

MODERN MECHANIX

HOBBIES AND INVENTIONS

September

NOW
15¢

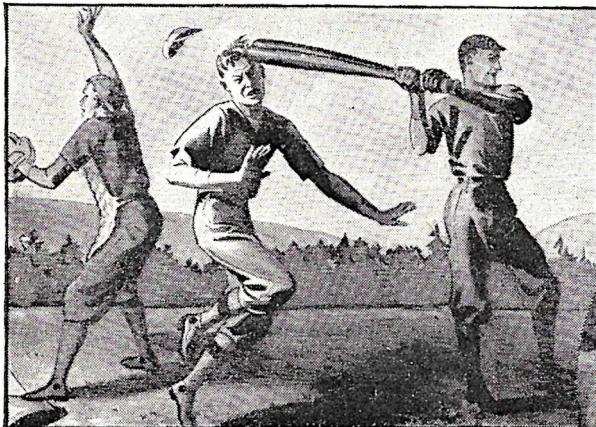


GERMAN PADDLE PLANE
SEE PAGE 68

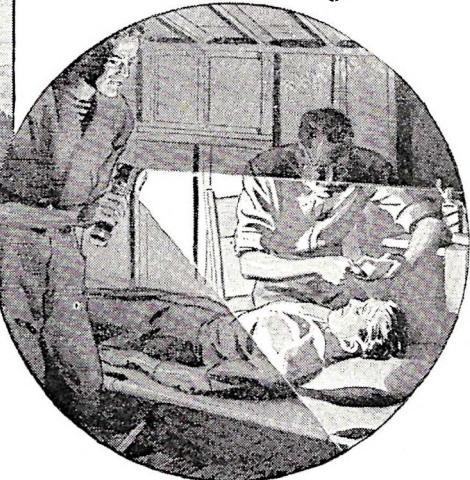
Training Army Air Fighters by Brig. Gen. Arnold

Gar Wood Predicts Startling Boat Speeds

Safe at the Plate....



....a casualty
ten feet beyond

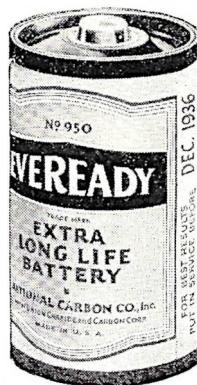


His Head Cut Open
Harold Genesen Rushed
to Camp Hospital Where
Lights Fail

WE HAVE A "twilight league" at our summer camp. One time, when I was on second base and a teammate made a hit, I dashed for home, thinking of nothing but how badly we needed another run.

I crossed the plate breathless and ran smack into a bat a fellow was swinging carelessly. It laid open a deep wound along my eyebrow, so they took me to the doctor's cabin. It was getting dusk and the camp electric plant was out of order, so the doctor told the boys to bring flashlights. We all had them, of course, but only one boy had one bright enough for the doctor to use. It was an Eveready Boy Scout. And the fellow who owned it said it was brighter because he had real, fresh Eveready Batteries in it and not just any old

kind. That accident showed me that just having a flashlight isn't enough . . . you've got to have good fresh Eveready Batteries in it . . . if you are going to live up to the Scout motto: "Be Prepared."



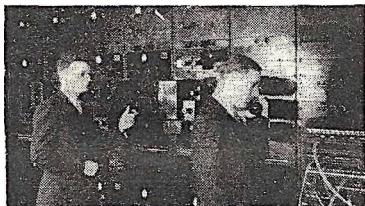
**EVEREADY
BATTERIES**
←
**ARE FRESH
BATTERIES**

NATIONAL CARBON CO.,
INC., 30 East 42nd Street,
New York, New York





J. E. SMITH, President, National Radio Institute
The man who has directed the home study training of more men for the Radio Industry than any other man in America.



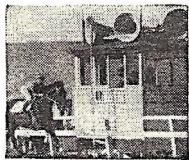
Broadcasting Stations

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



Set Servicing

Spare time set servicing pays many \$5, \$10, \$15 a week extra while learning. Full time servicing pays as much as \$30, \$50, \$75 a week.



Loud Speaker Systems

Building, installing, servicing and operating public address systems is another growing field for men well trained in Radio.

HERE'S PROOF THAT MY TRAINING PAYS



80 Monthly in Spare Time
...I work on Radio part time, still holding my regular job. Since enrolling five years ago, I have averaged \$80 a month, even with a job. JOHN B. MORISSETTE, 728 Silver Street, Manchester, N. H.

Makes \$50 to \$60 Week

...I am making between \$50 and \$60 a week, and all expenses are paid and I am getting all the Radio work I can take care of, thanks to R. H. W. STANFILER, 305 Walnut St., Knoxville, Tenn.



Operates Public Address System

...I have a position with the Los Angeles Civil Service, operating the Public Address System in the City Hall Council. My salary is \$163 a month. R. H. RODD, R. 136, City Hall, Los Angeles, Calif.



Be a Radio Expert

Many make \$30 \$50 \$75 a week

I will train you at home for many Good Spare Time and Full Time Radio Jobs

Do you want to make more money? Radio offers you many opportunities for well-paying spare time and full time jobs. And you don't have to give up your present job or leave home and spend a lot of money to become a Radio Expert.

Many Radio Experts Make \$30, \$50, \$75 a Week

Radio broadcasting stations employ engineers, operators, station managers and pay up to \$5,000 a year. Spare time Radio set servicing pays as much as \$200 to \$500 a year—full time jobs with Radio jobbers, manufacturers and dealers as much as \$30, \$50, \$75 a week. Many Radio Experts operate their own full time or part time Radio sales and service businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, service men, paying up to \$6,000 a year. Radio operators on ships get good pay and see the world besides. Automobile, police, aviation, commercial Radio, and loud speaker systems are newer fields offering good opportunities now and for the future. Television promises to open many good jobs soon. Men I have trained are holding good jobs in these branches of Radio. Read their statements. Mail the coupon.

There's a Real Future in Radio for Well Trained Men

Radio already gives jobs to more than 300,000 people. In 1935 over \$300,000,000 worth of sets, tubes and parts were sold; an increase of 20% over 1934. Over 1,100,000 auto Radios were sold in 1935; 25% more than in 1934! 22,000,000 homes are to day equipped with Radios, and every year millions of these sets go out of date and are replaced with newer models. Millions more need servicing, new tubes, repairs, etc. Broadcasting stations pay their employees (exclusive of artists) more than \$23,000,000 a year! And Radio is a new industry, still growing fast! A few hundred \$30, \$50, \$75-a-week jobs have grown to thousands in less than 20 years!

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

Practically every neighborhood needs a good spare time serviceman. The day you enroll I start sending you

Extra Money Job Sheets. They show you how to do Radio repair jobs that you can cash in on quickly! Throughout our training I send you plans that made good spare time money—\$200 to \$500 a year—for hundreds of fellows. My training is famous as "the Course that pays for itself."

I Give You Practical Experience

My Course is not all book training. I send you special Radio equipment and show you how to conduct experiments and build circuits which illustrate important principles used in modern Radio receivers, broadcast stations and loud speaker installations. I show you how to build testing apparatus for use in spare time work from this equipment. This 50-50 method of training makes learning at home interesting, fascinating, practical.

You Get a Money Back Agreement

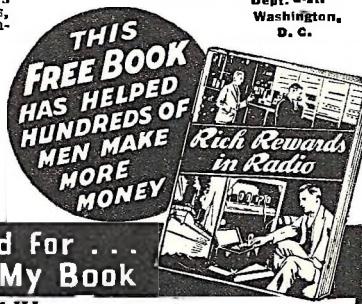
I am so sure that I can train you successfully that I agree in writing to refund every penny you pay me if you are not satisfied with my Lessons and Instruction Service when you finish. I'll send you a copy of this agreement with my Free Book.

Find Out What Radio Offers You

Act Today. Mail the coupon now for "Rich Rewards in Radio." It's free to any fellow over 16 years old. It describes Radio's spare time and full time opportunities and those coming in Television; tells about my training in Radio and Television; shows you actual letters from men I have trained telling what they are doing and earning. Find out what Radio offers YOU! MAIL THE COUPON in an envelope, or paste on a postcard—NOW!

J. E. SMITH, Pres., National Radio Institute

Dept. 6-JH
Washington,
D. C.



This Coupon is Good For . . . One FREE Copy of My Book

J. E. SMITH, President, Dept. 6-JH
National Radio Institute, Washington, D. C.

Dear Mr. Smith: Without obliging me, send "Rich Rewards in Radio," which points out the spare time and full time opportunities in Radio and explains your 50-50 method of training men at home in spare time to become Radio Experts. (Please Write Plainly.)

NAME.....

AGE.....

ADDRESS.....

CITY.....

STATE.....

PRICE
15 CENTS

SAME PRICE
IN CANADA

MODERN MECHANIX

HOBBIES & INVENTIONS

SEPTEMBER
1936

Volume XVI
Number 5

CONTENTS

SPECIAL FEATURES

Training Army Air Fighters - - - - 36

*By Brig. General H. H. Arnold, Assistant
Chief, Army Air Corps*

Science Vies With Sport At Olympics - - 42

Making Boats Go Faster - - - - 46

By Gar Wood with Paul Weber

Whirling Funnels Spread Disaster - - 52

By S. D. Flora, Topeka Meteorologist

Stunting On A Motorcycle - - - - 56

By E. Leland Elam

Auto Triumphs Feature Texas Centennial - 60

Tackle Suggestions For Best Bass Fishing - 64

By Robert Page Lincoln

The Pre-Fabricated House Arrives - - 70

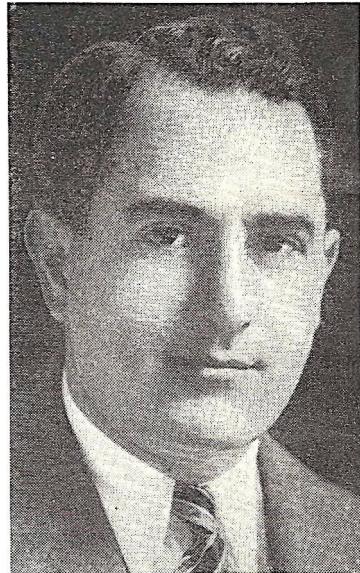
By Donald G. Cooley

Plastics Revolutionize American Industry - 80

By W. A. Swanberg

[Continued on page 8]

NEXT MONTH

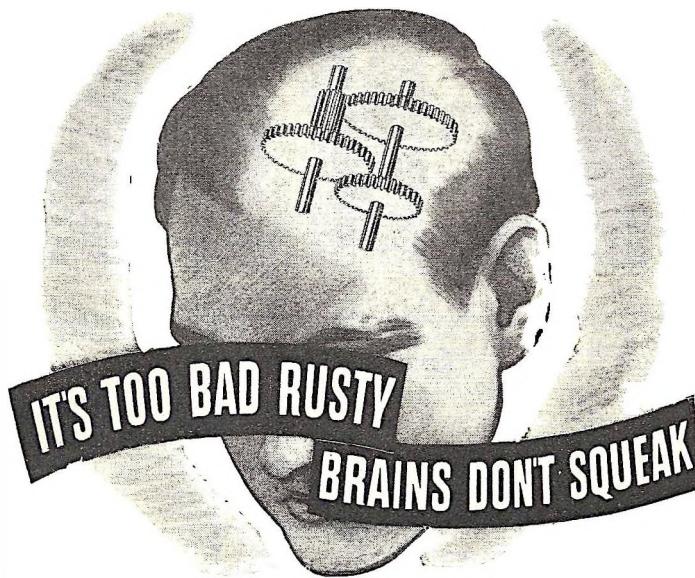


Daniel M. Daniel, New York World-Telegram baseball writer, contributes an unusual article on unusual phases of the game for the October issue. In something of the manner of the late Ring Lardner, Mr. Daniel recalls the first player to wear a glove, the first catcher to wear a mask and countless anecdotes of the national game. If you enjoyed his "Scoring on Stolen Signals" last month, you will like the October article. Don't miss it!

FOR WORKSHOP FANS

The How-to-Build section of MM for October will include a bicycle radio set, directions for battery making, plans for a basement pump, an article on color photography for the amateur, design for a novel refreshment cabinet, lathe projects and scores of helpful home improvement kinks.

Published monthly by Modern Mechanix Publishing Co. at Broadway and 11th St., Louisville, Ky., U. S. A. Entered as second-class matter under the act of March 3, 1879, at the post office in Louisville, Ky., with additional entry at Greenwich, Conn. Copyright 1936. Editorial and general business offices, 22 West Putnam Ave., Greenwich, Conn. Address all manuscripts to Modern Mechanix Hobbies & Inventions, at the Greenwich, Conn., address. Not responsible for unsolicited manuscripts. Contributions accompanied by insufficient postage will not be returned. In U. S. and Possessions and in Canada, 15¢ a copy; \$1.50 a year. Other Postal Unions, \$2.00 a year. Printed in U. S. A. Advertising forms close the first of second month preceding date of issue. Advertising offices: New York, 1501 Broadway; Chicago, 360 N. Michigan Ave.; San Francisco, Simpson-Reilly, 1014 Russ Bldg.; Los Angeles, Simpson-Reilly, 536 S. Hill St. Member Audit Bureau of Circulations. Managing Editor, William Kostka; Editor, Tom Mahoney; Associate Editors, George S. Sculkin, Thomas A. Blanchard; Hunting and Fishing Editor, Robert Page Lincoln; Naval Architect, S. S. Rabl.



● IF RUSTY BRAINS did squeak, no one would have to warn you against trying to get ahead in a modern world with antiquated training! Keeping your brain modern is just as important as keeping plant equipment modern. The best way to keep your brain up to date is to keep your training up to date. The business of modernizing men's training is the business of the International Correspondence Schools. All over the world men testify to the effectiveness of I. C. S. training — and if you are stuck on a job, if your pay envelope is too thin, this coupon can be the first step towards changing the whole course of your life.

modernize
MAKE MORE
MONEY

INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 2317-J, SCRANTON, PENNA.

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

- | TECHNICAL AND INDUSTRIAL COURSES | |
|--|---|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Heat Treatment of Metals |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Sheet Metal Worker |
| <input type="checkbox"/> Building Estimating | <input type="checkbox"/> Telegraph Engineer |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Telephone Work |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Mechanical Engineering |
| <input type="checkbox"/> Auto Body Repair | <input type="checkbox"/> Motor Draftsman |
| <input type="checkbox"/> Management of Inventions | <input type="checkbox"/> Machinist |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> Toolmaker |
| <input type="checkbox"/> Electric Lighting | |
| <input type="checkbox"/> Welding, Electric and Gas | |
| <input type="checkbox"/> Reading Shop Blueprints | |
| <input type="checkbox"/> Boilmaker | |
| | <input type="checkbox"/> Plumbing |
| | <input type="checkbox"/> Heating |
| | <input type="checkbox"/> Air Conditioning |
| | <input type="checkbox"/> Steam Engineer |
| | <input type="checkbox"/> Steam Electric Engineer |
| | <input type="checkbox"/> R. R. Locomotives |
| | <input type="checkbox"/> R. R. Section Foreman |
| | <input type="checkbox"/> Air Brakes |
| | <input type="checkbox"/> R. R. Signalmen |
| | <input type="checkbox"/> Highway Engineering |
| | <input type="checkbox"/> Civil Engineering |
| | <input type="checkbox"/> Surveying and Mapping |
| | |
| BUSINESS TRAINING COURSES | |
| <input type="checkbox"/> Business Management | <input type="checkbox"/> C. P. Accountant |
| <input type="checkbox"/> Office Management | <input type="checkbox"/> Bookkeeping |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Secretarial Work |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Spanish |
| <input type="checkbox"/> Accountancy | <input type="checkbox"/> French |
| <input type="checkbox"/> Cost Accountant | <input type="checkbox"/> Advertising |
| | <input type="checkbox"/> Service Station Salesmanship |
| | <input type="checkbox"/> First Year College |
| | <input type="checkbox"/> Business Correspondence |
| | <input type="checkbox"/> Stenography and Typing |
| | <input type="checkbox"/> Civil Service |
| | <input type="checkbox"/> Mail Carrier |
| | <input type="checkbox"/> Railway Mail Clerk |
| | |
| | <input type="checkbox"/> Grade School Subjects |
| | <input type="checkbox"/> High School Subjects |
| | <input type="checkbox"/> College Preparatory |
| | <input type="checkbox"/> Illustrating |
| | <input type="checkbox"/> Cartooning |
| | <input type="checkbox"/> Lettering Show Cards |
| | <input type="checkbox"/> Signs |

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

City.....State.....Present Position.....

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

INVENTORS

TO BE successful as an inventor, you don't need to be an Edison who took out 1099 Patents before he died, or a C. F. Kettering, who helped develop the Self-Starter, Duco, Ethyl Gas, and other outstanding inventions, and is today the famous head of the Research Division of the General Motors Corporation. In fact, you don't need to be known as an inventor at all, if you have a practical, useful, salable invention—or an idea for one—and go about it right.

Remember that for every Edison or Kettering, for every McCormick, DeForest or Atwater Kent—there have been thousands of unknown men whose inventions helped along the wheels of progress and helped the inventors financially at the same time.

Many Little Ideas Have Big Commercial Possibilities

For example, who knows the name of the inventor of the wooden golf tee, the ordinary crinkly hair pin, or the metal ball or disc that the average housewife uses for scouring pots and pans? Who knows the inventors of the thousands of gadgets that you will find in the ten-cent stores, in the modern drug and department stores? Some day, stop and look at some of the simple articles you'll find on the counters of a ten-cent store. Notice how many of them are marked Patented or Patent Applied For. It is an interesting, educational experiment. These inventors, most of them, weren't of the genius class. They simply got an idea for doing something in a better, easier, faster, or more economical way—AND THEN DID SOMETHING ABOUT IT.

Interesting Points

Who is today's "champion inventor"?

Ans.: John F. O'Connor, of Chicago, Ill., holds 949 Patents, more than any other living man.

Who is "Lady Edison"?

Ans.: Miss Beulah Louise Henry of New York City leads all women inventors, holds fifty patents; is known as "Lady Edison".

What is an improvement?

Ans.: Nearly all inventions today are improvements over earlier inventions. Often the improvement proves more profitable than the earlier invention.

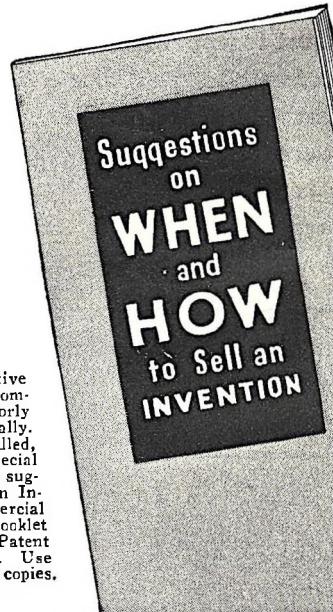
Is a model necessary?

Ans.: Today, most inventions are patented without models. A subject fully explained in our book.

What is the preliminary search?

Ans.: The preliminary search is ordinarily the first step to help an inventor. Also fully explained in our book. Send for a copy today.

You may be able to do as well as others who have been successful. That only time can tell. But there is one thing you can do, and do now, without waiting on time. You can find out easily and quickly exactly what to do to protect yourself. In the 48-page book, "Patent Protection" shown on the opposite page, which will be sent to you FREE, we tell you what many other inventors have done, just what you yourself must do to make Application for a Patent, give you interesting facts about inventive history, show you 115 mechanical movements that inventors have used in working out ideas, and much more. Decide now to get a copy of this interesting book. Its facts can be worth much—yet they cost you nothing.



A New Book About Selling Inventions

There are two sides to every inventive success: The inventive side and the commercial side. A good invention poorly handled, can prove a failure commercially. An ordinary invention, properly handled, can be made a money-maker. In the special booklet, shown here, we give you some suggestions on "When and How to Sell an Invention"; practical hints on the commercial side of inventing. We'll send this new booklet along with the big 48-page book, "Patent Protection" illustrated on the next page. Use the convenient coupon to request your copies.

We Cordially Invite You to...

NOTE

★ You may not be an Edison or a Kettering but still you may have a good idea

YOUR QUESTIONS ANSWERED! There are a lot of questions that the average man with an invention, or an idea for one, wants answered before he goes ahead. Here are a few of them that most inventors put up to us: How do the Patent Laws protect me? What easy steps can I take, without cost, to put myself in position to support my belief that I am the first man to think of my invention? Is a Patent worth the cost?

Should I try to sell my invention before I have it Patented? Is there any safe, business-like way to secure financial help? If I do apply for a Patent how shall I reach people who can market my invention? Can I protect and sell an improvement on some invention that has already been Patented? These are but a few of the questions which usually confront the average man. **You need the answers! YOU CAN HAVE THEM, without cost, trouble, or delay.**



Our Business is To Help You—Write Us Today

For more than thirty-seven years, this firm has been helping men with an inventive turn of mind. We maintain a large staff of trained, experienced specialists—**Registered Patent Attorneys, Draftsmen, and Searchers** to help our clients secure all the protection to which they are entitled. Fees are reasonable. Deferred payments frequently arranged. Questions promptly answered. Write us frankly with absolute assurance that what you say will be treated with strictest secrecy. But first send for the **FREE BOOKS** shown on these two pages. They are filled with facts, pictures and suggestions. They tell you things about Patents, Inventions and Selling Inventions that we have learned in our long experience. **They may save you time, expense, EVEN LATER DISAPPOINTMENT.** Simply fill in the coupon or write us a confidential letter. No charge, no obligation. **Mail the coupon today.**

**VICTOR J.
EVANS & Co.
REGISTERED PATENT ATTORNEYS**

**MAIN OFFICE: 720-K, VICTOR BUILDING,
WASHINGTON, D. C.**

Other Offices: 1007-B, Woolworth Bldg., New York
1445-B, Monadnock Bldg., Chicago
514B, Empire Bldg., Pittsburgh
1010-B Hobart Bldg., San Francisco
736-B, Security Bldg., Los Angeles

Send me **FREE** copies of your books, "Patent Protection" and "When and How to Sell an Invention." (Note: Same books supplied by any of branch offices listed above.)

Name

Street and No.

City or Town

SUMMER SPECIAL!

LOW-COST PURCHASE PLAN!

AT LAST anyone can own a New Royal Portable Typewriter! Prices are low now and terms are easy—only a few cents a day!

Brand-New Genuine Latest Model NEW ROYAL PORTABLE

with
TOUCH
*
CONTROL



GREATEST VALUE

IN ROYAL'S HISTORY! With many exclusive improvements, including Touch Control—"it adapts the key-tension to your exact finger-pressure;" Finger Comfort Keys; Standard Office-style Keyboard. Easy to use. Perfect for student, teacher, or business man.

ACT QUICKLY!
FREE!

LEARN TOUCH TYPING this summer. Type like an expert in the fall, be ready for school or business.

Royal's simple system shows you how—*free* with every New Royal Portable.

CARRYING CASE. Handsome. Compact. Typewriter easily and quickly removed. May also be used as extra luggage case.

*Trade-mark for key-tension device.

Don't Delay—MAIL TODAY!

Royal Typewriter Company, Inc., Dept. MM-96
2 Park Avenue, New York City

Please give me details concerning special low-cost purchase plan on New Royal Portable.

Quote trade-in allowance on my.....
Typewriter, serial number.....

Name _____
Street _____
City _____ State _____

SEND NO MONEY!

**Choose AVIATION
and Learn at LINCOLN**

**\$500
A MONTH**
That's the kind
of big pay
earned by
line Pilots!
Airplane Me-
chanics also
earn good sal-
ries!

**GOVERNMENT-APPROVED
SCHOOL.** Course gives you re-
quired training for Government Pilot's
license. Mechanics' Course gives you
required training for Government
Airplane and Engine Mechanics' Li-
cense. Special course in Sheet Metal
Training. Finest modern equipment.
High class instructors. Lincoln
graduates employed by leading air-
lines, factories, airports, and
air ice stations. Others in demand.
Now in 26th year; 18 years teach-
ing aviation. Start training at Lincoln now for a
successful aviation career. Special part-time employment offer for a
few men to buy board and room while training. WRITE
today. Please state age.

LINCOLN AIRPLANE & FLYING SCHOOL
Division of Lincoln Aeronautical Institute, 403F Aircraft Bldg., Lincoln, Nebr.

CONTENTS—Continued from page 4

SHORTER FEATURES

Frontiers of Science—A Guest Editorial	33
By David Sarnoff	33
Winners in MM Auto Contest	35
Paddle Plane Built on Flapping Wing	
Principle	68
Housewives Inspire Home Improvements	74
Needed Inventions Winners Suggest New Ideas	75
Stamina is Built Into Training Planes	78
Astronomers Study Radio Interference	86
He Finds Music in Plumbing Tools	88
New Stunts for the Auto Mechanic	102
Mystifying with Chemical Magic	103

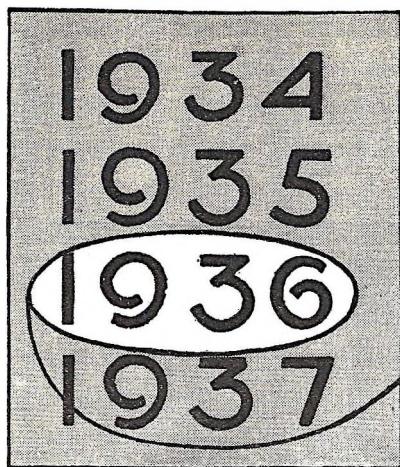
HOW-TO-BUILD FEATURES

Auto Parts Make Efficient Windcharger	
Plants	90
Checking the Car for Elusive Engine Noises	92
Pull-Cord Control Opens Garage Doors	96
Inlaying With Colored Sealing Wax	98
A Midget Foot-Powered Locomotive Boys Can Make	100
Practical Modern Furniture for the Workshop Fan	104
Turning Clay Projects on a Potters Wheel	108
A Lead Plate Bud Vase	110
"MM Master" Metal Tube Sound System	112

NEW MECHANICAL INVENTIONS

Slot Machine Yields Fishing Worms	34
Swiss Power Plant Fulfills Prophecy	40
Hangers Help Sell Airplanes	40
Wooden Safes Protect From Fire	40
Super-Flying Boat Powered With 800 H.P.	
Motors	41
Tractor Fires Fuel With Spark	41
Wooden Radio Tower Improves Reception	44
Putting Machine Improves Stroke	44
Army Tanks Crush Obstacles at 70 M.P.H.	45
Wind Marker Flush With Runway	45
Model Locomotive Wins Honors	45
50,000 Watts Consumed by Giant Light	50
Three Colors Form Airport Light	50
Speedometer for Train Passengers	51
New Metal Turns Glass Like Wood	55
Lawn Sprinkler Pulls Itself Along	55
Compass Shows Change of Course	59
Rubberized Fabric Covers Balloons	59
New Strato Rocket Claims 200-Mile Ceiling	63

[Continued on page 12]



Now is the time!

Business is Searching for YOU, if

RIIGHT now, in many lines, there is a search for really *good* men—managers, leaders—men who can take charge of departments, businesses, branch offices, and get things humming.

As always, there are not enough ordinary jobs to go 'round—but rarely before, in the history of American business, has there been so much room at the *top*! New jobs are being created by the business pick-up in almost all lines—jobs that pay splendidly and that open the way to lifetime success.

Ordinarily, there would be plenty of men to fill these jobs—men in junior positions who had been studying in spare time. But most men have been letting their training slide during these dark years of depression . . . "What's the use?"—You have heard them say. Perhaps there has been some excuse for sticking to any old kind of a job one could get the past few years—but the door is wide open for the man with ambition and ability *NOW*!

And don't let anyone tell you that "Opportunity Only Knocks Once"—that's one of the most untruthful sayings ever circulated. Op-

portunities flourish for *every* American every day of his life.

Far more to the point is to be ready—to be *prepared*—to make yourself *interesting* to the big-time employer—and LaSalle offers you a short-cut method of qualifying for opportunity jobs in accounting, law, traffic, executive management, and kindred occupations.

LaSalle Extension University is 28 years old—averages 40,000 enrollments a year—60 American firms each employ 500 or more LaSalle-trained men—surveys show that LaSalle students attain 40% average salary increase after graduation—10% of all C. P. A.'s in the U. S. A. are LaSalle-trained.

Why not find out what LaSalle has done and is doing for men in *your* position? Send and get the facts; see what LaSalle can do for you, personally!

There's no question about it—business is picking up—jobs are looking for *men*—the time has come for you to *qualify* for prosperity. Mail this coupon today!

LA SALLE EXTENSION UNIVERSITY, Dept. 9493-R, Chicago
I am in earnest about my success and I would like to have your special booklet—without any cost or obligation to me—about my opportunities and your success training in the business field I have checked.

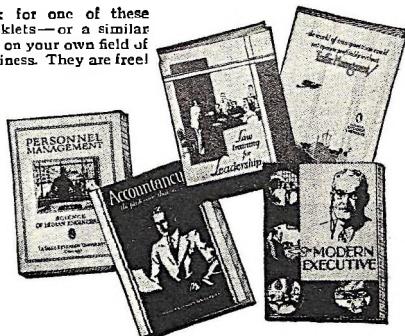
- | | |
|--|--|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Industrial Management |
| <input type="checkbox"/> Higher Accountancy | <input type="checkbox"/> Modern Foremanship |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Personnel Management |
| <input type="checkbox"/> Modern Salesmanship | <input type="checkbox"/> Business Correspondence |
| <input type="checkbox"/> Commercial Law | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Law: Degree of LL. B. | <input type="checkbox"/> Effective Speaking |
| <input type="checkbox"/> Expert Bookkeeping | <input type="checkbox"/> Office Management |
| <input type="checkbox"/> C. P. A.-Coaching | <input type="checkbox"/> Stenotypy |

Name _____ Age _____

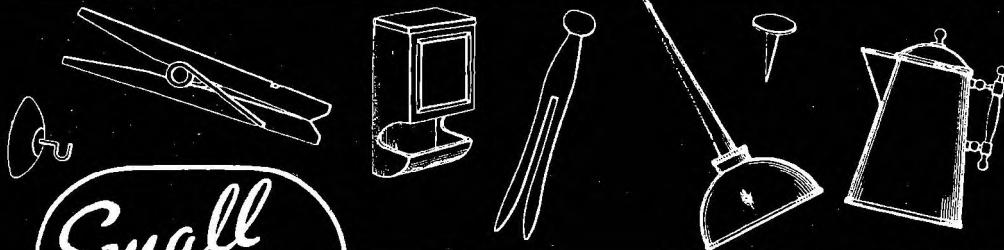
Position _____ Address _____

La Salle Extension University

Ask for one of these booklets—or a similar one on your own field of business. They are free!



INVEN



Small Ideas

THAT HAVE
BUILT BIG
BUSINESSES

IDEAS do not have to be complicated to be profitable when Patented. The 5c and 10c stores flourish on simple Patented products which are commercially successful. The zipper, safety pin, thumb tack, paper clip, collar button—all simple, yet familiar inventions—brought their inventors rich rewards. If you have a Patentable idea—act to protect it. Many of the most useful, widely popular, greatly profitable, and extremely successful inventions have been very simple ones. You have only to look at the devices we have pictured here to realize how a simple idea may become a utility bought by a hundred thousand or a million people soon after it is produced. Don't be afraid that the simplicity of your idea makes it valueless. The thing that you find so simple that you wonder why a thousand other people haven't already done it is often the invention worthwhile.

HOW OTHER INVENTORS GOT STARTED

The list of men who succeeded in invention with only a poor boy's start is a very long and noble one. Poverty, hardships, lack of friends, distance from the market—these could not hold back Bell, Edison, Eastman, McCormick, Whitney and others. Everyone cannot succeed. But every man can try. Courage, sacrifice, and hard work may bring you a measure of the success these men had. Lack of mechanical ability is not a serious draw-back. You can always get someone able to build a model, draw a detailed design, or otherwise materialize your idea for you. The big draw-back is discouragement.

Your idea for a practical article or an improvement upon an old one should be patented NOW. Frequently many of the thousands of applications filed in the U. S. Patent Office each year are for the same or almost the same idea. In such a case, the burden of proof rests with the last application filed. Sometimes a delay of even a few days in filing the application means the total loss of the patent. **LOSE NO TIME.**

The entire time of this large and experienced organization is devoted exclusively to patent and trade-mark cases. We know the rules and requirements of the Patent Office. We understand the technicalities of Patent Law. We can proceed in the quickest and safest ways in preparing an application for a patent covering your idea.

FREE

The Biography of George Eastman
Views of the man who used Patent Protection to amass millions and give perfection to a new art—Photography—itself one of the greatest inventions.



CLARENCE A. O'BRIEN & HYMAN BERMAN

Registered Patent Attorneys Before U. S. Patent Office

317-L ADAMS BUILDING

WASHINGTON, D. C.

TO RS

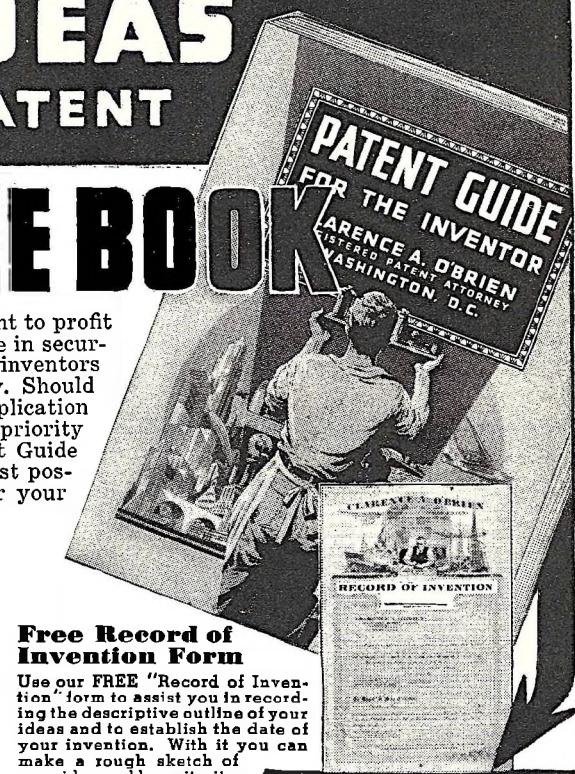
Act Now TO PROTECT YOUR
IDEAS
WITH A U.S. PATENT

Send For FREE BOOK

If you have a new idea that is patentable—and want to secure for yourself your inventor's sole right to profit from the idea—you can't afford to lose time in securing the protection of a U. S. Patent. Other inventors may be working on the same idea right now. Should they develop this idea and file patent application before you do—the burden of establishing priority will be upon you. Our Big Book—"Patent Guide for the Inventor"—will tell you the quickest possible way to secure Patent Protection for your idea. SEND FOR IT TODAY!

The FIRST IMPORTANT STEP in SECURING A PATENT—is to obtain the services of a Registered Patent Attorney. The U. S. Patent Office advises that you secure the aid of an experienced Registered Patent Attorney to prepare your statements. Establish the date of your invention as explained in our book and disclose your idea to him in correct form. He then makes a SEARCH of the Patent Office Records and reports to you on existing U. S. Patents which might bear on your invention, giving his opinion on the advisability of proceeding and filing formal application.

REASONABLE FEES - CONVENIENT TERMS. Don't worry about finances. Our fees are very reasonable—we can arrange convenient terms of payment. It is our custom to permit clients to pay for our services in installments as the application progresses in our office. See our Big Book for fees in obtaining Patent. It explains our arrangements clearly. Send for it NOW!



Free Record of Invention Form

Use our FREE "Record of Invention" form to assist you in recording the descriptive outline of your idea and to establish the date of your invention. With it you can make a rough sketch of your idea and have it witnessed in a manner of value to you as evidence should occasion arise.

**TEAR OFF
AND
MAIL
NOW!**

CLARENCE A. O'BRIEN
AND HYMAN BERMAN
Registered Patent Attorneys
317-L Adams Building
WASHINGTON, D. C.

Please send me at once your Big Free 48-Page Book, "Patent Guide for the Inventor" and your Specially Prepared "Record of Invention" form. Also George Eastman Biography, "Inventor and Business Man." This request does not obligate me.

NAME _____

ADDRESS _____

(Please write or print plainly)

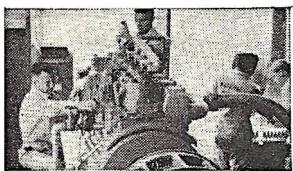
Learn **DIESEL** and **GAS ENGINEERING**



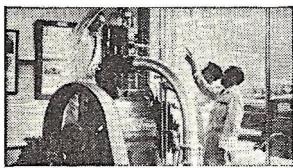
Partial view of Diesel-engine operating room—one of the important Departments at National Schools.



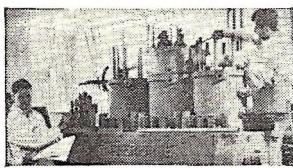
Students checking starting unit on Caterpillar Diesel.



Students servicing Fairbanks-Morse Diesel power generating unit.



Students making adjustment on Venn-Severin Diesel.



Students overhauling large heavy-duty Diesel.

YOU WORK ON FINEST and LATEST EQUIPMENT AVAILABLE IN AMERICA

Established in 1905, National Schools' course of Diesel Training is the outgrowth of years of successful development. The instruction is PROVEN. Over 30,000 graduates have received National Training. Now, National offers the most comprehensive training—actually two complete courses for the price of one—Gas and Diesel Engineering. Both courses are absolutely essential to qualify for best jobs.

Easy, Fascinating "Shop-Practice" Method

The day you begin your training at National you start right in with a practical job on the most modern Gas and Diesel equipment, including Caterpillar, Cummins, McCormick-Deering, Hercules, Venn-Severin, Fairbanks-Morse, Enterprise, and many others. The work is actually a pleasure for students—easy to understand—ever-fascinating. You learn in a few months what would ordinarily take far longer.

No Dummy Equipment at National

The vast installation of modern Gas and Diesel equipment here is all used by you in learning your trade. You learn to assemble and dis-assemble all parts, learn trouble-shooting; operating and all essentials to qualify you for big-pay Gas and Diesel opportunities. Your instruction is personalized under direct supervision of a large staff of experts.

LEARN IN LOS ANGELES, Playground of America

RAILROAD FARE ALLOWED

For a limited time, coach R. R. fare allowed to L. A. from any part of the U. S.

EARN ROOM AND BOARD

We help students obtain part-time jobs to earn room and board while learning.

NATIONAL SCHOOLS, LOS ANGELES

MAIL THIS COUPON

NATIONAL SCHOOLS, Los Angeles, Calif.
Dept. MMA-9, 4000 So. Figueroa St.

Please send Catalog.

NAME AGE

ADDRESS

CITY STATE

QUALIFY FOR GOOD PAY JOBS

NATIONAL'S

Master Training

Includes

All Phases of

Diesel Engines

Fuel Injection

Gas Engines

Butane Engines

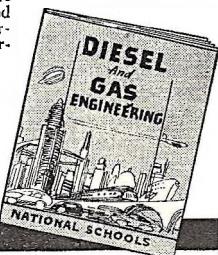
Propane

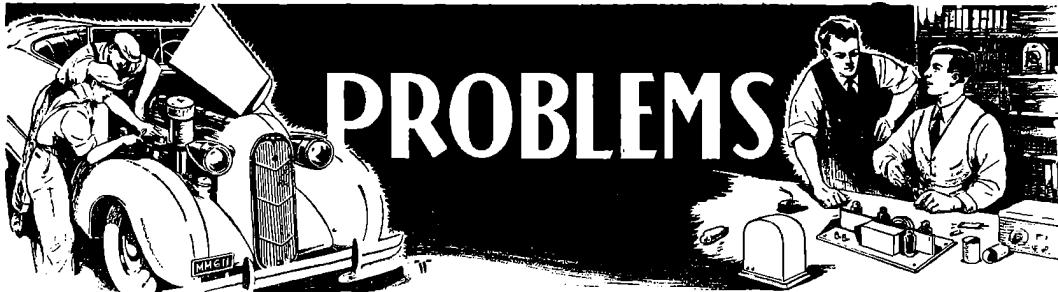
Natural Gas

Auto-Diesel Electrics

Machine Shop

Batteries





MM EDITORS ANSWER READERS' QUERIES

REMOVING PAINT FROM BOAT HULL

I intend to repaint my boat this fall before storing it for the winter. Since the paint on the hull has already showed signs of swelling I should like to remove the old paint before applying the new. Can you suggest a suitable paint remover? —J. T. B., Jacksonville, Fla.

A suitable paint and varnish solution can be made by dissolving 1 part caustic soda in 5 parts of water adding to this 1 part of mineral oil. The mixture is then boiled until the emulsion forms after which 1 part of fine sawdust is added to the solution to render it into paste form. The paste is then applied to the old painted surface and allowed to react. After the paint has loosened flush off the paste with clear water.

A SOLUTION THAT WILL FROST GLASS

I have heard of solutions for rendering transparent glass opaque, but don't know if this is possible. I should like to give several windows in my home a frosted finish so as to improve their appearance. If a formula of this kind is available you may rest assured I'd appreciate knowing about it.—S. L. N., Philadelphia, Pa.

Clear glass can be given a frosted appearance by applying the following mixture to its surface: 6 oz. magnesium sulphate, 20 oz. water and 2 oz. dextrin. Apply the solution with a soft cloth or brush and allow to dry. The magnesium sulphate will form itself into a frosted crystal effect as it dries.

ELIMINATING RADIO INTERFERENCE

Although our radio receiver is new and free from any defects we are bothered with static produced by telephone dial clicks and motor noises. Is there any method by which this nuisance can be eliminated or partly silenced?—P. O. N., Edenton, N. C.

Your local telephone company at your request will install a filter condenser on the

telephone causing excessive interference in your neighborhood. There is no charge for this service. Electrical line disturbances can be eliminated in many instances with a choke and condenser filter. Although you can purchase a device of this type from any radio shop there is no reason why you can't make your own. Complete plans on radio noise elimination appear in the *Radio Builders Manual*, available from MM at 50c postpaid.

PARTS SOURCE FOR MIDGET AUTO

I plan to construct a midget auto as soon as finances permit and would like to know where the necessary parts can be secured. Must I use special parts in the construction work or can I fashion them from old auto and motorcycle materials? —R. G., Denver, Colo.

If you are planning on building a midget auto we advise you build "Midget Miller" which is described in full in the 1936 edition of our *How To Build It* book. This racing car, although tiny in size is authentic in constructional details and can be built from materials available at any auto graveyard. Either a lawn mower or washing machine gas engine may be used to power it or better still a good outboard motor.

A ROAD BED FOR MODEL RAILWAYS

I am constructing a model railway of the "oo" gauge type and find difficulty in securing an authentic looking road bed. While roofing paper mounted over a wood foundation is satisfactory for "o" gauge use it doesn't look natural on the smaller gauge layout. Can you offer a suggestion for making a good imitation road bed on which the tracks can be attached?—S. D., Ft. Worth, Texas.

An authentic looking road bed for your model railway system is not at all hard to make. Secure as many feet of 3" by 1/2" white pine as your tracks are long then round off the edges with a block plane. Next cut strips of heavy cardboard for the imitation ties, the

[Continued on page 16]



**AW, QUIT IT,
CAN'T YOU-just
tell the fellows
I'm staying home**

**- NED'S
PIMPLY
SKIN
MADE
HIM
SHUN THE
CROWD

UNTIL**

SAY JUDY - WHAT'S EATING NED? WHY DIDN'T HE COME DOWN WITH US THIS WEEK-END?

I DUN'NO — HE KEPT SAYING HE COULDN'T. HE WON'T DO ANYTHING LATELY — JUST STICKS AROUND HOME ALL THE TIME



WHAT'S GOT INTO YOU NED - WHY'D YOU TURN DOWN JUDY'S INVITE? WE HAD A SWELL TIME

WELL I'LL BET YOU'D HAVE STAYED HOME, TOO, IF YOUR FACE LOOKED LIKE MINE! JUST TAKE A SQUINT AT THESE BLOSSOMS



WELL FOR CRYIN' OUT LOUD - IS THAT ALL THAT STOPPED YOU? SAY-DON'T YOU KNOW FLEISCHMANN'S YEAST IS THE WAY TO FINISH OFF THOSE HICKIES?

YOU MEAN TO SAY IT REALLY CLEANS 'EM UP? I'LL ASK MOM TO GET ME SOME



LATER BOY, BUT IT'S SWELL TO BE STEPPING OUT AGAIN - BILL YOU SURE DID ME A GOOD TURN WHEN YOU PUT ME WISE TO FLEISCHMANN'S YEAST

IT'S THE STUFF ALL RIGHT!



HI THERE, JUDY - LOOK WHAT I'VE GOT IN TOW

WELCOME STRANGER - MY IT'S NICE TO SEE YOU, NED -

YOU CAN BETCHA LIFE I'M GLAD TO BE HERE, JUDY



**Don't let adolescent pimples spoil
YOUR chances for fun**

PIMPLES can be joy-killers after the start of adolescence—from 13 to 25, or longer. At this time, important glands develop. Disturbances occur in the body. The skin gets oversensitive. Waste poisons in the blood irritate this sensi-

tive skin. Pimples result.

Fleischmann's fresh Yeast clears these skin irritants out of the blood. Then, the pimples go. Eat 3 cakes daily—plain, or in a little water—until your skin clears.



*-clears the skin
by clearing skin irritants
out of the blood*

Copyright 1936, Standard Brands Incorporated

BE A TRAINED

AUTO-DIESEL

Expert

GOOD JOBS—

GOOD PAY

EARN AS
YOU LEARN
AT HOME

Diesel Power for trucks, buses, tractors, farm power and lighting plants opens rich, new fields of opportunity for Diesel-trained men.

Good jobs, at good pay, await those who prepare NOW to get in on the ground floor of this fast-growing industry. And with combined Auto-Diesel "Job-Way" Training and the "Job-Way" Home Training, an automatic home-study school, you can train for success in this new field without leaving your present position while learning.

"Job-Way" Training is Practical, Complete, Modern

Our modern, revised Training covers every new development in the operation and repair of present day gasoline and Diesel engines. It is based on the "Job-Way" method, the same practical, easy-to-learn method that has started thousands of our students toward success, will qualify you in a few short months for a better job, or a profitable repair business of your own.

New Auto-Diesel Course Included at No Extra Cost

Students enrolling now for our regular Automotive course get our complete new Auto-Diesel course AT NO EXTRA COST. Send coupon today for details of our "Learn as You Learn" Training plan, backed by fifteen years' success in the automotive training field.

Learn as You Learn—Two Motor Testers Free

Just now, we are also including complete, valuable motor testing equipment, to assist your training and enable you to begin earning extra spare-time money soon after you enroll.

AUTO-DIESEL BOOK FREE

Men without previous auto experience or special education quickly master "Job-Way" Training and become skilled experts in every branch of auto work. Mail the coupon today for Big FREE AUTO-DIESEL Book and complete facts about Free Employment and Consultation Service. No obligation!

MOTOR INSTITUTE OF AMERICA

4554 Broadway Dept. JD-13 Chicago

MAIL
COUPON
FOR
FREE
BOOK

MOTOR INSTITUTE OF AMERICA

4554 Broadway, Dept. JD-13, Chicago, Ill.

Without obligating me, send Free Auto-Diesel Book with all facts about "Job-Way" Home Training and Special Offer.

Name.....

Address.....

City.....

State.....



Many New Deal appointments. Common education usually sufficient.

Mail Coupon immediately
—sure.

COUPON
Gentlemen: Rush to me, FREE of charge, list of U. S. Government big pay jobs obtainable. Send FREE 32-page book describing salaries, vacations, hours, work, etc. Tell me how to get one of these jobs.

Franklin Institute
Dept. M264
Rochester, N. Y.

Name
Address

Problems Editor Answers Queries

[Continued from page 14]

cardboard should be black if possible. Apply a coat of varnish to the white pine and after it has become tacky stick the ties in place. Last of all sprinkle ordinary cement over the assembly and your roadbed is complete. When dry the bronze rails may be attached.

STAINING LARGE FLOOR SURFACES

Our club recently acquired a medium size dance pavilion with unfinished floors. Can you tell us how to finish the floors as simply as possible so that we will be able to use the pavilion without making a large investment for paint?—Miss D. L., Chicago, Ill.

Probably the quickest and most inexpensive way to finish your dance floor would be to apply a stain made by dissolving a cup of permanganate potash crystals in a bucket of boiling water and applying this to the floor with a mop. If the shade is not deep enough apply a second coat then allow to dry. Over this apply a coat of sizing, then prepare your polish. This consists of ordinary bees wax dissolved in turpentine until a rich milky solution is obtained. Apply the polish with a mop and finish with a polisher until a luster is secured.

MAKING AN ELECTRIC REFRIGERATOR

Is it possible to convert my metal ice box into an electric type refrigerator? I have heard that it can be done but am doubtful about this.—G. F., Troy, Ohio.

Any ambitious mechanic can convert his ice box into an electric refrigerator. Plans on this conversion are available in blueprint form from MM at \$1.50 per set.

MODEL PLANE SHORT CUTS WANTED

Having had very little experience in model plane building I'm puzzled as to how I can make authentic looking cabin windows. Is there any simple way of increasing the tensile strength of the balsa wood framework without adding too much weight to the plane? How can I make suitable wheels for models; that is wheels that will look much like the real ones?—J. S. P., Johnson City, Tenn.

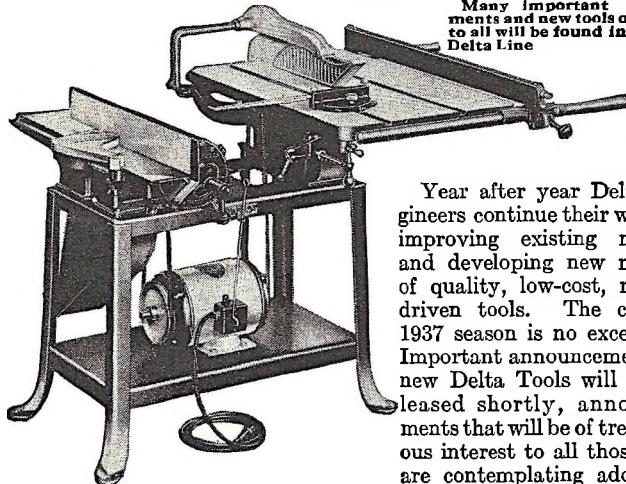
Light celluloid may be glued in place inside the fuselage for the window effect although Cellophane will be found much better for this purpose. The balsa wood frame can be strengthened by coating it with dope. Wheels can be turned from a block of balsa by inserting a bolt through the block and fastening in a hand drill. Use a razor held rigid for your cutting tool.

(Editor's Note: Your questions will be answered personally and free of charge by MM experts provided they do not require special research or involve trade secrets. Names and addresses of manufacturers of new products described in this issue can also be obtained free upon request. Enclose a self-addressed and stamped envelope for reply. Address: Problems Editor, Modern Mechanix Publishing Co., Greenwich, Conn.)

NEW DELTA TOOLS

will be out soon

New 1937 Line to Be Announced Shortly



Many important improvements and new tools of interest to all will be found in the 1937 Delta Line

Year after year Delta engineers continue their work of improving existing models and developing new models of quality, low-cost, motor-driven tools. The coming 1937 season is no exception. Important announcements of new Delta Tools will be released shortly, announcements that will be of tremendous interest to all those who are contemplating additions to their shop. Before selecting new tools—be sure to see the 1937 Delta Line.

The New Delta 10-inch Circular Saw, shown in the illustration above in combination with the new Delta 6-inch Jointer, is the largest, heaviest and most completely equipped combination saw and jointer ever offered by the Delta pattern shop, contractor and builder. It has numerous exclusive features that make it the season's outstanding tool.

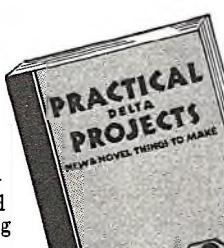
SEND COUPON TODAY! So Your Name Will Be on Our Mailing List

The new 1937 Delta Catalog will be off the press soon. It will contain full description, illustrations and photographs of the complete Delta Line, including the many new Delta Tools with improvements incorporated in the 1937 line.

Every man interested in low-cost, quality tools should see the new Delta Catalog. In order to make sure that your name will be placed on the mailing list to receive a copy, send the coupon below today. At the same time enclose only 10c for the new 1937 book of "Practical Delta Projects," Book No. 3 containing 32 pages of new and novel things to make, with many blue prints, working drawings, photographs, illustrations—and complete directions. Be sure to mail the coupon at once.

New 1937 Project Book

Now out, the new 32-page book No. 3 of "Practical Delta Projects"—crowded with new and "out of the ordinary" things to make—with many photographs, working drawings, and easy-to-understand illustrations. Simple, complete instructions make every project easy to follow. Every woodworker should have this book. Send 10c with coupon. 1937 Delta catalog mailed postpaid.



DETA MANUFACTURING CO., Dept. M936
600-634 E. Vienna Ave., Milwaukee, Wis.

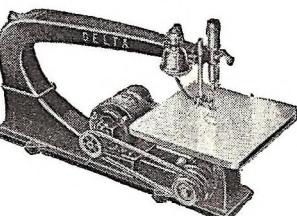
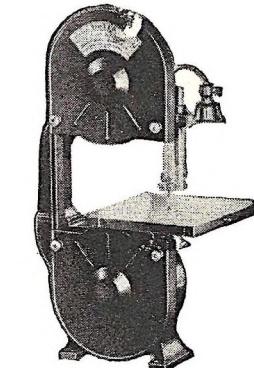
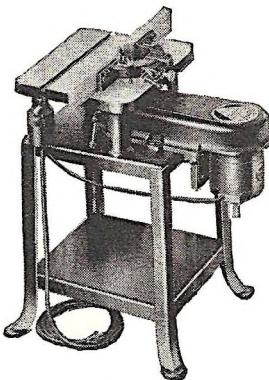
I enclose 10c (stamp or coin) for which please send me one copy of the new 1937 Book No. 3 of "Practical Delta Projects." Also place me on your mailing list to receive 1937 Delta catalog of quality motor-driven woodworking tools.

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

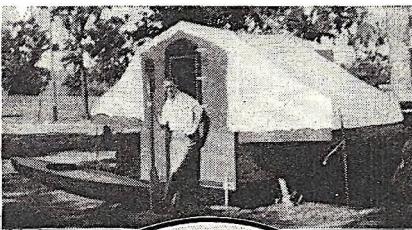
Address.....

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

Check here if you are a Delta user now.



Random Chips from



Here are the three prize-winners in this month's Workbench contest. Above are Baby Patches and Patches II, built from plans for Tarbaby and Dorothy respectively by Richard Glenn, winner of the \$5 first prize. At top, right is the Bungalow Camp Trailer and Kyack built from MM plans by Walter Buck, second prize winner. In the circle is Tom Gunderson with his Handy Henry tractor. Tom is winner of third prize.

AS WAS predicted in the Workbench last month, this summer is finding more activity among MM readers than ever before. With the home workshop waiting, and good plans to work from, the hot summer days seem to be acting as an inspiration rather than a deterrent in getting projects completed. The letters from our readers being even more eloquent on this subject than we are, we shall start right out with one from Richard Glenn, winner of the first prize of \$5 in this month's Workbench Contest.

Selfridge Field, Michigan.

Dear Editor:

May I enter two thoroughbreds? Enclosed find a snap of my Dorothy model sloop and Tarbaby model dingy, Patches II and Baby Patches respectively.

Patches II was built to scale other than being shortened 1 1/2 inches between the frames as I wanted to stay below the three-ton gross law of the Philippine Government where I was stationed. She carried 320 square feet of canvas, the mast was 32 feet in length and rigged with one-fourth-inch galvanized wire. I used about 750 pounds of concrete for ballast inside.

I had a small 1 1/2 horsepower Evinrude two-cycle outboard, about 15 years old, remodeled into an inboard and installed off center on the port side. It gave a speed of close to 5 miles an hour in still water, turning at about 180 R. P. M., which proved that Dorothy needs very little power to move her.

Of course I had to add sufficient keel for enough lateral

surface to make her work to the windward very nicely, which she would do unless it got too rough. Owing to her narrow beam at the waterline of course she was rather tender, but with plenty of rudder surface she could be straightened up nicely as soon as she got under way.

As I will be stationed at Selfridge field now I have intentions of building a 27-foot skipjack schooner.

Richard Glenn, Sgt. A. C.

Plans for both Dorothy and Tarbaby appeared in the first edition of How To Build 20 Boats, now out of stock, but they can still be obtained in blue print form. In the July issue the discovery of 200 copies of the first edition of How To Build 20 Boats was announced, and two weeks after it

reached the stands, they were all gone. However, the plans are all available in blue print form, and are described in the big free blue print booklet. Send a self-addressed, stamped envelope if interested.

The second prize letter in this month's contest comes from Walter Buck, of San Luis Obispo, Calif. He writes:

San Luis Obispo, Cal.

Dear Editor:

Having been a subscriber to MM for several years, I feel that we have something in common. I want to say your magazine is one of the best on the market for everyone, and especially those fortunate people interested in various hobbies. Although I am a barber in the daytime, I am an ardent wood-worker at night.

I have constructed many projects from your magazine, the two largest of which I am enclosing pictures. They are a house trailer weighing 1,000 pounds, constructed at a cost of \$70, and an Eskimo kyack constructed at a cost of \$20.

In a recent issue I saw a trailer constructed from the same plans as mine (Bungalow Camp Trailer), but the total cost was given as \$215. There being considerable difference in our costs, I thought you might be interested in our comparison.

Walter F. Buck.

the Editor's Workbench

For fast work, Tom Gunderson, of Red Lake Falls, Minn., comes forward to take third prize with his Handy Henry Tractor. Plans for this tractor were published in the July MM, and a month later found Tom with his tractor completed. These three prizes of \$5, \$3 and \$2 respectively are awarded each month to readers sending in the best letters, accompanied by photographs, describing their work with MM projects. The contest is open to everyone. Remember in writing that the editors always want to know which articles you liked most and which you liked least in the current issues of MM. Tom's letter follows:

Red Lake Falls, Minn.

Dear Editor:

Enclosed are pictures of my Model T Ford Tractor. I am very well pleased with what I can do with her. I believe it will last longer than other outfits I have seen, and it cost me only \$15.

I did not follow the plans exactly as I used an old Reo transmission in place of the Dodge specified. I did not

Winners of Soapbox Derby Contest

The first prize of a Soapbox racer, complete with a full set of donut tired wheels, goes to Billie Joe Neil, 309 E. 3d St., Bloomington, Ind. From the letters in the words "Hobbies and Inventions," Billie gathered 2661 words.

Arthur Santmier, 126 Smithfield Road, Woonsocket, R. I., is the winner of second prize, a "trike-wheeled" Soapbox racer. The third prize, a set of four donut tired wheels, goes to H. B. Baker, Box 242, Morro Bay, Cal.

raise up the rear end, but lowered the front end. I also left the tractor full length of Ford frame but plan to shorten it as well as the front axle. It sure has plenty of power. I put on a box behind to put in sand to give better traction.

I like all your mechanical plans but I miss your airplane stuff. I like least the indoor projects.

Tom Gunderson.

The old adage that "many hands make light work" is aptly demonstrated by the ever-active Hi-N-Dri Yacht Club of Los Angeles, charter members of the Society of Modern Mechanix and Inventions.

Co-operation is the secret behind the success of their organization, and that they are successful is clearly shown by the following letter from David Forsyth, Commodore:

Los Angeles, Cal.

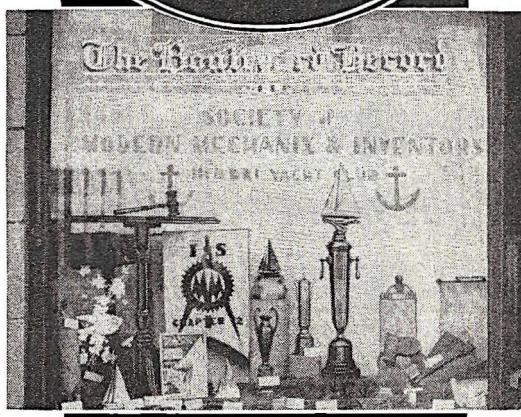
Dear Editor:

Greetings and salutations from Chapter 12, Society of Modern Mechanix and Inventors. We haven't heard much from the other chapters lately but these pictures will show that this chapter is still on its toes and going strong.

The display was placed in one of the windows of our local papers to show the people that besides racing and building boats our members do and make other things. It created a lot of curiosity and interest. The other chapters might use the same idea; publicity never hurts any organization.

This year's officers are: Alex Irving, Vice Commodore;

[Continued on page 20]



The Hi-N-Dri Yacht Club of Los Angeles recently staged this exhibit of their workmanship in the window of their local newspaper. Fleet officers for the next year will be left to right, standing, Fleet Captain Albert Holt, and Secretary Wayne Scott. Seated are Vice Commodore Alex Irving, Commodore David Forsythe, and Rear Commodore Robert Butte.

Learn in Los Angeles TALKING PICTURE PROJECTION



Talking Pictures offer excellent opportunities to trained experts. Complete course at National Schools qualifies you to accept positions in theaters. Newest equipment to learn with.

SOUND RECORDING



Radio Transcription Recording is a fascinating profession. The field of opportunity for trained men is unlimited. At National Schools you receive the most complete instruction in newest equipment. Experienced instructors. Students learn on same equipment used in largest transcription studios.

TELEVISION-RADIO



All of the science of sound is based on RADIO. National Schools' course of training embodies all divisions of Radio, including Television in its latest development. Graduates are qualified for Radio engineering, home, auto and commercial radio repairing, and Broadcasting. Easy "shop-and-studio" practice methods. No dry text books. Students actually operate our own Radio and Television equipment. You don't need advanced education. National's training methods teach you the practical way.

QUALIFY FOR GOOD JOBS IN FEW MONTHS

National training is thorough. Finest equipment in America. Proven methods. When you graduate you can command jobs that assure future success.

Earn Room and Board While Learning

We assist students to obtain part-time jobs while learning. For limited time we will allow coach railroad fare to L. A. Send coupon for Catalog.

NATIONAL SCHOOLS

LOS ANGELES

More than 30,000 Graduates
Established 1905



REQUEST FOR BOOK

NATIONAL SCHOOLS

Dept. MMR-9, 4000 S. Figueroa St., Los Angeles, Calif.

NAME AGE

ADDRESS

CITY STATE

Chips from the Editor's Workbench

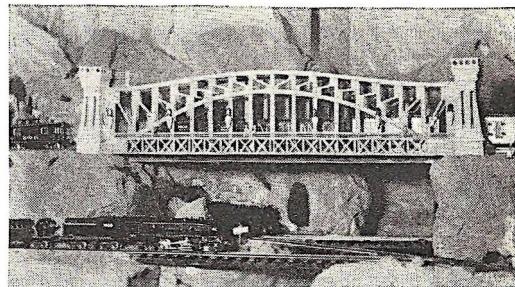
[Continued from page 19]

Robert Butte, Rear Commodore; Albert Holt, Fleet Captain, and Wayne Scott, Secretary. I was re-elected Commodore. We are all working together to make this our biggest year, and from all indications, it will be.

The club is sending several boats to the Coronado Yacht Club races the latter part of this month to see if we can bring home some of their silverware. Our annual Small Boat race to Catalina was held July 4th. Our entries were smaller this year as most of the fellows are gradually getting larger boats.

By the way, according to our news agent we have sold more copies of How To Build 20 Boats than any other store in town with the exception of one down town store. Our drug store is about 4 miles out from the central shopping district.

David Forsyth, Commodore,
Hi-N-Dri Yacht Club.



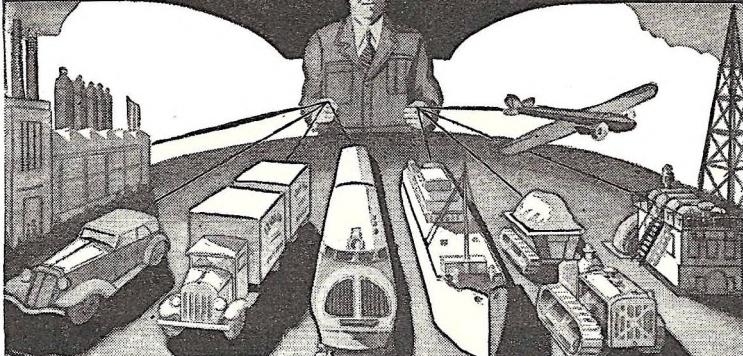
The Centinela Valley Model Railroad is the name of this "tin-plate" line operated by Leo Ridgman. It includes 166 feet of track, 18 locomotives, 58 cars, wrecking car and crane.

Another California group which is finding co-operation stimulates activity is the Centinela Valley Model Railroad of Hawthorne, Calif. This unique organization, which meets to compare notes, plan new railroads and swap "rolling stock" consists of 19 members, all devotees of "Tinplate" railroading. In addition the organization is the parent of Model Railroaders Digest, a miniature magazine devoted to "tinplate" railroading. Lee P. Ridgman is editor and publisher of the magazine, which is already going out to tinplaters in all parts of the country. As secretary and editor Mr. Ridgman welcomes inquiries.

California is not the only state enjoying club activity. The Five Star MM Club of Haverhill, Mass., has just added Robert Dube, Paul B. Magee and Max Wolf to its membership rolls during the past month. Reginald Dawkins is president, and has planned a full-sized program for the coming months. Clubs or groups desiring to become affiliated with the International Society of Modern Mechanix and Inventors and partake of its advantages should drop a line to the Society's headquarters, at 22 West Putnam St., Greenwich, Conn. Everything is free.

[Continued on page 23]

The Diesel Engineer



Is Your Job Safe

Just as the gasoline engine changed or wiped out the jobs of thousands who depended on horse-drawn vehicles for their living—just as electricity changed the entire set-up in the fields of light and power—so now the Diesel engine is fast invading both the power and transportation fields, and threatening the present jobs of thousands of workers.

If jobs in your line are steadily growing scarcer, you owe it to yourself to investigate this new, progressive, uncrowded line, that will offer good openings for many years to come.

Diesel—The Newest, Fastest-Growing Power

Diesel engines—because of their high efficiency, dependability, and economy of operation—are fast replacing steam and gasoline engines in power plants, motor trucks and busses, locomotives and ships, aircraft, tractors, dredges, drills, pumps, etc.—opening up an increasing number of well-paid jobs for Diesel-trained men. The field of Diesel Engineering is on the upgrade and continually expanding. It will provide steady employment and advancement for those properly trained in this new industry—as long as they need to work.

You get complete information on all the latest Diesel developments—two- and four-stroke cycles; low- and high-speed and heavy-duty types; Diesel-electric generating systems, etc.—in our course. Includes all text material—with special diagrams for quick understanding of this new power.

Now is your chance to get into a big new industry and grow up with it to an important position. Today there is practically no competition in the Diesel field, but the increasing use of Diesel engines will result in keen competition for jobs in the near future. By starting your training now, you can keep ahead of such competition.

What This New Field Offers You

Get our Free Diesel Booklet and learn all about this newest, fastest-growing line—its opportunities and requirements. Find out what the Diesel field offers you—how rapidly the Diesel industry has developed during the last three years—the large number of Diesel engines and accessories being manufactured today—how quickly you can obtain a complete understanding of Diesel engine principles and operation by home study during your spare time—without interfering with your regular work.

Asking for information involves no obligation—but it may mark the turning point in your life. Write TODAY for full information.

American School, Dept. D-628, Drexel Avenue at 58th Street, Chicago, Illinois

Turn Your Spare Time into Dollars

Raise
GIANT

FROGS



**START
BACK YARD**

Pair of breeders lay 10,000 eggs yearly! Frogs sell up to \$5.00 per dozen. **WE BUY!**

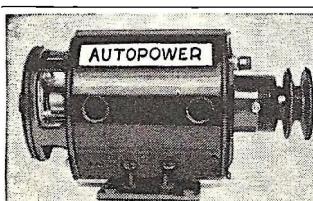
MARKET WAITING. Any climate suitable. No experience necessary. Shallow pond starts you.

AMERICAN FROG CANNING CO. Dept. 119-S New Orleans, La.

**FREE
BOOK**



Write today for complete, illustrated literature and **FREE FROG BOOK!**



TURN SCRAP INTO MONEY

The new "1936" edition of "AUTOPOWER" with all the original specifications and many new ones is now off the press. The book is plainly written and illustrated—the instructions easy and simple. Change auto generators into practical A. C. and D. C. generators and motors, with voltage from 2 to 1,000 volts, for power, light, welding, radio, sound, etc. No experience nor special tools needed to make these economical changes. Generators can be driven by wind, water, fan-belt, etc. \$500 IN PRIZES GIVEN TO THE READERS OF "AUTOPOWER." Send for your copy today. Price only \$1 postpaid.

AUTOPOWER, INC.

Dept. B 412 S. Payne Ave., Chicago

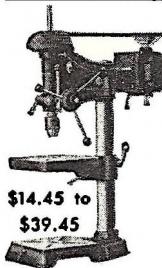


**AUTO
POWER**

Atlas
TODAY'S BIG LATHE VALUE

\$82.50
COMPLETE AS SHOWN
LESS MOTOR

DRILL PRESSES



\$14.45 to
\$39.45

They're all talking about it—master craftsmen, work shop specialists, users of fine precision equipment—because never before has such a modern back-gearied screw-cutting lathe been offered at such a price. 10" swing, built-in adjustable counter-shaft, V-belt drive, automatically reversible power feeds. Cuts 4 to 96 threads per inch, .001 accuracy. Sold on easy terms with 2 weeks trial. Send coupon TODAY for catalog of lathes, drill presses, and tools.

FREE CATALOG

Please send your latest catalog.

Name _____

Address _____

City and State _____
ATLAS PRESS CO., 952 N. Pitcher St., Kalamazoo, Mich.

AUTO-MECHANICS & WELDERS

Auto Mechanics and Welders are in big demand. Complete courses in arc and acetylene welding, metal finishing, body and fender bumping, spray painting. Special low rates. Write today.

MICHIGAN TRADE SCHOOL
3763 Woodward Ave., Detroit, Mich.

Write
for
FREE
CIRCULAR

How To Secure A Government Position

Why worry about strikes, layoffs, hard times? Train now for a Government job. Increased salaries, steady work, travel, good pay. Let me help you become a Railway Postal Clerk, Post Office Clerk, City Mail Carrier, Rural Carrier—or help you get into any other Government job you want. I was a Secretary Examiner of Civil Service Commission for 8 years. Have helped thousands. My 32-page book tells about Government jobs—and how I help to qualify you to get one. Send the coupon for your copy TODAY.

Now FREE S. R. PATTERSON, Civil Service Expert
PATTERSON SCHOOL, 439 Case Bldg., Rochester, N. Y.
Send, without obligation, freebook "How to Secure Government Position."

Name _____
Address _____

22 Thank You for Mentioning Modern Mechanix Hobbies and Inventions When Writing to Advertisers

HEAT 1½¢ Per Hour!



AMAZING INVENTION—New Radiant Heater. Burns 96° air. Makes its own gas. No piping. No installation. Gives roomful of clean, healthful, penetrating heat, like sunshine, for 1½ cents an hour. Hotter than gas or electricity, at 1/10th the cost. Easy to light and operate. No smoke. No soot or ashes. No odor. Portable—carry it anywhere. Low priced. Guaranteed.

30-DAYS' TRIAL

Liberal Offer. Try it 30 days at our expense. Write at once for special, introductory, low-price offer and no-risk trial opportunity. No obligation. Send today.

THE AKRON LAMP CO.
1169 High Street, Akron, Ohio



GIVEN AWAY!

You get one—Your friends get one—without cost. Let us give you the details of this amazing Time Teller. Also it can pay you big money giving it away free. Nothing to buy or sell! Write fast.

GARDEN CITY NOVELTY CO.,
4304 Ravenswood Ave., Chicago, Ill.

Learn Photography at HOME

Splendid opportunities. Prepare quickly in spare time. Easy method. No previous experience necessary, common school education sufficient. Many earn while learning. Send for free booklet "Opportunities in Modern Photography," particulars and requirements.

AMERICAN SCHOOLS OF PHOTOGRAPHY Dept. 2058 Chicago, Illinois

DIVORCE EYE CRUTCHES!

Get Rid of the Spectacle Handicap
The Natural Eyesight System tells how to do it at home. Full information FREE.
NATURAL EYESIGHT INSTITUTE, Inc.
Dept. 69-B Los Angeles, Calif.

WHY NOT RADIO FOR A HOBBY?

Have you a hobby? If not why not become a radio experimenter. What a thrill to hear foreign broadcasts on a set built by yourself. Start today by sending 50¢ for a copy of the big 148-page *Radio Builders' Manual*. Contains plans for building sets of from 1 to 6 tubes.

MODERN MECHANIX PUBL. CO.,
GREENWICH, CONN.

ENGINES
DIESEL • GASOLINE - KEROSENE

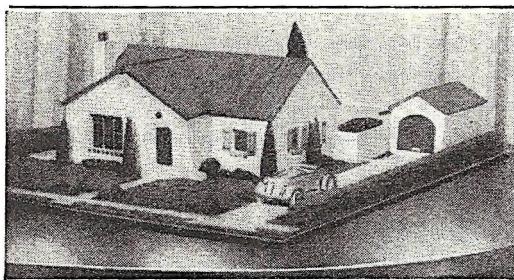
Enclosed • Self-Oiling • Roller Bearing
A size and style for every purpose. Most economical power for farm or factory. Put one to work and watch it pay for itself. Sold Direct From Factory to You! Write today for FREE Catalog Immediate Delivery.

WITTE ENGINE WORKS
1576 Oakland Ave.
KANSAS CITY, MO.

2551 So. 2nd St.
HARRISBURG, PA.

Chips from the Editor's Workbench

[Continued from page 20]



Using MM plans for a full sized Spanish bungalow, Everett Saggus built this model to see if it looked as good as the plans. Balsa wood and corrugated paper furnished materials.

One way of determining what your future home is to look like is to see it in model form first. Everett W. Saggus of Warrenton, Ga., working from MM plans for a Spanish type bungalow, built a scale model of it first and found it to be just what he wanted.

Random Chips: John Wages, Canton, Ill., writes, "Had a lot of pleasure building Sunray (15-foot sloop) from your plans and more now sailing it. I used Duco White on the sides, and she gleams like porcelain. After having one deck covering crack or alligator, I used nitrate dope on the next, soaking the deck first and then laying the canvas while wet. I applied three more coats of dope and finished with three coats of Duco Nile Green." From Lee's Summit, Mo., Norman Wilt writes to describe his version of Handy Henry tractor, "We built it of a Star 4. It has a Republic truck differential and a Star transmission. It weighs about 1,200 and will pull a three- or four-horse load." Jack Story of Butte, Neb., is another midget car fan. He says, "I went through all the MM's from 1933 on, got all the car plans, and used what suited my purpose best. The result was successful."

The new Workshop photo contest announced last month is now in full swing, with September 1 as the last day on which entries can be mailed. If you haven't submitted your photo yet, it's time to get busy. What the judges want is a photograph of your workshop, showing its layout and your equipment to best advantage. If you have discovered a way of making a small space do a great deal of work, be sure your photograph brings that point out. Use photoflood lamps or photoflash bulbs to insure good results. There is a first prize of \$15, a second prize of \$5 and five third prizes of \$1 each. As many of the photos will be published in MM as possible.

Arrest Him, Officer!

I'LL HAVE COMPLETE FACTS ON THE OTHER FELLOW TONIGHT!



Follow This Man!

SECRET Service Operator No. 38 is on the job... follow him through all the excitement of his chase after the counterfeit gang. See how a crafty operator works. Tell-tale finger prints in the murdered girl's room that help him solve the great mystery! BETTER than fiction because every word is TRUE. No obligation. Just mail me the coupon and get—

FREE The Confidential Reports No. 38 Made to His Chief

And the best part of it all is this—it may open your eyes to the great opportunity for YOU as a well paid Finger Print Expert. This is a young, fast-growing profession. The kind of work you would like. Excitement! Thrills! Travell! A regular monthly salary. Reward money. And remember: graduates of this school HEAD 47% of all Identification Bureaus in the U. S. Quick! Mail the Coupon NOW and I'll send you these Free Confidential Reports!

INSTITUTE OF APPLIED SCIENCE
1920 Sunnyside Ave., Dept. 2356 Chicago, Illinois

Institute of Applied Science

1920 Sunnyside Ave., Dept. 2356, Chicago, Illinois

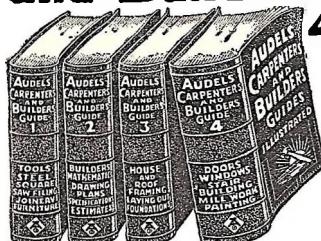
Gentlemen:—Without any obligation whatsoever, send me the Reports of Operator No. 38, also your illustrated Free Book on Finger Prints and your low prices and Easy Terms Offer. Literature will NOT be sent to boys under 17 years of age.

Name _____

Address _____

Age _____

AUDELS Carpenters and Builders Guides



Inside Trade Information On:

How to use the steel square—How to file and set saws—How to build furniture—How to use a mitre box—How to use the chalk line—How to use rules and scales—How to make joints—Carpenters arithmetic—Solving mensuration problems—Estimating strength of timbers—How to set girders and sills—How to frame houses and roofs—How to estimate costs—How to build houses, garages, barns, etc.—How to read and draw plans—Drawing up specifications—How to excavate—How to use settings 12, 13 and 17 on the steel square—How to build hoists and scaffolds—skylights—How to build stairs—How to put on interior trim—How to hang doors—How to lath—lay floors—How to paint



THEO. AUDEL & CO., 49 W. 23rd St., New York City

Mail Audels Carpenters and Builders Guides, 4 vols., on 7 days' free trial. If O.K. I will remit \$1 in 7 days, and \$1 monthly until \$6 is paid. Otherwise I will return them. No obligation unless I am satisfied.

Name.....

Address.....

Occupation.....

Reference..... M. M.

Learn Advertising at Home

Make money in advertising. Prepare quickly during spare time. Also earn while you learn. No expensive necessary. New, easy method. Nothing else like it. Send at once for free booklet—“Win Success in Advertising” and full particulars. No obligation.

Page-Davis School of Advertising
2601 Michigan Avenue, Dept. 2056, Chicago, Illinois, U. S. A.

Actually KILLS



FLEAS

Instead of Merely Stupefying Them

PULVEX Flea Powder both kills all the fleas on your dog or cat and prevents reinfestation for days! Pulverizing only twice a month insures against fleas that not only torment your pet but may cause him to become infested with tape worms. Harmless to pets. It is non-irritating. Backed by 93 years' experience. Sold on money-back guarantee. At drug, department and pet stores. In the shaker top can, at 50c.

Kills Them Off...
Keeps Them Off

PULVEX FLEA POWDER

For..BIG Money-Making..Doing ALL Work

Use The FIFEL-GEARED

PIERENCH KIT

• ACT TODAY, and get also Free...the world's Most Useful small tool." It has 2 End, 2 Side and 3 Angle Edges, 2 Turns, Screws in All Positions... \$1 worth of Uses.



FREE

Mail this Part of Ad **TODAY** with your address (on a Postcard will do). Get **FREE**—101-Picture Manual of Mechanics, with User Offers.

Or, With **DISTRIBUTOR**, Territory and **FREE KIT** Offers.

AMERICAN PIERENCH CORP. 1111 N. Ashland Ave., CHICAGO, ILL.

Correspondence Courses In RADIO and ELECTRICAL ENGINEERING

SPECIAL

Only \$25

ELECTRICAL ENGINEERING Covers complete electrical field. Most modern course. So simplified anyone can grasp quickly. Prepares you for success future. Low Cost.

RADIO and ELECTRONIC ENGINEERING Ultra-modern course in radio, public address, photo-electric work. Training you to be super-service man, real vacuum tube technician. Standard diploma given. Tuition ONLY \$25, other course.

FREE Send name quick for free copies of school catalogs, LINCOLN ENGINEERING SCHOOL, 855-14 So. 37th St., Lincoln, Nebr.

Complete DUPLICATING OUTFIT!



Do your own printing... 8"x12" size sheet or smaller. Duplicate writing, drawing, typing. Just the thing for announcements, menus, bulletins, advertising, price lists, small or medium size businesses. Very handy and compact. Experience unnecessary. Money back guarantee. Outfit includes metal frame, printing fluid, ink, sponge, complete instructions. \$1.25 postpaid (cash with order). \$1.30 C. O. D. in U. S. A. only. Order NOW!

MULTIPRINTER CO. 5712 Woodlawn CHICAGO

ATHLETE'S FOOT

CORRECTED OR YOUR MONEY BACK GUARANTEED. Van's Salve heals all the way to the roots of the fungi. Used in thousands of homes. No fuss—bother—or discomfort. Easy application. Full directions with each package. Send \$1 today for complete treatment postpaid.

VAN'S LABORATORY

961 Abstract Bldg. San Jose, Calif.

FREE ELECTRICITY

From Wind Power
For Lights, Power, Radio, from Auto Generators. New Copyright Book with over 100 Facts about Wind Chargers, Wind-Propellers—Generators—Plants—Batteries. Answers all questions you should know. Including plans for 6 or 32 V. Plant. Send 25c for plans, facts and catalog. Agents wanted. **CURRIER MFG. CO.** 407 Terminal Minneapolis, Minn.

SPECIAL SALE “100 SHOT” REPEATER

Latest Model 1936 Haenel repeating pistol. Sturdy, massive construction. 100 shot magazine. Shoots B. B. steel shot. **FREE**—500 shots.

BENJAMIN AIR PISTOL .177 .22 cal. **\$6.95** \$2.00 deposit on C. O. D.

FREE—Folder on Rifles, Pistols, etc.

Hudson Sporting Goods, M-52 Warren St., New York



\$4.95

\$6.95

BE A POULTRY EXPERT

Make \$40, \$50, \$60 a Week

Free book shows how to get started quickly. You'll be surprised at the amazing profit opportunities in the poultry business. Wherever you live—whatever you do—it is easy to start on a spare or full time basis. Free book tells all. Send for "How to Raise Poultry for Profit." You learn right at home in spare time by methods endorsed by colleges and leading poultrymen. Know how to get the maximum profits from interesting, healthy work. Iron-clad agreement protects you. We have prepared hundreds for good jobs and businesses of their own. Write now for free book. No obligation. National Poultry Institute, Inc., Dept. 131-B, Adams Center, N. Y.



SPORTSMEN'S MANUAL

Get your copy of this newest and finest of outdoor books now, and make that next vacation a hundred times more enjoyable. In it are those important tricks of camping, fishing, hunting and hiking that prevent disappointments and discomforts.

Edited by

ROBERT PAGE LINCOLN

*Hunting and Fishing Editor of
Modern Mechanix Hobbies & Inventions*

Filled with practical advice on every outdoor sport, written by leading experts in each field and edited by one of America's foremost outdoor writers

PARTIAL CONTENTS

FISHING

Unfolding Mysteries of Fly Casting
Spinner and Fly Kinks for Pan Fish
How to Use Lures in Autumn
Fishing for Fresh Water Giants
Choosing "Sure Shot" Casting Lures
Bass and Trout Fishing Do's and Don'ts
Tackle for Ocean and Gulf Fishing
How to Improve Your Trolling
Selecting Bait for Winter Fishing
Identifying the Fish You Catch

HUNTING

Talk Your Ducks Into the Bag
Know the Fine Points of Duck Shooting
Identifying Ducks
Training Hunting Dogs
Matching Wits with Pheasants
Choosing a Gun for Upland Bird Shooting
How to Get More Furs
Bedding Down the Winter Hunter

Preparing Hunting Camps
Finding Your Way in the Woods
Advantages of .22 Rifles in Hunting
Start a Skeet Club

CAMPING

Camping Without Cooking Utensils
Building a Semi-Leg Cabin
Selecting Your Motor Camping Tent
Camp Cooking Tips
How to Smoke Fish
Simplifying Fish Cleaning
Bagged Game — Care and Preservation

BUILDING PLANS

Collapsible Camping Trailer
"Skedaddle" — Simple Outboard Boat
Duckboat Costs \$10
16-Foot Canoe
Light-Weight Boat Trailer

and scores of other big features and kinks covering every phase of life in the outdoors.

148 Pages
593 Pictures

50¢

At Your
Newsstand or Order
Directly from



MODERN MECHANIX PUB. CO.
Fawcett Building :: Greenwich, Conn.

Thank You for Mentioning Modern Mechanix Hobbies and Inventions When Writing to Advertisers

MANY DIESEL EXPERTS STARTED THEIR CAREERS BY MAILING THIS COUPON

● THE world's oldest and largest correspondence school offers modern training in Diesels — man's supreme triumph of machine power. America's greatest opportunity for men employed in: Industrial power and lighting plants; small community power and light plants; municipal pumping stations for water supply; on construction work, trucks, tractors, hoists, power shovels, graders; transportation, with special reference to buses, rail buses, locomotives; marine service, including ocean liners, freighters, river and lake vessels, yachts and small cabin cruisers. Full information will be sent — free — upon request.



INTERNATIONAL CORRESPONDENCE SCHOOLS

Box 2318-J, Scranton, Penna.

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

TECHNICAL AND INDUSTRIAL COURSES

DIESEL POWER

- | | | |
|---|--|--|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Plumbing | <input type="checkbox"/> Heating |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Air Conditioning | <input type="checkbox"/> Steam Engineer |
| <input type="checkbox"/> Building Estimating | <input type="checkbox"/> Steam Electric Engineer | <input type="checkbox"/> Marine Engineer |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Civil Engineer |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Highway Engineer | <input type="checkbox"/> Highway Engineer |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Bridge Engineer | <input type="checkbox"/> Bridge Engineer |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> Machine Shop Building Foreman | <input type="checkbox"/> Machine Shop Building Foreman |
| <input type="checkbox"/> Electrical Lighting | <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Surveying and Mapping |
| <input type="checkbox"/> Welding, Brass and Gas | <input type="checkbox"/> R. R. Locomotives | <input type="checkbox"/> Air Brakes |
| <input type="checkbox"/> Reading Shop Blueprints | <input type="checkbox"/> R. R. Section Foreman | <input type="checkbox"/> R. R. Section Foreman |
| <input type="checkbox"/> Telegraph Engineer | <input type="checkbox"/> R. R. Signallers | <input type="checkbox"/> R. R. Signallers |
| <input type="checkbox"/> Telephone Worker | <input type="checkbox"/> Radio | <input type="checkbox"/> Radio |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Air Conditioning | <input type="checkbox"/> Steam |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Steam Electric | <input type="checkbox"/> Electric |
| <input type="checkbox"/> Machinist | <input type="checkbox"/> Marine | <input type="checkbox"/> Marine |
| <input type="checkbox"/> Patternmaker | <input type="checkbox"/> Civil | <input type="checkbox"/> Civil |
| <input type="checkbox"/> Sheet Metal Worker | <input type="checkbox"/> Highway | <input type="checkbox"/> Highway |
| <input type="checkbox"/> Heat Treatment of Metals | <input type="checkbox"/> Bridge | <input type="checkbox"/> Bridge |
| <input type="checkbox"/> Management of Inventions | <input type="checkbox"/> Machine | <input type="checkbox"/> Machine |
| <input type="checkbox"/> Aviation Engines | <input type="checkbox"/> Surveying | <input type="checkbox"/> Surveying |
| <input type="checkbox"/> Automobile Mechanic | <input type="checkbox"/> Mapping | <input type="checkbox"/> Mapping |

BUSINESS TRAINING COURSES

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

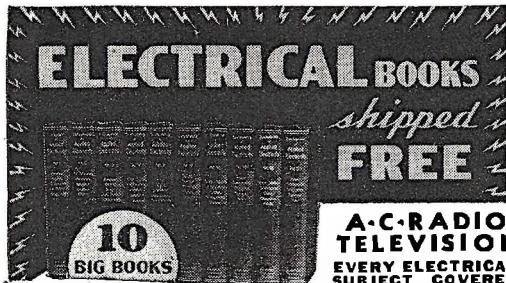
Name..... Age.....

Address.....

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

Present Position.....

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



Here's great news for anybody interested in Electricity. BRAND NEW edition of Applied Electricity brought right down to date with every NEW detail and fully covered. 10 big volumes and all shipped FREE for examination.

For
Beginners
and Experts

Over 3000 pages—hundreds of illustrations—the most complete book on Electricity of its kind ever published. Dynamos, motors, power, radio, television, everything electrical explained clearly so anyone can understand them.

BIG FIELD! Big Demand!

Big Pay!

Men who understand electricity are urgently needed right now in thousands of industries. Auto, airplanes, machine tools, bridges, every industry depends on electricity, and men who know this subject make big money. Pleasant, fascinating work, easy to learn and do; learn quickly with these books. Send coupon for set for FREE examination and see for yourself.

A year's consulting membership in the American Technical Society now given free to all readers of this famous Cyclopedia of Electricity. Many say, "That's worth more than the cost of books."

FREE AMERICAN TECHNICAL SOCIETY
Dept. E-6320, Drexel at 58th St., Chicago

American Technical Society, Dept. E-6320, Drexel at 58th St., Chicago
Send for 10 days' free use, BRAND NEW 10 volume set of Electrical Engineering. In return for mailing this coupon promptly, send free certificate of membership in the American Technical Society entitling me to full consulting privilege for one year. I will pay the few cents delivery charges on the books. I will return them in 10 days and get my money back. If I keep them, I will send \$2.00 after 10 days, then \$3.00 a month until the special price of only \$20.80 is paid.

Name _____

Address _____

City _____ State _____
Please attach letter stating age, occupation and name and address of employer and at least one business man as reference.



**IT'S FUN LEARNING
MUSIC THIS QUICK WAY**

in your own home—no teacher

Yes! There's a way of learning music other than spending years of study and practice. Remember, more than 700,000 men and women have already studied this modern, simple method! Learning music this modern U. S. School of Music Way is easy—fascinating—like playing a game.

You learn right in your own home—without a teacher, in your spare time at an average cost of only a few cents a day. First you are told what to do—then a picture shows you how to do it—then you do it yourself and hear it. You learn real tunes from the start.

Free Booklet and Demonstration Lesson

Decide now to play your favorite instrument. Send for the Free Booklet and Free Demonstration lesson explaining this method in detail. Mention your favorite instrument. U. S. School of Music, 2629 Brunswick Bldg., New York City. Instruments supplied when needed—cash or credit.

BUILD Your Own

AUTO TRAILER
FURNITURE
ICE BOATS
MODELS
RADIOS
BOATS



The 1936 HOW TO BUILD IT Tells You How

The man or boy with a home shop hobby needs this valuable book. It contains complete drawings, photographs, and instructions for building hundreds of projects with ordinary tools. Covers everything from tricks and kinks to dirt track racers.

50c

**AT YOUR NEWSSTAND
OR ORDER FROM**

**MODERN MECHANIX
Publishing Company**

GREENWICH,

CONN.

COOK WITH CHEAP OIL

Why Burn COAL?

Cool Kitchen in Summer

AT LESS COST

NO WORK—NO DIRT—NO ASHES

Revolutionary New-Type OIL
Burner Slips Into Any Cook-Stove

Cooks a Meal for Less

Beats any oil burner for low cost, perfect performance—burns cheap oil new way without pre-generating or clogging up. Quick heat by Simple Turn of Valve.

TRY AT OUR RISK

30 Days' TRIAL Proves ends drudgery and dirt of coal or wood; cuts fuel bills in half, pays for itself quickly by what IT SAVES.

FREE SAMPLE offered to one energetic man or woman FOR AGENTS in each locality who take orders. Write quickly. Report to learn how to make REAL MONEY quick or full time. Send 10¢ postcard today. **UNITED FACTORIES** L-600 Factory Bldg., Kansas City, Mo.

ON OR OFF AT TURN of VALVE



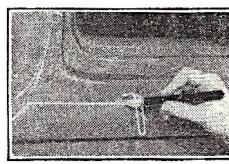
**AGENTS
SALESMEN
BIG MONEY**

Clark of Ind. sold \$200 in 20 days. Get YOUR OWN oil burner. FREE information on REAL Money. Write now.

STRIBE YOUR OWN

AUTOMOBILE

Anyone can stripe a car with a ROLL-ON STRIPE. You can save the price of your striping job and earn money doing others. Specially knurled roller and dependable gauge. Paint, lacquer, enamel or varnish may be used. Stripes in all colors, models and sizes. See any Auto Dealer today or send direct. Postpaid \$1.50.



MODCRAFT INDUSTRIES, Dept. D-9, 2908 N. Nordica Ave., Chicago, Ill.



Get Set for Life!

MAKE up to \$65 WEEKLY in new kind of wholesale business. Place famous line 5c-10c goods with stores. Merchants grab our FREE GOODS Deals. 200 fast-selling products—all on salesmaking Counter Displays. Up to 140% profit for you and merchant. No experience or investment to start. Big catalog and facts FREE.

World's Products Co., Dept. 9814, Spencer, Ind.

BUILD YOUR OWN
Electric Outboard Motor

from old auto generator. We show you how. Make money building for others. Variable Speed. Light weight and Silent. Operates from 8 to 12 hours on ordinary storage battery. Dime brings complete plans and catalog.

LEJAY MFG. 1514 W. Lake Minneapolis, Minn.

NEW INDUSTRY NEEDS MEN

**Is This
YOUR
Opportunity?**

AIR CONDITIONING and **ELECTRIC REFRIGERATION**—two giant industries—have need for reliable and properly qualified men for servicing and installation work. Good opportunities in most tenement houses have been selected by the Utilities Engineering Institute and fully trained in aptitude for the work involved. Many earn up to \$35 and \$75 a week. For **FREE BOOKLET** containing detailed information, write fully, giving age, experience, present occupation, etc.

UTILITIES ENGINEERING INSTITUTE
Dept. 296 403-410 N. Wells St., CHICAGO, ILL.

Thank You for Mentioning Modern Mechanix Hobbies and Inventions When Writing to Advertisers

LEARN AUTO MECHANICS

**DIESEL, AVIATION MECHANICS—
WELDING OR GENERAL
ELECTRICITY—**

in a few weeks!

Earn \$35 to \$75 a Week in any of these fascinating well-paying trades. Not a correspondence school—no books—no lessons. Don't look for a job. **TRAIN FOR IT.** Read what two McSweeny-trained men have done.

Livingston, Texas.

Dear Mac: I have been working mighty hard since I graduated from your school, with the Ford Motor Co., and am getting along fine. Of course I could not expect top wages at the start, but I have already had one salary increase. So I guess my work is entirely satisfactory, thanks to your school.—Herman Wilson.

Clendenin, W. Va.

Dear Mac: Send me a catalog. I just want to look over the old school. I am getting along fine, doing a good business, all thanks to you and your training. Will you send me another Diploma, as mine was destroyed. I was in the class of '21. I send my best regards to the instructors and to you, also.—Leo Foreman.

A Few Weeks of Interesting Shop Training

You work on real equipment with real tools. In a few short weeks you are trained by actual work to hold down a Big Pay Job.

**DIESEL, AVIATION, AUTO
MECHANICS—WELDING OR
GENERAL ELECTRICITY—
ALL OFFER REAL OPPORTUNITIES**

FREE Write today for Big Free Book. Get the facts about jobs; and Low Tuition Offers. Mailing the coupon does NOT obligate you. It obligates ME to tell YOU how you can train for Big Money in a few short weeks. Address Dept. 11-33.

McSWEENEY SCHOOLS

**Auto, Diesel, Aviation
Mechanics—Welding or
General Electricity**

CLEVELAND, OHIO or KANSAS CITY, MO.

Write Our School Nearest You—Specify Course Interested In

McSweeny Auto and Aviation School,

Dept. 11-33, Cleveland, Ohio or Kansas City, Mo.

Without cost or obligation, send me your Big FREE Book on Autos; also full information about your Low Tuition Offer.

Name

Street

Town..... State..... Age

BUILD YOUR OWN TOOLS

Own a complete wood or metal working shop. Use our castings and blueprints to make your own tools.



Blueprint portfolio of assembly drawings contains 16 units: Bench Milling Machine—10" Metal Shaper—Dividing Centers—7" Machine Vise—4" Bench Vise—Bench Drill Press—Floor Drill Press—4" Bench Grinder—6" Bench Grinder—14" Wood Shaper—8" Circular Saw—16" 2-Wheel Band Saw—24" 3-Wheel Band Saw—6" Jointer—Model Steam Engine—7/8" Bore, 2-Cycle Airplane Engine. Prepaid for \$1.00 or single prints 10c each.

Startling opportunity to build and sell these tools at an attractive profit. Our FREE catalog gives complete details. Write for it now.



Lewis Machine Tool Co.
542 5th St. San Francisco, Calif.

ASK FOR
LEPAGE'S
CASEIN GLUE
A real CASEIN GLUE

WANTED MEN

OPERATE POTATO CHIP STORES

We furnish everything—help finance and locate you. No experience needed. Tremendous profits. Sensational introductory starting plan. No house-to-house canvassing. Wonderful opportunity. Rush name for free book of Profit Facts—today!

LONG-EAKINS COMPANY
942-S High Street, Springfield, Ohio



MAN IN EACH TOWN

To Plate Auto Parts, Reflectors, Bathroom Fixtures, Refinish Beds, Mirrors, Chandeliers, by late method. Experience unnecessary. Simple plan of manufacturing at home starts you in big money making business. Free particulars and proofs. Write today.

GUNMETAL CO. Ave. P Decatur, Ill.

GOVT. JOBS

**SALARY TO START
\$90 to \$175
MONTHLY**

**MEN... WOMEN
Age Range 18 to 50**

- | | |
|--------------------------|---------------------|
| Village Carrier | () POSTMASTER |
| P. O. Laborer | Stock Clerk |
| R. F. D. Carrier | Auditor |
| Special Agent | Stenographer |
| Customs Inspector | U. S. Border Patrol |
| City Mail Carrier | Telephone Opr. |
| P. O. Clerk | Watchman |
| Electr. Conductor | Meat Inspector |
| () Special Investigator | Secret Service Opr. |
| () Typist | File Clerk |
- INSTRUCTION SERVICE, Dept. 233, St. Louis, Mo. Send me FREE particulars "How to Qualify for Government Positions" marked X. Send address, location, opportunities, etc. ALL SENT FREE.

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

ANY PHOTO ENLARGED

Size 8 x 10 inches or smaller if desired. Same price for full length or bust form, groups, landscapes, pet animals, etc., or enlargements of any part of group picture. Safe return of original photo guaranteed.

47¢
3 for \$1.00



SEND NO MONEY Just mail photo or snapshot ~~any size~~ and within a week you will receive your beautiful enlargement, guaranteed fadeless. Pay postman 47¢ plus postage—or send 49¢ with order and we pay postage. Big 16x20-inch enlargement sent C.O.D. 75¢ plus postage or send 77¢ with order and we pay postage. Write today, offering now. Send your photos today. Specify size wanted.

STANDARD ART STUDIOS, 104 S. Jefferson St., Dep. 376L, Chicago

AGENTS UP TO 14 A DAY

Everybody needs food. My plan gives you immediate opportunity for amazing profits. Make up to \$14.00 in a day. I'll give you a New Ford Tudor Sedan as a bonus in addition to your cash earnings. No experience required.

250 Famous Products—all fast sellers. I send everything. You don't risk a penny. Write quick for Free Facts.

ALBERT MILLS
1905 Monmouth Ave., Cincinnati, Ohio



No JOKE To Be Deaf

—Every deaf person knows that—
Mr. Way made himself hear his watch tick after being deaf for twenty-five years, with his Artificial Ear Drums. He wore them day and night. They stopped his head noises. They are invisible and comfortable, no wires or batteries. Write for TRUE STORY. Also booklet on Deafness.

THE WAY COMPANY
741 Hofmann Bldg. Detroit, Michigan



Learn Public Speaking

At home—in spare time. Many overcome "stage fright" and gain self-confidence and increase their earning power through ability to sway others by effective speech. Write for free booklet, *How to Work Wonders With Words* and requirements.

NORTH AMERICAN INSTITUTE, Dept. 2056
3601 Michigan Avenue Chicago, Illinois

LEARN WATCH REPAIRING



AT HOME You can learn by our modern and simple system of instruction every part of the Watch repairing. Trade at home. No extra money while learning and prepare yourself for a well paying position or start in business after completing our course of instruction. Good watch repairers are in demand and particularly earn very good salaries. For particulars apply to the good

WISCONSIN SCHOOL OF WATCH REPAIRING
524 E. Mason St., Dept. C, Milwaukee, Wis.

RAISE RABBITS FOR US

We Pay You Up To \$5.00 Each.

Also Put You in Touch with MARKETS EVERYWHERE. Large illustrated book and catalog, also copy of the **AMERICAN RABBIT FARMER** and monthly market bulletin showing names of buyers in various parts of America who continuously buy all rabbits offered them. All for 10 cents.

OUTDOOR ENTERPRISE CO., 113 Main St., Holmes Park, Mo.



HULL AUTO COMPASS

Have you ever taken the wrong road and traveled many miles before discovering your mistake? This new AIRPLANE TYPE COMPASS constantly tells your direction. Sticks to windshield. Base 1 1/2" diameter. ONLY \$1.95. POSTPAID, including Compensator. SATISFACTION GUARANTEED.

If your dealer cannot supply you, order direct.

HULL MFG. CO. Box 246-A **WARREN, OHIO**

GAS ENGINES

For Model Airplanes—Boats

An Engineering Triumph!

The G. H. Q. Motor is actually one of the most powerful motors ever constructed. Has broken records for amazing performance—flies model planes up to 10 ft. wing spread. Easy to start—just a twist of the wrist—and simple to run. No oil, gas or batteries are required. No driver is needed! Steady running (runs 27 minutes on ounce of gas). Cylinder and piston lapped to within .0003. Kit includes: piping, coil, condenser, lamp, ignition wire, cylindrical piston connecting rod, valve timer, crankshaft, all screws, nuts, bolts, etc. Every part is fully machined and finished. No oil, gas, batteries required. Postpaid \$8.50

P. a. d. y. -to-Run G. H. Q. Motor complete with propeller, engine, cylinder, piston, connecting rod, valve timer, crankshaft, all screws, nuts, bolts, etc. Every part is fully machined and finished. No oil, gas, batteries required. Postpaid for only \$12.50. Send 3c for illustrated catalog including information on gas accessories and parts.

G. H. Q. MODEL AIRPLANE CO.
564-A Southern Boulevard, New York, N. Y.



AT
THE
LOWEST
PRICE
EVER
OFFERED!



\$ CLEAN UP \$ average \$50.00 per day

Play stores, lots, carnivals with: "THE LORD'S PRAVER" engraved on your penny for 5c" (Suitable for rings, bracelets to sell for 25c). Price of machine complete: \$160.00. Send 10c for samples and facts to

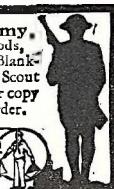
"BLUE DOT" STAMP CO., 124 E. Larned St., Detroit, Mich.



- of Bargains in Army, Outdoor and Sport Goods, Clothes, Shoes, Boots, Blankets, Tents, Firearms, Boy Scout Supplies, etc. Send 10c for copy to be redeemed on first order.



ARMY-NAVY SUPPLY CO.
ESTABLISHED 1868
4813 Lester St. Richmond, Va.



Be an ARTIST

MAKE \$50 TO \$100 A WEEK!
Many of our successful students are now making big money. Our simple methods make it fun to learn Commercial Art, Cartooning and Designing at home, in spare time. New low tuition rate. Write for big free book, "ART for Pleasure and Profit," to day.

**STUDIO 209, WASHINGTON SCHOOL OF ART
1115-15th ST., WASHINGTON, D. C.**



New Way to Improve YOUR ENGLISH

A command of effective English gives you added advantages and better opportunities. Poor English handicaps you more than you will ever realize. You can improve your English through Sherwin Cody's 100% self-correcting invention. It is a simple, easy-to-use book that makes in grammar, spelling, punctuation, or pronunciation, this new free book "How You Can Master Good English in 15 Minutes a Day" will prove a revelation to you. Send for it now. It's free. Address: SHERWIN COODY SCHOOL OF ENGLISH, 689 Searle Building, Rochester, N. Y.

WANTED ... BRANCH MANUFACTURERS

On small or large scale, by old established firm to cast 5 & 10c Novelties, Ashtrays, Toy Autos, etc. No special place or experience necessary as we furnish full instructions with moulds. A rare opportunity for these times so if you are over 21 and want to devote your spare or full time to profitable work write AT ONCE for full details as we are now closing arrangements for 1936 supply of our goods.

METAL CAST PRODUCTS CO.

1696 Boston Road, Dept. 2, New York, N. Y.

BE A RADIO EXPERT



LEARN AT HOME FROM THESE REAL RADIO ENGINEERS

Kendall Clough
Chief Engineer,
Clough-Brenkle Co.

E. E. Gramer
Chief Engineer,
Cleveland Transformer Corp.

Karl E. Hassel
Chief Engineer,
Zenith Radio Corp.

F. H. Schnell
Radio Engineer,
General Household Utilities (Grunow).

Dr. C. M. Blackburn
Radio Engineer,
P. R. Mallory &
Co., Mfrs. of Radio Apparatus.

Learn Radio from these men! Just see who they are! All top-notch engineers—selected by the great Radio concerns they work for to supervise and direct your Training. Learn Radio the way Big Radio Firms want you to learn it—the Shop way—the practical way—the real money-making way.

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

MANY R-T-I TRAINED MEN Earn Up To \$ 75 A Week



Among them
CROSLEY • PHILCO
STEWART-WARNER
GRUNOW
STROMBERG
ZENITH
and 44 Others

GET YOUR FREE BOOK—NOW

Read about the sensational endorsement of R-T-I Training—about the exclusive features that make it so outstandingly successful—a about R-T-I Working Outfits and 5 Advanced Courses furnished without extra cost. Act today. Mail the coupon. There is no obligation.

Get out of the rut. Fit yourself for good-pay work in Radio—the field with a future. My FREE book tells how real engineers train you quickly and inexpensively right in your own home and in your spare time.

Turn Your Spare Time Into Money

Many R-T-I students make \$5, \$10, \$15, and more, a week in spare-time work soon after enrolling. I send you instructions which you should master quickly for doing Radio jobs common in most communities—plans and ideas which have helped hundreds of my "boys" pay for their R-T-I Training with spare-time earnings.

Good - Pay Opportunities Everywhere

Broadcasting Stations, Factories, Dealers and Distributors and others all use "trained" men and pay well. See our list of 50 Radio Concerns. See how Radio Photo Cabs, Public Address Systems and Sound Pictures have created thousands of good-pay jobs. This is a big year for Radio. New developments in receivers alone, demand up-to-date trained technical men. Get the facts in my free book.

RAY D. SMITH, President
Radio & Television Institute (R-T-I)
2130 Lawrence Ave., Dept. 36,
Chicago, Ill.

MAIL COUPON for FREE BOOK

RAY D. SMITH, President
Radio & Television Institute (R-T-I)
2130 Lawrence Ave., Dept. 36,
Chicago, Ill.

Without obligating me, send FREE BOOK about spare-time and full-time Radio opportunities and how I can train for them at home.

Name.....

Address....., Age.....

City....., State.....



MECHANICAL ENGINEERING

Pays Big NOW!

Less than 20 minutes a day with these 7 big mechanical engineering books entitled "Modern Shop Practice," will prepare you for a better job and bigger pay. Machine hands become foremen and superintendents, helpers become experts, foremen become managers. Any machinist, helper or factory employee can benefit QUICKLY and can command more money.

Your Opportunity Don't miss this chance to qualify for promotion, don't put off for one minute this Big Opportunity which is yours almost for the asking. Seven Big Books chockful of every known mechanical fact, told so simply and clearly that any one can understand them. Over 2600 pages, nearly 2700 illustrations, cover every subject fully, including Tool Making, Pattern Making, Foundry Work, Mechanical Drawing, Forging, in fact anything you need to know.

Mechanical Drawing For examination. Yes

Everything Sent FREE ALL of these books will

be sent to you for examination. Decide in your own home or place of business whether or not you want to take the course. Note their great MONEY MAKING value, then, if you want them, pay on the easiest kind of payments.



Complete set of drawing instruments if you send for these books NOW. These instruments are made of the finest of German silver, are absolutely accurate and are packed in velvet lined leatherette pocket case. Real \$10 value but free to you with these books.

American Technical Society, Dept. M-6320, Drexel at 5th St., Chicago You may send me the 7 big NEW books for free examination. I will pay the few cents delivery charges only unless I decide to keep them in which case I will pay the full price of \$20.00 plus the postage and the trial price of only \$20.00 is paid. If I return them in 10 days I will owe you nothing. Because I send now, you agree to give me a membership in the American Technical Society entitling me to free consultation privileges with any of your experts for one year and set of consulting instruments.

Name _____

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

BUILD YOUR OWN FURNITURE

In the 1935 edition of the *Handy Man's Manual* you will find just the furniture project you are seeking. Send 50¢ now for your copy of this 14-page book.

MODERN MECHANIX PUBL. CO.,
GREENWICH, CONN.

Cheaper HEAT Without COAL

New Invention Fits Any
Stove or Range

Remarkable invention burns 96% air, 4% of a cheap variety of oil obtainable everywhere. Does away with coal, wood, ashes, dirt and drudgery. Quick, clean, silent heat, 3 times hotter than coal, and cheaper. Temperature control gives any amount of heat desired—no more getting up on bitter cold, wintry mornings. Many automatic features. No gas or electricity needed. Safe as ordinary kitchen range. Easy to install—no damage to stove—simply sits in firebox of any stove range, or furnace. Costs just a few cents a day to operate.



EARN \$60 A WEEK!

Write for FREE Burner offer and protected territory

Men and women wanted to demonstrate and take orders for this wonderful invention. This year's sales are tremendous. Make big money. Experience unnecessary.

TRY 30 DAYS AT OUR RISK

Low introductory price and 30 day trial. Write for free catalog. AGENTS and spare time workers: Oil heat saves money this year; people buy to save! Write immediately for free burner offer that starts you in business for yourself. Act NOW!

BRIGHAM OIL BURNER CO.

2923-J Clark Ave. St. Louis, Mo.

New 1936 Model SOUTH BEND LATHE

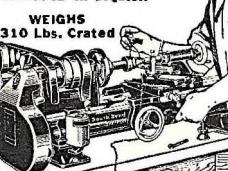
\$75
LESS MOTOR
DRIVE

Write for details on this 9 in. x 3 ft. Workshop Precision, back-gear, screw-cutting Lathe. Made in 8 different drives, 4 bed lengths, 2 spindles, 2 chucks, arranged over extended period of time. Complete information on request.

Free
WRITE FOR
Catalog 15

9" WORKSHOP LATHE

SOUTH BEND LATHE WORKS
271 E. MADISON ST. SOUTH BEND, IND. U.S.A.



BE A PILOT—FLY A SHIP

If you are stumped at the high cost of training to qualify for a license and a good future in aviation—write immediately, enclosing stamp for information on opportunities now available for Approved Training under our . . .

APPRENTICE PLAN

Mechanix Universal Aviation Service, Inc.
Strathmoor Sta., Dept. A, Detroit, Mich.

ONE-MAN SAWMILL FARM \$49

TURN TREES INTO MONEY WITH A BELSAW!

Makes lumber, shingles, lathe, staves, crates, boxes, cases, all forms of lumber.

Three capacities: 10, 14 and 20 feet. Accurate set works, positive dogs. Full or one-way type power feedruns on low power—many users use old auto engine.

Pays for itself quickly—thousands in commanding profits. Write for free lumber handbook and catalog of mills, supplies, tools, saw tables, and woodworking equipment.

BELSAW MACHINERY CO.
834-D Davidson Bldg., Kansas City, Mo.

CARTOON YOUR WAY TO SUCCESS!

DON'T COPY - LEARN TO ORIGINATE!

RAYE BURNS will teach you HOW to CREATE \$2.85 ORIGINAL CARTOONS at home that you can SELL! Course has 26 lessons and 600 illustrations.

Send name and address for free details. Only . . .

RAYE BURNS SCHOOL, Dept. F-X, Box 2194, CLEVELAND, OHIO



\$150 TO \$300 EXTRA MONTHLY WITH THIS

HOBART "SIMPLIFIED" ARC WELDER

Start profitable business of your own. Used car motor and chassis lets you "Build Your Own" and save \$300 to \$500.

30 Days Trial—Easy

"Pays-For-Itself" Terms

FREE Valuable Book if you tell us you're interested.

Hobart Bros. Co., Box SM-96, Troy, Ohio



Make this your life-time career

Wonderful, money-making opportunities. Men, women. Growing field. Become a Commercial Photographer; a News, Advertising, Portrait or Motion Picture Photographer. Personal Attendance or Home Study training. 26th year. Free Booklet.

New York Institute of Photography
10 West 33 Street (Dept. 153) New York

Can You Equal \$785
This Home for

Shipped
Direct
from Our
Mill

Save 30% to 40%
on Your New Home... WE PAY
FREIGHT

Don't pay several hundred dollars more than necessary when you build a home! Buy it direct from our mill at our low factory price. We ship you the materials—lumber cut-to-fit, ready to erect. Paint, glass, hardware, nails, etc., all included in the price—no extra charges. We pay the freight. Plans furnished—also complete building instructions. No wonder our customers write us that we saved them 30% to 40%, compared with builder's prices. Easy terms—3 years to pay.

**Handsome Big
CATALOGUE FREE**

Pictures wonderful homes in colors at money-saving prices. Designs to suit everyone.

Write for your catalogue today.

LEWIS MANUFACTURING CO.

Bay City, Michigan

*Send for
FREE
BOOK
of Liberty
Homes*

RADIO ENGINEERING

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

Illustrated Catalog on request

RCA INSTITUTES, INC. Dept. MM-36

75 Varick St., New York 1154 Merchandise Mart, Chicago
Recognized Standard in Radio Instruction Since 1909

FISHERMEN—

Are you prepared for the coming fishing season? The new *Sportsman's Manual* is just the book you need. Describes inland and sea fishing, lures, boats, camp trailers and articles on other interesting sports. Send 50c today for your copy of this 148-page book illustrated with more than 500 pictures—all in rotogravure.

MODERN MECHANIX PUBL. CO.,
GREENWICH, CONN.

30 Days Trial!

NOW you can ride a genuine Mead bicycle 30 days without "buying for keeps." Return it at our expense if not satisfied. Write quick for FREE color Catalog, marvelous new prices, special offers. Latest streamline models. SAVE $\frac{1}{2}$ buying direct from MEAD!

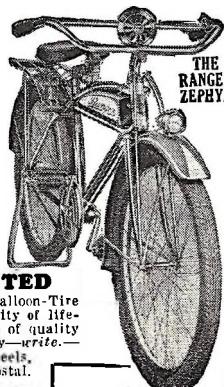
\$19.95

Mead's Sentinel bike only \$19.95
Rangers a few dollars more.
America's finest quality bicycles at
rock-bottom prices.

RIDER AGENTS WANTED
Ride and exhibit sample of our new Balloon-Tire
RANGER and make money. Opportunity of life-
time. Special Offers on our entire line of quality
bicycles—if you hurry! Send no money—write.

Tires Save One-Half on lamps, wheels,
tires, equipment. Drop us a postal.

Mead CYCLE COMPANY
Dept. H289 CHICAGO



FREE! Great New
Catalog
Slog sent FREE—hurry!

Thank You for Mentioning Modern Mechanix Hobbies and Inventions When Writing to Advertisers



Amazingly Easy Way to get into **ELECTRICITY**

**Learn to Earn A
Good Salary Every
Week—or Go Into
Your Own Business**

Whether you are 16 or 40... Don't spend your life never sure of a job. Make up your mind to prepare for a real future. Now let us train you for practical, that is to say, a career in Electricity—NOT by correspondence, but by an amazing practical method right here in the great Coyne Shops, giving you a practical training in 90 days! Getting into Electricity is easier than you imagine if you choose the right method. You don't need previous experience or need a lot of book learning. Start any time.

Finance Your Training

Mail coupon below for all details of my "pay-tuition-after-graduation plan" whereby you can pay your tuition in small monthly payments starting 5 months from the date you start school, and then you have 18 months to complete your payments.

LEARN BY DOING—IN 90 DAYS IN THE GREAT COYNE SHOPS

I don't care if you don't know an armature from an air brake—I don't expect you to! In 12 brief weeks, in the great shops of Coyne, we train you by this interesting modern method... on one of the greatest outlays of electrical apparatus ever assembled for training purposes.

MANY EARN WHILE LEARNING

If you need part time work to help pay your expenses we may be able to help you if you will write and tell us your problems. When you graduate we'll give you lifetime employment service.

DIESEL ENGINES, REFRIGERATION AND AIR CONDITIONING

Right now we are including additional instruction in Diesel Engines, Electric Refrigeration and Air Conditioning without extra cost so your training will be more valuable to you in these markets, rapidly expanding fields.

GET MY BIG FREE BOOK! Coyne is your great chance to get into Electricity. This school is 37 years old—Coyne training is tested. You can find out everything absolutely free. Simply mail the coupon and let us send you the big, free Coyne book with photographs... facts... jobs... salaries... opportunities. Tell us how many earn expenses while training and how we assist our graduates in the field. No obligation to you. So act at once. Just mail coupon.

H. C. Lewis



COYNE ELECTRICAL SCHOOL
500 S. PAULINA ST., Dept. 66-53, CHICAGO, ILL.

SEND NOW FOR FULL DETAILS!

**H. C. LEWIS, President, COYNE ELECTRICAL SCHOOL
500 S. Paulina St., Dept. 66-53, Chicago, Ill.**

Dear Mr. Lewis: Without obligation send me your big, free catalog with facts about Coyne Training and details of your "Pay-Tuition-After-Graduation" Plan.

Name.....

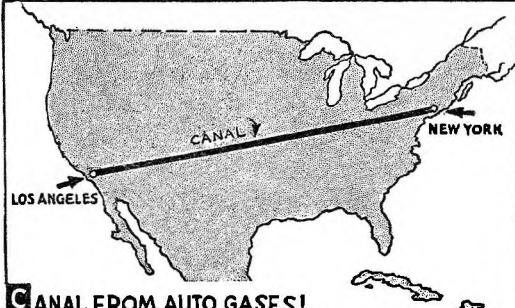
Address.....

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

Mail in envelope or paste on a postcard

COLD Makes CABLE of PLANE Exhaust

Nic Sprank Offers \$5 for Best Oddity



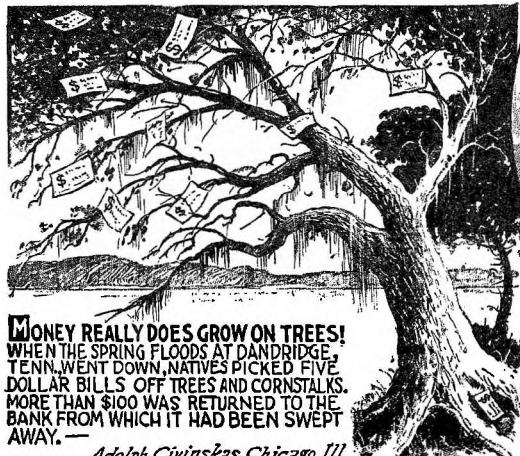
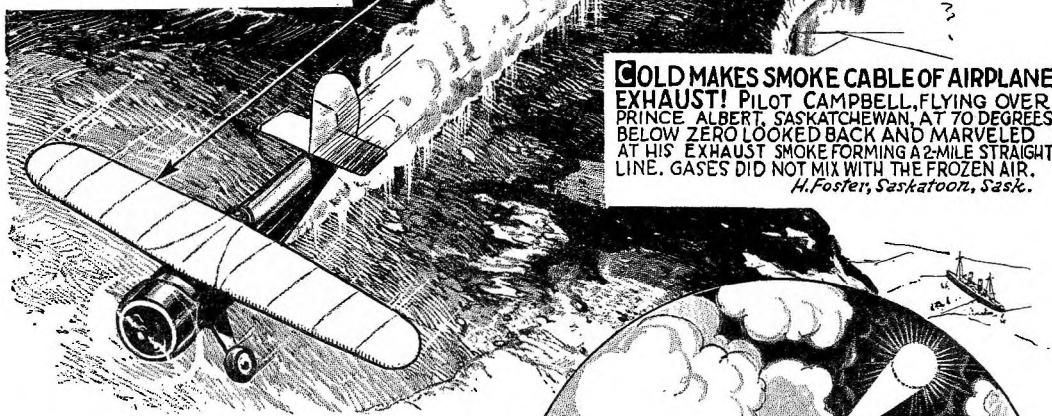
CANAL FROM AUTO GASES!
MOISTURE FROM THIS COUNTRY'S AUTOMOBILE EXHAUSTS CONDENSES INTO SEVENTEEN AND A HALF BILLION GALLONS OF NEW WATER EACH YEAR -- ENOUGH TO FILL A 25-FOOT WIDE AND A 6-FOOT DEEP CANAL FROM NEW YORK TO LOS ANGELES.

Robert Rose, Jr., New York, N.Y.



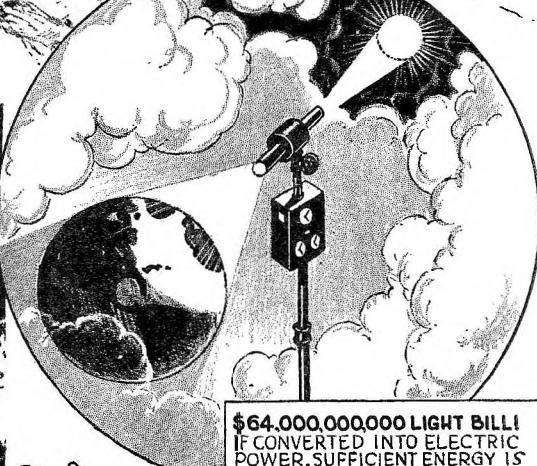
COLD MAKES SMOKE CABLE OF AIRPLANE EXHAUST! PILOT CAMPBELL, FLYING OVER PRINCE ALBERT, SASKATCHEWAN, AT 70 DEGREES BELOW ZERO LOOKED BACK AND MARVELED AT HIS EXHAUST SMOKE FORMING A 2-MILE STRAIGHT LINE. GASES DID NOT MIX WITH THE FROZEN AIR.

H. Foster, Saskatoon, Sask.



MONEY REALLY DOES GROW ON TREES!
WHEN THE SPRING FLOODS AT DANTRIDGE, TENN., WENT DOWN, NATIVES PICKED FIVE DOLLAR BILLS OFF TREES AND CORNSTALKS. MORE THAN \$100 WAS RETURNED TO THE BANK FROM WHICH IT HAD BEEN SWEPT AWAY.

Adolph Civinskas, Chicago, Ill.



\$64,000,000,000 LIGHT BILL!
IF CONVERTED INTO ELECTRIC POWER, SUFFICIENT ENERGY IS PRODUCED BY THE SUN TO SUPPLY THE WORLD WITH 64 BILLION DOLLARS WORTH OF ELECTRICITY EVERY DAY.

Leo Raymond, Sudbury, Ont.

Five dollars will be paid for the Oddity used by Nic Sprank as his central illustration. One dollar will be paid for all others used on this page. Send your Oddity to Nic Sprank, Modern Mechanix Publishing Company, Fawcett Bldg., Greenwich, Conn. Source or proof of each Oddity must be given. Send all Oddities separately, not with other manuscripts or letters.

FRONTIERS of SCIENCE

(A *Guest Editorial*)

UNTIL our own generation the wealth of the world came from below the surface of our globe—from the mines and waters and fertile soils. It is only in the last 30-odd years that humanity has begun to reach upward for new wealth—upward into the air, into the stratosphere. Already, we have made an impressive beginning with aviation and radio.

It is only a small beginning, but one could speculate at length on the potential resources that still lie untouched in ultra-short waves, in sun-energy and in the stratospheric lanes. Americans once faced the frontiers of geography. Today, we face new frontiers of science.

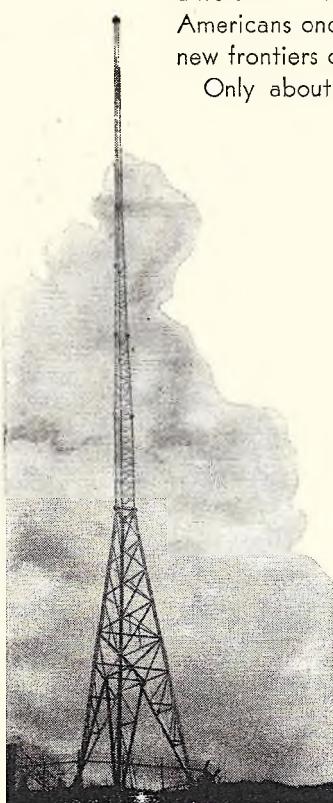
Only about one-half the human race is, at present, within the orbit of industrialized civilization. Untapped resources of science may soon bring the other half into this sphere, may create immense new producing and consuming areas and provide greater scope for growth and general worldwide enrichment than we now dare imagine.

I believe that the solution of the world's economic problems will yet be found through the progress of science.

For a full, unhampered development, we must have freedom of thought, freedom of action, rewards for initiative, for work, and for achievement—in brief, a democratic system of living and of government.



David Sarnoff

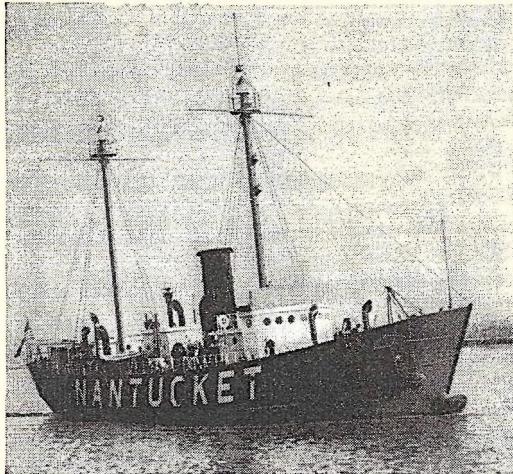


David Sarnoff

PRESIDENT

Radio Corporation of America

Short-Wave Radio Beam Protects Lightship From Ramming



Submarine oscillators, short-wave radio beams, fog horns, and powerful searchlights will guard this new lightship from the danger of being rammed in fog as its predecessor was.

PROTECTED by a special short-range radio beacon that will warn approaching ships of their nearness to her during a fog, a new lightship, No. 112, took her station off the Nantucket Shoals, Cape Cod, on July 1. Its predecessor was sent to the bottom when rammed by the liner Olympic through the lack of such a short-wave beam protection.

The new guardian of the shoals will have many new features including a 16,000-candle-power search light that will flash warnings from her masthead. Powerful automatic fog signals will sound every fifteen seconds and a radio beacon will send out messages that will reach out 200 miles. A submarine oscillator will send out underwater signals that can be heard still farther.

Passageways running to the deck from watertight compartments assure quick exit for the crew in event of danger. The ship carries fuel enough to last for one year.

Chamberlin Plans Strato-Flight

IN A specially designed Lockheed airplane capable of a speed of 400 miles per hour at an altitude of 35,000 feet, Colonel Clarence Chamberlin, noted trans-Atlantic pilot, will attempt a stratosphere flight between the U. S. and England.

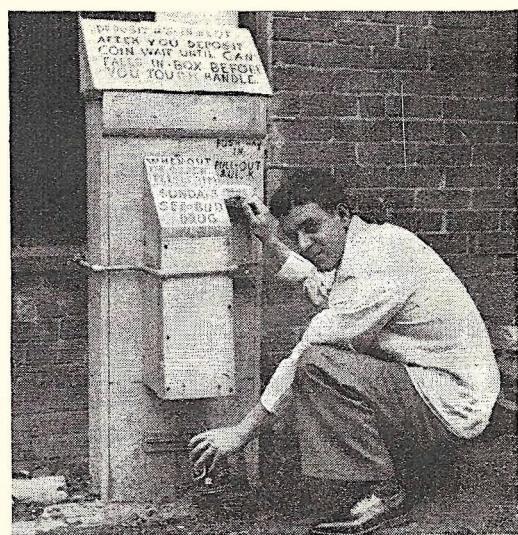
The plane will have double walls and facilities for maintaining the same atmospheric conditions found at 15,000 feet. No oxygen "suit" will be needed for breathing.

The three-bladed propeller of the single-motored plane will have an 11-foot diameter. Chamberlin expects to make the flight in less than six hours.



Clarence Chamberlin, noted trans-Atlantic pilot, plans a U. S. to England stratosphere flight. He will fly at 35,000 feet at a speed of 400 m.p.h. His bride helps plot the course.

Slot Machine Yields Fishing Worms



Here's how the fishing worm slot machine appears in action at Northampton, Mass. The worms come out below.

HERMAN P. DOUYARD, 28-year-old barber fisherman of Northampton, Mass., is the inventor of a unique fishing worm slot machine. All that fishermen have to do is to visit the rear of his shop, drop a coin in a slot and carry away a can of worms. At first Douyard gathered his own worms but pressure of business forced him to organize a staff of ten small boys to handle the production end of the business.

183 SHARE \$1000 IN PRIZES!



Meet the prize winners! Bert Pinson, the Texan pictured in the center, is the first prize winner in the big MM Auto Identification contest. Norman K. McWilliams, left, was second and Gwilym Thomas, right, was third. Misses Grace Merrill and Lucile Metha are shown with some of entries.

BERT PINSON, Lubbock, Texas, druggist, wins the \$250 first prize in the \$1,000

MODERN MECHANIX Hobbies AND INVENTIONS magazine automobile contest. He earned first place with a perfect entry and "Slow Down Death Begins at Forty" as his slogan. He is 35 years old. Entries were received from as far away as Syria.

Norman K. McWilliams, of Van Dyke, Michigan, wins second prize of \$150 in cash on the merits of his entry while third prize of \$100 in cash goes to Gwilym Thomas, of New York City.

Winners of fourth prizes of \$25 each: A. G. Wuertz, Tampa, Fla.; George W. Ronald, Jr., Minneapolis, Minn.; Clayton Protzman, Detroit, Mich.; J. L. Hutchinson, San Francisco, Cal.; and Weber English, Elgin, Ore.

Fifth prize winners \$10 each: George Smar, address omitted; Mrs. J. L. Neder-

hiser, Medford, Ore.; Bernard W. Skinner, Rochester, N. Y.; Saliba Sallum, Beirut, Lebanon; Albert J. Donnell, Kansas City, Mo.; Henry B. Campbell, Buffalo, N. Y.; Dr. A. J. Simpson, St. Paul, Minn.; Neal C. Monroe, Eureka, Cal.; Ira Sitkin, Lewistown, Pa.; B. Harrison Winfield, Woodcliff, N. J.

Sixth prize winners \$5 each: L. J. Landers, Atlanta, Ga.; Mrs. Hazel A. Raught, Lewes, Del.; Mrs. Martin D. Haney, Akron, Ohio; Mildred A. Bradley, Sheldonville, Mass.; Joe R. Heimert, Oakfield, Wis.; B. G. Zimpfer, Columbus, Ohio; Herman Henig, Bronx, New York City; T. E. Mueller, Chicago, Ill.; Martin Daly, Buffalo, N. Y.; Oak C. Walker,

[Continued on page 125]

TRAINING ARMY



An army airman learns to fly "blind" beneath a hood in this plane equipped with dual control.

A LARGE percentage of each year's graduates of the West Point Military Academy enter the autumn class at the Air Corps Training Center, Randolph Field, Texas. This fact, and the further fact that the flying school is conducted along lines similar to the Military Academy, has caused this Air Corps school to be popularly termed "The West Point of the Air."



The colors come down at retreat ceremonies in front of the Administration center at Randolph Field. This structure is typical of the distinctive architecture of the various buildings at the post.

The mission of the West Point of the Air is to turn out young military pilots competent to undertake the duties of second lieutenant in an Air Corps tactical squadron. The organization of the combat squadrons requires a high ratio of young pilots to officers of higher grades. This ratio is maintained by sending each year from 200 to 250 pilots, trained at the Air Corps Training Center to tactical squadrons of the regular army. The graduates of West Point are officers when they enter the flying school but the other young pilots are continued on active duty as Flying Cadets during one year. If their service shows them to be competent, they are then commissioned as second lieutenants, Air Corps Reserve and given a further year of active duty.

Legislation has been passed recently authorizing the Air Corps to have 1,300 Reserve Officers on extended active duty for periods of five years each. This will enable the selection each year of approximately 270 graduates of the Training Center for duty with tactical squadrons. The proposed law provides for payment, upon discharge from active duty after a minimum of three years active duty, of a bonus of five hundred dollars.

The West Point of the Air is organized to receive new classes at the Primary Flying School every four months. Each class has four months in the "Primary Stage" and four months in the "Basic Stage" at Randolph Field.

The "Air Cadets" then move over to Kelly Field for their last four months at the Advanced Flying School, where they are graduated as pilots. During the Primary Stage trainees receive ground in-

This Air Corps photograph shows how the hangars and runways look to the student flying above the clouds.



AIR ★ ★ ★ FIGHTERS

struction and flying instruction on "Primary Training Airplanes" or PT's, as they are known. In the Basic Stage the flying training is conducted in "Basic Training" or BT airplanes, larger, speedier and more maneuverable airplanes. These provide an intermediate step in piloting between the PT's and the service types such as pursuits, bombardment, attack and observation used in the flying training at the Advanced Flying School.

Since a knowledge of the equipment he is flying is essential to the student, and a continuous diet of flying would make a trainee "stale," it is convenient and advantageous to combine with the flight training, ground instruction in airplane engines, theory of flight, radio, ground gunnery, air navigation, meteorology, flight maps, airplane maintenance and other subjects. This ground instruction is continued until graduation. At the Advanced Flying School it emphasizes the tactics of each class of aviation—bombardment, pursuit, attack and observation.

The student body is made up of Flying Cadets and student officers. Each new class consists of approximately 150 men. The class beginning in October of each year usually



Student fliers form an aerial "U. S. A." with their planes over Randolph Field in Texas.

If you would fly for Uncle Sam, read this notable article by the Assistant Chief of the Army Air Corps explaining exacting requirements of life at Randolph Field.

by
**BRIGADIER
GENERAL
H. H. ARNOLD**

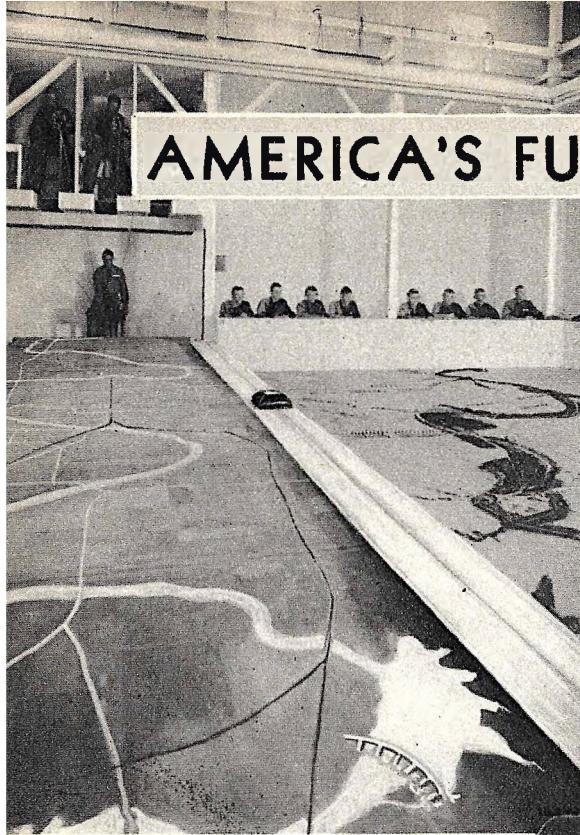


Future Army airmen pictured as they arrive to start instruction at the "West Point of the Air."

is composed of from 50 to 80 second lieutenants from the graduating class at West Point. The Flying Cadets in this class therefore are reduced to such number as to make a total for the class of approximately 150. The Flying Cadets, with the exception of a few ex-enlisted men from the army, are drawn entirely from civil life.

In the period of one year at the Training Center the young student receives a total of 323 hours flying instruction. For the fiscal year 1935 the flying for the

AMERICA'S FUTURE ACES STUDY



Future bombers and artillery observers receive practice on these miniature battlefields. One problem calls for the destruction of the dam.



Training Center, computed in airplane flying time, amounted to 113,802.8 airplane hours. The flying time for the remainder of the Regular Army for the same period was 312,575.4 hours, that of the National Guard 40,606.7 hours, and that of the Organized Reserves 23,204.8 hours.

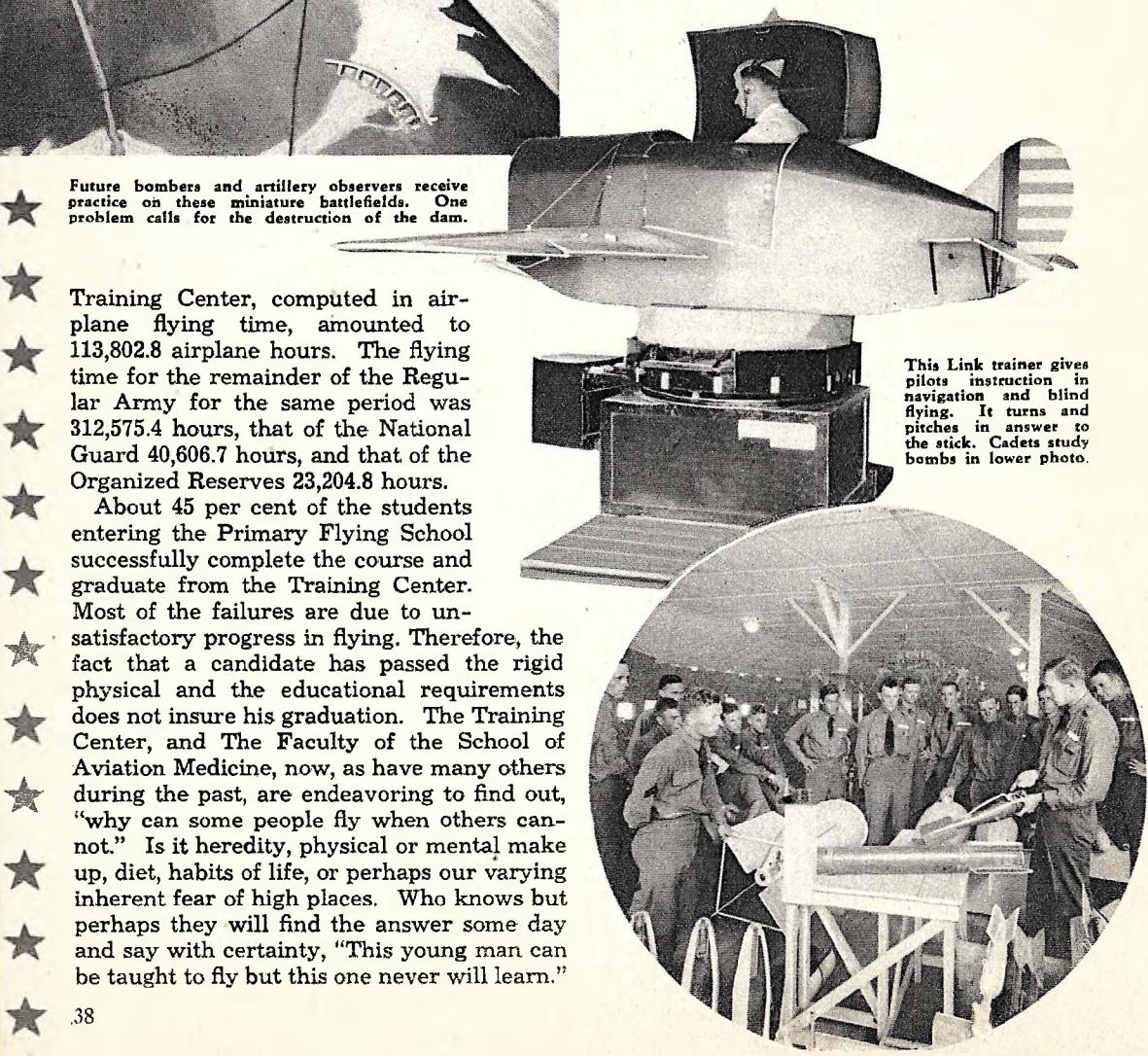


About 45 per cent of the students entering the Primary Flying School successfully complete the course and graduate from the Training Center. Most of the failures are due to unsatisfactory progress in flying. Therefore, the fact that a candidate has passed the rigid physical and the educational requirements does not insure his graduation. The Training Center, and The Faculty of the School of Aviation Medicine, now, as have many others during the past, are endeavoring to find out, "why can some people fly when others cannot." Is it heredity, physical or mental make up, diet, habits of life, or perhaps our varying inherent fear of high places. Who knows but perhaps they will find the answer some day and say with certainty, "This young man can be taught to fly but this one never will learn."



The Flying Cadets are all young, unmarried citizens, between the ages of 20 and 27, inclusive, of good character, sound physique, and who have had at least two years of college work. If lacking the required educational credentials, they must demonstrate their proficiency by successfully passing examinations in United States history, English, general history, geography, higher algebra, geometry, trigonometry, and physics. The educational equation is simplified for many of these aspirants by their possession of diplomas and degrees from the country's many colleges and universities.

Professionally, these trainees are from all walks of life. Geographically, all states in the



This Link trainer gives pilots instruction in navigation and blind flying. It turns and pitches in answer to the stick. Cadets study bombs in lower photo.

MINIATURE BATTLEFIELDS

United States are represented, with occasional applicants from our various foreign possessions. Students from foreign countries are frequently included in the student officer classification. However, regardless of their former occupations, or their native country, all are trained alike—all live in accordance with the same rules and regulations.

During the interval embraced by the dates of October 15, 1931, and March 1,

Every army flier must know something about aerial photography. A class is shown studying the various cameras used in map making.



Air Corps Photos
Future airmen relax with checkers and magazines after a busy day with planes, bombs, cameras and difficult formations.



Both wearing parachutes, an instructor prepares to take a student aloft for his first instruction at the "West Point of the Air."

When compared with similar statistics for training during the war period or with the peace time records of the schools of the armies of other nations, this small proportion is a monumental tribute to the efficiency of the Air Corps training method.

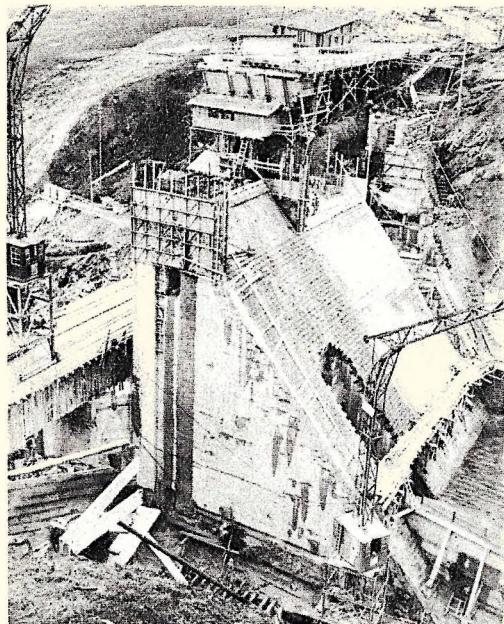
What of the future of the trainee? This answer can be made: Practically all who finish at the Primary Flying School graduate four months later from the Advanced Flying School and following that, the Americans are assigned to Air Corps stations for duty with tactical troops. The Flying Cadet continues in grade for an additional year for seasoning and experience. This is followed by a year, or perhaps two, of active duty as a second lieutenant in the Air Corps Reserve. Upon completion of this period he reverts to his former civilian status, but he may maintain active contact with the service through membership in the National Guard or Organized Reserves. A civilian with this wealth of flying experience behind him, is in a favorable position to seek employment with a commercial aviation company. Then, too, there is the recent possibility

[Continued on page 132]

1935, a total of 2,022 would-be pilots have reported to the Air Corps Primary Flying School. During that period there were 20 foreign students who came from countries as follows: 7 from Mexico, 2 Brazil, 2 Philippines, 3 China, 2 Turkey, and 1 each from Germany, Guatemala, Cuba and Colombia.

Of the 2,000 cadets who enrolled only five have been killed. This figure deserves especial consideration as it represents the infinitesimal percentage of less than one-half of one per cent of the total number graduated.

Swiss Run Sihl River Through Mountain For Power Dam

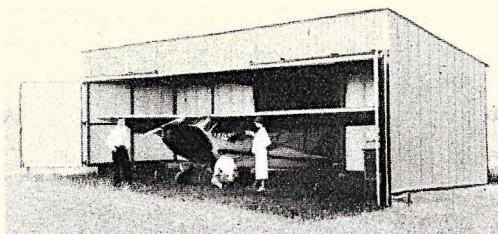


This dam will store the waters of the Sihl River, Switzerland, after the water has been brought under a mountain in a tunnel two miles long which sinks to a 670 foot depth.

Small Plane Hangar Easily Erected

A SMALL steel hangar that can be erected by two men in a few hours time has been placed upon the market. The frame is of wood and steel while the sides, doors and roof covering are made of galvanized iron. Made up of bolted construction it is an easy matter to take down the hangar in the event that the airplane owner should desire a change of location for any reason.

It is claimed that the new type hangars will aid the sales of small aircraft to individual private owners by making a low monthly rental charge possible.



Easily transported and capable of being assembled by two men in a few hours time, this low cost metal hangar will provide ample storage space for the average small airplane.

GOETHE, the famous German poet, predicted in the year 1797, that the course of the Sihl River, in Switzerland, would be changed. Today, 140 years later, his vision becomes a reality as engineers prepare to send the river through the mountain near Etzel to create a power plant dam.

High pressure pipes in a tunnel two miles long will carry the stream. The tunnel bores 670 feet under the highest point of the mountain. At the tunnel's end, a dam is being built to form the site of a lake over which a bridge is being placed in anticipation of the day when water will rush through the mountain to make the lake.

Wooden Safe Passes Rigid Fire Test



Exposure to fire for a period of one hour failed to damage the contents of this inexpensive safe made of Douglas fir lumber. The wooden safe is of airtight construction.

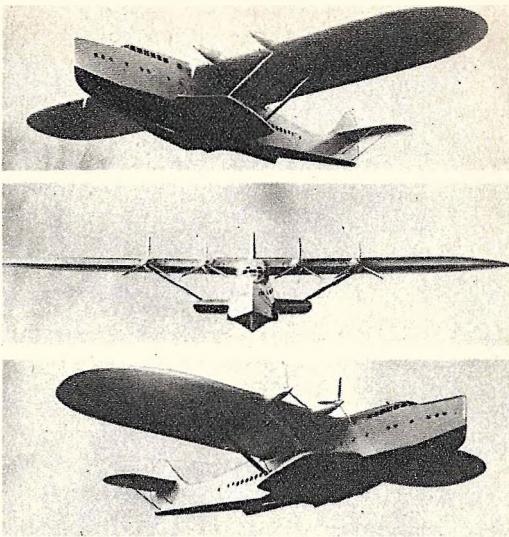
A WOODEN safe that will undergo fire all around it for at least one hour without harm to its contents has been constructed by Prof. T. J. Starker, of Oregon State College. It is made of two-inch thick Douglas fir lumber, is airtight, tongue grooved, and has door edges rabbeted like those found on steel safes.

Super-Flying Boat Powered With Eight 800 H.P. Motors

EIGHT Diesel motors of 800 horsepower each will furnish the tremendous power necessary to launch the new German super-flying boat, DO 20, now under construction at the Dornier Airplane Works at Friedrichshafen.

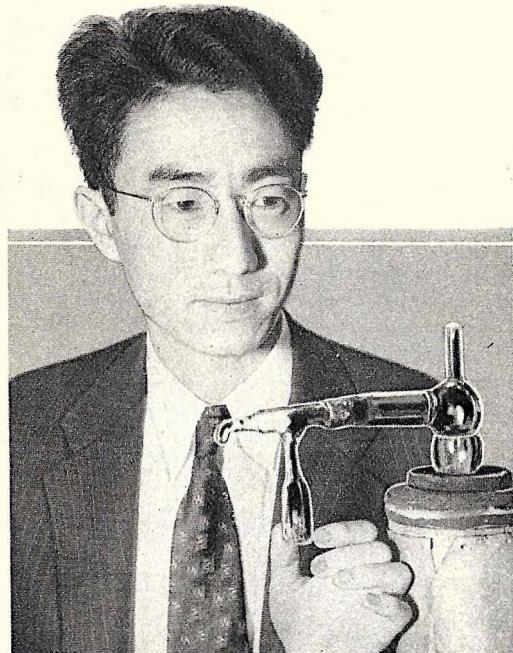
The new airplane, to be one of the largest of its type in the world, will have a cruising speed in excess of 200 miles per hour. No pontoons will be used to support the wings in landing, all shock being absorbed by stabilizing floats attached to each side of the hull.

It is being built purely for commercial purposes, with extra-large passenger and freight compartments.



Three views of a model of the DO 20, German super-flying boat now under construction at Friedrichshafen. It will be powered by eight 800-h. p. Diesel motors mounted in wings.

Student Makes Smallest Radio Tube



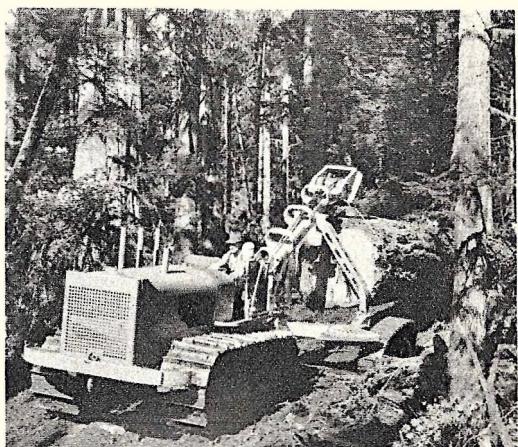
Chao-Ying Meng, Chinese research fellow of the Rockefeller Foundation is shown with the world's smallest radio tube which he built. It generates the world's shortest wave length.

THE smallest radio tube ever made proved successful in producing the shortest wave length yet to be reached. The tiny tube, with a plate diameter of but 2 mm. was built by Chao-Ying Meng, Chinese research student at the California Institute of Technology. The shortest wave length generated is about one centimeter. A retarding field method is used.

Tractor Fires Fuel Oil With Spark

DIESEL fuel, injected under pressure and ignited with a spark is the secret behind the economical, powerful performance of the new Allis-Chalmers general utility tractor. A Diesel pump is used in injecting the fuel oil, after gasoline has been used in starting.

The new tractor has six speeds forward, ranging from 2 miles to 6½ miles per hour. It develops 79 drawbar horsepower, although its weight is but 23,000 pounds. Spark ignition permits a low-compression type engine, making for greater economy of operation.



This new tractor, delivering 79 drawbar horsepower, burns Diesel fuel injected with a Diesel pump and spark ignited. It has a low compression type motor, started with gasoline.

Science Vies

SCIENCE vies with sport this summer at the Olympic Games in Berlin. The host nation is taking advantage of the ancient games to display Germany's advances to competitors and visitors from all parts of the world.

A \$900,000 television system, 14 trucks carrying transmitting equipment to various sports centers, will bring visual broadcasts of the events to that portion of the 500,000 visitors unable to crowd into the array of new sports field about Berlin. It will be the first visual screening of the great open air sports event.

Berlin has not only constructed the great Reich Sports Field five miles from the heart of the city but has rebuilt much of the German capital in preparation for contests in which nearly 5,000 men and women will compete under the colors of 52 nations.

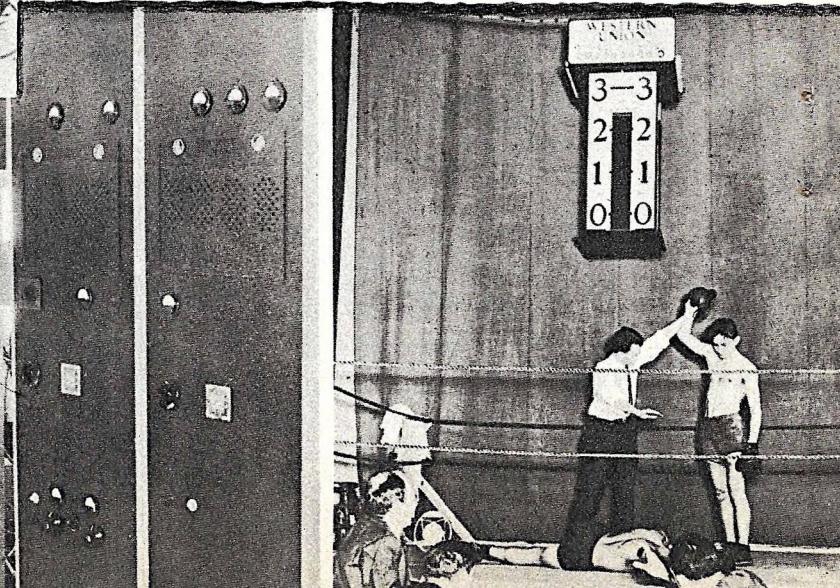
A 24-acre assembly field, scene of the opening ceremony, has been provided to accommodate 400,000 spectators and contestants. At one side is the Fuehrerturm, the 200-foot Leader's Tower, from which the Olympic bell rings. The bell, made especially for the games, is 16 feet high and weighs 10 tons.

The stadium proper is only slightly smaller than that at Los Angeles and will accommodate between 100,000 and 125,000 persons. Elevators have been installed to the upper tiers. An underground radio station will have connections with 30 stations

Berlin's newest television station is shown at the lower left. The film projector and picture scanner is in the rear. A new electric timing device for Olympic boxing preliminaries is shown at the right below. It registers the three-minute rounds, sounds the bell 10 seconds prior to the start of each round and counts the seconds when a boxer is floored. In the latter case, a mechanical speaker also gives a verbal count.

German Railroads Photo

The main entrance to the Olympic Stadium, reached from the city via Adolf Hitler Place, is pictured above. Glenn Cunningham, one of America's hopes in the events, is shown at the right. A portable German wirephoto transmitter is shown below.



With Sport at Olympics

and networks in all parts of the world. A staff of 400 engineers has been employed.

Contestants live in the Olympic Village, nine miles from the field and a city itself. A swamp was drained to provide the site. It contains a bank, a post office, and scores of one-story stone houses, each named for a German city and containing 10 or 12 double rooms for athletes.

Preparations for the field gave employment to 1,000 workers and additional thousands labored on improvements rushed to completion elsewhere in Berlin for the event. These included a new crosstown subway with a special station for the games. A special railroad station was built and the city studded with information booths.

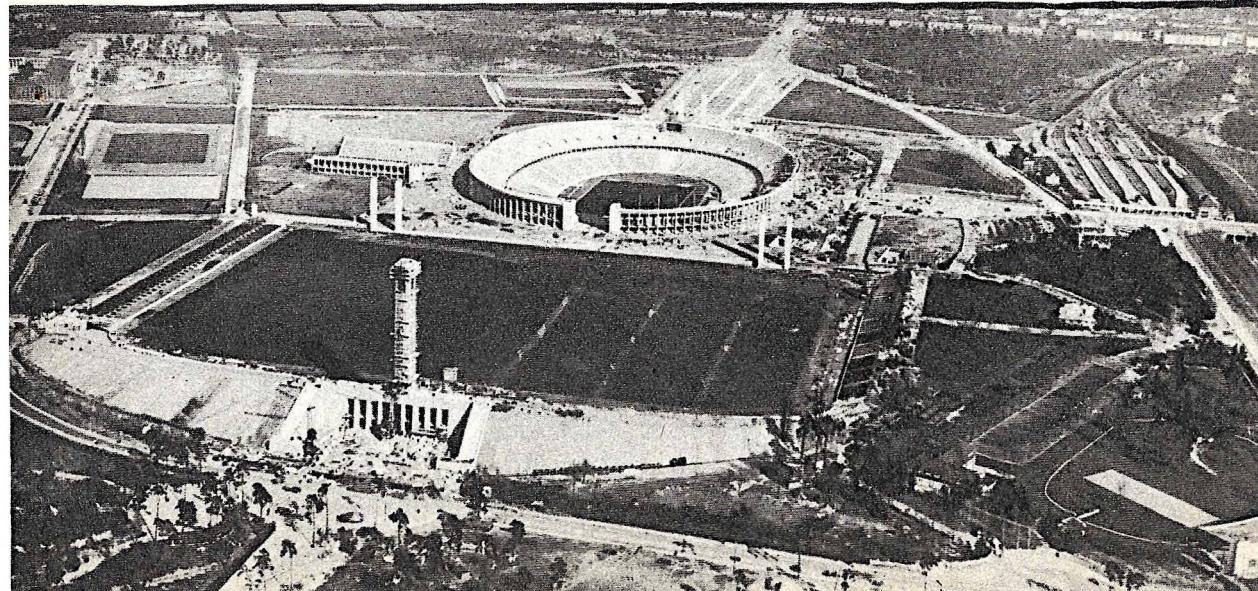
The sports area with the auxiliary swimming stadium, open air Greek Theater and other features, occupies 225 acres on the edge of the Gruenewald at the western side of the city. Parking space is provided for 10,000 automobiles in a single field.

Germany leads in the number of contestants with a team of 448. The United States is second with an aggregation of 395. Japan which hopes to hold the 1940 Games is represented by a total of 337 athletes, trainers and officials. The team is the largest ever entered by the nation in international competition.

Several new hotels have been built and many old ones rebuilt to provide 100,000 additional beds for visitors. Unlike the Los Angeles Olympic quarters of 1932, those in Berlin are of permanent construction.

A general aerial view of the Olympic Stadium and fields is shown below. The 10-ton bell, pictured at top right, hangs in the tower in the foreground. There are tunnel entrances to the great Sports Field adjoining and to the stadium in the background. The Olympic station of the German Railroads can be seen at the right. German girl gymnasts are shown above.

German Railroads Photo



Radio Tower Built Of Wood Improves Program Reception

AMERICA'S first wooden radio tower, 326 feet high, has been built for Larus and Brother, Inc., of Richmond, Va., manufacturers of Edgeworth Tobacco and owners of station WRVA.

Wood, being a non-conductor of electricity, has long been recognized as the ideal transmission tower material, but the number of braces and cross-braces necessary for a high tower has made such construction impractical. The WRVA tower, however, uses a new type of wood connector developed in Germany to eliminate most of the cumbersome cross-braces required for standard construction. These connectors consist of metal rings, saw-toothed on each edge, which are slipped between adjoining timbers to form a joint which bites into both surfaces with an iron grip.

The antenna is suspended vertically between the three legs of the tower, creating the effect of a single wire antenna standing erect in free space. Fading is thereby reduced at all distances, and entirely eliminated in certain zones.

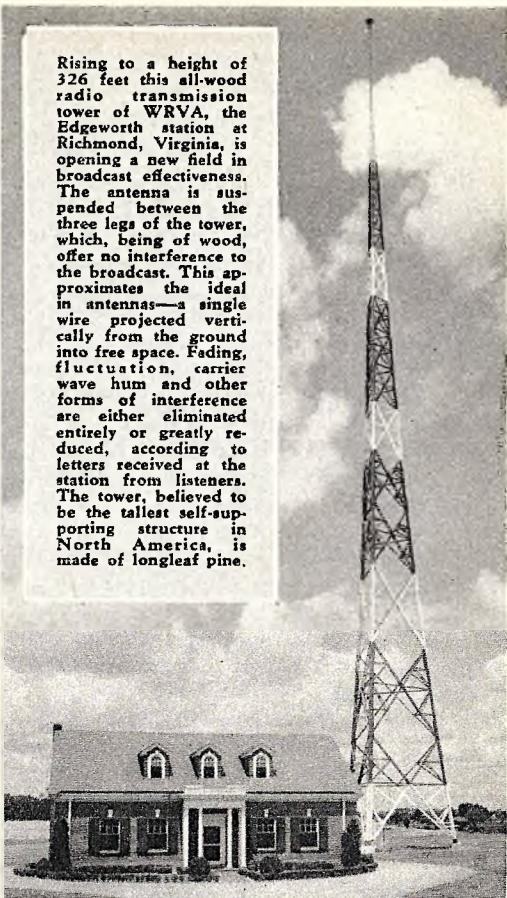
The tripod style of construction, offering only three surfaces to the wind instead of four, insures greater resistance to violent storms. Each foot rests upon a 36½-ton block of concrete imbedded nine feet below the surface of the ground.

Another big factor in the use of a wood tower is the controllability of current distribution in the wire antenna, permitting loading coils and condensers to be placed at any point where they will be most effective. Changes of frequency can be made easily should such a step become necessary.

There is no power loss through absorption of current as is experienced with a metal tower. Neither are there guy wires to further contribute to the loss. The result is practically a circle coverage, all receiving sets in the same radius from the tower receiving the same volume. This means a reduced load for the station, as the power does not have to be stepped up to overcome losses. Dead spots in the station's primary area are eliminated.

Field test show that the new antenna has increased the area served by the station by 400 per cent, while thousands of letters from listeners attest to reception improvement. WRVA operates on a frequency of 1,110 kilocycles.

Rising to a height of 326 feet this all-wood radio transmission tower of WRVA, the Edgeworth station at Richmond, Virginia, is opening a new field in broadcast effectiveness. The antenna is suspended between the three legs of the tower, which, being of wood, offer no interference to the broadcast. This approximates the ideal in antennas—a single wire projected vertically from the ground into free space. Fading, fluctuation, carrier wave hum and other forms of interference are either eliminated entirely or greatly reduced, according to letters received at the station from listeners. The tower, believed to be the tallest self-supporting structure in North America, is made of longleaf pine.



Putting Machine Improves Stroke

A RECENT invention designed to improve a golfer's putting ability will be placed on the market in the near future. The device consists of two track in which run three rubber tired wheels that support the golf club. After lining up the machine about five feet from the cup, the ball is placed on the bridge, and the golfer makes his regular putting movement. The rails serve to guide his stroke in the correct arc until it becomes a habit.



This new putting machine guides the golfer's stroke in the correct channel until it becomes a habit.

13-Ton Army Tanks Crush Obstacles At 70 Miles Per Hour

TANKS, built like forts, equipped like battleships, and as fast as automobiles, are the latest addition to the United States Army. The steel monsters weigh 13 tons and have a top speed of 70 miles per hour when stripped of the caterpillar treads.

Before being accepted by the army the tanks were subjected to rigid tests in sand pits, mud lakes, dense underbrush and steep hills. In all they proved themselves the most efficient fighting machines yet developed.

Equipment consists of one 37 m.m. gun, four 30 caliber machine guns, and a radio for contacting headquarters. Quarters are furnished for a crew of four, with plenty of room left over for ammunition lockers and a fuel supply sufficient for a cruising radius of 200 miles. In rough going caterpillar treads are used, reducing the speed to approximately 30 miles per hour.

Wind Marker Flush With Runway



Set flush with the runway, this neon lighted wind indicator reduces night flying hazards. As shown on this working model, when the weather vane atop the hangar turns with the wind, contacts light up the corresponding arrow in the runway. Pilots can sight the indicator through a pea soup fog.

A NEON lighted wind indicator, designed to eliminate night landing hazards at airports, has been perfected by Albert de Weerd of Roosevelt, New York. Contact points on a remote weather vane serve to illuminate the arrows of the giant indicator according to the wind changes. The red light of the neon tubes penetrates fog, giving high visibility. Because the indicator is set flush with the flying field, the tubes being protected by heavy glass, the pilot can land directly upon it, saving hazardous guess work.



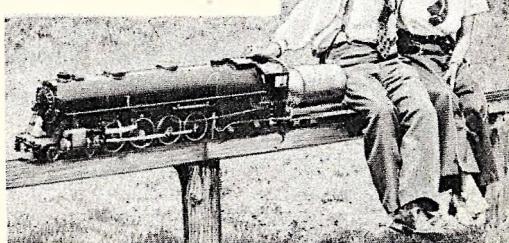
Top—The latest in Uncle Sam's fighting machinery. This tank, carrying four machine guns, one 37 m.m. gun and crew of four, has a top speed of 70 m.p.h. without caterpillar treads. Below—Plowing through a sand pit at 30 m.p.h.

Model Locomotive Wins Honors

AN EXACT scale model of a Timkin locomotive, built by C. F. Robbins of Keene, N. H., proved the fastest model entered in the National Steam Model Meet held recently at Oxford, Maine. Model locomotives from all over the country were entered in the meet.

Even the steam plant of Robbins' model functions as does the giant engine from which it was patterned. Soft coal is used for fuel to power the eight drive wheels. It hauled two passengers around the thousand-foot track with ease.

C. F. Robbins demonstrates his scale model of a Timkin locomotive at the National Steam Model meet. His model proved to be the fastest one at the meet. It burns coal.





Gar Wood and Orlin Johnson, his mechanic, wear the smile of victory after setting a new world's speed boat record of 110.785 m. p. h. in 1932. Left—Gar Wood and his pet Great Dane, "Bjoerne."

By
Gar Wood

as told
to PAUL WEBER

When water becomes as hard as marble, and waves rip vanadium steel bolts from the hull as though they were copper rivets—that's speed! America's premier boat racer takes you into the cockpit of Miss America X and shows you what it is like in this article.

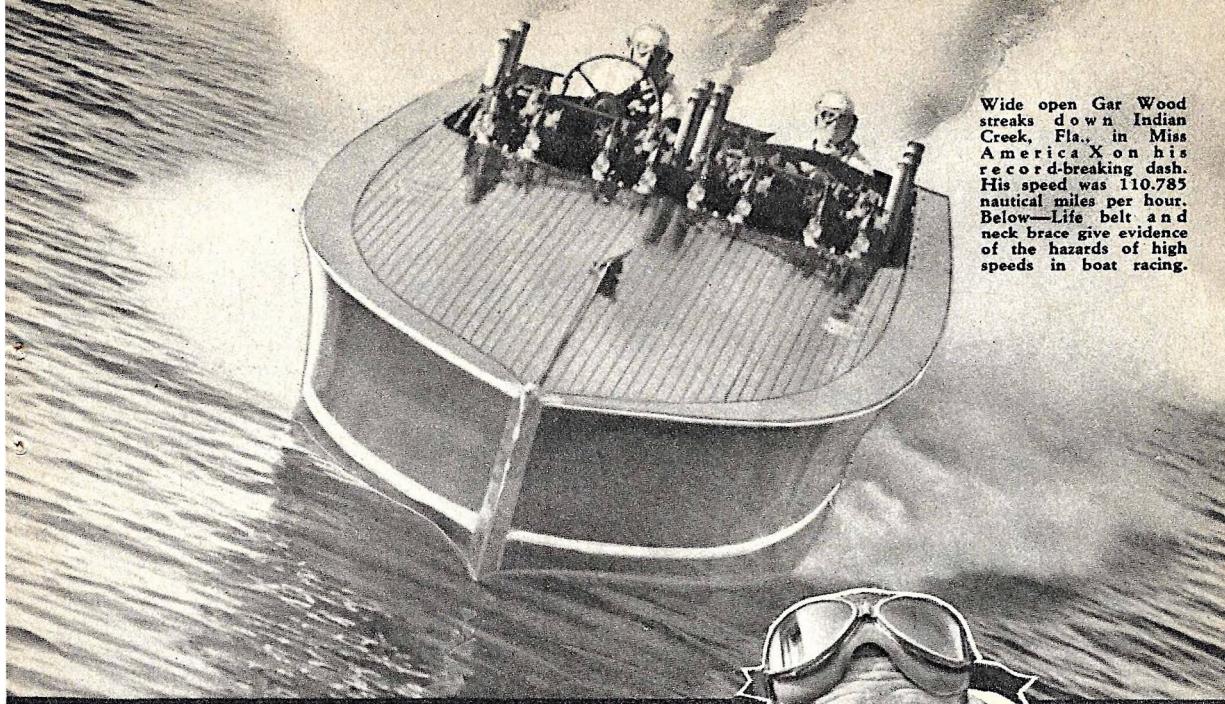
Making Go

Sixteen years ago at Cowes, England, Miss America brought to the United States the Harmsworth Trophy. In itself, this small bronze plaque is worth little. But, as the historical symbol of world motorboat racing championship, it is priceless. Millions have been spent in efforts to take the trophy out of the United States. It has cost me a king's ransom to defend it. But, thanks to luck and American engineering skill, I have been able to defend it successfully. Since the victory at Cowes, it has reposed without interruption in its place of honor at the Detroit Yacht Club. It does not belong to the Yacht Club, nor to me. It belongs—for a time, at least—to America.

These 26 years of experiment and struggle, have been a great adventure. I look backward with pleasure. But looking backward does not suffice; I am required also to look forward. Just how long I expect to be able to continue holding water speed honors in the United States is a question that I am often

FOR a quarter of a century it has been my pleasure and pride to act as America's self-appointed champion in the rivalry among nations for speed supremacy on water.

I have been privileged to travel faster in an American-made boat, powered by American-built motors, than man has ever traveled on water before. Twenty-six years ago, I set my first world speedboat record, at the dizzy pace of 30 miles per hour. Today, my Miss America X holds the world record of 124.91 statute miles per hour.



Wide open Gar Wood streaks down Indian Creek, Fla., in Miss America X on his record-breaking dash. His speed was 110.785 nautical miles per hour. Below—Life belt and neck brace give evidence of the hazards of high speeds in boat racing.

Boats FASTER

asked. Is the practical limit of speed on water approaching? Is it possible to go on indefinitely adding miles to that mark of 124.91 M. P. H.?

I should like to be able to make some satisfying reply to these questions. But I have no idea what the "practical limit" of water speed may be, if, indeed, there is such a thing. I feel sure that 150 M.-P. H. is well within the possibilities of boats of present basic design. How far beyond that we can go without some radical change, particularly in power plants, it is not within my power to prophesy.

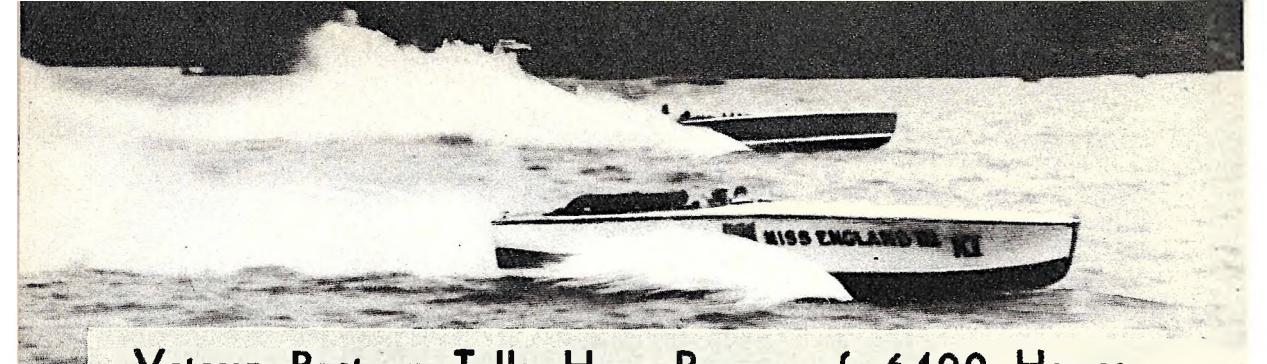
One thing definite is that the battle for speed honors has become a battle for more power in motors. Give me a 3,500-horsepower motor and the world will see a "new deal" in speed on water. But you could not buy such a motor in America today for its weight in government bonds.

A 3,500-horsepower motor is not an impossibility. However, before we go into the

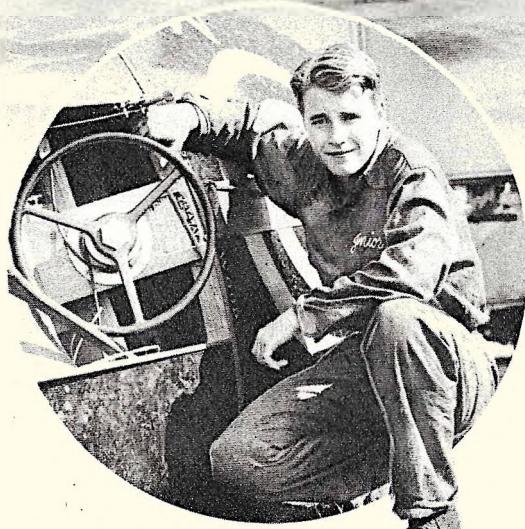


reasons why such motors are not made in this country, let us consider the two things that produce speed in a boat like the Miss America X. These two factors are power and planing ability.

Boats of the Miss America type are known as hydroplanes, which means "water planes." The hydroplane does not plow through the



Veteran Boatman Tells How Power of 6400 Horses



In his father's footsteps. Gar Wood, Jr., poses for cameramen after setting two records in Class A and C events at the National Motor Boat Sweepstakes.

water like an ocean liner or a pleasure yacht. It skims over the surface when going at high speed, and the hull rides almost entirely out of the water. This "planing" is caused by the lifting power of the plane surfaces which make up the bottom of the boat's hull. It is extremely important that these planing surfaces are set at the proper angle in relation to each other to bring about the proper lift. On the Miss Americas we have always used only two planing surfaces. On their relative positions depends her maneuverability, speed and, in fact, her actual existence.

The sharp break in a hydroplane's hull where the forward planing surface ends and the aft planing surface begins, is called the "step." The forces effective on the planing surface ahead of the step are unbelievable. The planks on the bottom of Miss America X are bolted to the hull timbers with bolts of vanadium steel, heat treated for the utmost strength. Yet we sometimes find them

Miss America Tenth, in the background, pulls up to pass Miss England III in the Harmsworth Trophy race. Gar Wood piloted Miss America, and Kaye Don piloted Miss England. Wood won.

wrenched loose, as though the water had gigantic fingers.

When Sir Henry Seagrave, of heroic memory, was killed at Lake Windermere in England, in 1930, it was stated that his Miss England hit a floating log. In my opinion, what really happened, was this: Sir Henry was experimenting with the location of his "step," to make his boat plane properly. He had not been able to figure it out mathematically or from experience. So he fastened a makeshift temporary "step" on the bottom of his boat, with the idea of changing its position to suit conditions.

He was wrong. It proved not strong enough. The water's pressure tore part of the "step" out of the Miss England. The boat overturned and Sir Henry was crushed to death. He was a great sportsman and a hardy competitor. His death was a tremendous loss to England and the whole world of sport.

Through continued experiments and the construction of the successive Miss Americas, we have assembled a treasury of information about what takes place in that small area—hardly larger than a kitchen table top—where the speeding hydroplane rests on the water. We feel that American engineers now know at least as much about this factor in building super-speed boats as any other engineers in the world. Although there is much still to be learned in this field, boat design has ceased, at least for the present, to be our major problem.

The second factor in the make-up of a

A crucial moment in the Harmsworth Trophy race of 1932. Kaye Don in Miss England has stolen the lead from Gae Wood, the "Silver Fox of Boating" and is heading for victory. A moment later he ran into motor trouble and Wood coasted in to an easy triumph. The race was held at the Detroit Yacht Club.



Pushed MISS AMERICA X To New World Record

hydroplane is power. And that's something else. The engines installed in the Miss America X are four Packard V-twelves, the most powerful gasoline motors in the United States. They are direct descendants of the famous Liberty engine. This motor was designed and developed by Col. Vincent, of Packard Motor Company, and Mr. Hall, of the Hall-Scott Company, and their associates, for American airplanes during the world war. Fundamentally it was as good a motor as had ever been built, and it is still practically as good a motor as can be obtained in the United States today, power for weight, for marine purposes. Of course these Liberties haven't sufficient power for super-speed boats, although they were used in the first five Miss Americas.

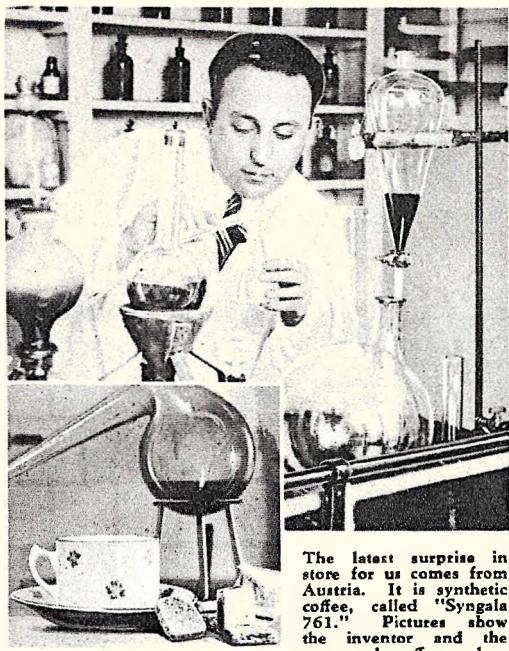
The Packards in the Miss America X originally generated 725 horsepower each. By applying superchargers and various experiments, we have stepped them up to 1,900 h. p. each. This illustrates the possibility of increasing power by persistent effort, and it sounds like a tremendous lot of horsepower. But let's see what sort of power Harmsworth challengers bring against us. When Lord Wakefield sent Kaye Don over to drive his Miss England III in 1932, the Miss England

Gar Wood is now searching for the 3500 horsepower motor, light enough for a speed boat. He is convinced that speed boat supremacy rests not in boats and men, but super-motors.

carried two Rolls Royce motors capable of developing nearly 2,500 h. p. each—a total of 5,000 h. p. against the 3,000 we could develop with two Packards in Miss America IX.

To be sure of enough power to drive the Miss America X to victory we decided to use four motors against Don's two, regardless of additional weight. In other words, pounds for horsepower, the British challenger was far better equipped than we were. Miss America X's weight was approximately ten

[Continued on page 135]



The latest surprise in store for us comes from Austria. It is synthetic coffee, called "Syngala 761." Pictures show the inventor and the processed coffee cubes.

Austrian Chemist Makes Synthetic Coffee

THE accidental triumph of an Austrian bio-chemist, Magister S. Rosenzweig, has resulted in synthetic coffee. Last summer the fruit produced by the grafted bushes on Rosenzweig's Viennese farm was found to have the aroma and taste of Brazilian coffee, and an additional nutritive value, hitherto unknown in the tropical coffee plant.

The bio-chemist calls it "Syngala 761." Its base consists of dried fruits, seeds and roots. The dried extract is mixed with sugar and compressed into cubes, each cube making a cup of coffee. The cube is porous and easily crushed by the spoon. When hot water or milk is added, the powder dissolves without a trace of sediment. The caffeine content is controlled to the wanted amount.

50,000 Watts In Giant Light Bulb

ELECTRIC light bulbs come in all shapes and sizes, but never before has there been one so big as the giant bulb now on display at the California-Pacific International Exposition in San Diego. It is the world's largest and weighs 70 pounds.

But soon it will be removed and put on the job for which it was made—airport flood lighting. The bulb has a capacity of 50,000 watts and will burn steadily for 120 hours. It required a month to make and cost \$600.



Miss June Bishop is holding the world's largest electric light bulb in her lap. This is the six-hundred-dollar, 50,000 watt bulb which is to later light one of our airports.



Pointing like a rifle and having triggers, this portable light throws colored beams for signaling purposes at Logan Field, Baltimore, Md. It replaces the old flagging system.

Three Colors Form Airport Light

WHEN the spring floods came to Logan Field, Baltimore, Md., a portable traffic light was substituted for the old-fashioned flagging system. The light worked so well that it has been kept in continuous use ever since.

It is operated by revolver-like triggers, and the operator can snap on a powerful red, green or white beam. The red and green beams keep airplanes in the air until the field is cleared, the white beam signals "clear."

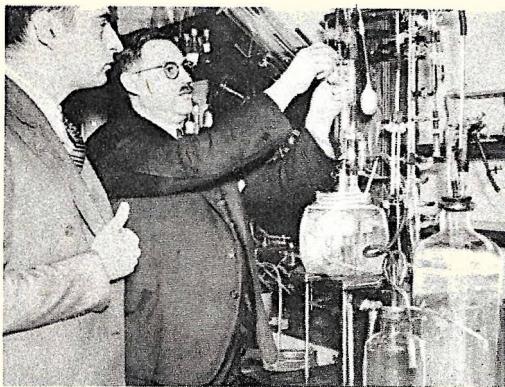
Trocadero Falls To Make Way For 1937 Exposition

HUNDREDS of buildings, many of them ancient landmarks, are being torn down in the heart of Paris to make way for the 150-acre International Exhibition of Art and Technique to open during 1937.

Among the first to fall was the famous Trocadero, built for the exhibition of 1878, and since used as a museum.

In planning this vast exhibition for the world's public, the French were inspired by the example of Chicago, Cleveland and Dallas. Aviation, the radio, television, movies, the victory over space and time, the harmonies of light and sound, the unity of matter and the movement of waves—all these wonders will be on display in the French capital next year.

Blood-Making Bottle Newest Robot

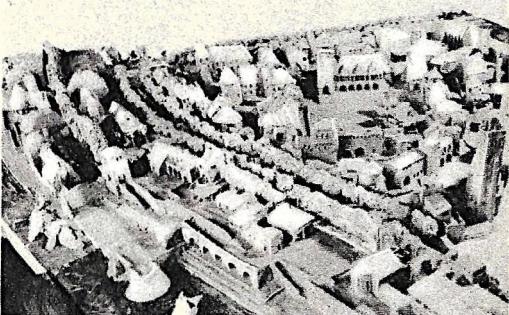
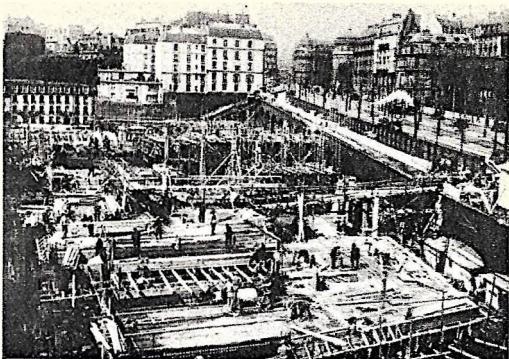


Dr. Edwin E. Osgood (right), and his co-inventor, Alfred N. Muscovitz, with the "blood-making" bottle in their laboratory at the University of Oregon Medical School, Eugene, Oregon.

OF INTENSE interest to the medical world is the new synthetic-life apparatus invented by Drs. Edwin C. Osgood and Alfred N. Muscovitz of the University of Oregon Medical School.

This device is a robot bottle in which one of life's most vital processes, the replenishing of the blood-cell supply by the bone marrow, may be reproduced artificially and viewed for the first time. The bottle will be used in testing serious blood diseases.

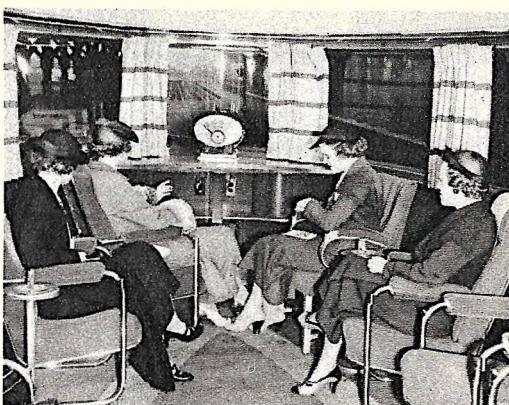
With this "blood-making" bottle and the Lindbergh "life-chamber" working for biological science, who knows but that we may soon have a complete glass robot, in which all the extirpated organs from the human body will live and function under observation.



The sum of the scientific knowledge of today is the aim of the 1937 Paris Exposition, where Science is to be on display. Above—Model of coming exposition and the first excavation.

Speedometer For Train Passengers

THE Boston and Maine Railroad recently installed a speedometer in the solarium of its crack, streamlined Flying Yankee, so that passengers might check their estimates against the actual speed of the train. If the passengers like the device, the B. & M. will install one in each of their de luxe day coaches on express trains. The speedometer was developed by the Waltham Watch Company.

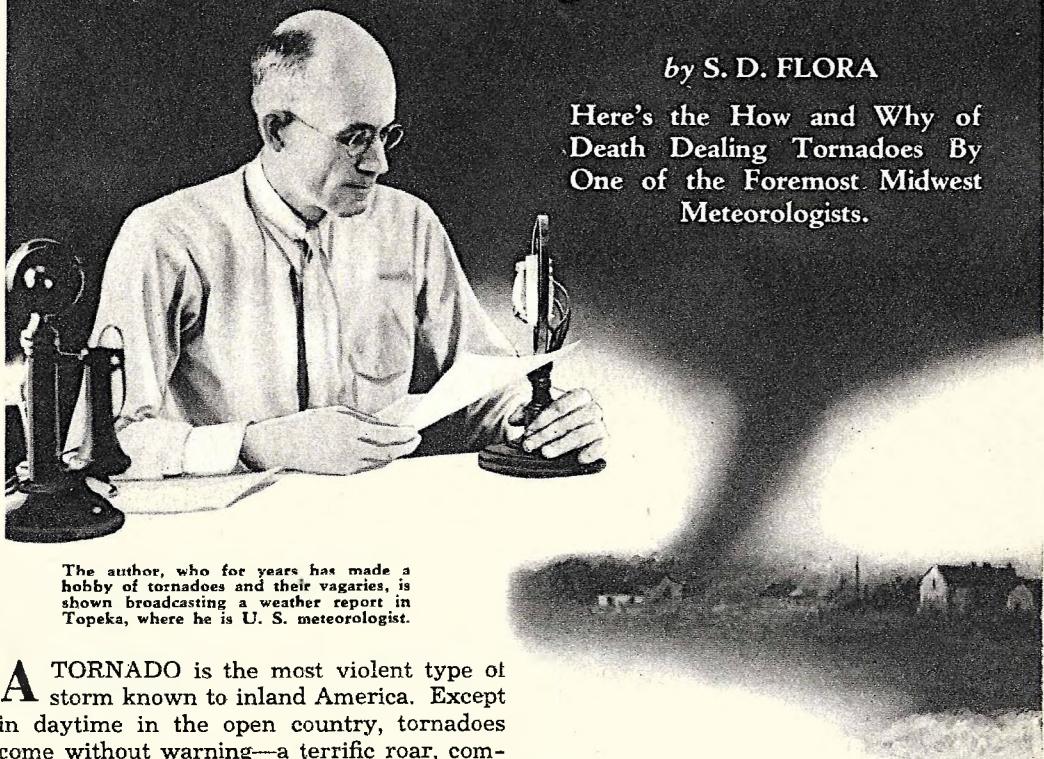


If the speedometer on one of the Boston & Maine Railroad's crack flyers works out satisfactorily and interests passengers, the company will install them on all their express trains.

Whirling Funnels

by S. D. FLORA

Here's the How and Why of
Death Dealing Tornadoes By
One of the Foremost Midwest
Meteorologists.



The author, who for years has made a hobby of tornadoes and their vagaries, is shown broadcasting a weather report in Topeka, where he is U. S. meteorologist.

A TORNADO is the most violent type of storm known to inland America. Except in daytime in the open country, tornadoes come without warning—a terrific roar, commonly described as resembling “a thousand freight trains,” often a weird whistling sound, and the crash of wreckage, and the storm moves on, leaving a trail of desolation and often death that seems incredible considering that the passage of the storm requires only a few seconds.

In the 20 years ending with 1935, Weather Bureau reports list 2,702 tornadoes, with a death list of 5,258 and a property loss in excess of \$225,000,000. The greater number of these storms occurred in the mid-western and southern states, though very few parts of the country have escaped.

In the open country of the plains states, tornadoes occurring in daylight hours can often be seen approaching, sometimes a quarter of an hour before they strike. There is a swift exodus of families into basements or storm caves. Experienced persons in these sections often seem to develop a knack for recognizing “cyclone weather,” and are alert to take refuge when threatening clouds loom up. This results in many unnecessary rushes to basements and caves, but it saves

Terror is the natural reaction when a storm of this kind appears. This tornado swept through the northern suburbs of Wichita, Kansas, on February 24, 1935, injuring six persons and causing \$10,000 damage. Two miles farther south, a great disaster would have resulted.

human life when a tornado really strikes. In large cities, with vision cut off by buildings and the warning roar of the storm muffled by city noises, there is seldom any notice of a tornado until buildings begin to crumble. Life then becomes a matter of chance.

A tornado, still miscalled a cyclone in spite of the educational efforts of the Weather Bureau, is caused under certain conditions by abnormally warm, moist air being overrun by colder air. The warm air, being lighter, is forced up through the colder, much as a cork is forced up in water, and its movement is governed by the same law of moving liquids that sets up the whirl in a draining bath tub, except that in the case of the tornado the movement is upwards.

The usual description by persons who have seen the start of a tornado is: “Two clouds

Spread Disaster



This splinter was driven deeply into the post during a small tornado in the suburbs of Topeka on June 3, 1927. E. C. Corkill, Weather Bureau official, is examining the splinter, which could not be removed without breaking.

seemed to come together." A violent whirl starts at the cloud level and bores its way down towards the earth's surface. When it reaches the ground

destruction begins and dust and dirt drawn up soon make the cloud a menacing black color, usually with much lightning and hail.

The speed of the whirling winds in a tornado has never been measured, but has been estimated at 300 to 500 miles per hour. The decreased pressure inside the whirl, similar in a way to the vortex in a draining bath tub, actually causes buildings to explode when the normal atmospheric pressure inside the walls is suddenly exerted against the lowered pressure outside as the tornado passes over.

Tornado clouds are generally spoken of as being funnel-shaped, but eye witnesses often describe them as resembling ropes dangling from the sky, as "snakes in the sky," or more commonly as resembling an elephant's trunk. The latter is a very apt description, as the cloud has a tendency to sway back and forth



Some of the damage is shown at the left after a tornado killed 203 persons and caused \$6,000,000 damage in and about Gainesville, Ga., last April 6. Inhabitants of Hartsner, Kans., dived into their caves so rapidly that the above twister passed without fatalities on June 2, 1929.

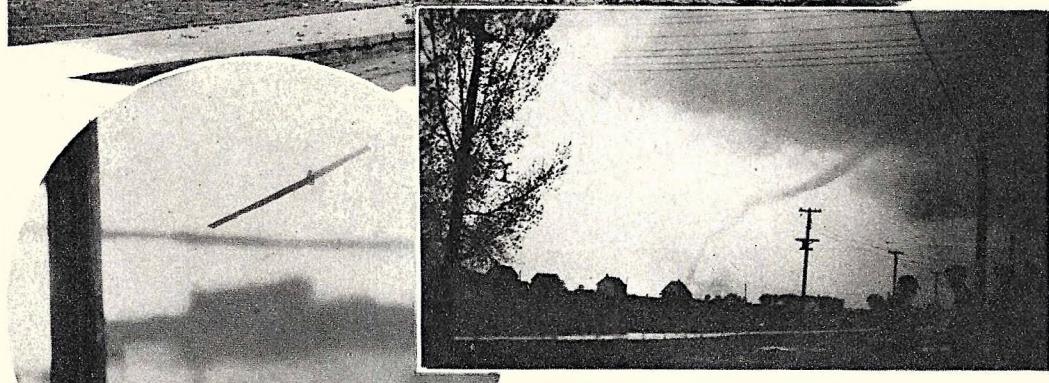
as it moves along its path. A collection of almost 200 views of tornado clouds in the Topeka Weather Bureau, probably the largest collection of its kind in the world, shows some that are inclined from the vertical until they are almost horizontal, some that seem to be bent into right angles, some that are larger at the bottom than at the top, and some that are huge vertical columns.

Tornadoes travel along their paths at what in these days is considered a moderate rate of speed—usually 30 to 40 miles per hour, and seldom more than 60 miles per hour. They can readily be out-run by a person in an automobile with an open road ahead. It is even possible to avoid them on foot, if they are seen in time, by running at right angles to their path, preferably towards the north

2702 Tornadoes Recorded in 20 Years



These are the ruins of the Trinity Episcopal Church at Yazoo City, Miss., after the tornado of April 30, 1933. There was loss of life and property damage in many parts of the South on that date.



A wooden splinter driven through a plate glass window at the Santa Fe store house in Wellington, Kans., during a tornado Nov. 18, 1934, is shown in the circle. The photograph above was made 75 miles southwest of Winnipeg, Canada, on May 23, 1933. Tornadoes have occurred in western Canada as well as almost every part of the United States.

or northwest, if a person is directly in line with their advance.

Straws are found driven into trees, timbers are driven through other timbers or trees, chickens are often stripped of their feathers, sometimes without serious damage otherwise, and miraculous escapes are reported along with a grawsome list of casualties.

In the Gainesville, Ga., tornado of last April 6, an automobile was thrown into a hole left by an uprooted tree. A tree was snapped off and then rammed down into the ground a short distance away and left standing upright. One house was lifted up eight feet, according to an occupant, let down again, then picked up and turned over. A freight car was found on its side, with the heavy wheels and truck nowhere in sight. A large hog was picked up somewhere in the suburbs and set down

on a public square without being injured.

In a Louisiana tornado a few years ago a rooster was carried several miles and set down in another flock of chickens. In the Great Bend, Kansas, tornado of November 10, 1915 an unmailed letter was carried 85 miles to the northeast; and empty flour sacks from a wrecked mill were scattered over an area miles distant from the storm. In another Kansas tornado a herd of cattle was struck and sailed through the air like birds.

In the great Murphysboro, Ill., tornado of May 18, 1925, a piece of house siding was blown entirely through a 2x6 timber, and the tongue of the siding cut a clean groove as it passed through.

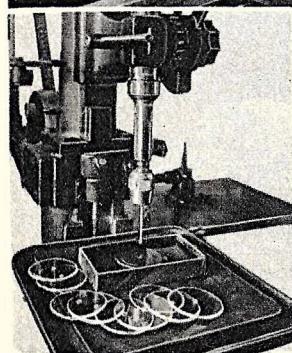
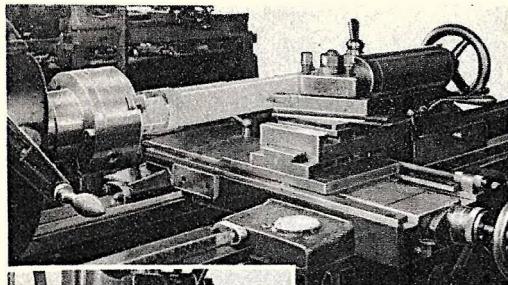
In a tornado at Wellington, Kansas, November 18, 1934, a wood splinter was driven through a large plate glass window in the Santa Fe Store House, cutting a clean hole without cracking the glass.

[Continued on page 144]

Brilliant New Comet Found By Young Garageman

IN THE northern skies has been found another comet, and credit for its discovery goes to Leslie A. Peltier, who works in a garage by day and studies the stars at night. He lives on a farm near Delphos, Ohio, where he has a home-made observatory. His 6-inch telescope was loaned him by Princeton University. To date Peltier has discovered five new comets, all of which have been named for him. As a reward for his good work, Peltier was made guest of honor by the American Association of Variable Star Observers at Harvard University and received the first merit award ever conferred by them.

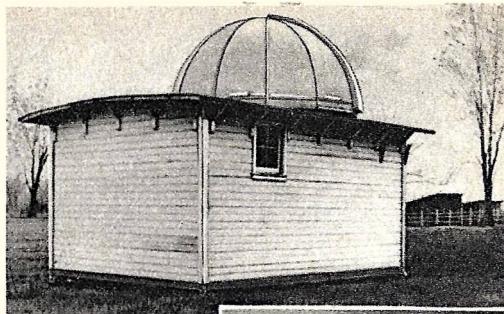
New Metal Turns Glass Like Wood



These pictures were taken at the recent "New Material" exhibit at the Deutsches Museum in Munich. The smaller picture shows the new widia tipped boring tool drilling holes in glass discs immersed in oil. The larger picture shows the tool turning a glass roll on a lathe.

SAID to be as hard as diamonds, widia, a new metal invented and developed in Germany, is used to make machine tools for working glass, porcelain and other of the heavy combinations known as "carbides."

Tools made with widia are used in ordinary machines and will work glass in every way that woodworking will work wood, such as planing, boring, mortising, turning—straight or tapered, beveling, producing curved surfaces, decorative designs and so forth. No matter how hard the product, it can be accurately finished to a thousandth of an inch.



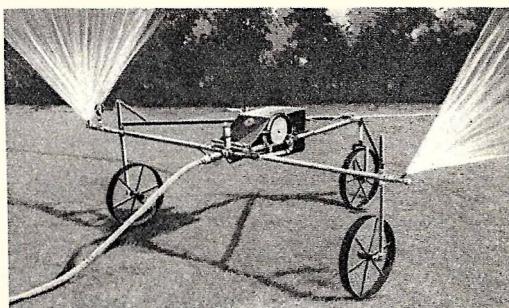
Above is shown the home-made observatory of Leslie Peltier, amateur astronomer and discoverer of five new comets. He is known as the world's greatest variable star observer. All of Peltier's knowledge was gained at home through reading and observation of the heavens. The comets he discovered were named in his honor.



Lawn Sprinkler Pulls Itself Along

ELLIMINATING the constant moving necessary to the ordinary types of lawn sprinklers, a Beverly Hills, Calif., irrigation equipment company features portable, automatic sprinkling machines.

Wire cable is wound around a drum mounted on the machine, one end of which is attached to a stake the desired distance across the lawn, with a sliding stop threaded on the wire and tightened. The sprinkler travels across the lawn until it reaches the stop, which trips a valve and shuts off the water. The rate of travel is about forty feet an hour. Distances of 200 to 400 feet can be covered at one setting.



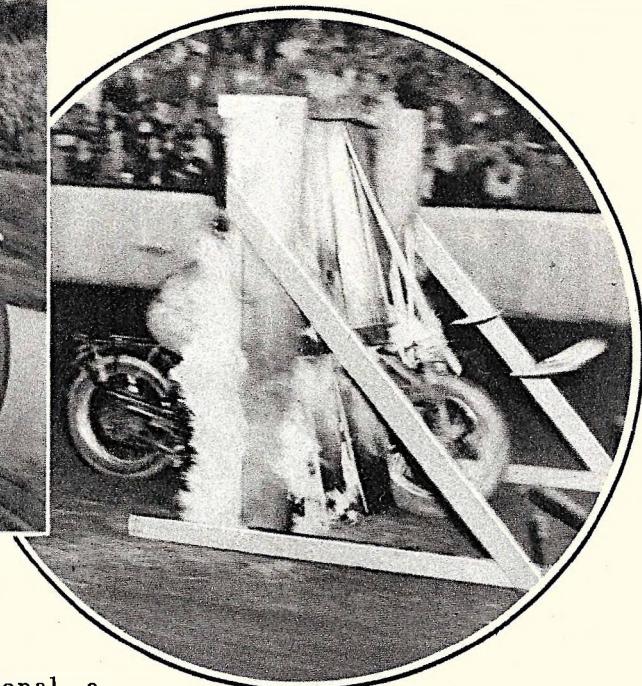
The portable traveling lawn sprinkler is a new development in automatic irrigation. It gives square watering and even coverage, and operates successfully on 35-pounds pressure.

STUNTING on a



It looks easy but it really isn't. This champion rider illustrates a riding pose which, difficult as it is in itself, is the basis for shooting balloons, juggling balls, riding backward and other antics.

F. LELAND ELAM
tells the inside story of professional stunt
motorcycling—riding the bronco bikes.



THRILLING, exciting, sensational—a three-word description of motorcycle stunt riding. Since the introduction of night lighted stadiums, oval track motorcycle racing is growing fast in popularity and with this breath-taking sport has come the rebirth of stunt riding.

Putt Mossman, Oakland, Calif., champion stunt rider is taking its popularity around the world. He is touring with a group of riders.

"Any person who is physically fit and can ride a motorcycle can learn to do stunts," explains Lawrence N. Weaver, prominent California stunt rider, and a member of the California Highway Patrol. "They must, however, have a perfect sense of balance to be able to carry on with stunts after they start them or an accident will result. They must have that sixth sense which automatically tells them just where to put their foot or which way to sway their body. They

San Francisco's Don Rodman, a super daredevil, claims that crashing The Wall of Death is only dangerous to those who haven't the feel of their wheel, who are nervous and careless.

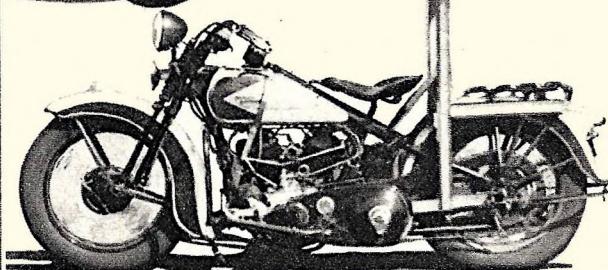
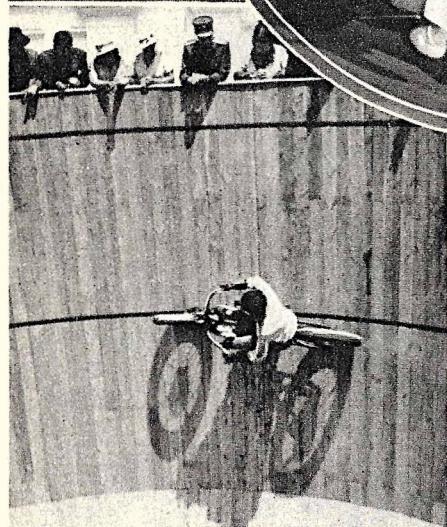
must be cool and not nervous, have no fear, and be confident.

"Partner stunting is the most difficult. They must have perfect confidence in each other. They must synchronize in their work.

"There are no set rules for doing certain stunts. Each rider must work out his own procedure as best suited to his own build and weight. All real stunting motorcycles are lower than stock machines although a stock machine can be used for many stunts. The safest stunting speed is from 30 to 35 miles an hour. There are many different stunts and only a few that are new. There is a future in motorcycle stunt riding for the persons who can meet the requirements."

MOTORCYCLE

Gene and Ruth, a pair of well-known stunters, are shown here in action at Lincoln, Neb., Ruth leans back over the front wheel while her partner balances on one foot in the saddle. George Sowopoulos, famed Greek performer, is shown below riding a Harley-Davidson in a wall exhibition at Athens.



Could you climb a ladder atop of a driverless motorcycle spinning along at a steady pace, as shown in the thrilling picture above? The stunt rider does it by climbing the ladder backwards, crossing the top; then descending the other side. But it's an indoor stunt. If there is any wind whatsoever, a bad spill is the inevitable result.

One of the most thrilling of motorcycle stunts is wall crashing, says Weaver. At night it is exceptionally spectacular. The requisites for this stunt are steady nerves, a sturdy and speedy machine.

The wall is six feet square. It is constructed of boards $\frac{3}{4}$ -inch thick and six inches wide, nailed on a frame of 2x4 foot boards with 4x4 foot posts at each side. The rider always picks the wall boards as they must be soft, fir being used mostly, free of knots, and straight of grain.

A piece of mosquito netting is tacked loosely on the side from which the crash is to be made. Excelsior is placed between the wall and netting. Coal oil is poured over it. Just before the rider starts on his 70-mile-an-hour ride the material is set afire. When

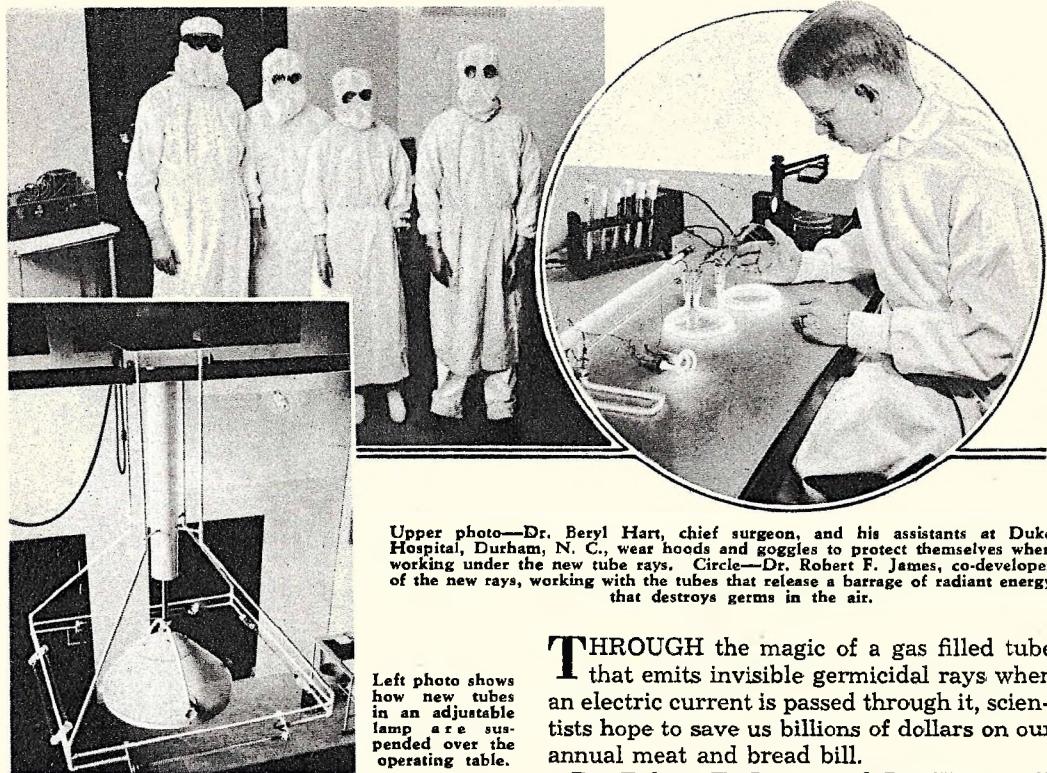
the wall is crashed the rider passes not only through a wall of wood but a wall of flame.

Metal hand guards and a metal helmet are the only protective measures taken by the rider. A horseshoe shaped frame of steel extending from the front wheel forks over the handlebars and down to the other side of the wheel is used sometimes instead of the plates on the handlebars.

It is necessary for a rider to take many positions on the cycle and he must have a feeling for the proper position for his feet so as to get the correct balance. Among these stunts are ones in which the rider stands on the seat. While this is no easy trick, it is made difficult by shooting balloons, playing a drum, juggling balls, and riding backward.

[Continued on page 127]

Bacteria-Killing Tube Sterilizes Air



Upper photo—Dr. Beryl Hart, chief surgeon, and his assistants at Duke Hospital, Durham, N. C., wear hoods and goggles to protect themselves when working under the new tube rays. Circle—Dr. Robert F. James, co-developer of the new rays, working with the tubes that release a barrage of radiant energy that destroys germs in the air.

Left photo shows how new tubes in an adjustable lamp are suspended over the operating table.

Plane Builder Wins Collier Trophy

DONALD WILLS DOUGLAS, airplane designer and manufacturer of the famous Douglas Sleeper Planes was awarded the 1936 Collier Trophy for the year's outstanding contribution to aviation. The award was based on the performance of the DC-2 a 14-passenger, twin engined all-metal monoplane with a speed of 185 m.p.h.



The 1936 Collier Trophy was won by Donald Douglas. He is shown receiving award from President Roosevelt. C. Horner, president of the National Aeronautic Association, is at left.

THROUGH the magic of a gas filled tube that emits invisible germicidal rays when an electric current is passed through it, scientists hope to save us billions of dollars on our annual meat and bread bill.

Dr. Robert F. James and Dr. Harvey C. Rentschler developed the tube in the research laboratories of the Westinghouse Lamp Co., after years of experimenting. The tube consists of a slender glass tube containing a special gas. When electricity passes through the gas it emits rays that will kill the micro-organisms associated with food spoilage in packing plants and warehouses.

Aside from its commercial possibilities, the new ray is being used in the medical field as the energy rays emitted by the new tube have been found to kill air-borne bacteria in a few seconds thereby offering a solution to the long baffling problem of contaminated air in hospital rooms. In operating rooms it has been found that the new ray will effectively protect the operator and assistants from contamination and minimize danger for the patient.

Tests have shown that post-operative fevers of patients who were operated upon under the radiations of the new tube have been markedly lower and their convalescence more rapid. A transformer using less power than is consumed by a 25-watt lamp will operate tubes.

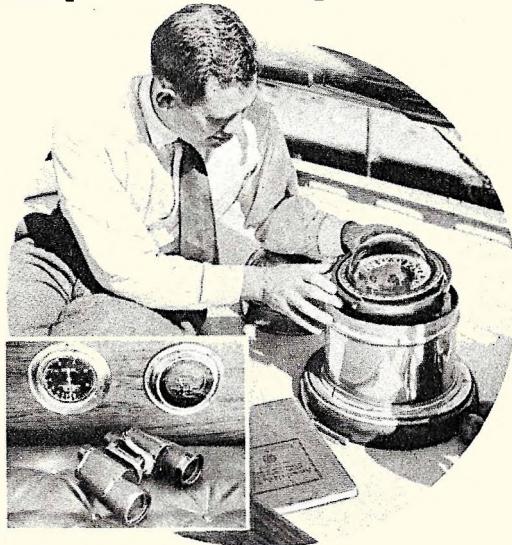
Caterpillar Hordes Invade Forests And Homes

CRAWLING in massed millions over an area of 8,000 square miles in Northern Ontario, tent caterpillars have stripped forests of foliage, stopped trains and destroyed crops. The squirming scourge has even invaded schools, homes and stores in its relentless advance.

Dr. F. C. Craighead, of the bureau of entomology and plant quarantine, U. S. Department of Agriculture says that the caterpillars are to be less feared in this country than the plague of grasshoppers which has become a serious menace in Oklahoma, Kansas, Montana, and a few counties in northwestern Illinois.

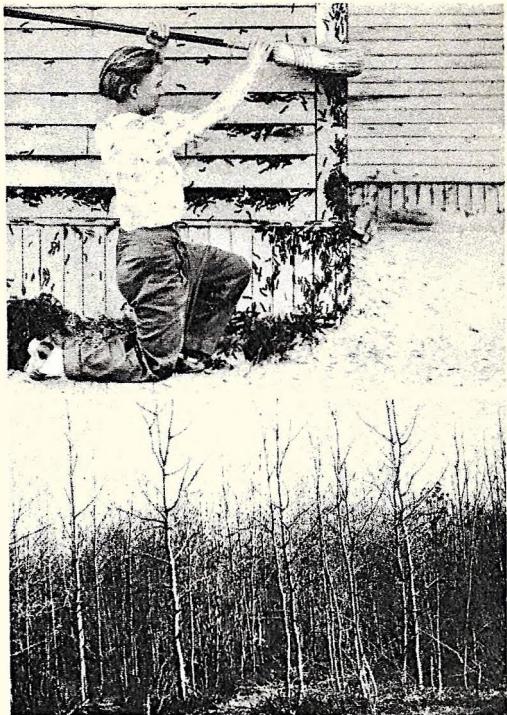
Lack of funds with which to secure poison bran bait, the standard means of grasshopper combat, has hampered many states in their war on the pests.

Compass Shows Change Of Course



This new type of tele-magnetic compass which is electrically operated permits the yachtsman to control the course of his ship by remote control from points aboard ship.

A TELE-MAGNETIC compass that registers immediately when a craft has left its course has been invented by F. W. West, a young yachtsman. The new type compass enables the helmsman to ignore his regular compass once the course has been set. Power for the instrument is derived from a battery or a small generator.

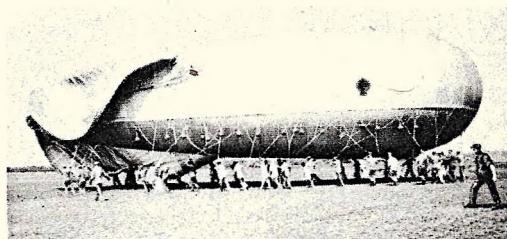


Top—This Ontario school girl is trying to sweep away the crawling pests that have invaded her school building. Below—Ontario's forests have been left almost leafless.

Rubberized Fabric Covers Balloons

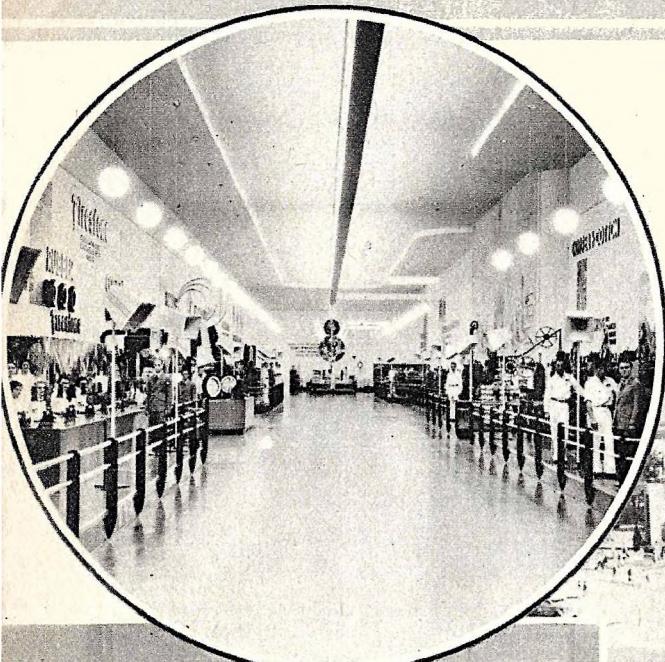
A NEW synthetic rubberized fabric will increase the life of balloons when used in place of the regular rubber covering. Recent tests indicated that the new fabric, known as DuPrene and developed in the laboratories of the Du Pont Co., has a greater tensile strength and is less affected by weather conditions.

A recheck of the permeation of the hydrogen supply of the test balloon indicated superior results when using the new fabric. Du Prene proofed fabric retained its normal physical properties and characteristics after six months of weather exposure.



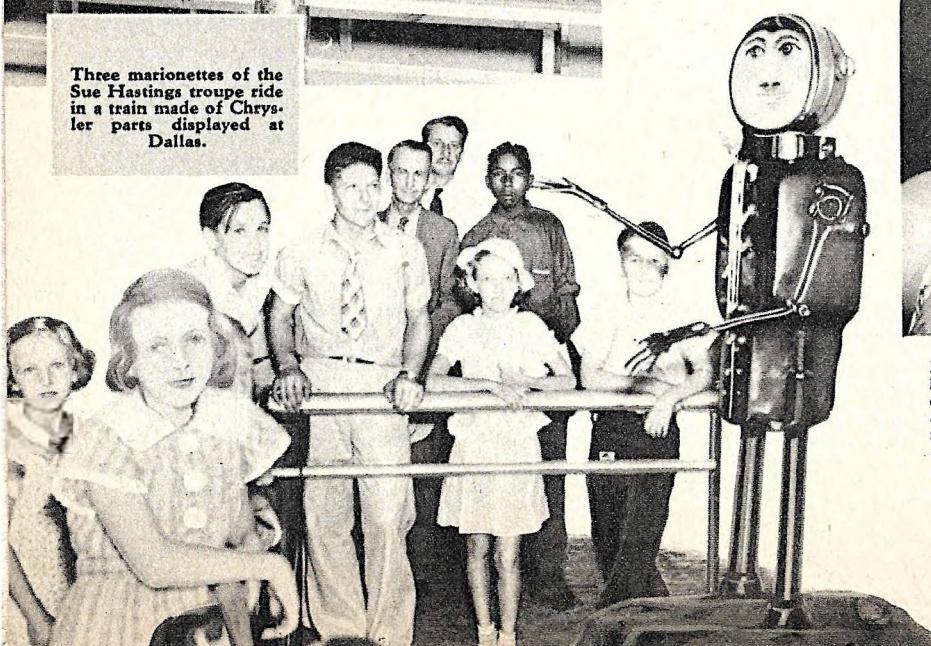
16,000 feet of DuPrene fabric 36 inches wide was used in the construction of this new C-3 type Army balloon. The new synthetic rubber covering has all cemented seams.

Auto Triumphs Feature



Three marionettes of the Sue Hastings troupe ride in a train made of Chrysler parts displayed at Dallas.

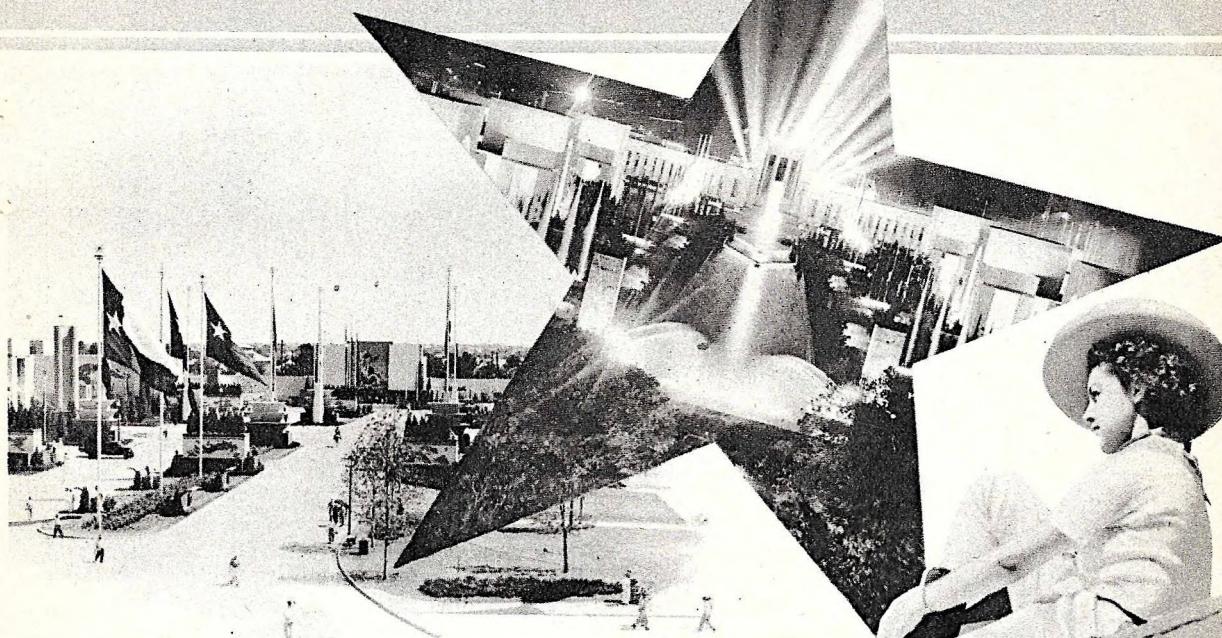
Part of the imposing \$2,250,000 Ford show is shown in upper left. General Motors has a \$950,000 display in the above building.



Frances Nalle, 21, red-haired Dallas beauty, is official "Bluebonnet Girl" at the Exposition. A robot made of auto parts draws a crowd at the left.



Texas Centennial Show



Decked with the traditional Lone Star flags, this Court of Honor is one of the principal features of the \$25,000,000 Texas Centennial celebration at Dallas. The Hall of Petroleum appears in the background. A night view of the Esplanade is shown in the star with searchlights illuminating the scene in the Hollywood manner.

EXHIBITS showing automobile advances in speed and safety are almost half of the dollar value of the \$25,000,000 Texas Centennial display now attracting visitors by the thousands to Dallas, Texas.

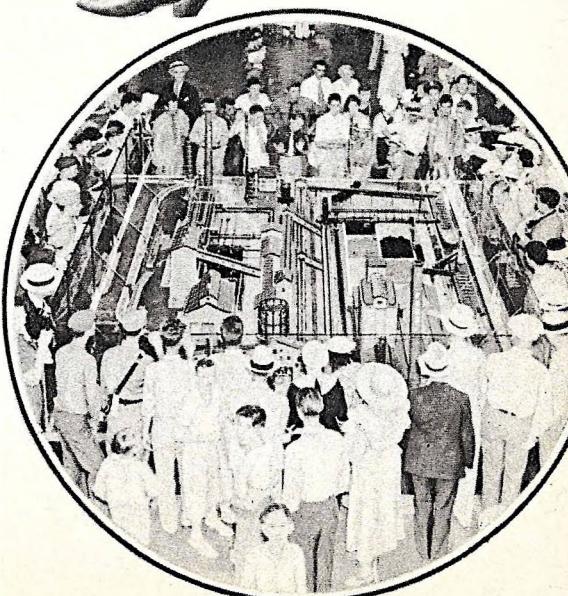
Largest exhibitor at the celebration marking the 100th anniversary of Texas freedom is Ford with a \$2,250,000 display. General Motors has a building and display valued at \$950,000. Chrysler is present with a \$500,000 exhibit. The event continues through Nov. 29.

The Ford show includes 15 major exhibits in the air-conditioned Ford Exposition building. A replica of the company's by-products plant, complete to railroad sidings, attracts model railroad enthusiasts. There is a service exhibit showing the development of auto service from the blacksmith days to the present.

All of the exhibits show methods of testing materials and means of assembling. A mechanical man made from auto parts is a feature of the Chrysler show. He not only turns his head and lifts his arm but he can hear and speak as well.

[Continued on page 126]

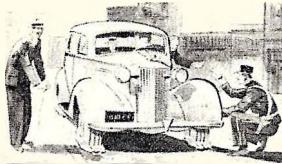
Pretty Jane Collins is one of the "Rangerettes" adding beauty and color to the show. Below, a replica of the Ford by-products plant, complete to railroad sidings, attracts scores of visitors.



PARAGRAPH ODDITIES

OF SCIENCE

Traffic officers in Yugoslavia punish speeders by deflating their tires. Free air pumps are few and far between, creating an embarrassing situation. It works. — S. L. Harmon, Doylestown, Pa.



The cost of building the average railroad is so great that the money, in dollar bills, would cover its length and width.—Fred Raymond, Garson Mine, Ont.

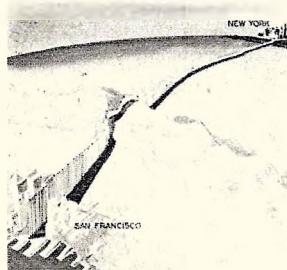
To aid the olive industry in Tunis the government has decreed that all automobile lubricating oil used in the country must contain 20% olive oil.—Walter Hagen, Britton, So. Dakota.

It would cost nearly \$3,000,000 to make a complete collection of the major stamps of the world.—M. Mulford, Buffalo, N. Y.

A clock that didn't run was one of Edison's most valuable inventions. The dummy clock, located in his Ft. Myers, Fla., laboratory, reminded workers that time was measured in results, not minutes.—John Frank Dopak, Jr., Chicago, Ill.

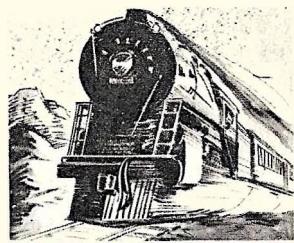
The winter of 1936 was so severe that fifty years from now it will still be the subject for comment according to leading forecasters.—Frank Harris, Portal, North Dakota.

More than \$150,000,000 was expended by autoists last year in replacing worn parts on their cars.—John H. Gulick, Cleveland, Ohio.



The poles used by one telephone system are the equivalent of a solid fence 30 feet high reaching from San Francisco to New York. — Morris Hall, White Plains, N. Y.

The piston of a locomotive is always advancing. It returns only in relation to the engine's frame. — Rudolf Trimmel, Wien, Austria.



The human body carries enough electricity in its red corpuscles to keep a 25-watt lamp burning for 5 minutes.—Ralph Sullivan, Boston, Mass.

Flat cars, though lighter than box cars, are the hardest for the locomotive to pull, having greater inertia.—M. N. Crowe, Souris, Man.

A phosphorescent automobile enamel recently demonstrated in Paris makes it possible to see vehicles a half mile away with the headlights turned off.—Mrs. Nella Canfield, Estherville, Iowa.

Although temperatures on the moon vary from 250 degrees below to 200 degrees above zero, F., one inch below the surface the temperature is a constant 32 degrees.—M. Gold, Philadelphia, Pa.

Particles of dye must be one seven-millionth of an inch in diameter to satisfactorily penetrate the pores of cotton.—B. Miller, Minneapolis, Minn.

A space ship could travel to the moon in 3½ hours by standing still. The moon, swinging on her orbit, would overtake it.—H. L. Kidder, Rock Springs, Wyo.

Special bull shoes of two pieces are being used on Nevada range bulls to prevent sore, stone bruised feet.—F. S. Reynolds, Fort Morgan, Colorado.



One dollar will be paid on publication for every Paragraph Oddity accepted. State source or proof. Do not include Oddities with contributions, or letters for other departments. No items will be returned. Address "Oddities," Modern Mechanix Publishing Co., Fawcett Building, Greenwich, Conn.

New Stratosphere Rocket Claims 200-Mile Ceiling

A ROCKET designed for flights into the stratosphere carrying scientific instruments which will record temperature, cosmic radiations, and general stratospheric conditions has been invented by Maurice Poirier, of Burbank, California. It will weigh 175 pounds and, for the protection of persons below, will explode when its maximum height has been reached. A small parachute will enable the scientific instruments to reach the earth safely.

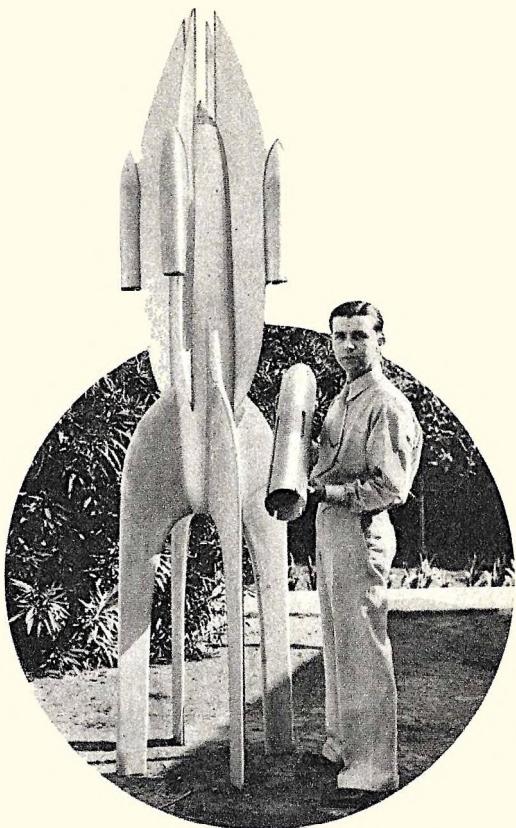
The builder asserts that the rocket will be capable of reaching a height of over 200 miles above the earth's surface and will be able to attain a speed of more than 25 miles per minute. The power is generated by the mixing of two gases known only to the inventor. No date has been set for the flight.

Serves Same Railroad 81 Years



Eighty-one years of continuous service without an accident or loss of a day's work is the world's record of 98-year-old John M. Horan. He is a boiler washer inspector.

AN UNUSUAL record of 81 years of continuous service with the Milwaukee Road is held by "Johnny" Hogan, 98-year-old veteran. He is a boiler washer inspector and developed the idea of using soda ash in the treatment of water in locomotive boilers. A staunch supporter of the Safety First movement, Horan has never had an accident nor missed a day's work. Residing in Milwaukee, he still puts in a good day's work.



Flashing through the stratosphere at 25 miles per second, this rocket is expected to reach a 200 mile height. It will carry aloft instruments that will descend via a parachute after the rocket has exploded harmlessly in mid-air.

Silos Become Observation Towers

TWIN silos that once stored feed for live stock of a dairy farm have been converted into observation towers at a summer camp near Peekskill, N. Y. Some farmers there have found it more profitable to cater to the tourists than to undertake the tilling of the soil. The observation platforms on the silo roofs have proved very popular.



Observation towers and porches, as well as cool rooms, are features of these two renovated farm-yard silos.



SPORTSMEN'S TACKLE FOR THE BEST

by ROBERT PAGE LINCOLN

a shaft in these last-named locations, and it is a wise bass indeed that does not make a dash at it with deadly effect.

The bass fisherman, therefore, who carries with him both the fly-rod and the bait-rod has at his command two deadly weapons, for which any bass water affords an opening. It is because the bait rod and fly rod can thus work together so effectively that the fisherman should possess and should become proficient in the use of both rod types and their methods.

Bait casting for bass is, without doubt, more commonly practiced throughout the country than any other manner of taking bass.

The first bait rods that were put forth in this country were rather long, ranging in length up to eight feet. From this extreme

A GREAT satisfaction to the bass fisherman is a tackle outfit that will give him the maximum in enjoyment in handling, but which will, at the same time, touch the peak in effectiveness: The right rod, the right line and the right lure for the occasion. That bass may be taken at times on very crude tackle goes without the saying, but it is not all of fishing just to fish.

Fishermen are rapidly getting in the habit of using both a bait casting rod and the fly casting rod in their fishing, having come to a realization of the fact that where the one will not avail itself, there the other one may prove unusually effective. To be efficient in both departments is, therefore, to a decided good effect and gives one the unusual opportunity of testing out both methods of fishing where the situation calls for one or the other lure and manner of delivery. Obviously the fly rod has no place in the midst of the pads and other vegetation when the bass are in such locations. Here the bait rod, with various weedless pork-rind and wire-guarded lures, will prove effective. But where unobstructed water is to be met with, around rocks, sunken trees, stumps, etc., there the fly-rod will do wonders, and may produce bass when the bait rod will be found wanting. Drop a fly in combination with a spinner on



No bass fisherman can resist the lily pads. Here lurk the big large mouth, waiting to be tempted by a pork-rind lure or any other weedless baits. This lake is typical.

The small mouth bass is one of the gamest fish in fresh water. This catch represents a day of thrills for three men. Either bait rod or fly rod lures can be used against this battler, depending upon type of water.

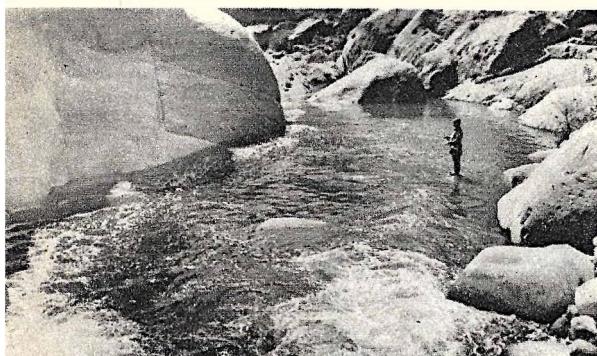


CAMPFIRE SUGGESTIONS BASS FISHING

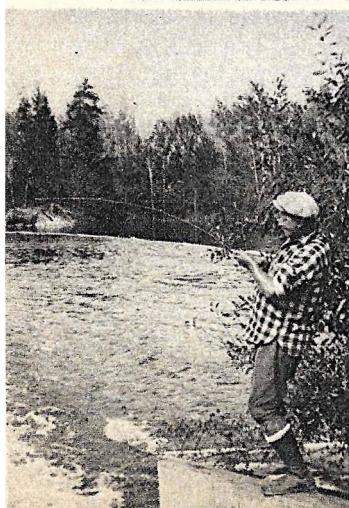
length they went to the other extreme and dropped down to as short as 3, 3½ and 4 feet. In more recent years this rod length was stepped up to the extent that 5 and 5½-foot rods are now considered standard for length, although 4½ and 6-foot rods are to be had, the latter especially fitted for the casting of very light lures.

It is obvious in the selection of a bait casting rod in bamboo that it should be picked according to the weight of bait that is to be used. There are light, medium, heavy and extra heavy bamboo rods. That fishermen attempt casting heavy lures with a too-light bamboo rod accounts for breakages every season. It is obvious so far as bamboo rods are concerned that they should be definitely picked according to the work they are supposed to do. *To treat a bamboo rod otherwise is sheer injustice.*

Certain features with regard to the fittings



Like trout, small mouth bass prefer fast water, although now, due to stocking, they are found in both streams and lakes. In this water, a fly rod is a big advantage.



A short cast into fast water, and Robert Page Lincoln has hooked another one. He is playing this small mouth with a five and one-half foot steel bait rod, one of the most popular lengths.



of the bamboo bait casting rod may be mentioned. Guides are fitted with garnix linings, also agate lining, also in a stainless steel chrome plated. Agate lining is excellent, but the steel guides are now fast coming into prominence. Both agate and garnix guides will crack and break, but steel guides invariably hold their own.

The handle should be of the best grade solid cork and there should most assuredly be a forward grip, that is a grip ahead of the reel. This grip permits of a sure and comfortable hold on the rod. Without it one does not have the proper control over the rod. Again, there should be a finger pull under the reel seat, which the trigger finger can grasp when casting. The value of the finger-pull lies in the ease and sureness with which the rod may be handled. Those rods not fitted with finger-pulls, may have detachable ones slipped on. However, most bait casting rods now are supplied with these pulls.

Bamboo rods generally come in single enamel, six strip construction. Double built rods involve the lamination of two pieces of the outer or fibrous enamel of the bamboo, and cutting V-shaped strips from the same,

[Continued on page 137]

Fire Alarms, Flashed By Radio, Bring Prompt Response



Chief Thomas Burns, of the Bridgeport, Conn., Fire Department, broadcasts the first message over the Talkalarm, a radio fire alarm system. Inset shows loud speaker installed at fire station.

Speed Boat Modeled After Seaplane

SEAPLANES skimming across the water before taking off provided German naval architects with the cue for a new type of speed boat, embodying all the features of the plane except the wings.

For lightness in hull construction a corrosion proof alloy called ultra-aluminum is used. On a straight course the broad hull rises almost out of the water at high speeds, while on the turns rigidly braced outriggers provide stability.

Engineer H. Ellinghausen of Bremen and Naval Architect Fritz Peschkes of Cologne are leading experimenters in this type of boat. New improvements are expected to increase their speed to more than 60 m.p.h.

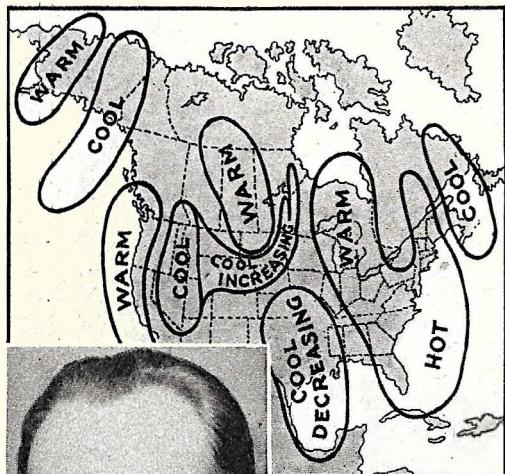


Speed boating reaches a new peak in thrills in one of these wingless seaplanes. A standard airplane motor and propeller lift the aluminum hull almost clear of the water at high speed.

WHERE once a steel tire rim, struck with a heavy hammer, summoned the fire department of Bridgeport, Conn., there now is employed a radio Talkalarm system, the first of its kind in the country.

The Talkalarm system has a central unit about the size of a PBX telephone board. At each fire station is a reproducer. When an alarm is turned in the dispatcher summons all stations to attention with a "siren howler" installed in the central unit. There then follows a verbal description of the fire's location and equipment needed. In this way the response is speeded up and there is no possibility of signal bells being misinterpreted through a miscount.

Key Found To Long Range Forecasts



Four more years of drought are predicted by Dr. Selby Maxwell, forecaster of this year's floods and dust storms. His long range predictions have proven more than 90 per cent accurate. This map, prepared two weeks in advance for May 30, 1936, proved accurate in every detail. The moon figures largely in his calculations.

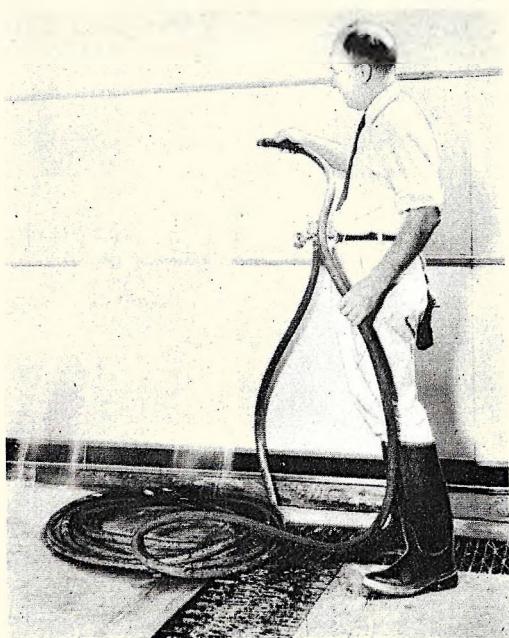
COMBINING three sciences, mathematics, astronomy, and meteorology, Dr. Selby Maxwell, Chicago scientist, has developed his own weather bureau, known as World Weather, Inc., specializing in long range predictions. In operation over a period of years, his predictions have proved more than 90 per cent accurate. Beyond admitting that the moon figures largely in his calculations, Dr. Maxwell will not divulge his secret.

Inventor Photographs Vibrations With Light Rays

A BEAM of light projected through a narrow slit upon a mirror proved to be the solution in the puzzling problem of how to photograph a vibration. George W. Jacobus was the discoverer of the new principle, which he incorporated into his latest invention, the vibrometer.

The mirror is floated in a hermetically sealed pool of mercury in the base of the vibrometer. Outside light passes through a narrow slit, strikes upon the mirror and is reflected through another slit to register upon moving film. The slightest vibration is picked up by the mercury, the mirror quivers in response, and the light beam traces the vibration upon the film.

Fused Panels Replace Painted Walls



Turning a stream of water on this wall surface does not harm it in any way. Constructed of porcelain panels the wall will retain its color forever. Washing restores its color when dirty.

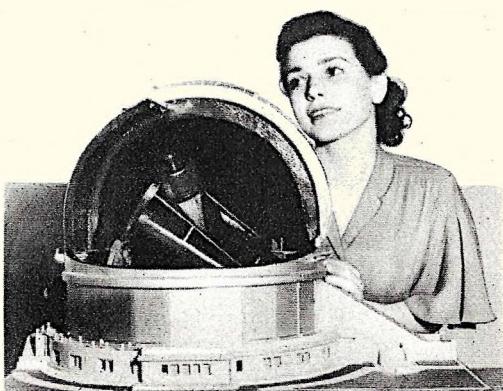
PANELS of porcelain enamel in a variety of colors are now replacing painted wall surfaces in many homes and office buildings. The new material which may be installed by any contractor insures a wall surface that will never have to be replaced. The panels when dirty may be restored by washing.



George W. Jacobus is shown here with his vibrometer, or vibration photographer. As a pool of mercury in its base quivers in response to vibrations, its movements are photographed from light rays reflected from a mirror on its surface.

New Observatory Built In Miniature

IN ORDER that visitors to the Palace of Education at the California Pacific International Exposition might familiarize themselves with the new observatory now under construction on Palomar Mountain a model of it has been placed on display. Constructed to the exact scale, the model shows the new observatory as it will appear when completed and the 200-inch telescope installed. The observatory, itself, will be the world's largest.



The exact replica of the Palomar Observatory now being made ready for the new 200-inch telescope is shown above in model form where it is being exhibited at the San Diego Exposition.

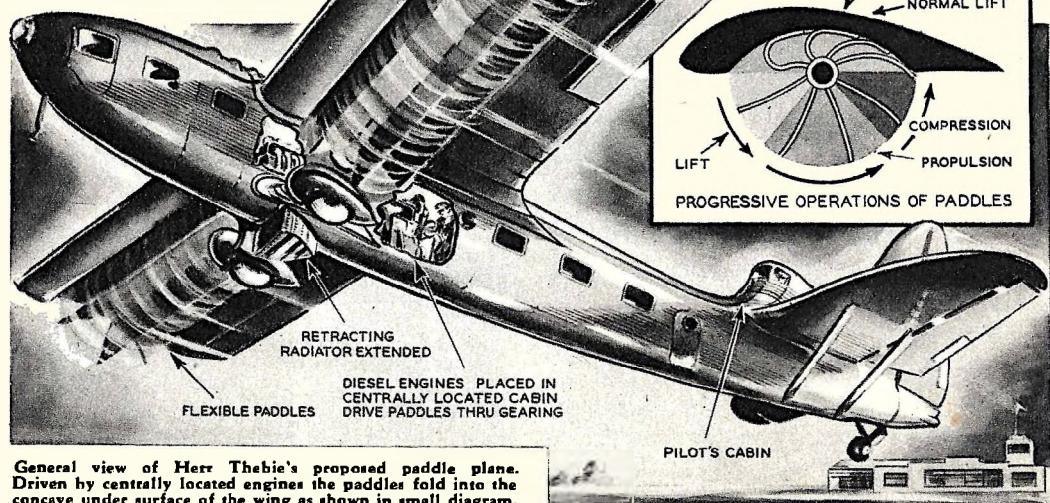
Sensational German Paddle Plane Built On "Flapping Wing" Principle

FROM Germany comes the news of another attempt to produce a plane of the rotating wing, or "paddle" variety. Unlike the well-known Dr. Rohrbach's paddle-plane design, the latest attempt to get away from conventional airscrews as a means of propulsion does not depend upon the paddles as a sole means of lift as well as propulsion. Rather, it seeks to adapt the paddle principle to an otherwise normal airfoil.

The inventor, Herr Engineer R. Thebie, of Chemnitz, after studying wing-flapping flight as practiced by birds, has introduced the results of his observations in his airplane.

The paddles project from the lower surface of the wing and, made of flexible material, fold up into the wing itself during the upper half of the revolution. The compression of air natural to a wing in flight is thus assisted. Emerging from the wing the paddles exert a downward and lifting force. As the rotation proceeds they exert a propulsive force.

Should the propulsive effort prove insufficient for practical purposes, Herr Thebie will install an auxiliary airscrew in front to aid the plane in taking off and other situations where exceptional power is needed.



General view of Herr Thebie's proposed paddle plane. Driven by centrally located engines the paddles fold into the concave under surface of the wing as shown in small diagram.



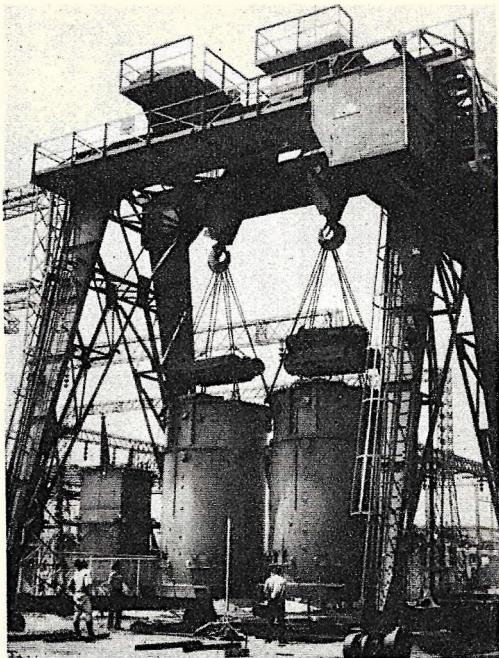
The novel location of the pilot's cockpit affords a striking example of divergence from accepted design. Seated thus at the tail of the plane, the pilot has a commanding view of structure beneath him.

Giant Crane To Swing Ponderous Transformers Into Power House

SATISFACTORY tests have been completed on the giant crane that is to lift the 185-ton transformers into the Municipal Power Bureau station on Central Avenue, Los Angeles. This station is the terminus of the 266-mile transmission line from the Colorado River, and the transformers will lower the voltage of the Hoover Dam power.

The crane is the largest Gantry type in California. It is mounted on steel wheels and travels a track 172 feet in length. Its big hooks have the unusual lift of 40 feet.

The unusually heavy equipment and special machinery being installed in this up-to-the-minute power station is the largest ever used, which made necessary the designing and building of this great crane.



This great crane was put to a severe test by lifting two enormous power transformers weighted with steel ingots. The crane will be used for heavy lifting in a new electric station.

Modernistic Birdhouses Win Prizes



Each of the birdhouses shown represents a different bird classification. In the foreground is a bird bath, while the house showing construction was the largest in the contest.

MODERNISTIC and rustic types marked a recent birdhouse contest of the *Buffalo Evening News*. Class winners included Geo. Fadale, Chester Malachowski, Sherwood Petersdorf, Harry Polarski, C. Gorsky, James Cary, Montrose Hartwick, Daniel Wiertel, Wm. Elsaesser, Fred Vogel and Billie Hughes.

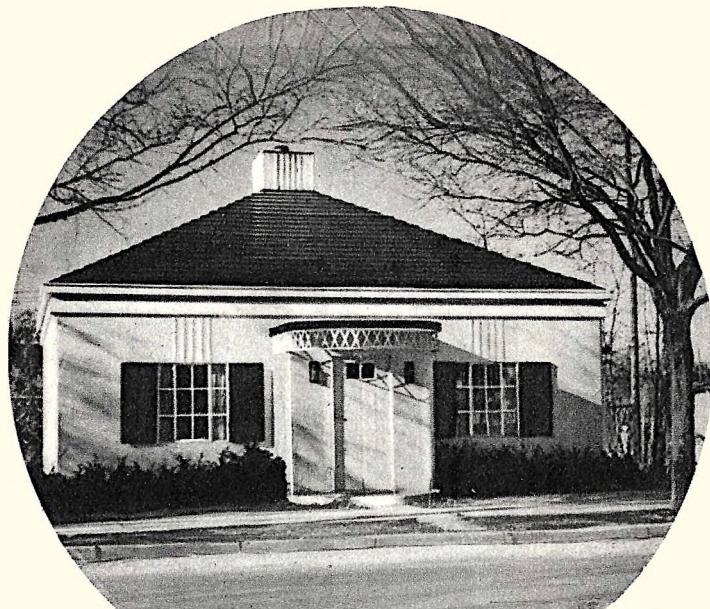
Big Guns Ride To Maneuvers By Rail

EARLY in June, with rails and wheels groaning beneath the weight of 500-ton units, the 14-inch "Big Bertha" Army guns rolled away from their stationary bases at Fort Arthur, near San Pedro, California. They were bound for a coast point near Oceanside, over a hundred miles away.

Later in the month these great guns were fired for the first time in eight years, for they took part in artillery maneuvers and repelled an imaginary enemy twenty-five miles out to sea. This is the maximum range of the 14-inch gun. Where the coastline isn't fortified, concrete bases lie ready to receive the guns in an emergency.



Moved by rail from San Fort Arthur to Oceanside, Calif., these ponderous Army guns were fired for the first time since 1928, when they took part in recent coast maneuvers.



A miracle home, swiftly made and erected by modern Science, is the pre-fabricated house, Industry's most-needed invention for home seekers. Presto! factory-made panels become dream castles. Truly, these pages reflect the creative spirit of America's progress.

by
DONALD
G. COOLEY

The PRE-FABRICATED

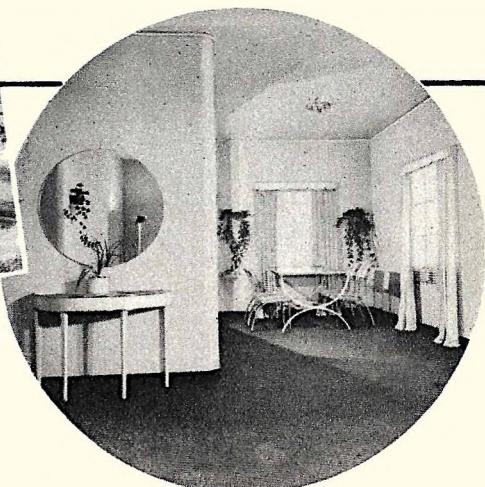
The house above, featured by the Hobart Brothers, of Troy, Ohio, is a 5-room, arc-welded steel house, costing about \$3,600. There are other views of the house on this page.



At the factory (see picture over the one just above) the hip roof is arc-welded into four portable sections and shipped by rail or truck. This type of roof gets away from average "box type" house, heretofore so objectionable to builders. Above—The roof portions are lifted from the truck and assembled on top of the house. Circle—Note the artistic layout of the interior of the house and how the living room merges into the dining room without the use of doors. It is a model of simplicity, even to the placing of the glass-topped steel furniture, the mirror and also, the drapes.

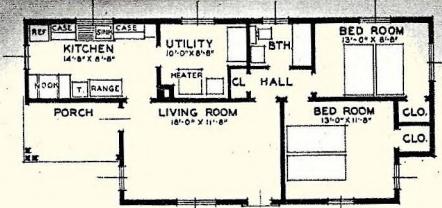
"**G**IVE me a living room, bath, kitchen and two bedrooms. Wrap them up and deliver them in time to assemble my home for occupancy the first of the month."

The scene is the display room of a pre-fabricated house manufacturer, and the speaker is Mr. Average Man out shopping for a new home. He has just made his choice of rooms from a wide variety displayed on the demonstration floor. The manufacturer will deliver the pre-fabricated units from his warehouse—wrapped in a cellophane





Above is a late model by the E. F. Hodgson Co., of Dover, Mass. They have been building pre-fabricated homes for 25 years.



HOUSE ARRIVES

package, if he has a flair for the dramatic—and in a week or two the proud new home owner will be able to step into a marvelously efficient house whose cost is well within the limits of a modest income.

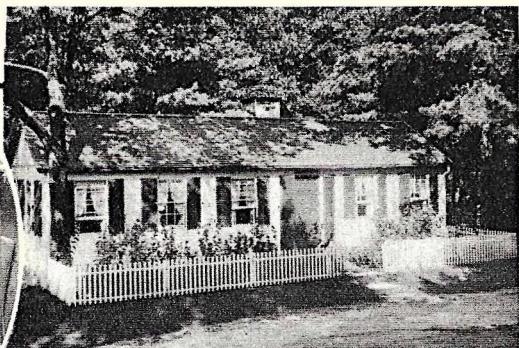
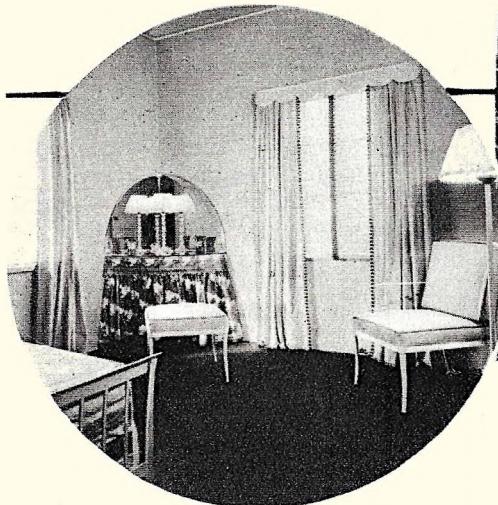
It all sounds like one of those intriguing visions of the future which nobody really expects to come true, but the startling fact is that the day of the packaged house is almost here.

A survey reveals some two dozen com-

panies actively engaged in developing and marketing such houses.

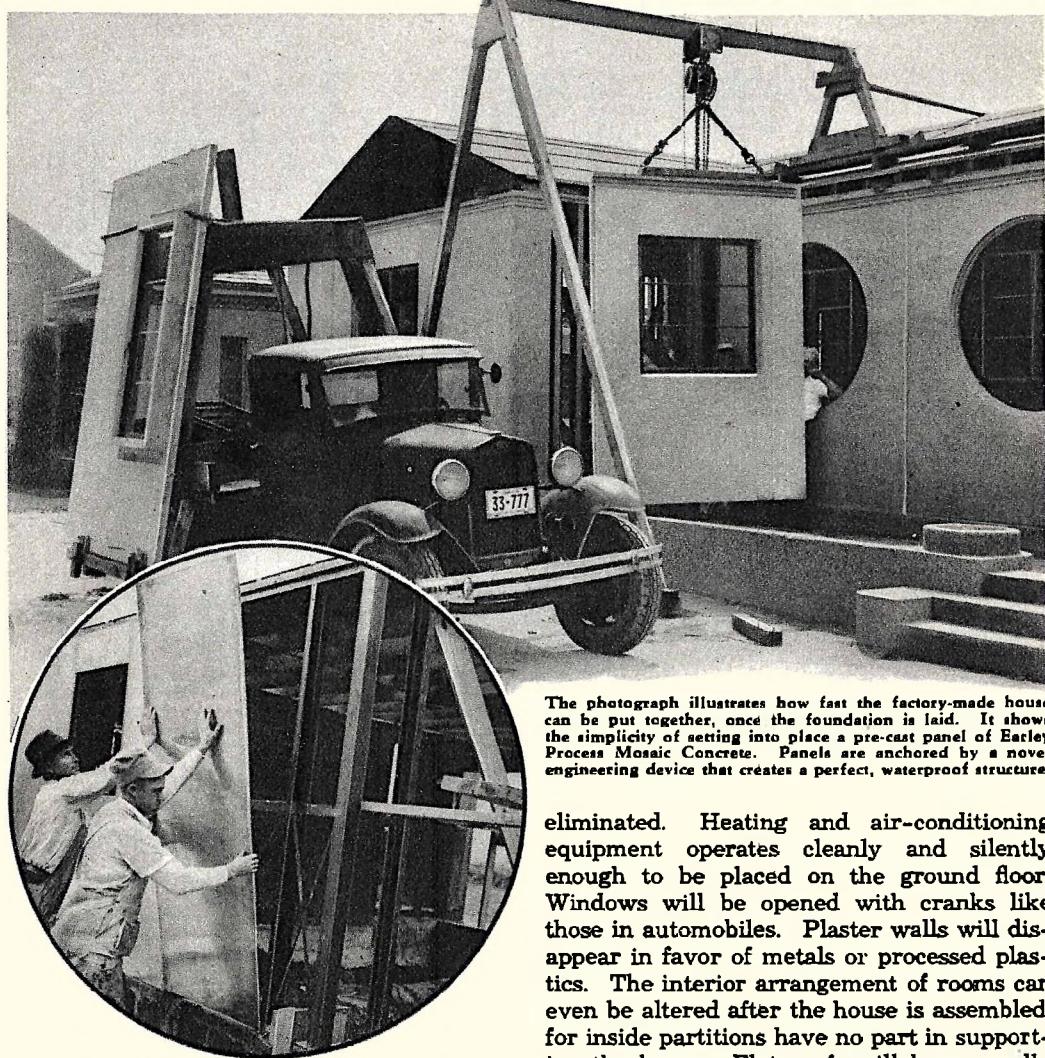
A pre-fabricated house is built up of wall panels turned out in quantity in factories with high-speed machinery. Panels come with doors and windows fitted into them; even plumbing pipes and electric outlets can be built in at the factory. The plumber, electrician, and plasterer are to a large extent eliminated.

What will the pre-fabricated house look



This little dream house in the pines is what many yearn for, and is another artistic model by Hodgson. The owner of an unencumbered lot valued at \$1,000 can erect a pre-fabricated house with a cash payment as low as \$375, with the remainder at an average rate of \$23.53, including fire insurance and taxes.

NEW PACKAGED STRUCTURES CAN



The photograph illustrates how fast the factory-made house can be put together, once the foundation is laid. It shows the simplicity of setting into place a pre-cast panel of Easley Process Mosaic Concrete. Panels are anchored by a novel engineering device that creates a perfect, waterproof structure.

Circle—The house built of copper is rather expensive, but it has the advantage of lasting indefinitely. A blow on the house will not result in a metallic ring, as one would imagine, because insulation between copper walls absorbs the sound.

like when it is unwrapped from its package? There is as yet nothing like a standardized form, and probably never will be, but in general the packaged home will be square-cut, free from gables, turrets and complicated ornaments, modernistic in general outline. Wood will give way almost completely to metal. The framework will be of steel, except where panels are used which supply their own frames.

Walls will be amazingly thin and well insulated, with a corresponding increase in usable floor space. Costly basements will be

eliminated. Heating and air-conditioning equipment operates cleanly and silently enough to be placed on the ground floor. Windows will be opened with cranks like those in automobiles. Plaster walls will disappear in favor of metals or processed plastics. The interior arrangement of rooms can even be altered after the house is assembled, for inside partitions have no part in supporting the house. Flat roofs will be generally favored, adapted as sun decks and actually affording an additional outdoor room.

And how much will it all cost? You can buy the pre-fabricated units for a two bedroom, living room, kitchen and store room house for as little as \$1,050, and you can range upward to \$15,000. In general, what the average man regards as an average house will cost around \$4,000 from any one of several pre-fabricators.

The ultimate aim is to supply homes to those family groups who cannot afford more than \$2,500 for a house. The Roosevelt administration, actively attacking the pressing problem of low-cost housing, estimates that 90 per cent of our population falls within this

BE ASSEMBLED ON SHORT NOTICE

income bracket. A survey of the field shows an amazing variety of structural materials obtainable, all of them fireproof, termite-proof, rainproof, hurricane-proof, vermin-proof, and proof against so many other contingencies you can literally describe your house as being one hundred proof.

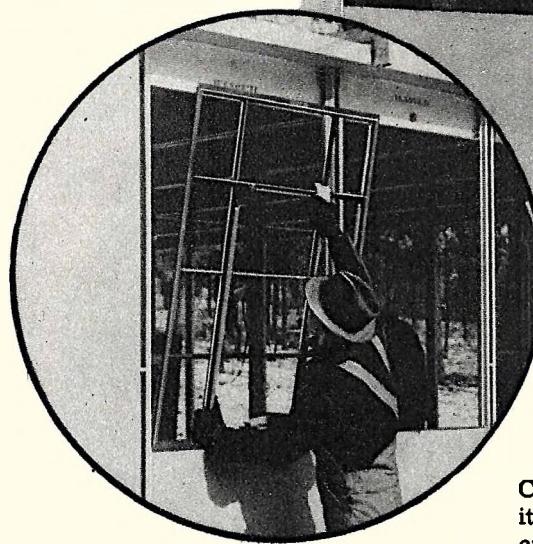
Steel, aluminum and other metals will be widely used. Glass will become important, not only for windows but in the form of hollow bricks for translucent walls or interior partitions. The house framework will be of steel, just as in skyscrapers, except in those versions where no skeleton whatever is used.

In this category fall pre-cast concrete panels, and channelled steel panels which themselves support the house. One company is experimenting with plastics—the material out of which the caps for toothpaste tubes are pressed—for use as structural panels. Such a house would literally come out of the chemist's test tube!

Already in production is the Moto-home of American Houses, Inc., of New York City. This firm turns out a wall panel made of a cement and asbestos mixture compressed into a slab $2\frac{1}{4}$ inches thick—which is the thickness of the completed wall, since insulation is provided by the panel itself. It is claimed that the panel never requires painting and that ageing in the weather improves it until it reaches a hardness exceeding that of limestone.

The panels are four feet wide and ten feet high, and come in three standard units—a blank panel, a window panel, and a door panel. These are supported by a steel frame. Spun glass is used beneath the roof for insulation. Cost is said to be 16% less than for the same amount of usable space in traditional-type houses.

National Houses, Inc., also of New York



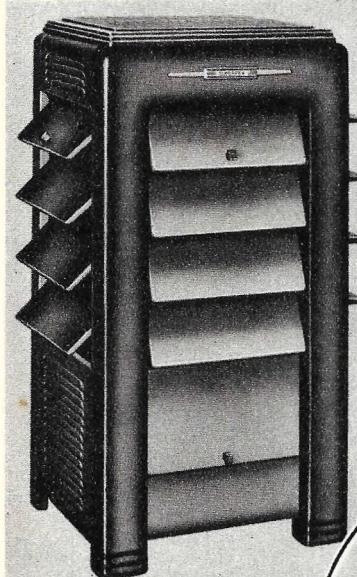
General Houses, Inc., are pioneers in the development of the pre-fabricated steel panel and steel frame house, which are put together with a socket wrench. They have just introduced new model homes to sell from \$2,500 to \$5,500. These houses are built in 2-foot sections.

City, uses no frame in its system of pre-fabrication. Sheet steel panels are used for the outer and inner walls, separated by a four-inch space which is packed with a special insulating material known as "vermiculite," which is essentially powdered mica. Four inches of it give the insulating efficiency of a fifty-inch stone wall. The panels are simply bolted together and the exterior surface sprayed with marble dust, giving a fine-grain stucco-like finish of great durability.

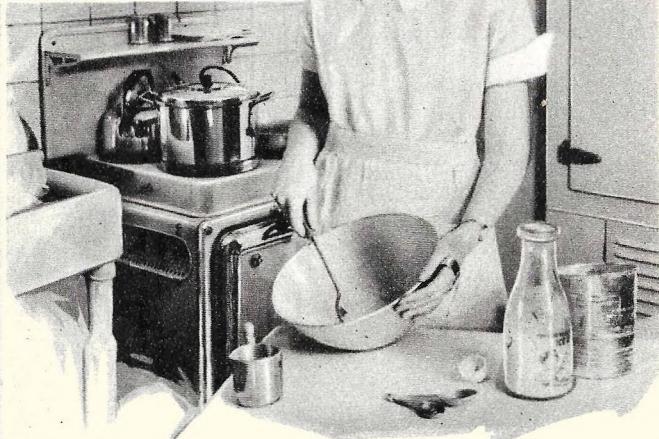
This design was developed by William Van Alen, architect of the Chrysler building in New York, which made history in skyscraper design by having its top 18 stories finished in stainless steel. A four-room National House with garage costs around \$4,000, the garage representing \$300 of this cost. This company also offers sloping roofs at the option of the

[Continued on page 122]

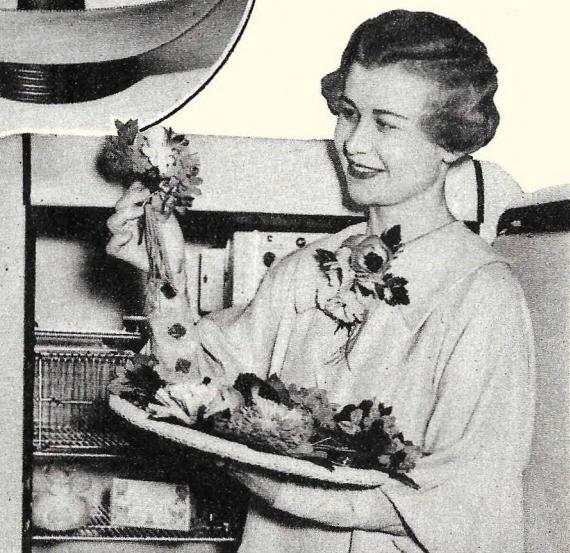
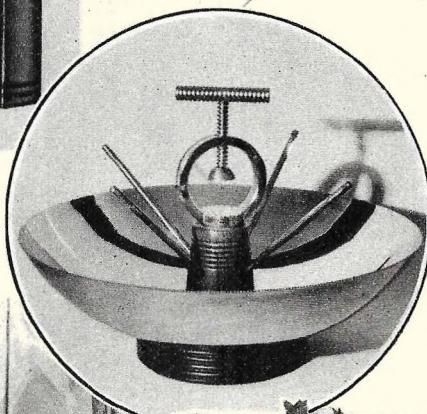
Housewives Inspire Home Improvements



THIS NEW TYPE OIL-BURNING HEATING STOVE, designed to serve as a central heating plant, needs no pipes or flues. With shutters open, it supplies radiating heat, and when closed, heat is circulated through a grille.

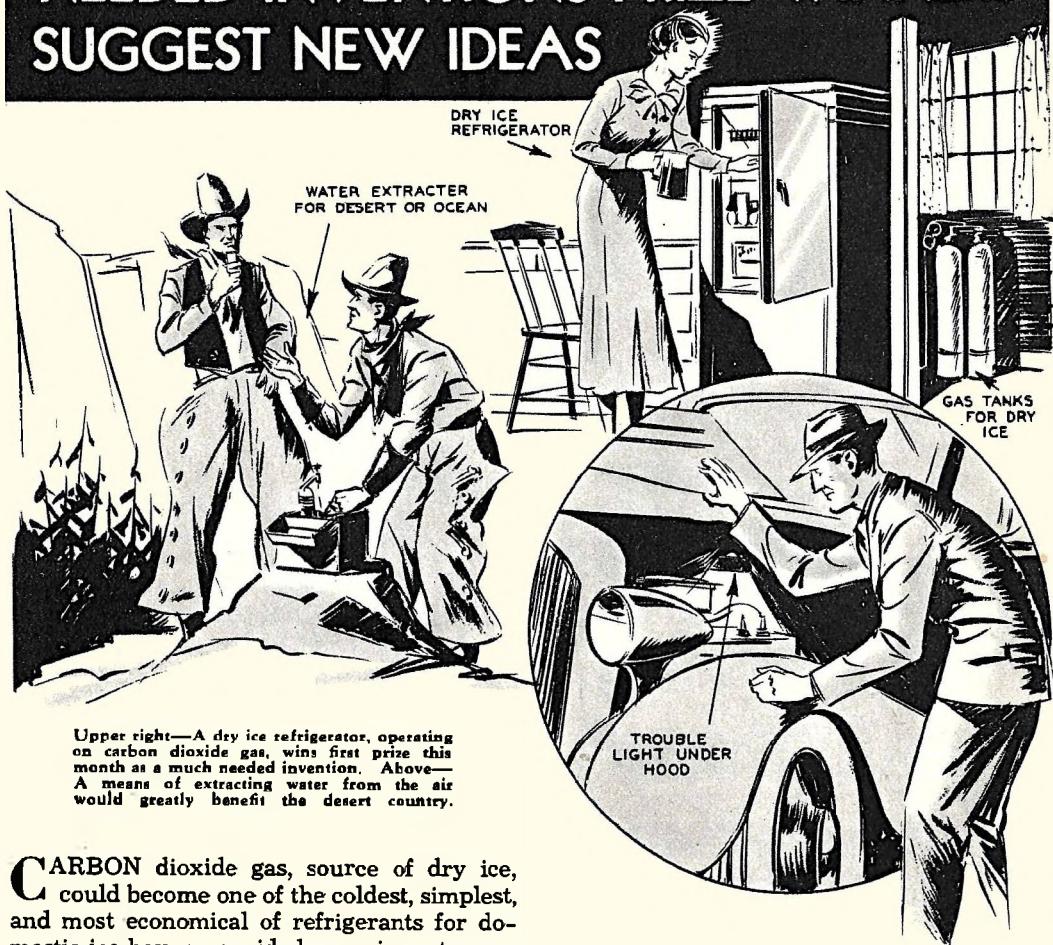


A MIXING BOWL made of aluminum is now claiming the title of the "perfect mixing bowl." It is light and equipped with a special handle to afford a secure grip. It has an electro-hardened finish which will not wear down or smudge the batter. Circle—A CHROMIUM NUT BOWL on a walnut base makes a handsome gift and a practical household item.



Left—SAFETY WINDOWS which can be washed on both sides without leaning out the window are contributing to the reduction of household hazards. The sash is tilted inwards at the midrail and at top. Right—ICE BOX FLOWERS with all the characteristics of the natural blossom make novel bouquets for parties. Their vitality is restored when placed in ice box.

NEEDED INVENTIONS PRIZE WINNERS SUGGEST NEW IDEAS



Upper right—A dry ice refrigerator, operating on carbon dioxide gas, wins first prize this month as a much needed invention. Above—A means of extracting water from the air would greatly benefit the desert country.

CARBON dioxide gas, source of dry ice, could become one of the coldest, simplest, and most economical of refrigerants for domestic ice boxes, provided some inventor can produce an economical method of compressing the gas for mechanical refrigeration. The gas could be supplied in tanks, much as oxygen is supplied for welding, and released into the ice box as needed. For this suggestion A. G. Wuertz, 315 E. Lambright St., Tampa, Fla., was awarded the first prize of \$25 in the monthly Needed Inventions contest. He points out that the advantages of dry ice refrigeration would include lower temperatures, noiseless action, lack of odors, portability, simplicity, and low installation and operation costs. Once perfected, this invention could almost name its own price.

The winner of the second prize, \$10 in cash, is C. J. Dyer, 311 S. Division St., Ann Arbor,

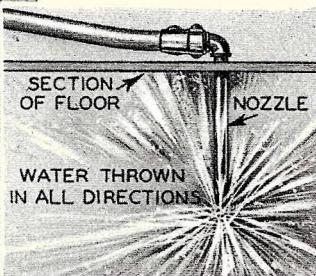
Mich. Mr. Dyer believes that deliquescent salts, such as calcium chloride, used in con-

nection with a small sun-power boiler and an air-cooled condenser, could be made to extract water from the air in sufficient quantities to make it a vital addition to any desert expedition. The salts, even in the driest countries, will extract moisture from the air. This

is vaporized in the solar boiler, and condensed for drinking purposes. As life boat equipment for ocean-going vessels, the salts would not be necessary, ordinary sea water

[Continued on page 128]

Invents Fire Nozzle; Then Designs Truck To Go With It



Supt. N. T. Woods, left, and Capt. Grenfell try out the pneumatic wood cutter and concrete driller, two tools necessary in boring through docks and floors. Once the hole is made, the special fire nozzle invented by Woods quickly quenches the fire.

A NEW fire truck, an air compressor, jack-hammer, drilling tools and an acetylene torch, all these had to be added to the Portland, Oregon, fire department simply because N. T. Woods, superintendent of fire apparatus, invented a fire hose nozzle.

The new nozzle was highly efficient in fighting dock and cellar fires. It would throw 700 gallons of water a minute in all directions, up, down, and to all sides. But it required that there be a two-inch hole in the dock or floor through which it could be inserted, and with ordinary fire tools, it took too long to chop through heavy timbers, concrete or steel.

Superintendent Woods went to Fire Chief Grenfell with his idea, and together they designed a fire truck to carry the new nozzle, air compressor and cutting tools. A two-inch hole for the nozzle can now be cut through anything from wood to steel in a few minutes.

Poland Vies For Tourist Trade With Luxury Motorliner



Here is Poland's new queen of the seas, the 1600-ton motorliner, the Batory. She is reported one of the finest afloat.

WHILE world-wide attention was being focussed on the Queen Mary, Poland went quietly ahead with the construction of her 16,000-ton luxury motorliner, the Batory. Built in Trieste, Italy, in return for coal from Poland, the Batory is a sister ship of the Pilsudski, Poland's first transatlantic liner since she regained her independence.

The Batory is now plying between New York, Halifax, Copenhagen and Gdynia in the Gdynia America Line service. She crosses to Copenhagen in 8 days, to Gdynia in 8½ days.

Woman Invents Foot Brake Catch

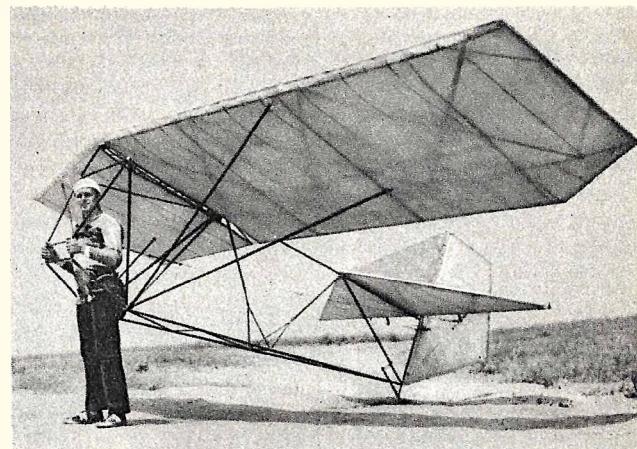
MISS HELEN RANLETT, a graduate of Radcliffe College, is credited with being the only woman to exhibit an invention of her own at a New York Automobile Show. She is the inventor of a brake catch which will hold the car stationary on a hill, leaving the foot free for quick starting. The catch is co-ordinated with the foot brake.

A Hop, Skip, And Jump Launches 90-Pound Hang-Glider

THE closest approximation to free flight yet to be reached by man has been achieved by Bob Morse, 28-year-old glider pilot, of Rendondo, Cal., with his 90-pound hang-glider.

No motor or launching device is necessary with his glider. Strapping himself into the open nose of the craft, the pilot uses leg power to build up a take-off speed of 15 miles per hour. Once in the air, the glider builds up a flying speed of from 22 to 25 miles per hour.

The glider is the result of four years of experimentation on the part of the inventor. He uses no ailerons and the rudder and elevator controls are worked by cables attached to his body. He serves as his own landing



Here is Bob Morse and his man-powered hang-glider. A run and a jump and the ship is launched. It has a flying speed of 22 miles per hour and is controlled by movements of the pilot's body. No landing gear is needed.

gear.

New Device Sends Color By Wire

THE transmission of color over telegraph or cable lines has been accomplished after ten years of experimentation by Howard Ketcham, New York color engineer. By means of his simple, inexpensive device color in more than 300,000 shades and variations can be wired to any part of the world.

A three-color card is set to whirling in the device, the colors varying according to its speed. At the other end of the line another card is synchronized with the sender, and a signal is sent when the desired color has been reached. It will be used for industrial purposes.

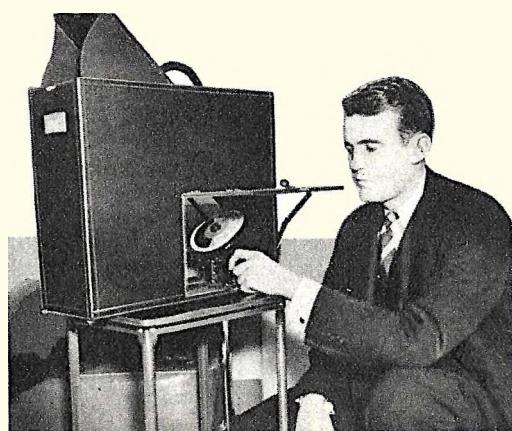
Life Preserver Worn Like Collar



The collar life preserver demonstrated by this young lady is intended for rescue work in rough water. It keeps the victim's head above water, and makes towing an easy process.

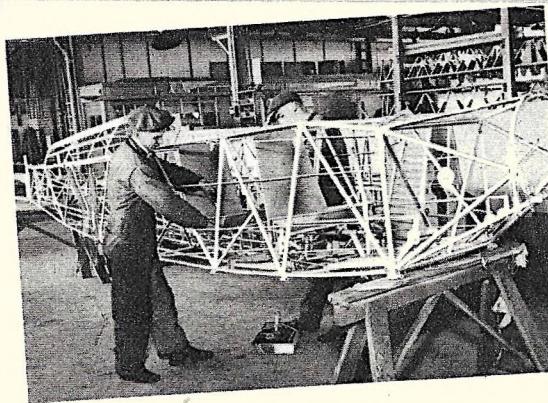
THE difficulty encountered by life guards in saving people from drowning in rough water has been greatly reduced by the use of a new collar life preserver.

The life preserver, which weighs but a few ounces, will support a person indefinitely. It is worn, ready for an emergency, across the back of the life guard. He swims to the victim, attaches the preserver about his neck, and tows him easily to shore. The collar serves to keep water out of the victim's face, and at the same time it is impossible for him to lose his grip. In the event of a major catastrophe, such as the sinking of a boat, a life boat equipped with the collar preservers could supply the victims with the safety devices until additional help arrives.

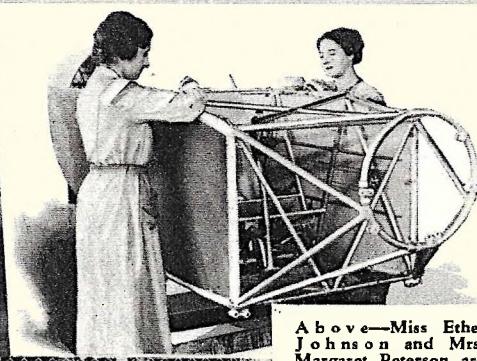


Industrial plants with branches at distant points can now match colors perfectly by wire. Howard Ketcham is shown here with his device for sending colors by telegraph or cable.

BUILDING PLANES For STUDENT FLIERS



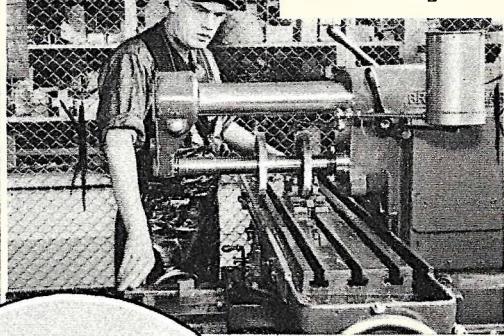
One of the Fleet Trainers under construction in Fort Erie, Ontario. Henry Sawyer and Jack Edgeworth are seen fitting seat into assembled fuselage of plane. *Buffalo Times* photos.



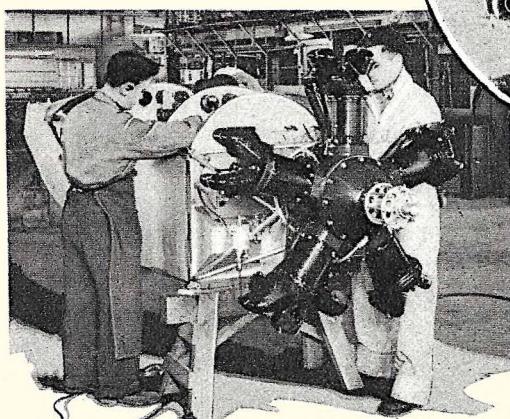
Above—Miss Ethel Johnson and Mrs. Margaret Peterson are seen at their task of covering and doping the fuselage.



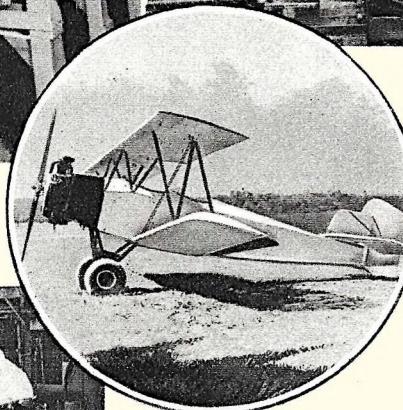
Details of wing construction are pictured here. When the tilerons are to be attached, only a cabinet-maker of John Collingridge's ability is permitted to drill the wings. He is shown in the above photo.



Super-craftsmanship, that is what counts at this plane factory. There is no high-speed production assembly line here, for Victor Wicks machines every metal fitting by hand. When the parts are installed, the fit is exact and accurate, with no lost motion. Left—The finished airplane, sparkling with newness, is wheeled out of the factory and ready for flying tests and shipment.



When the fuselage is constructed, the engine is set into its bed. Then comes the intricate job of instrument installation, which is in the hands of Beverly Brisco and Ivor Elliott. This company makes everything but engines and instruments.



THE Fleet Aircraft Company of Canada, a branch of the American Consolidated Aircraft Corporation, in its factory, builds the Fleet Trainers which are used so roughly by the pilot training instructors of fourteen nations. These planes must stand the gaff of bad landings and faulty air handling, because embryo pilots make many mistakes.

With only slight changes yearly, the planes have been manufactured for a decade. Current models have hoods attached for training in blind flying. Fittings are tooled individually and there is no high-speed assembly line.

Attic-Raised Silk Worms Forecast \$100,000,000 Industry

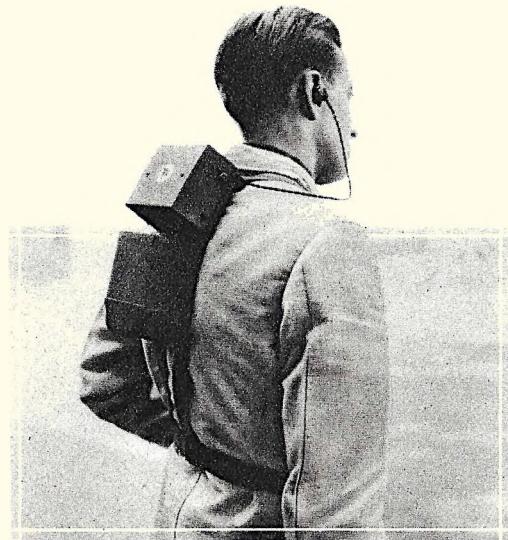
A \$100,000,000 dollar industry, producing nearly a million new jobs, can be brought into the United States with the introduction of silk worm raising, John Ousta, a silk expert from Turkey, believes. As further proof of his claims, he has begun the raising of silk worms in the attic of his home in The Bronx, New York.

At present the United States is importing millions of dollars in raw silk. According to Mr. Ousta, American climatic conditions are more favorable to the raising of silk worm than in either Japan or Turkey. The silk worms he has raised thus far substantiate his claims and produce high quality silk.



Here is what may be the start of a \$100,000,000 silk industry in the United States. John Ousta, Turkish silk expert, raises these silk worms in the attic of his New York home. He finds they are healthier than those raised in Japan or Turkey.

Fire Fighters Use Knapsack Radio



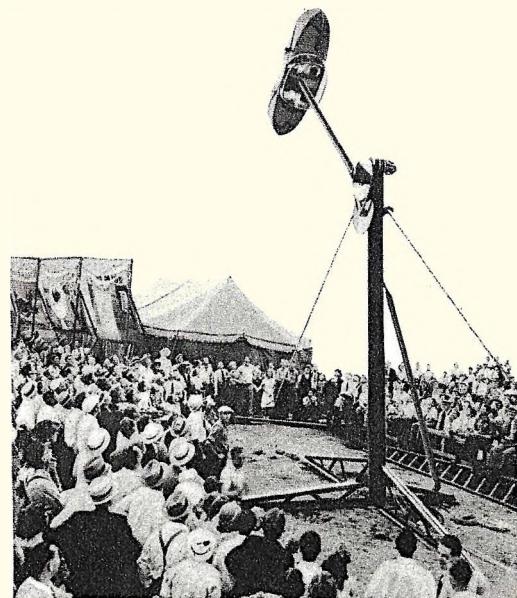
No larger than a soda cracker box, this pack-type radio receiver is designed for emergency work such as mine rescues and fires. Weighing less than 4 lbs., it has a range of several miles.

A KNAPSACK radio receiver, no larger than a soda cracker box and weighing only four pounds, has been designed for use in emergency work such as mine rescues or forest fires when every second saved may mean the difference between life and death.

Using a single tube, the midget receiver has a range of several miles and is equipped with batteries for several hours of continuous reception. The single small ear phone causes no discomfort and allows perfect freedom of motion. In attacking a forest fire, the head ranger, located at some vantage point, can use a small transmitter to direct the work.

New Ride Thriller Loops The Loop

THRILL seekers at county and state fairs, carnivals, and other amusement resorts will this year be offered all the thrills of a test pilot and all the safety of a train ride in the new Loop-o-plane. The new ride whirls its passengers in a giant loop, keeping them all the while securely strapped to their seats. It is six times stronger than necessary.



Looping the loop in a Loop-o-plane, one of the latest thrill rides to make its appearance. It looks and feels daring, but it is perfectly safe, as there is nothing to get out of control.

PLASTICS REVOLUTIONIZE



An ancient game is now played with pieces of a new material. These chessmen are made of Catalin, one of a score of the new plastics brightening life.

AS THRILLING as any Polar exploration is the day-by-day chemistry in America's laboratories. Here intrepid men with test tubes and beakers forge into the vast uncharted lands of science. More money is spent in this ceaseless venture than was ever dreamed of by Byrd or Stefansson. The cost is reckoned in millions—even, as with radium, in human life—but the gains are worth the battle. For out of this pioneering comes new wonders to revolutionize industry and add comfort and enjoyment to living.

The average American gets up in the morning, switches on the light, shaves, has breakfast, buttons his coat, hops into his car and is off to work. In that short morning hour, usually without realizing it, he has many times made use of a peculiar substance that not so long ago was unknown. That substance is the plastic, a brilliant new child of modern research. The electric light switch is plastic. The razor and its case are probably plastic—as are the handles on the breakfast cutlery, the buttons on the coat, the knobs on the instrument panel of the car. Bright, sturdy and useful articles are all of them—yet they were made

Out of Test Tubes Come Man-Made Products Smashing Traditional Fabrication Methods and Making Cheaply Available Shining Articles of Surpassing Utility.



The material beneath the dishes is washable Fabrikoid. The Remington knives have handles of Dupont rubber. The worker below is forcing Catalin into desired forms.

AMERICAN INDUSTRY

by

W. A. SWANBERG



This new dinnerware is made at Hopewell, Va., with pencil line trimmings unaffected by wear, water or acids, thanks to research.



from sour milk, from the fuzz of cottonseeds, from carbolic acid or from thin air. All are recent triumphs of the laboratory.

New as they are, plastics have several decades of history behind them. Celluloid, one of the first widely known plastics, is familiar to all; and Bakelite has long been indispensable in telephonic, electric and radio construction. Yet after these had been on the market for years there sprang a new and versatile aggregation of plastics that brought new moldability and workability, new color and more uses. Though of somewhat different formulae, and suited for different uses, all have two things in common. All are plastic—capable of being molded or cast. And all go through the chemical process known as polymerization, in which the molecules of the substance combine by enlargement of molecular structure.

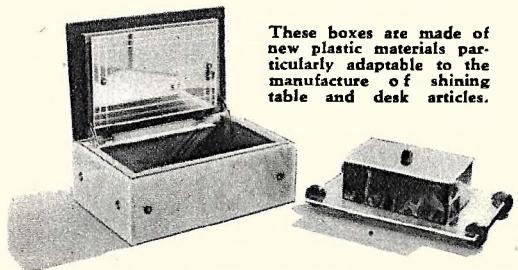
After Dr. Leo Baekeland discovered Bakelite almost by accident in 1909 when he was trying to make a fusible synthetic resin, the creation of new plastics slumped. For years Bakelite and Celluloid were the only important ones used in America, and each had definite limitations. Celluloid, admirable as it was for many uses, was highly inflammable; and Bakelite, despite its utilitarian excellence, could not then come into popular use because of its cost and blackness.

America needed a popular plastic—a substance cheap, fire-resistant, and capable of taking on beautiful colors so that it could be used in the drawing-room as well as the telephone exchange. Not until the last decade did such a product appear.

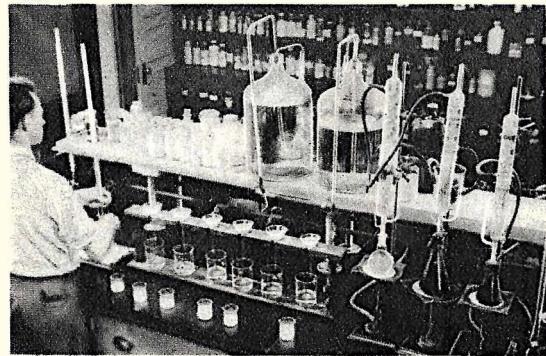
Beetle, Catalin, Durez, Plaskon, Tenite, Resinox, Unyte, and many others—all are new names, all trade names of brilliant plastics made for thousands of uses. Outwardly similar, they are chemically different. Lus-

STARTLING NEW SUBSTANCES

trous, vari-colored Catalin, for instance, cannot take the place of Bakelite in telephone and radio; nor can black Bakelite replace Catalin in the construction of toilet articles and chessmen, where beauty is needed and electricity is not. Roughly, plastic can be divided into three groups: Those made from vegetables, from animal, and from mineral matter.



These boxes are made of new plastic materials particularly adaptable to the manufacture of shining table and desk articles.



A scene in a research laboratory at Newburgh, N. Y. Chemists conduct endless experiments in their quest for new substances for industry.

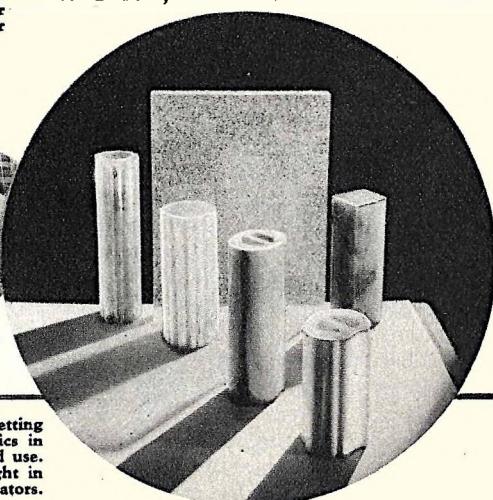


This Fabrikoid table setting shows possibilities of plastics in several phases of household use. Catalin is shown at the right in forms available to fabricators.

Cellulose—the fiber forming the cell wall of all plants, but found in its purest form in cotton—is the old and the new titan in plastics. From this cheap and plentiful vegetable base came the earlier Celluloid; and it now makes Pyralin, Tenite and cellulose acetate. Though it will burn slowly, cellulose acetate is not highly inflammable as was the older Celluloid. Buyers of Cord, Auburn and Hudson cars this year have steering wheels made of this newest plastic. Sheets of Pyralin one-fiftieth of an inch thick are sandwiched between two thin panes of glass to make modern automobile safety glass. And tough, gleaming Tenite now makes thousands of fountain pen barrels, as well as many other semi-transparent things.

It seems a far cry from cow's milk to buttons, yet chemistry has hurdled the distance. America's button industry—a large producer concentrating on a small but vital product—relies largely on milk for its basic material. Casein, made from milk, is chemically combined with formaldehyde to form a lustrous plastic that is giving buttons a more prominent place in wearing apparel.

Mineral plastics are composed chiefly of phenol (carbolic acid) combined with formaldehyde. Of these the well-known Bakelite and a few others are molded into desired shapes, are black in color, and therefore are largely restricted for industrial use. Others such as Catalin are made from similar basic materials but are cast into sheets, rods and tubes of brilliant



REDUCE COSTS IN MANUFACTURING

colors. This bulk stock can be fabricated by cutting or by turning on an ordinary lathe, resulting in colorful cutlery handles, knobs and novelties.

Among the most useful of the phenol plastics is the laminated type, such as Formica, in which canvas or other fabric is pressed into the material for greater strength and insulation. Modern motor cars can thank laminated phenolic formaldehyde for a large degree of their quietness. Gears of this substance have widely supplanted steel because they wear remarkably and do not clatter. In the new ocean giant, Queen Mary, too, is \$100,000 worth of decorative material made from fire-resistant American Formica.

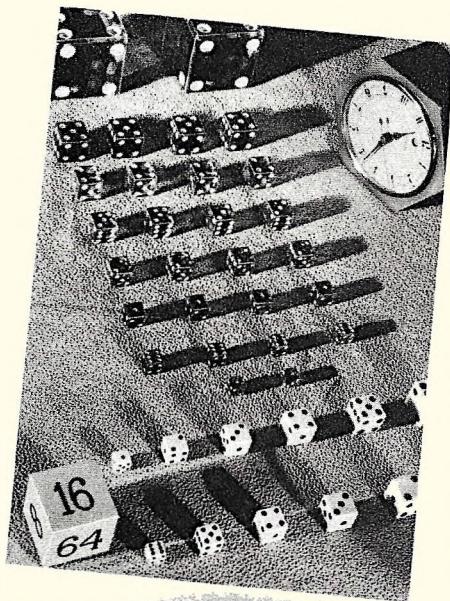
One of the newest compounds to startle the market is the urea plastic, a mixture of nitrogen—snatched from the air—with carbon dioxide and formaldehyde. Unlike the others this is manufactured first as a powder and is then molded. Grocery scales made by the Toledo Scale Company used to be housed in cumbrous metal that made them weigh 160 pounds. The company substituted Plaskon, a urea plastic, for its metal housings; in so doing it reduced the weight of the scales to 55 pounds and trebled its sales!

Industrial war is the inevitable result of a

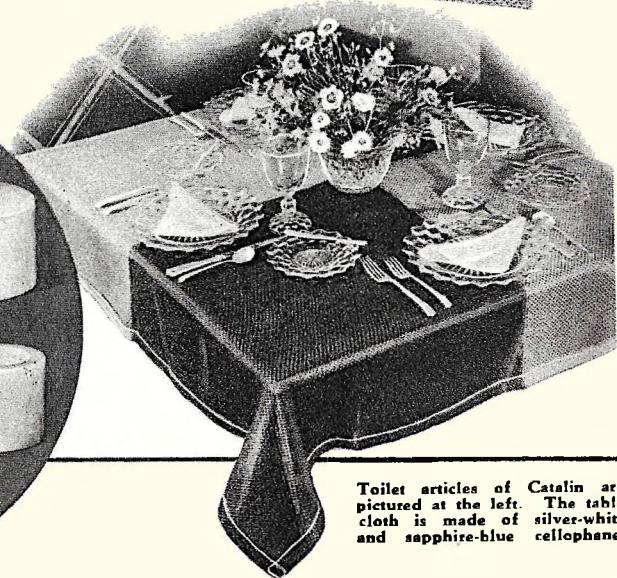
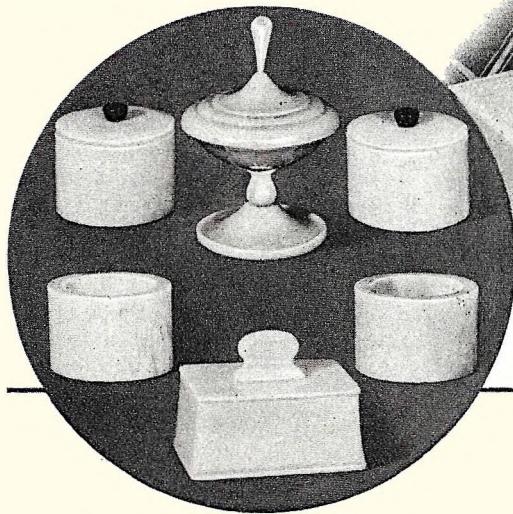
successful new material. When one considers that many industrial units formerly made of several pieces of metal bolted together can now be molded in one piece of plastic, thus saving the cost of assembly and painting, the answer is obvious.

Yet there are many uses which plastics cannot as yet fill, because of mechanical limitations. Will research remedy that by

[Continued on page 130]



Playtime gadgets of Catalin are shown at the right. They are made of synthetic resin, now widely used in manufacturing. A solution of phenol and formaldehyde is oven cured and shaped.



Toilet articles of Catalin are pictured at the left. The table cloth is made of silver-white and sapphire-blue cellophane.

Mirror Delivers Sales Talk To All Who Pause Before It



Anyone pausing to inspect himself before this mirror is rewarded with a sales talk delivered by automatic phonograph shown in the foreground. An electric eye starts the machine.

THE universal appeal of the mirror has long been recognized by advertising men as an effective medium for attracting attention to their message but it was left to an enterprising inventor to perfect the talking mirror. With his device the mirror delivers a sales talk the moment someone pauses before it.

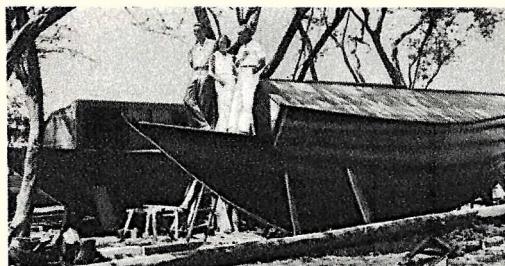
The talking mirror is intended for installation in department stores, but it can be used outside with equal effectiveness. An electric relay system swings into operation the moment anyone interrupts an electric eye to scan himself in the innocent appearing mirror. The relay starts an automatic phonograph and amplifier and a brief sales talk is delivered.

Casting Turns Out To Be Monster

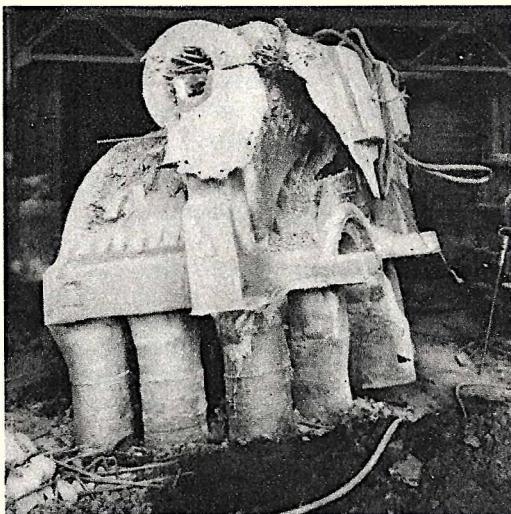
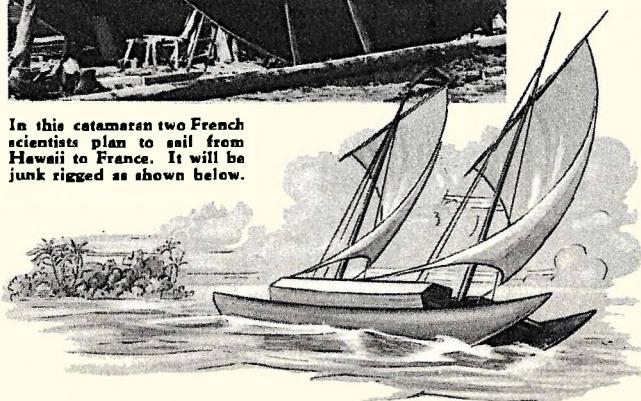
Marooned Men Build Catamaran

THEIR Chinese junk wrecked at Kalau-papa, Molokai, two French scientists, Capt. de Bischop and M. Joseph Tatibouet, immediately began construction of a new craft in which to continue their study of the South Seas.

Aided by two Chinese carpenters, the pair began work on a catamaran, or "double outrigger," and expect to have it ready for launching in a few weeks. It will have two hulls, each 30 feet long with four feet of draft. It will be a two-masted, junk rigged sailing vessel. They plan to sail it back to France via the Panama Canal.



In this catamaran two French scientists plan to sail from Hawaii to France. It will be junk rigged as shown below.



Like a sculptor's nightmare appeared this giant casting when engineers knocked off the mold. The steel elephant is really the outer high-pressure shell casting of a steam turbine.

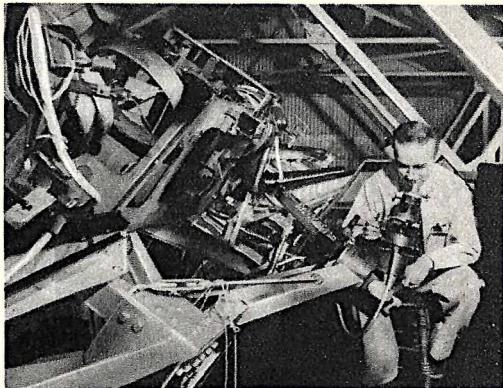
KNOCKING the mold from a giant casting to be used as part of a 40,000-kilowatt turbo-generator, General Electric engineers were startled to discover they had apparently unearthed a prehistoric monster. The excess metal had overflowed the mold, adding a vicious trunk and huge ears to the many-legged monster. After trimming and machining operations are completed, the casting will become the outer high-pressure shell of the steam turbine.

Astronomer Builds Fifty-Foot Transit To Survey Universe

A SURVEYOR'S instrument, not for measuring rods and miles on earth but for accurately surveying millions of miles in space, has been designed by Dr. F. G. Pease for use at the Mount Wilson Observatory.

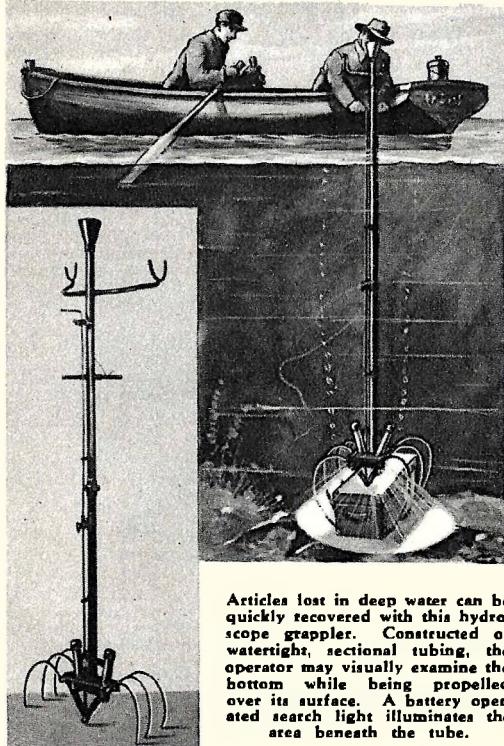
With the assistance of his new instrument, called the interferometer, Dr. Pease determined that the star Epsilon Pegasus, 2,160,000,000,000,000 miles away, had a diameter 100 times as great as that of the sun.

By adjusting two sliding mirrors on a 50-foot steel frame, the star's reflection can be measured. Mathematics then supplies the actual diameter of the star.



This is the interferometer, a 50-foot transit used by astronomers in surveying the universe. Two sliding mirrors are focused on a star and the reading, based upon a mathematical formula, accurately determines the diameter of the star.

New Grappler Has Sighting Tube



Articles lost in deep water can be quickly recovered with this hydroscope grappler. Constructed of watertight, sectional tubing, the operator may visually examine the bottom while being propelled over its surface. A battery operated search light illuminates the area beneath the tube.

SUNKEN motors, fishing tackle and other articles lost overboard may be quickly recovered with a recently patented hydroscope grappler which can easily pick up a small ring or a heavy motor. A sighting tube illuminates the bottom with light from a small battery, and the grappling hooks can be manipulated from the surface as desired. Additional sections provide for deep water. It was patented by Fred Arnold of Cambridge, Ohio.

Atom Gun Will War On Cancer

SCIENCE continues to marshal its forces in the war against cancer, the latest addition being a new atom gun with a potential of 2,500,000 volts recently constructed at the University of Wisconsin.

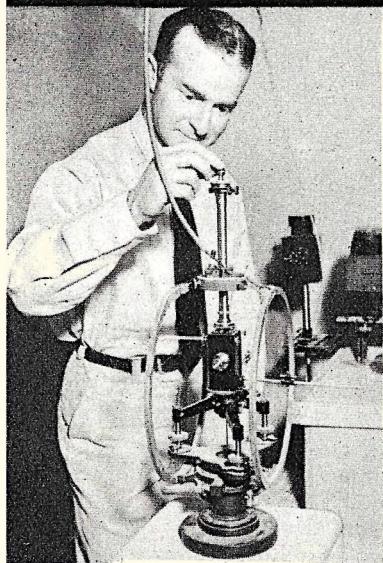
The great machine is expected to hurl protons at a velocity of 15,000 miles a second. Present experiments are being directed at developing super X-rays to produce an effective cure for deep-seated cancer.

The experiments are being conducted under the supervision of Dr. D. B. Paarkinson and Dr. R. G. Herb. Last year the two scientists attracted nation-wide attention with their work on a smaller atom gun.



Dr. D. B. Paarkinson, left, and Dr. R. G. Herb of the University of Wisconsin, shown inspecting power plant of a new atom gun expected to develop a potential of 2,500,000 volts.

Astronomers Study Radio Interference

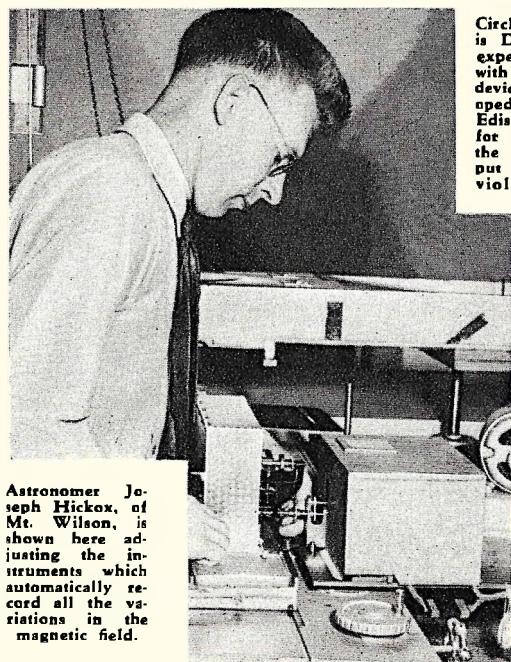
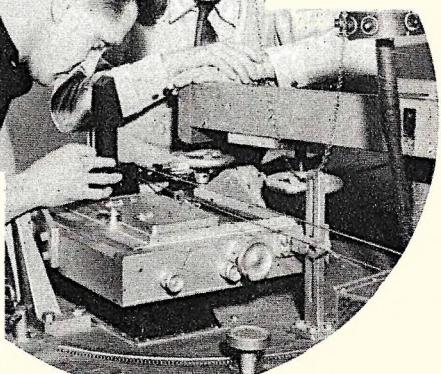


The instrument shown above is the remarkable apparatus with which Dr. Robert S. Richardson, of Mount Wilson Observatory, Pasadena, Calif., discovered that when short wave radio went out of commission about every 54 days, it was because exploding sun gases interfered.



Dr. Seth B. Nicholson is shown adjusting the automatic spectrohelioscope used to obtain a continuous record of the sun.

Circle — Here is Dr. Hickox experimenting with the filter device developed by Dr. Edison Pettit for measuring the sun's output of ultra-violet light.



Astronomer Joseph Hickox, of Mt. Wilson, is shown here adjusting the instruments which automatically record all the variations in the magnetic field.

IMPORTANT astronomical problems are being solved with recently invented scientific apparatus by Doctors Nicholson, Hickox and Richardson at Carnegie Institution's Mount Wilson Observatory, near Pasadena, California.

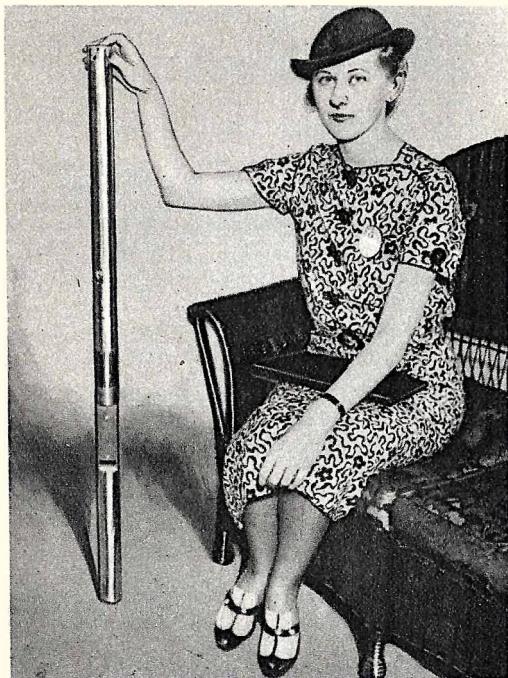
For the first time a new camera makes continuous photographic records of the sun, and an intricate filter device measures its output of ultra-violet light. A new spectrohelioscope enables astronomers to observe masses of exploding gases moving over a 7-inch image of the sun, while a magnetometer records all variations in the intensity of the earth's magnetic field. Scientists believe that sun spots explosions cause a periodic interruption of short wave radio reception.

Radio Telephone Solves Difficult Railroad Problem

THE difficulty of communication, especially in emergency situations between signal towers and engineers on trains, has long been a major problem of the railroads. When a change of orders came over the wire, nothing could be done but signal the train to stop at the nearest block.

But the French railroads solved a world-wide problem by installing radio sending and receiving apparatus on the locomotives and in the signal towers. The idea was first experimented with on the Rouen-Paris run, and radios were immediately adopted as standard equipment. Today, engineers and signal tower chiefs are in constant communication.

Camera Shoots Inside Of Oil Well



The stake-like affair held by Miss Ann Hollenburg, and demonstrated at the recent Tulsa, Oklahoma, Oil Exposition is the new power-driven, electric-lighted oil well camera.

CAMERAS go everywhere these modern times, into the air above, the waters beneath and, now, into the very earth itself. For today there is a 4-foot, power-driven camera, carrying its own electric light and automatically taking pictures every three minutes, that follows the oil or rock drill down the hole to a 10,000-foot depth to secure photographs of the earth's strata.



The circled photograph shows the engineer talking into and receiving orders from one instrument, but the radio itself is in a compact box on the front of the locomotive, as shown.

Novel Gas Gun Is Death On Flies

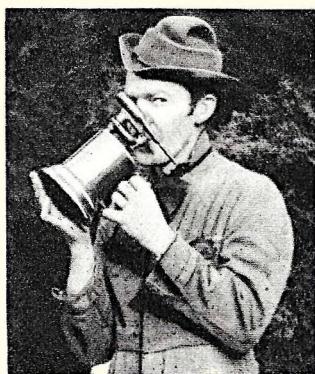
SOMETHING of a crack shot is Dr. J. F. McClendon, of the University of Minnesota, who will not permit flies in his classroom or laboratory.

His air gun is loaded with pyrethrum concentrate, which is four times as strong as ordinary insecticides. When a fly zooms in to put on an annoying aerial exhibition, plop! goes the good doctor's trusty gun, and there is one less fly to fight against.



Dr. J. F. McClendon, University of Minnesota, is shown demonstrating his recently invented fly-gun, which shoots a powerful chemical at flies. The poisonous vapor kills them.

He Finds Music in Plumbing Tools



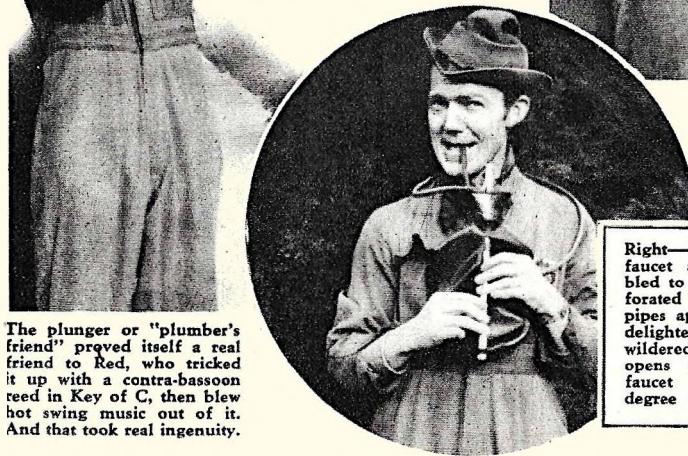
Above—By inserting a trumpet and mouthpiece into the hole where the pump ordinarily screws in, Red produced what he calls the hot blow torch trumpet.



Red inserted a cornet mouthpiece into a length of shower hose (above), perforated for finger play, plugged in the nozzle and found himself with a rubber clarinet.



Red added a fife and so solved the problem of what to do with old hot water bottles. He calls this unusual oddity the plumber's bagpipes.



The plunger or "plumber's friend" proved itself a real friend to Red, who tricked it up with a contra-bassoon reed in Key of C, then blew hot swing music out of it. And that took real ingenuity.

THOSE tools that plumbers once left behind have been given new uses by "Red" Smith of Los Angeles. He has turned them into musical instruments.

Red was a professional crooner and saxophone player. When work became slack in the movie studios and theaters he took up the creation and playing of unique musical instruments. And get work he did—as the musical plumber.

He plays all the plumbing tools. Yes, sir, actually plays them, for he fashioned all the tools into musical instruments. And, to keep his act in character, he wears coveralls and hauls his tools around in a bathtub.

To hear the strains of his musical blow-torch, suction pump or water faucet, is first to laugh, then marvel over his mechanical ingenuity and unique musical cleverness.



By turning a pound coffee can upside down inside an enameled stew pan, Red strung up an instrument to rival the real banjo. He is seen strumming the pan-can in the photograph at left.



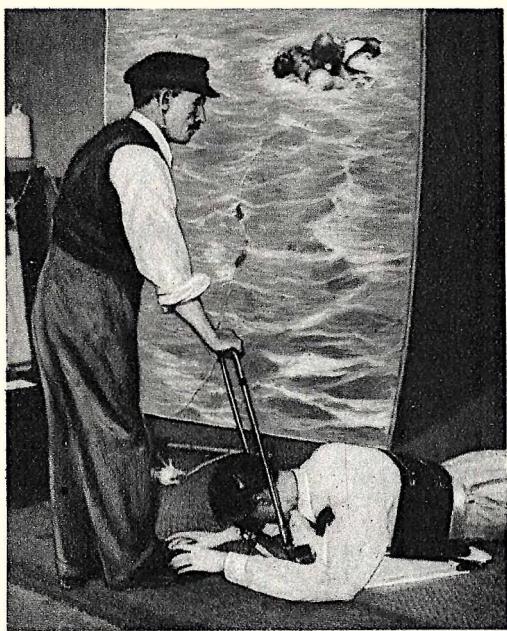
Right—With a water faucet and trap assembled to a length of perforated brass pipe, Red pipes applause from his delighted but rather bewildered audience. He opens and closes the faucet to the wanted degree to change tones.

New Denmark-Sweden Bridge Spans Famous Battle Inlet

TO JOIN Denmark and Sweden, a great bridge is now being rushed to completion between Malmo and Kjobhnavn. It spans the inlet between the Baltic and the North Sea, at the spot, where, during the World War, submarines fought against enemy battleships.

The Oresund Bridge will span eleven miles of open sea, with the central arch 150 feet above the sea, sufficiently high for the largest ocean liner to pass beneath without lowering her masts or funnels. The two navigation channels are bridged by single 1,000-foot bowstring spans. There will be levels for trains, automobiles and push cycles, of which there are millions in use on the Continent.

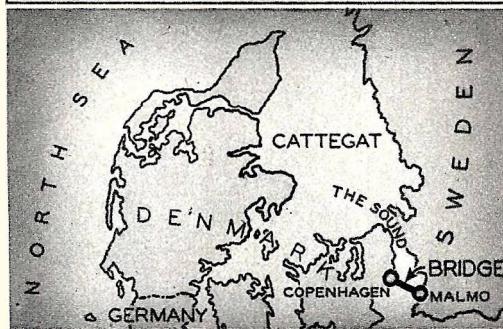
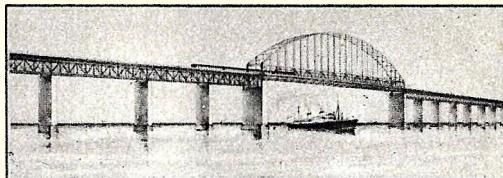
Life-Saving, A One-Man Operation



Life-saving now becomes a one-man operation instead of using men as formerly, for with this new apparatus, the chest bellows, operated by handle, provides artificial respiration.

AMONG the many exhibits on display recently at the Salon Nautique, Paris, was the latest in life-saving apparatus.

Where formerly it required the aid of two men to complete the job of artificial respiration, the new apparatus needs only one man to resuscitate the water victim. The operator straps the bellows beneath the unconscious man's chest, lays him face downward, adjusts the head-rest to align the windpipe, then rocks the handle of the respirator.



This new railroad and motor bridge spans the inlet between the Baltic and the North Sea where, during the World War, German and British submarines fought against enemy ships.

Vertiplane's Wing Locks In Place

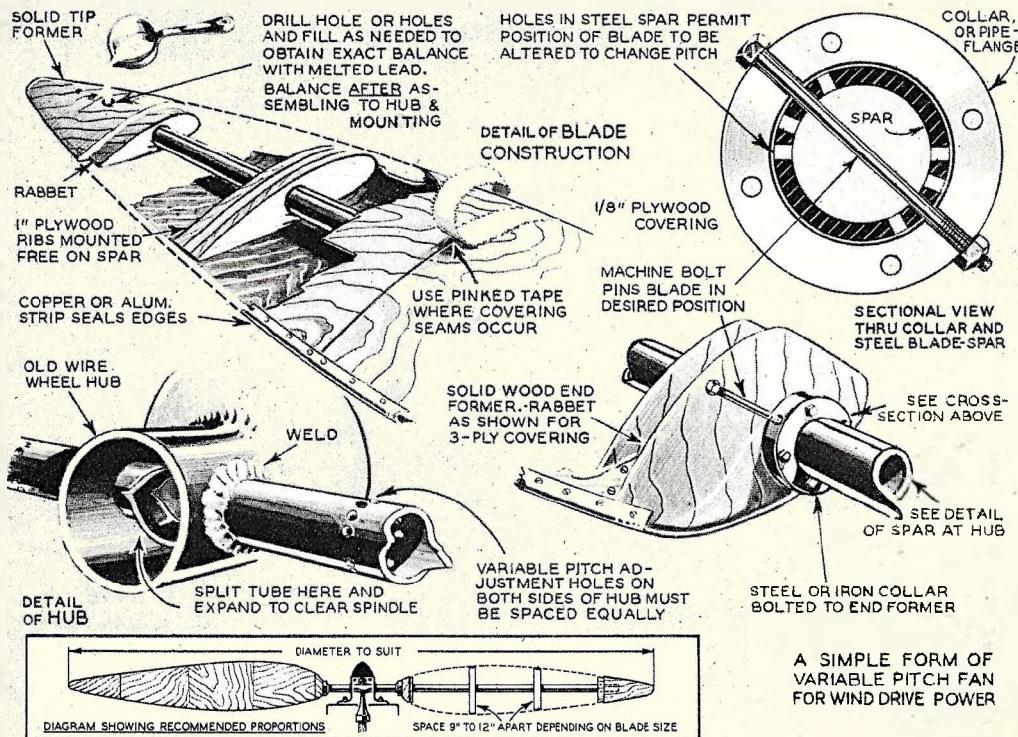
THE vertiplane, closely related to the autogiro, and perhaps later to evolve into the long sought helicopter, is the invention of Gerard P. Herrick, cousin of the late Ambassador Herrick. It was tested recently at Fairchild Field, N. Y.

The novel upper wing of the vertiplane functions in the usual biplane manner, or spins like the vanes of an autogiro. So far take-offs have been accomplished with the fixed wing, but when altitude was reached, the wing was made to spin and hover the ship over given points. The idea behind all these experiments is to perfect the vertiplane so that it will rise and descend vertically.



Called the vertiplane by its inventor, Gerard P. Herrick, this new type of aircraft is a combination of biplane and autogiro. The novel top wing spins or remains stationary.

Auto Parts Make Efficient



The propeller blades are constructed from plywood with airplane tubing forming the rigid center core. Spacers placed 9 to 12 inches apart serve as mountings for the plywood covering. If one side of the propeller is too heavy drill holes in the tip of the other blade and fill with melted lead. A copper or aluminum strip seals the edges of the blade and prevents chipping.

by DOUGLAS P. ROLFE

ONE of the many problems confronting the prospective builder of a wind driven generating plant is the selection of a suitable windmill or propeller. While the flat-bladed, fan type is usually selected by amateur builders there is a strong argument for the airplane type propeller and as a matter of fact it is becoming increasingly popular. In the first place old airplane propellers are fairly easily obtained and are not at all expensive. While in certain instances an old airplane propeller may prove satisfactory there are many more cases where its value is something less than zero.

Many times these propellers are too heavy and have a fixed "pitch" which may be quite unsuited to the prevailing winds of your locality.

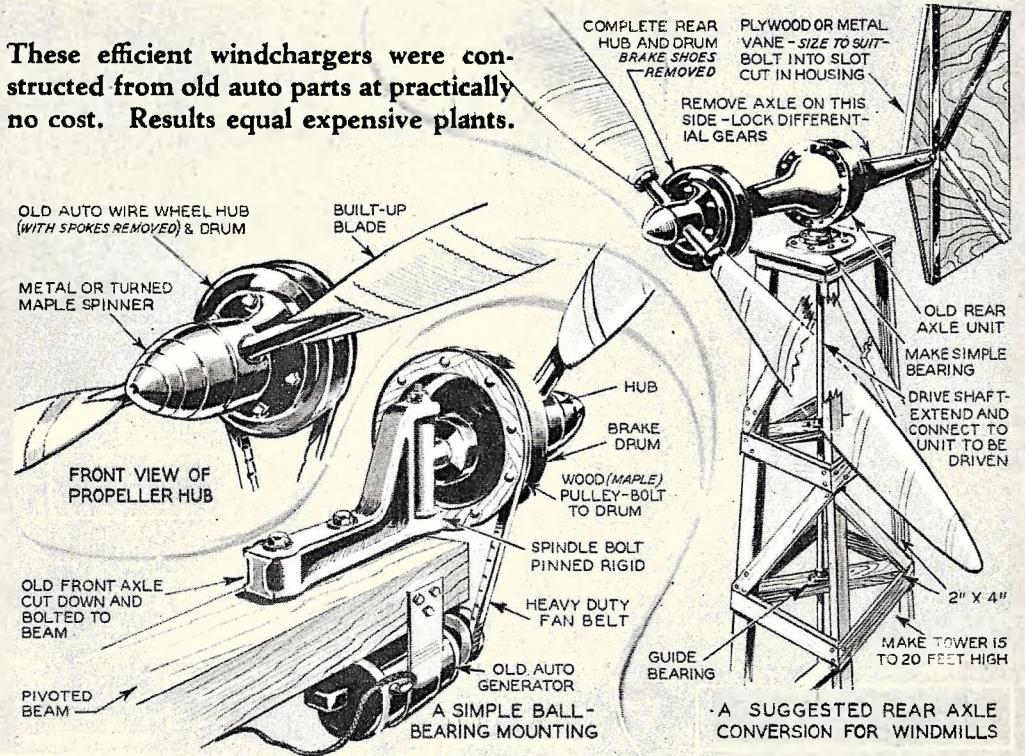
This article will proceed to outline the

construction of a simple, reasonably light and quite practical "fan" which is built something in the manner they put autogiro vanes together. It can be built by anyone able to use tools and has moreover the answer to your particular "pitch" troubles incorporated in its design!

The first item is a ball bearing hub. This would be expensive and difficult to produce in a home workshop. Fortunately this necessity does not exist as the junk yards are teeming with hubs, and spindles, too, ideally suited for the purpose. Any light car hub and spindle is adaptable although for small units the rear hub from an old motorcycle may be used. As the drawings show, this hub forms the starting point for the wind propeller. The blades, built up of plywood on formers, are spaced along the central spar and are adjustable to provide variation of "pitch." How this is done can be seen quite

WINDCHARGER Plants

These efficient windchargers were constructed from old auto parts at practically no cost. Results equal expensive plants.



Junked automobile parts are ideal for use in building a sturdy windcharger plant. A front axle cut down and bolted to the pivoted beam makes an ideal propeller mounting. The ball bearing hub of an auto wheel provided with a maple wood pulley is ideal for windcharger use. Mount the generator under the pivoted beam and gear to propeller with "V" belting.

clearly from the detail diagrams. The central spar or tube may be of iron but it is far better to use a length of steel tube for this. Tubing such as is used in airplane construction is ideal for the purpose. The diameter of the tube is in direct relation to the diameter of the propeller you plan to build. General proportions are shown in the accompanying drawings, although actual constructional details may be varied to suit the builder's own ideas and, to some extent, his materials available. For instance, the blades are adjustable on the spar itself as shown, but two tubes may be employed and attached to the hub in such manner as to permit varying the pitch at this point of attachment if so desired.

It is assumed that most amateur builders plan on using automobile generators for their wind electric plants. This presupposes some gearing up to insure adequate revolutions in a moderate breeze. To accomplish this a hard wood pulley is attached to the hub with

a length of "V" belting to make the connection direct to the standard generator pulley. The hub pulley for best results should be between 8 and 10 inches in diameter. Heavy duty automobile fan belts are excellent for the drive belt.

For really large ambitious wind plants something more substantial is necessary. Many ingenious ideas have been developed and carried out with standard automobile parts.

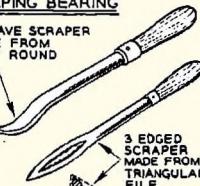
For a light windcharger plant an old front axle cut down and bolted to the pivoted beam makes an ideal mounting. In this case the wood pulley is bolted to the back of the brake drum with the fan belt connecting to the generator which is mounted directly underneath on a bracket. A plywood vane of suitable size attached to the opposite end of the beam completes the windcharger. For best results the device should be mounted at least twenty feet in the air either on a housetop or tower.

CHECKING the CAR for Elusive



SCRAPING BEARING

CONCAVE SCRAPER
MADE FROM
HALF ROUND
FILE



BEARING CAP

3 EDGED SCRAPER
MADE FROM
TRIANGULAR
FILE

REMOVING BUSHINGS &
PINS BY CONTRACTION
IN HOT WATER

OLD PIN,
GROUND
DOWN

SET PISTON
ON BLOCK

PISTON PIN
OR BUSHING

REMOVING PISTON PINS

OLD PIN,
GROUND
DOWN

SET PISTON
ON BLOCK

PISTON PIN
OR BUSHING

BUSHING
OIL GROOVES
OIL HOLE

SHIMS
SHAFT

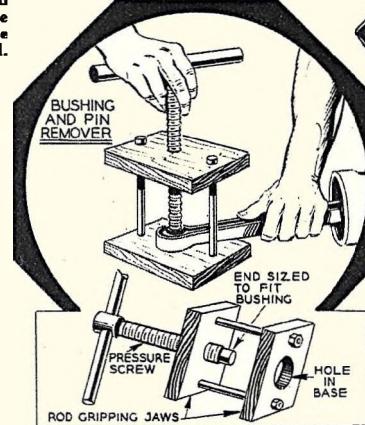
HALF OF BEARING

HIGH SPOTS TO BE SCRAPED

CONSTRUCTION OF BEARING

Crankshaft pounding is caused by loose bearings. Tighten bearing bolts or scrape with a scraper made from a half round file as shown above. Use Prussian blue in the scraping process so that surface is made perfectly round and not oval.

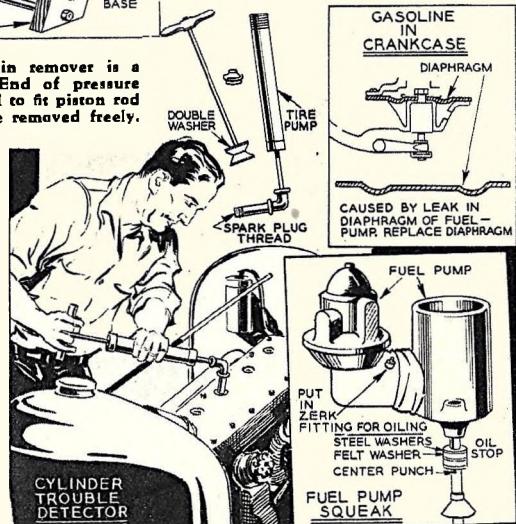
To simplify the removal of bushings and pins from the piston assembly submerge in boiling water to expand the metal, then drive pins out with an old pin which has been ground down to serve as a punch. Place the piston on a block of soft wood during the removal operation.



This bushing and pin remover is a handy piston tool. End of pressure screw should be sized to fit piston rod bushing so it may be removed freely.



After completing the scraping of a bushing it should be well lubricated, oil being spread out with finger tips. This completed, bushing may be assembled.



A handy cylinder trouble detector for locating piston knocks and similar noises can be made from an old tire pump provided with double washers and threaded reducer to fit spark plug taps. Fuel pump squeaks can be eliminated as shown.

NO MATTER how good an automobile motor may be it will eventually get noisy and begin to lose power. While the power factor is very often ignored the presence of noise is most objectionable.

Crankcase pounding, valve hiss and piston slap are the more common causes for a motor to be noisy and lacking in its power output. While these items appear to involve special processing that can only be attempted by an experienced mechanic, it is possible for anyone with a fair knowledge of automobile construction to correct trouble.

Noise caused by worn bearings can usually be detected by the loud dull sound produced. The same sound is present if they are merely loose, therefore first check for loose bolts and if the trouble is not here take the bearing apart and re-scrape it. A tool for this work can be made from a half round file which has been ground into a concave blade. A similar tool can also be fashioned from a triangular file in the manner made clear by the diagrams. After smoothing off the inside of the bearing sections smear on a thin coat of Prussian blue then re-assemble the unit.

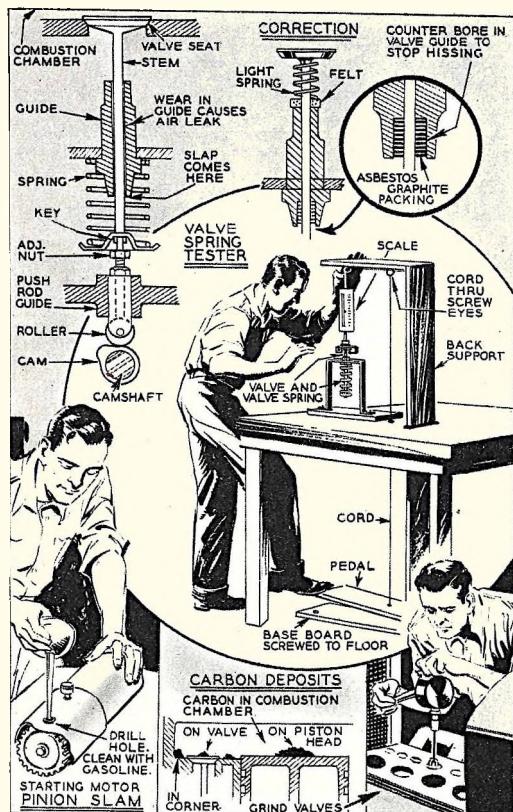
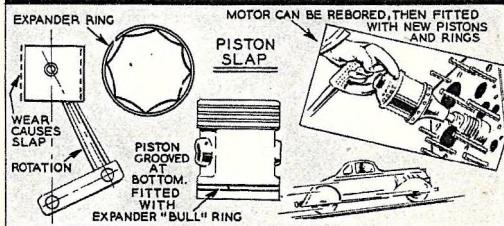
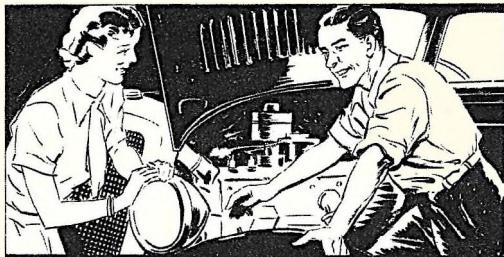
Engine NOISES

by
MORRIS A. HALL

Until now only the most experienced auto mechanic could track down an elusive motor noise. This article tells how you can easily correct these annoying sounds.

Turn the shaft several times in the bearing, then open the sections. High spots will clearly show up and should be removed so that shaft turns freely.

Worn piston pins and piston rod bushings are also responsible for much of the trouble. An old pin ground down makes a handy tool for removing piston pins. A simple screw device similar to the one illustrated on this



All valves must have a uniform spring tension if the motor is to perform efficiently. Springs may be quickly checked on the simple spring balance device shown above. The proper adjustment of the valve tension can be determined by referring to the cross section diagram illustrated at upper left. Asbestos-graphite packing in the counter bore will eliminate valve hiss. The starter motor mechanism should never be oiled. Instead plain gasoline should be squirted into mechanism from time to time. A small hole drilled in motor housing permits access to starter spring and the unbalanced pinion for pouring gas.

Piston slap is often due to one side of the cylinder wall being worn down. The only correction for this trouble is to re-bore all cylinders to the first oversize and use new oversize piston rings. The above diagram shows the cause for pistons to slap.

page will aid in the removal of worn bushings. Placing the entire piston in boiling water for several minutes will expand the outer metal sufficiently so that pins and bushings will come out easily.

Where the piston rings have caused the cylinder walls to wear rough, re-boring is necessary. For this work the proper hand drill attachments should be used to insure a perfectly true surface. When re-boring, grind out the cylinder to the first oversize and secure piston rings to fit so that there is no leakage of power.

It is easy to find the exact cause for the particular noise your car has developed by using a simple cylinder trouble detector. Secure an old auto pump and install a double washer plunger on the shaft, then fit up the end of the pump with a connection threaded to fit a spark plug tap. When a cylinder is suspected remove the plug, screw on the pump then turn over the engine until the pump handle is forced upward. By removing the pan and allowing someone to hold the rod a loose piston can be immediately detected.

In assembling the pistons be sure to lubricate the surfaces of the bearing well by applying heavy oil to the inner surfaces and smoothing out with the finger tips. The bear-

[Continued on page 126]

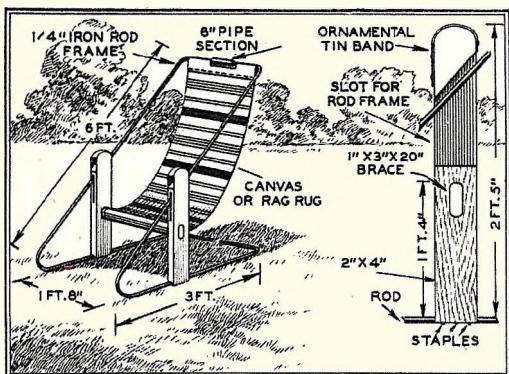
Build A Swinging Desk Stand For Your Typewriter

IN HOMES where a typewriter finds occasional use in the library or study it must usually be carried from the closet and returned each time it is used.

By constructing a simple swinging stand it can be permanently installed and pushed out of the way when not in use. The stand can be built for about one dollar.

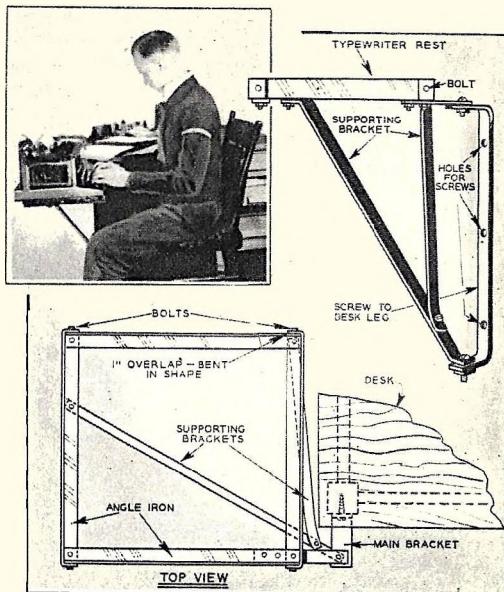
Make the dimensions to suit your own requirements with the top of the stand just large enough for the typewriter feet to fit snugly into each corner. The bracket to which the top is mounted is of $1\frac{1}{4}'' \times \frac{1}{4}''$ stock bent to shape as shown in the diagram. Attach the bracket to the top with machine bolts then form the "C" support and attach this to the desk with wood screws. Two machine bolts serve as the pins on which the stand swings.

Modern Lawn Chair Easily Built



Made from lengths of iron or steel rods, a piece of awning canvas and two-by-four wood supports the lawn chair above is an interesting and practical summer project for the workshop.

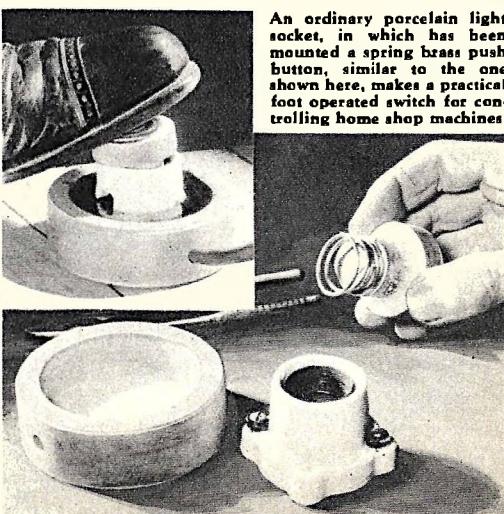
TWO lengths of scrap iron rod $\frac{1}{4}$ " in diameter, a six-foot length of $2'' \times 4''$ and some bright awning canvas form the materials necessary for building this comfortable lawn chair. Bend the iron rods to the shape shown in the illustration, joining the top section with a six-inch length of gas pipe. Cut the $2'' \times 4''$ into two pieces and shape them accordingly. A brace extending across the $2'' \times 4''$'s forms a rigid support for the chair. Attach the colored canvas to the top of the pipe frame and to the crosspiece. The frame is painted in bright red and silver bronze. Bronze all metal parts and apply two coats of enamel to the wood construction. Strips of tin or chrome tacked over the $2'' \times 4''$'s as indicated add to the chair's attractiveness.



Constructed of inexpensive strap and angle iron, this typewriter stand offers a new convenience to home craftsmen or students. Assemble with bolts and attach to desk with screws.

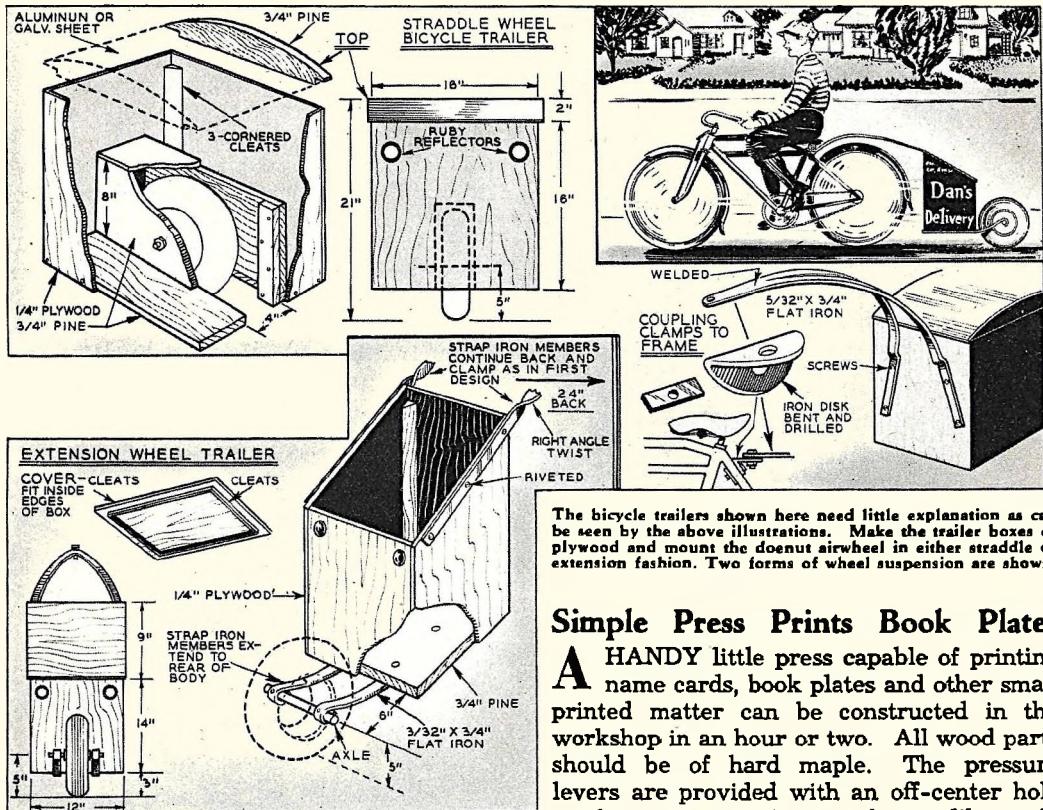
Light Socket Forms Handy Switch

ANY porcelain cleat socket can be made into a useful foot switch for operating power tools. To a wooden button attach a strip of copper for a contact and wind a spring from stiff wire. Insert the button in the socket, mount socket in a wooden base filled with molten wax and the switch is ready for use.



An ordinary porcelain light socket, in which has been mounted a spring brass push button, similar to the one shown here, makes a practical foot operated switch for controlling home shop machines.

Handy Trailers Speed Bicycle Deliveries



The bicycle trailers shown here need little explanation as can be seen by the above illustrations. Make the trailer boxes of plywood and mount the doenut airwheel in either straddle or extension fashion. Two forms of wheel suspension are shown.

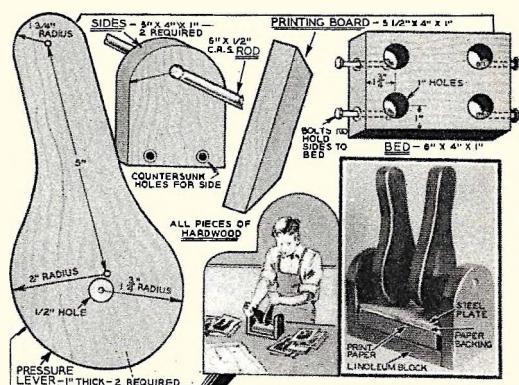
Simple Press Prints Book Plates

A HANDY little press capable of printing name cards, book plates and other small printed matter can be constructed in the workshop in an hour or two. All wood parts should be of hard maple. The pressure levers are provided with an off-center hole so that an impression can be readily made from a linoleum block or wood cut. After applying printers ink to the face of the cut insert it in the bed of the press face up. The paper to be printed should be moist for best results. Place this over the cut followed by the paper backing and last a steel plate. Pulling the levers makes the printed impression.

FOR the youth who does the neighborhood chores a bicycle trailer will prove of much assistance in hauling ice and groceries. Both trailers described here employ a single wheel making it possible for them to follow narrow paths. With the conventional two-wheel trailer this is not possible.

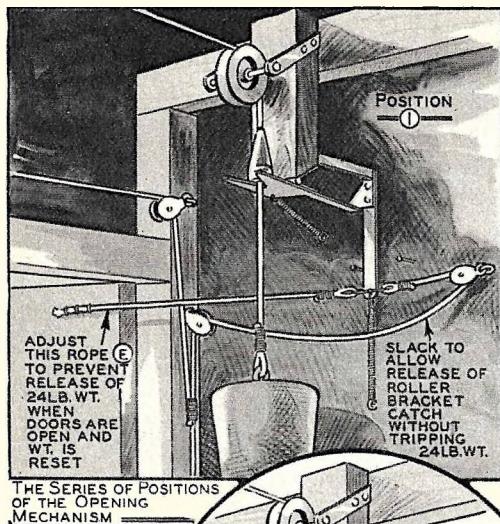
The builder has a choice of wheel mountings, in making the trailer, which best suits his requirements. One trailer features the straddle wheel while the other offers more carrying space, but has the wheel mounting projecting in the rear.

In constructing the straddle wheel trailer first make a plywood box measuring 16 inches square with a well allowed in the center for the doenut air wheel. Make the towing bar from two lengths of strap iron welded as indicated and arranged so as to fasten to the coupling located on the bicycle frame just under the saddle. The rear wheel trailer is identical to the straddle type except that parallel bars support the wheel. The completed trailers are painted in brilliant enamel.

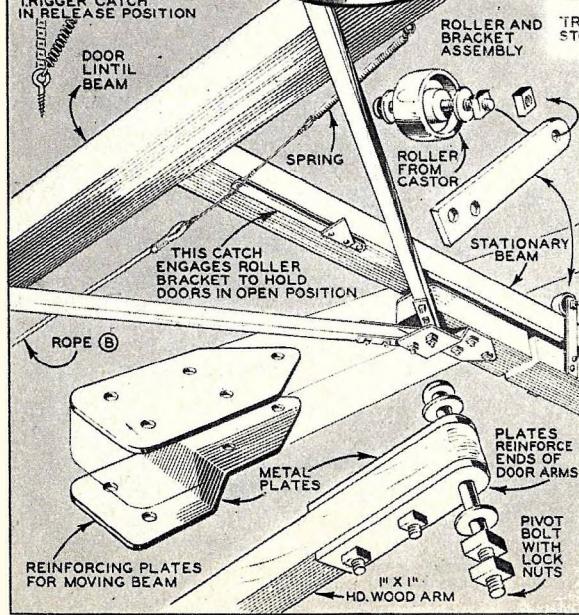
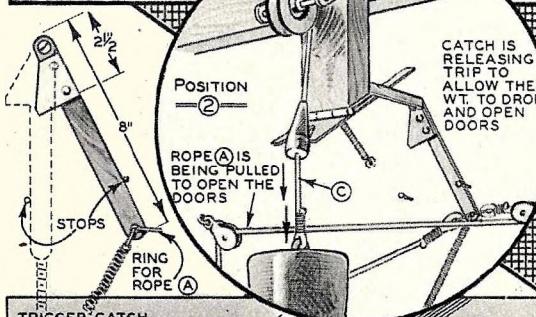


Making your own cuts from inexpensive linoleum and printing attractive book plates in this simple press is fun. The press can be built in a few hours from several pieces of scrap maple.

PULL-CORD CONTROL OPENS



THE SERIES OF POSITIONS OF THE OPENING MECHANISM

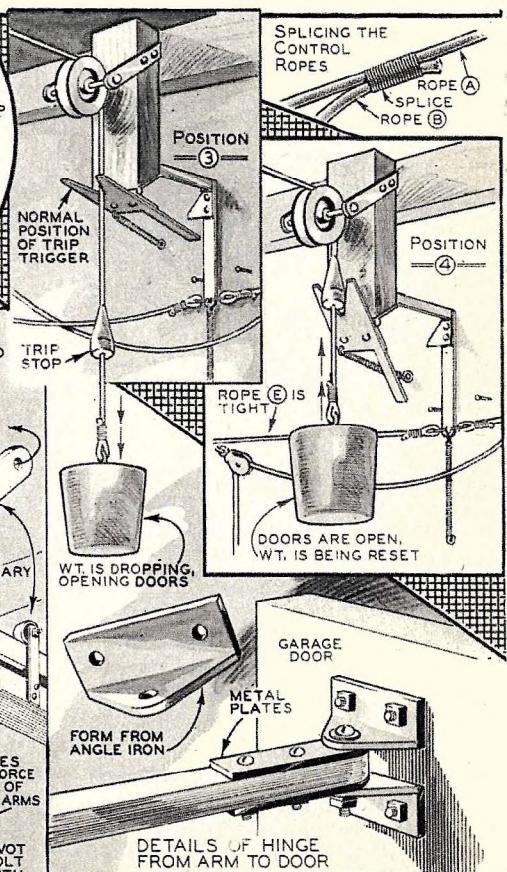


HERE'S a simple, automatic garage door control with which you may close your garage doors as you drive out and open them without leaving the car when you are ready to drive in.

The illustrations explain clearly, the construction of the various mechanisms required in the construction.

When the doors of the garage are closed, a pull on the control rope "A" releases the 24-pound weight as in Position 2. The weight opens the doors and the catch on the stationary beam engages the first roller bracket on the movable beam which holds the doors firmly in a wind. The catch on the stationary beam is placed so that the movable beam will project about 18 inches beyond the door frame in full open position.

Reset the 24-pound weight as in Position



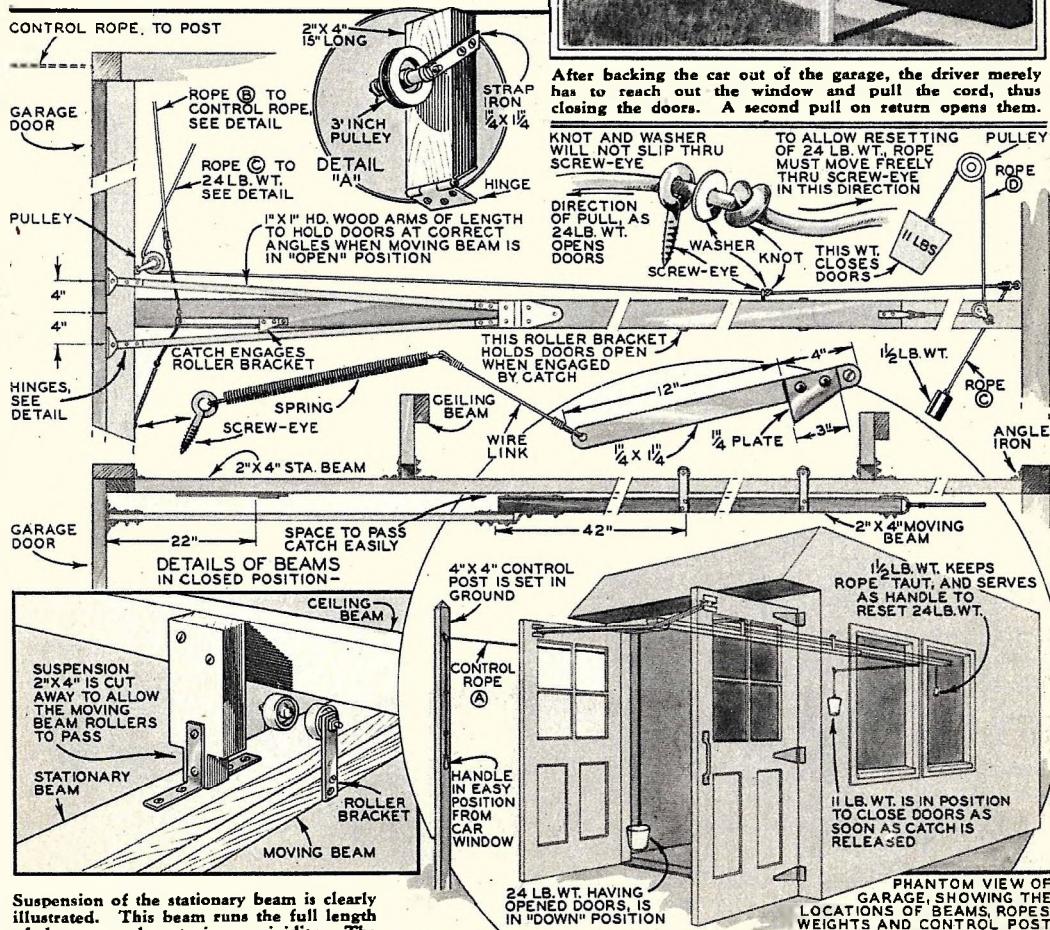
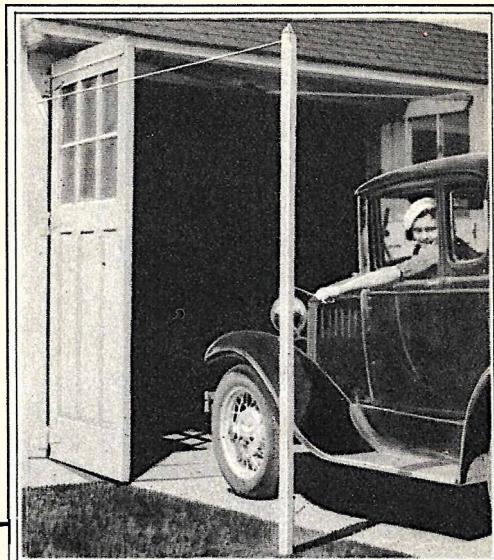
Details of automatic controls and weights are given above. Re-inforcing plates on moving wooden parts will prevent wear. As a safety measure, box-in weights.

GARAGE DOORS Automatically

1 then drive the car out of the garage. A pull on the control rope "A" will release the catch holding the doors open, and the 11-pound weight will close the doors by its pull on the rope "D." Rope "B" is spliced to rope "A" at the proper point to make this operation possible. It should be noted that while the doors are open, a pull on the control rope "A" will release the catch on the stationary beam, but rope "E" prevents the release of the trigger catch controlling the drop of the 24-pound weight.

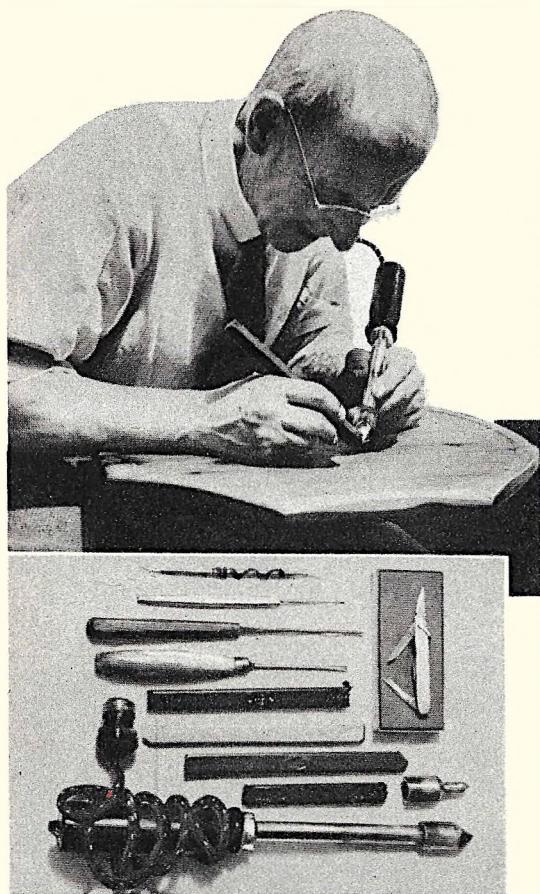
You will not find it necessary to leave the car to operate the control from the time you drive out of the garage until you have driven the car into it again.

Always remember to reset the 24-pound weight each time you leave the garage, whether you are driving in or out.



Suspension of the stationary beam is clearly illustrated. This beam runs the full length of the garage door to insure rigidity. The rollers should be kept well lubricated.

Inlaying with Colored Sealing Wax



Beautiful Venetian Marquetry can be produced in the home workshop by using ordinary colored stick shellac for the inlay material. The inlay above work was done with the simple tools shown at left. Suitable designs may be traced from magazine illustrations.

paint dealer; thin tracing paper, white office or wall paper paste, a pencil, two or three bottles of waterproof ink in various colors and a small water color paint brush.

Marquetry, or inlay work, of this type is particularly adaptable to decorating cedar chest lids, wood panels, checker boards and table tops. In making a small table head design similar to the one shown here, select kiln dried stock of cedar, mahogany, bass-wood or oak and finish the surface to a satin smoothness.

This done trace the design selected on thin tracing paper. The picture, "Birds In Combat," used on the original project was traced from a color plate illustration in a bird book.

The tracing completed, brush a thin coat of paste on to the wood and lay the paper over it. Center the design so the longer cuts will follow the grain as much as possible. Make sure the tracing is pasted down absolutely smooth and free of wrinkles then set aside to dry thoroughly.

Cut over the tracing through the paper and into the wood to a depth of approximately one-eighth of an inch with a razor sharp penknife. After checking the tracing

[Continued on page 124]

by G. A. MOLECEY

WHERE the inlay artist of old set mosaics with ivory and semi-precious stones, the modern workshop fan melts stick shellac with an electric iron for his inlays. Venetian Marquetry, an art that is rapidly being lost, can be successfully reproduced in the home workshop with no particular skill required to duplicate the strength of design and delicacy in workmanship of a 15th century artisan.

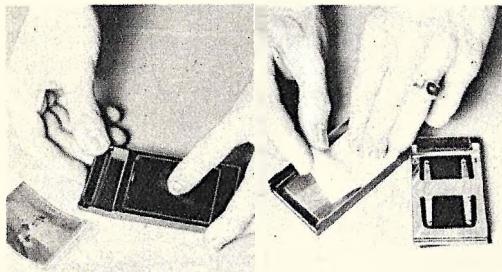
As in relief wood carving, designs may be selected from magazine illustrations or drawings and traced on the wood. Tools can be minimized to an electric soldering iron, sharp short bladed pen-knife, a few chisels and, where procurable, discarded dental tools. Materials are inexpensive and include several bars of colored stick shellac, available at any

Telescopic Finder Improves Camera Pictures

IF YOUR camera depends upon a scale focusing device the chances are that many pictures are ruined because you are a poor judge of distance. By using a focus finder on the camera all chance of errors will be eliminated since the finder automatically sets the camera bellows to the proper focus.

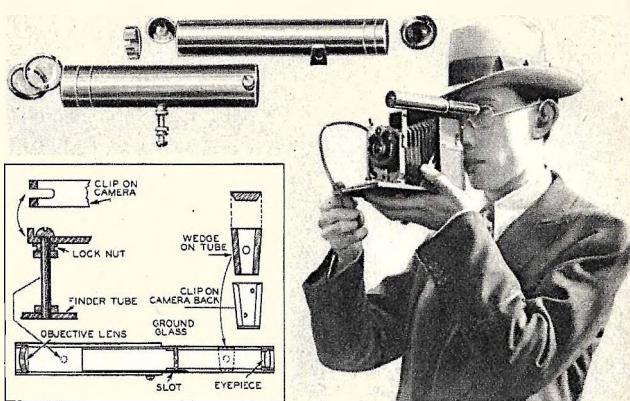
Make the telescopic unit from aluminum or brass tubing and install an objective lens of the same focal length as the camera lens in one end of the large tube. In the smaller tube insert a ground glass so that it will be in a position equal to the focal length of the objective lens. About two inches in back of the ground glass and at the end of the smaller tube mount a small magnifying lens for an eyepiece. Attach a wedge catch to the smaller tube and a bolt to the larger tube for mounting to the camera.

Film Pack Serves As Novel Printer



Using a film pack as an emergency printing frame is accomplished as pictured above. Take film pack apart, insert a glass over opening, then the printing paper and finally spring back.

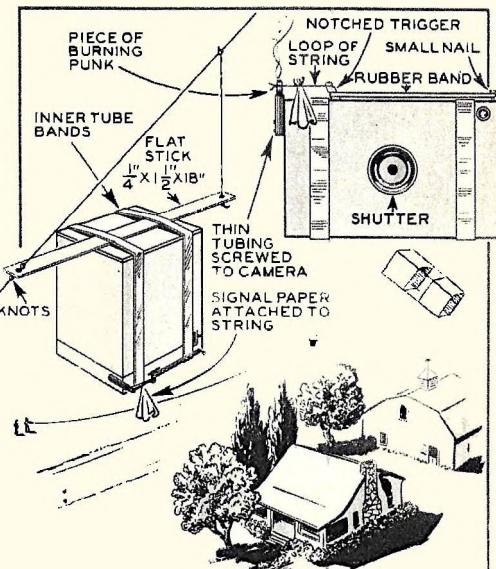
THE metal parts of a film pack can be quickly converted into an emergency printing frame. Take the metal casing of the pack apart and lay a piece of clean glass over the film window. On this lay the negative followed by the sensitive printing paper and on this a stiff piece of cardboard or fiber for backing. Replace the rest of the film pack so that spring strips will hold the paper and film in close contact. While this arrangement is at best a makeshift affair it will prove helpful when a suitable printing frame is not available. Old film packs may also be cut apart with tin shears and used as printing masks.



This telescopic attachment will insure your camera taking sharp pictures. Turn down tubes from brass or use pre-formed aluminum tubing. Finder is brought into focus by adjusting camera bellows until object is sighted.

Box Camera Takes Aerial Photos

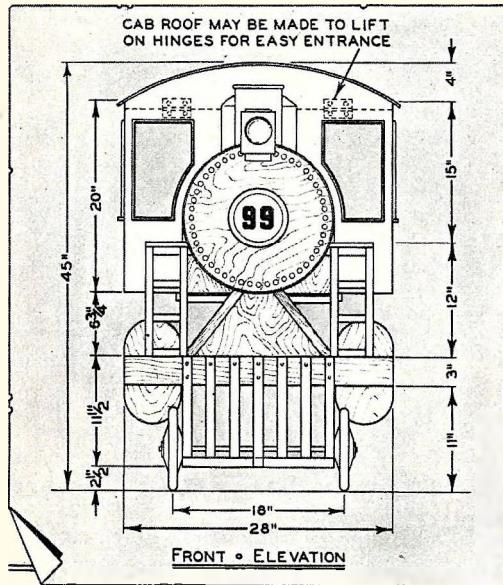
AN ORDINARY dollar box camera attached to a suitable kite will make excellent aerial photos. To the camera attach a small metal clip for holding a piece of Chinese punk. Slip a thread loop around the punk and camera shutter release and a rubber band from the release to a small tack on the opposite side so that the burning punk will eventually burn the thread and snap the picture. Camera is suspended from kite string.



Attached to a large box kite your inexpensive camera can be used to take interesting aerial photos. Slow burning punk is used to release camera shutter in manner shown in diagram.

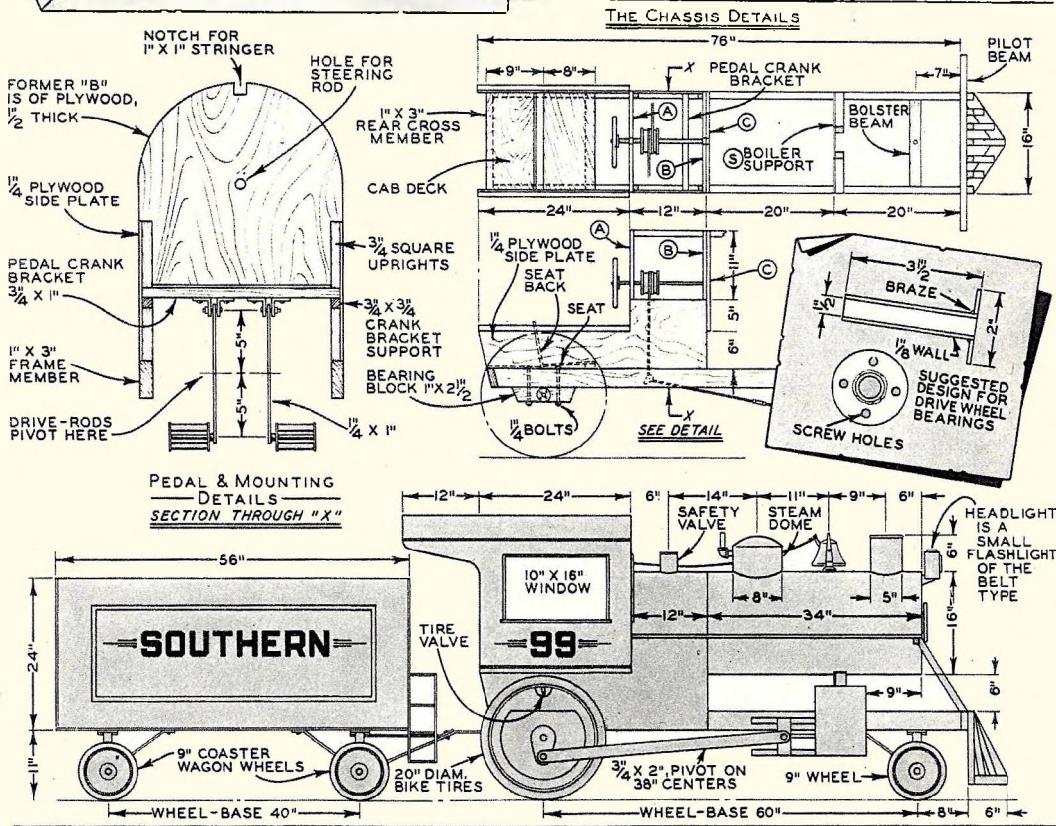
A Midget Foot-Powered Locomotive

by MANLEY MILLS



BUILT mostly from discarded materials that can be readily picked up about the workshop this novel foot-powered midget locomotive will make any youth the envy of his friends. Unlike the usual foot propelled locomotive, this one permits the engineer to ride in the cab instead of in the tender.

While it isn't necessary that the dimensions given here be followed out to the Nth degree, they should be followed as closely as possible in order that the locomotive will operate properly. In constructing the engine and tender start with the frame for the boiler. This is made from lengths of 3"x1" stock as is the rear cross-member and pilot beam. The pilot trucks are made from the front end of a coaster wagon chassis equipped with 9"



The above pictorial diagrams show the simplicity of the toy locomotive. While it is not necessary to follow the exact dimensions given here adhere to them as closely as possible. Parts from broken toy autos and wagons will aid in construction.

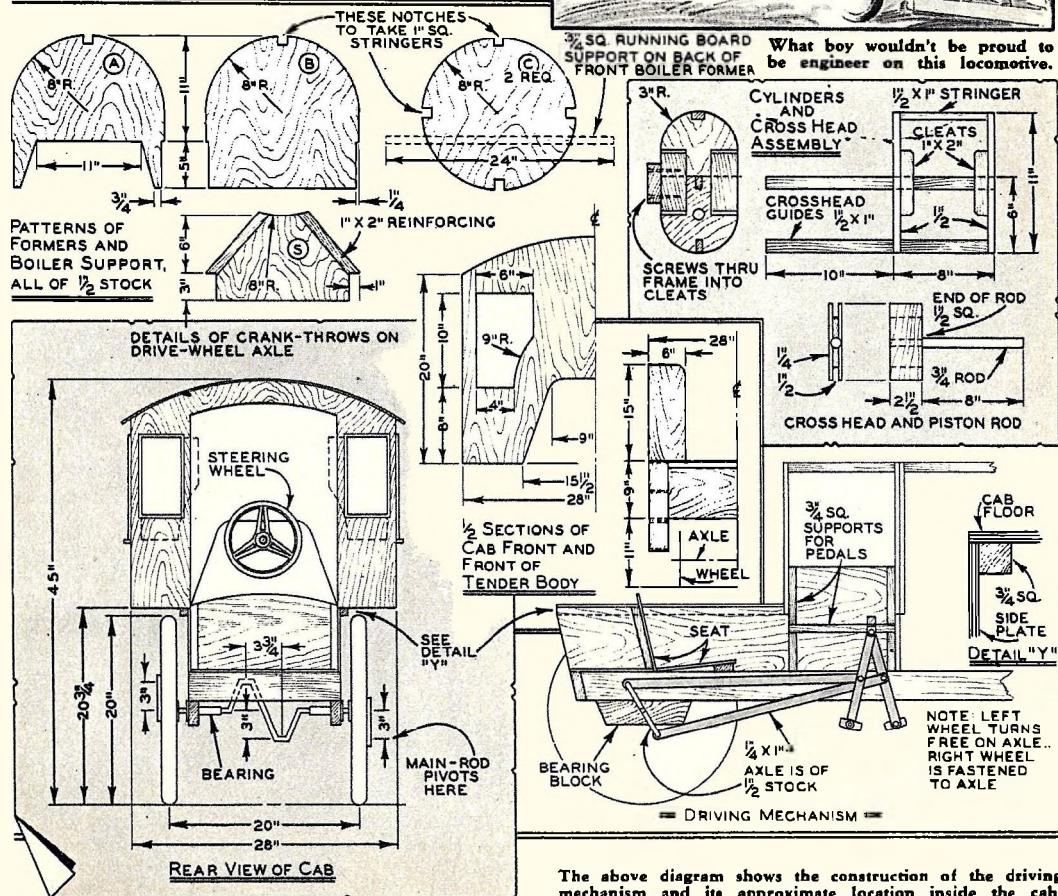
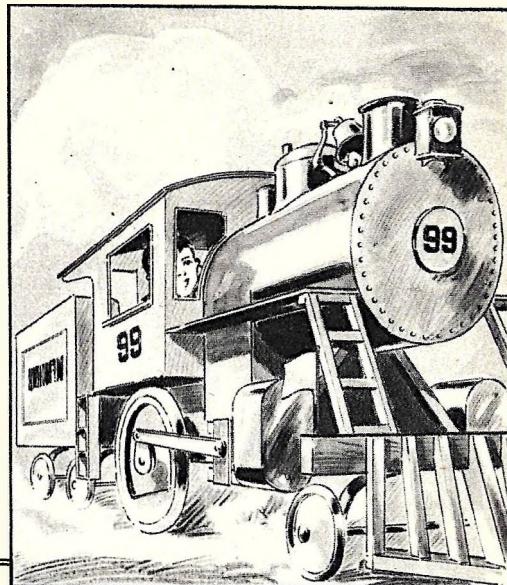
That Any Boy Can Build

wheels. The pilot guard is fashioned from either wood strips or strap iron, the latter being suggested.

The boiler is of the thinnest gauge sheet metal obtainable and attached to a suitable wooden frame with small wood screws. The cab is made of plywood except for the roof which is of the same metal as the boiler. Sheet metal attached to a wooden supporting frame forms realistic cylinders for the driving rod mechanism. The drive rods being nothing more than lengths of stock measuring $\frac{3}{4} \times 2 \times 38"$ are extremely simple to make.

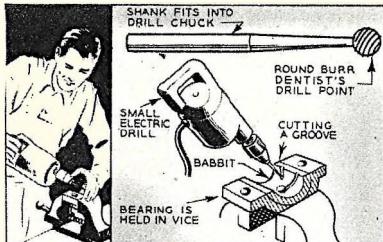
A pair of 20" bicycle rims are screwed in place over a disc having a diameter equal to the inside diameter of the rims. A notch is cut in the discs to allow for inflating the tires. The drive shafts are attached to the wheels

[Continued on page 120]



The above diagram shows the construction of the driving mechanism and its approximate location inside the cab.

NEW STUNTS For The AUTO MECHANIC



Dentists Drill Cuts Oil Groove In Bearings

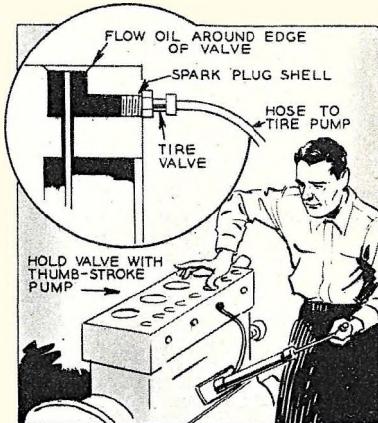
THE usual difficulty experienced in cutting oil grooves in babbitt bearings is eliminated by the use of discarded dentists' drill points in a small hand electric drill. Neat, clean grooves of any desired depth and width may be easily cut by this method. Since drills of this type cannot be resharpened your dentist will gladly provide them to you gratis.—Arthur C. Klust, Minneapolis, Minn.

Auto Pump Locates Leaky Valves

AN AUTO pump is a valuable aid in locating leaky valves in your car's motor. Break away the porcelain from an old spark plug and solder an inner tube stem in the spark plug shell.

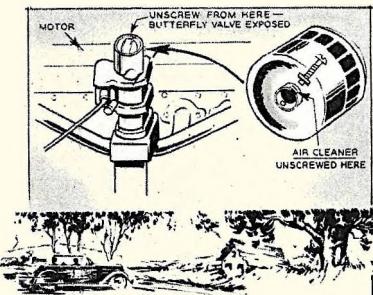
To test for a leaking valve flow a small amount of lubricating oil around the valve so a perfect seal is made. Next attach the auto pump to the valve stem which has been inserted in the respective spark plug tap. With one hand hold the valve down and at the same time force the pump handle down. If the valve leaks, air bubbles will form in the oil film, indicating that a leak is present.

Leaking valves thus located may be ground down and the process repeated until there is no leakage present. All valves may be checked in this manner.—Clayton Farley, Columbus, Ohio.



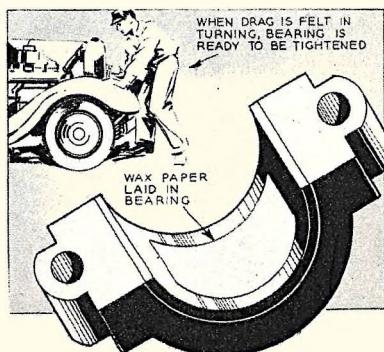
Starting Motor After Running Out Of Gas

ON MODERN automobiles the well-known vacuum tank is no longer used and starting up the car after running out of gas is quite a problem unless you know the method of procedure. The air filter on the carburetor is removed and a few drops of gasoline injected directly into the carburetor. Stepping on the starter will immediately set the motor into operation. The filter being held in place with a single machine screw is easily replaced after injecting the gas. It is better, of course, to watch your gauge and not run out of gas.—Vernon Tracey, Centerville, N. B.



Wax Paper Makes Ideal Bearing Adjustment

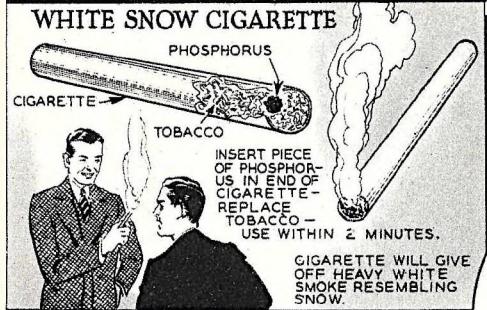
A TIME saving and accurate bearing adjustment can be accomplished by using a piece of wax paper. Cut the paper slightly smaller than the bearing surface then insert between the crankshaft and bearing surface. If no tight drag is felt when the crankshaft is turned, file down the bearing surface until the shaft turns, but is sufficiently tight to require effort in turning. When the shaft can be turned it is an indication that there is sufficient clearance for the oil pressure system to function.—A. O. Detjon, Maywood, Illinois.



Mystifying With Chemical Magic



When placed over a flame this bowl of water glows with the brilliance of a fire ball when the lights in the room are turned out. The secret of the stunt is the dropping of a small piece of phosphorus into the water after it has reached the boiling point. Dust the hands with chalk before handling the raw phosphorus.



Upon lighting this cigarette volumes of white smoke issue from it to the amazement of the onlookers. Prepare the cigarette by removing some of the tobacco from the tip and inserting a piece of phosphorus the size of a rice grain, then replace the tobacco in the tip.



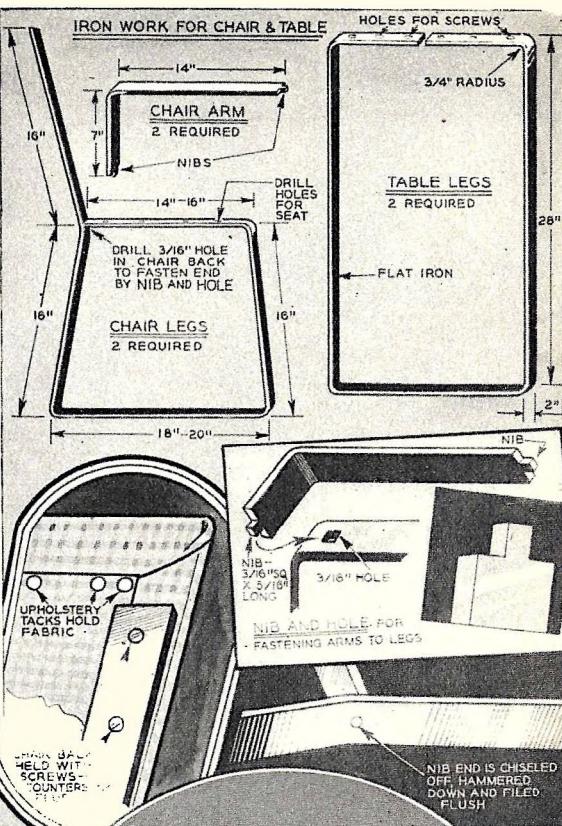
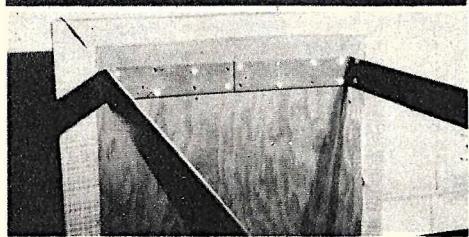
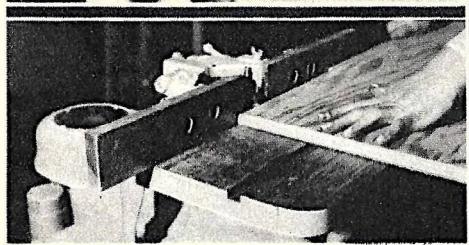
When properly treated with the smoke mixture given above any cigarette can be made to produce clouds of black smoke when ignited. The smoke is soot black, yet harmless if inhaled by yourself or anyone receiving the cigarette.



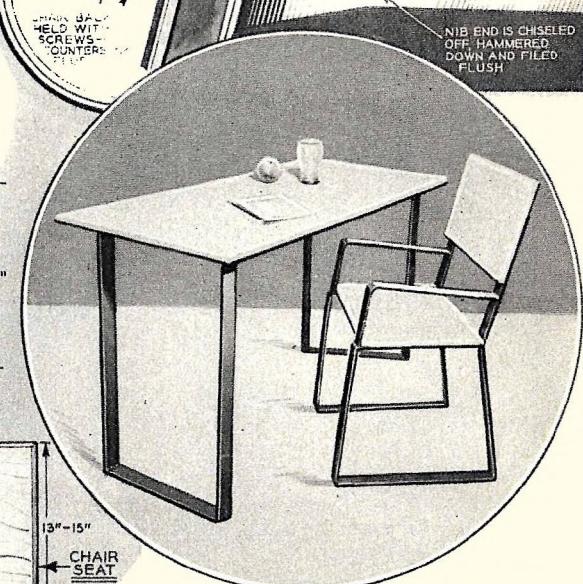
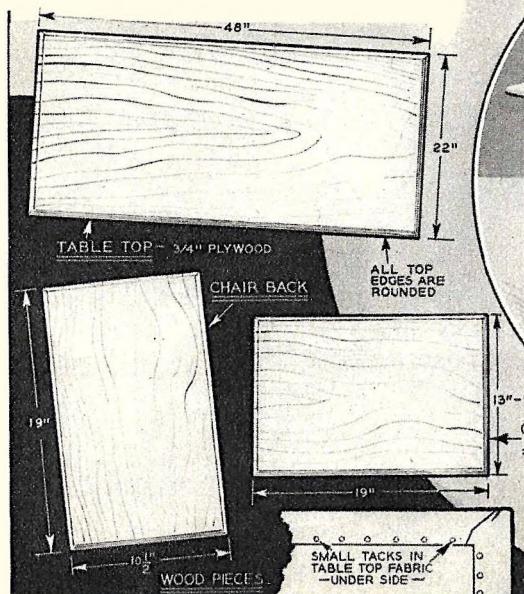
Lighting a candle with a liquid instead of fire will amaze and mystify your friends. Coat a charred candle wick with the solution given above and allow to dry. The candle is ignited with a drop of sulphuric acid.

WHILE all stunts described above are harmless, care should be exercised in the handling of the phosphorous and sulphuric acid (H_2SO_4). Phosphorous when exposed to open air for periods longer than two minutes will burst into flame, therefore submerge it in kerosene when not in use. To protect your fingers from its effects powder them with chalk or talcum. A pair of small forceps may be also used, if available, in handling small pieces of the chemical. In handling the sulphuric acid be sure that none drops on clothing as it rots material.

Practical MODERN FURNITURE



Modern furniture is easy to make. The upper photo shows how a scratch wheel may be used to give the metal a bright finish after which it is lacquered. Center photo is shown the table top being squared up on the shaper with the leg installation clearly defined in the lower picture.



Not only is this modern table and chair durable, but very attractive as well. Constructed of strap iron and plywood the furniture can be worked into the color scheme of any home. Forming of the metal parts can be done at home by following the diagrams given here. The height may be altered to meet the particular needs although care should be taken to keep one leg or chair arm from being higher than the other. The furniture is covered with plaid fabric.

FOR THE WORKSHOP FAN



For the home shopman who makes his own, these interesting pieces of ultra-modern furniture are certain to win favor.

MANY pieces of the wood and metal modernistic styled furniture that is now so popular can be easily duplicated in your home workshop. If you are the owner of a few woodworking tools and have access to a strong vise and forge you are ready to start construction. If you don't have the latter equipment any blacksmith shop can quickly form the metal for you at a nominal charge.

The modernistic chair and table pictured on the opposite page are extremely simple to make and when completed prove unusually attractive. About 32 feet of $\frac{1}{16}$ "x2" strap iron, three pieces of $\frac{3}{4}$ " plywood, one piece 48"x22" for the table top, another 19"x10 $\frac{1}{2}$ " for the chair back and a third 19"x15" for the chair seat are the only materials required.

The strap iron for the table legs is bent according to the dimensions given in the diagrams. Holes drilled and countersunk in the metal allow the table and chair legs to be attached to the plywood. In making these metal pieces make certain that they match so that the furniture sets level. The height of the table may be increased to meet your particular needs if desired.

The chair may be constructed with or without arms. If arms are desired cut nibs in the strap iron so that the formed metal can be rigidly mounted to the chair legs. To do this drill holes in the leg and back supports, insert the arm nibs then hammer them flat as you would rivets.

The table top, chair seat and back are finished by covering them with a water-proof plaid material similar to the coverings used on cardtables. Cotton wadding under the material will greatly improve the appearance of the project. After removing all rust particles from the metal it can be enameled in a color that will contrast with the plaid ma-



terial. Probably the most attractive combination is a red, orange, green or blue plaid with the metal parts finished in silver bronze although any combination may be used.

Twin beds in the modern trend of design supply another idea for the ambitious shopman. The beds, which are ideal for a small guest room, consist of four units; head, foot and two side rails. The head and foot pieces are made of $\frac{1}{2}$ " plywood panels with a $\frac{3}{4}$ "x2" trim around the edge and mitered at the corners. The trim is attached with finishing nails and casein glue after which casters are mounted.

The bed rails are of stock $\frac{3}{4}$ "x6"x6"x2" with bedhooks attached to each end. These being obtainable at any hardware store. Slots cut in the head and foot pieces allow for

Modern TWIN BEDS Are EASY To MAKE

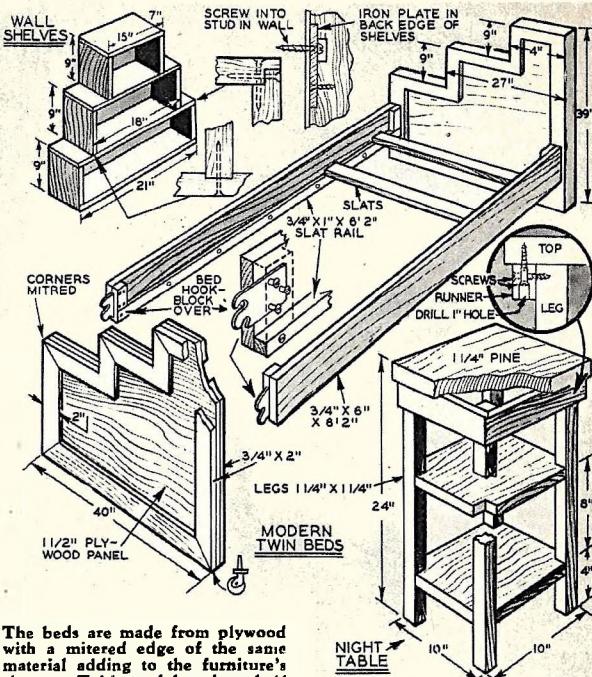


For the small guest room what could be more attractive than a set of modernistic beds? Using standard 37"x72" box springs the bed can be constructed at home with hand tools. The table and rack are also easy to make.

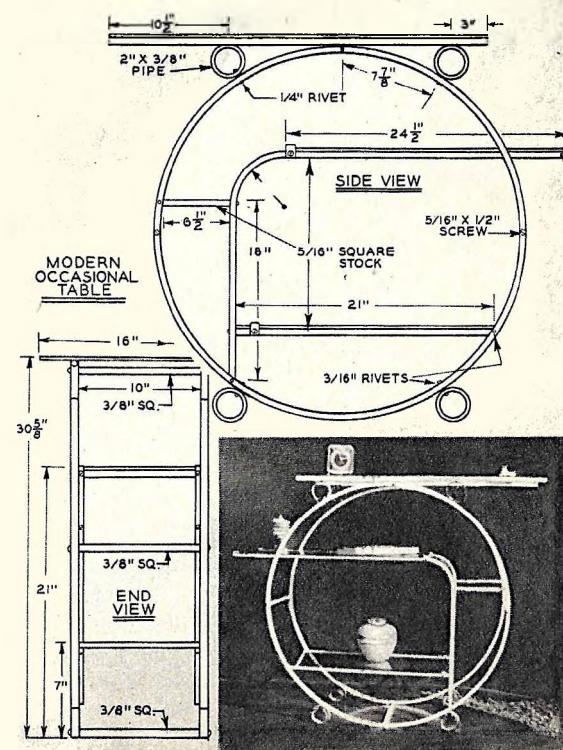
inserting the rails. After construction is completed sand all parts well and finish in white enamel. A small table and hanging shelf, although extremely simple to build, will greatly improve the room in which the beds are used. These are also painted white so as to harmonize with the other fittings. The last suggestion in the line of modern home furnishings is an occasional table that is ultra-modern in its design. Constructed entirely of metal and plate glass the table is certain to gain the attention of everyone who sees it.

The table is formed from $\frac{3}{8}$ " and $\frac{5}{16}$ " square cold rolled steel, the $\frac{3}{8}$ " stock being formed into rings having a diameter of 30". The rings are assembled with lengths of stock measuring 10" in length. The L shaped shelf supports are made of the lighter $\frac{5}{16}$ " stock and bolted in place with machine screws. The ring feet and table top supports are cut from 2" pipe and fastened in place with either bolts or rivets. The table is provided with three plate glass sections. The uppermost measures 16"x30", the middle one 10"x24 $\frac{1}{2}$ " and the bottom shelf 10"x21". If desired the glass may be colored or better, a colored plastic material may be used since this material is unbreakable. The metal construction may be finished in white enamel or silver bronze with foot rings in black.

The occasional table at right is made of square steel stock formed into rings and jointed with cross pieces. The shelves are panels of plate glass.

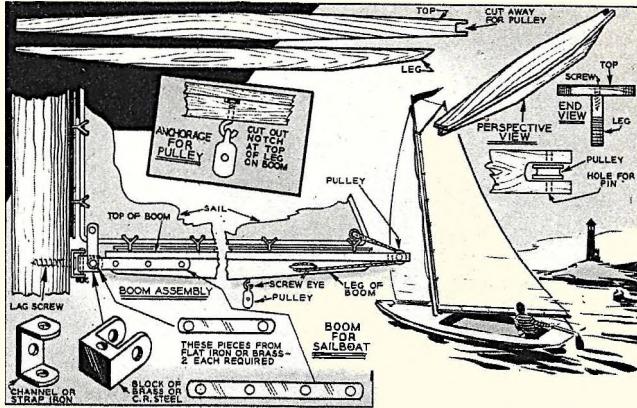


The beds are made from plywood with a mitered edge of the same material adding to the furniture's charm. Table and hanging shelf are simple and need no explaining.



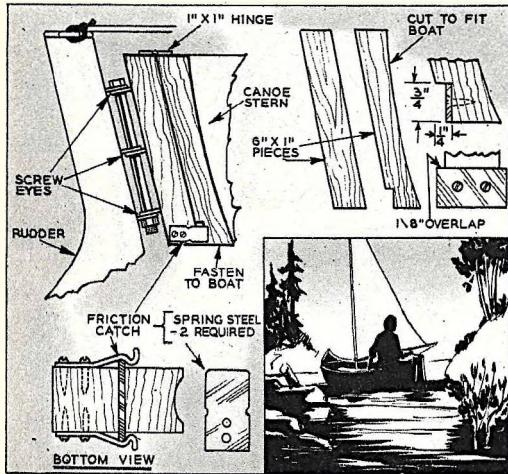
Make a Low Cost Boom For Your Sail Boat

AN INEXPENSIVE boom for a small sail craft may be constructed from odd lumber which has been tapered into a top and leg piece, then assembled to form a "T." Angle iron strips are attached to the end of the boom and to these are attached a universal joint made from a block of cold rolled steel or brass. A bracket attached to the mast with a lag screw completes the mounting. Either bolts or pins may be used in mounting the boom to the hinged joint. A slot in one end of the boom allows for the pulley. The sail is attached to this boom in usual manner. No dimensions are given since the construction depends entirely upon the boat on which sail is used.



This novel boom is constructed from two pieces of ordinary one-inch stock bolted together to form a "T". No dimensions are given here since measurements depend entirely upon the boat on which the boom is used.

Hinged Rudder Prevents Damage



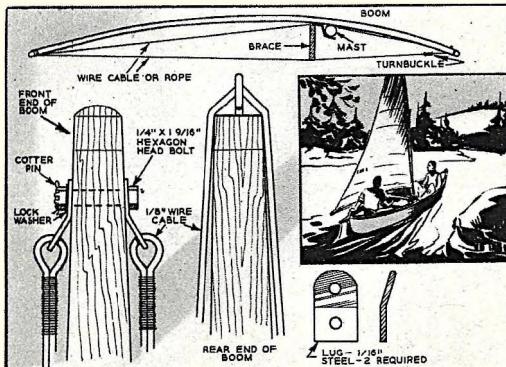
By providing a hinge in the rudder mounting the craft is free from damage if it runs aground. Make the friction catch, as shown above, so that it will hold the rudder when sailing.

PROVIDING your canoe with a rudder that will swing upward when it strikes an obstruction or is beached, will eliminate damage to your boat in the future. Cut a 6"x1" piece of hardwood to match the curvature of the boat then mount this to the stern. A similar piece of wood is attached to the first using a hinge and a friction catch. The regular rudder is then installed to the hinged section with screw eyes. The hinge and catch on the 6"x1" strip allow for rudder's release.

Bent Boom Increases Sailing Speed

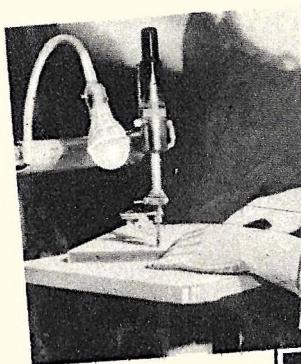
NAVAL architects claim that the use of a bent boom will increase the performance of any light sail boat since the curve allows the wind to supply more pressure to the sail. To bend the boom on a light craft drill a hole in the front of the boom large enough to pass a $1/4" \times 1 \frac{1}{16}"$ hex bolt to which has been attached two steel lugs. On the opposite end of the boom fasten a screw eye large enough to pass $1/8"$ diameter steel yacht rigging cable.

Splice one end of the steel cable to a lug then thread it through the eyelet on the other end of the boom returning it, finally, to the starting point. A turnbuckle is used to draw the cable taut. Make a brace from a piece of hard stock so that when finished it measures $3/4" \times 1 \frac{1}{4"} \times 12"$ and insert this between boom and cable just opposite mast as illustrated.

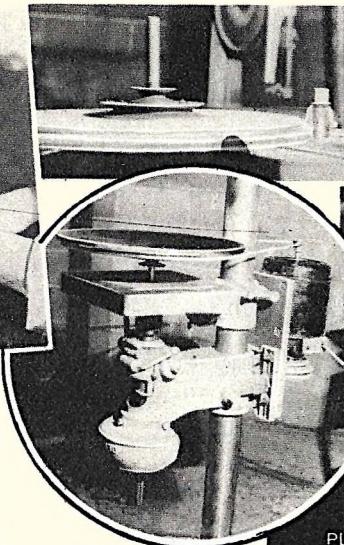


By bending the boom to the curvature shown at the top of this diagram the efficiency of any boat is increased by at least 20%. A steel yacht cable permits boom to be bent bow-like.

TURNING CLAY PROJECTS on



The throwing wheel, on which the pottery is turned, is cut out of plywood on a power jig saw. The bottom of the disc is provided with an undercut belt groove. The drill press is reversed and the wheel attached to its chuck.



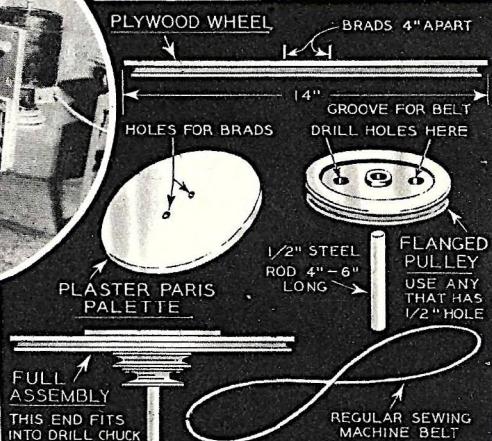
by DALE R. VAN HORN

SOMETHING new in home workshop projects and seldom attempted by the amateur is the turning of pottery articles. Not only is the making of clay articles interesting, but simple if your shop includes a floor type drill press.

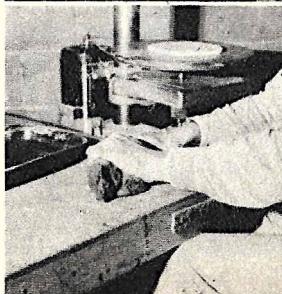
The extreme rigidity of the modern drill press makes its adaption to turning a potters' wheel ideal. The first step is to reverse the chuck and motor position with the chuck under the table and centered with the center hole. To bring the end of the motor shaft in line with the wheel groove it was necessary to cut out a board for the purpose, drill the necessary holes, then bolt it to the motor support as a photo shows.

The largest wheel possible to use with this drill press is one about 14 inches in diameter, so this was cut from 5-ply wood with the jig saw. To utilize as much of this large diameter as possible for speed reduction, yet get the belt just under the edge where occasionally mud and water would not work under it, a groove was cut with one of the shaper knives to the shape shown. An ordinary sewing machine belt was used.

Two turns of friction tape wrapped about the motor shaft itself and the belt run directly on the shaft will provide an ideal speed of about 114 R. P. M. A belt tightened with



A steel flanged pulley screwed to the bottom of the plywood disc completes the throwing wheel assembly. A short length of $\frac{1}{2}$ -inch steel shafting connects to the flanged wheel and the drill press chuck as described above. Plaster of Paris palette is attached to the top of the wheel with small brads. A regular sewing machine belt transmits the power from motor to wheel.



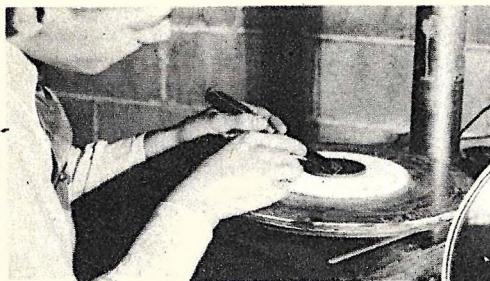
Suitable clay for pottery work may be secured from a local brickyard for a few cents. The clay is handled in the same manner as dough after which it is rolled out, as illustrated above, into long rolls using a flat board for the working tool. In making the coils it is advisable not to have the clay too moist, otherwise it may stick to the forming tools.

A POTTERS' WHEEL

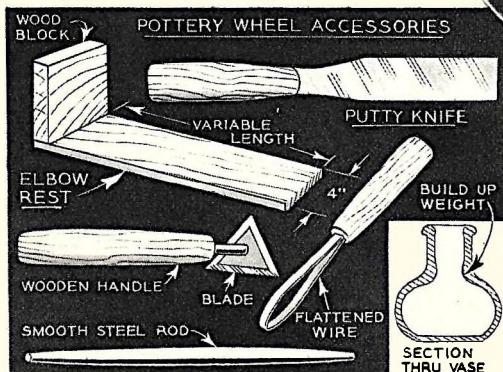
Attractive vases, crocks and jars of baked clay can be produced in the home workshop. An ordinary drill press forms the basic throwing wheel equipment.

an idler pulley to be operated with the foot will provide graduated speeds. This can be clamped to the drill press table and removed when wanted. Of course, with a little practice you will be able to turn out nice pottery pieces with the constant speed wheel.

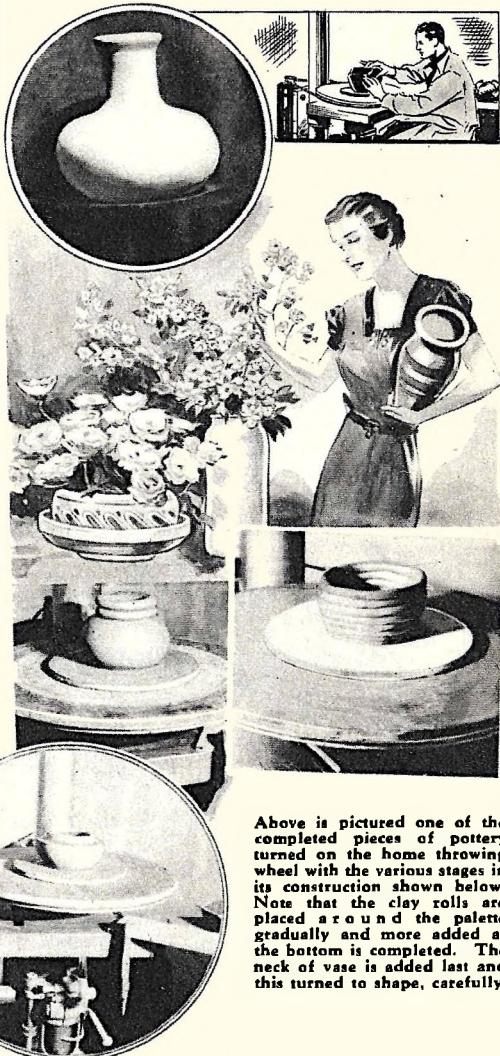
Floor flanges are not accurately drilled, so a better line up results if any ordinary grooved pulley fitting a half inch shaft is drilled for 2, 3 or 4 screws midway between rim and center and this fastened to the exact center of the plywood wheel with wood screws. The 4 or 6-inch half inch shaft is then fastened in the pulley wheel with the set screw provided, and the other end of the half inch shaft set tightly in the drill chuck.



Start the project by applying a pliable lump of clay to the plaster palette then with the throwing wheel turning at a speed of about R. P. M. spread out the lump with a broad putty knife as shown here.



Only simple homemade tools are required for turning pottery projects. These consist of a simple elbow rest, a flexible putty knife, steel rod and clock spring mounted on a handle.



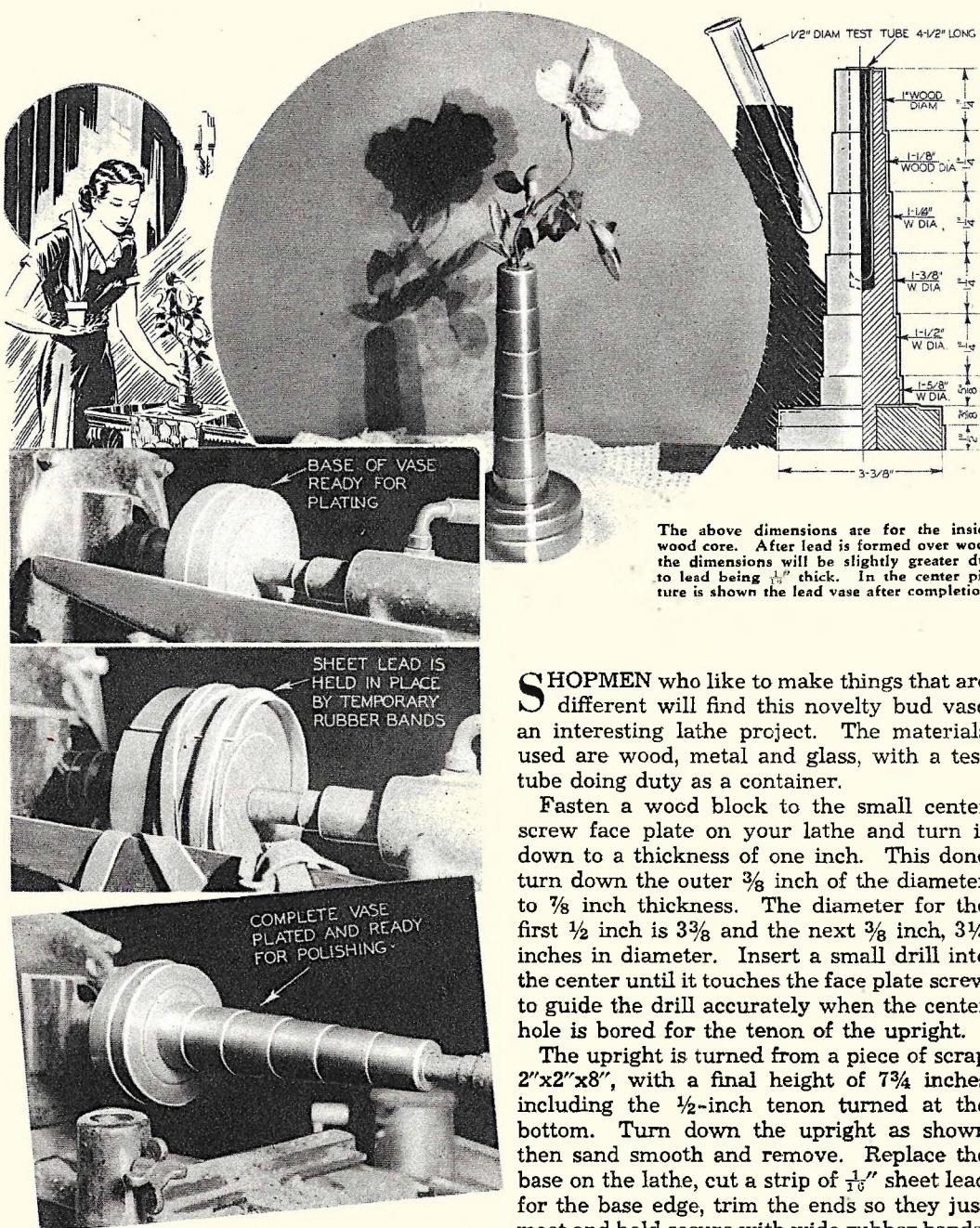
Above is pictured one of the completed pieces of pottery turned on the home throwing wheel with the various stages in its construction shown below. Note that the clay rolls are placed around the palette gradually and more added as the bottom is completed. The neck of vase is added last and this turned to shape, carefully.

The wood wheel should be given a double coat of clear lacquer or varnish and special attention given the rim, both top and bottom, to render water proof.

Two or more palettes should be made from plaster of Paris. Mix the plaster and pour it out on a flat surface to harden. Then drill two holes to fit the brads in the wood wheel, drop in place and with a file tang held vertically and the wheel in motion, cut through the surplus plaster to leave a round palette upon which pottery is to be made.

[Continued on page 128]

A LEAD PLATE BUD VASE



The above dimensions are for the inside wood core. After lead is formed over wood the dimensions will be slightly greater due to lead being $\frac{1}{16}$ " thick. In the center picture is shown the lead vase after completion.

SHOPMEN who like to make things that are different will find this novelty bud vase an interesting lathe project. The materials used are wood, metal and glass, with a test tube doing duty as a container.

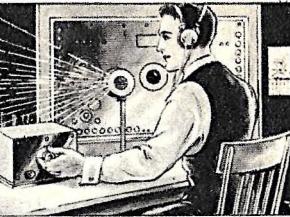
Fasten a wood block to the small center screw face plate on your lathe and turn it down to a thickness of one inch. This done turn down the outer $\frac{3}{8}$ inch of the diameter to $\frac{7}{8}$ inch thickness. The diameter for the first $\frac{1}{2}$ inch is $3\frac{3}{8}$ and the next $\frac{3}{8}$ inch, $3\frac{1}{4}$ inches in diameter. Insert a small drill into the center until it touches the face plate screw to guide the drill accurately when the center hole is bored for the tenon of the upright.

The upright is turned from a piece of scrap $2'' \times 2'' \times 8''$, with a final height of $7\frac{3}{4}$ inches including the $\frac{1}{2}$ -inch tenon turned at the bottom. Turn down the upright as shown then sand smooth and remove. Replace the base on the lathe, cut a strip of $\frac{1}{16}$ " sheet lead for the base edge, trim the ends so they just meet and hold secure with wide rubber bands. Solder where the seam is exposed, then shift the rubber and finish soldering. With a slow lathe speed, trim and true this lead sheet, using a wood turning chisel, then with a maple dowel and the end of a candle for lub-

[Continued on page 120]

Turn down the base from any available stock following the dimensions shown in the upper right hand corner of the page. The base appears in the top picture in this group. In the center is shown the manner in which sheet lead is attached to base, for forming, with rubber bands. The bands hold lead in place so that seam may be soldered rigidly. The lead is attached to the upright wooden turning in the same manner. A maple dowel serves as lead forming tool. Vase should appear as shown in lower photo after forming is completed.

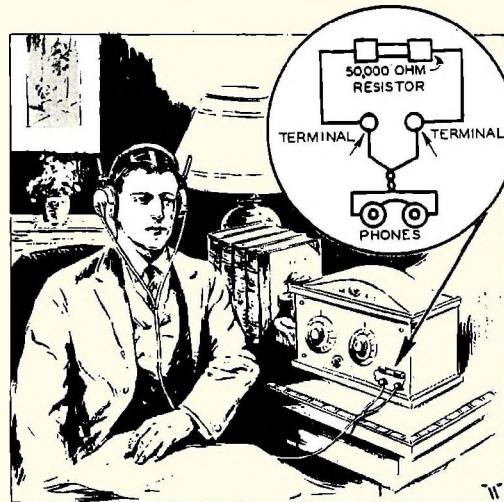
RADIO SPARKS



RESISTANCE REPAIRS DAMAGED HEADPHONES

THREE are still many radio fans and experimenters who find headphones valuable for tuning in distant stations or listening to programs during the late hours of the evening. For those, this kink will be of special interest and for others it is well worth knowing. When headphones suddenly go dead the cause is usually due to an open coil in the phone unit. To correct the trouble secure a 50,000 ohm carbon resistance of the "pig tail" variety and connect it across the earphone terminals of the set and the phones will again function although some of volume will be lost.

Since headphone coil units are connected in series one little wire breaking will result in the entire headset failing to work. While the resistance method is ideally suitable for a temporary repair job it is advisable to check the coils for the open circuit and make the necessary repairs by unwinding the fine coil wire until the break is located then soldering the fine wires carefully together and winding the coil to its original condition. Since the fine magnet wire used in the earphone construction is usually enameled the enamel must be carefully removed before any attempt is made to solder the broken leads.



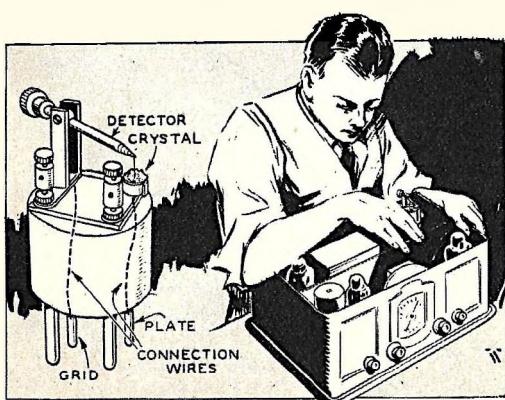
When a pair of earphones suddenly refuse to function it is often possible to correct trouble by connecting a 50,000 ohm resistance across the receiver phone terminals as shown here.

Crystal Is Handy Tube Substitute

ON EARLIER types of electric receivers and practically all battery sets a crystal detector makes an excellent tube substitute. For the experimenter who likes to try new stunts this one should prove most effective since the volume of the receiver will depend upon how careful the "catwhisker" has been adjusted on the crystal.

First secure a crystal detector unit and mount this on a 4-prong tube base using heavy copper wire to hold it rigid. If desired, of course, a fixed detector can be used instead of the adjustable type. The leads connect to the plate and grid prongs of the tube base, these being the two small ones; the large prongs are left disconnected.

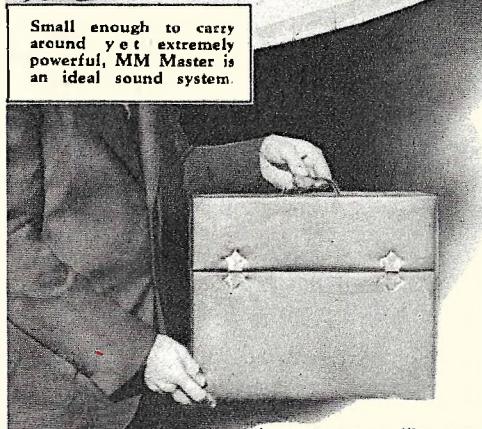
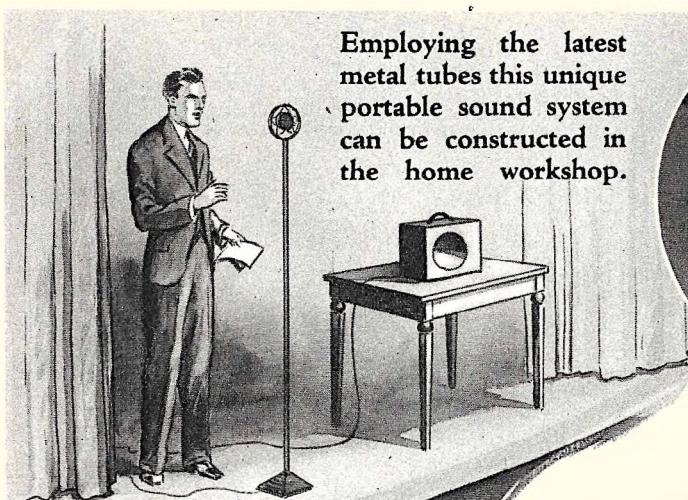
When a tube suddenly burns out and a replacement is not on hand insert the crystal into the socket in question, adjust the "catwhisker" carefully and once more the set is in working condition.



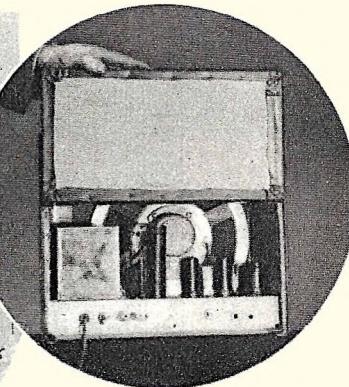
A crystal detector unit connected to a four prong tube base as described in the above illustration will make a practical tube substitute when one of the set's tubes suddenly fails.

"MM METAL TUBE MASTER" —

Employing the latest metal tubes this unique portable sound system can be constructed in the home workshop.



Appearing more like a traveling bag than an amplifier container this case made of leatherette and wood nicely solves the carrying problem.

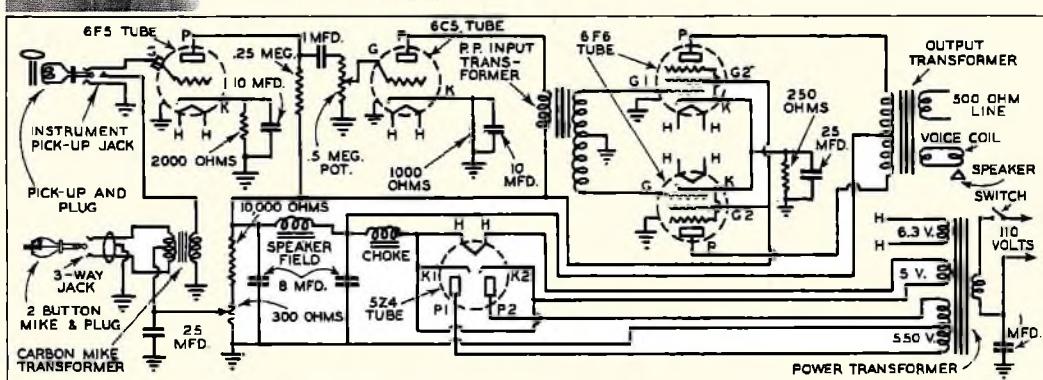


Above is shown a rear view of the MM Master with the lid of the cabinet raised. The speaker attaches to the chassis.

by J. R. MACK

NEARLY everyone at some time has wished for his own portable public address system either for supplying music for a party or in making announcements at outdoor gatherings. Practical portable sound systems are usually expensive, therefore placing them beyond the reach of the average income. Realizing this fact an amplifier was decided upon which could be constructed by anyone the least bit familiar with radio. Through the use of modern metal tubes and a high-gain circuit the completed public address system offered all of the advantages of the expensive equipment yet it cost less than \$25 to build.

Parts for building the amplifier may be purchased from any mail order or local radio



The experienced radio builder will find this schematic diagram helpful in wiring up the amplifier. Wherever possible connect leads directly to the ground so as to eliminate all unnecessary wiring. Pick-up and microphone jacks should be insulated from panel. Since all metal tube sockets have the same number of prongs care should be exercised so that connections are made correctly. Although indicated at 550 volts, power transformer can have plate voltage output of slightly more or less than this.

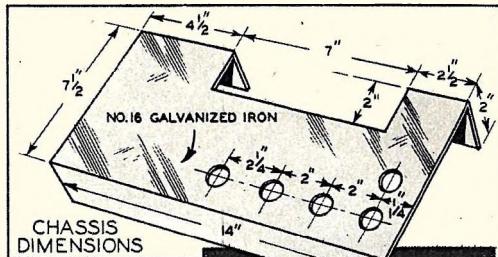
A PORTABLE SOUND SYSTEM

supply house including the metal chassis although it is quite simple to make this yourself from No. 16 galvanized sheet iron. The panel is laid out according to the dimensions given on the diagram and then bent to shape. Any tinsmith will do this work for you for a small charge.

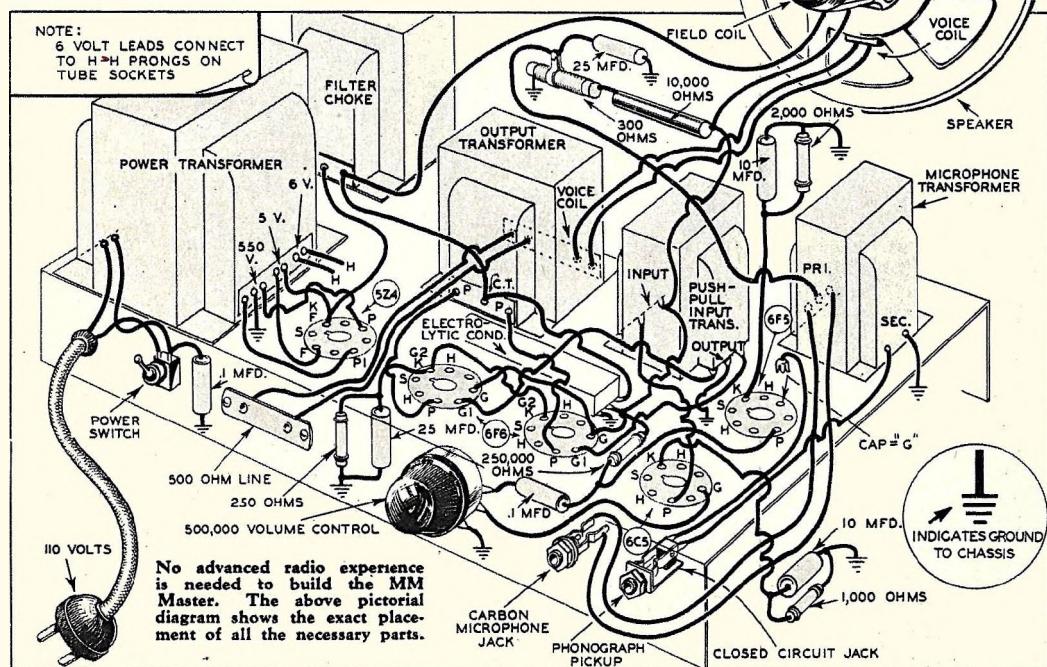
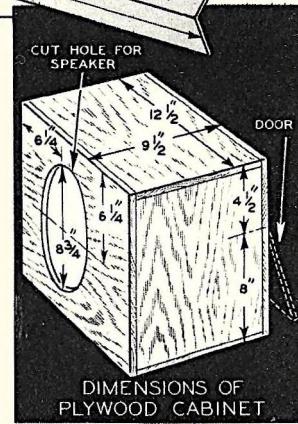
The sockets for the metal tubes are installed first, after which the power transformer, A. F. transformers and other mountable items are fastened in their respective positions. The speaker is a 12-inch dynamic type mounted to the front of the chassis with machine screws. The field coil winding of the speaker serves as the filter choke thus saving valuable chassis space. A type 5Z4 tube serves as the rectifier with two 8-mfd. electrolytic condensers providing the necessary filter capacity.

[Continued on page 124]

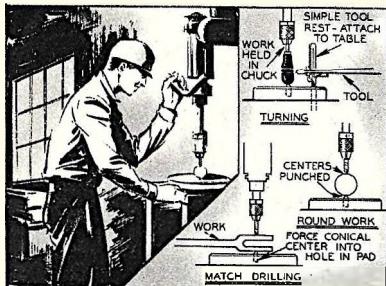
Here is the completed Master before installing in the carrying case. Although a workshop job it has all the makings of an expensive manufactured amplifier. For best sound coverage a 12-inch diameter dynamic type speaker is suggested.



The chassis is cut as shown from No. 16 galvanized iron. The cabinet is of wood covered with leatherette material.



TIMELY TIPS FOR THE HOME SHOPMAN

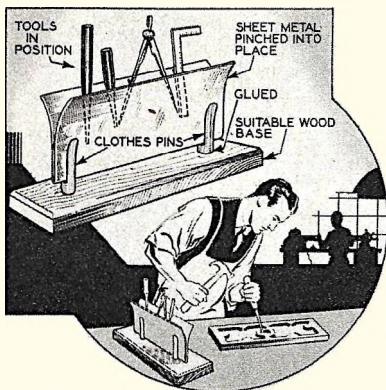
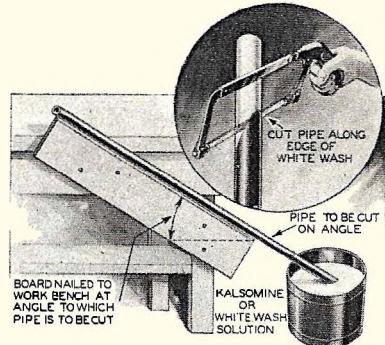


Pin Simplifies Difficult Drilling

THE difficulty of drilling through irregular shaped metal can be greatly simplified through the use of this centerpunch support. Turn down to a point a short length of steel rod having the same diameter as the hole in the drill pad. Harden the point by heating white hot and plunging into cylinder oil. When cool insert in the drill pad and place the work on the point for easy drilling.—H. Walton, New York.

Paint Line Aids In Making Angle Cuts

WHERE pipe must be cut off at an angle it is no easy task to mark it off so that a uniform cut will result. A sure way of marking an accurate "cut-off" line is to place the pipe in a container partially filled with kalsomine or white wash solution. A board nailed to the side of the workbench at the correct angle will serve as a guide in marking the pipe. When a length of pipe is to be cut mark it first with a pencil to indicate how far it should be submerged in the solution. It is then only necessary to slide the pipe down the guide to the proper depth.—J. Petr, Omaha, Nebraska.



Pinch Rack Protects Tools From Damage

IF YOU have a number of tools that are easily damaged a pinch tool support will keep them off the workbench when not in use. The support is made from a length of sheet metal bent over like a book cover and then opened at the end to receive the tools. The sheet metal clip is mounted on a wooden base drilled at each end to receive a pair of clothes pins in the manner shown. With the pinch support tools that are very often mislaid can be always kept in sight. If the builder so desires he can make supports of various sizes to meet his particular requirements. If available, spring brass may be substituted for sheet iron.—D. R. Van Horn, Lincoln, Neb.

Announcing The MM Workshop Contest Winner

HERE is the letter which won the \$5 Workshop Contest prize offered in the July issue of MM. This letter, submitted by W. S. Vincent of Norfolk, Virginia, was considered by the judges as the most original. Starting with little or no capital Mr. Vincent constructed basic playground equipment and erected it on a nearby vacant lot. Charging a nominal sum easily within the reach of all parents he succeeded in inducing them to leave their children in his charge, but let his letter tell the story.

MM Workshop Editor
Dear Sir:

Norfolk, Va.

With my wife's assistance I contacted the parents and suggested a plan whereby their children would not only be safe, but enjoy themselves as well during school vacation. To my surprise nearly all were willing to pay \$2.50 a month for their children's safekeeping—and it was worth it. With the money advanced and my credit I was able to equip the playground with balls, bats, goal posts, teeter boards and other incidentals. Most of the large equipment was constructed in my shop at little or no expense. Today my private playground offers amusement for children of all ages—we have more than 50.

W. S. Vincent.



with THRILLS GALORE !

Yes, siree! Miles of broad highways and picturesque by-paths, new sights, new beauties unfold before you, with new thrills at every turn—when you ride a 1936 Harley-Davidson. Your pulse will quicken to its fast getaway — zooming speed — high-stepping power — eye-filling style... You'll find extra thrills aplenty as you reel off the low-cost miles — carefree, happy miles made possible by the new speedline design and up-to-the-minute motor improvements!

See your Harley-Davidson dealer for a FREE ride — ask about his Easy Pay Plans and send in the coupon—NOW!

Ride a

HARLEY-DAVIDSON

Thank You for Mentioning Modern Mechanix Hobbies and Inventions When Writing to Advertisers

HARLEY-DAVIDSON MOTOR CO.
Dept. MM, Milwaukee, Wis.

Interested in motorcycling. Send ill-
lustrated literature. Postage stamp
is enclosed to cover mailing cost.

Name.....

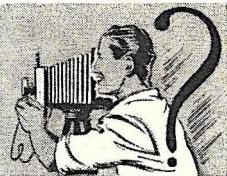
Address.....

My age is 16-19 years, 20-30 years,
 31 years and up. under 16 years.

Check your age group.

AMATEUR PHOTO PUZZLERS

Your Camera Problems Answered



In this department the Photography Editor will answer any question or problem related to cameras of all types, enlarging, printing, developing, taking pictures, and the various phases of home movie making. When sending questions to this department, be sure to include a stamped, addressed envelope in case space does not permit publication of the question and reply on this page. Send all inquiries to the Photography Editor, Modern Mechanix Hobbies & Inventions Magazine, 22 West Putnam Avenue, Greenwich, Connecticut.

PROCESSING MOTION PICTURE FILM

Since my hobby is taking motion pictures I would like to reverse my own film, but am somewhat puzzled as to the apparatus required. I know that there are special solutions for doing this work, but have heard that they can also be reversed by fogging the film during the developing process. Is that correct?—R. N.

It is possible to reverse films by exposing to light after they have been partly developed but this method is very uncertain. In many instances the film will be ruined. The usual method of reversing motion picture film is to develop up the image properly and then reduce out the silver image by using a special reducer. The unexposed silver salts remaining are then exposed to a white light and the film again developed to secure a positive.

PROPER PROCEDURE FOR FILM DEVELOPING

Will you please advise the proper time film should remain in the developer solution for best results? I would also like to know the proper developing time for prints.—C. D. McG.

Many of the prepared developers will properly develop film in about five minutes when the temperature of the solution is kept at 65°F. By the dark-room tray method. The negatives should be fixed in the hypo bath for about twice the time required to clear them of the white milky appearance. Prints will develop to the proper

depth in 45 seconds using the correct developer at 70°F. Follow instructions on developer package.

CAUSE FOR FILMS TO FOG

Recently I have experienced disappointing results with my home developing work. For some reason the film after being developed was very badly fogged. Until now my work has been satisfactory. Can you suggest a possible cause for the trouble?—R. J. K.

The trouble about which you inquire was no doubt caused by an unsafe light in the dark-room during the developing process. When developing panchromatic film it is

advisable to work with no light at all. On fogged negatives and those which are very flat a printing paper with a very good contrast should be used. The printing exposure should be limited to 45 seconds. If the print when developed shows up too dark the exposure should be made less than 45 seconds. The developing solution should be kept at 70°F. for best results.

TWO WINNING PHOTOS



The top picture shows what happens when a circle swing is photographed at night. This picture taken with a 2 sec. exposure and f:4.5 stop won \$5 for Paul Strisik of Brooklyn, N. Y. This month's 2nd prize of \$3 to J. P. Knipp, Long Beach, Calif., for his dog photo.

TAKING PICTURES WITH COLOR FILTERS

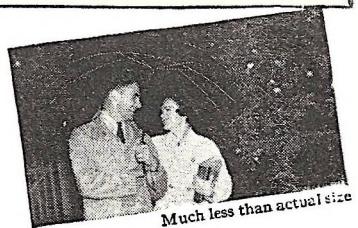
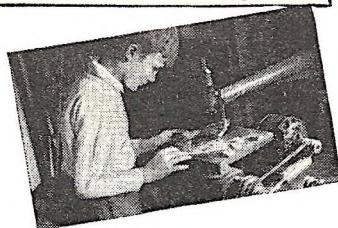
How can I take snapshots so as to have them appear that they were taken on a moonlight night?—L. O. V.

A simple filter of dark yellow cellophane placed over the lens of your camera will make photos taken just around sunset appear to have been taken in the moonlight.

FAST ACTION

INDOORS AT NIGHT

EVEN IN THE RAIN



Much less than actual size

For the Pictures You Want —when you want them

THE big fun of picture making is in having a camera that doesn't need time off. Kodak Six-16 (f.4.5) lets you master every snapshot opportunity.

Every hour of the day or night is picture-making time with this modern Kodak. No matter when or where snapshot opportunities arise, you're set with Kodak Six-16.

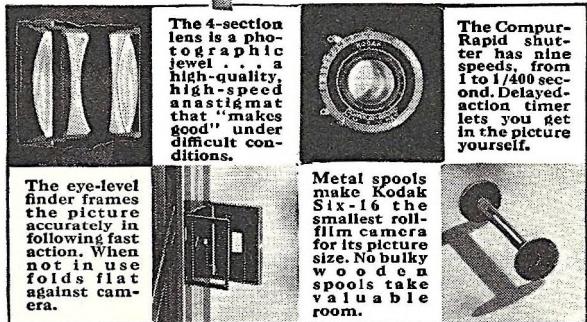
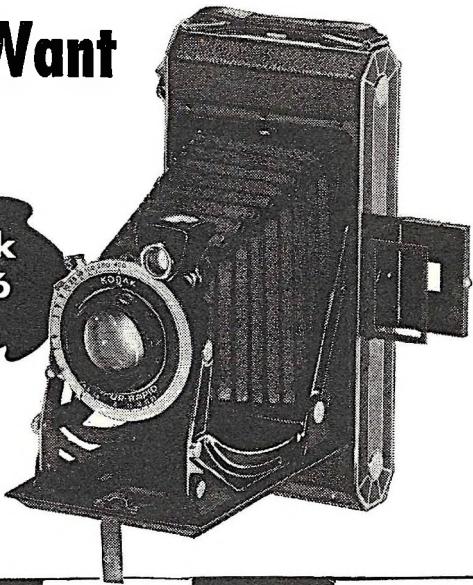
Action shots . . . scenes . . . close-ups . . . even indoor snapshots at night, with Kodak "SS" Film and Mazda Photo-flood bulbs, are easily within range of this Kodak. Take the restrictions off your snapshot making . . . ask your dealer to show you this all-round, fine Kodak.

FEATURES: 1/400-second Compur-Rapid shutter with delayed-action timer, Kodak Anastigmat f.4.5 lens, eye-level finder. Makes $2\frac{1}{2} \times 4\frac{1}{4}$ -inch pictures, costs \$40.



KODAK AUTO-FOCUS ENLARGER, MODEL B. The ideal enlarger for home darkrooms—takes negatives up to 4x6 inches, is adaptable to film or plate negatives, enlarges from 1 1/2 to 3 1/2 diameters. Complete with lens, Photoflood lamp, paper holder, table clamp and set of seven flexible metal masks. Price, \$40.

**Kodak
Six-16
(f.4.5)**



KODAK CATALOG

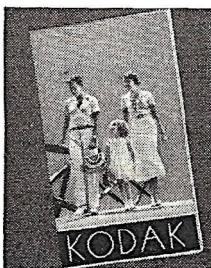
Write today for your copy of the small Kodak catalog, 1936 edition, or get it at your dealer's . . . Eastman Kodak Co., Rochester, N. Y.

Name _____

Address _____

City _____ State _____

M. M. 0-56



STAMPS WORTH MANY TIMES WEIGHT IN GOLD



A LITTLE more than 63 years ago a British lad while looking through a package of old letters came across a one-cent British Guiana stamp which was unlike any he had ever seen before. The small magenta colored stamp, when shown to a local collector, brought the youth three dollars. Shortly after, the collector sold the same stamp to another dealer for a higher price. This collector held the stamp for ten years and when he finally sold it he received about \$125. During the next 52 years the stamp passed from one collector to another until the late Arthur Hind of New York purchased it in 1921, for the unheard of sum of approximately \$36,000. When Mr. Hind died, the stamp was placed on sale in London, but only after armed guards were posted around the display cabinet as shown in the photo. The stamps at right are equally as rare as the New Guiana issue.



ADLETS FOR HOBBYISTS

(See regular classified section for rates and other information.)

STAMPS

SUPER-WONDER Packet offered, containing 60 different stamps from Afghanistan, Transjordania, North Borneo, Manchukuo, Sudan, Macao, Iraq, Charkhali, French and British Colonies, including natives, beasts, ships, etc., all for 5¢ to approval applicants. Big illustrated lists included. Kent Stamp Company, Box 87Z (G. P. O.), Brooklyn, N. Y.

50 DIFFERENT Stamps cataloging over \$1.00 only a dime to approval applicants. 20,000 different stamps at prices ranging from 1¢. All stamps guaranteed genuine. A fine selection of U. S. revenues at 1¢ and up. Address F. G. Stein, Dept. 214, 7360 N. Seeley Ave., Chicago.

JUGOSLAVIA TWO SETS COMPLETE; Dominican Republic, two, beautiful sets; Sweden, 1920 complete; Ten Hungary Heads; 23 different Soviet Russia. 66 stamps cataloging \$2.33 only 25¢. Friendly Filatelists, 3615 N. Sydenham, Philadelphia, Penn.

FREE! New illustrated 56-page catalog "United States, British Colonies and Foreign Stamps"—at real money-saving prices. Includes details of amazing Free Stamp Offer. Send postcard for copy. H. E. Harris & Co., 156 Transit Building, Boston, Mass.

BRITISH TURKISLANDS—Also Congo's—Montecarlo—Nigercoast—Uganda—Djibouti—Ecuadorian—Ivorycoast—Ubangi—Countries collectors need. Free for 5¢ postage. EMPIRE STAMP SHOP, Dept. MM., TORONTO, CANADA.

STAMPS! 100 diff. 3¢; 500 diff. 35¢; 1,000 diff. 90¢! Illustrated Album (4000 spaces) 22¢. Approvals sent. Tatham Stamp Co. (D9) Springfield, Mass.

FREE! Rare Siberia, Far Eastern Republic valued 35¢, Levant Set, interesting Soviet Packet—Approvals included. "Saxon" Albee Bldg., Brooklyn, N. Y.

AIRMAILS—60 Specially Picked, including triangle and Zeppelin, only \$1.00. Eisenmeier, 3700 Frankford, Baltimore, Maryland.

MONTHLY Stamp Magazine one year and 25 foreign stamps. 25¢. American Stamp Journal, Cedar Rapids, Iowa.

10 UNUSUAL U. S. Revenues, only 5¢ to approval applicants. Crane Stamp Co., 901 Bedford Bldg., Chicago, Ill.

FREE!!! King George Memorial Packet, 15 varieties. Postage 3¢. Roberts, 901-T Fourth, Baycity, Michigan.

UNITED STATES—Elaborate Pricelist free. 45 different 10¢, 75 different 30¢. Seidenberg, Baroda, Mich.

STAMPS sent on approval. Quality at low prices. Fred Herzberg, MM 197, Grantley, Elmhurst, Ill.

COINS

\$5000.00 EACH for Rare Coins. We guarantee to pay the World's Highest Prices. Old Cents up to \$2000.00 each, 1860 Cent \$50.00. Cents of 1861, 1869, 1870, 1881, 1890 \$20.00 each, 1859, 1866 to 1875, 1909 \$10.00 each, 25¢ before 1916 \$300.00, 50¢ before 1916 \$750.00. Lincoln Cents before 1932 \$35.00 per 100. Paper Money \$26.00, Foreign Coins, Half Cents, Half Dimes and thousands of others up to \$2500.00 each. Send Dime for Large Illustrated List before sending coins. Romancoinshop, Dept. 560, Springfield, Mass.

\$5.00 TO \$500.00 EACH paid for Old Coins. Keep all old money. Get posted. Send 10 cents for Illustrated Coin Value Book, 4x6. Guaranteed Buying and Selling Prices. Coin Exchange, Box 17, Le Roy, N. Y.

COMMEMORATIVE $\frac{1}{2}$ s. Lincoln, Texas, San Diego, Oregon, \$1.50 each. Illustrated Catalogue 25¢. Norman Shultz, Salt Lake, Utah.

FREE: Foreign Coin, Banknote and Large Illustrated coin catalogue, for 4¢ postage. Approvals sent. Tatham Coinco, Springfield, Mass.

OLD MONEY Wanted. \$5.00 to \$2,500.00 each paid for old coins. Buying catalog 10¢. Robert Cohen, Box 483, Muskogee, Okla.

COINS, Beadwork, Indian Relics, Minerals, Books, Curios, Stamps. Catalogue, 5¢. Indian Museum, Northbranch, Kansas.

INDIAN CURIOS

16 ARROWHEADS, Spearhead, Scalpingknife, Gempoint \$0.99—120.00 Bargains—Firearms—Photolist 10¢. Paul Heikes, Rutland, Illinois.

15 GOOD Indian Arrowheads 50¢. Tomahawk head 50¢. Catalog 3¢. H. Daniel, Dardanelle, Arkansas.



Forging spindle bolt heads.

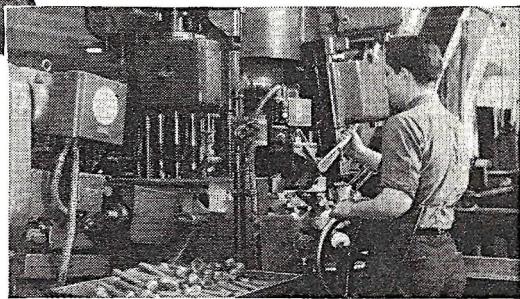
FOLLOW a Ford spindle bolt through the various operations of its manufacture and you will spend the better part of a full working day. From the time a piece of rough stock is sheared from a bar until the finished spindle bolt is produced, you will see 33 different operations that will take 5 hours and 44 minutes to complete. You will be impressed by the care and precision used in the various forging, machining, grinding and inspection operations.

And when that spindle bolt is finished it will be the best spindle bolt that men, money, machines and experience can make.

The care taken and the precision used in the manufacture of Ford spindle bolts are typical of that used in the making of all Genuine Ford Parts. Quality materials, expert workmanship, precision machines, careful inspections are important in the making of a vital part such as the spindle upon which your safety depends.

5 HOURS *and* 44 MINUTES

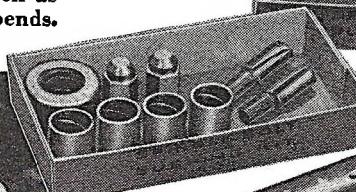
**TO MAKE ONE FORD
SPINDLE BOLT!**



This huge, semi-automatic machine with rotating table performs six machining operations simultaneously.

It pays always to demand Genuine Ford Parts!

When replacement parts are needed, you can maintain with Genuine Ford Parts the same high standards of quality and performance that were built into your Ford car or your Ford truck at the factory.



Ford Spindle Bolt and Bushing Kits contain all necessary parts for completely rebushing the spindles. Included are spindle bolts, bushings, thrust bearings, locking pins, nuts, felt washers and retainers. Complete kit costs less than when parts are purchased separately.



Heat-treated spindle bolt forgings from continuous type electric furnace.



Inspecting spindle bolt diameter on visual indicator which has 1000 to 1 magnification—1/1000 inch looks like 1 inch on scale.

FORD MOTOR COMPANY, DEARBORN, MICH.



NEW LIFE FOR LIGHT MOTORS, AUTOS, HINGES,
ACTION POINT OF TOOLS, LOCKS, ETC.
LUBRICATES—CLEANS—PREVENTS RUST

25 Piece ELECTRICAL EXPERIMENTAL KIT



Original cost
of parts \$18.50
SPECIAL \$3.99

FREE! with Purchase of Short Course in Electricity—Laboratory Bench Plans
with Blue Prints. Order direct from this ad and send your money for
Free Catalog and Booklet "20th Century Electronic Magic."

ELECTRICAL SALVAGE COMPANY
Box 524-MM Lincoln, Nebr.

Be a TELEVISION EXPERT

LEARN TELEVISION with RADIO—NOW!

Great opportunity for experts in this amazing new industry. Recent developments in radio make television a certainty NOW. We teach you by our "on the job" method. Radio and Television from beginning to end in our marvelously equipped labs and studios. You actually operate thousands of dollars worth of expensive equipment. You get expert instruction and skillful guidance by radio-television specialists.

Demand for Television Experts

Television now perfected and ready for the market ON THE NEXT BIG BUYING WAVE. Business leaders predict new system television will require thousands of relay and broadcasting stations. Ultra-short waves will permit eighty thousand television stations in America alone.

GET IN NOW and "build up" with America's next billion-dollar industry.

6 MONTHS THOROUGH PRACTICAL TRAINING

Qualifies for radio-phone license (1st Class). Complete up-to-the-minute training on modern, "walkie-talkie" television equipment including the new cathoderay. Practical experience in studio, control room, transmitter, and receiving. Employment Station WNYA-L Employment aid while training and upon graduation. Write for free book "Pictures On the Air" NOW!

FREE BOOK

S. Q. NOEL, Pres. First National Television, Inc.
Dept. G-9, Power & Light Bldg., Kansas City, Mo.

Without obligation, send me postpaid FREE. Illustrated Book—"Pictures On the Air", telling about new opportunities in television. I am 17 years or older.

Name _____

Address _____

BIG FUTURE USE COUPON

A Midget Foot-Powered Locomotive

[Continued from page 101]

as indicated in the diagrams so that a realistic effect is produced.

The locomotive proper is completed by installing such extras as running boards, end ladders and boiler fittings. The safety valve can be duplicated by installing a small tin can on the boiler just behind the steam dome. The steam dome is a tin bucket which has been hammered out on the bottom so as to form a curved surface. A short length of pipe plus an elbow will do nicely as a dummy safety valve. A bell may be picked up in any 10-cent store and mounted on a suitable strap iron bracket.

A drum and cable system is employed to steer the locomotive. The steering wheel can be cut from several thicknesses of plywood or a wheel from a discarded pushmobile may be used. Power is supplied to the locomotive either by an auto car motor geared up to the drive wheels or through the use of an axle provided with double crank throws. This is clearly defined in the diagrams.

The tender is built up from an express wagon frame, therefore little explanation is required. To complete the locomotive paint the roof of the cab and the wheels red, the frame, boiler and firebox black and the cab and tender in green. The name of your favorite railroad may be painted on the tender in gold bronze. If desired an auto starter motor powered by several storage batteries connected in parallel may be used to power the train. A satisfactory gear or chain drive will of course be required between the motor and axle. It should be noted here that only one rear wheel is connected to this axle. The other remains free so as to prevent the locomotive from skidding when taking corners.

By following the diagrams any shopman or boy should have no trouble in producing a train equal or superior to this one. It is surprising what a few extra attachments such as dummy gauges and electric headlight will make. Careful construction will result in an unusual toy of which you can well be proud.

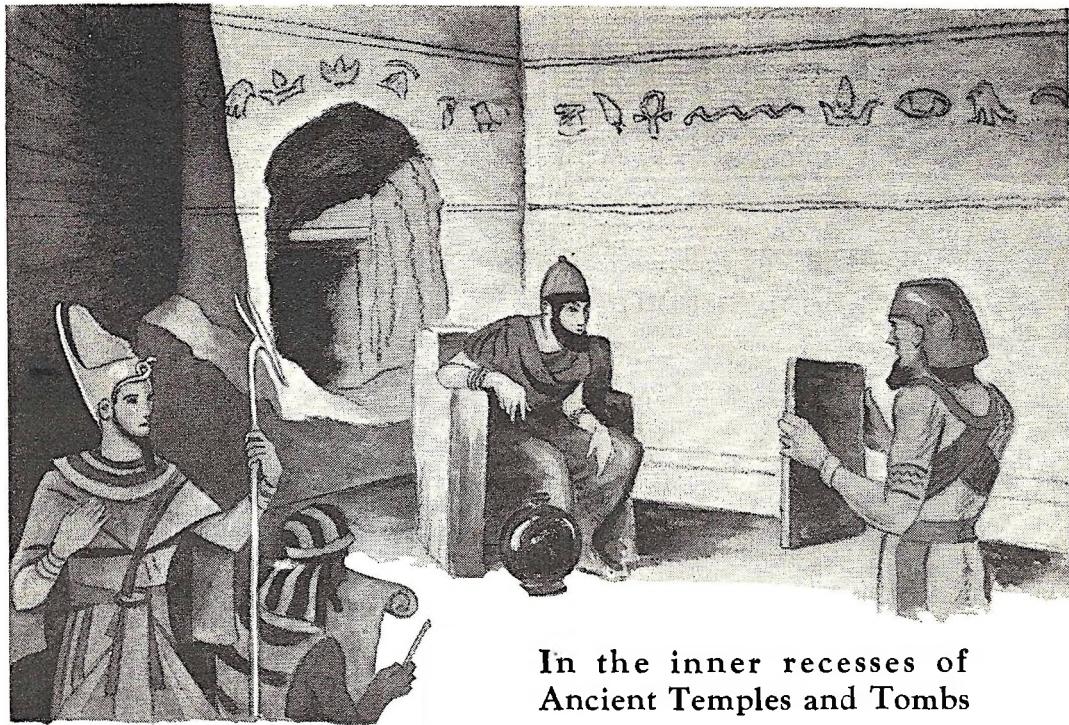
A Lead Plate Bud Vase

[Continued from page 110]

ication, rub the lead until it fits the wood tightly. The upright is plated with sheet lead in the same manner as the base. It will be best to touch the seam occasionally with solder, first taking out all slack with the maple stick. Last, solder the seam solid, cut and true with the chisel then solder a small lead disc to the top to complete the lead sheath.

Bore the hole in the base center for the tenon, coat this with best quality liquid glue and assemble. Place the vase between the lathe centers and turn up the tail stock to make the joint tight.

Complete the vase by boring a half-inch hole in the top, deep enough to take a test tube. For the final finish, place the vase in the lathe and rub lightly with No. 00 steel wool. Blow on clear lacquer with a brush and after it has dried, touch lightly with the finest steel wool to produce a nice luster. A piece of felt glued to the bottom will prevent the vase from marring furniture.



In the inner recesses of
Ancient Temples and Tombs

Wise Men of Antiquity

Preserved This Mysterious Knowledge

Do you think that the profound scientists of ancient lands—who knew more about the laws of the universe than the entire world at the time of Newton—*do you think* that those men were “accidents”?

Do you believe that the miracles of early days, attested by the writings of serious men of every ancient people, were mere lies or exaggerations for the amusement of children?

Do you think he was talking nonsense, when the greatest philosopher of the ancient world said to his pupils: “Know Thyself”?

Isn’t it possible that the transmutation of metals, the elixirs to prolong life, the projection of thought, and the ability to read another’s mind were actually possible to those early sages who recorded and preserved the accumulated wisdom of a thousand generations?

The world has long marveled at the secrets of Personal Power possessed by the ancient Sages. Their knowledge was never lost, except to the mass of mankind; it was preserved and used through the ages by those who were qualified to possess it.

You can know things, understand things, accomplish things, you have never before thought possible. You can discover a whole world of new

and startling Knowledge, which will stir into activity inner powers you have never dreamed you possess.

Perhaps you have realized that you are not as efficient as your intuition tells you that you should be.

Perhaps you have a thirst to know things which the world does not know.

Perhaps you sense that with Knowledge comes Power—a Power far beyond your present possibilities.

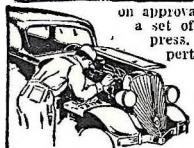
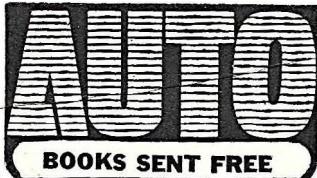
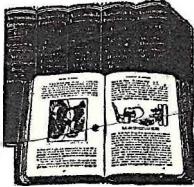
Perhaps you have that desire to turn a key and open a door into a mysterious and entrancing New World.

The Sealed Book Sent Free

Serious people who realize that personal satisfaction and accomplishment can be greatly stimulated by knowledge are invited to send for a Free Copy of “The Secret Heritage.” Address: Scribe A.O.W.

The ROSICRUCIANS

San Jose (AMORC) California
Not a religious organization



CAN YOU FIX IT?

These wonder books tell step by step HOW to take out "play" in different parts, kill the shuddering in steering, to save TAKING—how to put your finger instantly on engine trouble and then the cause. Every part of the engine is fully covered. Newest improvements fully covered. Equal to a complete trade course at less than a fourth the cost.

6 BIG VOLUMES
Brand New Edition
2,000 pages, 2000 illustrations, wiring diagrams, etc., including Marine Engines, Aviation Motors, Diesel engines, etc. De Luxe edition, in a 1-d stamped flexible binding.

AMERICAN TECHNICAL SOCIETY.

Dieck Ave. 58th St. Dept. A-6320, Chicago, Ill.
I would like to buy the 6 volume edition of your AUTO BOOKS. I will pay the extra cents delivery charges only, but if I choose to, I may return them express collect. If after 10 days use I prefer to keep them, I will send you \$2 and pay the balance at the rate of only \$3 a month, until \$24.50 is paid. Please include free consulting membership as per your offer above. Send brand new 1936 edition.

Name _____

Address _____

City _____

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



FREE—if you act now—Kushlan's HANDBOOK OF INDUSTRIAL ELECTRICITY

with the
**Croft Library
of Practical
ELECTRICITY**

Regular McGraw-Hill, 500-page manual of practical information for those engaged in electrical construction, maintenance, testing, inspection and contracting. Yours without charge on receipt of your first payment to the Croft Library. The Croft Library is a complete electrical educator. It is founded on practice—on 20 years of short-sleeved experience—on work as it is actually done. It is jargon-free—written in simple, lucid English. It is not only up-to-date, it yet so sound, so thorough that it is the daily guide of 50,000 highly paid electrical workers and engineers. Croft tells you the things you need to know about motors, generators, armatures, commutators, transistors, starters, switchboards, control systems, electrical machinery of every type—wiring for light and power—wiring of finished buildings—underwriters' and municipal requirements—illumination in its every phase—the most improved methods of lighting—lamps and lamp effects, etc.—how to do a complete job, from estimating it, to completion.

No money down—easy payments

Fill in and mail the coupon attached and we will send you the entire set of books—postpaid—for ten days' free examination. We take all the risk; you assume no obligation. If you decide to keep the books, send \$1.50 in 10 days and the balance at the rate of \$2.00 a month and send Kushlan's useful Handbook free, in addition. Send the coupon NOW and see the books for yourself.

FREE EXAMINATION COUPON

McGRAW-HILL BOOK CO., 330 W. 42nd St., New York
Send me _____ for ten days' free examination the Croft Library of Practical Electricity. If satisfactory I will send you \$1.50 in 10 days and \$2.00 monthly until the price of \$10.50 is paid. If not wanted, I will return the books postpaid. Upon receipt of my first payment of \$1.50 you are to send me a copy of Kushlan's Handbook of Industrial Electricity, absolutely free.

Name _____

Home Address _____

City and State _____

Position _____

Name of Company _____ MMX-936

The Pre-Fabricated House Arrives

[Continued from page 73]

customer, at an extra cost of \$250 for the change.

A similar system is employed by General Houses, Inc., of Chicago, which estimates the yearly upkeep cost of one of its homes at \$50. Interior steel walls may seem a radical departure, but they can be finished in a variety of methods—either by painting, or by the patented method developed by one company in which actual photographic enlargements of wood graining or other effects are mounted on the metal and become a permanent part of it.

The use of concrete for house walls is not new, but some of the recent advances are arresting. As long as twenty years ago Thomas A. Edison built a series of experimental concrete houses. He sawed out wooden molds in quantity in a factory, set them up and poured the walls.

Pre-cast concrete panels are also important in the pre-fabrication picture. The Earley Process Corporation of Washington, D. C., is casting reinforced concrete panels in slabs two inches thick, room height, and varying from two to ten feet in width.

One of the most inexpensive pre-fabricated houses is offered by the Steelox Company of Chicago, which will sell you two bedrooms, living room, kitchen, bath and storage room for \$1,050, and for an additional \$300 will provide window shades, kitchen equipment, plumbing and electric fixtures.

Wood has not by any means been completely discarded, but its use is greatly modified by modern methods. The United States Forest Products Laboratories at the University of Wisconsin in Madison, Wisconsin, has developed pre-fabricated plywood panels only 1½ inches in thickness from which a house can be entirely constructed without use of a frame.

Pre-fabrication in wood has enjoyed considerable vogue for some time. Forty years ago a young man named Ernest F. Hodgson began the manufacture of pre-fabricated wooden panels for the construction of cottages and garages. For \$393 his company will deliver a two-room cottage with side porch, and for \$1,400 a double-wall cottage with living room, bedroom, kitchen and bath.

Strongly appealing to the imagination is the plastic house molded from resins such as form the basis of pipes and buttons. Such houses are not yet commercially available, but a demonstration home has been built to prove the obvious advantages of this novel material. The plastic is called Vinylite, and in its natural state is so transparent that it can be used as window glass.

Another ingenious pre-fabricated house makes use of airplane principles. This is the cotton house designed by Stanley Nicholson of Milwaukee. A wood frame is employed and over it is stretched cotton sheeting which is given a coating

[Continued on page 129]



Graham McNamee

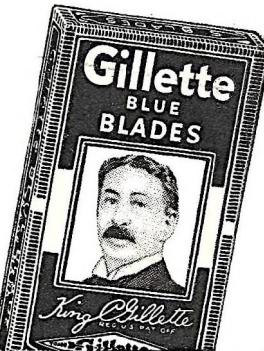
SAYS

"I just don't see how Gillette Blades could possibly be equalled for downright shaving comfort"

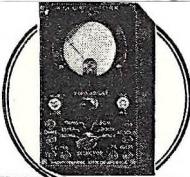
Gillette Blades

5 for 25¢ • 10 for 49¢

Reputable merchants give you what you ask for. In stores where substitution is practiced, insist on Gillette Blades



Be a RADIO EXPERT • Learn AT HOME



FREE
OF EXTRA COST

To start you making money without delay we equip you with a Circuit Analyzer and Point to Point Resistance Tester.

Be the ONE Man in 1000 Who Can Service Modern Sets!

Modern circuits stump the old-time cut-and-try radio fixer. More puzzling complications are coming. Trained men with up-to-the-minute radio knowledge are urgently needed to service these new receivers. Such men easily make up to \$3 an hour.

No Past Experience Needed

Past experience counts for little at this time because changes in radio design are so swift and radical. That's why you as an R. T. A. Certified Radio-Technician can step right into the big money at once. Write today for full particulars.

EARN \$2.00 to \$5.00 AN HOUR
I started a radio shop handling all kinds of radios and electric equipment. Since starting this shop, I have been able to earn from \$2 to \$5 an hour. I have built up a good reputation for sales and service work. These satisfied customers have referred their friends to me and as a result I have all the business I can handle. Recently I opened my eyes to the money I was wasting and I will soon be doing for me. My income is more than doubled what it was at the time I enrolled and I expect to earn still more.

Ernest Lancet

RADIO TRAINING ASSOCIATION OF AMERICA

Dept. MM-69,

4513 Ravenswood Avenue

Chicago, Ill.



BALL JOINT

Auto Trailer Coupler . . . \$1.95
Rocky Mt. States West, \$2.25, Postpaid
Adjustable Bumper Hitch . \$1.35

This hitch can be put on, taken off, or adjusted to 6 different positions with a wrench. Postpaid, \$1.35 without ball. (Rocky Mt. States West \$1.50.) Write for catalog on trailer hardware and camping trailers.

ZAGELMEYER AUTO CAMP CO.
1368 S. Henry St.



MAKE GLAZED CONCRETE PRODUCTS NEW MONEY MAKING BUSINESS

Make beautiful, colored glaze finishes on concrete pottery, tiles, walls, novelties. New, perfected, low cost method. Make 2,500 designs of vases, jars, bird baths, etc., without molds, power or costly tools. Use only sand and cement. No experience needed. Learn glazing, decorative waterproofing, pottery making. Earn money in your own business. Send 10c TODAY for booklet, color plates and complete information.



NATIONAL POTTERIES COMPANY

13 West 26th Street, Room 26
Minneapolis, Minnesota



Cut Fuel Costs 25%
LACO Oil Burners

Finest Automatic Models—Marvelous Performance—Lowest Prices

Now—Clean, automatic Oil Heat, without a basement! Gets utmost heat from oil. "Inner Heating Unit" with 20,000 square heating surface, delivers amazing heat. Automatic temperature control. Humidifiers and circulates the air. Built of very best extra-heavy copper-bearing steel. Electrically welded into solid unit. Handmade in finest furniture. 4 sizes.

PRICED BELOW OTHERS!
Send today for illustrated folder, and very Low Prices!

This amazingly quiet, extra compact LACO Oil Burner gives the most satisfactory, low-cost oil heating ever known. Not only does it adaptable for all installations—furnaces, boilers, air conditioners, etc. Possibly the most popular. Easy to install, and service. Patented "High Pressure Carburetor" cuts fuel bills 25%!

PRICE \$100 LESS!
World's greatest value! Why pay more? 40,000 users praise it. Write for details, today!



DEALERS:

Sample burner shipped for examination without obligation. Write for details!

WRITE for Free Books, Low Prices → LACO OIL BURNER CO., 296 Union St., Griswold, Iowa

Thank You for Mentioning Modern Mechanix Hobbies and Inventions When Writing to Advertisers

Trindl ELECTRIC ARC WELDER

375

Works Off Any Storage Battery

This new electric arc welder is made possible by the invention of a low voltage carbon. Auto batteries may be used without removing from car. Uses about same current as four headlight bulbs. Broken parts are simply melted together by the white hot electric arc, in just a few seconds. Produces about 7000 degrees heat.

Hottest Flame Known

Melts iron and steel instantly. Welds fenders, radiators, holes in bodies, milk cans, tanks, brazes broken castings. Works on anything iron, steel, brass, copper, tin or galvanized metal. Permanent repairs made for almost nothing. Used by factories in many operations. Positive money back guarantee by a responsible firm.

AGENTS

Men with cars to sell mechanics, repairmen, farmers, radio in business, stores, factories. Five minute demonstration makes sales. Call to 1-9076, write today.

2613D, S. Mich. Ave.
CHICAGO, ILL.

TRINDL PRODUCTS

BE A RAILWAY TRAFFIC INSPECTOR

TRAINED MEN NEEDED NOW! A GOOD POSITION is ready for you upon completion of our simple, home-study course. We place you as a Railway Traffic Inspector, with a salary up to \$135 per month, to start, plus expenses, or refund tuition. Interesting, healthful (outdoor) work and rapid advancement for the ambitious and travel if you like. Free Booklet outlines our 1-year course of training, standard of the STANDARD BUSINESS TRAINING INSTITUTE DIV. 6109 Buffalo, N. Y.

1937 RADIO CATALOG

Allied Radio

FREE
SEND
COUPON

10,000 Items at Lowest Prices

Write for the big new 1937 ALLIED Radio Catalog 152 pages packed with Everything in Radio. New Metal Tube Radios—4 to 17 tubes—AC, battery, 32 volt, 6 volt and auto sets; dozens of new Sets; Builders' Kits; everything in Short Wave Transmitters and Receiving equipment; new Public Address systems; also thousands of exact duplicate and replacement parts; books, tools, tools and latest test equipment.

FREE PARTS LISTS

Write to us for free parts lists covering the Vest Pocket AC, Hitch Hiker, Auto Portable, Musical Derby, 2-in-1 Amplifier, Crystaldyne Match Box, Portable Sound System, All Star Jr., Thordarson Amplifiers, etc. We can supply matched kits for building any Modern Mechanix circuit.

ALLIED RADIO

833 W. JACKSON BLVD.
CHICAGO, ILL.

Dept. 6-J

Send me 1937 ALLIED RADIO CATALOG.

Send me FREE Parts List for

Name

Address

City State

Inlaying With Colored Sealing Wax

[Continued from page 98]

carefully to see that no lines have been left uncut and formed into channels, strip off the tracing paper, sponging it with warm water where it sticks. This done, enlarge the outline with a small gouge so inlays may be run in.

The next step is that of actually running the shellac into the cuts. Fit the soldering iron with a small size tip and heat slightly. Mahogany shellac was used for all cuts except the birds' claws and part of the eyes, the white used only for the high lights in the eyes.

Melt the proper color of shellac in small quantities directly into the channels until filled, wiping off with a clean rag after each color has been inlayed.

Coloring the picture is the next step. The water colors are applied to the wood with care to prevent an overflow of coloring beyond the shellac filled outline.

After coloring has been completed, the project is ready to receive a surface finish. A solution of 1 part white liquid shellac to 7 parts wood alcohol, used for the first coat, is brushed on with quick light strokes, and left to dry thoroughly. The second and finishing coat of a 1 to 1 solution shellac in wood alcohol is then applied. When this has dried rub down with fine steel wool and apply furniture wax.

"MM Metal Tube Master"

[Continued from page 113]

Any power transformer having a six, five and high voltage winding between 450 and 600 volts may be used with the amplifier. The speaker output transformer should include an extra 500 ohm winding so that additional speakers may be added if desired. The amplifier should be wired up according to the pictorial diagram. Leads should be connected only to the tube socket prongs indicated with the other prongs remaining blank. A 500,000 ohm potentiometer serves as the volume control and is located on the rear of the chassis. The 300 ohm slide resistance is adjusted for best results. Jacks permit either a phonograph pickup or carbon microphone to be used with the unit.

A wooden container large enough to house the amplifier, and covered with black leatherette, completes the work. An opening in the front serves as the baffle board for the speaker.

Resistances, except for the 10,000 and 300 ohm sizes, are of the 1-watt carbon type. All condensers, except for the electrolytic 8-8 mfd., are cartridge types and of the highest voltage rating available for the particular sizes used.

No external batteries are required for the microphone since it takes all of its power directly from the amplifier. When constructed according to the diagrams, the outfit will deliver sufficient volume to fill an auditorium seating 1,000 people.

[Continued from page 35]

Omaha, Neb.; Eldon Frye, Bartlesville, Okla.; Nathaniel Smolen, Bronx, N. Y. C.; C. D. Kitchin, Jr., Atlanta, Ga.; Roland J. Sigafoos, Bridgeton, N. J.; Edward C. Gilmore, Holly Hill, S. C.

Seventh prize winners \$2 each: Gordon Black, Graymont, Ill.; Richard T. Jahant, Akron, Ohio; R. B. Mickey, Highland Park, Mich.; H. T. Connelly, Upland, Ind.; Mrs. Rose Renshaw, Ilion, N. Y.; Charles N. Gerard, Woodbury, N. J.; Paul L. Evans, Nelsonville, Ohio; H. Heinrichs, Sellersville, Pa.; Mrs. Hilda Bartlett, Oakland, Cal.; Wendell W. Page, Delta, Colo.; Fred E. Beaumont, New Bedford, Mass.

Mrs. Ivan Selstrom, Wilborn, Mont.; James Howell, Fort Worth, Texas; Ewald Wegman, Gibsonbury, Ohio; Elizabeth W. Berrey, New Orleans, La.; Andrew Vena, New York City; Dean Frost, Tucson, Ariz.; Derwin E. Moses, Roselle Park, N. J.; Mrs. Mildred M. Danborn, Portland, Me.; Maurice R. Fitch, Lincoln, Neb.; Warren Grimes, Waterloo, Iowa; Marjorie E. Sevin, New Orleans, La.; William H. Meyers, Davenport, Iowa.

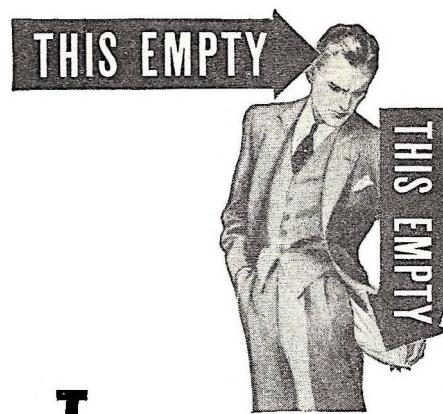
John N. Hall, Buckhannon, W. Va.; George Kirkpatrick, Phila., Pa.; Gruver Davis, Springfield, Ohio; Herbert G. Jones, Springfield, Mass.; Graddy Cary Richard, Louisville, Ky.; Mitchell C. Dattolo, New Orleans, La.; Dwight R. Jones, Portsmouth, Ohio; Charles O. Greenless, Jr., Davenport, Iowa; James K. Baughman, Galesburg, Ill.; Louis McNair, St. Louis, Mo.

D. L. Brock, Alameda, Cal.; Mrs. Florence Koontz, Moundsville, W. Va.; Clinton W. Haines, Bryant, Wis.; Robert C. Young, San Francisco, Cal.; Jim Eastman, Daytona Beach, Fla.; H. E. Wenrich, Berwick, Pa.; Norman F. Walle, Buffalo, N. Y.; D. L. Cheek, Oakland, Cal.; Miss Leila A. Holcombe, Mobile, Ala.; Ray Sanderson, Davison, Mich.; Curtis J. French, Louisville, Ky.; Verle Copeland, Bellingham, Wash.; James Morgan, East Cleveland, Ohio; W. R. Sproles, San Diego, Cal.; Edith E. Dwyer, New Orleans, La.; Vervyl F. Saffell, Beech Grove, Ind.; Gerald Damush, Brooklyn, N. Y.

Eighth prize winners \$1 each: Gus Saclarides, Tarpon Springs, Fla.; Everett E. Linpus, Connersville, Ind.; Joseph Schultz, Two Rivers, Wis.; Cecil Rivera, New York City; Edward Slatinka, Buckingham, Iowa; Gilbert V. Cody, El Monte, Cal.; Tony Nedwick, Chicago, Ill.; H. J. Gregory, Portland, Ore.; John Brewer, Mankato, Minn.; M. C. Wallace, Minneapolis, Minn.

Maude Henline, Towanda, Ill.; Adolf Klarl, Bronx, N. Y. C.; Alfred Hillberry, Houston, Pa.; Marshall A. Riley, Bridger, Mont.; Mrs. Lodie Gass, Detroit, Mich.; Edward H. Reh, Buffalo, N. Y.; W. D. Gregg, Pittsburgh, Pa.; E. L. Coe, Westhope, N. D.; Robert Weiss, Woodside, N. Y.; John F. Konow, Rush Lake, Wis.

Alvin C. Wallace, Watertown, N. Y.; Jules M. Gilbert, Cincinnati, Ohio; Mischa Spiegel, Los Angeles, Cal.; Thomas Smith, Fort Smith, Ark.; Victor H. Vincent, St. Louis, Mo.; Joseph Glezen, Jasper, Ind.; T. J. Mayhood, Lashburn, Canada; Marvin Dokken, Hancock, Minn.; L. F. Mayhood, Lashburn, Canada; C. Alvin Kessler, Portland, Ore.; John Hering, Cincinnati, Ohio; C. L. Johnson, Glendale, Cal.; Leonard Lyyksi, Republic, Mich.; Junior B. Bradford, Bellevue, Ohio; J. P. Coll, Santurce, Porto Rico.



IT TAKES BRAIN to earn money — trained brain! The man without training is usually the man without cash. You can train your brain! Thousands of men have done it through spare-time study of I. C. S. Courses. Be a cash man — be a trained man — mail this coupon!

INTERNATIONAL CORRESPONDENCE SCHOOLS

Box 2319-J, Scranton, Penna.

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

TECHNICAL AND INDUSTRIAL COURSES

- | | | |
|--|--|--|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Plumbing | <input type="checkbox"/> Heating |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Air Conditioning | <input type="checkbox"/> Steam Engineers |
| <input type="checkbox"/> Building Estimating | <input type="checkbox"/> Steam Electric Engineer | <input type="checkbox"/> Marine Engineer |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Highway Engineer |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Bridge Engineer | <input type="checkbox"/> Bridge and Building Foreman |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Refrigeration |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> R. R. Locomotives | <input type="checkbox"/> Air Brakes |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> R. R. Section Foreman | <input type="checkbox"/> R. R. Signaling |
| <input type="checkbox"/> Welding, Electric and Gas | <input type="checkbox"/> Chemistry | <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Reading Shop Blueprints | <input type="checkbox"/> Coal Mining | <input type="checkbox"/> Navigation |
| <input type="checkbox"/> Telegraphic Engineer | <input type="checkbox"/> Cotton Manufacturing | <input type="checkbox"/> Woolen Manufacturing |
| <input type="checkbox"/> Telephone Work | <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> Agriculture |
| <input type="checkbox"/> Radio | <input type="checkbox"/> Aviation Engines | <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Automobile Mechanic | <input type="checkbox"/> Poultry Farming |
| <input type="checkbox"/> Mechanical Draftsman | | |
| <input type="checkbox"/> Machinist | <input type="checkbox"/> Toolmaker | |
| <input type="checkbox"/> Fitter | <input type="checkbox"/> Boilermaker | |
| <input type="checkbox"/> Metal Worker | | |
| <input type="checkbox"/> Heat Treatment of Metals | | |
| <input type="checkbox"/> Management of Inventions | | |
| <input type="checkbox"/> Diesel Engines | | |
| <input type="checkbox"/> Aviation Engines | | |
| <input type="checkbox"/> Automobile Mechanic | | |

BUSINESS TRAINING COURSES

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

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

Address.....

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

Present Position.....

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

INVENTORS PATENT YOUR IDEAS SEND FOR FREE BOOK



HOW TO OBTAIN A PATENT

written by a Former Member of the Examining Corps (1922-24) of the U. S. Patent Office. If you want to profit by your idea, you should take steps to apply for a U. S. Patent at once. Your first step is to get this Free Book. This interesting illustrated book contains valuable information you should have. It tells you fully how to obtain a patent on your idea in the quickest way. With this Free Book you will also receive a "Record of Invention" form on which you can easily record your idea. Personal and Confidential Service: Your Case will be personally handled only by a Registered Patent Attorney who is also a Former Member of the Examining Corps of the U. S. Patent Office. All communications will be strictly confidential.

MAIL COUPON TODAY FOR FREE PATENT BOOK AND RECORD OF INVENTION FORM

CARL MILLER

REGISTERED PATENT ATTORNEY
FORMER MEMBER EXAMINING CORPS U. S. PATENT OFFICE

1638 Woolworth Bldg., Dept. 96B, New York City
Miller Building, Dept. 96B, Washington, D. C.
Please send me your Free Book, "How to Obtain a Patent," and "Record of Invention" form.

NAME

ADDRESS

PATENT
your INVENTION through
this RESPONSIBLE FIRM

... and Get PROMPT
EXPERIENCED ACTION

We offer you the experience and proven responsibility of 61 years. Since 1875 we have rendered expert service and counsel to tens of thousands of inventors. Every member of C. A. Snow & Co. who works on your case is a Registered Patent Attorney. This is important, for only Registered Patent Attorneys may plead your case before the Patent Office.

The home of C. A. Snow & Co. is the largest building in Washington occupied exclusively by one Patent Attorney firm. We offer you thorough, competent work.

If you have an invention, we advise immediate action to protect it, for someone else may be working on the same invention.

Write today for our FREE "Certification Of Invention", which is of real value to you RIGHT NOW! Also two new guides, "How We Protect You" and "Suggestions On How To Commercialize Your Invention".

free
THESE
VALUABLE
GUIDES TO
INVENTORS

C. A. SNOW & CO.

Patent Attorneys Since 1875

SNOW BLDG. DEPT. WASH. D. C.

Checking Car For Engine Noises

[Continued from page 93]

ing sections are next bolted rigidly together so that the vibration of the motor will not cause them to come loose.

It is very important that each cylinder receives its proper quota of vapor so that all pistons will be forced down with a uniform explosion. In order to insure this all valves must be provided with springs of uniform tension. One spring being weaker than the others will result in the motor vibrating excessively. To prevent this, the tension of all valve springs should be tested by compressing with a spring balance installed to a jig similar to the one illustrated in the diagrams. When replacing a spring that has been broken be sure that it is of the same tension as the others. The nut on the valve stem is adjusted until the proper tension is secured.

If valves hiss there is an escape of vapor through the valve guide. To overcome this place a tight fitting felt washer over the guide with a light spring being placed over the stem to hold the washer down. The sealing is completed by packing the counter bore with asbestos-graphite packing.

Even though your car burns high test carbon free fuel it is advisable to clean the carbon deposits from the valves and pistons after each 50,000 miles of driving. If ordinary gasoline is used the valve grinding and carbon cleaning should be attended to sooner. Doing this at the proper time will save you many dollars later on if left go.

The last of the many elusive automobile noises is that one caused by grease and dirt entering the housing containing the tork spring and gear. Usually the oil is thrown off by the flywheel while the dirt adheres to the mechanism just as soon as oil is present. To eliminate the tork spring going erratic a small hole is drilled in the top of the housing and plain gasoline squirted into the mechanism. The gas will dissolve the oil and eliminate sudden breaking of starter springs.

From the explanation given here it is clear to see that even the most involved automotive troubles can be remedied by the average person if the work is performed in a systematic manner.

Auto Triumphs Feature Centennial

[Continued from page 61]

A notable system of electric lighting and an array of man-made lakes feature the Centennial grounds. A detail of Texas Rangers and the "Rangerettes" add color to the scene. The latter are young women in western garb who are official hostesses and information dispensers.

The National Cash Register Exhibit is a giant cash register which rings up the attendance as crowds flock through the turnstiles. Attendance during the first week was 426,625 and officials expect 10,000,000 visitors before closing.

Stunting On A Motorcycle

[Continued from page 57]

Another stunt is one in which the rider leans backward, extends his feet into the air and lets his head hang down over the back wheel. Still another is to place both legs to the right side of the machine, stand on the foot rest with the left foot and grip the handlebars with the left hand. The right side is preferred because the grip on the handlebar gives the stunter control of the throttle and he slows the machine as desired. The right hand and foot are stretched outward.

There are kneeling stunts, such as riding with both knees on the seat with arms outflung, and riding the seat with one knee with one leg out.

Stunts become more complicated when the rider has a partner. One of the popular double person tricks is one in which the rider takes a position on the seat with one foot and grips the handlebar with one hand, having the other hand and foot flung outward. His partner, generally a woman, takes a sitting position on the front wheel mudguard, braces her feet on the foot plates, and leans backward, with her arms outflung, and her head almost touching the spinning wheel.

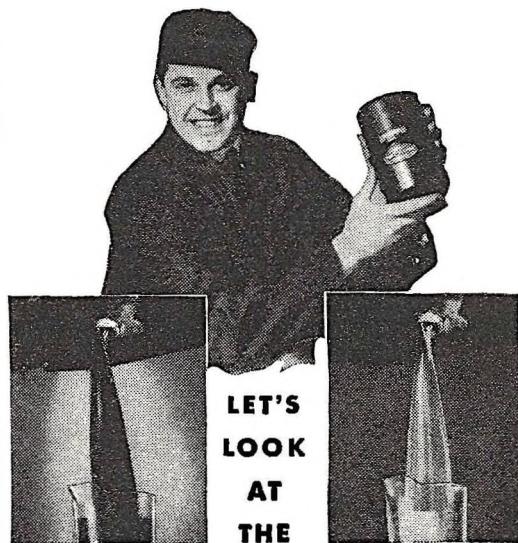
Another trick is for the woman to climb to the top of the rider's shoulders and take either a sitting or standing position, with her arms stretched upward. After she gets her position the rider rises into upright sitting position, letting go of the handlebars.

The partner stunt which is breath-taking is the "human leap." A sturdy board, one which will stand the weight of the machine and rider, is fastened on an obstruction which rises one end from the ground several inches. The partner then lies down on the side opposite from which the board extends. The rider takes the cycle at a fast speed up the board and jumps entirely over the woman.

Ladder Climbing Tops Stunt List

One stunt people will hardly believe is possible is ladder climbing atop a fast moving machine. A ladder, some made of wood and others of metal are used for this stunt. These ladders are fastened by various means, according to the riders choice, in back of the seat. The cycle is speeded to about a 35-mile gate. The rider either climbs the ladder backward or turns around and goes up forward, crosses the top and climbs down the other side. He repeats the process, back to the seat again. The ladder is six feet high to the top round. A quiet day must be had for this trick. Wind might mean disaster.

Riders who are good at climbing a pole often rig up one just back of the seat and climb to its top. The height varies according to the desire of the rider, but is generally eight feet.



EVIDENCE

A week ago, the same high-grade oil was put in the drained crankcases of two automobiles and each driven about 500 miles.

The oil on the right was protected by a genuine Purolator Oil Filter. It is as clean as when it came out of the can . . . and will even retain its color for thousands of miles. The oil on the left has had no filter protection . . . is tarry looking . . . full of sludge and beginning to accumulate dirt and grit and hard carbon that gets in the oil stream and grinds away at closely fitted moving parts.

Your car was probably equipped with a genuine Purolator Oil Filter at the factory. If it wasn't, your service station is prepared to supply this protection. But, remember this—

THE PUROLATOR MUST BE RE-SERVICED AFTER EVERY 8,000 MILES

That is because it becomes so full of the destructive sludge it removes from the oil that its reservoir will hold no more.

Your garage man will attend to this in a very few minutes . . . and no service of his will mean more to you in smooth driving, freedom from repairs, and saving in oil, money and trouble. Motor Improvements, Inc., Newark, New Jersey. Makers of

PUROLATOR

The Oil Filter on Your Motor Car

LICENSED UNDER SWEETLAND PATENTS

Important Notice
TO OWNERS OF FORD V-8
Passenger Cars or Trucks

You can now secure a GENUINE Purolator Oil Filter with all attachments, at a price of \$3.25 plus a small charge for installation. Ask your service station.

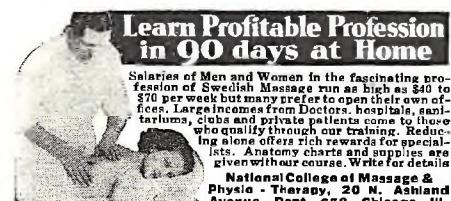


INVENTORS

SEE

Pages 6 and 7

Learn Profitable Profession in 90 days at Home



Salaries of Men and Women in the fascinating profession of Swedish Massage range as high as \$40 to \$70 per hour, but you can start to earn in 90 days. Large incomes from Doctors, hospitals, sanitariums, clubs and private patients come to those who qualify through our training. Reduced tuition for first year students or technicians. Anatomy charts and supplies are given without cost. Write for details.

National College of Massage & Physio - Therapy, 20 N. Ashland Avenue, Dept. 658, Chicago, Ill.

1,500 NEEDED INVENTIONS



Concentrate your talents on inventions that will pay BIG MONEY. 1938 Edition of **1,500 NEEDED INVENTIONS** by R. F. Yates tells what inventions manufacturers NEED badly. Describes in detail 1,500 Needed Inventions in these fields: Chemical, Aircraft, Electrical, Mechanical, Chemical, Aviation, Radio, Marine, etc. Also chapters on the Ten Most Needed Inventions, and on new sciences discovered important to inventors. Simple, practical ideas—one idea, from 1,500, can pay you \$1,000. You can know what inventions will pay you the most money. This book tells you. Keeps you from working on inventions nobody wants to buy. Large cloth bound book, 250 pages, nine big chapters. **Only \$2.50.** We pay postage. If you send cash with order, if not delighted after 5 days examination, return it and get your money back.

INVENTORS' SELLING GUIDE

How and where to sell patented or unpatented inventions. *Inventors' Selling Guide* by R. F. Yates, noted authority on inventions, gives classified list of nearly 1000 manufacturers who buy ideas. Tells how to sell unpatented inventions safely, how to sell chain stores, how to sell to inventors, sell by correspondence and demonstration, how to find buyers, etc. Tells what an inventor must know about Law, Royalty, Contracts, Patents Pending, Financing, etc. 250 pages, cloth bound book, 100 Methods. Cloth bound book, 224 pages, 15 chapters, postage \$2 for C.O.D. plus postage. Satisfaction guaranteed.



BOTH BOOKS FOR \$4.00

if ordered at one time
Write for FREE specimen pages and
complete catalog of valuable books for
inventors.

DONLEY PUBL. CO., 509 FIFTH AV., DEPT. M-9, NEW YORK, N.Y.

Turning Pottery Projects On Wheel

[Continued from page 109]

To make good pottery, you must have good clay. Two methods are commonly used. One is called "throwing" and consists of placing a ball of rather soft, thoroughly kneaded clay on the wheel's center and working it to shape with the hands. To do this calls for an elbow rests, one of which is shown, so that the piece can be kept continually "on center." This is the fastest and also the most skillful method. The other plan is to use the coil method which was used to build the vase shown in some accompanying photos. For the coil method, the clay should have less water—just dry enough that it will not stick readily to the hands. First a ball about 1 1/4 inches in diameter is placed on the wheel. Now turn the switch and with a putty knife work the clay down flat, then cut off the uneven edge leaving a disc about 3/8-inch thick and 3 1/2 inches in diameter.

Small portions of the clay are then rolled out into ropes about 3/8-inch in diameter as shown. A rolling pin or flat board will help to keep the piece uniform. Wet the clay slightly when making contact to insure bonding. Make the ends well joined by slight kneading. Build up several layers, then start the wheel and with a point or simply your wetted finger, work the outside smooth, then the inside. Then add more layers as the work progresses until finally you will have the completed article. The work must be kept centered. If the clay becomes too moist with frequent wettings, let it stand with a fan blowing against it or play the flame of a blow torch briefly over the area to be slightly dried. Too much heat will cause cracking due to uneven drying.

Before commencing a project, the plaster palette should be immersed in water until about half saturated. Then when the clay is placed upon it, the soaking of water from the clay into the plaster will cause a tight bond and with reasonable pressure during the molding there will be little danger of the piece slipping loose.

Slow setting plaster can also be used in place of clay with satisfactory results. Plaster of Paris sets too rapidly though and cannot be used for regular molding. Plaster pieces which are molded can, after drying, be given a luster by covering inside and out with clear shellac, varnish or lacquer.

Needed Inventions Prize Winners

[Continued from page 75]

being put through the boiler to remove the salt. The entire unit should be small enough to be packed by horse or stowed away beneath a life boat seat.

Almost everyone has experienced the difficulty of working on their automobile motor after night-fall without sufficient light. Pvt. M. W. Pawlowicz of the 5th Marines, Quantico, Va., found himself in this situation, and determined that a much needed invention was a flood light installed

beneath the motor hood. For this idea Pvt. Pawlowicz wins the third prize of \$5.

The three fourth prizes of \$2 each went to Val Jameson, Wichita, Kansas; Leon Levy, Bronx, New York, and Steven Billcheck, Hollidays Cove, W. Va. Jameson suggests a siren attachment for the automobile fan which would remain inaudible while the car was traveling within the speed limits proscribed by law, but would howl with increasing power when the car exceeded the speed limit. The governor would be on the siren, not on the car. Levy recommends that a means be found for installing a small light within a doorknob so that when the knob is pressed, the keyhole is illuminated. Billcheck would like to see a built-in typewriter inker through which the ribbon could pass.

The four fifth prizes of \$1 each went to Ewing Campbell, Murfreesboro, Tenn.; Mrs. Don Ross, Grand Rapids, Mich.; Louis La Grange, Allegan, Mich.; and to Donald Backe, Hammond, Ind.

Here are the contest rules:

1. In 100 words or less explain your idea for a needed invention. 2. This contest is open to everyone except employees of Modern Mechanix Publishing Co. 3. You don't have to buy a copy of the magazine or be a subscriber to enter. 4. Write your name and address plainly on your entry. No entries will be returned. 5. The editors of this magazine will be the judges. All decisions will be final. 6. Mail your entry to Inventions Contest Editor, Modern Mechanix Publishing Co., Greenwich, Conn. Entries arriving too late for next month's contest will be considered for the following month.

The Pre-Fabricated House Arrives

[Continued from page 122]

of cellulose dope, as used on airplane wings.

Copper has kept pace with the increasing use of metals in home building. Copper Houses, Inc., of New York City, recently erected a copper house at Washington, D. C., which to the eye presents no variation from a conventional home.

For the builder who prefers to take only partial advantage of pre-fabrication, a number of alternatives are available. The Berger Manufacturing Company of Canton, Ohio, markets standardized steel-frame units suitable for the framework of any house regardless of exterior finish. These steel units weigh but 42 pounds and can easily be erected by one man, eliminating the need for heavy erection machinery.

The Robertson system of cellular steel units is widely employed for floor and ceiling construction. These units are very much like metal planks two feet wide and four inches thick, made of a single piece of metal pressed into a series of deep square corrugations. Within these corrugations wood sleepers can be dropped and floors nailed to them.

One of the principal advantages of the pre-fabricated house is that rooms can be added to it at minimum cost as the family grows. It can also be completely disassembled and set up on a new site at a loss of only 20%.



High School Course at Home

Many Finish in 2 Years

You can complete this simplified High School Course as rapidly as your time and abilities permit. Equivalent to resident school work—prepares you for entrance to college. Standard H. S. texts supplied—Diploma. Credit for H. S. subjects already completed. Single subjects if desired. High School education is very important for advancement in business and industry and socially.

College Entrance

During the past 14 years, our High School graduates have been admitted to 531 different Universities, Colleges, Junior Colleges and Normal Schools—80% of them without entrance examination. Course also prepares for teachers' certificate and pre-professional examinations.

Business—Industry

To get and hold a good position in Business today you must be able to write clear, accurate letters and reports—do figuring involving Algebra and Geometry—talk intelligently on matters requiring a knowledge of Geography, History, and Economics.

In Industry—Mechanical and Engineering lines—you must have at least an elementary knowledge of Physics and Chemistry—be able to figure quickly and accurately—know something of Mechanical Drawing and blueprints—and be able to talk and write accurately and clearly on both your work and ordinary topics of conversation.

Our High School course meets the preparatory educational requirements for Business and Industry.

An Educational Institution

The American School was chartered in 1897 as an educational institution, not for profit—and is exempt from paying Federal income tax, like the best resident colleges and universities.

Don't Be Handicapped—Complete Your Training Now

Be a High School Graduate. Prepare yourself for promotion in Business and Industry—for the Professions, College Entrance and social success. No matter what line you may select, High School training will prove invaluable to you! Our moderate fees cover all instruction, standard textbooks and Diploma. Easy monthly terms. Get ahead in life. Start your training NOW!

Mail coupon for information about line that interests you

American School, Drexel at 58th, Chicago

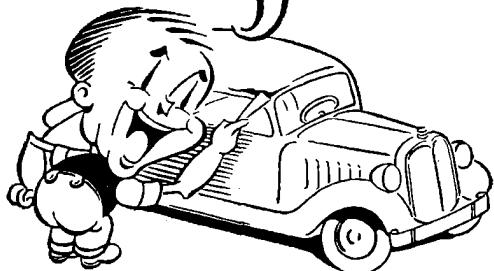
American School, Dept. H-628, Drexel at 58th, Chicago
Tell me how to train for success in line checked. No obligation. High School Course

- Accounting & Auditing
- Diesel Engineering
- Architecture & Building
- Drafting & Design
- Automotive Eng'ning
- Liberal Arts
- Business Management
- Private Secretary
- Commercial Aeronautics
- H'ter Act'g (C.P.A.)
- Electrical Engineering
- Highway Eng'r'g
- Electrical Refrigerat'n
- Mechanical Eng'r'g
- Air Conditioning
- Radio & Television
- Civil Engineering
- Salesmanship
- Complete Law
- Steam Engineering

Name _____

Address _____

I CAN PATCH THIS TOP with PLASTIC WOOD



Damaged or leaky tops or rotted posts are repaired by applying Plastic Wood firmly into cracks or holes—allow to harden—sandpaper smooth. Fabric patch can be cemented over Plastic Wood.

Make 1001 Household Repairs

Genuine Plastic Wood is actual wood in putty form—when dry it is hard wood that can be worked with any wood - working tools—sawed, planed, turned on lathe, carved—will hold nails and screws perfectly without chipping, cracking or crumbling. Adheres to any clean, dry surface—wood, metal, glass or porcelain—is waterproof and weatherproof—can be painted, varnished or lacquered perfectly.

Genuine Plastic Wood is also used to repair broken furniture, reset loose bathroom fixtures, loose casters; fill old screw holes, baseboard cracks, shelving cracks, replacing wood rot; fill holes around pipes, wiring, boat and canoe repairs, etc.

Get your can or tube at any leading paint, hardware or variety store.



PLASTIC WOOD

BUILD AN AUTO TRAILER

Plans in 1935 Handy Man's Manual
Send 50c to Modern Mechanix Publishing Co.
Fawcett Bldg., Greenwich, Conn.

ELECTRICAL ENGINEERING

A BROAD, basic intensive course complete in one school year. Includes fundamentals of Refrigeration, Air-conditioning, Electronics. Approved by educators, endorsed by industry. 44th year. Catalog.



299 Takoma Ave., Washington, D. C.

Plastics Change American Industry

[Continued from page 83]

producing still newer materials that will make beautiful and inexpensive furniture, automobile bodies—even houses? Research is trying, that is certain; and seldom does it fail. Meanwhile, the art of fabricating plastics is advancing steadily. The new automatic injection method of molding, in which a plastic almost ready to harden is forced under pressure into the molds and can be ejected in a few seconds, a finished product, is a case in point. By this method, too, whole sets of buttons, typewriter keys and other similar objects can be molded at once, instead of laboriously one at a time.

There is no telling what may happen next in this lusty infant industry. Molders now produce plastics in sizes ranging from tiny, jewel-like earring adornments to nine-foot, 4,000-gallon water tanks. The Ford Motor Company uses oil pressed from soy beans in the enamel finishes for its cars; and Ford is now experimenting with a plastic made of the soy bean meal, after the oil has been removed, mixed with formaldehyde. It is an exciting technological race; and modern plastics—those already in use and those still bubbling in test tubes—may well be the source of a new era of prosperity.

Paint, incidentally, gives a startling example of research's ability to jolt industry into new channels. Twenty years ago automobiles hastened through the assembly line only to languish for five weeks in the finishing shop. Today, because of the high development of nitrocellulose lacquers—made from plant fiber—cars are finished from the bare metal to the final polish in one day! That development was a rude awakening to a sleeping paint industry, which was suddenly forced to scrap old equipment and hurriedly reorganize to meet new demands. Plastics have already caused a similar re-gearing of basic industries, and undoubtedly will cause more.

Cellulose, which exploded paint theories and makes excellent plastics, is a marvelously versatile substance. It goes into the manufacture of such widely separated things as raincoats, cements, substitutes for leather, and the film which makes the modern motion picture possible. Into Cellophane it goes—and in a decade enough Cellophane has been manufactured to encircle the earth with a band 200 miles wide. It makes rayon, and a rayon cord as strong as structural steel of the same cross-section promises to double the life of automobile tires. Such things don't just happen; they are brought about by ceaseless, untiring research.

The laboratory has changed rubber from a sticky, ungovernable substance into a tough and sturdy one; it has transformed the tire from a mental and physical hazard into something seldom given a thought. Yet in automobiles it is generally the rubber parts that require replacement first; chemical tougheners have worked

wonders, but there is still room for improvement.

It may seem strange that the Dupont laboratories, largely instrumental in bringing rubber to its present dependability, should now be engaged in perfecting synthetic rubber. Artificial rubber has long been the ardent dream of many a chemist. Why aim for a substitute when the natural product is so cheap and so much improved? The answer is largely an economic one. America gets its rubber from abroad. During the past decade, through foreign manipulation, rubber's price has gone as high as \$1.29 a pound. Chemists saw that challenge. If they could do the impossible—produce synthetic rubber at a reasonable price—they could free the country from its dependence on foreign supply.

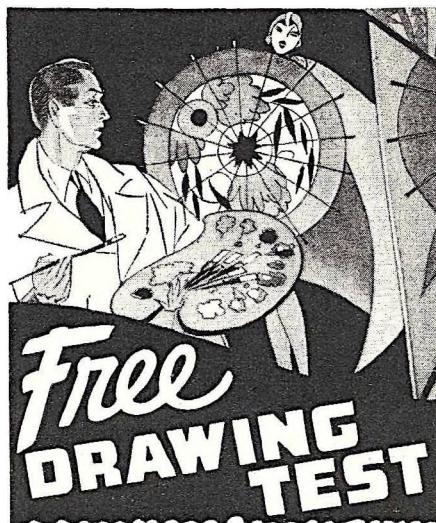
Research has done just that, using acetylene as a raw material. Dupont chemists, aided by the work of a Notre Dame professor, Father J. A. Nieuwland, have made artificial rubber that excels the natural product in many respects. Called "Duprene," this substance is already being manufactured on a commercial scale. An acre of rubber trees yields approximately 500 pounds of rubber in 500 years; but an acre-large factory can turn out 200 tons of man-made rubber in five hours! And the raw materials, including sulphur, salt and natural gas, are well-nigh inexhaustible. Natural rubber's weakness—its deterioration from contact with heat, oil, acids and alkaloids, is largely removed in "Duprene." Though it now costs a \$1 a pound, six times the price of rubber, "Duprene" has already found a market in gaskets, tubing, and many other uses where rubber is exposed to chemical decay.

To those who remember camphor as a smelly substance applied in treating colds, it may be a surprise to know that camphor is an essential ingredient in pyroxylin plastics and safety glass. The only source of natural camphor is the Japanese island of Formosa. In short, we were long dependent on one small spot on the globe, subject to the vagaries of shipping, tariff, and the possibility of war, for an important product.

It is under these circumstances that research works at its best. No time is wasted in devising substitutes for natural products when they are cheap and plentiful. But let there be a threat of scarcity or high price, and immediately all the guns of science are pointed at a synthetic. So it was with camphor. In 1934, after over \$3,000,000 had been spent in various laboratories in a vain hunt for artificial camphor, chemists of the Newport Company derived an excellent synthetic from American turpentine. This new synthetic is now helping make the nine million pounds of safety glass the automobile industry will require in 1936.

The cunning sandwich of materials that compose safety glass is a strange union of man's newest with man's oldest chemical achievement. Glass goes far back into ancient history. Yet the effort expended by plastic research is matched by the

[Continued on page 132]



Free DRAWING TEST

If you like to draw, test your sense of design, color, proportion, etc., with our simple Art Ability Test. An opportunity to get a frank opinion, free, as to whether your talent is worth developing.

Magazines, newspapers, publishers and advertisers spend millions yearly for illustrations. Design and color influence the sale of most things we buy. Artists have become important to industry. Machines can not displace them. If you have talent, train it. Drawing may be your surest road to success.

The Federal Schools, affiliated with a large art, engraving and printing institution, has trained many young men and women now serving industry as designers or illustrators, capable of earning from \$1,000 to \$5,000 yearly. Its Home Study courses in Commercial Art, Illustrating and Cartooning, contain exclusive illustrated lessons by many famous artists. Practical instruction by experienced men is the reason for its many years' outstanding success. Courses sold on easy payments.

Send today for Art Test and Free Book explaining present opportunities in art. Just fill out and mail coupon below.

FEDERAL SCHOOLS, INC.

9066 Federal Schools Bldg.
Minneapolis, Minn.

Send me, without obligation, your Art Test and Free Book.

Name.....

Address.....

.....

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

Hunters! Trappers!



WE CAN TEACH YOU TO MOUNT BIRDS

Send Coupon for Free Book

Tells all about Taxidermy, and how you can learn at home to mount life-like Birds, Animals, Game-Heads, Fish. Save your valuable trophies. Decorate your home and office. Learn genuine Chrome Tanning for harness and leather. Send today for our free book. *Charming*, squirrels, rabbits, owls, even frogs, into marvelous craft work groups, both useful and humorous. Wild-game not necessary. A marvelous hobby, great fun and fascination.

BIG PROFITS Turn your spare time to cash. Have a side profit—make money. Make game trophies for sportsmen, sell them, own mounts, save money and Make Money with expert tanning. Learn by mail from old reliable school, with 200,000 graduates. Invest—Send coupon, or letter or post card. Right Now! for this marvelous book—no cost—no obligation. State your age.

FREE BOOK

Northwestern School of Taxidermy,
4736 Elwood Bldg., Omaha, Neb.

Gentlemen: Please send me your free 48 page booklet explaining Taxidermy.

Name _____

Age _____

Address _____



NEW!! MIDGET POCKET RADIO



\$2.99 Complete Postpaid

Fits in any small pocket easily. Weighs only 4 ozs. as shown. Comes in four beautiful colors—Black, Green, Brown, White. No tubes, batteries, or electrical connections needed! Nothing to wear or need repaired—will fit in your pocket—separates and receives broadcast stations with beautiful clear tone.

MUCH GREATER under good conditions—very little static or interference! Can be used by ANYONE ANYWHERE! NO CRYSTALS TO ADJUST! Absolutely complete with midget phone and instructions to use while in bed, hotels, at home, auto, offices, camps, bicycles, etc. Very portable, compact. Many satisfied owners. **GUARANTEED TO WORK**—**THOUSANDS OF SATISFIED OWNERS.** THESE ARE FACTS. Send only \$1.00 and pay postman \$1.00 plus postage on arrival or send \$2.99 (Cash, Money Order, Check). Ideal Gift. Guaranteed. State Color. ORDER NOW! (For other orders, call TRINTONE)

TRINTONE RADIO CO., Dept. M-9, KEARNEY, NEBRASKA

Plastics Change American Industry

[Continued from page 131]

glass chemist's constant endeavor to transform his material with new life and new uses. The Corning Glass Works recently completed tests aimed at producing a material long considered impossible—a glass that would endure the terrific heat of direct flame on top of kitchen stoves.

During these trials, scientists with doctor's degrees became cooks. Glass made from 1,500 different formulae was tested. To reproduce actual kitchen conditions, these eminent men presided over the frying of 18,000 pounds of potatoes in glassware over many kinds of wood, coal, oil, gas and electric stoves!

As a direct result of this ordeal by fire came Pyrex glassware that defies flame and can be used as a serving dish on the table. More than that, laboratory workers cataloged the performance of 1,500 glass formulae, and increased immeasurably their knowledge of the product.

From the same laboratory has come fibrous glass, spun to a fineness seven to fifty times that of a human hair. A glass wool made up of these fibers resembles cotton batting, and is used extensively as insulation in ships and electric refrigerators, where vibration causes ordinary insulating material to settle. In addition, these superfine fibers have been wound around electric wires for insulation with excellent results; and they have been twisted into yarn and woven into textiles!

Today we wonder at the marvel of plastics, at the adaptability of glass. Tomorrow may see still a new material, with new advantages. It has been said that the pen is mightier than the sword but the fragile glass test tube bids fair to outrank them both.

Training Army Air Fighters

[Continued from page 39]

of securing a permanent commission in the Air Corps.

From the start of training all students think of but a single topic—flying. During the first or second week in November the all-absorbing topic of conversation is the first solo. Some morning after a particularly rough landing, the instructor clammers out of the ship and says: "Well, you can't do any worse alone." The fledgling gulps twice to swallow his thumping heart and gives her the gun. At 400 feet he wiggles the stick a couple of times, tentatively, just to see if the ship recognizes him. A few turns and he glides in to a breathlessly happy landing. The solo is successfully accomplished! That alone has been sufficient recompense for hours of study and training. If a "washing out" takes place next week, the solo has made it all worthwhile.

Although construction of Randolph Field was started in 1928, it was not officially dedicated until 1930. The first buildings were occupied by

school troops on Oct. 15, 1931, when the Primary Flying School and the School of Aviation Medicine from Brooks Field, the Air Corps Training Center Headquarters from Duncan Field, and the Primary Flying School from March Field, Calif., took up permanent residence. The project as it now stands represents a total investment of some \$12,000,000 exclusive of aircraft, supplies and equipment.

The land, on which stands the most complete and modern air training center in the world, consists of 2,368 acres, of which 400 acres in its geometric center are confined to the building area. The remaining 2,000 acres, comprising four distinct landing areas, known as the "NORTH," "EAST," "SOUTH," and "WEST" fields, completely surround this central web-like pattern of buildings and streets.

Officers Have Own Homes

The Administration Building, which houses the photo section, administrative offices, War Department theater and the post office is the predominating structure on Randolph Field. It rises to a height of 175 feet and overlooks the surrounding plain. At night, the beams from a powerful revolving beacon atop the tower can be seen by flyers for a distance of 50 miles.

The circular residential area in the center of the great flying field has in its exact center the Officers' Club. The officers' homes surround the club, being symmetrically spaced on the concentric circular streets and radial spoke-like roads. The majority of the homes are of two-story design, but a number are of the bungalow type.

Flanking the administration building at the left of the main double boulevard entrance to the field stands the Post Chapel, a magnificent structure of Spanish design. Just across the main traffic artery is located the Post Exchange. This building consists of three separate wings. One houses the Post Exchange proper, the second is occupied by a grocery store and meat market, and the third by a restaurant and beauty parlor.

Flying Cadet Club Organized

Forming the boundary on the west and east sides of the building area are eight hangars. Each one measures 220 feet in length, 110 feet in width and is 47 feet high. On the northwest boundary, two large warehouses house the Post Quartermaster and the Air Corps Station Supply.

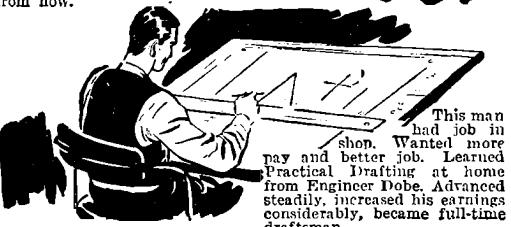
The organization of the new Flying Cadet Club in San Antonio is indicative of the constructive and ceaseless activity towards bettering conditions with the Cadet Detachment. It is largely through this effort that the Cadets now find themselves enjoying club rooms and privileges which are far superior to those of the recent past.

Such is the institution which today receives, trains, educates and transforms into pilots—the youth of America. Young men, who yesterday were no different from thousands of others throughout our Country, upon graduation are the equal of any airplane pilot in the world.

WHAT KIND OF MAN ARE YOU?



This man has routine job in shop. Would like to earn more money, advance to better job, but does nothing about it. Will be doing same work 20 years from now.



This man had job in shop. Wanted more pay and better job. Learned Practical Drafting at home from Engineer Dobe. Advanced steadily, increased his earnings considerably, became full-time draftsman.

The Road to Advancement DRAFTING

In every walk of life practical training in DRAFTSMANSHIP will prove valuable. Even if you don't accept a job as a DRAFTSMAN, you will be money ahead by taking Engineer Dobe's Course. You will be amazed at the speed with which you can learn in your own home in your spare time by Engineer Dobe's PRACTICAL METHOD.

JOBS NOW OPEN

In all industries, Drafting leads the way. In Aviation, Electricity, Building, Machinery, Automobile, Draftsmen must be used, and their work comes first. Recovery in industry and building is definitely on the way. Many trained Draftsmen will be needed on better jobs at better pay and shorter hours. Prepare NOW!

Learn at Home From an Engineer

I will teach you my practical method that has been successful with thousands since 1900. I will furnish you with all tools and a drawing table. I will teach you in a very short time by mail in your spare time until you actually have a desirable Draftsman's job, or prepare you for better pay in the job you now have. No High School or previous experience needed. You must be entirely satisfied with my personal training UNTIL COMPETENT and until assisted to a position, OR YOU GET ALL YOUR MONEY BACK. Start NOW and get the training. Prepare for more pay and a better job. Send the coupon below TODAY! Time is money! Don't delay! No obligations!

Complete outfit,
size 20x25 in.,
furnished to you.



These TOOLS and Other EQUIPMENT Given When You Start

Free Book!

ENGINEER DOBE, Div. 4736 Libertyville, Ill.

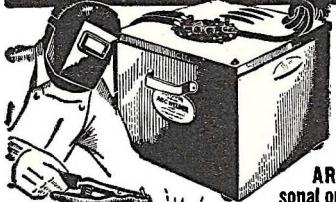
Send me your free book, "Successful Draftsmanship" and explain how you will assist me to a good position as a draftsman.

Name _____ Age _____

Address _____

Post Office _____ State _____

Full Size Professional ARC WELDER Only \$29.50



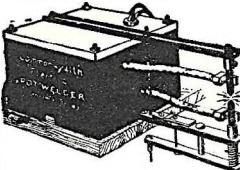
Amazing Machine, with Efficiency of Arc Welders Selling for \$145.00 and More Offered at Breath-Taking Low Price.

Now You Can Own
Full Size ELECTRIC
ARC WELDER for Personal or Shop Use—or Go Into Welding Business for Yourself!

Here's thrilling news! A full size, heavy-duty Aladdin Electric ARC WELDER—only \$29.50! Not a toy, but a big, 100-pound machine that welds all metals and alloys, everything from heavy motor blocks to fenders. A sturdy, welded-steel-construction machine, yet easily portable on casters. Approved by Automotive Test Laboratories of America.

SPOT WELDER \$19.75

Complete with all Accessories



Lowest priced practical Spot Welder on market! Heavy, full size unit, capable of doing work of machines costing up to \$300. Plugs into 110-Volt socket. Welds steel, iron, tin, wire mesh, with all fluxes, acid, welding rods. Fully guaranteed. Ask for details and specifications—sent FREE.

Works from 110-Volt Socket

Simply plug into a socket with 110-volt current. Economical—costs only a few pennies an hour to use. Often pays for itself on first or second job. Fine for soldering and brazing. Complete heat controls. Simple instructions for doing all kinds welding jobs included.

Amazing Details FREE!

Send no money! Write today for fascinating facts about this new Aladdin ARC WELDER at \$29.50! At last, machine shops, garages, mechanics, inventors, etc., can obtain a highly efficient machine GUARANTEED IN EVERY WAY—at a saving that may amount to several hundred dollars! Send today for free details.

COMMONWEALTH MFG. CORP.
3785 Beechmont, Dept. J-10
Cincinnati, Ohio



FREE: This Outdoors Sheath Knife

Ideal for hunting, fishing and camping trips. It has a sturdy 4" blade, tempered and polished, with keen, durable cutting edge. Blade extends clear thru the bone stag handle. Complete with leather sheath. OUTDOORS is a monthly magazine you will enjoy. Filled with illustrated stories and information on hunting, fishing, camping and outdoor activities. Also up-to-the-minute information on guns, fishing tackle, dogs.

SPECIAL OFFER

We will send you this Sheath Knife and OUTDOORS MAGAZINE for a whole year.

Both for only \$1.00

Clip this ad and mail today with \$1.00 bill to

OUTDOORS, Dept. M
333 N. Mich. Ave., Chicago, Ill.



TRAILER

SEND 25¢ TODAY

for this big 60-page book that tells how to build Tops, Beds, Cabinets, etc. All about Electric Light and Water Systems. Plans, ideas, suggestions that save time and money for trailer builders, buyers, and users. Catalog of parts and equipment includes everything you want—Axles, Hitches, Jacks, etc. Write today for free catalog. TRAILER SUPPLY CO., Box 438-C, Wausau, Wis.

TRI-STATE COLLEGE

Enroll now for one of the short courses in this world famous Engineering School. Courses designed to give trade proficiency for earning an immediate income—as a remunerative life work or as a financial stepping stone. Training given by skilled instructors of the engineering school. Modern equipment and laboratories. Low tuition and living costs. Write today for complete details. 696 S. College Ave., Angola, Ind.



NEED MONEY?
Write for free booklet describing "107 Plans for Operating a Successful Business of Your Own". Make from \$20 to \$100 a week starting in spare time at home. No peddling or house-to-house selling. Booklet sent free, and without obligation. Write for your copy today.

ELITE PUBLISHING CO.
Dept. G 214 Grand St. New York, N. Y.

FREE
BOOK

NO BOSS! SURE CASH! START OWN BUSINESS

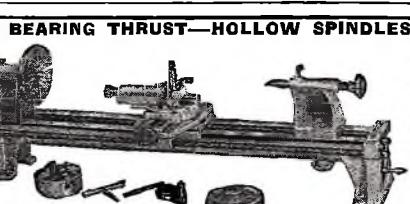
Resilvering mirrors. Replating tableware, reflectors. Refinishing chandeliers. Making Chipped Glass Signs. Experience unnecessary. Combination outfit furnished. Write—SPRINKLE, Plater, 855, Marion, Indiana.

FREE

LABORATORY APPARATUS BIOLOGICAL SUPPLIES MICROSCOPES TELESCOPES CHEMICALS

New complete 32 page catalog lists hundreds of items of interest to students and professionals, experimenters. Save Money—Buy Direct. Send now! IT'S FREE and crammed full of bargains and valuable information.

J. H. WINN MFG. CO., Dept. 209, 124 W. 23d St., New York



NOW A SCREW FEED METAL CUTTING LATHE \$9.95

With features of a high priced lathe. Mod. 350—6 in. between centers (Mod. 360 18 in. between centers only \$10.95). Lathe compound slide rest—carriage ACME thread lead screw with ball crank—face plate—two No. 0 MORSE taper centers and standard type tool post with rocker wedge. Spindles are hollow bearings of bronze! Likes all—0.030" Morse taper centers. In Dept. 209, 124 W. 23d St., New York. Ball bearing top and cross feeds are equipped with gibs and a series of take up screws. Bed is made of one solid piece of cast iron and is carefully machined—3 in. four jaw chuck \$8.50. 4 in. \$4.50. Adapter bushing 50 cents. Ball bearing thrust 50 cents. Shipping weight approx. 31 lbs. Send \$1.00 with order, balance express C. O. D.

BALKO ELEC. MOTOR & SUPPLY CO.
10 S. Clinton St., Chicago, Ill.

Making Boats Go Faster

[Continued from page 49]

tons, Miss England's slightly more than five tons. Miss America X had 6,400 horsepower with four engines, Miss England 5,000 with two engines.

Our American motors were developed by a private industrial concern. Such companies are interested in economy and efficiency. But the motors we need to power future Harmsworth hydroplanes need not be efficient nor economical.

Our Packards, for example, use between seven and eight hundred gallons of gasoline an hour. The special highoctane gasoline we use costs one dollar a gallon. For any commercial purpose a motor so expensive to operate would be impossible to sell.

No Subsidies For America's Boat

In the United States the development of super-speed marine engines is strictly a development by an individual who happens to be myself. No endowments or government subsidies figure in the case. The motors in Miss England III were financed through government endowment.

The problem, of course, is not just one of power; it is a problem of *power versus weight*. Engines that are merely powerful will not suffice. They must be powerful AND LIGHT.

It is amazing how an apparently useless competition for purely honorary achievement, such as the Harmsworth, often results in substantial commercial benefits. The entire course of an industry is frequently changed by someone's desire to win a race or capture a trophy worth a few dollars at most.

Let me tell a story to illustrate:

Back in the early days of motorboating, builders of marine engines got themselves into a mental groove. Then the world war brought the development of the high-speed light-weight aviation engine. To me, and to a few other motor-boat enthusiasts, these aviation engines appeared admirably adapted to water craft.

Aviation Engine Approved

But the "old guard" marine engine makers consistently opposed the use of aviation engines in boats. In 1923 I entered one of my Baby Gar runabouts, in the Carl G. Fisher race. This was a race for "gentlemen's runabouts," and the rules specified that the boats should be powered with marine engines. The rules committee barred my entry three successive times after we had won the races. They said the Baby Gar carried an aviation engine.

I appealed to the American power-boat association for a definition of a marine engine. Their answer was: "any engine manufactured or assembled, and sold or offered for sale as a marine engine, is a marine engine."

This gave us a chance to use a Liberty motor we had purchased at junk prices after the war. We rebuilt it, and put it in a Baby Gar Runabout. We advertised the motor for sale as a marine

[Continued on page 137]



**TURN SPARE HOURS
INTO CASH!**

**up to \$40 Weekly
In Your Own Home**



No soliciting! No canvassing! We show you how to make big money decorating fast-selling Giftwares. We start you with the big \$10 Artist's Outfit shown above. We supply you with \$150 worth of Giftwares free of extra charge and show you how to dispose of them without leaving your home. We give you 29 Tested Plans for making money. One Fireside Member says, "I made \$100 on furniture in one week." Another writes, "My sales were \$500 for 5 weeks. This is my first year." R. M. P., of Ill., says, "I did \$2,500 worth of business last year and over \$12,000 this year." D. W., New Mexico, reports, "I would not take \$1,000 for my Course."

No Experience Needed

You too may have a guaranteed income opportunity with Fireside. No tiresome study. You learn by doing. No artistic ability necessary. Our easy 3-Step Method makes the work easy to learn and easy to do and fits you to make good money practically from the start.

Quick Sales in Your Home

No need to leave the house to dispose of everything you make. Our new automatic salesman does all the selling for you. Designed to quickly find cash buyers for all the Giftwares you can turn out.

No Cost Plan

Send coupon for details of new plan that pays for your Fireside Course besides putting big cash profits in your pocket. Mail coupon now while openings for new members are still being offered.

FIRESIDE INDUSTRIES
Dept. 142-M

Adrian, Mich.

Fireside Industries
Dept. 142-M, Adrian, Mich.
Send me FREE Book on Home Deco-
rating for a big steady income. Also
details of plan that will pay for my
Course and give me big profits be-
sides.

NAME
ADDRESS
CITY STATE

Tackle Suggestions For Bass Fishing

[Continued from page 65]

enamel, six strip construction. The seamed bait rod while it has a considerable sale has practically been superseded by the new seamless tubular rods, the same being drawn from a short length tube of steel. A bait rod in the seamless tubular type answers almost perfectly to the demands set up for an all-around rod to be used for casting all manner of lures and the playing of many various weights and species of fish.

The single action and automatic reels are both used in bass fishing with a bass fly rod. Of the two it is certain that the automatic reel is the best and most efficient. A reel of the sort makes it possible to pay strict heed to the fishing and the activities of the lure without dividing the attention between what is going on with the reel and the destination of the lure. A 50-yard reel is most suitable for bass fishing and like all-around work. A reel of the sort will hold a double tapered HFF line.

In making a reel selection for your bass fly rod let it be understood that the balance as between the rod and the reel must be observed if the best results in casting are to be had. Experience with such outfits has taught that the reel with line on it should weigh one and one-half

[Continued on page 143]

Making Boats Go Faster

[Continued from page 135]

engine, thus fulfilling the qualifications of the definition. It wasn't our fault that nobody wanted to buy it. Maybe our price of \$25,000 was a little high. . . . Anyway, the rules committee had to let us in.

The race was held in Buffalo, in the summer of 1923. The race committee got something of a shock when Orlin Johnson, my mechanic, and I appeared. We were both in formal attire—top hats, white gloves and all.

"What's the idea?" the Committee wanted to know.

"Well," our answer was, "The rules describe this event as a 'gentlemen's runabout race' and we're taking no chances of being disqualified. We're gentlemen!"

The other contenders in the race never got near us. We had a motion picture camera mounted in the stern of the Baby Gar. During the race it ground out pictures of all the other boats until they fell too far behind.

That was one of the most satisfying larks I ever had. But the serious point of it is, that after that race, nobody quibbled about the marine and aviation engines. The incident helped to force recognition of a new era in marine motor development. Today the aviation engine and the marine engine (except the small outboards, of course) are becoming fundamentally the same.

No machine can ever take a DRAFTSMAN'S JOB



● The draftsman is one man who doesn't have to worry about being replaced by a machine. His **HEAD** and his **HANDS** are needed — always. Even the smallest improvements must be laid out by the draftsman so he is usually the first man to be hired, and among the last to go in a lay-off.

Get into drafting, where the pay is big, the work is fascinating and opportunities lie in **EVERY** branch of industry. Men from every walk of life enter this profession and thus start their careers toward success and independence. We can help **YOU**. Let us send you our plan, there is no cost or obligation.

Learn at Home

Unlike many other professions, drafting is easily learned at home. It requires no previous training, no college education. Just an hour or two a day right in your own home can do wonders towards making you a draftsman and fitting you for this interesting, profitable, inspiring profession. The American School is proud of the success of its students, for American School graduates are found everywhere in positions of responsibility and power.



The American School Building, Drexel Ave. at 58th Street.

BIG OPPORTUNITIES Right now is the time to get into drafting, for new machines, placements, buildings, bridges, roads, and all other new ventures must be planned on the drafting board before the actual work can begin. The classified sections of most daily newspapers carry advertisements of jobs open for draftsmen **NOW**. Under our plan of instruction you can often qualify for a good job long before you have completed the course. This is important for it enables you to get into this fascinating work within a comparatively short time. Business is building fast, every month more draftsmen will be called for. Join this profession **NOW**.

Text Material All Furnished

When you enroll for a course in drafting with the American School you will be impressed with the low cost of this instruction and the easy terms of payment. There are no books to buy, for these are all supplied as a part of the course without one penny of extra cost. Send the coupon for information, there is no cost or obligation.

AMERICAN SCHOOL

Drexel at 58th St. Dept. DD-628 Chicago, Ill.

American School

Drexel at 58th St., Dept. DD-628

Chicago, Illinois

You may send me, without cost and fully prepaid, details of your course in Drafting and tell me why such wonderful opportunities exist now.

Name.....

Address.....

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

Classified Advertisements

Rate for classified ads, 10c per word (include name, address and all numbers) per insertion. Minimum 10 words. Cash must accompany order and be received in this office August 3rd for the October issue (on sale August 29th). Address Classified Mgr., Modern Mechanix, Hobbies & Inventions, 1501 Broadway, New York City.

A. C. GENERATORS

PRACTICAL changes for automobile generators. See our advertisement at bottom of page 21. Autopower, Inc.

ADVERTISING AGENCIES

LEARN Advertising quickly at home. Easy practical plan. No text books. Common school education sufficient. Interesting booklet and requirements free. Page-Davis School of Advertising, 3601 Michigan Avenue, Dept. 2044, Chicago.

ADVERTISE: Get mail-order business agents. Free assistance. Free Ad- Guide of newspaper, magazine, circula- tions, rates, mailing-lists. Chicago Ad- vertising Agency, 22 West Jackson, Chicago.

ADVERTISE—24 words in 250 newspapers \$10. Lists Free. Advertising Service Bureau, 4258B Drexel, Chicago.

30 WORDS, 25 magazines \$1.00. Good- all Agency, 230 Bankers Investment Bldg., San Francisco.

FREE NEW advertisers rate guide. Brown Advertising Agency, 140 South Dearborn, Chicago.

AGENTS WANTED

IF YOU want to get groceries and household supplies at wholesale, and a wonderful chance to make \$15 a day besides, send me your name immediately. No experience necessary. New Ford Sedans given to producers. Albert Mills, 2739 Monmouth, Cincinnati, Ohio.

MEN OR WOMEN—Look after local Coffee and Tea Route. Call on homes with 300 highest quality necessities. Spare or full time. No investment. Permanent. Pay starts immediately. Bright future. Blair Laboratories, Dept. 613-Z, Lynchburg, Virginia.

BIG MONEY and Fast Sales. Every owner buys Gold Initials for his auto. You charge \$1.50; make \$1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 11, East Orange, New Jersey.

AGENTS—To call on drug, cigar, candy stores and restaurants, with product yielding handsome all-year-round living. Write information. Safebreath, Dept. K, 863 Pacific St., Brooklyn, N. Y.

MAKE More Money selling Shirts, Ties, Underwear, Dresses, Hosiery, Raincoats, Jackets, Pants, Uniforms. Sales Outfit Free. Nimrod Company, Department 132, 4922-28 Lincoln Avenue, Chicago.

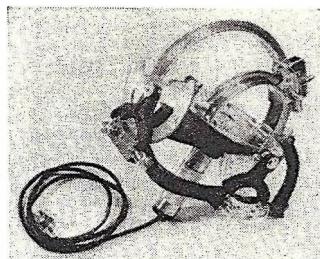
START Bargain Business. Large profits. New and used clothing. Bankrupt and auction sale merchandise. Experience unnecessary. Everything supplied. Publix, 568-FG Roosevelt, Chicago.

PROFIT with new products. Make, sell, repeat. Analysis. Research. Guaranteed formulas. Special prices, leads. Biggest catalog free. Gilson. Chemist. CE-1142 Sunnyside, Chicago.

WHERE To Buy At Wholesale 500,000 articles. Free Directory and other valuable information. Maywood MM. Publishers, 925 Broadway, New York.

GOLD Reflecting Letters for store windows. Easily applied. Large sizes, penny each, free samples! Atlas Sign Works, 7941-G Halsted, Chicago.

Slide Rule Sextant Speeds Sun Shooting



Automatically solving the spherical triangle this new position finder greatly reduces the chances for error in navigating on land, sea or in the air.

AGENTS: Smash go prices! Santos Coffee 12c lb., 100 sticks Chewing Gum 12c. Christmas Cards, 21 in box, 14c. 150 other bargains. Premiums. Car- nation Co., MN, St. Louis, Mo.

A BUSINESS of Your Own—Making sparkling chipped glass name plates, numbers, checkerboards, medallions, signs. Illustrated literature mailed free. E. Palmer, 255, Wooster, Ohio.

THREE color Roosevelt, Landon, license plate emblems; 25c sellers. Transportation paid cash orders; big profits; prompt shipment. Peegee Sales, 445 Riverside Drive, New York.

WISE HOME Worker and Spare Time money makers will send immediately for free details of NEW "SILENT SYSTEM" business. No canvassing. Harry Julius, Amarillo, Texas.

1000 BARGAINS, Drygoods, Notions, Drug Sundries, Specialties, Novelties. Agents undersell stores. Free catalog. Johlers, Dept. 998-A, 504 S. Crawford, Chicago.

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

GOOD Income plating Auto Parts, Reflectors, Mirrors, by late method. Free particulars and proofs. Gunmetal Co., Ave A, Decatur, Ill.

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

NO BOSS! Sure Cash! Silvering Mirrors. Autoparts, Reflectors, Combination outfit. Write, Sprinkle, Plater, 850, Marion, Indiana.

AGENTS' Gold Sign Letters for store windows. 500% profit. Free sample. Metallic Letter Co., 426 N. Clark, Chicago.

AMERICAN POLICE JIU JITSU

13 KNOCKOUT blows without fists, by internationally known Police Instructor. Send 15 cents, coin or stamps. S. J. Jorgensen, 277 Maritime Bldg., Seattle, Washington.

AUSTRALIAN OPALS

OPALS, Cheap. All sorts. Lists free. Sample Packet, \$5.00. Norman Seward, Melbourne, Australia.

AUTOMOBILES

AUTOMOBILE Racing, third edition gives speed records, drawings, pictures of cars and drivers, full description record cars. Tells how you build 135 mile per hour stock car speedway racers. Midget conversions fully described. \$1.00 postpaid. \$1.12 C. O. D. Ray Kuns, Dept. 10, Cincinnati, Ohio.

"SEMI-DIESELIZING with Controlled Heat." Greatest efficiency, most mileage. Introducing new copyrighted plans 50c. Crippen Deming Lab, N. W. Rd., Jackson, Mich.

AUTOMOBILE Owner. Save Money. Use cheap oil instead of gasoline. Plans drawn by Diesel Engineer \$1.00 prepaid. Diesel School, 2929 Atlantic Avenue, Brooklyn.

MIDGET gasoline engine popular priced. Circular 5c. Anton Boaboy, Rahway, New Jersey.

AVIATION

ARMY AIR CORPS gives free flying training, salary, expenses paid. Information pamphlet, how to apply, 20c. Same information, Navy Aviation training, 20c. Information on Marine Corps Aviation, 20c. All three, 40c. Used airplanes, \$40 and up. Literature 10c. Continental Sales, Box 344, Dept. 23, Indianapolis, Ind.

FOR SALE One Pair Wings, Clark-Y 66" chord, 16 ft. long each wing, complete with ailerons and control cables, covered. Also tail group, to match wings. If you plan on building a ship, it will pay you to write us for more details. Argonaut Aircraft Co., Tonawanda, N. Y.

GET INTO AVIATION. Air transport pilots get up to \$7,000 per year; mechanics, \$2,500. Learn at this Government approved school. Write for complete information. State age. Lincoln Flying School, 4002 Aircraft Bldg., Lincoln, N. H.

AEROPLANES, New Production, \$98.00. Easy payments. Propellers for aeroplanes, boats, sleds, wind-driven generators, \$2.50 up. Send 25c for more information. Hibbs, Fort Worth, Texas.

YOUNG men interested in entering aviation under Apprentice Plan write immediately enclosing stamp. Mechanix Universal Aviation Service, Strathmore Station, Dept. C, Detroit, Mich.

AVIATION apprentice jobs for inexperienced workers. Complete list employers and details 20c. Airployment, Box 535, West Los Angeles, California.

PROPELLERS—Ornamental. Price \$0.50 up. 4 ft. while they last \$1.50. J. B. S. Propeller, Lititz, Pennsylvania.

BATTERIES, GENERATORS, ETC.

500 watt 32 volt Dyneto ball bearing generators built for service; no toy; renewed. \$18.50. Hurry. M. C. Solon, 636 E 3rd St., Duluth, Minn.

USED DODGE 12-volt Generators and Parts Cheap. Particulars dime. C. McKinney, Box 3172, West Monroe, La.

BIG MAILED

RECEIVE gigantic mails, magazines, samples. Your name in 1,000 mailing lists 10c. Fairbanks Mailbureau, 100 Forsyth, New York.

BOATS

HOW TO BUILD 20 BOATS—The big new edition contains twenty different up-to-date plans for sailboats, ice-boats, rowboats, outboards, cruisers, and speedboats. The price for the book, 50 cents, makes each plan cost only 2½ cents. Order your copy from Modern Mechanix Pub. Co., Fawcett Bldg., Greenwich, Conn.

BOOKS

SPORTSMEN'S MANUAL—The outdoorsman's guide, containing scores of practical articles by America's leading outdoor writers, covering every phase of fishing, hunting, camping, and trapping. This book, edited by Robert Page Lincoln, will make that next vacation a dozen times more enjoyable. Price 50c at your newsstand, or order directly from Modern Mechanix Publishing Co., Fawcett Bldg., Greenwich, Conn.

BOOKS! BOOKS! BOOKS! No matter what you want in the book line I can fill your order. If you cannot find the books you want send 25c in silver for my book catalog today. Levi Bryant, 654 East 44th Street, Chicago, Ill.

FREE—Send for list of new technical books at sensational discounts. U. Winn, 124 West 23 St., New York.

BURIED TREASURE

TREASURE Seekers—Learn scientific methods. Wyss, 104½ Francis, St. Joseph, Mo.

BUSINESS OPPORTUNITIES

THE PLASTEX Industry needs manufacturers on small scale and for big production of Art Goods, Novelties, Souvenirs, etc. in Plaster and Marble imitation. Experience unnecessary. 2c material makes 25c articles. Rubber moulds furnished for speed production. We place orders and buy goods. Small investment brings big returns. Interesting booklet mailed free. Plastex Industries, Dept. R, 1085 Washington Ave., New York.

MAKE Artificial Marble, tiles, natural glaze, uncanny. Tabletops, plaques, sanitary flooring, whiststones. Cement secrets, inexpensive, fireproof. Colorful Tile and Liquid Rubber samples, 3c. John H. Payn, 945 Grande Vista Ave., Los Angeles, Calif.

MEN, learn to become retail store owners. No capital or experience required. \$10 training fee, payable \$1.00 with application, balance from your store profits. Application dime. Hugh Amidon, Box 293, Elyria, Ohio.

WE START you in business, furnishing Outfits and Instructions, operating "Specialty Candy Factory" home. Men, women—earn \$25.00 to \$75.00 weekly. Booklet free. Hillyer Ragsdale, Inc., No. 110, East Orange, N. J.

IF You Have Some Spare Room, a basement or garage where you can do light work, see our offer to Branch Manufacturers on page 29. Metal Cast Products Co., 1696 Boston Road, New York City.

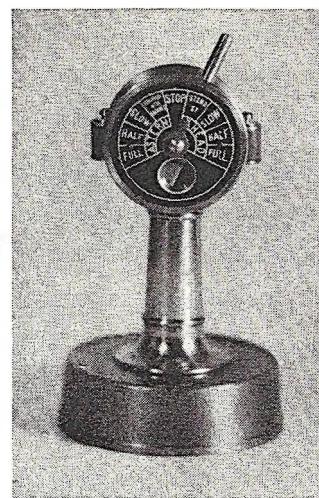
PROFIT with new products. Make, sell, repeat. Analysis, Research. Guaranteed formulas. Special prices, leads. Biggest catalog free. Gibson, Chemist, CE-1142 Sunnyside, Chicago.

FREE marbleizing and flexible mold making instructions. Sample mold and marbleized cast. Assorted samples. Send dime for mailing service. Cowell Institute, Grayling, Mich.

\$888 \$40,000. I made it. Plan 10c "Moore-Made," Lapeer, Mich.

Thank You for Mentioning Modern Mechanix Hobbies and Inventions When Writing to Advertisers

Tiny Ship's Telegraph is Novel Cigar-Cutter



Complete in every detail this model of a ship's telegraph stands less than 4 inches high. It serves as a combination paper weight and cigar-cutter device.

CAMERAS AND PHOTO SUPPLIES

MAKE MONEY in photography. Learn quickly at home. Spare or full time. Easy plan. Previous experience unnecessary. Common school education sufficient. Interesting booklet and requirements free. American School of Photography, 3601 Michigan Avenue, Dept. 2044, Chicago.

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

CASIS for your photographs. Sell to advertisers. Make your camera pay. Our new copyrighted course gives complete details. \$1.00. Free circular. Lenox Press, 115A Prospect, East Orange, New Jersey.

CARNIVAL GAMES

MAKE you money—Outfits supplied, catalog 10c. "Moore-made", Lapeer, Michigan.

CHARTERS

DELAWARE Charters: Complete incorporating and organizing service \$35. Submitted forms, Chas. G. Guyer, Inc., Wilmington, Delaware.

CHEMISTRY

NEW Photochemical Outfit. 20 different photochemical actions. Also experiments with radioactive minerals, cold light and phosphorescent materials. Make blueprints, luminous pictures. Complete outfit, apparatus, chemicals, instructions, postpaid \$2.98. None C. O. D. G. G. Ridendorf, Dept. A, 1241 Bensch St., Lansing, Mich.

SEND 25c for new illustrated chemical Experiment Book with over 300 formulas and tests. Also receive 32 page illustrated catalog of apparatus, microscopes, telescopes and chemicals free. U. Winn, 124 West 23 St., New York.

DETECTIVES

BECOME a Successful Detective. Experience unnecessary. Detective Paper and Particulars FREE. National System, Box 425-D, Fremont, Nebraska.

DETECTIVES—Make Secret Investigations. Experience unnecessary. Detective particulars free. Write, George Wagner, 2640-V Broadway, N. Y.

DUPPLICATORS

INCREASE Business. "Excellograph" Rotary Stencil, Clay, and Film Duplicators \$3.85 to \$37.50. Prints anything typewritten, penned, drawn, traced. Colors. Folder Free. Pittsburgh Typewriter Supply, Suite 519, Pittsburgh, Pa.

DUPPLICATOR Set. 9" x 12". Prints material written, drawn, traced or typed. Complete. Postpaid. 75c (Coin or M.O.). Kopy-Quik Duplicator Co., 1531 Walnut, Alameda, Calif., 50c BUILDS Mimeograph. Plans 10c. Bill, 11126 Buckeye, Cleveland, Ohio.

EDUCATIONAL AND INSTRUCTION

WANTED Immediately, Men-Women, age 18 to 50, qualify for next eligibility test for steady Government Jobs; commence \$105-\$175 month. Common education, paid vacations, pension. Valuable information from our Civil Service Expert mailed free. Write, Instruction Service, Dept. 234, St. Louis, Mo., Today.

MEN Wanted—Learn Tool & Die Making. Automatic Screw Mach. Machinist Trade. Big Demand. Actual Experience. Expert Supervision. Write for Free Book "M". Allied Screw Machine Co., Inc., School Div., 603-9 Lake St., Chicago.

LEARN To Drive quickly, easily by learning elementary principles. Send for complete, illustrated course, \$1.00. Hurry! Limited supply. Educational Service, 22 Leonard St., Brooklyn, N. Y.

\$105—\$175 month. Work for "Uncle Sam". Men—women. Try next examinations. List jobs and particulars free. Write today sure. Franklin Institute, Dept. N-73, Rochester, N. Y.

BECOME Claim Adjuster, Investigator. Good position or own business. Easily learned. Low cost. Particulars free. S. Y. Morse, 1009 Oak, Elmira, N. Y.

FOREST Jobs available \$125-\$175 month. Cabin, hunt, trap, patrol. Quality immediately. Write Rayson Service, B-32, Denver, Colo.

ELECTRICAL SUPPLIES

HUNDREDS of new and rare items, replacement parts and supplies. Send 10c for new, 60-page, wholesale catalog. Autopower, 412-B S. Hoyne Avenue, Chicago.

ENGINES, MOTORS, ETC.

NEW A. C. Motors, Grinders, Fans, original factory packing. 10-inch oscillating fan, \$4.85; 1/4 H. P. motor \$5.80; 1/2 H. P. \$18.40. Illustrated price list free. Mailorder Electric Co., 1722 So. Michigan, Chicago.

10—1/2 horsepower General Electric motors 60 cycle, 110 volts, \$9.50 each. Buffalo send money order for freight shipment. Erie Electric, 121 Church. WINDING Data, 1000 AC motors, eight leading manufacturers. \$1.00. Chas. Chittenden, Jr., Box 7631, Kansas City, Missouri.

FOR INVENTORS

INVENTORS: Send immediately for your copies of our new Free books, "Patent Protection" and "Suggestions on Selling an Invention". Sixty-eight pages of interesting facts. They tell how Patent Laws protect you; kind of sketch or model needed; simple steps to take without cost; how successful inventors have secured financial assistance; show interesting inventions; illustrate important mechanical movements. With books we also send Free Evidence of Invention form to help establish date of disclosure. Prompt service, reasonable fees, special deferred payment plan. Strictest secrecy. Thirty-six years' experience. Highest references. Write us today. The facts in our books are worth money to the man with a good invention. Address: Victor J. Evans & Co., Registered Patent Attorneys, 821-K Victor Building, Washington, D. C.

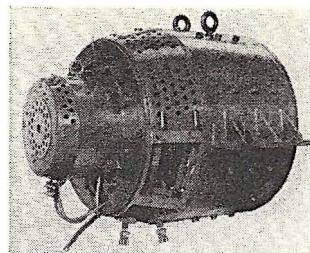
INVENTORS—Small ideas may have large commercial possibilities. Write us for FREE book, "Patent Guide for the Inventor" and "Record of Invention" form. Delays are dangerous in patent matters. Free information on how to proceed. Clarence A. O'Brien and Hyman Berman, 28-T Adams Building, Washington, D. C.

WE Successfully Sell inventions, patented and unpatented. Write for proof, and tell us what you have for sale. Chartered Institute of American Inventors, Dept. 5-B, Washington, D. C.

FREE Information about new magazine for inventors who want more profit from their ideas. Write "Successful Inventions," 801 Barrister Bldg., Washington, D. C.

INVENTORS—Sell your inventions before patenting. Free particulars. Write W. T. Greene, 942 Barrister Building, Washington, D. C.

Giant Generators Light New Trains



Giant electric generators similar to the one shown here will be used on the fleet of new "Zephyr" streamlined trains now under construction at Philadelphia. Generators will produce current for lighting and air conditioning.

SMALL inventions wanted by manufacturers. I'll help you sell your invention. S. Hull, 7829 Euclid Avenue, Cleveland, Ohio.

FORMULAS

SUCCEED With Your Products. Make-Sell them. Learn how. Formulas, Processes, Analyses. Catalogs, circulars free. A. Thaxtly Co., Washington, D. C.

ANALYSIS. Research. Newest guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, CE-1142 Sunnyside, Chicago.

TESTED collection polishes for all purposes. 30c. Free list. E. McLaughlin, Box Yonkers, N. Y.

FORMULAS—Latest money makers. Literature free. D-Belfort, 4042 N. Keele, Chicago.

ICELESS Ice: Colder! Cleaner! Cheaper. Instructions, 25c. Duffy-Co., Covington, Ky.

FORMULAS—All kinds. Guaranteed. Catalog Free. Kemico, 67, Parkridge, Illinois.

FOR SALE—CAMERAS, PROJECTORS, ETC.

SEND for Bargaining; used, new, movie, photographic, sound, silent equipment. National Film Library, Catalogue. Mogull's, 1944-M Boston Road, N. Y.

HOBBIES

CHIP Carving, interesting, inexpensive. Complete instructions 10c. Bowers, 819 Federal, Los Angeles, California.

HYPNOTISM

HYPNOTIZE Instantaneously! Learn how! Instructions 25c. Lomk Institute, D-1313, Palatine, Illinois.

INVENTIONS

HAVE you a sound, practical invention for sale, patented or unpatented? If so, write Chartered Institute of American Inventors, Dept. 5-A, Washington, D. C.

INVENTORS' Primer answers every question right. Saves you dollars. Copy postpaid \$1.00. Adam Fisher Co., 582 Enright, St. Louis, Mo.

LAMP INSECT KILLER

ELECTRIC Lamp Kills insects indoor or out. \$2.75 and up. Literature free. Sauer Brothers, Oakland, Calif.

MACHINERY, TOOLS AND SUPPLIES

SPRING winders \$3.00. Myers Spring Winder Co., 111 Washington St., Burlington, Iowa.

MAGIC TRICKS & NOVELTIES

MAGIC TRICKS, Joke Novelties, Puzzles, at lower prices. South's largest line. My famous Catalogue, "Book 1,000 Wonders" and "50 Mysteries Magic" postpaid 10c. Write today! You will be surprised! Lyle Douglas, Station A-14, Dallas, Texas.

BE A Handcuff King. We teach you. Escape from handcuffs, boxes, ropes, etc. Secrets of 8 sensational escapes, 25c. Particulars free. Edward Witt, 439 South Broad St., Elizabeth, New Jersey.

TALK with your fingers! Fun talking with friends secretly. Complete chart and instructions sent postpaid 50c (coin). Southwest Novelty Company, P. O. Box 1909, Tucson, Ariz.

LEARN MAGIC—Large Illustrated Catalog of tricks. You Can Do, 25c. Holden, 222 West 42nd St., New York.

MAIL ORDER OFFERINGS

10c BRINGS copy National Mail Order News. Box 1773-MLJ, Roanoke, Virginia.

MALE HELP WANTED

LOCAL AGENTS wanted to wear and demonstrate Free Suits to friends. No canvassing. Up to \$12 in a day easy. Experience unnecessary. Valuable demonstrating equipment, actual samples free. Progress Tailoring, Dept. J-219, 500 Throop, Chicago.

RAISE canaries for us. Fascinating, pleasurable, spare time money maker. Splendid breeders supplied you. Crimmins, 3741E 60th Street, Woodside, New York.

MALE INSTRUCTION

DETECTIVES. Work home or travel. Experience unnecessary. Write, American Detective Institute, 2640-T Broadway, N. Y.

MIDGET AUTOMOBILES

BUILD a Midget Miller Racer. Complete plans for constructing this authentic midget automobile appear in the new 1930 edition of How-To-Build-It along with many other interesting home and workshop plans. Send 50c for the 148-page book to Modern Mechanix Publ. Co., Greenwich, Conn.

MIDGET Cars, complete parts for two, for track extra motor and parts \$200.00 takes all. A. S. Murray, 104 Donna Ave., Elizabethton, Tenn.

MINK

RAISE MINK. Send dime for general information. Lomman's Fur Farm, Barnesboro, Pa.

MISCELLANEOUS

TYPEWRITERS, Duplicators, Addressographs, Telescopes, Cameras, Watches, Jewelry. Fully guaranteed. Big bargain lists free. Deel's Exchange, 1125 So. 21st, Manitowoc, Wis.

ATTENTION Jig Saw Operators! No drilling, no sawdust, perfect cutting, with new simple method. Information, sample cut 10c. Gene Hubacher, Bradock, Pa.

EXPERIENCED machinist will take lathe, drill jobs. Single, quantity. \$1.00 hr. Fred Short, Cleveland, N. Y.

BURIED Treasure Minerals, free booklet, photographs. Fisher, Palmer Bldg., Hollywood.

MODEL MAKING

EASY-BUILT 00 GAUGE (3/4-inch between rails) box and refrigerator car body construction kits \$1.00. Choice of ten cars. Catalogue one dime. Nason Railways, Dept. A9, New Rochelle, New York.

MODELS & MODEL SUPPLIES

YOUR Ideas developed into practical working model. 30 years successful experience; thousands satisfied customers. Confidential service guaranteed. Bank references. Send 3c postage for 32 page book "Making Inventions Pay." Crescent Tool Company, Dept. T. Cincinnati, Ohio.

MONEY MAKING OPPORTUNITIES

NEED money? Full or part time work. Either sex. Legitimate tested plans. Not formulas. Complete with instructions, 50c postpaid, coin or stamps. Box 156, Oakland, Calif.

MOTION PICTURE AND SOUND EQUIPMENT

SUPERSPEED Panchromatic 16MM film, 100 ft. \$3.75. Other films from \$2.19. Bargains in new, used equipment. Send for circular. Fotoshop, 134 1/2 F West 32nd, New York.

LEARN Motion Picture Theatre Business. Home Study Training: Management, Advertising, Projection. Free Catalog. Theatre Institute, 345 Washington, Elmira, N. Y.

HIGHEST prices paid for used still-movie equipment. Send description. Fotoshop, 134 1/2 F West 32nd, New York.

SMM SPECIALTIES, Dufaycolor, Panchromatic, Home Tinting Film. Film Specialties, 111 W. El Monte, California.

16 MM FILMS bought, sold, exchanged. Catalogue 10c. Fotoshop, 134 1/2 F West 32d, New York.

MOTORCYCLES

SEND 15c for 11-ILLUSTRATED used Motorcycle catalog. Bargains. Largest stock genuine Indian parts and motorcycles. Indian Motorcycle Sales, Kansas City, Mo.

RECONDITIONED Motorcycles. New and used parts for all makes. Complete service. Whitman Motorcycle & Supply Co., 405-9 Southwest Blvd., Kansas City, Mo.

ALLOY Pistons. Harley, Henderson, Indian, Excelsior. Used parts, catalogue and wings pin 10c. Ballak, 1115 Chestnut St., St. Louis, Mo.

OFFICE EQUIPMENT

TYPEWRITERS, multigraphs, addressing machines, adders, dictaphones, duplicators, sealers, folders. Save half, write Pruitt, 553 Pruitt Bldg., Chicago.

OLD MONEY WANTED

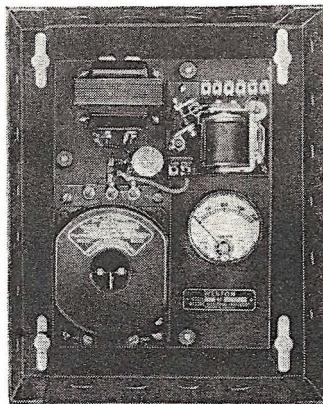
\$5.00 to \$500.00 EACH paid for Old Coins. Keep all old money. Get posted. Send 10 cents for Illustrated Coin Value Book, 4x6. Guaranteed Buying and Selling Prices. Coin Exchange, Box 18, Le Roy, N. Y.

PATENT ATTORNEYS

INVENTORS—Small ideas may have large commercial possibilities. Write us for FREE book, "Patent Guide for the Inventor" and "Record of Invention" form. Delays are dangerous in patent matters. Free information on how to proceed. Clarence A. O'Brien and Hyman Berman, 28 T Adams Building, Washington, D. C.

REGISTERED Patent Attorney-Consulting Engineer obtains patents and trademark registrations. Write for confidential advice. Z. Polachek, 1234 Broadway, New York City.

Photo Cell Control Designed for Industry



Designed for industrial use the photo electric control shown here may be used for counting, sorting, alarm signals and other electronic applications.

INVENTORS: Send immediately for your copies of our new Free books, "Patent Protection" and "Suggestions on Selling an Invention." Sixty-eight pages of interesting facts. They tell how Patent Laws protect you; kind of sketch or model needed; simple steps to take without cost; how successful inventors have secured financial assistance; show interesting inventions; illustrate important mechanical movements. With books we also send Free Evidence of Invention form to help establish date of disclosure. Prompt service, reasonable fees, special deferred payment plan. Strictest secrecy. Thirty-six years' experience. Highest references. Write us today. The facts in our books are worth money to the man with a good invention. Address: Victor J. Evans & Co., Registered Patent Attorneys, 820 K Victor Building, Washington, D. C.

INVENTOR'S Universal Educator: contains 900 mechanical movements; 50 perpetual motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price \$1.00 postpaid in U. S. A. Address Dietrich Co., 511 Colorado Bldg., Washington, D. C.

UNPATENTED Ideas Can Be Sold. We tell you how and help you make the sale. Particulars, with list of manufacturers and wanted inventions, sent free on request. Write W. T. Greene, 958 Barrister Bldg., Washington, D. C.

"INVENTOR'S Guidebook" containing 96 mechanical movements and advice about patenting, selling inventions, also "Record of Invention", Free. Frank A. Ledermann, Patent Attorney-Engineer, 154 Nassau Street, New York.

PATENTS

INVENTORS: Small ideas may have large commercial possibilities. Write us for FREE book, "Patent Guide for the Inventor" and "Record of Invention" form. Delays are dangerous in patent matters. Free information on how to proceed. Clarence A. O'Brien and Hyman Berman, 28 T Adams Building, Washington, D. C.

PATENT Your Idea—Write immediately for two free books, "Patent Protection" and "When and How to Sell an Invention." Fully explain many interesting points to inventors and illustrate important mechanical principles. With books we also send "Evidence of Invention form." Prompt service, reasonable fees, thirty-seven years' experience. Avoid risk of delay. Address: Victor J. Evans & Co., Registered Patent Attorneys, 825 K, Victor Building, Washington, D. C.

PATENTS. Booklet free. Highest references. Best results. Reasonable fees. Watson E. Coleman, Victor Building, Washington, D. C.

INVENTIONS Commercialized. Patented or unpatented. Write Adam Fisher Company, 582 Enright, St. Louis, Mo.

INVENTIONS Wanted—Patented, unpatented. If you have an idea for sale, write Hartley's Inc., Box 928-J, Bangor, Maine.

PATENTS—Reasonable Terms. Book and advice free. L. F. Randolph, Dept. 341, Washington, D. C.

PERSONAL

STUTTERING and Stammering corrected at home. Booklet free. Paul J. Wolfe, Box 52, Pittsburgh, Penna.

PHOTO DEVELOPING

FINER Finishing—Rolls developed and printed, colored Enlargement, or two double professional enlargements, all for 25c (coin). Genuine Nationally Known Moon-Tone Superior Quality. Moen Photo Service, La Crosse, Wis.

OIL COLORED ENLARGEMENT or 2 5x7 glossy enlargements with each roll film developed and printed. All for 25c (coin). Badger Studios, La Crosse, Wisconsin.

QUALITY Finishing, roll developed and printed 25c. Pocket album free with first order, enlargement coupon. Ideal Photo Service, Box 2255, Patterson, N. J.

FILMS DEVELOPED—25c coin two 5x7 enlargements, 8 High Gloss Never Fade Prints. Club Photo Service, La Crosse, Wis.

ROLL DEVELOPED, printed 15c. Prints Inc. Howard's, 2947 Jarvis, Chicago.

PLASTICS

MAKE colorful plastics. Formulas \$1.00. Carroll, 5253 Brooklyn, Seattle, Wash.

POEM—SONGWRITERS

SEND for Free Copy of Booklet revealing Secrets of Successful Songwriting, free Rhyming Dictionary and market information. If you write poems or melodies, Send for Our Offer Today. MM Pub's, Dept. MX1, Studio Bldg., Portland, Ore.

SONG Ideas Wanted for Radio, Movies, etc. One good song may make your fortune. Write for Free Booklet of professional information for song—poem or melody writers today. Standard Song Service, 1412-E Great Northern Bldg., Chicago.

SONGWRITERS—Get all inside facts. Free booklet by famous Broadway composer. Songwriters Institute, 1234D Broadway, New York.

I PAY Cash for songs, poems or music. J. W. Earle, Dept. M, Station F, Box 115, New York.

SONGWRITERS' Poems—Melodies. Special offer. Studio MM, Guaranty Bldg., Hollywood.

NEW GERMAN STAMPS PICTURE OLYMPIC EVENTS



Issued in commemoration of the coming Olympic Games to be held in Berlin late this summer this set of unusual German stamps illustrates some of the more popular sports in which the best athletes of the world will compete. The series includes stamps on horsemanship, fencing, javelin throwing, soccer ball, swimming, relay running, acrobatics and scull racing.

PRINTING

BUSINESS CARDS — Best quality; snow white vellum, $2\frac{1}{2} \times 3\frac{1}{2}$. Artistically engraved style. Finest ever. Unequalled for price. Money back guarantee. \$1.49, 1,000, delivered. **Willcox Art Press** (Est. 1899), Hamburg, New Jersey.

1000 STATEMENTS $3\frac{1}{2} \times 6$ \$1.50, postpaid (white bond paper). Samples. **Frederic Mahon**, 231 79th Street, Rockaway Beach, N. Y.

500 WATERMARKED Bond Letterheads, envelopes \$1.75. Illustrations. Anything printed. **Bradshaw**, 3214-M Huron, Chicago.

GUMMED LABELS: 1,000 printed. $1 \times 3\frac{1}{4}$, 20 words or less, 50c. **JBS Company**, Box 93, Holyoke, Mass.

1000 BILLHEADS \$2.00. Illustrations. Anything printed. **Bradshaw**, 3214-M Huron, Chicago.

RADIO AND TELEGRAPHY

RADIO BUILDERS' MANUAL — A book of radio set building plans and kinks for the home experimenter. Everything from a crystal set to a powerful 6-tube auto radio is included. Price 50 cents—order directly from **Modern Mechanix Publishing Co.**, Fawcett Bldg., Greenwich, Conn.

RADIO Engineering, broadcasting, aviation and police radio. Servicing, Marine and Morse Telegraphy taught thoroughly. All expenses low. Catalog free. **Dodge's Institute**, King St., Valparaiso, Ind.

CRYSTAL SET — 4,250 mile record. Blueprint 18 Distance Models with "Radiobuilder" year—25c. Laboratories, 151-K Liberty, San Francisco.

RUBBER STAMPS & OFFICE SUPPLIES SEND for New Catalog. **McKechnie Brothers**, 9F36, Calvin, N. Dak.

SALESMEN WANTED

SOMETHING NEW in Fire Extinguishers—Red Comet Automatics. Proved in West five years. Exclusive territory. Low price opens pocketbooks. Write Red Comet, 409 Comet Building, Littleton, Colorado.

SALESMEN, Distributors. We pay higher commission. Exclusive territory. 125 varieties, brushes, mops. **Neway Brush Factory**, Hartford, Conn.

GOLD Reflecting Letters for store windows. Easily applied. Large sizes, penny each. free samples! **Atlas Sign Works**, 7941-G Halsted, Chicago.

SHOOTERS & HANDLOADERS

RELOADERS "This Handloading Game" by Phil Sharpe, just published. Completely covers subject for tyro or expert. Tools, equipment, measures, balances, casting bullets, powders, dies, gauges, chronographs, pressure guns, loading kinks. Price postpaid \$1.00. Outdoors, Dept. M, 333 North Michigan Ave., Chicago, Ill.

SPECTROSCOPES

SPECTROSCOPE with book of 120 experiments. \$2.50. **Cudding Sons**, Campbell, California.

SPORTING GOODS, ETC.

HUDSON Bay blankets, Indian pack baskets, camp stoves, knives, compasses, outdoor equipment. Free catalog. **Hove Fur Co.**, Box MM, Coopers Mills, Maine.

TATTOOING SUPPLIES

AMATEUR Tattooing Outfits, free folder, illustrated catalog 6c. "Tatucco", 653 South State, Chicago.

TATTOOING Outfits, Supplies—Catalogue. Guaranteed Remover. "Waters", M-955 Putnam, Detroit.

TAXIDERMY SUPPLIES

FREE catalogue. Big values direct from official Taxidermic supply manufacturer. Eyes, Headforms, Everything. **Taxidermic Manufacturers**, Memphis, Tenn.

TELESCOPES, MICROSCOPES, ETC.

GET our lowest prices on Telescopes, Microscopes, Movie Cameras and hundreds of other items. Catalog free. W. Winn, 124 W. 23 St., New York.

TELESCOPES, Microscopes, Binoculars. Lowest prices. Optical catalog free. **Brownscope Company**, 234 Fifth Avenue, New York.

BUILD your own Reflecting Telescope. Copy of instructions ten cents. Catalog Free. **Optical Laboratories**, Larchmont, New York.

TRAILERS

UTILITY Trailer Plans 25c. **Century Products**, Box 127, Racine, Wisconsin.

WELDING

POWERFUL Arc-Welder from old Dodge generators. Instructive plans, \$1.00. **FREE** choice of Club Membership or Special Fibre Brush Ring with every order. **Welders' Club of America**, 3432 Drake, Chicago.

60 AMPERE, 110 volt Arc Welding Transformer \$8.00. 100 ampere, 110-220 volt, \$16.00. Welding supplies, Literature, **Arcomaster**, 1936 Lyndale, South, Minneapolis, Minnesota.

D. C. MOTORS, generators, car generators make welders, chargers, light plants, A. C. generators, etc. **100 Practical Plans**, \$1.00. **Monroe**, Box 3343, St. Paul, Minn.

ARC WELDER only \$29.50. Professional type—110-220 volt. Delivers 110 amperes. Easy to use. Details free. **Commonwealth**, Dept. J-14, Cincinnati, Ohio.

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

OXY-ACETYLENE Welding outfit on easy payment plan. Box 331, Hamilton, O.

WIND ELECTRIC LIGHTS

ELECTRIC Light-Wind Driven, automatic control, build your own electric plant. Copyrighted Blueprints. Write **Wind Motor Electric**, Brainerd, Minnesota.

WIND ELECTRIC PLANTS

BUILD Windcharger from old automobile generator. Dime brings complete plans and catalog. **Motors, Welders, etc.** **LeJay Manufacturing**, 1414 Lake, Minneapolis, Minnesota.

GENERATOR Propellers, expertly designed at factory prices. **Hibbs**, Fort Worth, Texas.

Tackle Suggestions For Bass Fishing

[Continued from page 137]

times that of the rod. Thus if the rod should weigh 5 ounces the reel, to balance properly, should have a weight of $7\frac{1}{2}$ ounces. Because automatic reels can be obtained in these weights, is another point scored in their behalf.

Fly rod fishing for bass, having become little short of a national institution, and being practiced everywhere, has brought on a host of lures especially fitted for this rod and method of casting. In this department are found a number of lifelike lures of a small nature, bass bugs with cork bodies, bass flies and flies in combination with a spinner on a shaft. All of these are effective, each type of which has its devotee. Of the two types, the bass bugs and the fly-and-spinner combination are the two outstanding and universally effective ones. Nor should the various bucktail and squirrel hair flies, as used in small mouth bass fishing, be left out in the cold; or certain feather minnows that sometimes have the effect of bringing forth the finest old bass in the river.

Plug Lures Divided Into 3 Classes

The lures used in bait casting are, of course, heavier. Mostly they are plug lures that range in weight from $\frac{3}{4}$ -ounce on up to an ounce and a half. They are divided into three classes, namely, the underwater minnows that have a weighted body that stays deep in the water; the surface-and-sub-surface lure, which floats when not reeled, but which dips under when set in motion; and the strictly top-water lure, that clings to the surface all of the time.

Spinners and metal lures in many varieties have proved effective in bait casting. Bucktail lures that are weighted, and have a spinner with them are especially useful in river fishing. A spinner on a shaft and a frog often proves taking when other lures fail. Wobbling metal lures are exceedingly attractive. The pork-rind lures, in many varieties, belong in a class so prominent and so deadly in taking bass that they simply cannot be left out of the tackle box. Three or four specimens of various rind lures should be in every bass fisherman's tackle box!

Don't Select Too Light A Line

For the casting of fly rod lures with the bass fly rod the enameled (not oiled silk) lines are used. A common failing is the selection of a line that is too light. A heavy line will cast much better, hence a size C or D enameled line will give the best of service.

While pork-rind lures and other like attractors, being light in weight, cast with greater ease when handled on a soft braided line, the 18-pound hard braid also does as well. One reason why most fishermen select a hard braid in bass fishing is because all too often in such fishing a possible heavy-weight in the muskellunge or pike division will seize the lure. A durable line is then equal to a capture!



Anything and Everything in Radio!

Radio Experimenters, Hams and Fans who build their own radio and radio devices will find this carefully compiled catalog *invaluable*. It lists thousands of items, sets, parts, tubes, kits, etc.; approved parts so that you can build your own pet circuits, *parts for all kits described in this magazine*; short wave apparatus; public address equipment and a huge selection of radio merchandise of all kinds . . . all at lowest Wholesale prices. Write for FREE copy today.

MAIL COUPON TODAY

Wholesale Radio Service Company, Inc., Dept. J-22
901 W. Jackson Blvd., Chicago, Ill.
Rush FREE radio catalog.

Name
Address
Town State



CASH CROP

for you every week raising Royal Squab baby birds. Orders now waiting for hundreds of thousands. Easy to raise. You get your money for them when only 25 days old. Send three-cent U. S. stamp for particulars and picture book. PR Company, 602 Howard Street, Melrose, Massachusetts. Reference, any bank.

60 POWER TELESCOPE \$2.29 VARIABLE EYEPIECE—20X—40X—60X

NEW! Three telescopes in one. 3 different magnifications. 20 power for ultra-bright images with 40 and 60 power for extra long range. Guaranteed to bring distant objects, people, sports events, ships, moon, stars, etc., 60 times as close.

Makes distant objects appear right in front of you. Can be collapsed to less than a foot in length. Multiple lens system. 90 mm. objective in heavy brass mount. Diectection included for using as a compound 4 lens microscope. American made. We pay the postage. Only \$2.29. BROWNSCOPE CO., Dept. 79, 234 Fifth Ave., New York, N. Y.

Learn Radio - 12 Weeks SHOP TRAINING FINANCE YOUR TUITION GET DETAILS of MY AMAZING OFFER!

Prepare for jobs in Radio Broadcast, Talking Pictures, Television by twelve weeks of practical shop training at the great Coyne Radio Shop, one of the leading training schools. You don't need previous education or experience. Free Employment Service for life. Many earn while learning. Mail coupon today for free book which tells you how hundreds have become successful Radio men after taking my training and all details of my "Pay Tuition After Graduation" Plan.

H. C. LEWIS, Pres., COYNE RADIO SCHOOL
500 S. Paulina Street, Dept. 66-1H, Chicago, Ill.
Send Free Radio Book and facts. Tell me now I can pay for my course on easy payment plan after I graduate.

Name
Address
Town State



DIESEL the NEW POWER

The whole world gasped at the amazing performance of the Diesel powered Burlington R. R. Zephyr train. It opens a new era of power efficiency. Aeroplanes, automobiles, great industrial plants may soon be using these marvelously efficient engines.

It means a new profession, a new trade for thousands and thousands of men. Learn Diesel operation, construction and repair NOW. Use our magical quick reference method. Find out all you need to know through these books, "Diesel and Other Internal Combustion Engines," "Diesel Engines, Operation and Maintenance," "Diesel Electric Plants," which we send free for examination. This combination offer brings you the latest and most authoritative information obtainable. Over 300 illustrations.

3 BOOKS ALL SHIPPED FREE

for examination. There are no strings to this offer, if you really want to get into the most promising new field of the century—the finest—most up-to-date—most talked of profession, send for these books on our amazing free shipment offer. Read them, examine them, test them in any way and then if you are not sold 100% send them back at our expense and you won't owe one cent.

American Technical Society, Dept. 06320,
Drexel at 58th Street, Chicago, Illinois.

Send me the 3 Volumes on Diesel Engines, listed above for 10 days FREE examination. I will pay the few cents express but don't owe you a cent unless I keep the books, in which case I agree to send \$2.00 in 10 days and \$3.00 a month until the introductory price of only \$9.80 is paid.

Note: If you prefer you may send only \$8.80, cash or money order (you save \$1.00) in full payment, and we will send the 3 books prepaid. We agree to return your money if you are not satisfied and return them in 10 days.

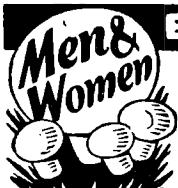
Name

Address

City State

Please attach a letter giving age, occupation and the name and address of your employer and that of at least one business man as reference.

ASK FOR
LEDAGE'S
CASEIN GLUE
A real CASEIN GLUE



Earn Cash at Home!

Mrs. M. M. earned \$267 in 3 weeks (sworn statement) raising mushrooms for us in her cellar! Exceptional? Yes, but YOUR cellar, shed, barn may be suitable to bring moderate income. Book, pictures sample FREE. (Estab. 1908).

UNITED MUSHROOM CO.
3848 Lincoln Ave., Dept. 79 Chicago

**TRIAL LESSON in
Free • DRAFTING**

Get ready now for new money-making opportunities in Drafting. Clean, well-paid work. Send post card for **FREE TRIAL LESSON** in Drafting. Shows how easy to learn at home by C.T.C. method. We furnish all tools. Write today.

CHICAGO TECHNICAL COLLEGE
M268 Tech Bldg., 118 E. 26th St., Chicago, Ill.

**Have
Your Own
Workshop**

DRIVER POWER TOOLS

Build furniture, toys, novelties in your spare time. Make extra money. Tools are easy to operate. You can start a workshop for as little as \$10.50.

Write Dept. MM9 for free 40-page Catalog

Walker-Turner Co., Inc., Plainfield, N. J.

Whirling Funnels Spread Disaster

[Continued from page 54]

There is no regularity about visitations of tornadoes. Most places have never been known to be hit; but the town of Codell, Kansas, was struck three times in three successive years, 1916, 1917 and 1918, and was close to the beginning of a tornado in 1915. Each time the tornado occurred on May 20 and at almost the same hour of the day. The last time, the town was practically wiped out. People there almost acquired the habit of keeping close to their caves and basements when May 20 rolled around, but the town has not been struck since.

Chicago has had not less than three tornadoes. St. Louis has experienced two outstanding disasters, in 1896 when the loss was \$12,000,000, and in 1927, when the loss was twice as great.

Omaha, Neb., Louisville, Ky., Minneapolis, Minn. and Philadelphia, Pa., each have been struck twice by tornadoes, at least one of which was quite destructive at each place. St. Joseph, Mo., had four tornadoes in 14 years ending with 1927, while the Kansas Cities have been struck twice.

Gainesville, Ga., had been struck twice before by tornadoes; and there were two tornadoes or groups of tornadoes there last April 6—one at 8:27 a. m. and one ten minutes later.

Tornadoes usually travel toward northeast, and most commonly form in the late afternoon; but they have been known to approach from almost every direction, and their paths are often far from straight lines. They may occur at any hour.

Conditions that favor tornadoes are warm, "sticky" mornings, especially between March 15 and June 15, over an area located to the southeast of a center of low atmospheric pressure, the familiar "Low" of the weather map.

No system has yet been devised for warning communities of the approach of a tornado. As the storm strikes, communication facilities are usually destroyed instantly, and everyone thrown into confusion by an occurrence that is seldom experienced more than once in a life time. Besides, at the time there is little opportunity to ascertain in what direction the storm is moving, and no way of knowing how far it will travel. A few instances are known where warnings have been telephoned to persons nearby as a tornado has moved across open country.

One of the safest refuges from a tornado is a storm cave or "cyclone cellar," common to the dry plains country, where it is used to store fruit and vegetables. Next to this, the basement of a frame house, crouching along the wall on the side from which the storm is approaching, usually the southwest corner, is a popular and safe refuge. The basement of a brick house is to be avoided on account of danger from falling walls; but the first floor of a brick or modern steel reinforced building, close to an inside wall or pillar, is preferable to upper stories. Stay away from windows in such a case, as the air will be filled with flying debris.

VACU-MATIC SCORES AGAIN!

BOB MCKENZIE
TRANSCONTINENTAL AUTOMOBILE CHAMPION
COAST TO COAST

WESTERN UNION
TIMED
—
NEW YORK
DA 44-240 MIN
—
LOS ANGELES
TO NEW YORK
97 HRS 10 MIN
—
CANADA
16,000 MILES
18 DAYS
—
LOS ANGELES
TO NEW YORK
AND BACK
121 HRS 52 MIN
—
WASHINGTON, D.C.
—
MEXICO CITY
63 HRS 27 MIN
—
LOS ANGELES
TO PHOENIX
6 HRS 18 MIN
—
MUNIC. OF LAKE
1597.1 MI 1 DAY
—
LOS ANGELES
TO ATLANTA, GA.
120 HRS 37 MIN
—
LIPPS, ND.
DOVER, B. C.
108-21 HRS

Vacu-matic Carburetor Co.
7617 W. State St.
Wauwatosa, Wisconsin

Dear Sirs:

Having just completed a new speed record between Los Angeles and Chicago driving a 1936 Chevrolet equipped with a Vacu-matic carburetor control I thought you might be interested in knowing some of the facts and the important part Vacu-matic played in the success of the run.

The distance covered was 2322 miles in thirty-nine hours and forty-two minutes, officially timed by Western Union, which gave me an average speed of 59.7 M.P.H. based on elapsed time and with the Vacu-matic averaged 18 1/2 miles per gallon on gasoline line.

Before leaving Los Angeles, we made several test runs both with and without the Vacu-matic, and the tests proved that Vacu-matic increased my gas mileage 3 1/2 miles per gallon at the driving speed of 80 M.P.H. and also very noticeable increase in both acceleration and power.

After this experience with Vacu-matic, you can depend that I will be depending on Vacu-matic to give me the same added performance it has proven on this last 1936 breaking drive. It has proven on this last

Yours very truly,
Bob M. McKenzie



Sets New
Coast-to-Chicago
Record

New Supercharge
Principle
SAVES GAS

MORE POWER - MORE SPEED
FASTER PICK-UP - - - NEW LIFE

ESTABLISHING new mileage records on cars in all sections of the country, the Vacu-matic again scores in a new speed record established by Bob McKenzie transcontinental automobile champion. Los Angeles to Chicago—2,322 miles in 39 hours and 42 minutes—driving 75 and 80 to maintain a speed average of 59.7 miles per hour!

Here is speed—a grueling grind—where quick acceleration, greater top speed—and less stops for gasoline mean those precious moments saved that make new speed records possible. The same Vacu-matic that helped Bob McKenzie establish this speed record and gave him such fine gas savings is now available for all car owners. It is positively automatic—simple to install—inexpensive—and pays for itself many times over in gas savings.

Automatic - - Nothing Like It!

Vacu-matic is *entirely different!* It operates on the supercharge principle by automatically adding a charge of extra oxygen, drawn free from the outer air, into the heart of the gas mixture. It is entirely AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles—no carburetor adjustments necessary. It is so simple it will amaze you—so practical it will save you many dollars on gas costs.

Fits All Cars

VACU-MATIC is constructed of six parts, assembled and fused into one unit, correctly adjusted and *sealed at the factory*. Nothing to regulate. Easily attached in ten minutes.

The VACU-MATIC Co. Wauwatosa, Wis.

Guaranteed Gas Savings

VACU-MATIC must prove itself on every car. It is guaranteed to give worthwhile gas savings, quicker pick-up and more power, or it costs you nothing. "On my V-8 Ford it works miracles", says Ralph Fields. James Seeley—"On an International Truck on a round trip to Cleveland, 385 miles, it saved 19 gallons of gas." A. V. Grove—"On the Buick it showed 5 miles more per gallon." F. S. Peck—"I average 22 miles per gal. on my Plymouth, an increase of 7 miles, for a saving of \$15.00 a month, or \$180.00 a year." Wm. Lyons—"Averaged 25 miles on a gal. with a Model A Ford at 40 miles per hour."

Free Details

You owe it to yourself to know all about this remarkable discovery. Mail the coupon below. Start saving gas with VACU-MATIC and enjoy a new driving thrill! There's no obligation—so get the facts now! Write today!

— — — FREE OFFER COUPON — — —

THE VACU-MATIC COMPANY

7617-233 W. State St., Wauwatosa, Wis.

Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

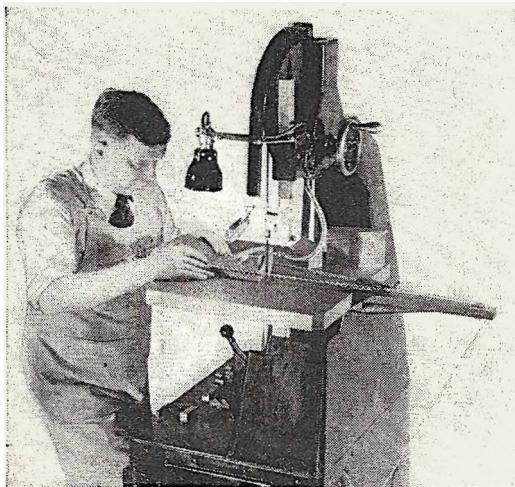
Name

Address

City State

Check here if interested in selling proposition.

New Ideas Meet Changing Business



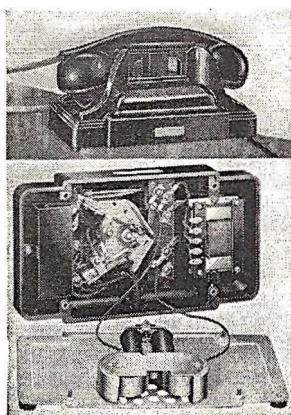
A magnifying glass for fine work, a power work feed to keep a constant pressure on heavy work, and a circle cutting table are new features of this versatile power machine. Work feed has a spring motor; pressure is controlled by a foot pedal.

A synthetic resin, produced by chemical reaction, can be used as an adhesive base for plywood, in plastics, dyeing, or as sizing. New uses are sought by the inventor.

A coin and slug sorting device for coin operated vending machines side-tracks slugs before they can reach the mechanism.

A rubber impregnated paper is pliable, tough and waterproof.

A motor-driven lawn mower, weighing but 95 pounds, has free-wheeling, automatic start and stop, four cutting heights, speed governor, and uses but a gallon of gas a day.



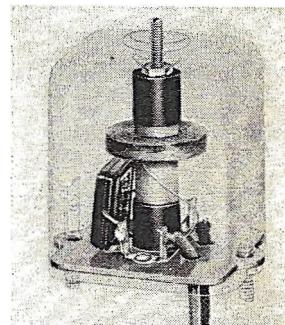
This new French type phone contains coil, condenser and ringer in its streamlined base. No extra wiring or desk box is necessary.

A remote control unit for operating doors, alarms or signal bells, goes into action when a person or car approaches within

three feet of its 50 to 100-foot antenna.

An air conditioner for individual rooms requires no extra plumbing or electrical work.

A new pocket knife has blades which open at the push of a button on the grip.



This wave trap, tuned by a movable magnetic core, prevents interference from ship-to-shore stations.

An intermediate frequency transformer furnishes unusual selectivity and simplicity in receiver balancing on super-hetrodyne sets.

A radically new spot remover has a brush in the container top to simplify cleaning work.

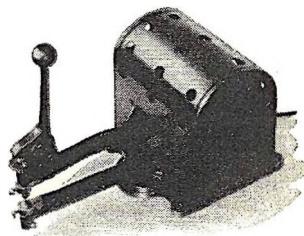
A sports shoe for soft ball players has detachable cleats, making the shoe available for other sports.

A metal priming paint is water, oil and acid resistant and dries in 24 hours.

Asphalt shingles, reversible, self-spacing and self-aligning, are now available.

A berry picker's wrist guard also serves as a container into which berries can be dropped.

An asbestos mitten with woven wool lining withstands terrific temperatures.

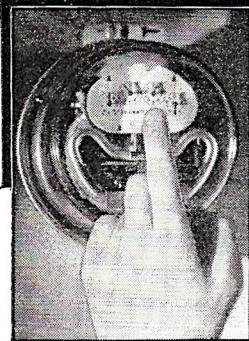


A new type sales letter includes envelope, display advertising, and business reply envelope on a single sheet of paper.

A typewriter eraser consisting of a mineral fiber brush in a molded plastic case quickly removes ink from bond or ledger paper.

Materials up to $\frac{1}{4}$ -inch can be welded on this low-cost electric spot welder. It is designed for home craftsmen, sheet metal shops, service men and school shops.

Editor's Note—Addresses of manufacturers of these and other new products in this issue can be obtained by sending a stamped, self-addressed envelope to MODERN MECHANIX HOBBIES & INVENTIONS, Information Bureau, Fawcett Building, Greenwich, Connecticut. Manufacturers are invited to submit material.



Exclusive New MIDWEST ELECTRIK-SAVER

Slashes Radio Current Bills IN HALF !

NEW
1937
AIR
TESTED

16-TUBE MIDWEST

5 WAVE BANDS

9 to 2,200
METERS

The Electrik-Saver is today's most sensational radio feature. It cuts radio wattage consumption as much as 50% and results in Midwest 16 and 18-tube radios consuming no more current than an ordinary 7 or 8-tube set. This feature enables the "Air Tested" Midwest to operate on low line voltages—as low as 80 volts! In addition, the Electrik-Saver increases tube life, reduces strain on the set, eliminates repair bills and makes for more consistent and gloriously realistic reception.

SAVE UP TO 50%
DIRECT FROM MIDWEST FACTORY

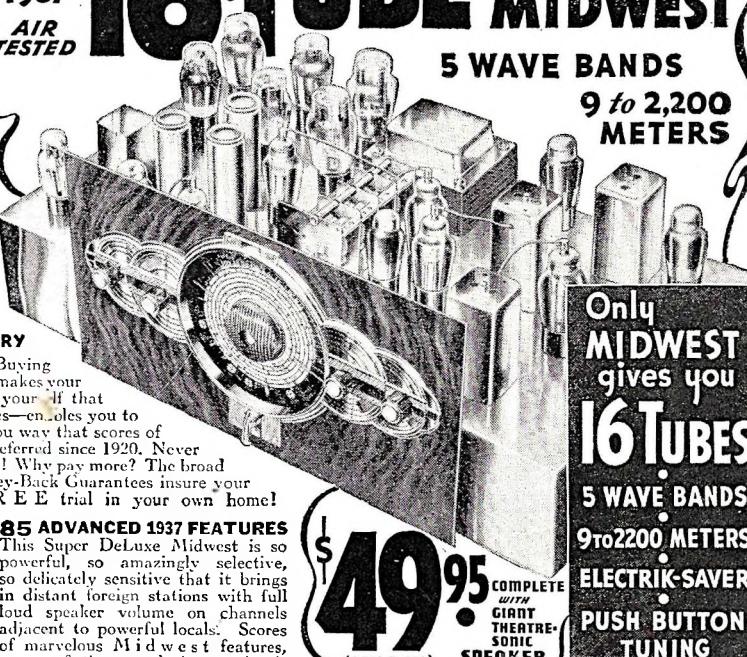
NO middlemen's profits to pay! Buying direct from the Midwest factory makes your radio dollar go twice as far. See for yourself that Midwest offers you greater radio values—enables you to buy the more economical factory-to-you way that scores of thousands of radio purchasers have preferred since 1920. Never before so much radio for so little money! Why pay more? The broad Midwest Foreign Reception and Money-Back Guarantees insure your satisfaction. You get 30 days F R E E trial in your own home!

Once again, Midwest demonstrates its leadership by offering the world's most powerful and most beautiful ALL-WAVE 16-tube, 5-Band Radio. A startling achievement, it makes the whole world your playground. Powerful Triple-Twin tubes (two tubes in one!) give 18-tube results. This advanced radio is a master achievement, a highly perfected, precisely built, radio-musical instrument that will thrill you with its marvelous super performance...glorious crystal-clear "concert" realism...and magnificent foreign reception. The Dual Audio Program Expander gives a living, vital realistic quality to voice and musical reproduction. Before

you buy, write for the
F R E E
40-page four
color

1937 MIDWEST USES LESS
CURRENT THAN AN
ORDINARY LIGHT BULB

With a Midwest, the finest entertainment the world has to offer is at your command. It is preferred by famous orchestra leaders, musicians, movie stars and discriminating radio purchasers everywhere. It enjoys an increasing world-wide sale because it outperforms ordinary receivers costing twice as much. You can order your Midwest "Air-Tested" radio from the new 40-page catalog with as much certainty of satisfaction as if you wrote to company itself to our great factory. (It pictures the beautiful 1937 radio in its four colors.) You pay as little as 10¢ a day. Three installments protect you: (1) A Foreign Reception Guarantee—(2) Absolute Guarantee of Satisfaction—(3) One-Year Warranty. Fill in and mail the coupon NOW!



\$49.95
COMPLETE
WITH
GIANT
THEATRE-
SONIC
SPEAKER
(LESS TUBES)

TERMS AS LOW AS 10¢ A DAY

MY MIDWEST HAS
UNEQUALLED BEAUTY
OF TONE AND SHARP-
NESS OF SELECTIVITY.
Glen Gray

CONGRATULATIONS FOR
CREATING THE MIDWEST. IT
BRINGS IN WONDERFUL
FOREIGN RECEPTION.
Rubinoff

Only
MIDWEST
gives you
16 TUBES

5 WAVE BANDS
9 to 2200 METERS
ELECTRIK-SAVER
PUSH BUTTON
TUNING
AUTOMATIC
AERIAL ADAPTOR

DUAL AUDIO
PROGRAM
EXPANDER
**30 DAYS
FREE
TRIAL**

MAIL COUPON TODAY for

Free 30-DAY TRIAL OFFER and **40-PAGE FOUR-COLOR Free CATALOG**

MIDWEST RADIO CORPORATION
Dept. C-10, Cincinnati, Ohio

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



Special offer and
prices prevail
only when dealing
direct with factory
by mail.

Name _____

Address _____

Town _____

State _____

MIDWEST RADIO CORP.

DEPT. C-10

Established 1920



CINCINNATI, OHIO, U.S.A.

Cable Address MIRACO...All Codes

FACTORY TO YOU

NEW REMINGTON NOISELESS PORTABLE

10¢
A DAY

AT LAST! The famous Remington Noiseless Portable that speaks in a whisper is available for only 10¢ a day. Here is your opportunity to get a real Remington Noiseless Portable direct from the factory. Equipped with all attachments that make for complete writing equipment. Standard keyboard. Automatic ribbon reverse. Variable line spacer and all the conveniences of the finest portable ever built. PLUS the NOISELESS feature. Act now while this special opportunity holds good. Send coupon TODAY for details.

YOU DON'T RISK A PENNY

We send you the Remington Noiseless Portable direct from the factory with 10 days' FREE trial. If you are not satisfied, send it back. WE PAY ALL SHIPPING CHARGES.

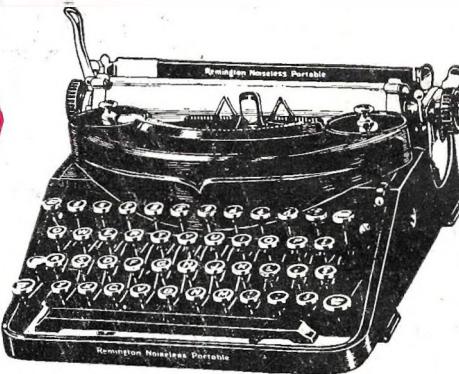
FREE → TYPING COURSE

With your New Remington Noiseless Portable we will send you—absolutely FREE—a 19-page course in typing. It teaches the Touch System, used by all expert typists. It is simply written and completely illustrated. Instructions are as simple as A, B, C. Even a child can easily understand this method. A little study and the average person, child or adult, becomes fascinated. Follow this course during the 10-Day Trial Period we give you with your typewriter and you will wonder why you ever took the trouble to write letters by hand.

FREE → CARRYING CASE

Also under this new Purchase Plan we will send you FREE with every Remington Noiseless Portable a special carrying case, sturdily built of 3-ply wood. This handsome case is covered with heavy du Pont fabric. The top is removed by one motion, leaving the machine firmly attached to the base. This makes it easy to use your Remington anywhere—on knees, in chairs, on trains. Don't delay... send in the coupon for complete details!

CLIP COUPON NOW...



MONEY
BACK
GUARANTEE
10-DAY
FREE TRIAL
OFFER

GREATEST TYPEWRITER BARGAIN IN 10 YEARS

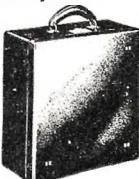
The gem of all portables. Imagine a machine that speaks in a whisper, that removes all limitations of time and place. You can write in a library, a sickroom, a Pullman berth without the slightest fear of disturbing others. And in addition to quiet is a superb performance that literally makes the words seem

to flow from the machine. Equipped with all attachments that make for complete writing equipment, the Remington Noiseless Portable produces. Telescoping and stencil cutting of truly exceptional character. Finished in black with shining chromium attachments. Mail coupon today!

SPECIFICATIONS. Standard Keyboard. Finished in glistening black with chromium attachments. Takes paper 9.5 inches wide. Writes lines 8.2 inches high. Writes 9.5 yards ribbon. Makes up to 7 clear, legible carbons. Back spacer, full size platen, paper fingers,

roller type. Black key cards with white letters. Double shift key and shift lock. Right and left carriage release. Right and left cylinder knobs. Large cushion rubber feet. Single or double space adjustment. All the modern features plus NOISELESS operation.

MONEY-MAKING OPPORTUNITIES OPEN. Hundreds of jobs are waiting for people who can type. A typewriter like yours put your ideas on paper in logical, impressive form. Helps you write clear, understandable sales reports, letters, articles, stories. A Remington Portable has started many a young man and woman on the road to success.



SEND COUPON WHILE LOW PRICES HOLD

Remington Rand Inc., Dept. 141-B
205 E. 42nd Street, New York, N. Y.

Please tell me how I can get a new Remington Noiseless Portable typewriter, plus FREE Typing Course and Carrying Case, for only 10¢ a day. Also send me, without obligation, new illustrated catalogue.

Name _____

Address _____

City _____ State _____

PRINTED IN U. S. A.