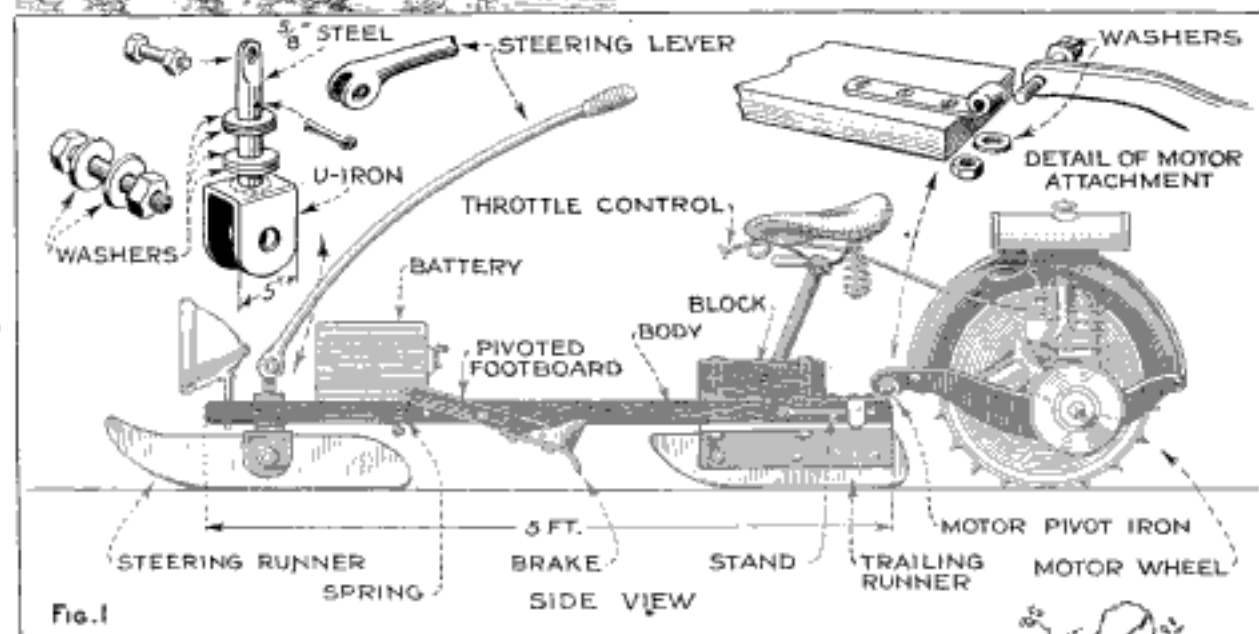
By L. B. ROBBINS

WHEN snow-filled roads make the use of the bicycle impossible and outdoor sport seems limited, it is time to build the fast ice speeder shown in the drawings. It is simple in design and the parts can readily be obtained, so that anyone who has a little mechanical skill can build it. A motor wheel, such as used with bicycles and children's autos, provides the power. On smooth ice it is possible to make 35 to 40 miles per hour, and with a fair wind behind much greater speed can be expected.

Practically all the parts necessary in the construction of this device can be picked up at any garage or automobile junk yard. The body consists of a 2-in.

Any auto headlight with a vertical support can be used.

About 6 in. behind the first hole drill a $\frac{3}{4}$ -in. hole for the steering-runner post. A few inches behind this, say about 1 ft. from the front edge of the board, a storage-battery box or a box for dry cells is attached. This battery is to furnish current for the headlight and for a horn or bell, if desired. Next, measure 2 ft. from the front end and drill a $\frac{1}{2}$ -in. hole through the board from edge to edge, taking care to drill it through the exact center and at right angles to the edges. A long bit, the kind used by electricians, will have to be used for this purpose. A piece of $\frac{1}{2}$ -in. iron rod, 28 in. long and threaded at both ends, is pushed through this hole, to project 9 in. on either side. The footboards, to which the brakes are attached, are bored through and pivoted on these projections, and consist of two pieces of 1-in. hardwood, about 1 ft. long and 8 in. wide. Round the back end of each and screw on a semicircular piece of



plank, 5 ft. long and 10 in. wide, planed smooth on both sides. The corners are rounded slightly and both sides and edges are given a thorough application of linseed oil to protect the wood against the weather. Drill a hole through the center of the plank, about 1 in. from the front end. This is for the headlight post.

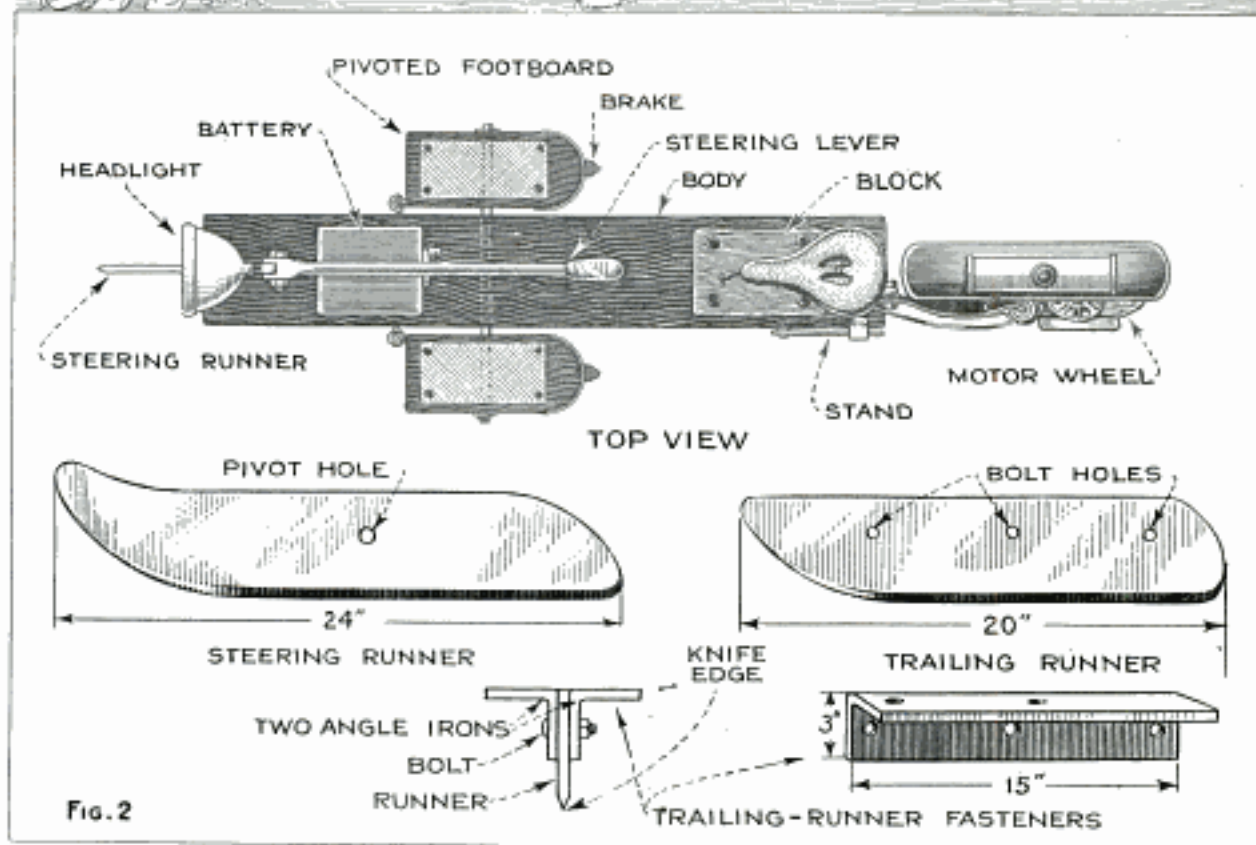
Side View of the Ice Bicycle, Showing Details of Steering Equipment, Motor-Wheel Pivot Support, and Other Parts



Motor. Bugg. Stratton Co., 1047 Long St., Milwaukee, Wis.

thin sheet metal to make a heel guard, then tack a piece of rubber matting on the top side for treads. Nuts are driven on the threaded ends to hold the footboards on and a couple of washers are used between the footboards and the body to prevent binding. Small coil springs are attached to the front edge of the foot-

Top View Showing How the Footboards Are Pivoted, Details of Runner Construction and Their Dimensions



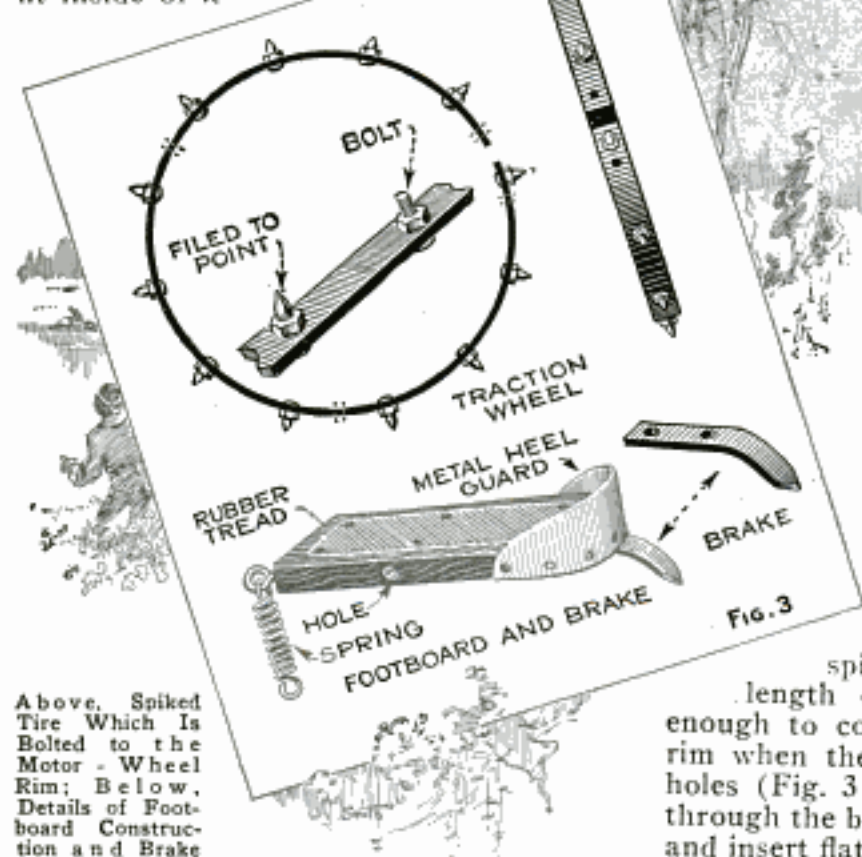
boards and to the body, as indicated, to hold them up against normal foot pressure. Underneath the footboards, at the rear, a piece of steel rod, bent down sharply and ground to a sharp point, is screwed on, to act as a brake, as shown in Fig. 3.

The motor-wheel attachment (see Fig. 1) consists of a piece of flat steel about 10 in. long, with one end bent over to form an eye, $\frac{1}{2}$ in. in diameter. Three holes are drilled through the flat portion and it is bolted to the plank, about 2 in. from the left edge, so that the eye projects slightly over the rear end of the plank and turns upward. Then cut a block of wood,

1 ft. long, 4 in. deep and 6 in. wide, and place it on the bank 6 in. from the rear end, in the position indicated in Figs. 1 and 2. Toenail it to the plank temporarily and drill a vertical hole in each corner, through both block and plank, leaving the permanent fastening until later.

The runners are shown in Fig. 2. They are made from sheet steel, $\frac{3}{8}$ in. thick and 6 in. wide. The steering runner is 24 in. long and the trailing runner 20 in. As will be noted, the steering runner is turned up slightly at the front so that it will be sure to ride over small obstructions. Drill a $\frac{1}{2}$ -in. pivot hole through the center of

the steering runner and three similar holes, in line and slightly nearer the top edge, in the rear runner. Then grind the bottom edges of the runners to a knife-edge. The steering mechanism is shown in Fig. 1. It consists of a U-shaped piece of flat steel, $\frac{1}{2}$ in. between sides and drilled so the runner will fit inside of it



Above, Spiked Tire Which Is Bolted to the Motor Wheel Rim; Below, Details of Footboard Construction and Brake

and pivot on a short bolt through the holes shown. The post is a piece of $\frac{5}{8}$ -in. round steel riveted vertically into the top of the U-iron and flattened at the top. Place two washers over the U-iron, push the post through the hole in the plank, then place two more washers over the plank and drill the post for a cotterpin to prevent end play as much as possible. The end of a length of curved steel tubing or rod, which is used for the steering lever, should be split and drilled to bolt loosely over the flattened end of the post. This makes a flexible joint. Push a bicycle handlebar grip on the end.

The trailing runner is bolted between two steel angle irons 15 in. long and 3 in. wide on each leg, as shown in Fig. 2. This assembly is placed under the plank so the front ends of the angle irons are directly below the front of the block and in the exact center. Four holes are then drilled in the angles to coincide with the four

holes in the block. The block and runner irons can now be fastened solidly to the plank with four long bolts. Remove the nails from the block and drill a hole for a bicycle saddle post, at an angle through the block and plank, as shown. A small metal wedge driven in snugly will prevent the post from turning.

At the rear end, on one edge, pivot a short piece of round iron so that it can be turned down to keep the speeder upright when standing still. A spring clip holds this up when not in use. The body assembly is now completed. Give all wood and exposed metal a coat of bright paint and connect the headlight to the battery, using a switch to cut off the current when not used.

Traction for the motor wheel is provided by a spiked tire. This consists of a length of $\frac{1}{4}$ -in. flat steel, wide enough to conveniently fit in the wheel rim when the tire is removed. Drill 18 holes (Fig. 3 shows only some of them) through the band, at equal distances apart, and insert flat-head steel bolts, $\frac{3}{4}$ in. long, with heads on the inside. Run thin nuts down tightly on the outside and then file each bolt to a point, as in Fig. 3. Bend the strip to a circular shape to fit around the wheel and drill a hole near each end and two at other convenient points, and fasten the strip to the rim with bolts, similar holes being drilled in the rim. Attach the motor wheel to the pivot iron at the rear of the plank with a bolt just as it would be attached to a bicycle. Run the flexible throttle control through the saddle springs (see Fig. 1) to the front. Now, with the tank filled, you are ready for a trial. Set the spark and throttle and run along a few feet on the ice until the motor starts. Then step aboard the plank and seat yourself on the saddle, placing your feet on the footboards. Steer just as though riding a bicycle, but be careful to make wide turns as a short one might lead to a bad spill. To stop abruptly, shut off the motor and press down on the footboards with the heels.

Containers for Grinding Compounds

Suitable containers for holding grinding compound, soapstone, polishing materials and other powdered stuff in the garage, are rather hard to find, but one mechanic solved the difficulty in an ingenious way and at no cost. Talcum-powder tins with perforated tops, which can be picked up in any home, are the containers used. These are held in a simple rack on the back of the bench, and are much handier than any of the usual open-top tins, as the material can be sifted out of the perforations in as small quantities as required, without waste. Flat tobacco tins will serve the same purpose if holes are punched in the hinged tops.—G. A. Luers, Washington, D. C.

Handy Funnel for Gas Tank

In many autos the filling spout of the gasoline tank is between the tire rack and the back of the car, leaving a space only about 6 in. wide.

When gasoline must be poured into the tank from a can this proves to be very awkward, even if a funnel of the ordinary type is used. The illustration shows how I overcame this difficulty. I obtained a gallon can that formerly had contained hair tonic; this was 8 in. long,



3 in. wide and 12 in. high. I cut the height down to 5 in. and slit the cut edge so as to make a number of small "ears." A piece of baling wire was then bent around the edge and the ears bent over it as shown in the detail. A handle made of baling wire completed the device. This is much more easy to pack in the car than a funnel of the ordinary kind, and gasoline can be poured into it quite easily without danger of spilling it over the rear of the car. In addition to this, when the cap is in place on the can spout it serves as a pail for carrying water or oil in emergency.—William Calvert, Vickery, Texas.

Novel Hay Door Saves Work

Instead of providing his barn with the usual doors which swing open or slide



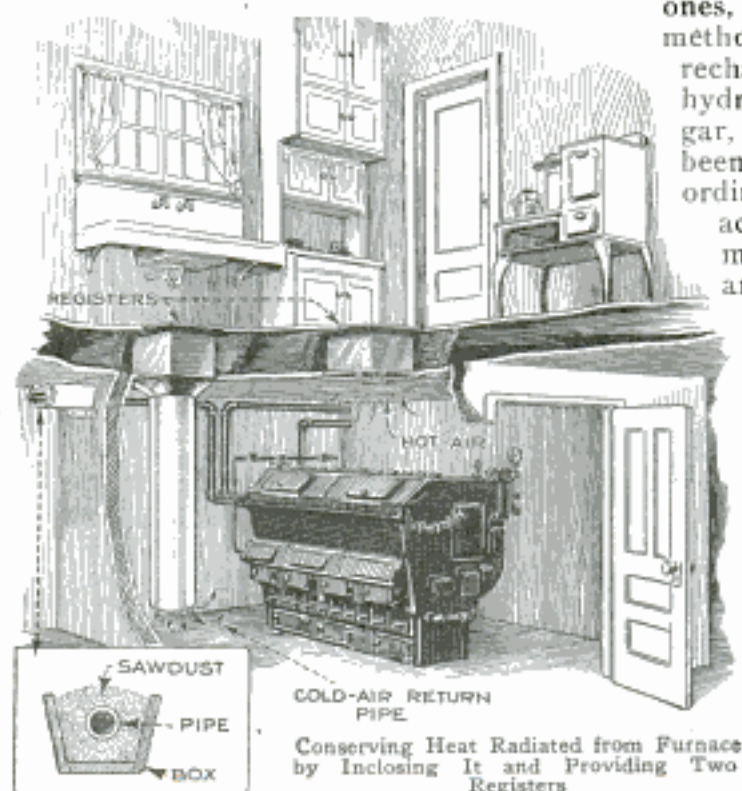
Projecting Gable with Trapdoor on Barn Makes It Easier to Take In Hay

downward on tracks, a Nebraska farmer used the trapdoor shown in the photo. The gable is extended and the bottom is divided in the middle, each half forming a door which swings downward and is drawn up in place again with two ropes operated by the team that lifts the hay into the mow. The projection is 10 ft. square and 16 ft. high from floor to peak. Its roof is merely a continuation of the upper part of the hip roof. The carrier track continues along the ridge to the end of the projection and when the doors are lowered a chute or mow is formed which takes the hay in. The owner declares this type of construction is superior to the method commonly used in that it is handier, the opening can be closed easier and the walls of the projection form adequate anchorage for the extended track.—Dale R. Van Horn, Walton, Nebr.

☞ To prevent dresses and coats hung on ordinary hangers from slipping off, twist rubber bands around each arm of the hanger about 1 in. from ends; these provide friction enough to overcome the tendency to slip.

Conserving Furnace Heat

Considerable heat is radiated from the furnace in the basement where it is not needed so much as in the rooms above. A



simple method of turning this waste to account is shown in the illustration. Walls are built around the furnace forming a small room and two registers are provided in the floor above, as indicated. One of these has a length of galvanized-iron pipe extending under it nearly to the basement floor. All steam or hot-water pipes running along the ceiling in the basement are packed in sawdust as in the lower left-hand detail, if they are not already wrapped with asbestos. The heat given off by the furnace passes up through one register and the colder air in the room above returns into the furnace room through the other register.—Walter J. Wilhelm, Randolph, N. Y.

Burning Off Dry Weeds

Recently I noticed workmen along the highway using a novel and practical method of burning off dry weeds and grass. An old tire was first set afire and slowly dragged along by means of a wire, about 12 or 15 ft. long. One man stood by with a fire extinguisher in case the blaze should spread too far or come too near the fence.—M. M. Fishback, Orange, California.

Recharging Dry Cells

Many times I have thrown away old dry cells even though the outward appearance of the cells was similar to fresh ones, with the zinc cover intact. Several methods had been used in an attempt to recharge them, including the addition of hydrochloric acid, common salt, vinegar, and sal-ammoniac solution. All had been highly praised, but I got no extraordinary results from any. One of the active salts in the dry cell is sal ammoniac. This deteriorates with time and use. To restore the chlorides to the ammonium form, common ammonia water, very strong, should be added. The sealing wax is broken from the top of the cell and ammonia added. When the paste has absorbed this, add more. Do this two or three times. Then place the cell in a warm oven to drive out excess water. Pour melted sealing wax over the paste as before. Flashlight cells, with scarcely enough power to cause a bulb to glow, treated in this manner, will light the bulb practically as efficiently as new cells and it will be found that in many cases they will last almost as long.—Clyde E. Volkers, Terre Haute, Ind.

Holding Umbrella on Suitcase



Tourists and travelers who find it inconvenient to carry an umbrella along with a suitcase will appreciate the holder for it shown in the illustration. Two narrow strips, of the shape indicated, are cut from a discarded inner tube and slits are cut through one side of the suitcase. The ends of the strips are inserted in the slits and the umbrella can then be inserted under them, where it will be held securely.



Shop Notes

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Dumping Body on the Farm Truck

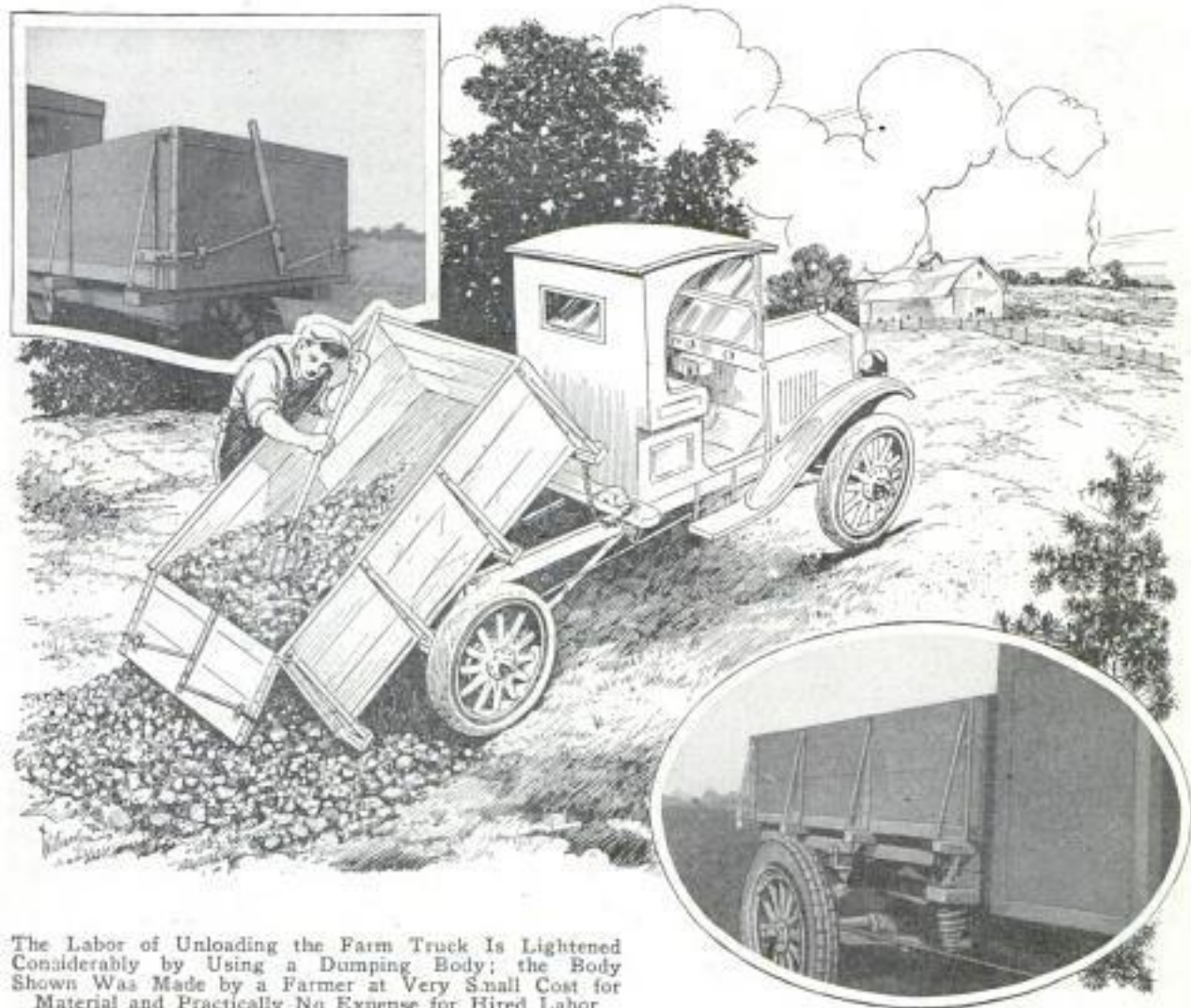
By J. R. KOONTZ

OF all the various kinds of bodies that have been designed for the farm truck the handiest is the dumping body, and it is not a difficult matter to build one. That shown and detailed in the illustrations was made at a cost of less than \$18 for materials, all the work being done by the farmer himself except some blacksmithing.

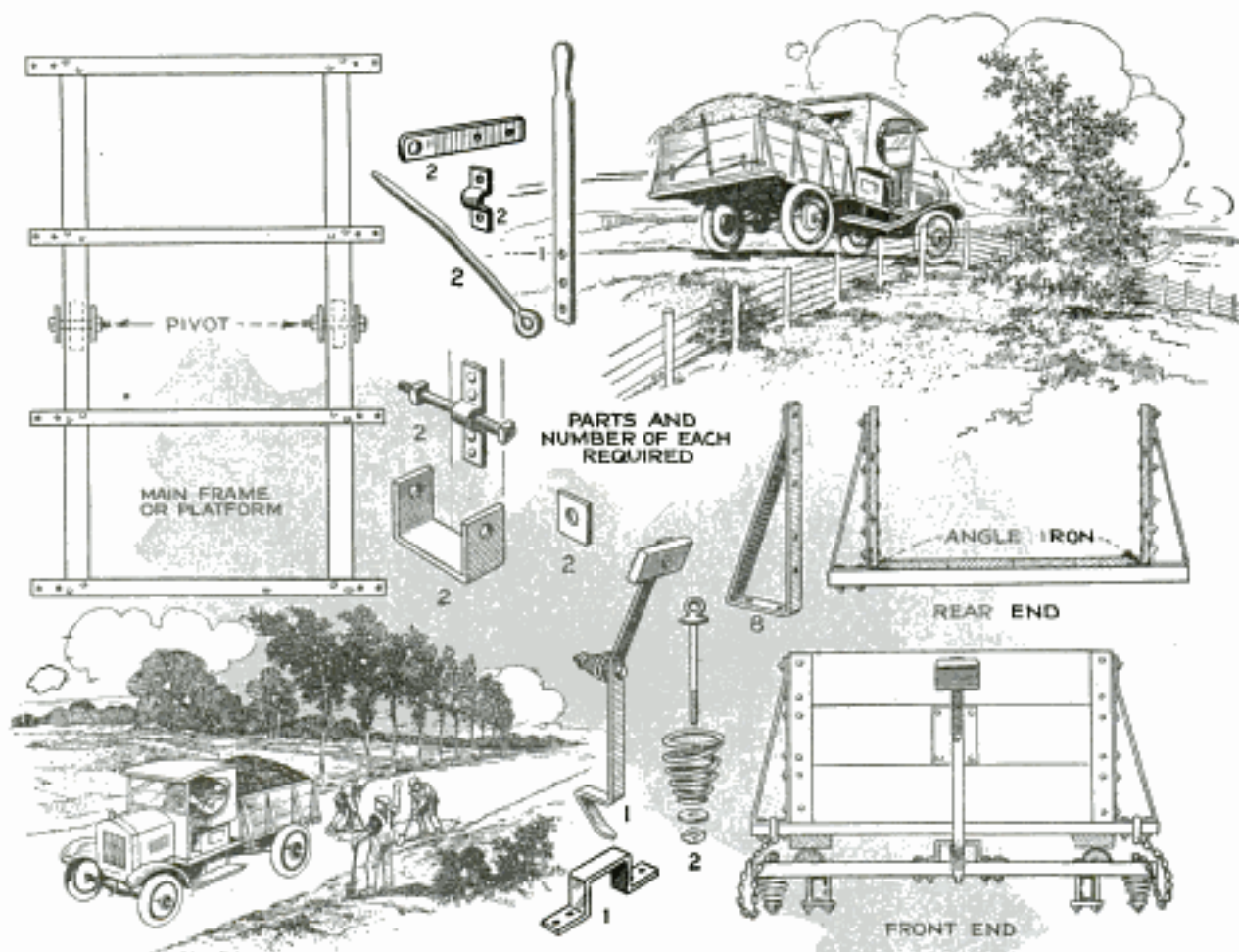
As the body usually gets extremely hard usage it must be substantially built, and for this reason, the frame is made of two

pieces of 3 by 5-in. timber, 6 ft. 8 in. long, across which are bolted at equal intervals four pieces of 2 by 4-in. stock, 3 ft. 10 in. long. The width of the frame is the same as that of the truck chassis, which varies in different makes.

The floor, sides and endpieces are made of 1 or 1¼-in. lumber, preferably cypress. Three boards of 7-in. width are used for the sides, which are held in place securely by means of braces made of 1-in. flat iron, ¼ in. thick, bent to the shape shown in



The Labor of Unloading the Farm Truck Is Lightened Considerably by Using a Dumping Body; the Body Shown Was Made by a Farmer at Very Small Cost for Material and Practically No Expense for Hired Labor



Construction of Body Frame, Side and Floor, Latch on Front Endpiece and Locking Device on Rear Gate, with Details of Necessary Metal Parts

the detail and drilled to receive $\frac{1}{4}$ -in. bolts, two for each board. These braces are also bolted to the ends of the crosspieces, which project on each side of the body. It is advisable to use an ordinary washer and a lock washer before tightening down the nuts, to prevent the latter from loosening from vibration. A length of angle iron with 3-in. flanges is run under each side, as shown, to support the floorboards between the crosspieces.

The front end and the floor are put on in the same way. The rear endpiece is made separately, being reinforced by strips of flat iron, 4 in. wide, screwed to the inside. It is hinged to the top of the sidepieces and opens at the bottom as shown. The latch consists of an old lifting lever from a harrow, or other machine, and other metal parts shown in the upper details, the number required of each being specified. The body is pivoted at its center on the truck chassis, as will be explained later, and therefore, a latch must be made to hold it down at the front end. To provide this latch, a piece of 2 by 5-in. wood, 3 ft. 10 in. long, is bolted to the truck chassis as shown in the front view.

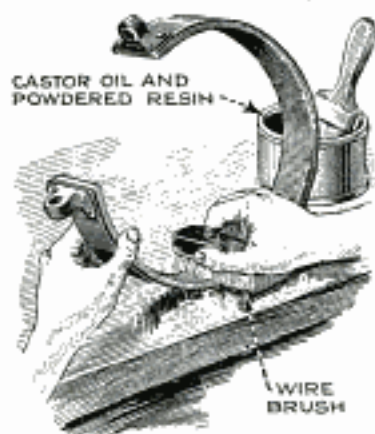
A piece of $\frac{1}{2}$ -in. flat iron is bent over to form a catch for the latch, which engages with it as indicated. The latch is made of the same stock, is bent in the center and has a $\frac{1}{4}$ -in. hole drilled through it for a $\frac{1}{4}$ -in. bolt; a coil spring is slipped over the bolt between the latch and the body to keep the latch closed while traveling. This bolt passes through the front end, iron plates being bolted on either side to reinforce the end. To open the latch, the upper end is pushed in; a weight may be bolted to this end if desired in order to make manipulation of the latch easier. It is necessary to fasten two chains to the front crosspiece of the body and the ends of the 3 by 5-in. pieces carrying the catch, and coil springs are provided to take the shock of the load when it is dumped. Rubber cushions, made from pieces of old solid tires, are provided to absorb the jolt when the box is pushed back in position after the load has been dumped.

The pivots underneath the frame of the body are then put on. They should be placed 42 in. from the front end or exactly in the center of the body. Two pieces of

$\frac{1}{2}$ -in. iron are bent to a U-shape and $\frac{3}{4}$ -in. holes are drilled through both ends. These pieces are welded to the chassis, care being taken to locate them accurately. Bolting them to the chassis is not advisable, as the holes drilled for this purpose would weaken it greatly. Two bolts, $\frac{3}{4}$ -in. in diameter are fastened to the underside of the 3 by 5-in. timbers, and are held with strips of $\frac{1}{2}$ -in. flat iron, which serve as bearings. One piece is used to prevent the bolt from wearing into the wood and the other to hold it in place. Holes are drilled through both of these pieces so that they can be bolted to the frame securely. When finished, an application of creosote or paint will help to improve the appearance of the body and protect the wood from the weather.

Restoring Brake Bands

Brakes that squeak are not necessarily in need of relining. The noise is often due to dirt and grit imbedded in the brake lining and can be removed by scrubbing the lining with gasoline or kerosene and a wire brush. However, some brake linings, which have been neglected for a long time and consequently have the surface glazed and impregnated with grit, cannot be thoroughly cleaned in this way, and it is necessary to apply dressing. A large service station uses a mixture of powdered rosin and castor oil with satisfactory results. The rivet heads holding the lining should be below the surface so that they will not touch the drum. It may be necessary to use a punch and hammer to set the rivets back. If new rivets are needed use only copper rivets.

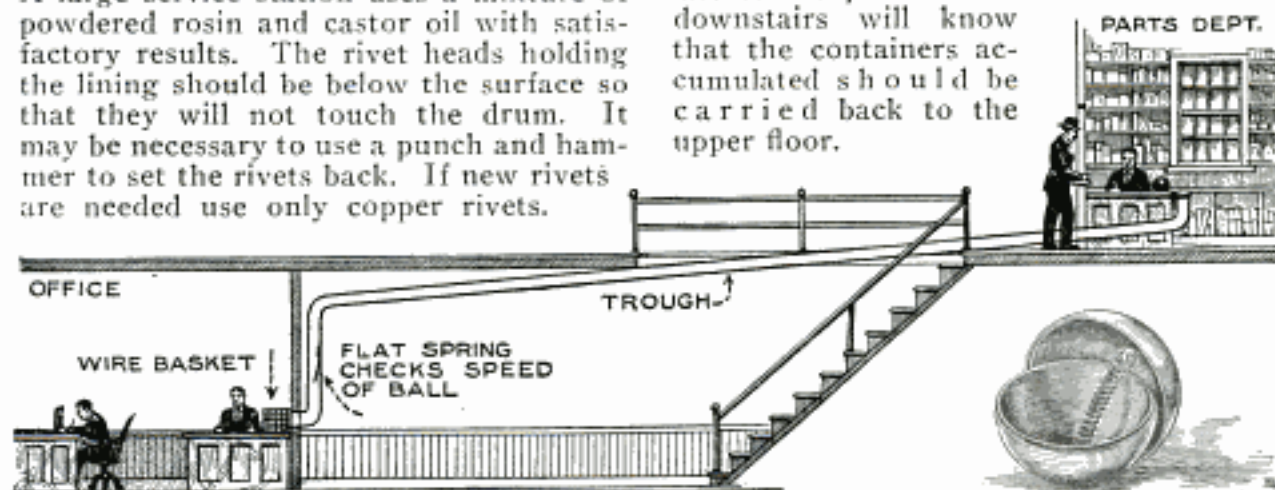


Tester for Determining Negative Wiring Line

Finding the negative line of a house-lighting circuit is an easy matter with the aid of a tester made in the following way: Get a burned-out auto lamp with a tip, and two short lengths of covered wire. These are soldered to the metal contacts, if the lamp is of the double-filament type, or one wire is soldered to the single contact and the other to the side of the ferrule, if a single-contact lamp is used. The lamp is then immersed in a dish of saturated salt water and the tip is clipped off with a pair of pliers or shears, which makes a small opening. The lamp being evacuated of air, brine will enter it until it is practically full, and it will not run out again. To use the tester place the terminals on the live lines to be tested. Gas bubbles will appear on the negative filament support.—J. G. Brown, Evanston, Ill.

Spherical Carriers for Office Messages

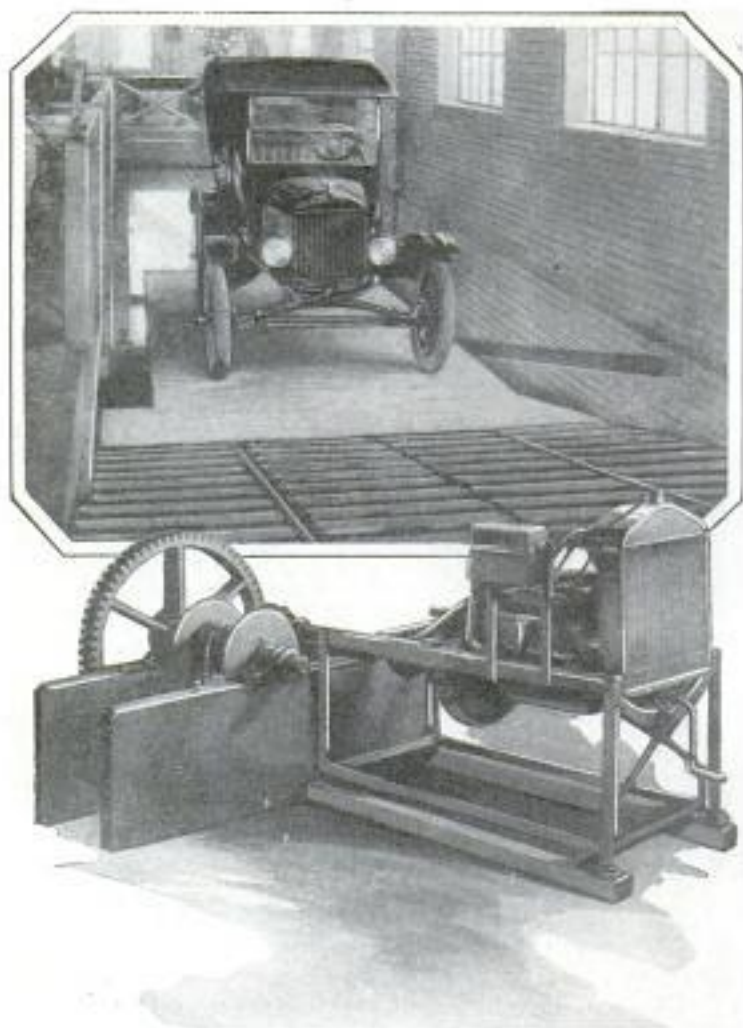
In a Kansas City automobile concern a novel method of carrying requisitions from the parts department on the second floor to the office on the first floor, is used. A trough, about 100 ft. long, is run from the upper desk to one below, as shown in the illustration, with sufficient pitch to cause the hollow balls of light metal used as containers to roll down easily. The balls are cut through in the middle and the two halves are held together by means of a coil spring, as shown in the detail. A flat spring at the lower end of the trough checks the speed of the balls just before they reach a wire basket where they are taken out. The last ball is painted red so that the clerk downstairs will know that the containers accumulated should be carried back to the upper floor.



Novel Method of Carrying Requisitions and Messages from the Second Floor to the First Floor in Spherical Containers Rolled Through a Trough

Combined Auto Stairway and Elevator

By installing the moving platform shown in the illustration instead of an



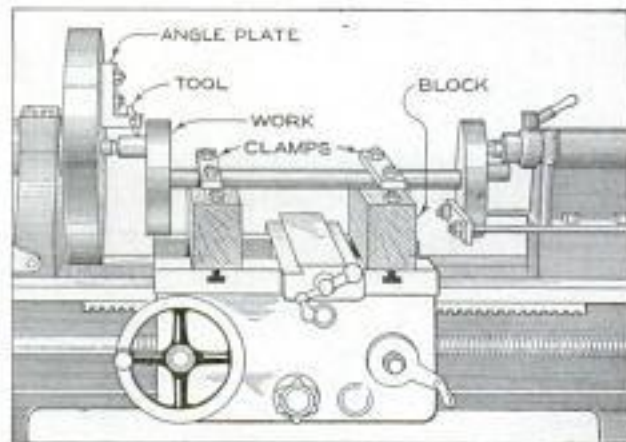
Combination Inclined Run and Elevator from First to Second Floor of Garage

elevator for raising autos from the first to the second floor of his garage, a southern automobile dealer saved nearly \$1,000 in initial expense and \$70 a month in operating cost. An incline of 15° grade leads from the driveway at the street level to the upper floor and is in most cases easily negotiated by cars that can run under their own power. For autos that are wrecked, there is a platform at the lower end of the incline and level with the floor, onto which they are pushed and the whole then pulled up by means of a winch driven by an old auto engine. The platform is provided with wheels, which run on tracks, as shown in the upper photo. The lower photo shows the engine and the drum on which the hoisting cable is wound.—Archie Richardson, Decatur, Georgia.

Turning Work Too Large for Lathe

A mining company high in the mountains of a western state had a breakdown of their hoisting engine, the crankshaft of the double-cylinder hoisting engine snapping off short at the crank disk. A new shaft was ordered immediately, but in spite of all efforts a long delay resulted. When the shaft finally arrived, it was found that the pins were larger than the old ones, in fact so large that the brasses would have had to be bored out entirely in order to make them large enough to fit the crankpins. Having a 24-in. lathe in the mine shops, the crankpins were turned down to a suitable diameter by adopting the method shown in the illustration. Centers were laid out on the crank heads opposite the centers in the crankpins, and the whole was supported by and bolted to wooden blocks that were bolted to the shears. The right-hand disk was clamped to the tailstock, which was left free on the lathe bed. A plain angle toolholder was made as shown in the drawing and bolted to the lathe faceplate. The carriage was then backed away from the headstock and the tool set in its holder, after which the carriage was fed in the regular way, the tool revolving instead of the work. The tool was fed by tapping it inward, and, while this meant careful caliper-ing, it saved the time necessary to provide a fine adjustment.

The center in the headstock was used only when setting up the work, then removed.—A. A. Stafford, Reno, Nev.

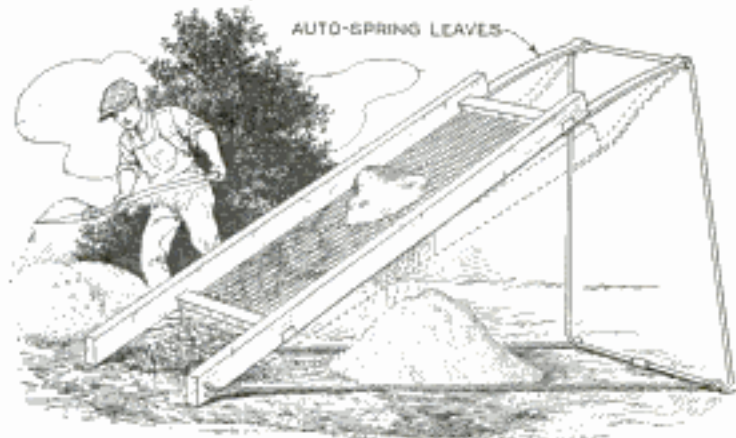


Lathe Setup for Turning Crankpins of Hoisting-Engine Crankshaft

Springs Aid Gravity Sand Sifter

Contractors handling small jobs of cement work usually employ a sloping or gravity-type screen for sifting sand. The sand is shoveled onto the upper end of the screen and, while sliding downward, sifts through, leaving the pebbles and other foreign matter to roll off at the lower end. However, if the sand is damp, it slides slowly, and the workman must then scrape the screen with a shovel to force the sand through. This naturally wears out the screen and necessitates occasional re-covering, and besides is time-wasting and annoying. By bolting two discarded auto-spring leaves on the upper end of the sifter, as shown in the drawing, a Wisconsin contractor eliminated the necessity of scraping the screen. The weight of the sand when thrown onto the upper end of the

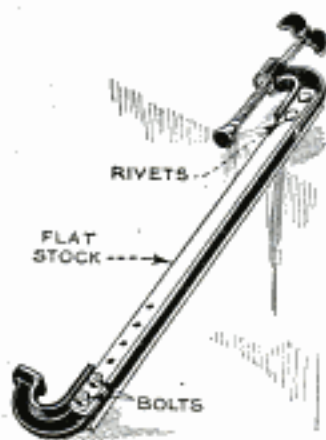
screen causes the springs to vibrate, tossing the sand up and down so that it sifts through the screen readily. The sifter is supported at the rear by a frame of $\frac{3}{4}$ -in. pipe, the springs being attached to the top



This Sifter, Being Supported on Auto Springs, Will Let the Sand through the Screen, Even if It Is Damp

as indicated, and two chains at the bottom keep it from slipping down.

Increasing Size of C-Clamps



The range of the average-size C-clamp can be extended to accommodate any width of work, by cutting it in half and joining the parts with two strips of flat iron or steel, which are fastened by means of rivets and $\frac{3}{8}$ -in. bolts, as shown in the illustration. At the screw end, only two holes are drilled through both strips and clamp, but at the other end a number of equidistant holes are drilled in the strips so that work of many sizes can be accommodated in the clamp.—M. J. Quoits, Philadelphia, Pa.

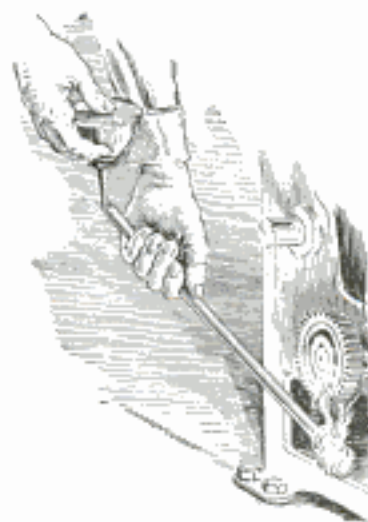
Dentist's Cement for Mechanics

Few mechanics are aware that dental supplies are often useful to them. The cement used by dentists for crown, bridge and gold-inlay work is waterproof, resists corrosion, does not shrink or expand, and has great strength and hardness. The powder and liquid components are easily mixed by the amateur at the time of using, and a hard "set" is obtained in a few

minutes. It is very useful in cementing glass to glass for use under water, though it is desirable to allow it to set before immersion. The cement is valuable also for many other uses.

Removing Stubborn Gears

After considerable use, gears or wheels on tractors and other heavy machinery often become set so that it is very difficult to remove them.



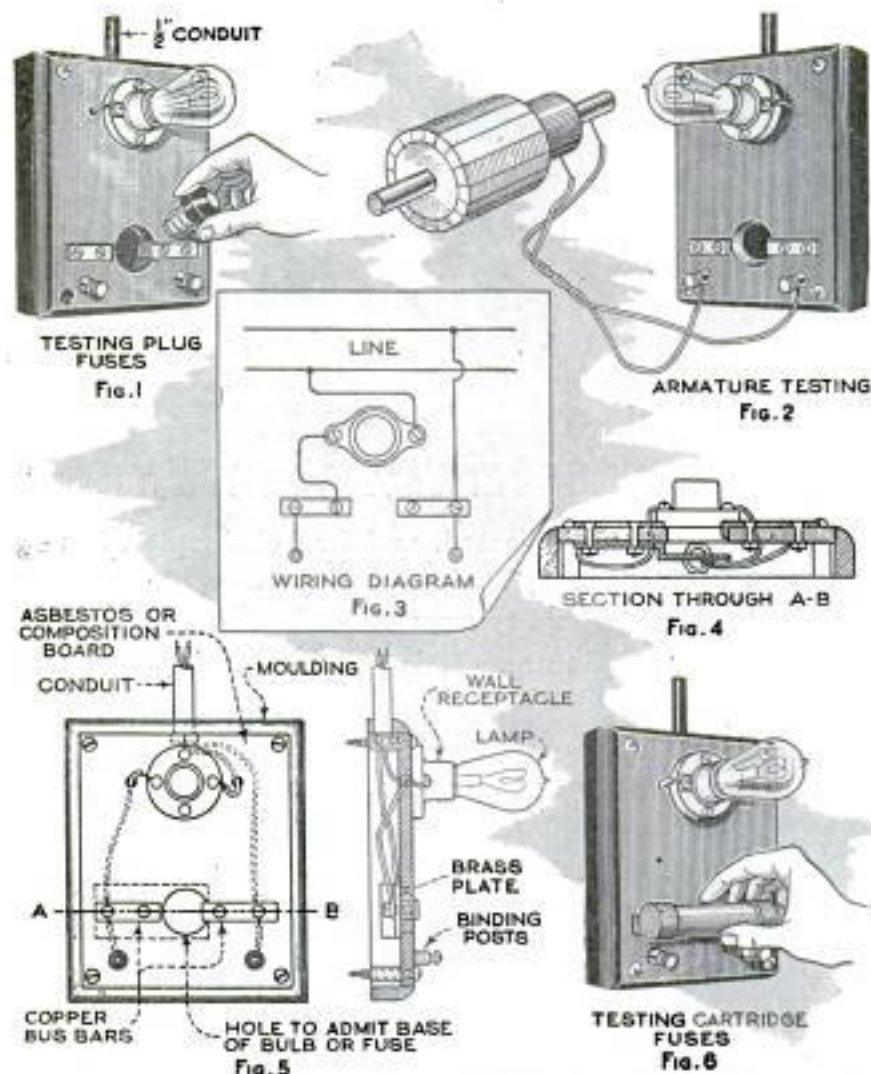
However, they can usually be loosened very easily by the method shown in the illustration. A length of ordinary $\frac{1}{2}$ -in. pipe is wrapped with burlap or cloth at one end, and this is soaked with kerosene and lighted. The flame is held under the gear, and a few drops of kerosene occasionally dropped into the upper end of the pipe with an oilcan to keep the flame burning. When water sizzles on the gear it usually can be easily removed.

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and

S. S. White Dental Mfg. Co. 211 S. 12th St. Phila. Frank Supply Co. 4753
Broadway, Chicago.

Testing Fuses and Lamps

For an all-around tester, the one shown in the illustration is easy to make and will be found to be of considerable usefulness.



Convenient Board for Testing Fuses, Lamps and Armatures Eliminates All Danger of Short Circuits

The board can be made of almost any material on hand; I used asbestos board. When mounted on the wall on wooden

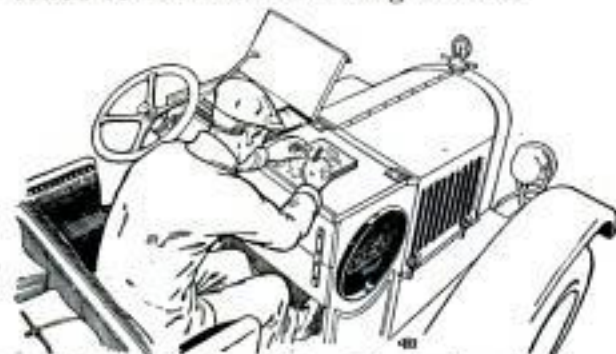
cleats, it can be bordered by quarter-round molding. A hole, large enough to admit plug fuses, is drilled near the bottom, as shown, and a bus bar is screwed down on either side, one being bent over to project into the hole so that it touches the screw shell of a fuse or lamp, while the other is connected to a brass plate directly underneath the hole; this plate must make contact with the center terminal of the fuse or lamp. A wall socket is mounted on the board and connected to the bus bars as shown in Fig. 3. The connections to the lines are also shown. In use, a lamp is screwed into the socket and the fuse or bulb to be tested is inserted into the hole as in Fig. 1. If it is in good condition, the lamp in the socket will light. A pair of radio binding posts are also fastened to the board near the bottom, and are connected to the bus bars so that leads for testing armatures and other work can be attached as shown in Fig. 2. Fig. 4 gives the sectional view, showing the arrangement of bus bars, and Fig. 5 shows how the board is wired. Fig. 6 shows how cartridge fuses are tested. This type of tester is safe, as all connections are

made on the back of the board thus eliminating possibility of short circuits.—W. W. Parker, Lead, S. Dak.

Auto Dash Box and Desk

Drivers of Reo trucks will find a box enclosure for the gasoline tank of considerable convenience as it provides a place for keeping order books, delivery sheets, pencils, shipping tags, and also affords a good surface to write on. The box is made of 1-in. boards and the slanting top, consisting of two parts, is hinged as shown in the drawing. The box itself has no wooden bottom as the gas tank serves the purpose. It must be fitted around the tank snugly and any small openings between the tank and the box may be filled

with waste. The ends of the box are fastened to the dash with angle irons.



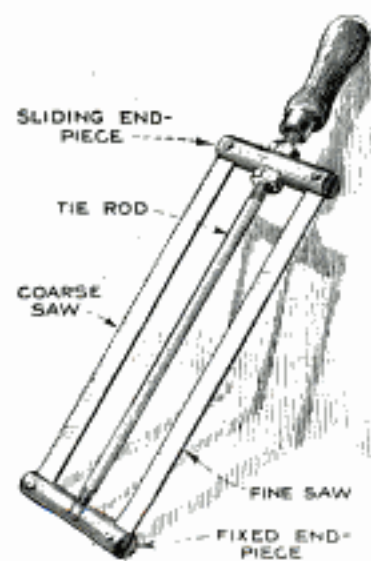
Desk on Box around Gasoline Tank on Truck

Sand Pan to Receive Oil Drip Protects Concrete Floor

Oil has a pronounced tendency to disintegrate concrete. It is not satisfactory merely to wipe off the oil now and then, but it should be prevented from getting in contact with the concrete. If a tank or auto crankcase leaks, fix the leak or provide a shallow pan, filled with sand, for the oil to drip into. It is still better to provide a pit in the garage, which not only eliminates the above-mentioned trouble, but also makes it easy to get at the parts underneath the car when these must be removed or adjusted. The idea, of course, applies to all places where oil leakage occurs.

Hacksaw Frame Takes Fine and Coarse Saws

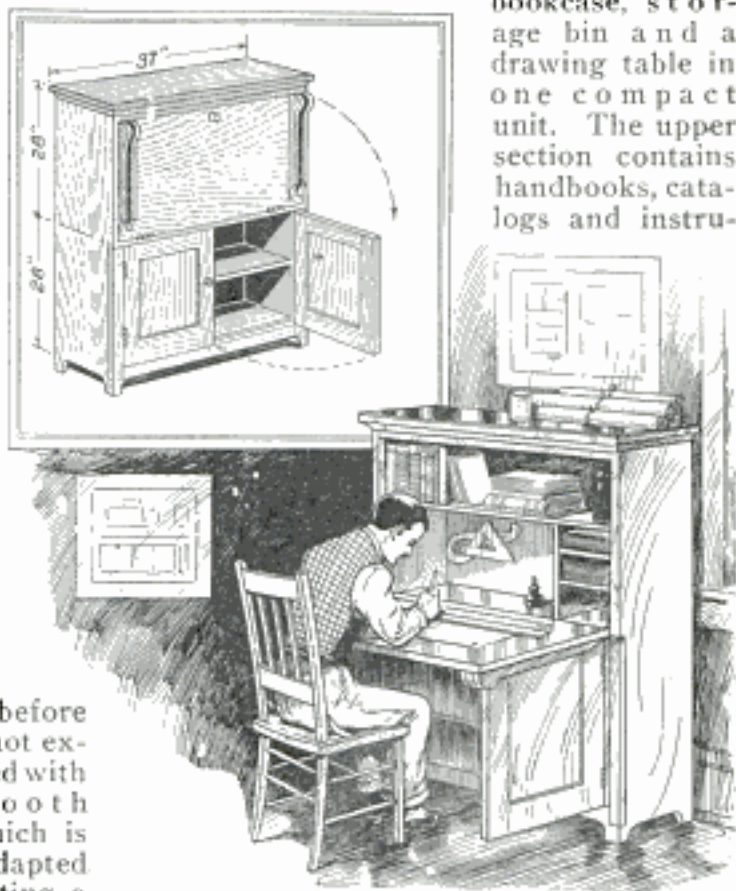
Users of hacksaws are aware of the difficulty of starting a diagonal cut on flat metal. If a coarse blade is used it is liable to slip sideways or break the teeth before the cut is started. This annoyance is not experienced with a fine-tooth saw, which is well adapted for starting a cut, but is too slow to go right through the piece. The double saw holder illustrated is of advantage for such work in a small shop. Two end-pieces, made of $\frac{1}{2}$ -in. round stock, and one piece of $\frac{1}{4}$ -in.



rod as a tie piece, are the essential parts of the frame. One end piece is tapped in the center and slotted on top and bottom to take the saw blades. The other end piece is similarly treated but the central hole is clearing size. On one side a fine-tooth saw is held and on the other a coarse one, the former for starting and the other for cutting. Both saws are tightened up by a nut on one side, a nut on the other side locking the adjustment.—Harry Moore, Montreal, Can.

Draftsman's Cabinet Combines Bookcase and Drawing Table

The illustration shows a draftsman's homemade cabinet, which combines a bookcase, storage bin and a drawing table in one compact unit. The upper section contains handbooks, catalogs and instru-



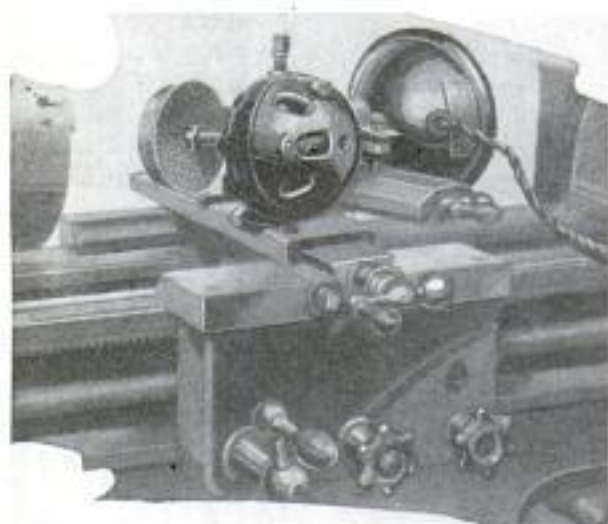
Convenient Draftsman's Cabinet, the Upper Door of Which Serves as a Drawing Board

ments, while the lower section accommodates standard-size rolls of tracing cloth and drawing paper. A drawing board, hinged at the bottom, closes the upper section, and is held in its closed position by a latch. In use, the board is lowered and rested on the doors of the lower section. The drawing board is reinforced by double cleats at the ends, the space between them being such that the edges of the doors fit snugly in it and hold the board securely. With this arrangement there is no need for the draftsman to remove his drawing and put it away for protection; he only needs to lift the board up.—C. Nye, New York City.

☞ To bleach gum shellac, which is naturally dark, it is subjected to the action of chlorine, and when the treatment is overdone the gum becomes insoluble in alcohol. To render it soluble, first moisten the gum with ether equal to about .05 of its weight, and allow the gum to swell in a closed vessel until its solubility is restored.

Lathe Grinder Made from Electric Fan

In a small hardware-manufacturing plant the absence of a lathe grinder pre-



Improved Lathe Grinder Made from Electric Fan Proves Satisfactory

sented quite a problem in grinding a cylindrical punch-press die. Observing an electric fan standing idle in the office, the toolmaker visioned the grinder. The fan guard and blades were removed, the shaft lengthened to hold the grinding wheel, and the arrangement then fastened to the lathe as shown in the photo. So satisfactory was this improvised grinder that in three hours the die was completed and the punch press again in operation.—D. B. Hoag, Kansas City, Mo.

Built-Up Printers' Chase Is Very Substantial

Some time ago, I was working in a printing office where only homemade cast-iron chases were available, which would



not stand up to the work. There were several that showed signs of having been welded, and when rush jobs came along of a certain size, it was invariably the case that the chase required was broken. In order to overcome this difficulty, I designed a chase that would last a

lifetime. It is made laminated, being built up of three layers of $1\frac{1}{2}$ in. by $\frac{1}{4}$ -in. cold-rolled steel. Each piece was sawed off to its proper length, care being taken to have the ends square. The three parts of each side were clamped firmly together, drilled and reamed to suit No. 1 drill rod, of which the rivets were made. Then the whole frame was assembled and riveted. The upper outside edge was rounded as shown, and the locking seat milled in one long side. The inside edges were draw-filed smooth and square.—E. N. Davey, Vancouver, Can.

Clear Varnish for Enamel

To make clear varnish for enamel, add 2 qt. of denatured alcohol to 4 gal. of damar varnish, and shake well. The resulting varnish will have a rather dark appearance, but it will look clear on the enamel. The alcohol removes the opalescence of the damar varnish, leaving a clear, transparent liquid, and also causes the varnish to dry harder than it would otherwise do, damar being a soft-gum varnish.—A. A. Kelly, Malvern, Pa.

Safeguarding Block and Tackle



Unless some provision is made to safeguard the workman's hand on block and tackle of the type shown in the illustration, he is apt to place

his hand on the cable, which will draw it into the pulley and considerable injury is possible. To prevent this, a piece of tubing or old pipe can be arranged in a crosspiece as shown. This will not only safeguard the hand but will also help in manipulating the tackle.—Auguste Mathieu, Chicago, Ill.

When the keyhole in the end of the drill-chuck screw is worn, drill a hole in the other end of the screw and broach or cut it out square to fit the key.

Building a Two-Kilowatt Spot-Welding Set

A Practical Shop Utility Which Has Wide Usefulness
and Can Be Made by Anyone

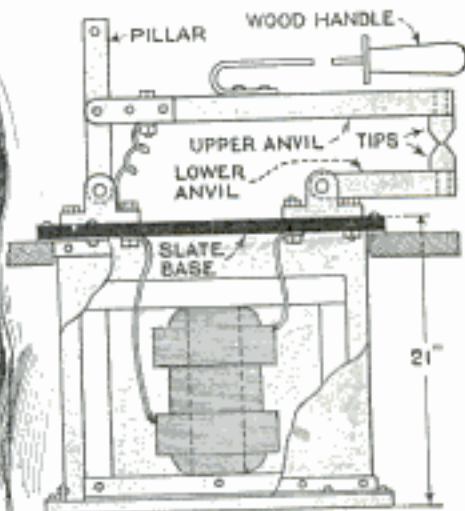
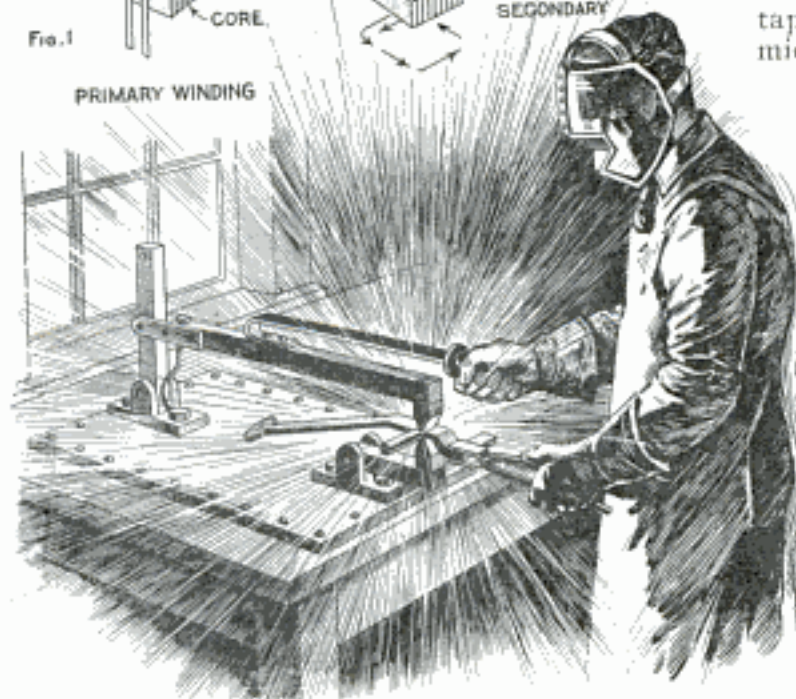
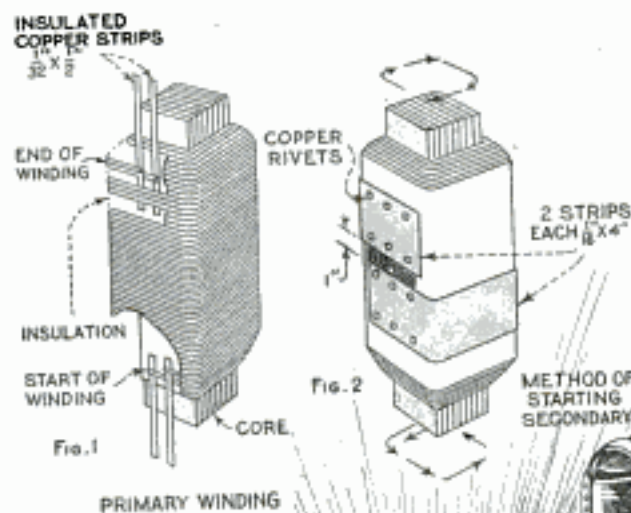
By ARTHMAN N. CAPRON

FOR welding light sheet iron, small rods, etc., a 2-kw. spot-welding outfit will be found very useful in the average small shop. The design is simple, no difficult castings are required, and when in operation, it does not cause any disturbance on the line by unbalancing the phases, owing to the special construction of the core.

It is to be kept in mind that the electrical capacity of the average small shop's supply line is practically limited to about 2 kw., so that no spot-welding work should be attempted that requires a heavier current. The electrical characteristics of this transformer are such that the current on a dead short circuit of the

secondary coil will be limited to about 2 kw., and if this condition is kept up, the secondary coil will get red-hot and begin to melt. Hence care must be taken not to overheat it. The design is for use only with 110-volt, 60-cycle, alternating current. The maximum contact area of the tips is equivalent to a $\frac{1}{4}$ -in. circle, and the maximum thickness of material to be welded is $\frac{1}{4}$ in. The potential at the copper tips is 3 volts and the current approximately 600 amperes. On heavy stock, say of $\frac{1}{2}$ -in. thickness, a $\frac{1}{4}$ -in. iron rivet is used, and this rivet is welded to the material, resulting in strong joints.

The central core on which the coils are wound is built up from strips of transformer iron, 4 in. wide. This is 30 or 32-gauge japanned silicon steel and can be obtained at the larger electrical concerns. The object of the japan finish is to prevent eddy currents in the core. The central core strips are 14 in. long and are staggered 2 in. at each end so that the yoke strips can be pushed between. The over-all dimensions of the central core are 4 by 2 by 16 in.; it is riveted in the center to hold its position solidly, is wound with one layer of friction tape, except the ends, 2 in. being left bare, and then a coat of varnish is applied over the tape. When dry, a strip of $\frac{1}{8}$ -in. micanite is placed around the tape.

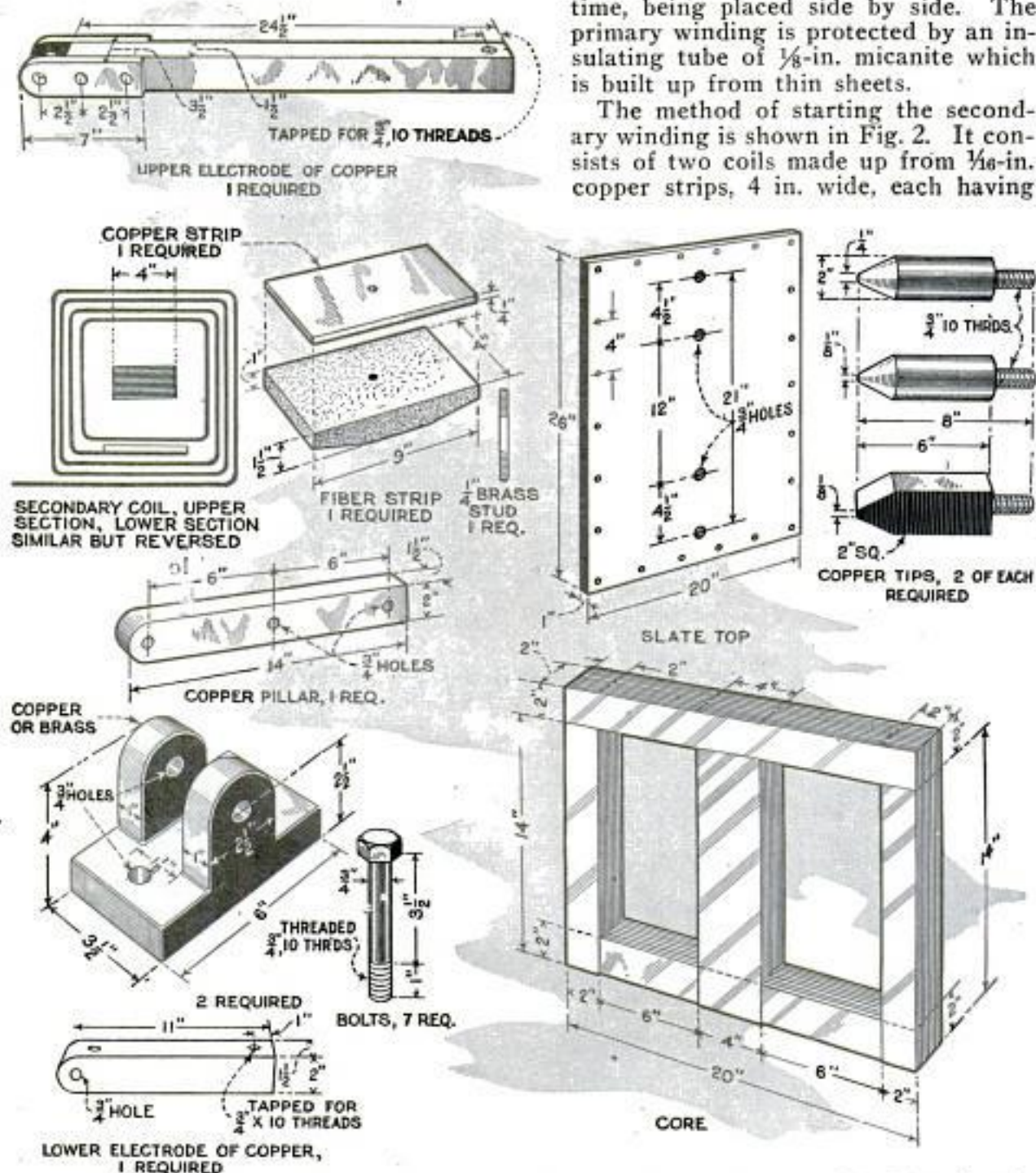


METHOD OF MOUNTING
TRANSFORMER UNDERNEATH
BENCHTOP
Fig. 3

All Kinds of Light Welding Work in the Small Shop Can Be Done Efficiently with This Homemade Electric Spot-Welding Outfit of Two-Kilowatt Capacity, Designed to Operate only on 110-Volt, 60-Cycle A.C.

*Allegany Steel Co
Parachuck, Pa*

*Manufactured by
Electrical Supply Co
114 S. West Chicago*



Constructional Details of Transformer Core, Slate Base, Method of Winding Secondary Coils, Dimensions of Anvils, Anvil Supports, Welding Tips and Fiber Clamp for Holding Ends of Secondary Winding in Place

Next comes the primary winding. It consists of two parallel coils each having 220 turns of No. 12 d.c.c. magnet wire. The method of winding it is shown in Fig. 1. It is advisable to wind a layer of tape over each layer of the primary coil to prevent the possibility of a short circuit, or if desired, the layers can be given a coat of black asphaltum varnish and baked. The ends of each winding are securely soldered to two 3/2 by 1/2 by 6-in. insulated copper strips, as indicated. Both the primary coils are wound at the same

time, being placed side by side. The primary winding is protected by an insulating tube of 1/8-in. micanite which is built up from thin sheets.

The method of starting the secondary winding is shown in Fig. 2. It consists of two coils made up from 1/8-in. copper strips, 4 in. wide, each having

three turns, which are insulated from each other with a layer of 3/64-in. micanite, 4 1/4 in. wide. The two secondary coils are wound in opposite directions, as indicated by the arrows, and are connected in series, which is done by riveting and sweating the inside ends of both coils to a 9-in. strip of 1/4-in. flat copper, 4 in. wide. A 3/4-in. hole is drilled and tapped in the center of this strip for a stud, as shown in the sectional view of this coil. After the coils are wound, a fiber strip, 1 1/2 by 4 by 9 in., with a hole

MATERIAL LIST

| | |
|---|--|
| 100 lb. 30 to 32-gauge transformer iron. | 1 $\frac{3}{4}$ by 5-in. brass stud and nut. |
| 660 ft. No. 12 d.c.c. magnet wire. | 40-in. length 2 by 2 by $\frac{1}{2}$ -in. angle iron. |
| 240 sq. in. $\frac{3}{8}$ -in. mica made up of thin sheets. | 40-in. length 2 by 1 by $\frac{1}{4}$ -in. channel iron. |
| 216 sq. in. 1-16-in. mica made up of thin sheets. | 8 $\frac{1}{4}$ by $3\frac{1}{2}$ -in. bolts and nuts. |
| 4 copper strips, 1-32 by $\frac{1}{2}$ by 8 in. | 4 $\frac{3}{4}$ by $1\frac{1}{2}$ -in. bolts and nuts. |
| 1 copper strip, $\frac{3}{4}$ by 4 by 9 in. | 1 piece 1-in. slate, 20 by 26 in. |
| 24 ft. copper strips, 1-16 by 4 in. | 1 piece 1-in. asbestos slate for base (size to suit). |
| 50 in. hard-drawn copper bar, 2 by $\frac{1}{2}$ in. | 24 $\frac{3}{4}$ by 2-in. round-head bolts and nuts. |
| 7 $\frac{3}{4}$ by 6-in. bolts, 10 threads, with nuts. | 1 pt. asphaltum varnish. |
| 32-in. length of hard-drawn copper bar, 2 in. square. | 1 roll $\frac{1}{2}$ -in. friction tape. |
| 16-in. length round hard-drawn copper bar, 2 in. in diameter. | 3 by $\frac{3}{8}$ -in. copper strip for conductors. |
| 1 piece fiber, $1\frac{1}{2}$ by 4 by 9 in. | 16 $\frac{3}{4}$ by 2-in. copper washers with $\frac{1}{4}$ -in. hole. |
| | 1 double-pole, single-throw, fused knife switch, 25 amp. |

drilled through the center, is slipped over the projecting stud and a nut driven on; the purpose of this is to hold the finishing ends of the secondary down securely and also to make a neat-appearing job. The assembled view of this holder is not shown in the drawing. The outer ends of the secondary winding are connected to the two anvils by means of conductors, which consist of four strips of $\frac{1}{16}$ -in. copper, 4 in. wide. These conductors are bolted and then soldered to the ends of the secondary winding and also to the supports of the anvils, as shown in Fig. 3. A similar conductor is later coiled between the upper-anvil support and the anvil itself, permitting it to be moved readily. These conductors, which must be able to carry 600 amperes, are made up of strips to make them flexible.

The transformer proper is now completed, and the two outside cores and the yokes are built up of transformer iron. The ends of these parts are staggered 2 in. to dovetail nicely, and the dimensions are all given in the lower-right corner of the detail drawing. The whole core assembly is fastened together securely at the top with two 20-in. lengths of channel iron, one on each side of the upper yoke, and clamped together with bolts, which are run through both channel irons and the yoke, three or four holes having been drilled for this purpose. The lower yoke is similarly clamped between two 20-in. lengths of angle iron, which are also bolted to a slate base. The channel iron and angle-iron clamps are not shown. Although it is not necessary, the transformer may be inclosed in a sheet-metal case, which the builder can design. It should be perforated to allow free circulation of air to keep the transformer cool. The most convenient mounting for the transformer is directly underneath the benchtop, as shown in Fig. 3, as it will then be entirely out of the way and will not be damaged easily.

It is necessary to provide a 1-in. slate top on the bench to prevent burning the bench when welding. This piece, with all the dimensions, size of holes and their spacing, is shown in the upper-right detail. The anvil clamps and pillar are made of hard-drawn copper-bar stock, $1\frac{1}{2}$ in. thick and 2 in. wide, and their exact construction, length and location of holes to be drilled and tapped, etc., are clearly indicated in the details, as well as the construction of the anvil-pivot supports and the welding tips. A steel handle with a wooden handgrip projecting well out and away from the upper electrode is provided so that the worker can manipulate the upper anvil easily. As will be noted, the upper anvil can be pivoted on the pillar at two points, spaced 6 in. apart, to accommodate various sizes of work. A double-pole, single-throw knife switch, of 25-ampere capacity, with fuses of this capacity, is provided in the primary circuits.

Old Casings Make Good Unloading Mat

Made of discarded tire casings, the mat shown in the drawing is an excellent landing pad upon which barrels or other containers may be allowed to fall from trucks without injury. Obtain three old casings and cut two of them through once. Coil these inside the other, cut off surplus, and bind with wire as shown.



☐ To use a lathe bed as a substitute for an anvil on small jobs quickly destroys its accuracy.

Removing Asphalt from Concrete by Burning

Many workmen spend hours using tools to remove asphalt from joints between concrete slabs or from concrete surfaces, but all this labor can be saved by pouring gasoline over the asphalt and igniting it. This is a rapid method, far cheaper than the other process, and one that does not



Burning Off Asphalt Coating on Concrete with Gasoline

damage the concrete. To remove all the old asphalt may call for repeated applications of gasoline. It is, of course, far better and safer to repeat the process than to try to do it all at once. It is also necessary to avoid a continuous fire to prevent the concrete from being damaged. Care must be taken if this method is used in concrete reservoirs, which are covered with wooden roofs. Plenty of ventilation must be provided before the gasoline is ignited. The accompanying photo shows the removal of several tons of asphalt from a reservoir surface by this method. In this case one man was able to remove a 1/2-in. coating of asphalt from a surface area of 15,000 sq. ft. in two days, the treatment leaving the surface perfectly clean.—George F. Paul, Chicago, Ill.

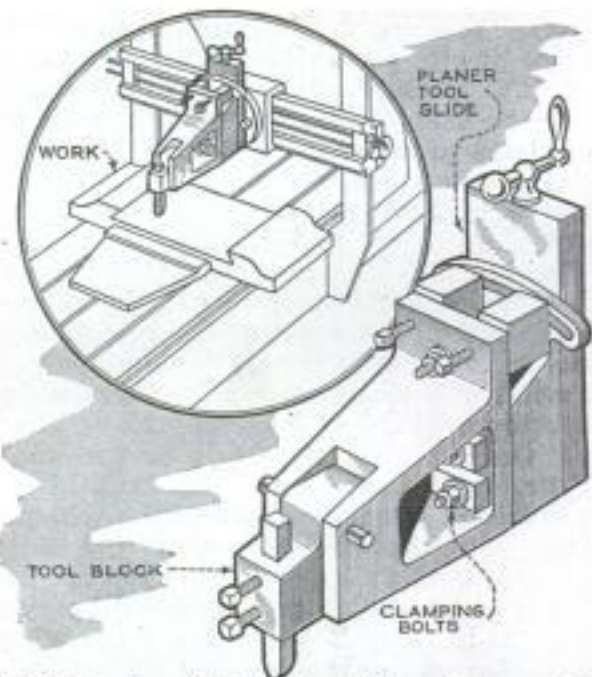
Lining Up Cotter Holes

After discarding one or more shims to take up a bearing, a mechanic is sometimes tempted to place undue strain on the bearing bolts or studs in order to properly line up the holes for cotter pins as the cotter hole does not always align with the castellations of the nut. The next time you are confronted with such a situation, do not take a chance of stripping the thread or breaking the stud, but remove the nut and place under it one of the shims just discarded. You will find that in almost every case this will furnish the exact thickness needed to fill the space, and the nut can then be tightened

up properly. The portion of shim extending beyond the nut can be removed with a chisel or knife, or it can be torn off easily with a pair of pliers.

Extension Tool on Small Planer

In the small shop where the largest planer is too small to permit large work to go through the uprights, it becomes necessary to use an extension tool of some kind. A common bar tool is generally used, which does the job by taking light cuts, on account of the spring in the bar. However, when machining a piece of work similar to the one shown, it is nearly impossible to make a first-class job, especially when cutting the angles, with such a bar extension, and a more rigid tool is required. Such a tool is shown in the illustration. It fits onto the four regular bolts in the planer tool block. A stud is screwed into the clapper box above the clamp bolts, and two set-screws are fitted into the upper part as shown, to tighten two cast-iron blocks between the clapper bar and the extension tool. After the regular



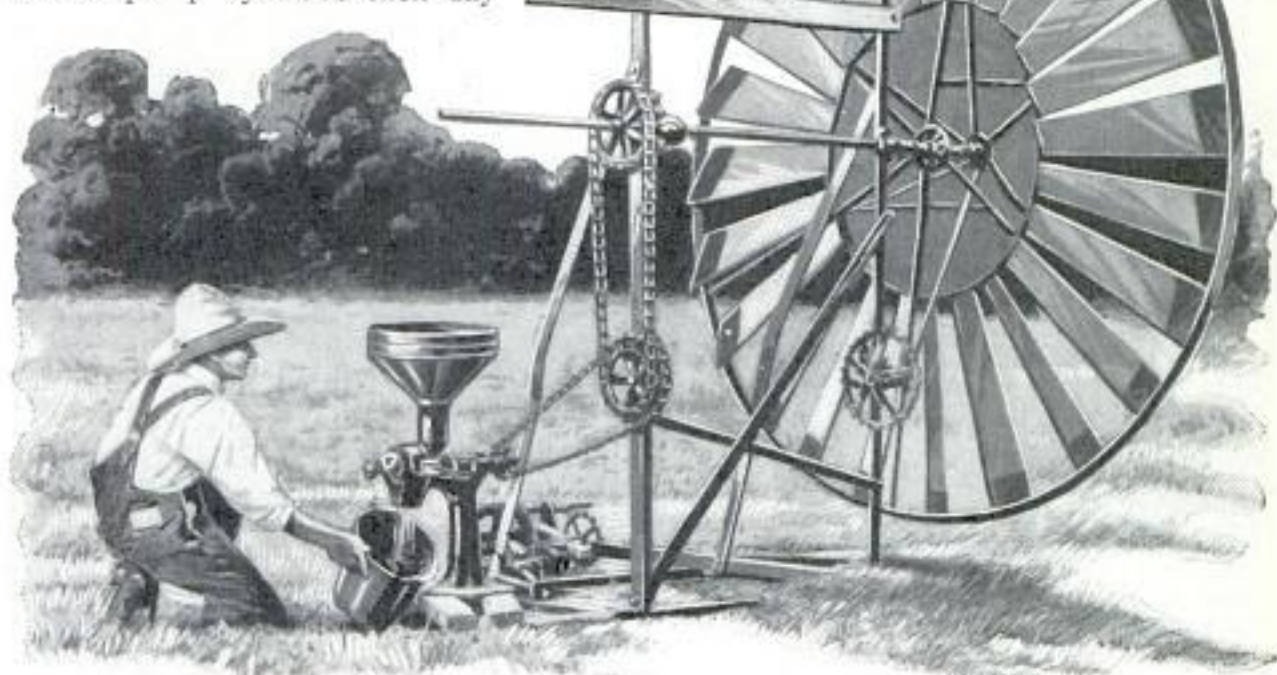
Rigid Extension Tool on Small Planer Increases Its Range of Work

clamps have been tightened, the nut on the stud is tightened, which takes the strain off the taper pin in the clapper box. The tool box on the outer end of the extension tool is fitted with a taper pin.—R. W. Laing, Fergus, Can.

☐ A little spar varnish in exterior oil paint will toughen it and increase its luster.

Old Windmill Parts Rigged Up to Run Field Pump

In the plains states, it is almost necessary to have water in the pasture, and it usually does not pay to pipe it there from the windmill. One farmer who had to pump by hand each day

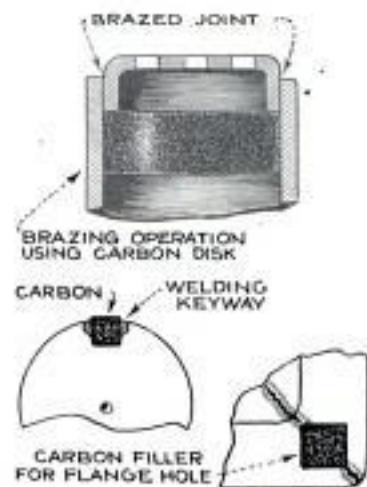


Farmer Uses Parts of an Old Discarded Windmill to Run Pump in Pasture for Watering His Cattle

rigged up the parts of an old discarded windmill to do the work for him. The arrangement was found entirely satisfactory and saved much labor.

Carbon Prevents Spelter and Filler Rod from Spreading

In many jobs of brazing or welding, the spelter or welding material spreads over finished surfaces, necessitating its removal by extra machining after the weld is completed. In a recent production job



of brazing heads into steel tubing, the trouble was evident at the first attempt. To avoid the spread of the spelter inside the tube, a stopper or disk of some kind was necessary, and as heat-resistant material was

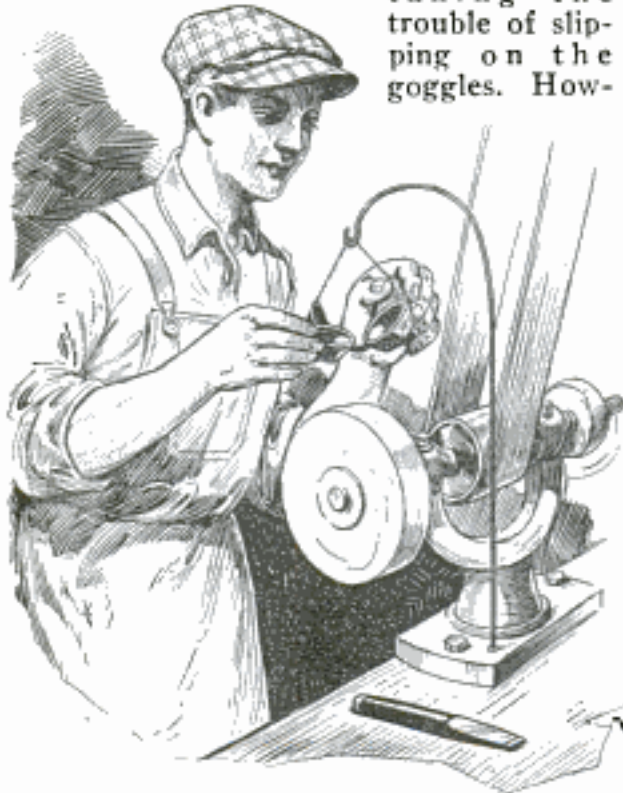
required metal could not be used. A carbon disk was suggested by the welding department and found successful. This department had used carbon successfully before. The filling of worn keyways and the repair of drilled flanges, for instance, had been accomplished with the aid of protecting carbon fillers, closing the key slot or the holes in these flanges. Arc-light carbons and carbons from dry cells can be used to advantage for this purpose.—G. A. Luers, Washington, D. C.

Filling Small Grease Gun

A good method of filling small grease guns is to remove the plunger and rear cap, and clamp them vertically in a vise. The grease first is forced into the casing of the gun with a paddle, and then it is pushed down on the plunger until some of it appears at the end of the spout. Place the thumb over the spout and pull the casing off. By holding the thumb over the opening the grease is prevented from being sucked back when the plunger is removed. This drives all the grease which has been placed in the gun solidly to the front end. The remainder of the gun is then filled and the plunger replaced.—E. T. Gunderson, Jr., Humboldt, Iowa.

Handy Holder for Shop Goggles

Even the boss of the shop may be caught going to the emery wheel and doing a touch-up job of grinding without taking the trouble of slipping on the goggles. How-



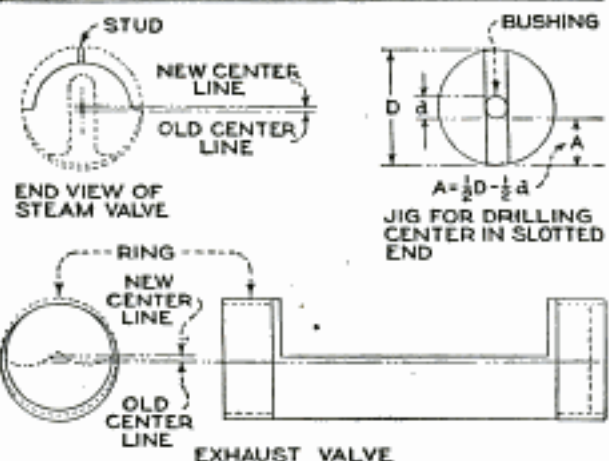
Convenient Holder for Goggles over Emery Wheel Reminds Worker to Use Them

ever, eyesight is too valuable to risk in that way and by hanging the goggles right over the emery wheel, they cannot easily be forgotten as they must be removed before starting to grind. Such a reminder is illustrated herewith. A steel rod or length of heavy wire is attached to the grinder frame as shown, bent over and formed into a hook at the end to hold the goggles. — Hiram E. Barber, Olney Springs, Colo.

Refitting Corliss Valves

To put old Corliss valves in shape to work as well as new valves it is necessary to re-turn them so that their diameter is the same as the newly bored chamber, less whatever clearance is allowed. For steam valves this is very simple; it is only necessary to move over the centers in the ends so that the solid part of the valve will clean up to the required size. This is possible because most steam valves are made with a bearing on the underside only, the top portion being cut away as shown in the drawing. The dotted line shows the circle around the new center.

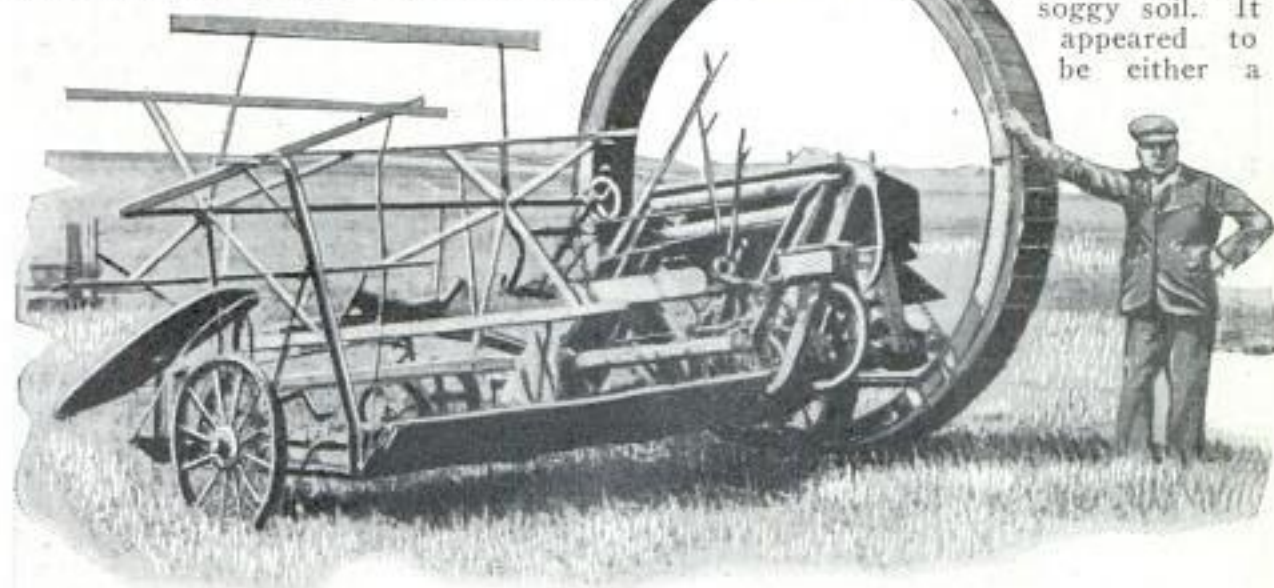
The centers may be moved over by chipping and recountersinking, or, if they are very large, a hole for a plug 1 in. in diameter may be drilled and tapped. A steel plug is screwed into this hole and the center accurately laid off on the plug. The new center need not be more than $\frac{1}{8}$ in. from the old one in most cases. The caliper of the valve may be facilitated by screwing a stud into the casting opposite the solid portion so that the tool will cut on the stud at the same time as on the casting. The exhaust valves usually have a cylindrical portion at each end, as shown in the drawing, which fits the chamber bore closely. It is obvious that, if we turn the exhaust valve with the cylindrical ends in the same manner that we did the steam valves, we will no longer have this end to guide the rotation of the valve. The ends of the valves should be centered as before. At each end a shoulder is turned for shrinking on a bushing. This bushing should not be less than $\frac{3}{8}$ in. in thickness finished. Bushings are made and shrunk on and the valve turned up as if it were a new casting. The bushings may be of pipe, or they may be forged. In case the end is very wide it is easier to make two narrow rings than one wide one. In any case the rings should be bored on the inside before shrinking on. While for the best results the chambers should be bored, it is sometimes found that the valves are worn much more than the chamber or have been scored by water or other foreign matter. If the nature of the service is such that the engine cannot



Two Types of Corliss Valves and How They Can Be Repaired; Above, Right, Center-Drilling Jig

be shut down long enough to bore the chambers and refit the valves, the economy of the engine may be improved by truing up the valves as described. In this case the ends, the part of the valve which

moves on solid metal, should be relieved so that the working portion can wear to a good fit in a short time. In putting the center in the slotted end, it is absolutely essential that the center be exactly in the middle of the slot. To obtain this result a bushing may be turned up in the lathe to a good fit in the slot and a hole for a



Many a Wheat Crop Has Been Saved by Using This Giant Wooden Wheel, Which Serves as a Track for the Binder Bull Wheel When the Soil Is Soggy

Giant Revolving Track for the Binder Bull Wheel

One summer, when the grain was ready to be harvested, it had rained so much that it was impossible to move the binder over the soggy soil. It appeared to be either a

$\frac{1}{4}$ -in. drill put through the center of the piece while it is still in the lathe. This bushing is located at the correct position in relation to the length of the slot by measuring as shown. The other center can be laid off by ordinary means.

Universal-Jointed Socket Wrench

There are many bolts or nuts on a car on which the regular socket wrench cannot be used with any degree of speed, because it has to be removed and replaced repeatedly. A universal-jointed socket wrench can easily be made from old steering knuckles or brake-rod clevises, as shown in the illustration.

The clevises or knuckles are screwed into an iron block from opposite sides as shown, forming a joint that enables the wrench to be used in any suitable position.—Robert H. Neill, Toledo, Ohio.



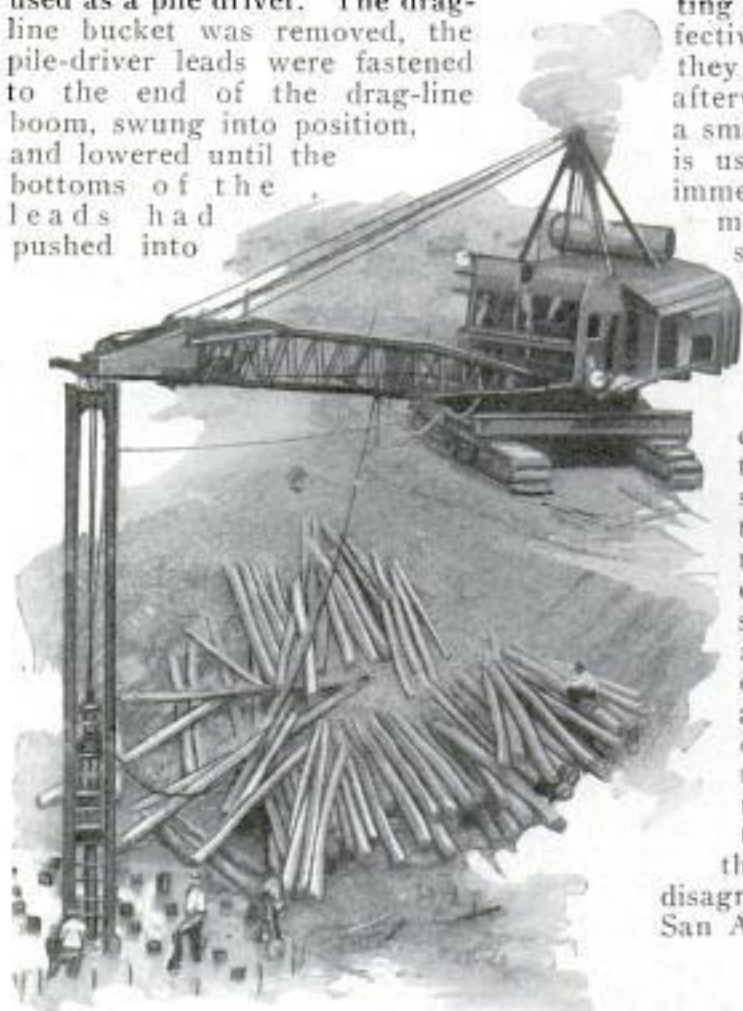
case of harvesting with hand scythes or losing all the grain. However, the wheel shown in the photo solved the problem. It is merely a huge wooden wheel without spokes and wide enough for the bull wheel to travel in smoothly. There is a rim 2 or 3 in. high to keep the bull wheel from slipping out. In use, the bull wheel is jacked up high enough to slip the track under it, and the machine is then ready to travel. This method saved many a crop.—Wm. J. Douglass, Missouri Valley, Iowa.

Feeding Poultry Salt

Most amateur poultrymen have been led to believe that salt added to the ration of their flock would be likely to result in death to all fowls that ate it. Salt in too great quantities is injurious to them but a limited amount is almost essential to their welfare. A Wisconsin poultryman who follows the advice of experts in feeding dry mash, has found that the judicious addition of salt causes an increase in egg production up to 25 per cent. It was found that if the dry mash was salted as one would salt vegetables for the table, a healthy thirst was stimulated and this caused the birds to drink larger quantities of water.

Excavating Machine Used as Pile Driver

The accompanying photo shows how a drag-line excavating machine can be used as a pile driver. The drag-line bucket was removed, the pile-driver leads were fastened to the end of the drag-line boom, swung into position, and lowered until the bottoms of the leads had pushed into



Using a Drag-Line Excavating Machine for a Pile Driver

the gravel far enough to be held firmly. Piles were swung into place with the drag-line load cable, and were driven 18 ft. into gravel at the rate of one every 12 minutes.—Ivan E. Houk, Denver, Colo.

Preventing Rust on Small Steel Instruments, Wire and Rods

After small steel instruments are made they soon rust from handling and some quick efficient method must be used to prevent this. There is a great difference in peoples' hands in the way they cause steel to rust, some having such "rusty" fingers that steel rusts very quickly after they have handled it. When small steel instruments or other articles are finished they should be immersed in a bath of gasoline, to which a very small amount of gas-engine cylinder oil has been added.

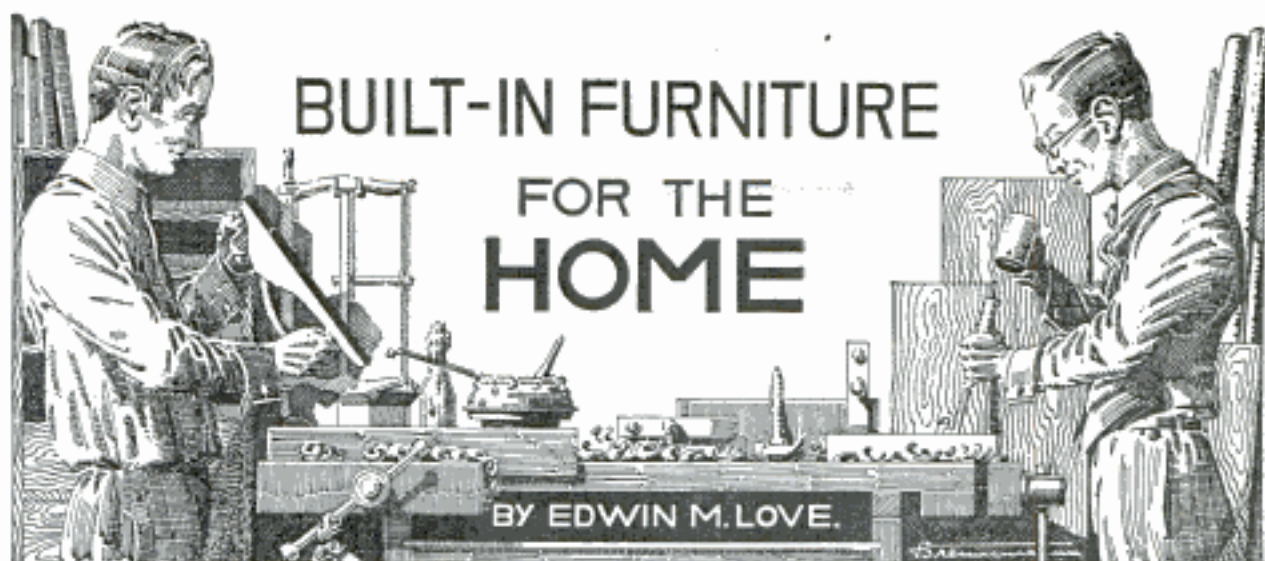
(This should be the lowest-grade, dark-colored oil, as the higher grades often contain a trace of acid.) After the bath the instruments are spread out on some absorbent material, such as a sheet of blotting or other clean paper. This will effectively prevent them from rusting and they should not be touched with the hands afterward. For very small instruments a small pan having a perforated bottom is used to hold the instruments while immersing them in the bath. Instruments that have been soldered into shanks or handles should be washed in boiling water and dried before they are immersed in the gasoline-oil bath. This method is also valuable for makers of music wire and small steel rods, etc. The coils of wire should be immersed in the bath and hung up to dry. A very small amount of oil is mixed with the gasoline so that the wire will not assume an oily appearance when dry. After the coils are dry they should be dusted with powdered talc and wrapped up. Steel rods that are dipped in this manner, laid away in a box and dusted over with powdered talc, will remain bright indefinitely. Foreign manufacturers of music wire have used air-slaked lime to dust the wire with for years, but the talc is just as effective and far less disagreeable to handle.—J. H. Downie, San Antonio, Texas.

Holder for Grinding Chisels

Grinding a true bevel on the cutting edge of a chisel or plane iron is usually an



expert's job, but with the aid of the simple rig shown in the illustration, anyone can do it. The device consists of two blocks hinged on one side and provided with a clamp, taken from an old plane, on the other side, so that the upper block can be set at the proper grinding angle. A metal plate is screwed to an upright beveled block with two coach screws, and the chisel is clamped under this plate.



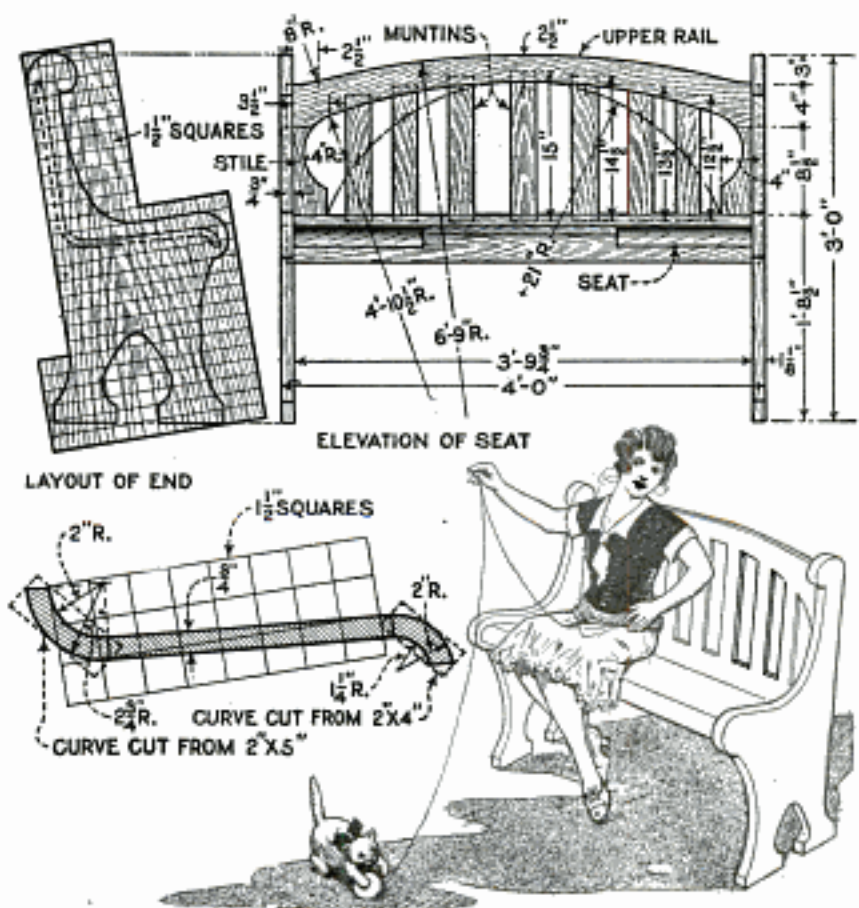
Part XII—Seats

SEATS are among the most adaptable and useful of all built-in furniture. They can be built between a pair of bookcases, or between a writing desk and a bookcase, or at the sides of a fireplace, or they may be made portable and finished to match the trim of the room. A pair of the latter type placed at right angles to the fireplace in a large room make for an atmosphere of cozy comfort.

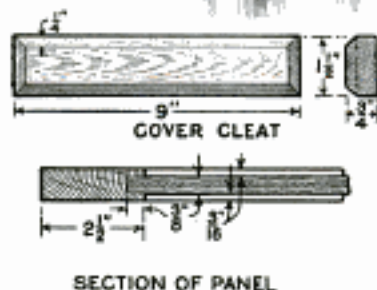
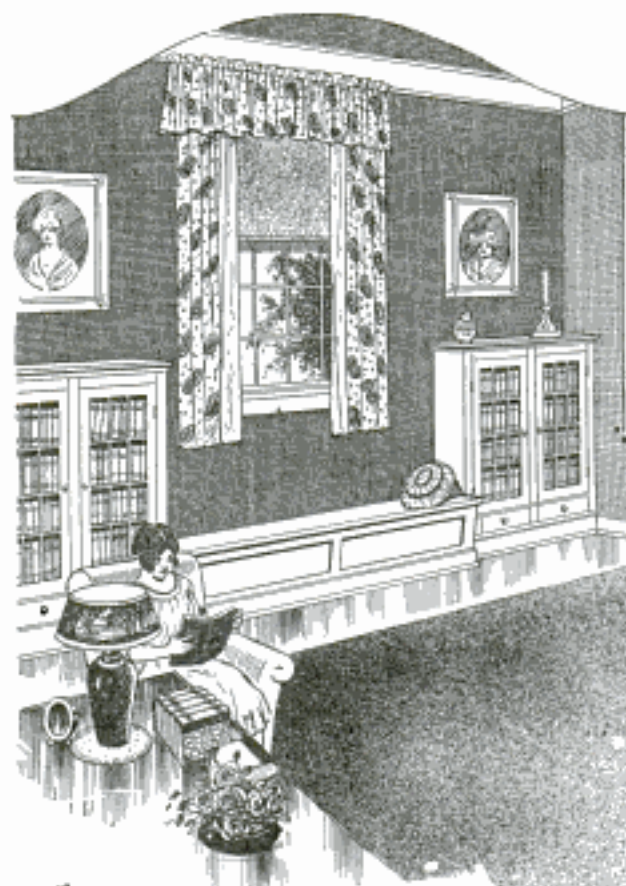
The ends of the portable seat are of $1\frac{1}{4}$ by 10-in. stock, glued up in the rough form indicated by the heavy lines of the layout diagram. On this blank, lay off $1\frac{1}{2}$ -in. squares as shown, and carefully point off the intersections of the curved outline with the squares. Through these points draw the outline, either by use of a large irregular curve or by driving in brads around which thin strips of wood can be sprung to guide the pencil. If a bandsaw is not available, saw out with a compass saw and smooth the edges with spokeshave, rasp and sandpaper. In using the rasp, do not file straight across, dragging the rasp back and forth like a saw, but stand facing the edge of the work and push away from the body while making the stroke from right to left, lifting the rasp on the return stroke. There are four advantages to this. The

shearing cut is smoother and faster; a cut is taken over an appreciable length of the curve, tending toward a smoother outline; there is less likelihood of rocking the file and thereby working an irregular round on the edge; and lastly, as the file teeth incline forward and therefore hardly cut on the backstroke, waste of energy and needless dulling of the rasp are avoided.

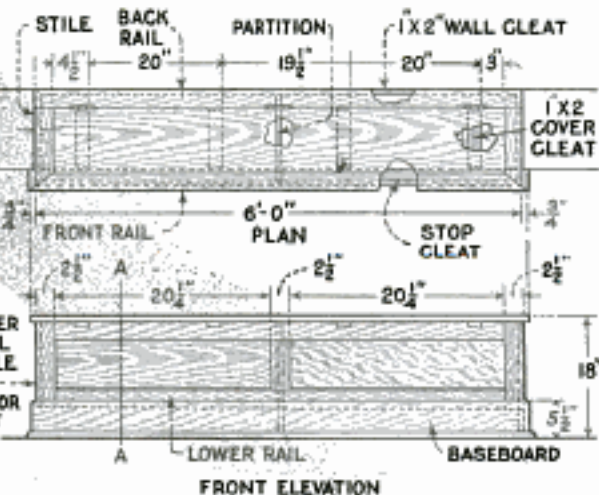
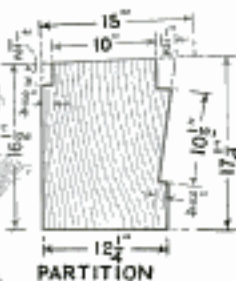
While the gain for housing of the seat and back may be laid out in the same manner as the outline, it is better to wait until



Particularly Adapted for Use on the Porch, This Portable Seat Is Both Substantial and Attractive



6 ft. 9 in., and $2\frac{1}{2}$ in. from this curve, at the center, strike another arc having a radius of 4 ft. $10\frac{1}{2}$ in. Cut end stiles of 1 by 6-in. stock, $8\frac{1}{2}$ in. long, and lay in position at each end of the rail, as shown in the elevation. Measure $3\frac{1}{2}$ in. from the line gauged on the ends of the rail. From this point on the inner curve of the rail, setting the compasses to 4 in., strike off an arc on the 4 ft. $10\frac{1}{2}$ -in. radius, and, with this point as a center, draw the curve of the stiles. Draw a radius of the top curve through this point on the rail also, and extend it until it intersects with a prolongation of the gauged line; then, with this as a center, draw the reverse curve for the top of the rail. Round



A Built-In Seat, between the Bookcases or along the Windows of the Living Room, Improves the Appearance Considerably, Provides Extra Seating Capacity and Furnishes a Desirable Chest

they are assembled, when the ends may be used for scribing the gains and an exact fit assured.

On the ends of the pieces of 2 by 5-in. stock lay out the curve shown in the section, using a radius of 2 in. for the inside and $2\frac{3}{4}$ in. for the outside. Work out the curve very carefully, afterward sandpapering the inside smooth by the use of a curved sanding block. Make the front roll with radii of $1\frac{1}{4}$ in. and 2 in., using the piece of 2 by 4-in. material. The straight section is of 1 by 12-in. stock, sized to a width of 11 in. This is joined to the rolls with $\frac{3}{8}$ -in. hardwood dowels spaced 6 in. apart.

Stock 1 by 8 in. is required for the upper rail of the back. Cut it to a length of 3 ft. $11\frac{1}{4}$ in., and gauge back from the ends $\frac{3}{4}$ in., representing the inside faces of the seat ends. Lay out for the upper edge of the rail an arc with a radius of

off the upper edge of the rail by first accurately chamfering the corners.

As the elevation shows, the stiles are reduced to a width of 4 in. Fit to the lower ends of the stiles a rail of 1 by 2-in. stock, sized to $1\frac{1}{2}$ in. in width. Dowel the joints, and assemble the back on trial. Locate the mortises for the slats or muntins, which are made of hardwood, $\frac{3}{8}$ by $1\frac{1}{2}$ in. net. These are not spaced evenly. The centers are obtained by striking an arc terminating at the inside corners of the lower rail and stiles and rising to touch the inside edge of the upper rail, having a radius of 1 ft. 9 in. This arc is divided into eight equal sections, and the muntins are centered on them. Square across both rails from the lower, take the back apart, and dig the mortises to a depth of about 1 in. Assemble, this time with muntins in place and every joint glued. Dowel the lower rail to the back round of

the seat with dowels spaced 6 in. Drive four six-penny finish nails into the back of each end through the ends of the rails

essary cuts on the bottom and back. Nail solidly in place and glue and nail the front panel to them.

MATERIAL LIST

Portable Seat

- 1 piece, 1¼ by 10 in. by 12 ft., pine or fir, S+S, sanded.
 - 1 piece, 1 by 8 in. by 4 ft., pine or fir, S4S, sanded.
 - 1 piece, 1 by 12 in. by 4 ft., pine or fir, S4S, sanded.
 - 1 piece, 1 by 2 in. by 4 ft., pine or fir, S4S, sanded.
 - 1 piece, 2 by 5 in. by 4 ft., pine or fir, S4S, sanded.
 - 1 piece, 2 by 4 in. by 4 ft., pine or fir, S4S, sanded.
 - 1 piece, ¾ by 2 in. by 8 ft., maple or birch, S+S, sanded.
- Cost of material, about \$5.
Time to build, about 24 hours.

Built-In Seat

- 1 piece, 1 by 3 in. by 16 ft., pine or fir, S4S, sanded.
 - 1 piece, 1 by 3 in. by 14 ft., pine or fir, S4S, sanded.
 - 1 piece, 2 by 2 in. by 6 ft., pine or fir, S4S, sanded.
 - 1 piece, 1 by 10 in. by 12 ft., pine or fir, S4S, sanded.
 - 2 pieces, 1 by 2 in. by 10 ft., pine or fir, S4S, sanded.
 - 1 piece, ¾ in. by 1 ft. 6 in. by 3 ft., 3-ply veneer.
 - 3 butterfly (surface) hinges; 1 flush lid lift.
- Cost of material, about \$3.25. Time 12 hours.

and stiles housed in, and set them for puttying. Remove all glue spots and bruises before finishing.

The stationary seat is designed to be built between two bookcases or some similar combination. It is 15 in. wide, 1 ft. 6 in. high, and 6 ft. long. The seat slopes toward the back ¼ in., making for comfort, and the bottom of the front is let back to give heel room.

Build the front panel of 1 by 3-in. stock, sized to 2½ in. in width. The stiles are 13 in. long, the rails 5 ft. 7 in., and the muntin, fitting between them in the center, is 8 in. long. Groove all ⅜ in. deep, centering the groove on the face edges, for housing the panels of ⅜-in. three-ply panel veneer. These are cut 8⅝ in. by 2 ft. 8⅞ in. Assemble by doweling the joints.

The top frame is of different construction. The back rail is cut 6 ft. long, and the stiles are butted against it. Note that the frame projects over the front panel ¾ in., necessitating the returns on the stiles shown in the plan. The front rail and stiles are joined by doweled miters.

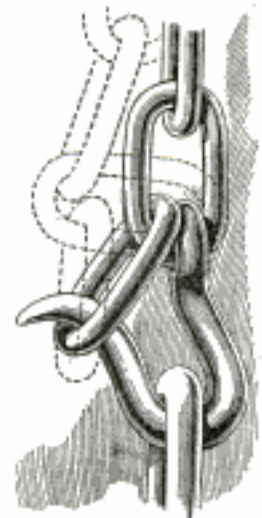
Measure up from the floor 1 ft. 4½ in. and level a line full length of the seat. Guiding on this, nail up a 1 by 2-in. cleat. Nail to the floor a like cleat, keeping the front edge 12¼ in. from the plaster, or in line with the baseboard backing of the cabinets between which the seat is being built. Now shape the 2 by 2-in. stop cleat as shown in the cross section and glue and nail it to the upper rail of the front panel. Make the center partition out of 1 by 12-in. stock, widened with 1 by 2-in. material, and make the two ends of the seat exactly like it, except that the stop-cleat notch is omitted, the cleat butting inside the ends. Tack the partition and ends in place and test the fronts to see if they line, taking them down to make nec-

The fitting of the top frame is rather difficult. Measure the exact length between the cabinets or walls at the ends of the seat, using two rods, and transfer this length to the frame. Then scribe a piece of cardboard to fit each cabinet, and trace the outlines on the ends of the frame. After cutting, slip it into place, and scribe the back rail to the plaster; or if preferred, nail in place and cover the wall joint with a small molding.

Run one straight length of baseboard through for both cabinets, or if the seat is built in a plastered corner, miter the base around the free end. Nail the base shoe to the floor rather than to the baseboard, for if the latter is done, shrinkage of the base will lift the shoe from the floor, making an open joint.

Non-Slip Hook on Chain

The tension on open chain hooks in many cases bends them out of shape and causes them to unhook, but with the simple arrangement shown in the illustration this objectionable feature is entirely eliminated. Instead of loosening as the tension increases, it is locked even more securely. This is accomplished by putting the hook on the second link from the end and slipping the last link over the hook, which is bent outward as indicated. The dotted lines show the position of the links while the last one is slipped over to lock it. It is obvious that tension holds the lock link tightly.



Portable Fire Barrel

In a large lumber yard where barrels of water were set out along lumber stacks for extinguishing beginning fires, it was



Wheeled Trucks for Water Barrels in Lumber Yard Help to Prevent Large Fires

found on one occasion that the flames could not be controlled because it was impossible to carry water fast enough in the fire buckets from the barrels. So the barrels were mounted on wheels, as shown in the illustration, so that the whole barrel could be taken to the blaze. A hoop was made of $\frac{1}{2}$ by $1\frac{1}{2}$ -in. flat iron to fit over the lower end of the barrel. At opposite sides wheel bearings are welded to the hoop to take 24-in. lumber-truck wheels. A tongue with which to draw or push the cart was then attached.—L. M. Jordan, Vredenburgh, Ala.

Removing Ford Front-Spring Perches

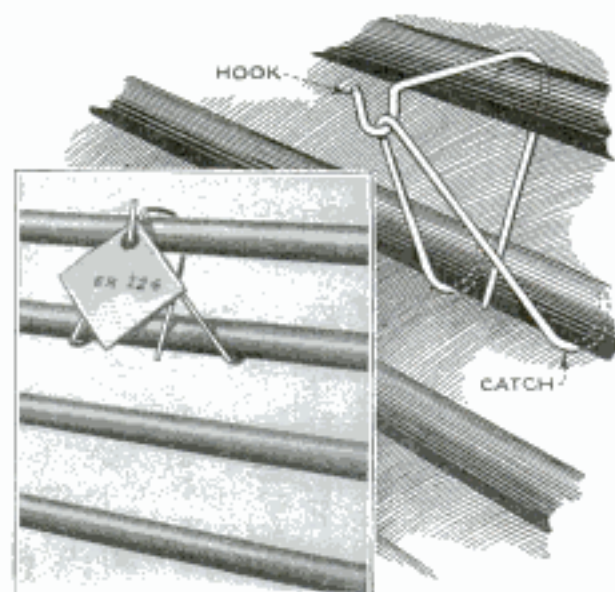
When Ford front-spring perches must be removed from the axle, they are often found to be a tight fit or rusted in place. With the axle in place on the car, they are rather difficult to drive up, because short hammer swings only can be taken, and to raise the front end of the car or remove the axle is difficult unless the proper hoist is at hand.

A good method is to place a jack or block under the lower end of the perch, after removing the nut, and raise enough to lift the wheel on that side. Then hammer on the upper side of the axle near the

perch. Hammering on the axle is not as effective as on the end of the perch when the axle is removed from the car, but with the axle in place it adds part of the weight of the car to the hammer blows. To prevent burring of the lower end of the perch, the radius rod can be dropped, on the new style cars, and the nut replaced flush with the end of the perch. This will allow the perch to be driven up about $\frac{5}{16}$ in. before the nuts need be removed. They are then unscrewed and the castellated end will straighten out the threads. This upward movement will break the rust, and the rest of the removal will be fairly easy. Plenty of penetrating oil or kerosene poured about the upper end of the perch will help in loosening it.—E. T. Gunderson, Jr., Humboldt, Iowa.

Tag Clip for Radiator Pipes

In a warehouse where material is often heaped temporarily on the floor, advantage was taken of the hot-water pipes on the walls for holding metal tags containing a description of the goods immediately below. These tags at first were simply wired to a pipe but as this meant trouble when they had to be changed or moved to another position, the clip shown in the photo and illustration was devised. It consists of two pieces of spring wire, one bent to form a hook and the other to form a catch. To attach the clip the hook



Safety Clips for Radiator Pipes Hold Tags Identifying Material Stored on Floor Below

is first put on one pipe and the catch pulled down and sprung under the pipe below as indicated in the illustration.—Hary Moore, Montreal, Can.

Six-Room Home—Hollow Tile and Stucco



Plan No. 6B20



© Architects' Small House Service Bureau

SIMPLICITY of design is the keynote of this modern English cottage. The direct arrangement of this plan provides a roomy interior without loss of valuable space.

Here is a step-saving, space-saving plan difficult to improve upon. Special thought has been given not only to the use of standard lengths of lumber, but to the use of stock millwork as well. This means a saving in building costs.

The house is planned to be built of hollow tile walls on concrete footings, with stucco exterior and brick base course. The house is planned to face west or south, but for other facings the plan should be reversed.

The basement is planned for excavation below kitchen, sleeping porch, rear chamber and dining room only. A full basement can be provided if desired.

Special features of the house are a lattice-inclosed pergola porch, a fireplace of simple, inexpensive design in the living room, an arched opening between living room and dining room, and French doors, if desired.

This house provides six rooms and bath. A breakfast table with seats are in the nook in the kitchen. A sliding door between the kitchen and the rear entry is a feature that will be found highly desirable and convenient.

Home Builders' Questions

Q. I am building a new home and am undecided as to the finishing of the floors. They are to be hardwood. Some people say that they should be finished with shellac, while others say to use varnish. Which is the better way? **A.** Shellac may be used on floors only where they are almost completely covered with rugs. In other words, shellac will not stand wear. Put on three coats of the finest varnish you can buy.

Q. I note the construction of one of the houses you illustrate is "trowel marked stucco." Just what is meant by this? **A.** Stucco is a plastic material that may be modeled freely. Customarily it is finished smooth. However, it is possible to secure a rough finish in various different ways, one of which is by putting the stucco on with a trowel and not smoothing it afterward. The finish will therefore bear the marks of the trowel.

Q. What is the usual charge made as commission on second mortgages and contracts for deed? **A.** Various commissions are charged on this kind of paper, depending upon the size of the mortgage and what the current market is for money. The exact amount of commission is often a matter of bargaining. In some districts the going rate of discount on a contract for deed is 4 per cent per 1,000. Thus a \$5,000 contract would be discounted \$200.

Q. Is there much difference in expense between a gas fireplace and one in which coal is burned? **A.** The difference is made up largely by the difference in expense between the metal pipe to vent the gas heater and the masonry stack necessary to carry off smoke. This amount is not great enough to be made the basis of choice. If you can afford a fireplace, build the one you like best.

Q. Can casement windows be made water-tight? Are they more expensive than double hung windows? **A.** Casement windows can be made perfectly water-tight, especially if they are of the out-swinging type. Weather stripping is of great assistance. Casement windows of the out-swinging type generally cost more than double hung windows, since the screens and storm sash must be of wood to match the finish woodwork.

QUESTIONS regarding home building addressed to this magazine will be answered by the Architects' Small House Service Bureau of the United States, Inc., controlled by the American Institute of Architects and indorsed by the department of commerce, United States government. Blueprints, specifications and material lists for the house shown above may be obtained at a nominal cost. Inclose self-addressed, stamped envelope for reply. If further information is desired send five cents and stamped envelope for a 24-page booklet explaining how the small home bureau functions and showing twelve sample plans.



Q. I am building a battery charger and wish to determine the polarity of the supply line. Please tell me some simple method of doing this.



Fig. 1

A. If the polarity of the circuit is not known, hold the exposed ends of the wires in a glass of water in which some common salt has been dissolved. Be sure to keep the ends of the wires separated. Gas bubbles will appear about the ends of the wires but the greater amount of bubbles appear on and about the wire that is connected to the negative side of the circuit. (See Fig. 1.)

Q. Will a wavetrapp give me greater selectivity? I am using the ultra-audion circuit, and find it very good but not as selective as I would like.

A. Yes a wavetrapp will give you greater selectivity. You will find a good wavetrapp described on page 999 in the June, 1925, Popular Mechanics.

Q. Can I use a gas pipe for a ground? What size of wire should I use for my receiver ground? **A.** Gas pipes should never be used as a ground, because they are often insulated at the meter, and then there is always a chance of static discharge, igniting a leak. A cold-water pipe serves best, as it has fewer joints, and leads more directly to the earth. Use No. 14 insulated wire for the ground lead, and attach it to the pipe with a good ground clamp.

Q. I have a six-tube receiver using the UV-199 tubes. When anyone walks across the room, or the set is jarred in any way, there is a growling noise in the horn. What is the cause of this and how can I remedy it? **A.** This noise is caused by the tube vibrating in the socket. The tubes must be mounted in rubber-cushioned sockets, or small squares of sponge rubber must be placed under the corners of the cabinet.

Q. What is a phusiformer? Does it take the place of the usual r.f. transformer? **A.** The phusiformer is another form of r.f. amplifying transformer, which has a primary and secondary winding with adjustable coupling.

Q. What is the difference between a regenerative set and a non-regenerative receiver? **A.** In the non-regen-

erative receiver the a.f. signals from the plate are made to actuate the telephone receivers, and no use is made of the r.f. pulsations. In the regenerative receiver the r.f. current is put to work by being fed back to the grid circuit. The effect obtained is greatly strengthened signals.

Q. I have a B-battery that makes a crackling sound in the horn; is there any way to eliminate this without getting a new battery at once? **A.** Sometimes the B-battery will break down, and cause jumpy reception, and horn noises. This can be partially remedied by placing a .001 to .006-mfd. condenser across the B-battery.

Q. Can a diode tube be used instead of a crystal in a reflex receiver? **A.** Yes; this tube contains but two elements, is stable in operation, and requires no adjustments, as is the case with a crystal.

Q. Can a sodion tube be used as an amplifier? **A.** The sodion tube is a detector only. Literature covering this tube can be obtained from any radio dealer.

Q. I have just finished a crystal receiver. Can I use an ordinary telephone receiver with this set? **A.** No; use good standard 2,000-ohm receivers.

Q. I have a five-tube set using two steps of tuned r.f., a detector and two steps of a.f. amplification. It gives good results on stations within 1,000 miles but I would like to build a set having a greater range. Would you suggest the superheterodyne? **A.** The superheterodyne still holds first place in radio receivers, having a consistent range of about 3,000 miles when properly constructed. It is easy to operate, and has loud-speaker volume on all stations within the range of the set.

Q. I purchased a three-tube receiver several months ago and have been getting good results up to this time, when for no apparent reason the set went dead. I know very little about radio and live some distance from anyone who could help me. The set works on dry batteries and I have put in new batteries, but this did not help. Where should I look for the trouble? **A.** The trouble may be caused by a defective tube, a short circuit in the set or aerial; broken or loose connections, broken loud-speaker or phone cord, poor contact of the springs in the tube sockets or jacks. Possibly you did not connect the new batteries correctly.

Q. Can a gap be arranged in the ground lead for a lightning arrester? Please give me a diagram for installing an arrester of this type. **A.** A gap can be built in flat-type porcelain cleats, but the better plan is to obtain a good protecting device approved by the underwriters, and connect it as shown in Fig. 3.

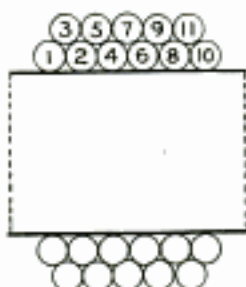


Fig. 2

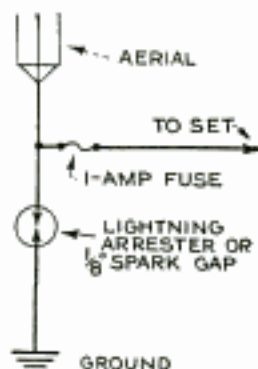


Fig. 3

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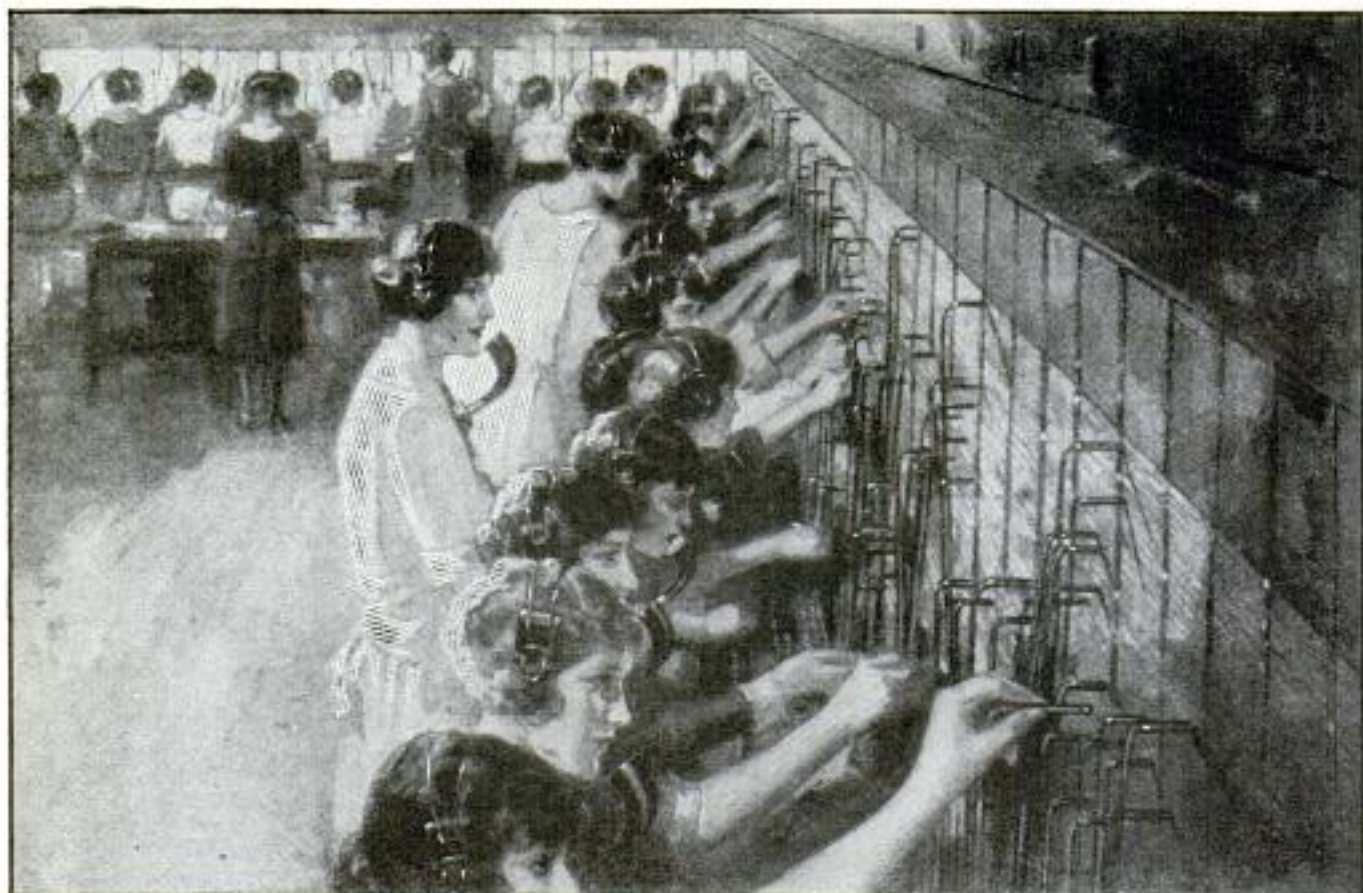
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The telephone, like the human heart, must repair itself while it works. The telephone system never rests, yet the ramifications of its wires, the reach of its cables and the terminals on its switchboards must ever increase. Like an airplane that has started on a journey across the sea, the telephone must repair and extend itself while work is going on.

To cut communication for a single moment would interrupt the endless stream of calls and jeopardize the well-being and safety of the community. The doctor or police must be called. Fire may break out. Num-

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Even when a new exchange is built and put into use, service is not interrupted. Conversations started through the old are cut over and finished through the new, the talkers unconscious that growth has taken place while the service continues.

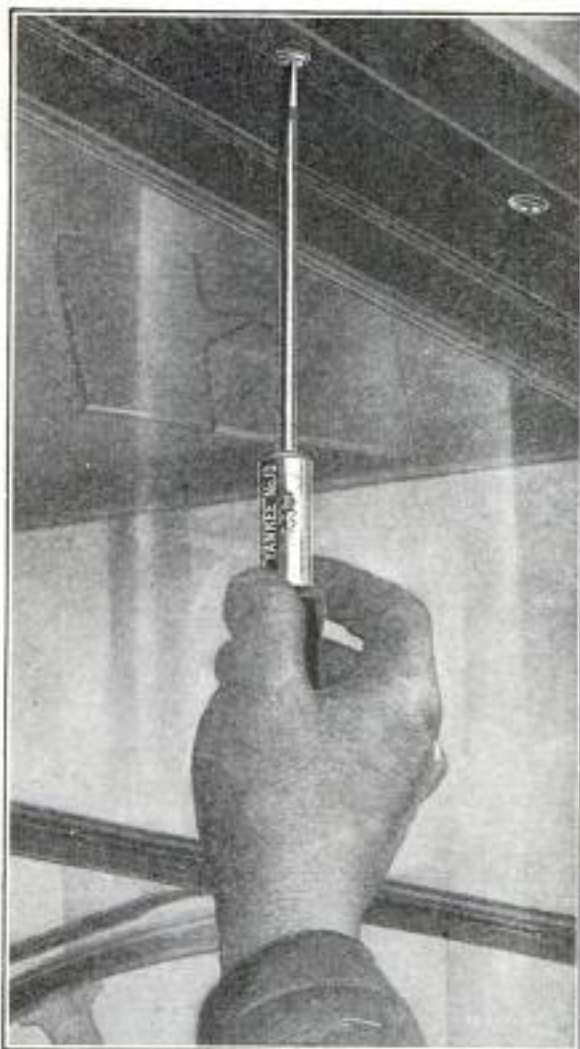
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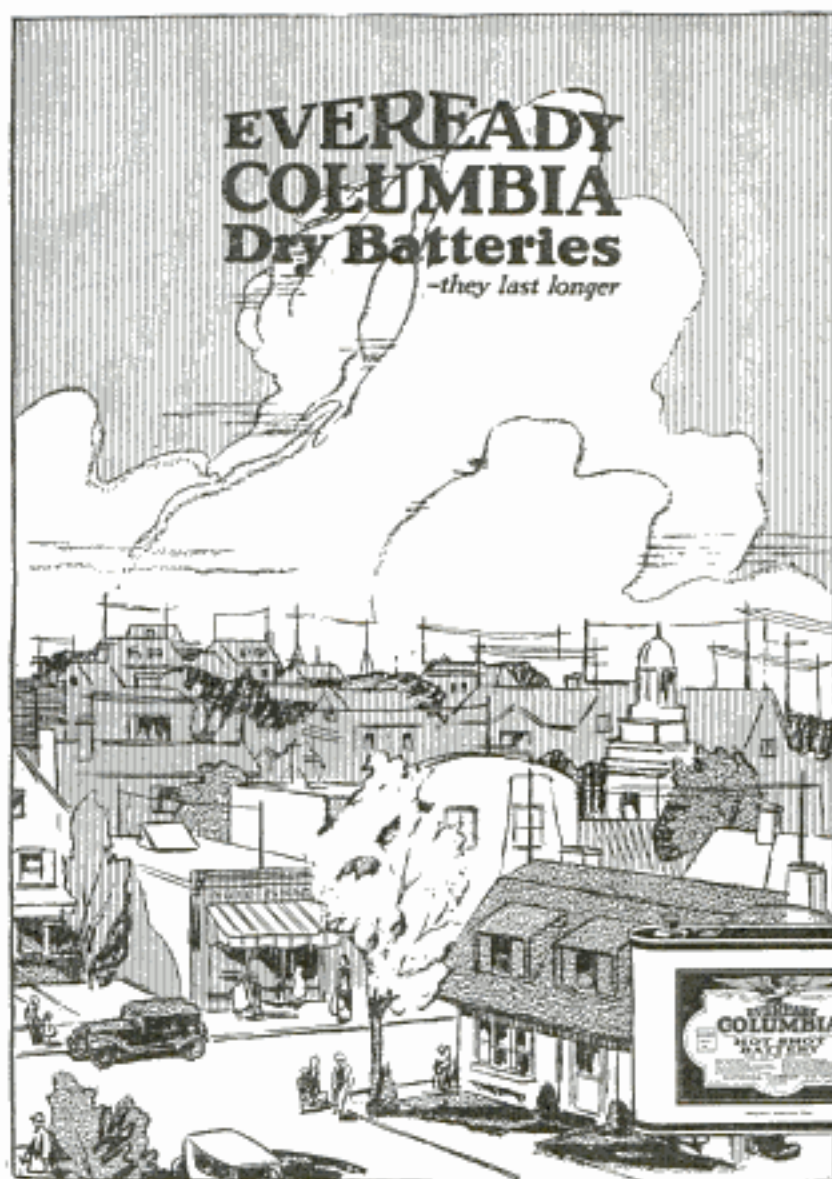
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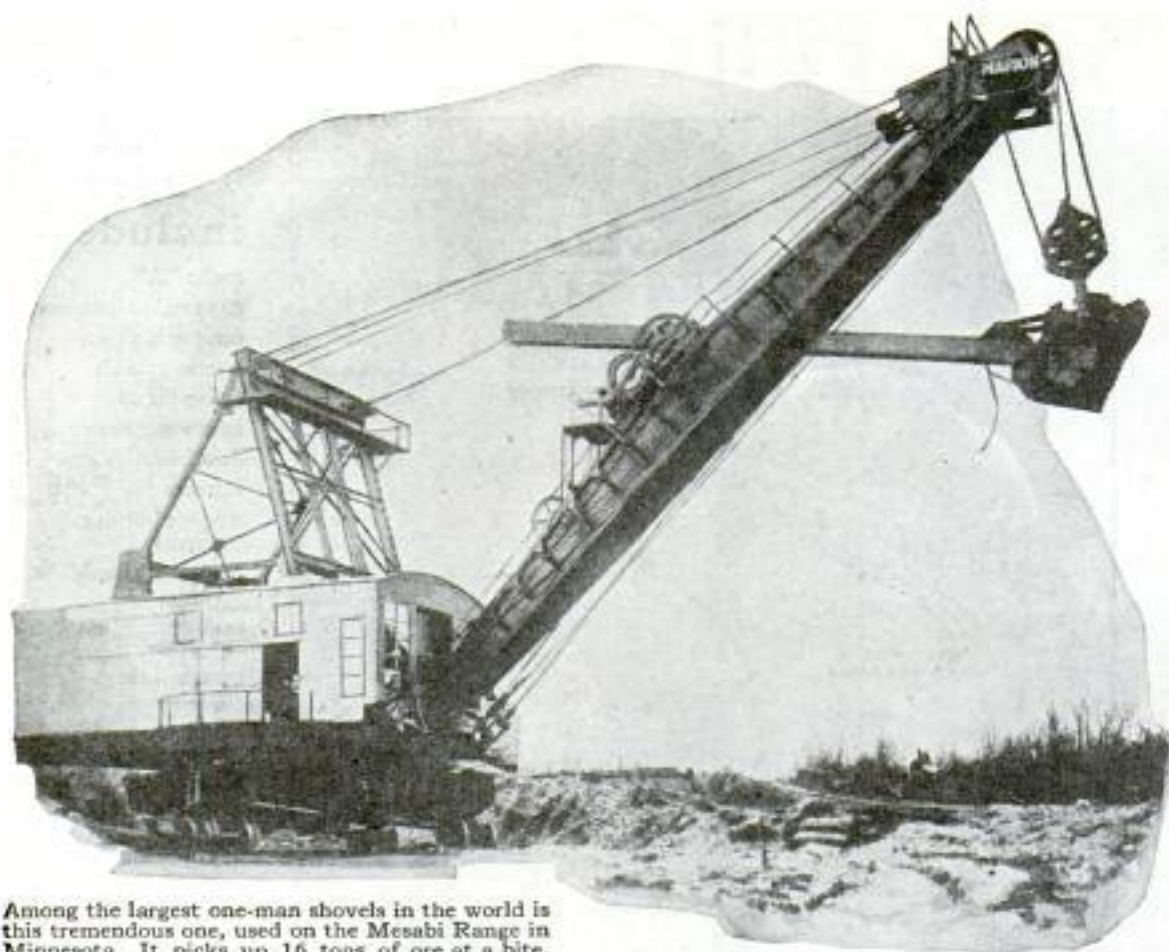
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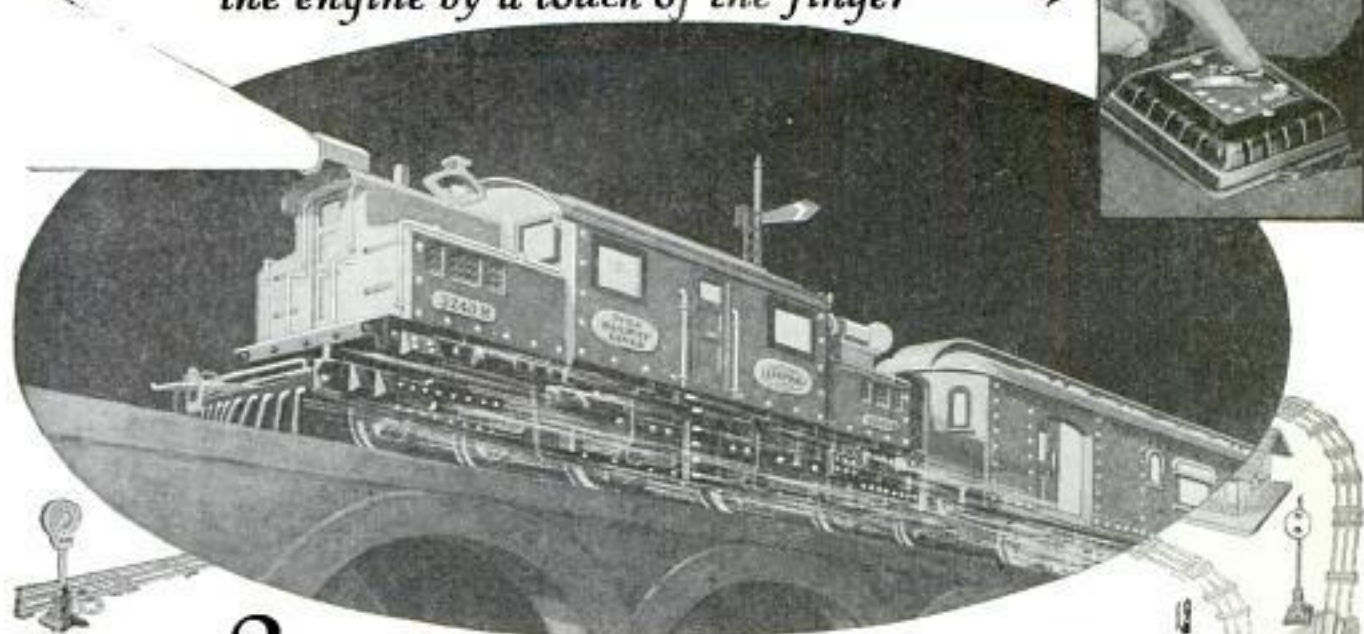
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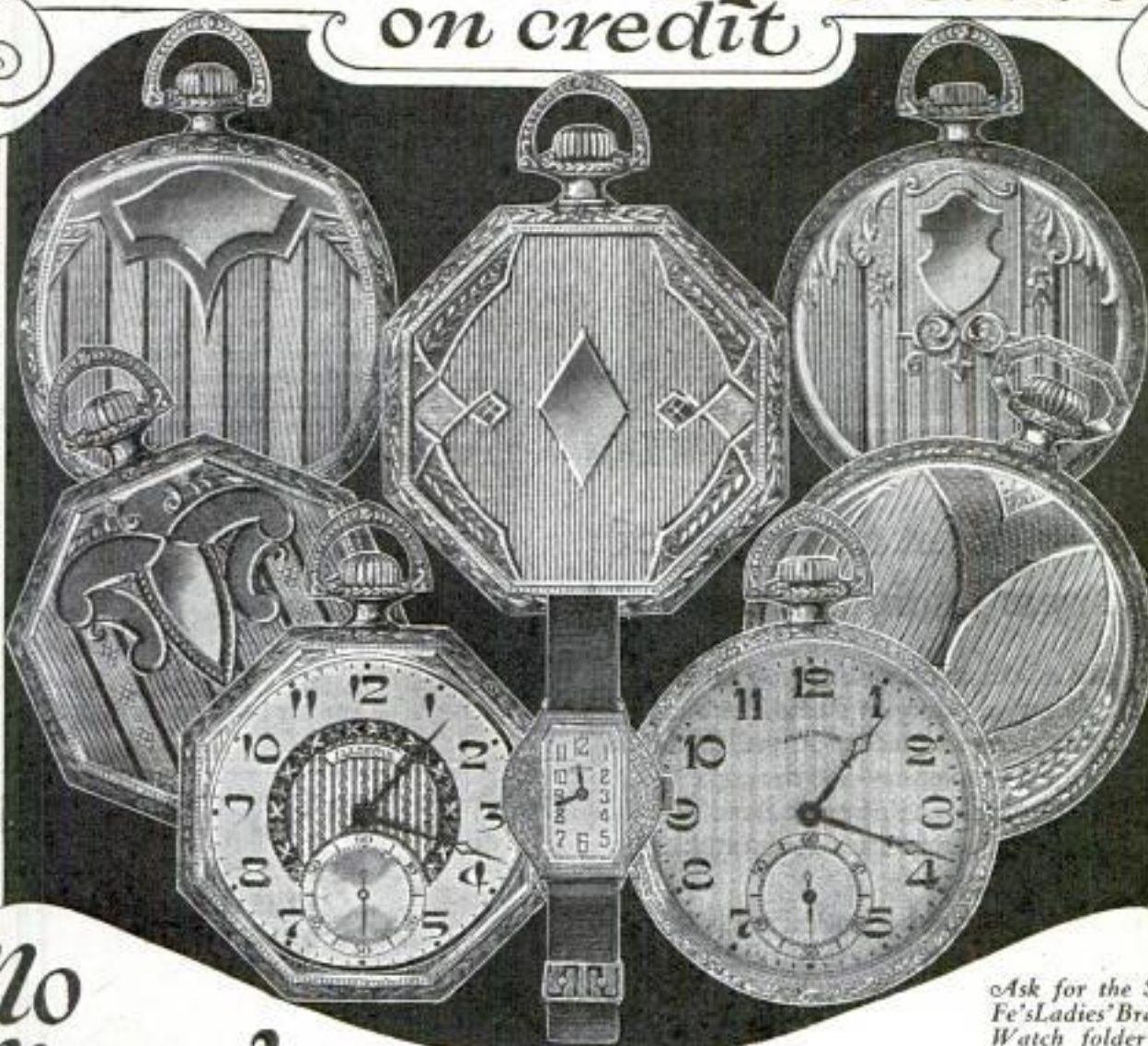
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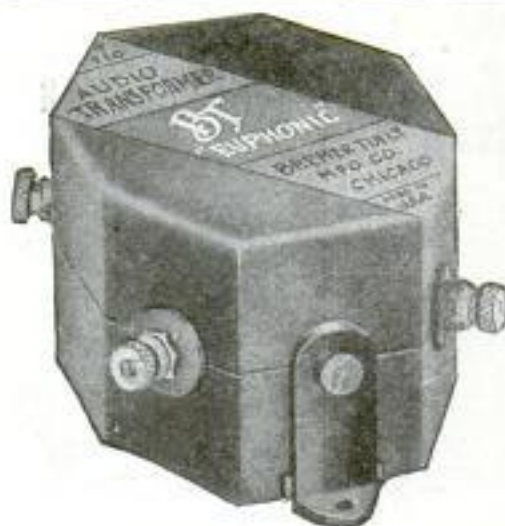
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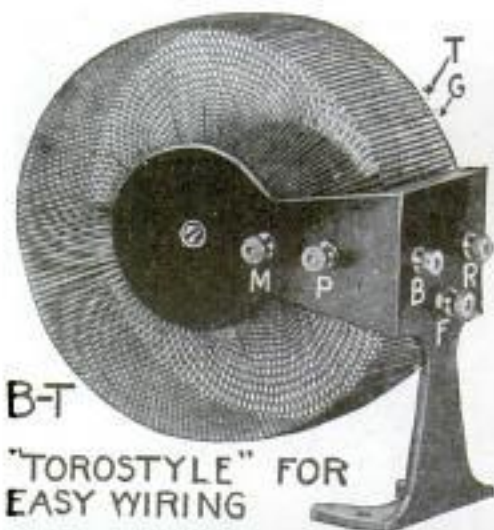
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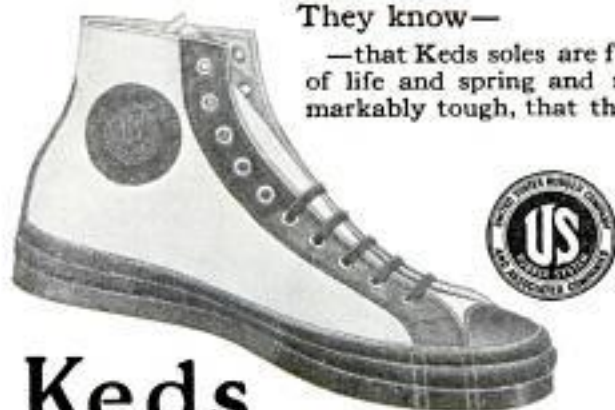
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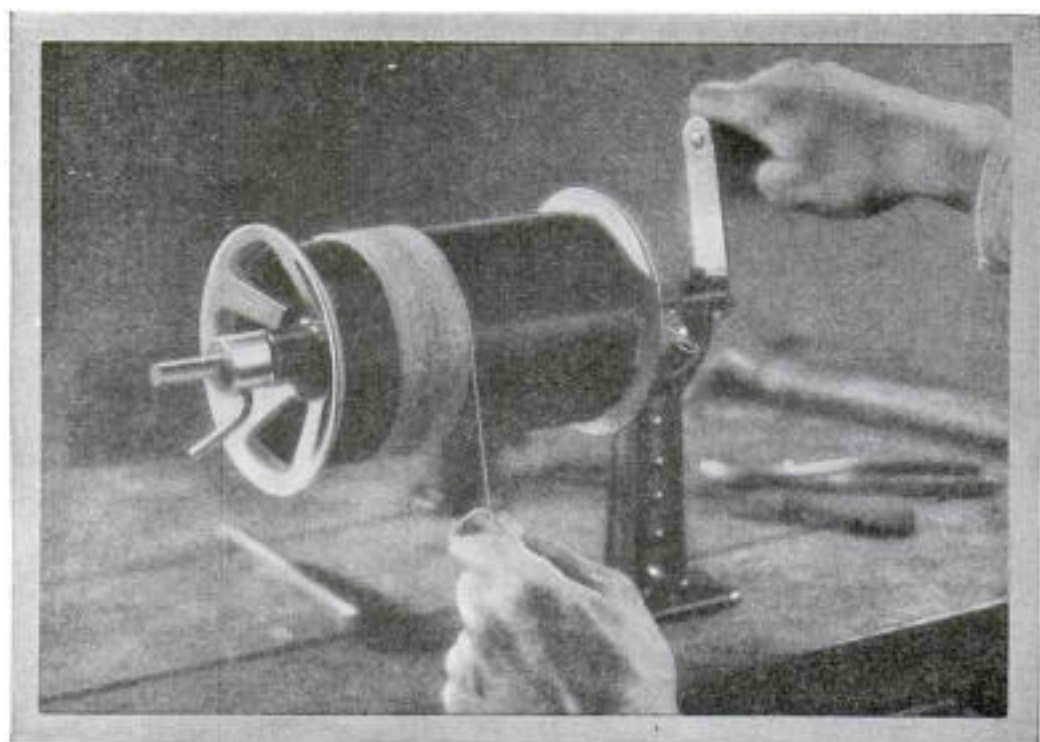
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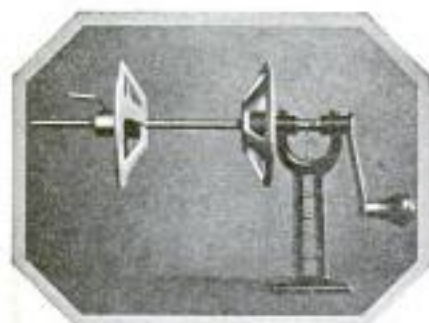
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Price, **\$4.20**

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A Real Long Range Crosley Receiving Set, \$9.75

Do not assume from its very interesting price that this very unusual Crosley set is a toy. Its impressive performance alone entitles it to serious consideration.

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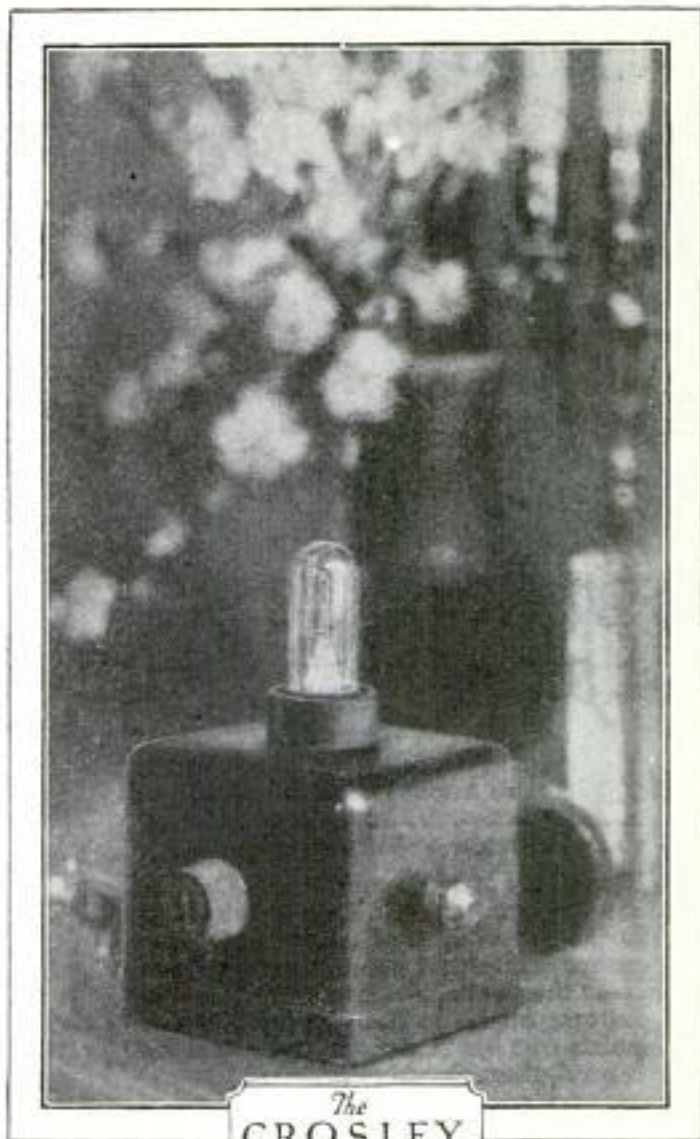
The Pup is the newest Crosley set with a price that reflects the volume-production economies of the world's largest builder of radios. It is substantially constructed and permanent in every regard. Its design is an improvement of the famous Crosley one tube set with which Leonard Weeks of Minot, N. D., heard the Mac-Millan Polar Expedition while the rest of America listened in vain.

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The
CROSLLEY
Pup - \$9.75

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Crosley 3 Tube 52S.D.
Mahogany finished cabinet, sloping panel. Holds all batteries - \$32.50



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More compact than the Special Model—but exactly the same superb performance - \$50.00



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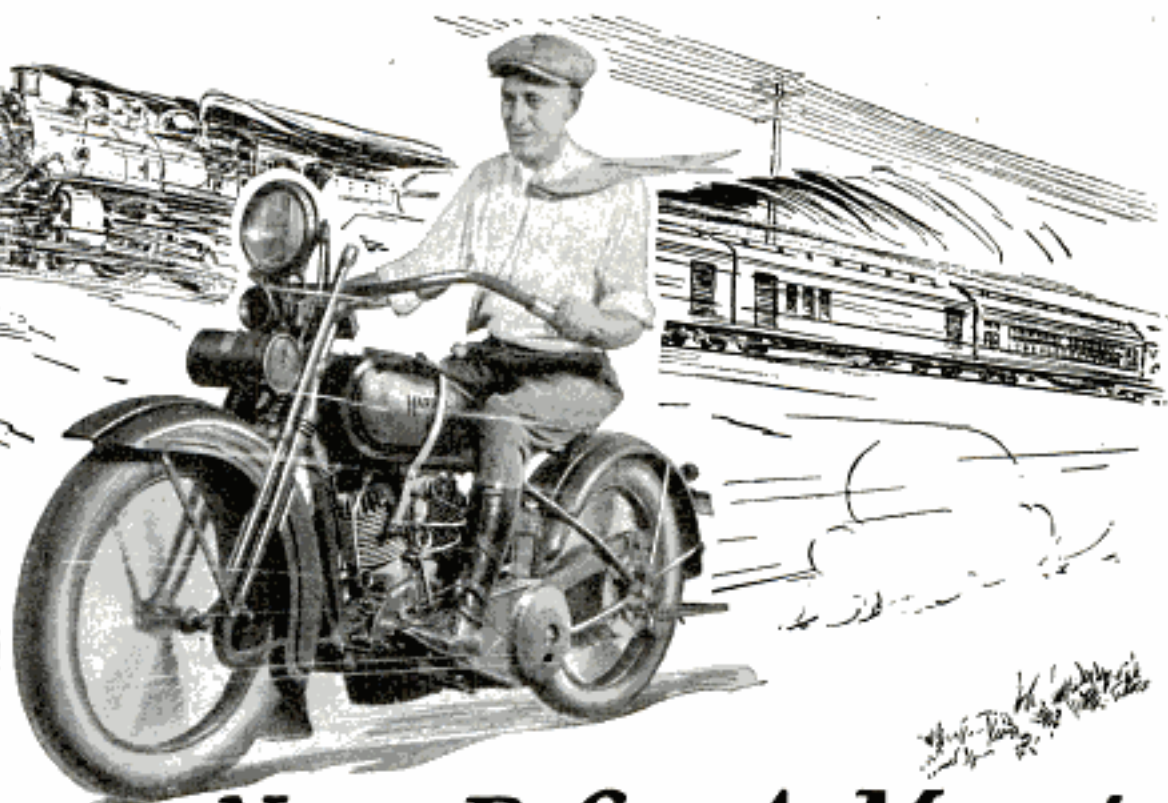
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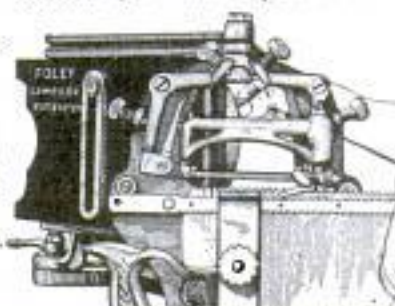
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1926 Catalog of RADIO BARGAINS

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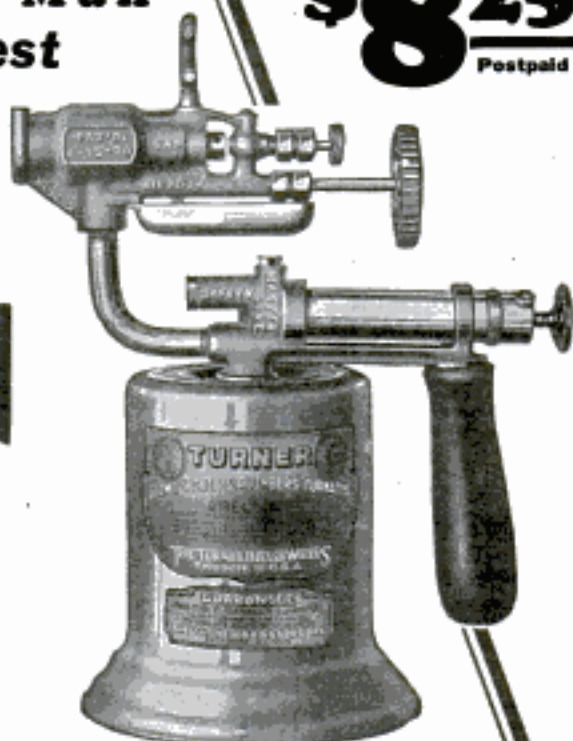
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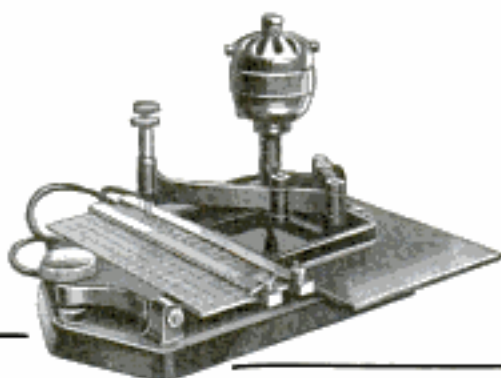


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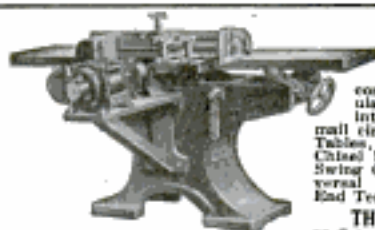
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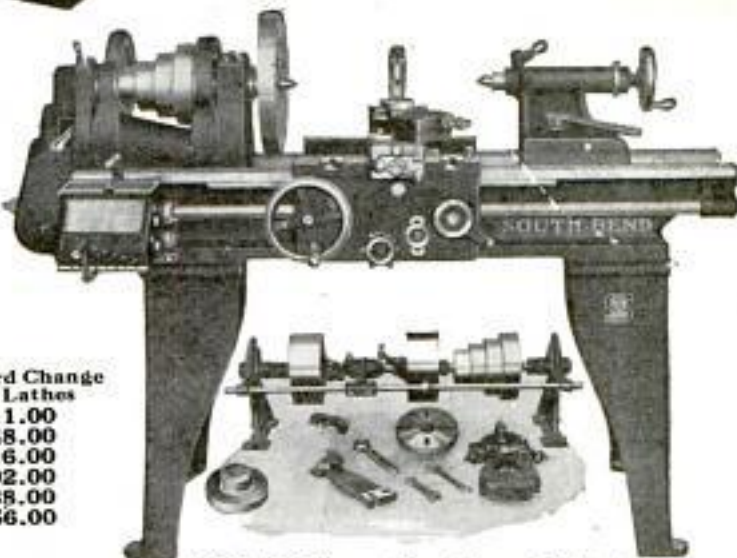
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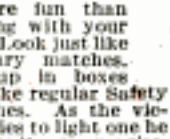
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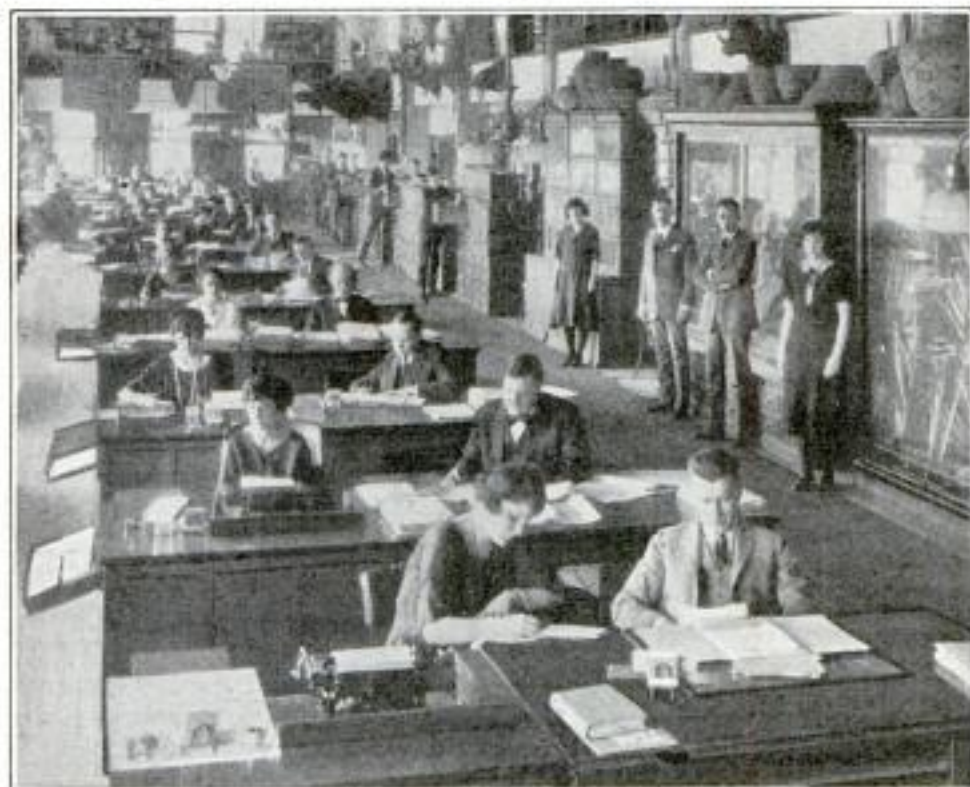
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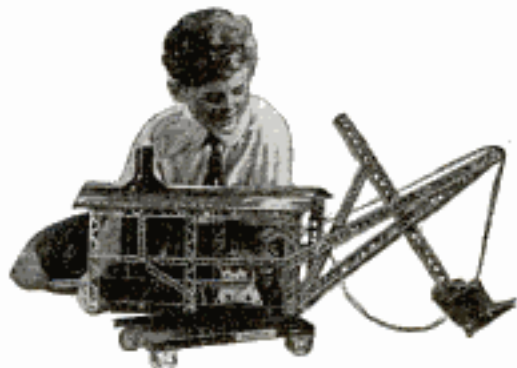
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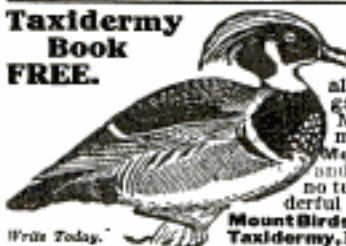
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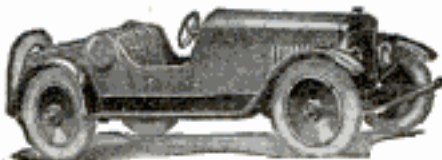
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IN ONE MINUTE

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NAIL & SPIKE
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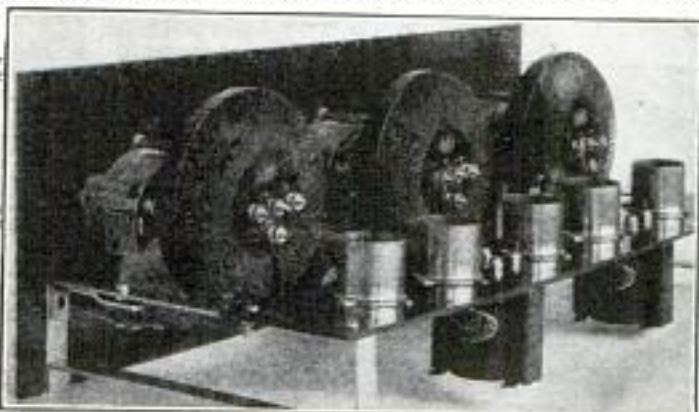
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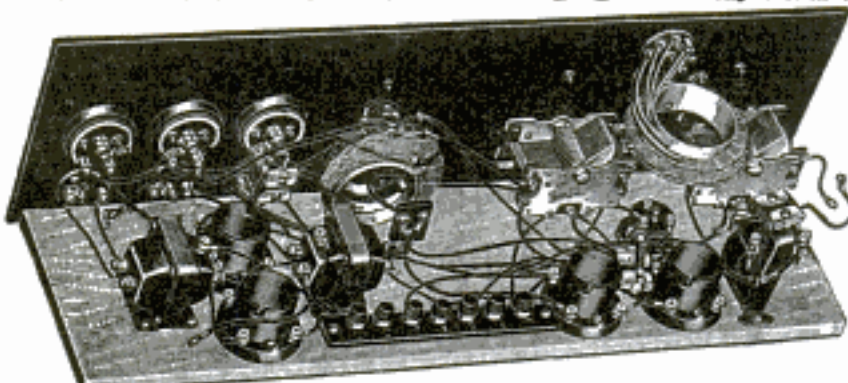
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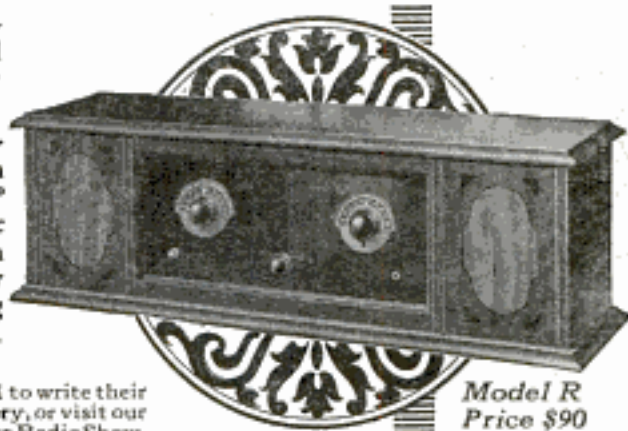
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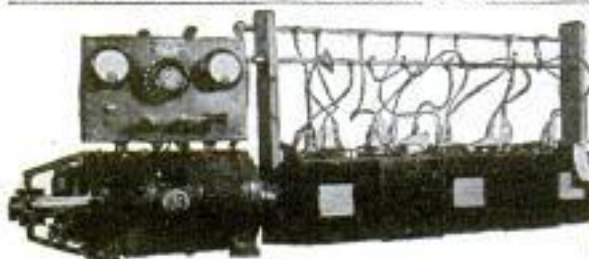
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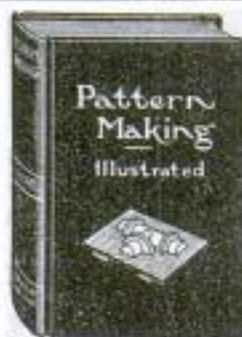
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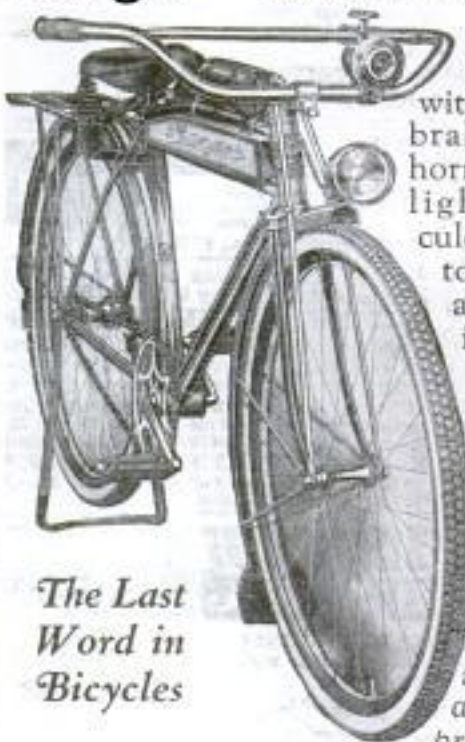
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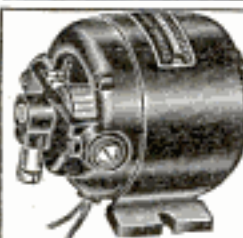
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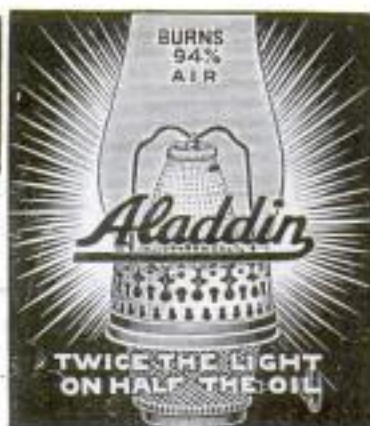
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Junior Saw

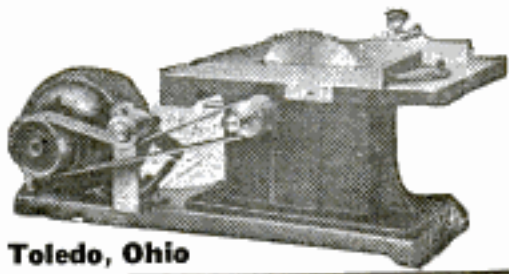
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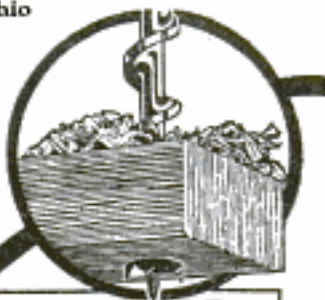
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FREE SPARE TIME OFFER

Steady-Boy sells quick. You can sell every Ford owner in spare time. If you really look for buyers you can make \$30 a day—\$20 easily!

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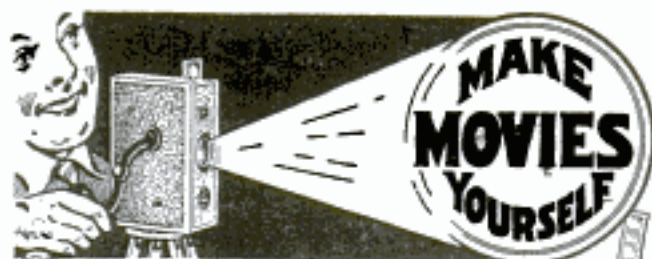
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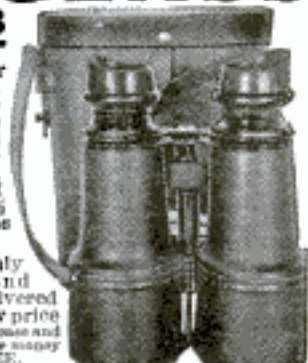
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"I am going to hang some paper in a day or two. I have not tried anything yet but what I have accomplished and I think I can hang the paper." * * * * *

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AGENTS

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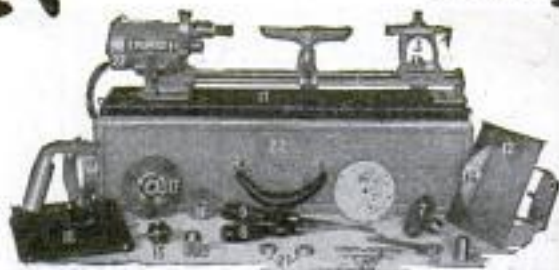
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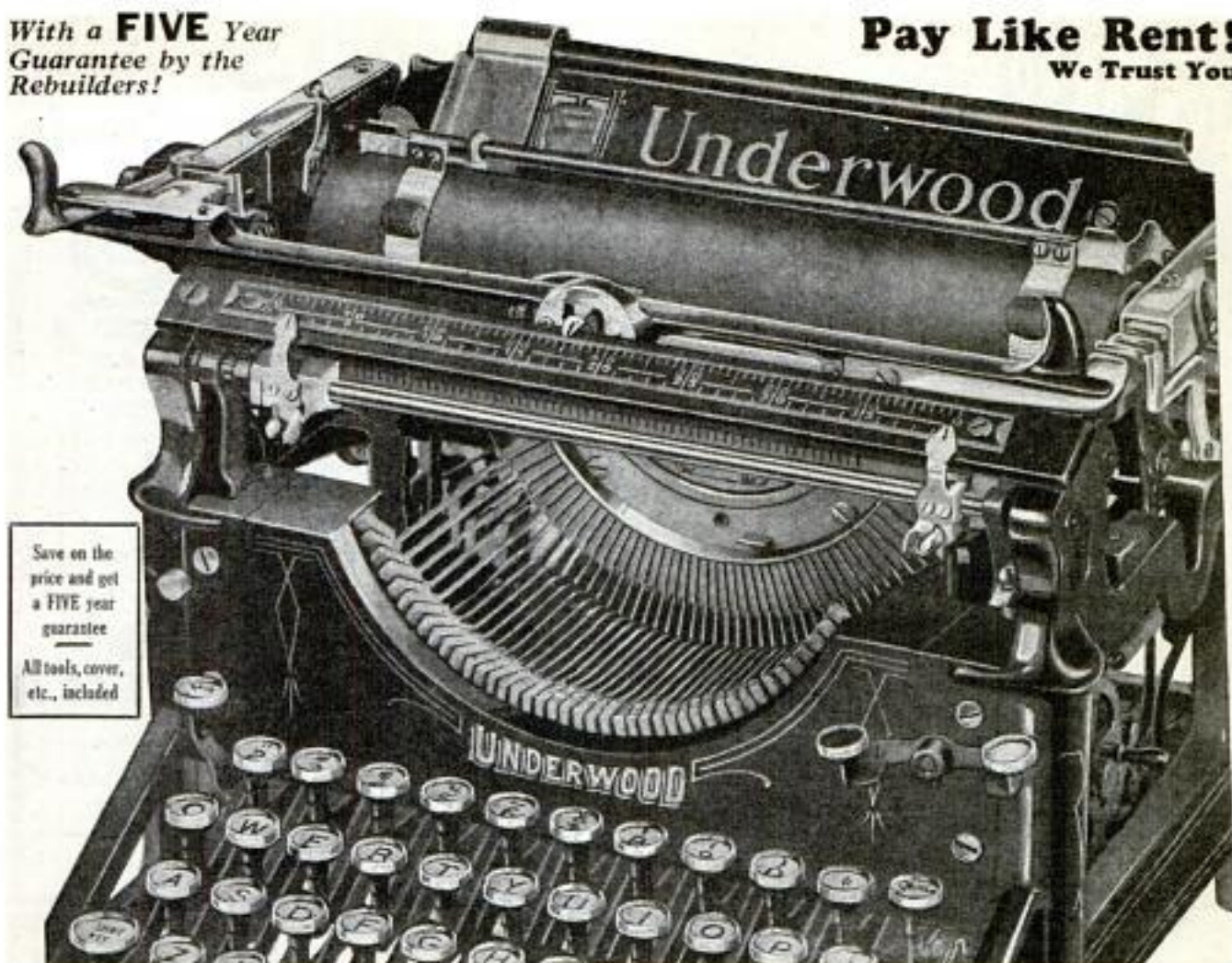
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\$351.00
Cleared
in one day
(Aug. 1925)
by W.H. Adams
Dayton, Ohio

V. A. Marini, Santa Cruz, Cal. (Nov. 1924) reports \$11,275 sales in 3 months. J. Gordon of New Jersey says \$4000 profit in two months. Alexander of Penn. \$3000 profit in four months. Ira Shook, Flint \$365 in one day. Bram, bought one outfit then 10 more within a year. Patillo, Ocala, writes: "Crispettes all you claim and then some." John W. Culp, South Carolina, writes, "Everything going lovely. Wrappers lying all over. It's a good old world after all." Perrin, \$380 in 1 day. Mrs. Lane, Pittsburgh, 8000 packages in

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With each sale of our wonderful 11 piece Toilet Article Assortment for only \$2.00. TOTAL STORE VALUE \$4.60

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MY! HOW THEY SELL!

You get the attention with the free Shears. Walter Harris sold 800 boxes in six weeks. Profit over \$100 a week. You can do this too.

Act Now! Sell like hot cakes year round. A baby could sell Lucky 11. Don't wait a minute. Save time. Send \$1.75 for complete outfit including display case. At least write for circulars explaining our unique plans, including 30 other packages. **ACT NOW!**

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AGENTS—SALESMEN



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\$100 WEEKLY AND UP

The opportunity of a lifetime—make money right and left. Every sale means ten repeats. Selling experience or capital not necessary. Not sold in stores. Exclusive territory to permanent salesmen. Hurry—don't delay—write quick for details. Address:

HUBERT MYERS LABORATORIES
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Console Style

\$1250
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Mathiesen's Loop Aerials

Four Styles

MASTER CONSOLE. Wound single; open 40 x 21, folded 22 x 4 x 5.

BABY CONSOLE. Wound double; open 30 x 14, folded 15 x 4 x 5.

MASTER STANDARD. Wound single; open 34 inches square; folded 22 x 4 x 5.

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ALL LOOPS have green Silk covered Wire, Nickel Trimming, and solid Mahogany Frames and have Three Taps. If your jobber or dealer cannot supply you, write and we will give the name of our nearest dealer.

MATHIESEN-SANDBERG CO.

5249 Ravenswood Ave.

CHICAGO



Standard Style

\$1250
List

How I Earn Money at Home

And in This Way Make Up for George's Shrinking Salary

Every Wife or Self-Supporting Girl Can Use Extra Money—Many Are Now Making It Themselves—Right at Home—How Auto Knitting Pays Three Ways

By MARY WHITMAN

"MY dear, you should have seen her at church this morning. She looked positively 'dowdy.' It's a shame. Mary used to be such a well dressed girl—until she married that bank clerk. I should think he'd feel—"

"Sh-h-h! She's on this car. Over behind you. She might hear."

But I had heard and my face flushed red with resentment and shame. It was true—I did look "dowdy"—and I knew it.

I got off the street car at the next corner and walked the remaining blocks to my home—and George. My cup of bitterness had spilled over, and I needed a few minutes to choke back my tears that wanted to run down my burning cheeks.

I didn't want to make George feel worse than he did already about our money situation. My husband is one of the "white collar men" whose salaries haven't kept pace with the mounting cost of living. I had sometimes hinted to George that I would be glad to take my old position again, but he had always vetoed the idea strenuously.

But the bitter experience of this Sunday morning was too much. I resolved as I walked home I was going to find a way to make extra money for clothes.

When I got home I was prepared to be cheerful as usual, but George was comfortably smoking and absorbed in his Sunday paper, and his contentment somehow irritated me terribly. To make matters worse he held up the magazine-picture section of the paper as I came into the room, and remarked that he had never seen the girls wear "such good-looking duds as they do this year."

I lost my temper, snatched the paper from him and cried, "If you like to see nice clothes so much, why don't you buy your wife some of them?"

Then I rushed to my room, still carrying the magazine section of the paper, shut the door, and threw myself across the bed for a good cry. George came and knocked and spoke to me, but I wouldn't let him in.

After a while I sat up, and idly began to turn the pages of the paper I had taken away from George. All of a sudden I sat up straighter and gasped. A woman was looking out of the page at me, holding a bank check in her hand, and across the top of the page were the words, "How I Make Money—Right at Home—Auto Knitting Pays Three Ways."

That night I mailed the coupon from that advertisement of The Auto Knitter Hosiery Company.

To make my story short, I found their prospectus so convincing and reasonable that I sent for and received the wonderful little machine, the Auto Knitter.

While George was at the bank, I used it every minute I could spare from my housework. At the end of a month I sent my first shipment of soft, warm, well-knit wool socks to the company's hosiery department. By return mail came a check in payment.

Well, I kept on knitting socks—but after a little while not many of them went to the company, for when I let my friend Gracia into my secret and showed her the socks, she immediately exclaimed: "I know where we can sell them right here in town and nobody need even know who made them." It worked out fine. I sold them and soon had calls for more. I found I could make more money selling them in this way than I could sending my standard socks to the company.

Then one day, as we were ready to go out, I presented myself before George in a pretty, new accordion-pleated frock which I had seen advertised in Park & Taylor's sale and a fancy little sweater I had made up myself with the aid of the Auto Knitter.

His mouth opened wide and he just stared at me in admiration. Finally, he managed to say: "Where did you get them, Mary?"



"It turned spare hours into extra dollars"

"I earned them myself," I replied brightly, not just sure how he would take the news.

"The sweater, too?" he inquired, and I knew he was thinking what an extravagant lot such a sweater must have cost.

"Well, the sweater—" I answered, "the sweater I really made myself!"

"But, Mary, I didn't know you could knit like that!"

"I couldn't by hand, George," I replied, "but I learned to do it another way."

George looked for a moment as if I had stolen my new things. But then I made him sit down and listen to my story.

Then I took the light, portable Knitter out of the closet and showed George how it worked. I had had enough practice by that time, so that I made a sock so quickly that George's

eyes almost dropped out of his head.

"And you say the Company's hosiery department will buy the socks from you?" he asked.

"Yes," I replied, "they will take my entire surplus of standard socks at a guaranteed price, but the best of it is that I can sell my work right here at home and make even more than by sending it to the company, to say nothing of the money I can save by making our own knitted wear just as I made this sweater."

George was certainly astonished, said he had no objection to my continuing the work. In fact, he was secretly proud of my ability. So I kept right on making clever little knitted articles for my daughter, socks for George and knitted novelties for home sale. When spring and summer came I took up the knitting of fancy, sport and golf stockings, so that I really had very little knitting to sell to the company, although they helped me in every way, even sending me a booklet telling how to build up my own home knitting business.

Now, I can have the pretty things I want for myself, for Helen and for the house—and I don't have to feel "guilty" when I buy them, because I am not obliged to touch a cent of what I call "the family money"—the money that George makes.

Whenever I hear a woman complaining about the high cost of living and clothes, I always try to tell her how the Auto Knitter will help her to make and save money at home in spare time.

No matter where you live, I feel sure that you want to know all about the Auto Knitter that has meant so much to us. By all means write to The Auto Knitter Hosiery Company at once and find out about this home industry waiting for you. Find out what others have done with the aid of the Auto Knitter and what it offers you. Send your name and address on the coupon below—no obligation of any sort. The Auto Knitter Hosiery Company, Inc., Dept. 21811, 630 Genesee Street, Buffalo, N. Y.

The Auto Knitter Hosiery Co., Inc.
Dept. 21811, 630 Genesee St., Buffalo, N. Y.

Send me full particulars about Making Money and Saving Money at Home with the Auto Knitter, telling how Auto Knitting Pays Three Ways. I enclose 2 cents postage to cover cost of mailing, etc. It is understood that this does not obligate me in any way.

Name.....

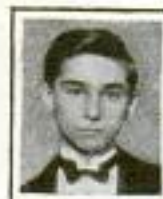
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So Mr. E. M. Lubeck of Kokomo, Indiana, expressed himself. "Karas Harmoniks bring in every voice and every instrument as distinctly as one could get them in the room," wrote the Rev. Wm. Stelhorn of Columbus, Ohio. "I consider your transformer a real musical instrument. Like a good violin, it has fine tonal qualities at all pitches covering the musical scale." That was the comment of Mr. Walter Krause of 7807 Burnham Ave., Chicago.

These few reports—picked at random from scores of letters—tell you more convincingly than we can tell you, the wonderful results YOU can obtain through installing Karas Harmonik Transformers in your set.

Here, for your enjoyment, is an audio transformer, scientifically designed to reproduce through your speaker *all* of the beauty of radiocast music—exactly as it is rendered in the studio.

High, low, and medium audio frequencies are amplified to an equal degree. Sonorous bass notes pour forth from the speaker in full strength and rich tone quality. The vital harmonics and rich overtones are brought out in their true beauty by this marvel of audio transformers.

Dear Sirs: I take great pleasure in praising your wonderful Karas Harmonik Transformers. I am using two of them in a three-tube Low-Loss set which I built. I have two brothers singing from Edgewater Beach, WEBH Station. Well, their singing comes in so natural and clear that at times we think they are right in the same room with us. They also tell me mine is the clearest set they have ever heard.

Robert Loos, 1640 N. Leavitt St., Chicago, Illinois

All last season, home set builders—the most discriminating class of radio enthusiasts—bought Karas Harmoniks and enjoyed a musical quality of radio reception that owners of factory-built sets knew nothing about.

If YOU want the utmost musical enjoyment that radio has to offer, get a pair of Karas Harmonik Transformers at once. It is

very simple to install them or, if you don't care to do it for yourself, any radio repair man will do it for you at small expense. Why not make up your mind right now to have the best music your set is capable of giving?

Most good radio dealers carry Karas Harmoniks. If your dealer is out of them, order direct of us. Send no money, just pay the postman \$7.00 each on delivery.

Karas Electric Co., 4047 N. Rockwell St., Chicago, Ill.

Please send me pairs of Karas Harmonik Audio Frequency Transformers. I will pay the postman \$7 apiece, plus postage, on delivery. It is understood that I am privileged to return the transformers any time within 30 days if they do not prove entirely satisfactory to me, and my money will be refunded at once.

Name

Address

if you send cash with order we'll send Transformers postpaid.

Make FURNITURE at Home

You Can Do It in Spare Time—It's Easy

THE simple designs in furniture are, after all, the most attractive. And the best of the easily-made styles have been gathered into "Popular Mechanics Furniture-Making Books." These books are filled with pictures that show you how the finished piece looks, and how to lay out, saw, and put together the various parts. You are also told how to finish your furniture in the most attractive ways. Nowhere else will you find instructions more clear. Nowhere else will you find such a marvelous assortment of simple designs to select from. Think of it! 142 different designs, including all the pieces of furniture and the different styles of lamps you need to make your home a pleasant place to live.

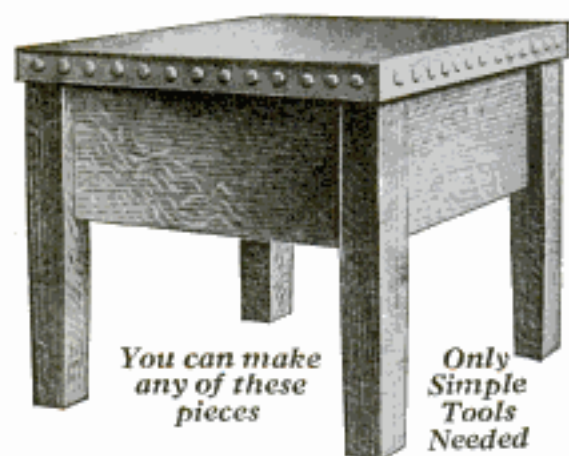


142 Pieces

**Complete
Instructions
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Popular Mechanics Furniture-Making Books

Tell How to Make These 142 Pieces of Furniture and Lamps



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any of these
pieces

Only
Simple
Tools
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the Egyptian style made 500
years before Christ
Piano bench
A shaving stand
A waste paper basket
A cigarette pedestal
A princess dresser
A sideboard
A window seat
A plant stand
A bedside medicine stand
A hall chair
A side chair
An arm chair
A book case
A lamp stand
Extension dining table
An oak-bound cedar chest

A dresser for child's playroom
Arts and crafts oil lamp
China closet
An oak bedstead
A footstool
A library set in pyro-carving
A grille with pedestals to match
A lady's writing desk
A telephone stand and stool
An oak medicine cabinet
Home-made mission chair
A lamp stand and shade
A porch chair
A tabouret
A Morris chair
A mission book rack
A substantial library table
A mission candlestick
A low-back mission chair
A magazine stand
A lawn swing
A portable table
A combination billiard table and
davenport

Easily made book shelves
A black case tabouret
A Roman chair
A roll top desk
A pyrographer's table
A piano bench
A library table
A princess dresser
A sewing box
A fern stand
A wardrobe
An oak table
A book trough
An oak serving table
An umbrella stand
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A writing desk
A music rack and book stand
A dictionary and magazine stand
A leather back arm chair
A wall shelf
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Two-light portable lamp
Four-light chandelier
Dining-room dome
Reading lamp
Pulver or den lantern
Lantern
One-light portable
Shade for droplight
Four-light chandelier
One-light bracket
Piano lamp
Newel post lamp
Electric candle sconce
One-light bracket
Droplight
Reading lamp No. 1
Reading lamp No. 2
Square dining-room dome
Mission chandelier
Desk light
Droplight No. 3
Chandelier
Hexagonal library lamp
Hexagonal dome
Lamp No. 1
Lamp No. 2
Lamp No. 3
Lamp No. 4
Conventional patterns
The butterfly design
The pyramid design
An oak buffet
Oak stain
A plain oak hall clock
A rocking chair

A curved back arm chair
A plate rack
A tool for marking dowel holes
A magazine table
A waste paper basket
A writing desk
A couch with cushions
Shade for dining room
How to bend wood
A smoking stand
A china closet
A leather-covered footstool
Arts-crafts mantel clock
A music stand
Wall case with mirror
A table for the den
A burlap-covered seat
A quarter-sawn oak settee
A screen
A mission book rack
A round extension table
An arm dining chair
A hall bench
A sewing table
A side chair
Another piano bench
Another screen
A folding card table
A magazine stand
A tabouret
A porch swing
A foot warmer
Plate rack
A mission sideboard

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*It's Fun to Make Things.
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HERE is the ideal watch for rough service. A masterpiece—with 21 ruby and sapphire jewels—handsome, sturdy, 100% dust proof—and it comes in a heavy 14 karat Gold Strata case. Adjusted to the Second—to Temperature—to Isochronism—to Positions. Built for absolute accuracy under all conditions and so strong in every part that it practically removes all chances of breakage. Note the tight fitting extra cap placed over the movement making it doubly dust proof! No matter what your work is—whether firing on a locomotive, working in a mine, on a farm or in a lumber camp, this is the watch for YOU—and you will be astonished to find such a wonderful watch so low priced!

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BURLINGTON WATCH COMPANY,

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Canadian Address: 62 Albert Street, Winnipeg, Manitoba

Please send me [without obligation and prepaid] your free book on watches and full explanation of your liberal approval offer on the Burlington Watch.

Name

Address

Big 3 ft. Telescope

Has unusually powerful lenses—magnifying over 8 times. Makes people and objects miles away seem close. Brings new pleasures to home, farm, camp, travel, sport. See moon and stars as never before. New Ferry "Wonder" telescope has 5 sections—opens out over 3 ft. long, measures 12 inches closed. Big, strong and powerful yet light, compact, easy to carry. Handy and draws fully brass bound with knurled edges. Body covered with black leatherette. Drawings made of special, smooth finish fibre, easy to slide in and out. Brass safety caps at each end to keep out dust. Powerful lenses are special clear achromatic European optical glass.

Free

YES ABSOLUTELY FREE! Handsome leatherette covered Carrying Case light, strong, complete with strap. Case is 12 in. long, 2 1/2 in. in diameter. Protects from dust and damage. Handy for farmers, auto tourists and bikers.

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12 in. long closed
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FIVE SECTIONS
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8-power Lenses
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Read These Letters
Thousands of Delighted Users

"I am delighted with the 'Wonder' telescope. Today I have been watching submarines 3 miles off the coast."

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Sign and mail coupon below and Ferry Wonder 3 ft. Telescope with free Carrying Case will come by return mail. Pay postman special bargain price of \$1.85 plus few cents postage. Satisfaction guaranteed or your money back. Send coupon today!

FERRY & CO., Chicago, Ill.

Ferry & Co., Dept. 1778
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Chicago, Ill.

Send me 3 ft. Ferry Wonder Telescope and Free Carrying Case. I will pay postman \$1.85 plus postage on arrival. If I am not satisfied you will refund my money.

Name _____

Address _____

City _____ State _____

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\$66 A DAY

IS EASY When You Give This Razor FREE

That's what H. R. King made in just 8 hours! And \$10 of it just rolled into his hands while he was waiting for gas at a filling station! No wonder salesmen everywhere say this amazing new razor is the greatest money-getter ever seen!

Kriss-Kross is absolutely unique—3 kinds of razors in one! Most unusual invention ever patented. No man can see it without wanting to own it instantly. And you give it to him absolutely FREE! Think of it!

Amazing Extra Profits, Too

We have originated a startling new bonus plan that brings you surprising extra profits. Nothing like it under the sun. K. D. Ralph made \$368.50 extra one month above his regular, big earnings. You just make one simple little sale and it often goes on working for you, piling up a big money-bonus while you sleep. We can't explain the plan here—others might copy it. Once you get the inside facts, you'll be simply astounded. Write us without a moment's delay! No obligation. Just send a postal today!

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Dept. S-370, Pendleton & Cozens Ave., St. Louis, Mo.

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Best for Your
Radio
Receiving Set

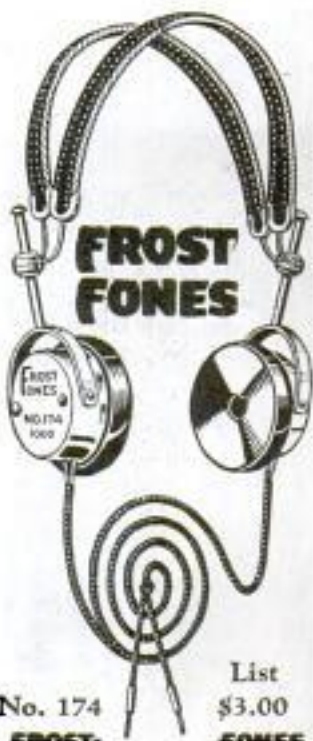
A new model—No. 174 FROST-FONES— with wonderfully light aluminum shells and featherweight headband. Sensitive—powerful—low in price—superb quality.

FROST-FONES

will greatly improve the operation of your radio receiving set and enable you to get more pleasure and satisfaction from its use.

FROST-FONES

are light in weight, give clearest reception, and are famous for their tone quality.



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Price
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**\$1
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Lamb Collar Submarine Coat

Combination Raincoat and Warm Overcoat

Men! Here is the most practical coat ever made, at a bargain price and only \$1.00 down! Broad shawl collar of best quality 4x beaverized lamb skin; and warm plaid blanket body and sleeve lining. Outer fabric is rippled submarine cloth with a coating of rubber between making coat absolutely stormproof. Smart stylish double breasted belted style with two large patch pockets with flaps and two muff pockets. Strapped sleeve. Length 44 inches. Tan only. Sizes 34 to 46.

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Have this serviceable combination coat *and never miss the money!* Six months to pay our bargain price! Send only \$1.00 now—when you get the coat you'll say it's the greatest garment you ever saw. Then if perfectly satisfied take six months to pay for it!

Order by No. W-18. Terms \$1.00 with the coupon, \$1.85 a month. Total price only \$11.95.

Elmer Richards Co., Dept. 1778
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I enclose \$1.00. Send Submarine Coat No. W-18. If I am not delighted with the coat I may return it and get my money back. Otherwise I will pay the bargain price on your terms; \$1 with coupon and only \$1.85 monthly. Total price \$11.95.

Size
Wanted.....

Name.....

Address.....

Post Office..... State.....

I have lived in this town..... yrs. And before that I lived in.....

For..... yrs. Age..... Own Rent Nationality or Color.....

Married Present Occupation.....

Employers Name.....

Give names of merchants who know you personally

Name..... P. O. Box or Street Address.....

Name..... P. O. Box or Street Address.....

If you have ever bought goods on credit by mail, tell us from whom. If there is anything else you wish to tell us about yourself, write on a piece of paper and enclose it with this coupon. But the coupon alone, fully filled out will do. That's all we want to know and we're ready to ship the coat at once. No red tape. No C. O. D.

Our Reference: First National Bank of Chicago.

**No
C. O. D.
to
Pay**

**Send the Coupon
And Only \$1.00 Now!**



Unlike Some Music OZARKA Service Satisfies Every Owner—

IN radio, when one selection does not please, you simply tune it out and pick up another broadcasting station. If it is a question of unsatisfactory volume or tone in your instrument then it becomes an entirely different matter.

You have certain very definite ideas in mind as to what you want your radio to do. Will you allow us to make a few suggestions regarding a plan whereby you can settle the radio question?

Select the instruments which you think might answer. Have a demonstrating instrument

brought to your home. Let each salesman, in turn, make the necessary battery connections. Let him tell you how to operate it but do all the tuning yourself.

You'll buy the instrument then, based on your own operation. You'll size up each one for

- ease of tuning
- distance received
- volume
- tone
- selectivity
- price.

OZARKA

120 Austin Avenue P,
Chicago, Illinois



**YOU'LL KNOW
THE MAN BY
THIS BUTTON!**

OZARKA Senior S-IComplete With All Accessories
Including Hi-Power Speaker**\$125.00**West of Rockies, \$137.50
Canada, \$180.00

There still remains one very important question to settle—the matter of service. No matter what anyone tells you sometimes little things may go wrong. The best radio salesman often knows nothing of correcting radio troubles—satisfy yourself.

Our Ozarka representative in your community will gladly put an Ozarka in your home for such a test. More than this, you will find that he is a thoroughly trained mechanic on our instrument. He has gone through a complete course of study under Ozarka Engineers, the men who designed and perfected the Ozarka.

3187 such men today can correct any trouble which may occur on any Ozarka instrument—more men are being factory trained daily. You wouldn't buy an instrument blindly—then don't buy service the same way. Any radio instrument is only as satisfactory as the quality of service behind it.

Our Book No. 200 shows the full Ozarka line from \$75.00 to \$197.50, complete with all accessories.

A Few More Men Are Needed

In a great many counties we have the man we want. He is rapidly building up a permanent and profitable business of his own because he has an instrument that will more than meet all competition. More than this, he is trained to back up his sales with the kind of service that counts.

Many well established Ozarka representatives started by giving us only their spare time—their evenings. If your county is open you can do the same.

The investment in cash is very small. The investment in time necessary for study is considerable. It requires patience, but the results have enabled many men to get out of the salary and time clock class.

Any previous sales experience is helpful but not necessary. We can and will teach you how to sell.

Send Coupon for FREE Book!

The 84-page "Ozarka Plan" is entirely too expensive to be sent out on postal card requests. It will be sent FREE to any man who mails the coupon below and who is really anxious to improve his condition. Tell us about yourself, ask for Ozarka Plan No. 100 and don't fail to give the name of your county.

**Ozarka
Incorporated**
120 Austin Ave. P.
Chicago, Illinois

Without obligation send book "Ozarka Instruments No. 200" and name of Ozarka Representative.

I am greatly interested in the FREE book "The Ozarka Plan" whereby I can sell your radio instruments.

INCORPORATED

120 Austin Avenue P,
Chicago, Illinois

Name.....

Address..... City.....

County..... State.....

Fastest Cutting

Saws Fifteen Cords
a Day!

Men—
Let Me Send You My
Greatest LOG SAW Offer!

ONLY
\$39

Puts the OTTAWA
Working for YOU!

"I average \$20 profit a day with my OTTAWA."—J. Schill, New York. "My OTTAWA has earned \$700 for me."—S. Graham, Wisconsin. "I can make more money with the OTTAWA than by farming."—D. Goff, Missouri.

It's easier now than ever before to own this fastest-cutting, easiest-moved, most powerful Log Saw. Now, you can make big money sawing firewood, stove-holts, ice, shingle timber, etc. Write today for full details of this most wonderful offer. Know how easy it is to make big money sawing fifteen cords of wood a day with no hard work.

350 Saw Cuts a Minute—

Make BIG MONEY—

nearly six each second. Just think of it—now you have a log—in a few seconds it's all sawed up into lengths you can use—without any hard work! The OTTAWA has balanced crank shaft, power force feed, friction clutch.

Wood selling at \$3 a cord brings owner \$45 a day. Saw your own wood—go into the wood business. Don't let the lack of ready money stop you. Remember, we sell on very easy terms. More in use than all others combined.



OTTAWA 4.H.P. LOG SAW

30 Days to Try—one whole month to use the OTTAWA at your own sawing. Shipped on trial only—backed by 10-year guarantee. Prove to yourself how easy you can saw 15 cords or more a day—at a cost of 15¢ a cord.

To Save You Freight—and get your machine to you a few days after you order, I ship from: Ottawa, Kan.; Pittsburgh, Pa.; St. Paul, Minn.; Albany, N. Y.; Memphis, Tenn.; Indianapolis, Ind.; Pueblo, Colo.; Ft. Worth, Texas; Portland, Ore.; San Francisco, Cal.

Send me your name and address on postcard today, so I can send you my wonderful new edition of the "Wood Sawing Encyclopedia." Educational, instructive. Be sure to investigate—will help you to make big money.

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Cuts Up Branches



Cuts Down Trees Level With Ground

Wood
Sawing
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The De Luxe The Machine That
Price \$12.50 Big Profits Cheats the Printer

Here it is, boys! Look it over. The selling Wonder of the Century. Handle a live one and climb the ladder of success. The machine pays for itself over and over each year. It prints the merchant's "ad" automatically on roll wrapping paper in one or two colors as you pull the paper. Guaranteed for five years. \$25.00 per day cost. Write for proof today. Woodworkers Mfg. Co., Racine Ave. & Cortland St., Chicago



Why Not Solve Your Saw
Problems With This Regular Tool?

You will like its sturdy mechanical construction. It will saw wood, fibre, bakelite 1" and metal 1/4" thick. Sold also without motor. We carry a complete line of bench woodworking machinery. For details write to DELTA SPECIALTY CO. Dept. A-2 858 Third St., Milwaukee, Wis.



\$150 to \$300 PROFIT MONTHLY FROM HB ONE DAY BATTERY CHARGING

Right now is your best chance to start a money-making battery charging business that will make \$150 to \$300 monthly clear profits. Winter brings greatest demand for HB One Day Battery Charging. Only \$35 cash brings complete HB equipment on 30 days' free trial with money-back guarantee. Easy monthly terms let you pay balance from your big battery charging profits. No experience needed. The lowest priced complete One Day Battery Charging equipment on the market. HB owners everywhere making big money, you can too. Write today for free bulletin 11A.

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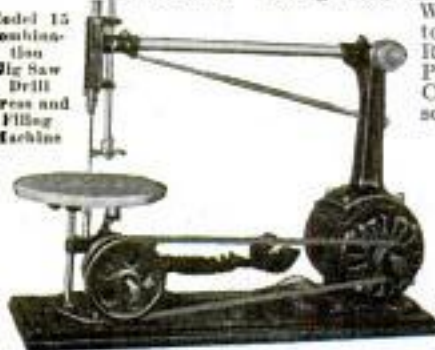
MORE HB ONE DAY BATTERY CHARGERS ARE IN USE THAN ANY OTHER MAKE



Do-All Bench, Wood and Metal Working Machines

Are designed to handle a large variety of work, both small and large, in metal as well as wood and all other materials. Being used in Manual Training Schools, Cabinet Shops, Monogram Manufactories, Metal

Model 15
Combina-
tion
Jig Saw
Drill
Press and
Filing
Machine



Workers, Sign Manufactories, Electric Shops, Radio Manufactories, Photographers, Art Craftwork of every description.

Send for Descriptive
Circular and our
Liberal Offer for the
months of
October and November

DO-ALL APPLIANCE CO., 859 N. Franklin St., Chicago

Manufacturers of The Do-All Combination Fruit Juice Extractor, Cream Whipped, Egg Beater and Knife Sharpener.



Agents Wanted

Model 11
Circular Saw
Table 11x15 1/2
6-Inch Blade

60 MILES ON A GALLON OF GASOLINE

TESTS SHOW FORD CAN RUN 60 MILES ON A GALLON

The amazing fact that a Ford can run 60 miles on 1 gallon of gasoline was recently brought to light through tests conducted by America's foremost engineers, where it was shown that a gallon of gasoline contains sufficient heat units which if properly atomized and mixed with air would give this additional mileage. Great strides have already been made in this direction by the recent invention of a simple attachment which can be installed in a few minutes without any alterations to the motor. It is common for Ford Owners to make from 40 to 44 miles per gallon after this marvelous device is attached.

MOST WONDERFUL INVENTION TODAY BRINGS JOY TO FORD OWNERS

Starts Ford Instantly

Starting a Ford Car in cold or zero weather is something every Ford Owner dreads—everybody realizes that difficult starting is an abuse on the starter and battery. Thousands of Ford Cars are "laid up" during the Winter just for these reasons. This great difficulty has been overcome. "The SUPER positively starts a Ford Car instantly in the coldest weather."

Marvelous Device

The SUPER is no trick affair—requires no mechanical adjustments and contains all the scientific principles of carburetors costing \$20 to \$35 and in its natural action uses up every particle of unused gasoline and breaks it up into a perfect vapor. The hitherto impossible is now realized by the SUPER.

Everybody Satisfied

Saves 3 to 7 Dollars Per Month

The best investment I ever made. The SUPER is saving me from three to seven dollars each month, besides putting new life into my motor.

A. H. WORRA, Iowa.

Makes 44 Miles Per Gallon

I have tried the SUPER and the results of the experiment are satisfactory. One quart of gasoline run my Ford 11 miles over improved roads which is just about as far as I could run with the plain Ford Carburetor.

G. E. YODER, Penn.

Finds That Our Claims Are Correct

I find that your claims for increased mileage are correct and that a big saving is made by your SUPER. In fact, the best device I have met with in that line.

M. J. VAN LEEUWEN, Mass.



*The
Heart
of the
Motor*

Eliminates Oil Pumping in Front Cylinder

What a wonderful relief to Mr. Ford Owner when he realizes that he can run his car without the motor pumping oil in the front cylinder. Sounds like an awful lot to expect of any device, but that is what the SUPER does and this is only one of its many advantages because it puts real efficiency into any Ford Car.

Complete Combustion

The SUPER is so designed that it takes advantage of the present Ford Carburetor and properly atomizes the light as well as the heavy elements of the fuel, converting every atom of gasoline and kerosene into power preventing liquid fuel from passing into the cylinders, thus avoiding carbon formation and oil dilution.

Easy to Sell

Sells Like Hot Cakes

This is a recent letter from one of our distributors: "Enclosed find draft for 200 more SUPERS, rush as I need them badly. I sold and banked \$104.00 in one day. Hope to sell 1000 SUPERS next month."

A. W. LEONARD, Penn.

Making Big Profits Every Noon

I have been working the SUPER at noon only. Yesterday noon I made more money with the SUPER than I did at my 11 hours hard work in the factory all day.

J. L. LEHNER, Wis.

Had No Previous Selling Experience

This letter shows what ambition does: "I sold six SUPERS in less than 2 hours tonight. I think it's a pretty good start—for it's the first thing I ever sold."

E. MANGOLD, Ind.

\$60.00 TO \$150.00 PER WEEK EASY

You just can't help making Big Money selling the SUPER because a trial sells itself and soon everyone in the neighborhood get talking about this marvelous device. Men like Leonard, Shaw, Manner, Kinsley, Peters, Sands, Beck and Hall are not exceptional salesmen, but just the type of men that saw an opportunity and were quick to grasp it when within reach. No previous selling experience is necessary, just a little ambition on your part to make money is all we ask and we will extend the same opportunity to you. Spare time will pay you well. If you can devote your entire time so much the better, because the SUPER is a whirl-wind seller and takes hold in a locality like wildfire.

Men Wanted Everywhere To Introduce

We want distributors in all parts of the country to take orders and deliver the SUPER and to look after the repeat business that is bound to follow and to such distributors we are willing to assign territory. You do not have to own a Ford to take up this proposition but if you have a Ford it is easier to explain its many advantages. However a Trial of the SUPER convinces the most doubtful person and tells a wonderful story.

A REAL FUTURE HERE

WEEKS SUPER CARBURETOR CO.
426-1532 Eleventh St., Milwaukee, Wis.

MAIL TODAY
WEEKS SUPER CARBURETOR CO.
426-1532 Eleventh Street, Milwaukee, Wis.

ENTRANCE: Please mail me full free particulars about your wonderful invention.

Name

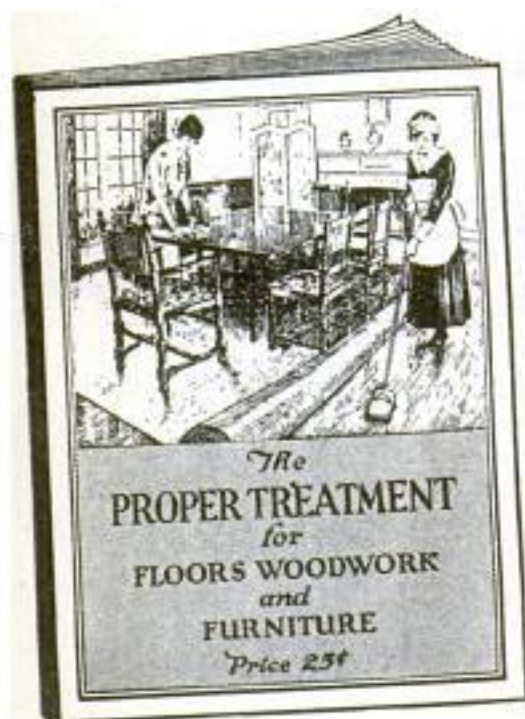
St. or P. O.

Town

County

State

FREE—Valuable Instruction Book on Wood Finishing



It tells how inexpensive soft woods such as pine, cypress, birch, fir, etc., may be finished so they are as beautiful and artistic as expensive hard woods.

Tells how you can easily put furniture, floors and woodwork in perfect condition. How to finish wood in beautiful stained effects with Johnson's Wood Dye and in up-to-date enamel effects with Johnson's Enamel.

How to Get it—FREE

Ask your best paint or hardware dealer for a FREE copy of the Johnson 25c Book on Wood Finishing. If your dealer cannot furnish this Book—mail the coupon to us, giving the name of your dealer, and we will gladly send you a copy free and postpaid.

JOHNSON'S WOOD DYE

Penetrating

| | | | |
|---------------|----------------|---------------|---------------|
| Dark Oak | Light Oak | Walnut | Bog Oak |
| Fumed Oak | Golden Oak | Mission Oak | Flemish Oak |
| Dark Mahogany | Light Mahogany | Weathered Oak | Early English |

Johnson's Wood Dye is very simple to apply—it goes on easily and quickly without a lap or a streak. Dries in four hours and will not rub off or smudge—penetrates deeply, bringing out the beauty of the grain without raising it. All shades of Johnson's Wood Dye may be easily lightened or darkened.

Johnson's Wood Dye is a *dye* in every sense of the word. It penetrates so deeply that the natural wood color is not disclosed. Like most first class products Johnson's Wood Dye answers one purpose only—it *dyes* the wood; a finish must be applied over it—we recommend Johnson's Varnishes or Johnson's Polishing Wax.

S. C. JOHNSON & SON, Dept. P. A. 11,
"The Wood Finishing Authorities"
RACINE, WIS.

Please send me free and postpaid, a copy of the Johnson 25c Instruction Book on Wood Finishing and Home Beautifying, "The Proper Treatment for Floors, Woodwork and Furniture."

Name.....

Address.....

City and State.....

Dealer's Name.....

The Symbol of the Specialist

The sign at the right distinguishes the Wood Finishing Specialist from the ordinary paint store. Stores displaying this sign carry a full line of Johnson's Artistic Interior Wood Finishes. They will gladly give you a FREE copy of the Johnson 25c Book on Wood Finishing and are competent to give advice on the proper finishing of wood.





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is securely founded on
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TRADE MARK REGISTERED
THE WORLD'S LARGEST MUSIC HOUSE



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EXAMINE it, show it to your friends, play it as much as you wish. A week's free trial—no obligation to buy. We make this liberal offer because we want you to see for yourself this superior quality of Wurlitzer instruments, the result of 200 years' experience. Noted musicians praise them for unusual tone quality, artistic workmanship and ease of playing. They are used in the finest bands and orchestras throughout the country.

Easy Payments

If you decide to buy, payments are arranged in small monthly sums. A few cents a day pays for your instrument. Special offers on complete musical outfits. Buy direct from Wurlitzer and save money.

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Instrument

(State instrument in which you are interested)