

A FAWCETT PUBLICATION

**10<sup>c</sup>**

# MECHANIX ILLUSTRATED

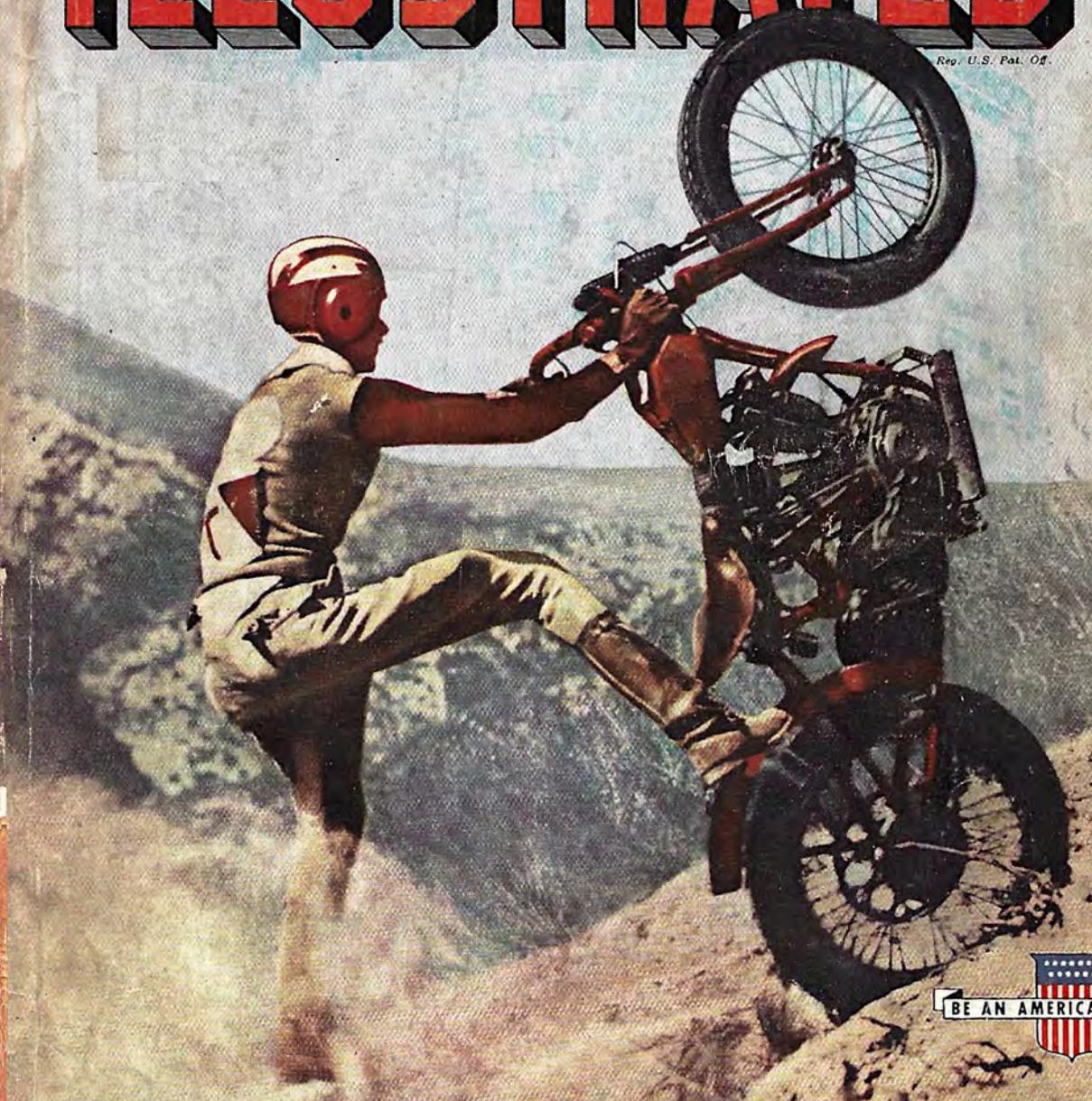
MARCH  
NSC

Reg. U.S. Pat. Off.

1941

MECHANIX ILLUSTRATED

10 CENTS



**FREE Motorcycle, Airplane!** **Big Contest!**  
**100 Other Prizes**

# WANTED

✓ ✓ ✓ New FULTONS,  
EDISONS and CHRYSLERS

The great strength of the United States is not its billions of gold, its tons of metal or its giant industrial capacity. It is the native mechanical skill and inventive power of its people.

In a crisis, this democracy always gives us the men and the ideas the nation needs.

Usually, we imagine that these ideas come from the scientific laboratories or from the drawing boards of engineers. Many do. But just as many and just as great ideas come from the men at the machines of industry.

For scientists, there is the Nobel Prize. For engineers, a score of awards. But there is no award for the gifted men now working at the lathes, forges and work benches of industry.

As a contribution to our national security, Revere Copper and Brass Incorporated is establishing an award of \$10,000.00 for the workmen in America's metal working industries.

*Donald Dallas*

PRESIDENT

REVERE COPPER AND BRASS INCORPORATED



# The REVERE AWARD

## of \$10,000 for Wage Earners in America's Metal Working Industries

THE Revere Award is made by Revere Copper and Brass Incorporated to help speed national defense by encouraging the mechanical genius and inventive talent of American wage earners.

The Revere Award totals \$10,000.00 divided as follows:

|                        |             |
|------------------------|-------------|
| 1st Award.....         | \$5,000.00  |
| 2nd Award.....         | 2,500.00    |
| 3rd Award.....         | 1,000.00    |
| 4th to 9th Awards..... | 250.00 each |

The Revere Award is open to all wage earners (foremen and workingmen) in the metal and metal-working industries and to all machine maintenance men.

Each entry remains the property of the sender.

Selection will be made by an impartial Jury of

Award consisting of men high in science, labor, the Army, the Navy and industry. The decision of the Jury of Award will be final.

Winners will be chosen for the inventions, devices, improvements or ideas which, in the Jury's opinion, contribute most to speeding up America's Defense Program.

It is desired that all entries be placed at the command of the Defense Advisory Council at Washington, D. C., subject to the entrant's own written consent.

Two or more men may cooperate in any entry.

Entries close on midnight, April 30th, 1941.

For booklet giving complete details of the Revere Award and for Entry Blanks simply write to THE REVERE AWARD COMMITTEE, Washington, D. C.



# BE A BETTER CITIZEN

# WITH A BETTER JOB!

★ U. S. defense program needs TRAINED MEN! The demand is urgent! Enroll NOW for spare-time study with International Correspondence Schools — get MODERN TRAINING in a few months! 400 up-to-date I. C. S. Courses to choose from, including vital defense subjects. Thousands of former I. C. S. students are leaders of Business and Industry today. Be a better PATRIOT — and BETTER PAID! Mail this coupon TODAY for complete information.

## INTERNATIONAL CORRESPONDENCE SCHOOLS

CELEBRATE 50 YEARS OF SERVICE TO AMBITIOUS AMERICANS



BOX 2323-V, SCRANTON, PENNA.

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

- |   |  |   |   |
|---|--|---|---|
| <b>TECHNICAL AND INDUSTRIAL COURSES</b>           |  |   |   |
| <input type="checkbox"/> Agriculture              | <input type="checkbox"/> Air Brake                                   | <input type="checkbox"/> Cotton Manufacturing                   | <input type="checkbox"/> Mfg. of Pulp and Paper   |
| <input type="checkbox"/> Air Conditioning         | <input type="checkbox"/> Diesel Engines                              | <input type="checkbox"/> Electrical Drafting                    | <input type="checkbox"/> Marine Engines           |
| <input type="checkbox"/> Architectural Drafting   | <input type="checkbox"/> Electrical Engineering                      | <input type="checkbox"/> Electric Lighting                      | <input type="checkbox"/> Mechanical Drafting      |
| <input type="checkbox"/> Architecture             | <input type="checkbox"/> Fire Bosses                                 | <input type="checkbox"/> Foundry Work                           | <input type="checkbox"/> Mechanical Engineering   |
| <input type="checkbox"/> Auto Engine Tune-up      | <input type="checkbox"/> Fruit Growing                               | <input type="checkbox"/> Heating                                | <input type="checkbox"/> Mine Foreman             |
| <input type="checkbox"/> Auto Technician          | <input type="checkbox"/> Heat Treatment of Metals                    | <input type="checkbox"/> Highway Engineering                    | <input type="checkbox"/> Navigation               |
| <input type="checkbox"/> Aviation                 | <input type="checkbox"/> House Planning                              | <input type="checkbox"/> Locomotive Engineer                    | <input type="checkbox"/> Patternmaking            |
| <input type="checkbox"/> Boilermaking             | <input type="checkbox"/> Management of Inventions                    | <input type="checkbox"/> Machinist                              | <input type="checkbox"/> Pharmacy                 |
| <input type="checkbox"/> Bridge Engineering       |  | <input type="checkbox"/> Management of Inventions               | <input type="checkbox"/> Plumbing                 |
| <input type="checkbox"/> Building Estimating      |  |   | <input type="checkbox"/> Poultry Farming          |
| <input type="checkbox"/> Chemistry                |  |   | <input type="checkbox"/> Practical Telephony      |
| <input type="checkbox"/> Civil Engineering        |  |   | <input type="checkbox"/> Public Works Engineering |
| <input type="checkbox"/> Coal Mining              |  |   | <input type="checkbox"/> Radio, General           |
| <input type="checkbox"/> Concrete Engineering     |  |   | <input type="checkbox"/> Radio Operating          |
| <input type="checkbox"/> Contracting and Building |  |   | <input type="checkbox"/> Radio Servicing          |
| <input type="checkbox"/> R. R. Section Foreman    | <input type="checkbox"/> R. R. Signalmen's                           | <input type="checkbox"/> Refrigeration                          | <input type="checkbox"/> Sanitary Engineering     |
| <input type="checkbox"/> Sheet Metal Work         | <input type="checkbox"/> Steam Electric                              | <input type="checkbox"/> Steam Engines                          | <input type="checkbox"/> Steam Fitting            |
| <input type="checkbox"/> Structural Drafting      | <input type="checkbox"/> Structural Engineering                      | <input type="checkbox"/> Surveying and Mapping                  | <input type="checkbox"/> Telegraph Engineering    |
| <input type="checkbox"/> Textile Designing        | <input type="checkbox"/> Toolmaking                                  | <input type="checkbox"/> Welding, Electric and Gas              | <input type="checkbox"/> Woolen Manufacturing     |
| <b>BUSINESS COURSES</b>                           |  |   |   |
| <input type="checkbox"/> Accounting               | <input type="checkbox"/> Advertising                                 | <input type="checkbox"/> College Preparatory                    | <input type="checkbox"/> Foremanship              |
| <input type="checkbox"/> Bookkeeping              | <input type="checkbox"/> Commercial                                  | <input type="checkbox"/> Commercial                             | <input type="checkbox"/> French                   |
| <input type="checkbox"/> Business Correspondence  | <input type="checkbox"/> Cost Accounting                             | <input type="checkbox"/> C. P. Accounting                       | <input type="checkbox"/> High School              |
| <input type="checkbox"/> Business Management      | <input type="checkbox"/> First Year College                          | <input type="checkbox"/> Home Economics                         | <input type="checkbox"/> Illustrating             |
| <input type="checkbox"/> Cartooning               | <input type="checkbox"/> Civil Service                               | <input type="checkbox"/> Home Economics                         | <input type="checkbox"/> Lettering Show Cards     |
| <input type="checkbox"/> Advanced Dressmaking     | <input type="checkbox"/> Foods and Cookery                           | <input type="checkbox"/> Professional Dressmaking and Designing | <input type="checkbox"/> Managing Men at Work     |
| <input type="checkbox"/> Railway Postal Clerk     | <input type="checkbox"/> Salesmanship                                | <input type="checkbox"/> Secretarial                            | <input type="checkbox"/> Sign Lettering           |
| <input type="checkbox"/> Spanish                  | <input type="checkbox"/> Tea Room and Cafeteria Management, Catering |   |   |

Name..... Age..... Address.....  
 City..... State..... Present Position.....  
 Canadian residents send coupon to International Correspondence Schools Canadian, Limited, Montreal, Canada  
 British residents send coupon to I. C. S., 71 Kingsway, London, W. C. 2, England

# MECHANIX ILLUSTRATED

MARCH  
1941

PRICE  
10 CENTS

Volume XXV  
Number 5

W. H. "BUZZ" FAWCETT, JR., President

Copyright 1941 by Fawcett Publications, Inc.

## SPECIAL FEATURES

|   |                     |
|---|---------------------|
| <b>Invisible Flash For Blackout Photography</b> | <b>- - 35</b>       |
| <i>By Kenneth Murray</i>                        |                     |
| <b>Air-Cooling vs. Liquid-Cooling!</b>          | <b>- - - - - 40</b> |
| <i>By George Daniels and Douglas Rolfe</i>      |                     |
| <b>Wings Over The Water!</b>                    | <b>- - - - - 46</b> |
| <b>THE MI PRIZE CONTEST</b>                     | <b>- - - - - 48</b> |
| <b>Secrets Of The Old Masters!</b>              | <b>- - - - - 58</b> |
| <b>The Sound Of Things To Come!</b>             | <b>- - - - - 60</b> |
| <i>By Jo Ranson and Dick Dorrance</i>           |                     |
| <b>Bullets To The Bull's Eye!</b>               | <b>- - - - - 66</b> |
| <i>By Richard W. Emery</i>                      |                     |
| <b>Gadget Man!</b>                              | <b>- - - - - 75</b> |
| <i>By Andrew R. Boone</i>                       |                     |
| <b>Musical Number, Please!</b>                  | <b>- - - - - 78</b> |
| <b>CASH SPONSOR CONTEST</b>                     | <b>- - - - - 79</b> |
| <b>Oil From The Earth's Core!</b>               | <b>- - - - - 80</b> |
| <b>Snapshots Of Court Shots!</b>                | <b>- - - - - 82</b> |
| <b>How To Buy A Used Car</b>                    | <b>- - - - - 84</b> |
| <i>By Rory O'Shane</i>                          |                     |

(Continued on page 8)

Last month's issue of MECHANIX ILLUSTRATED had barely hit the newsstands before the letters started to pour in!

Subject: Our "Words-Within-Words" Contest.

The questions covered a lot of territory. Are plurals permissible? Can crosswords have more than eight letters? Can more than one member of a family enter the contest? May I sponsor someone in my family? What does "par" mean—are you supposed to get more, less or the same as "par"? Can Canadians enter the contest?

There were other questions, but these were the ones that seemed to bother the readers most. Since it is absolutely impossible for us to answer the readers' letters individually, let's get those questions straight.

Plurals are permissible, if they can be formed with a letter in the keyboard.

Crosswords cannot have more than eight letters.

As many members of a family may enter as desire—the more the merrier!

You may sponsor someone in your family.

"Par" is an arbitrary, average score. You are supposed to get the highest score possible.

Canadians are eligible to enter the contest.

We advise you to read the rules carefully, study the specimen puzzle, and get to work and win one of those swell prizes!

ROBERT HERTZBERG, Editor

MECHANIX ILLUSTRATED is published monthly by Fawcett Publications, Inc., 1100 W. Broadway, Louisville, Ky. Printed in U. S. A. Advertising and Editorial Offices, Paramount Building, 1501 Broadway, New York, N. Y. General Offices, Fawcett Building, Greenwich, Conn. Elliott D. Odell, Advertising Director; Roscoe K. Fawcett, Circulation Director; Ralph Daigh, Editorial Director; Al Allard, Art Director. Entered as second-class matter at the post office at Louisville, Ky., under the act of March 3, 1879. Additional entry at Greenwich, Conn. Copyright 1941 by Fawcett Publications, Inc. Reprinting in whole or in part forbidden except by permission of the publishers. Title registered in the U. S. Patent Office. Address manuscripts to New York Editorial Offices. Not responsible for lost manuscripts or photos. Unacceptable contributions will be returned, if accompanied by sufficient first class postage. Price 10c per copy. Subscription price \$1.00 per year in U. S. and possessions. Canadian subscriptions not accepted. Foreign subscriptions \$2.00 per year. Foreign subscriptions and sales should be remitted by International Money Order in United States funds payable at Greenwich, Conn. Advertising forms close first of second month preceding date of issue.

MEMBER AUDIT BUREAU OF CIRCULATIONS

# Are You Going To Miss This Good Pay Chance Of Your Life?



J. E. Smith, President, National Radio Institute  
Established over 25 years

## ACT QUICKLY! LEARNING RADIO NOW CAN MEAN:

- 1 You'll be getting into the Radio industry at a time when the Government is pouring millions of dollars into Radio to buy Defense equipment, on top of boom civilian Radio business.
- 2 You'll be in line for specialist ratings quickly, as a Radio technician, if you enter the Army, Navy or Marine Corps. These ratings pay up to 6 times a private's or seaman's base pay, in addition to carrying extra rank and prestige.
- 3 You'll be trained and experienced in a wide-awake, growing field, when you return from Military service, and qualify for better jobs, better pay. Any way you look at it, IT'S SMART TO TRAIN FOR RADIO NOW!

## BE A RADIO TECHNICIAN

### I Will Train You At Home In Your Spare Time

Don't miss this opportunity. It may never come again. As America's great defense program moves ahead—as thousands of men called in the draft report for service—many new jobs are opening up. But when you look for a GOOD job, you quickly discover this: In one way, **TIMES HAVE NOT CHANGED, AND NEVER WILL!** Now, as always, the men who get good jobs first—the men who get the best pay—**ARE TRAINED MEN!**

#### Defense Opening Hundreds Of Good Pay Jobs For Technicians

Now is the time to **TRAIN FOR RADIO!** Millions more Radio sets are in use, more hours a day, than ever before—that means more Radio sets to be built, sold and serviced—**BY TRAINED MEN!** Huge government orders for Army and Navy Radio equipment are making Radio one of America's great essential defense industries—are opening many more good pay jobs—**FOR TRAINED MEN!** Many men are leaving good Radio jobs to enter military service—and winning better ratings and better pay because military Radio work, like all other work, pays off best to **TRAINED MEN!**

#### Bright Future Ahead For Trained Radio Men

Pushed ahead by the defense program, Radio is just entering a great new period of progress. Important new developments like television and frequency modulation mean that Radio's peace time future will be greater than its past—**FOR TRAINED MEN!** Radio is a **LIVE industry!** Right from its beginning through good times and bad, through war and peace, Radio has kept **MOVING AHEAD!**—introducing new developments, creating new job opportunities—**FOR TRAINED MEN!** And you need not quit your present job or leave home to **TRAIN FOR RADIO!** I'll train you quickly—in spare time at home nights.

#### How Many Radio Technicians Make \$30, \$40, \$50 A Week

Radio broadcasting stations employ operators, technicians, Radio manufacturers employ testers, inspectors, servicemen in good-pay jobs. Radio jobbers, dealers, employ installation and servicemen. Many Radio Technicians open their own Radio sales and repair businesses and make \$30, \$40, \$50 a week. Others hold their regular jobs and make \$5 to \$10 a week fixing Radios in spare time. Automobile, Police, Aviation, Commercial Radio, Loudspeaker Systems, Electronic Devices are other fields offering opportunities for which N. R. I. gives the required knowledge of Radio. Television promises to open good jobs soon.

#### Many Make \$5 to \$10 a Week Extra in Spare Time While Learning

The day you enroll, I start sending you Extra Money Job Sheets—start showing you how to do Radio repair jobs. Throughout your Course I send plans and directions which have helped many make \$5 to \$10 a week extra in spare time while learning. I send special Radio equipment to conduct experiments and build circuits. This 50-50 training method makes learning at home interesting, fascinating, practical. You **ALSO GET MODERN PROFESSIONAL ALL-WAVE SET SERVICING INSTRUMENT** to help you make money fixing Radios while learning and equip you for full time work after you graduate.

#### Find Out What Radio, Television Offer You

Act Today! Mail the coupon for my 64-page book, "Rich Rewards in Radio." It points out Radio's spare time and full time opportunities and those coming in Television; tells about my Course in Radio and Television; shows more than 100 letters from men I have trained, telling what they are doing and earning. Read my money back agreement. **MAIL COUPON** in an envelope or paste on a penny postcard—**NOW!**

J. E. SMITH, President, Dept. 1CH  
National Radio Institute, Washington, D. C.



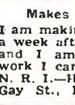
**RADIO OPERATORS** are employed by Government Departments, Shipping Companies and in Commercial Aviation; opportunities are increasing in these fields.



### I Trained These Men



In U. S. Signal Corps  
I am in the U. S. Army, Signal Corps, as Chief Radio Clerk. My duties also include maintenance of the transmitter and receivers when the Chief Radio Operator is absent.  
—R. W. Anderson, Radio Station WTI, Vancouver Barracks, Washington.



Makes \$50 to \$60 a Week  
I am making between \$50 and \$60 a week after all expenses are paid, and I am getting all the Radio work I can take care of, thanks to N. R. I.—H. W. Spangler, 126 1/2 S. Gay St., Knoxville, Tenn.



\$10 to \$20 a Week in Spare Time  
I repaired some Radio sets when I was on my tenth lesson. I made \$600 in a year and a half, and I have made an average of \$10 to \$20 a week—just spare time.—John Jerry, 1529 Arapahoe Street, Rm. 17, Denver, Colorado.

## MAIL NOW • Get 64 page book FREE



J. E. Smith, President, Dept. 1CH  
National Radio Institute, Washington, D. C.

Mail me **FREE**, without obligation, your 64-page book "Rich Rewards in Radio." (No salesman will call. Write plainly.)

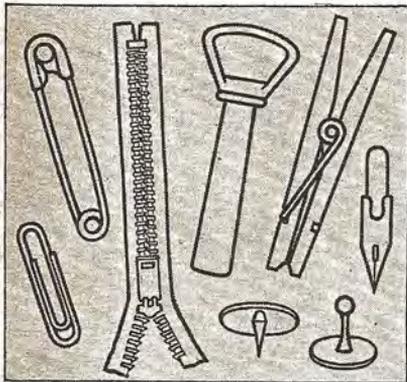
Age-----  
Name-----  
Address-----  
City----- State-----

# INVENTORS

*Act Now* TO PROTECT  
YOUR INVENTION WITH U.S. PATENT

## Small Ideas May Have Large Commercial Possibilities

Inventions 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 are simple yet familiar inventions—brought their inventors rich rewards. If you have a Patentable invention—act to protect it. Send for our FREE 48-Page Book that tells you how.



CLARENCE A. O'BRIEN

1C3 Adams Building, Washington, D. C.

Registered Patent Attorney before U. S. Patent Office

## *Free Book* TELLS IMPORTANCE OF QUICK ACTION—HOW TO OBTAIN PATENT AND MARKET INVENTIONS

If you have invented something, if you're interested in inventing something, you need our new 48-page book that gives the entire Story of Patents. It tells you for the first time about new phases of invention, how others succeeded, how the patent laws protect you, how to market your invention, where to obtain finances, how to form a company partnership, or arrange for royalties from your invention's sale.

### PRACTICAL BENEFITS OF THIS BOOK

You will find 6 complete pages illustrated with simple inventions that have succeeded in six different fields of industry. Over 100 illustrations are in this book. You will read the stories of ten (illustrated) of America's most famous inventors. You will find an experienced and thorough survey of market conditions affecting the inventor—showing the possibilities for commercial invention today. Entire chapters are devoted to the value of a patent in promoting the final success of your invention. The importance of quick action in applying for patent is stressed—facts revealing danger of delay are emphasized. If you expect to realize profits from your invention you must protect it with a U. S. Patent. Otherwise you may find that all your time and labor have been lost, because it often happens that other inventors are working on the same invention. If you have an invention, or an ambition to invent—get the information on obtaining patent AT ONCE!

### FREE RECORD OF INVENTION FORM

When you send for our FREE BOOK, we include, also Free, our specially prepared Record of Invention blank, on which you can quickly make and date a sketch and description of your invention. This "disclosure" as it is called, may be absolutely invaluable as evidence for you, should your rights ever be contested. Be sure to get it and use it.

# CLARENCE

REGISTERED PATENT ATTORNEY before U. S. Patent Office

for  
Quick  
Action

SEND  
TODAY



**GET FREE 48-PAGE BOOK**  
and Free Form for Recording Your Invention

**MAIL COUPON NOW**  
**TO CLARENCE A. O'BRIEN**  
*Registered Patent Attorney*  
**BEFORE U. S. PATENT OFFICE**

Clarence A. O'Brien, 1C3 Adams Building, Washington, D. C.  
Please send me your Big, Free 48-page Book for Inventors and your Specially Prepared Record of Invention form. This request does not obligate me.

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

(Please write or print plainly)

**You Can Patent IMPROVEMENTS IN**  
**MACHINERY, ARTICLES, DESIGNS, FORMULAS, ETC., IF NEW**

Every year thousands of Patents are granted. Very few, however, represent the discovery of entirely new principles. Most of them provide new methods of doing some every-day thing in a better way—changes for greater efficiency, usefulness, adaptability, or beauty in some previously Patented thing. These IMPROVEMENTS are patentable if new, and actually represent new inventions. These improvement Patents offer large chances for profit if commercially useful. The business world wants improved products and services.

**FINISHED DRAWINGS NOT NECESSARY**

Our Big Book tells you how you can start immediately to apply for Patent Protection even if you haven't finished models or drawings available now. It will tell you how we can prepare the specifications and finished drawings necessary in the form prescribed by the Patent Office—so as to secure for you full Patent Protection. Mail Coupon for Our Big Book TODAY.

**OUR SERVICES TO YOU**

We are Registered Patent and Trade-Mark Attorneys, serving Inventors all over the United States and abroad. Our Organization is complete. We have Draftsmen, experienced Searchers and Attorneys to serve your interests. We can act as your legal adviser in all Patent Matters. Our complete service is described in Our Big Book. Mail Coupon for it NOW.

**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.

**GET FREE PATENT GUIDE—MAIL COUPON NOW**

If you have an invention in the making—if you simply have the crude elements of an invention in mind—you should have our Big FREE BOOK without delay. It will guide you every step of the way—from the preliminary search stage to the issuance of the final patent grant. This book contains twenty-five chapters describing in plain man-to-man language the story of obtaining a patent and marketing an invention. This book is absolutely FREE—just tear off the above coupon or write us a letter or postcard TODAY!

**We Give Special Attention to MILITARY INVENTIONS**

Due to the essential nature of inventions which might be considered of value to the National Defense, we are giving special attention to such matters, even to the extent of assisting in submitting your invention to the proper authorities.



Get  
These Free  
MAIL  
COUPON

**A. O'BRIEN**  
1C3 Adams Building - - - - - WASHINGTON, D. C.

When Answering Advertisements, Please Mention MECHANIX ILLUSTRATED

DEPARTMENTS

Chips From The Editor's Workbench - - - 12  
 Moneymakers And Moneysavers  
 (Classified Ads) - - - - - 27  
 You're Right—That's Wrong! - - - - - 73

AVIATION

Air-Cooling Vs. Liquid-Cooling - - - - 40  
 Wings Over The Water! - - - - - 46  
 Learn To Fly With Electric Bells - - - - 59  
 New Glass Cloth For Airplane Wings - - - 65  
 War Plane Blast-Engine - - - - - 72  
 Depth Perception For Flying Cadets - - - 74

NEW MECHANICAL DEVICES

G-Man Guns Punch A Time Clock Now - - 38  
 This Machine Will Replace A Lathe - - - 39  
 Student Invents A New Diving Mask - - - 39  
 8,000 Volts Kill The Mouse - - - - - 59  
 Bomb Proof Eye-Guards - - - - - 72  
 Retractable Curb For Varied Traffic - - - 72  
 No Bugles—But What Bells! - - - - - 74  
 Jiggle Machine For Muscles - - - - - 74  
 X-ray Detector Worn On Wrist - - - - - 83

PHOTOGRAPHY

Invisible Flash For Blackout Photography - 35  
 Snapshots Of Court Shots! - - - - - 82  
 Miniature Super Camera Introduced - - - 83  
 Photo Contest - - - - - 89  
 Print "Dodging" In One Easy Lesson - - - 90  
 "Darkroom Spot" For Print Inspection - - 92  
 Helpful Picture Making Aids - - - - - 94

HOW TO BUILD SECTION

Introduction - - - - - 95  
 Prospecting With Black Light - - - - - 96  
 Graceful Console Table Is Easy To Make - 98  
 "All-Wave Eleven" - - - - - 100  
 Turned Candy Box - - - - - 104

(Continued on page 10)



Are you TRAINED? Do you have specialized skill and knowledge that make you IN DEMAND by industry? Now is the time to become "a man IN DEMAND" by training for Aviation . . . the industry growing so fast that it needs you NOW . . . and destined to grow so big that it will need you FROM NOW ON. Aero I.T.I. training has put over 2000 men into Aviation with the skill and knowledge for rapid advancement, security, success. Investigate NOW.

**AERO INDUSTRIES TECHNICAL INSTITUTE**  
 5265 WEST SAN FERNANDO ROAD, LOS ANGELES, CALIFORNIA  
 Five Courses in AIRCRAFT MECHANICS and AERONAUTICAL ENGINEERING  
 —Including 12 Month Aircraft Mechanics Course Approved by U. S. Civil Aeronautics Board

EXECUTIVE BOARD

**JOHN K. NORTROP**  
 President, Northrop Aircraft, Inc.  
**ROBERT E. GROSS**  
 President, Lockheed Aircraft Corporation  
**C. A. VAN DUSEN**  
 Vice Pres., Consolidated Aircraft Corp.



It's Easy To Be A Contractor

Learn to estimate, to plan buildings, to take contracting jobs, and make money on them. Here are 9 up-to-the-minute books on building, estimating, and contracting which cover in an interesting way the subjects that carpenters, builders, and contractors should know to make the most of their jobs. Roof Framing, The Steel Square, Architectural Drawing and Design, Estimating, Painting and Decorating, Heating, Air Conditioning, Building, Contracting, Concrete Forms and other subjects are all well covered.

"Boss" Carpenters in Demand Up-to-Date EDITION

Vast public works jobs, immense projects, and the rapid growth of home building, are making jobs for MEN WHO KNOW HOW. These books give you quick training. With them you shouldn't be afraid to tackle any job, for needed facts can be found in a hurry.

These books are the most up-to-date, complete we have ever published on these subjects.

Coupon Brings Nine Books FREE For Examination

AMERICAN TECHNICAL SOCIETY (Publishers—Home Study Courses)  
 Dept. G3320, Drexel at 58th Street, Chicago, Illinois

You may ship me the Up-to-Date edition of your nine big books, "Building, Estimating, and Contracting" without any obligation to buy. I will pay the delivery charges only, and if fully satisfied in ten days, I will send you \$2.00, and after that only \$3.00 a month, until the total price of only \$29.80 is paid. I am not obligated in any way unless I keep the books.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

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

**Do you really Want to  
get ahead in business ?**



## Then here is a valuable tip for you . . .

The problem of winning promotion—of achieving the better job and better pay—is not easy. Competition is keen and the demands are high. But it is much easier—simpler—if you understand one important fact.

Business and industry always need men and women who can take on larger responsibilities—give more valuable service. Those who step up into the bigger jobs are those who have an objective and definitely prepare for it—who not only give their best to today's job, but who also plan and prepare for the jobs on ahead and train themselves to meet the greater responsibilities of the bigger job.

### **Pick Some Growing Field and Prepare**

If you really want to get ahead, pick some field of opportunity—either your present field or some other. Find out its opportunities, and its requirements—decide whether you are fitted for it—then get busy.

Train thoroughly for it. Make yourself expert in it. Then you can compel success.

For 32 years, LaSalle has been helping ambitious men and women prepare for advancement. Hundreds of thousands now in good jobs and on the way up to better ones, owe their success to LaSalle training.

### **Investigate—Then Decide**

Out of that long and wide experience we have compiled a wealth of knowledge about various fields of business. That knowledge is freely at your disposal. Tell us—in a letter or in the coupon below—what you want to be. We will tell you—without cost or obligation—of the opportunities and requirements in that field. We will tell you also of our complete training program for that job. Then you can decide.

The coupon below lists a number of opportunity jobs. Check the one in which you are interested—or write in some other job on the blank line. Then mail the coupon today. It can be your first step toward the success you want.

## **LASALLE EXTENSION UNIVERSITY** **A Correspondence Institution**

Department 3493-R,

Chicago, Illinois

I am interested in winning to the career I have checked below. Please send me the facts about the opportunities in that field and about your training for that job.

- |  |  |   |
|--|--|---|
| <input type="checkbox"/> Business Manager            | <input type="checkbox"/> Cost Accountant           | <input type="checkbox"/> Collection Manager |
| <input type="checkbox"/> Industrial Manager          | <input type="checkbox"/> Statistician              | <input type="checkbox"/> Credit Manager     |
| <input type="checkbox"/> Factory Superintendent      | <input type="checkbox"/> Bookkeeper                | <input type="checkbox"/> Rate Clerk         |
| <input type="checkbox"/> Production Manager          | <input type="checkbox"/> Cashier                   | <input type="checkbox"/> Shipping Clerk     |
| <input type="checkbox"/> Foreman                     | <input type="checkbox"/> Salesman                  | <input type="checkbox"/> Traffic Manager    |
| <input type="checkbox"/> Inspector                   | <input type="checkbox"/> Sales Manager             | <input type="checkbox"/> Export Manager     |
| <input type="checkbox"/> Certified Public Accountant | <input type="checkbox"/> Correspondence Supervisor | <input type="checkbox"/> Legal Counsellor   |
| <input type="checkbox"/> Comptroller                 | <input type="checkbox"/> Sales Correspondent       | <input type="checkbox"/> Office Manager     |
| <input type="checkbox"/> Chief Accountant            | <input type="checkbox"/> Collection Correspondent  | <input type="checkbox"/> Secretary          |
| <input type="checkbox"/> Auditor                     |  |   |

.....  
(Any other)

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

Occupation.....

Address.....

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

HOW TO BUILD SECTION—Cont'd.

Knight Fire Screen - - - - - 104

Boxes From Wood Blocks - - - - - 105

Build This Convertible All-Purpose Trailer - 106

Valentine Hearts - - - - - 109

The Vultee Vanguard—Flying Model - - - 110

How To Use Nails - - - - - 113

For Enterprising Shop Hobbyists - - - - 114

Improve Your Shop Technique - - - - - 118

A Bicycle Drive For Your Rowboat - - - - 120

Tincan-ology - - - - - 122

Milling Attachment For The Lathe - - - - 124

Children Will Save With This  
Butcher Block Bank - - - - - 125

Finger-print Set For The Home - - - - - 125

Oaken Bucket Desk Set - - - - - 126

Papered Case For Stationery - - - - - 126

Toy Dragon Wiggles - - - - - 127

Book Match Holder Keeps A  
Large Supply Handy - - - - - 128

Coffee Grinder Table Lamp - - - - - 128

Floor Lamp From Old Butter Churn - - - - 128

Ice Skate Holders - - - - - 129

Snow Express - - - - - 129

Windy Matches - - - - - 129

Wooden Tips For Blower Hose - - - - - 130

Old Window Spray Makes Blowtorch - - - 130

Wire Cutters From Old Scissors - - - - - 130

MISCELLANEOUS

The Printer Is Off To The Races - - - - - 38

Setting A Trap For 4-Wheeled "Game" - - - 39

Mechanical Chiropractor - - - - - 59

Plumbers' Nightmare—Sardine Pipes - - - 64

Fully Equipped Model Race Car - - - - - 64

Built-In Car Showcase - - - - - 65

Plastic Eyeglass Guard - - - - - 65

You're Right—That's Wrong! - - - - - 73

**INVENTORS**  
**PATENT YOUR IDEAS**  
SEND FOR FREE BOOK →

**HOW TO OBTAIN A PATENT**

Written by a Former Member of the Examining Corps (1922-24) of the U.S. Patent Office. If you want to profit by your idea, you should take steps to apply for a U. S. Patent at once. Your first step is to get this Free Book. This interesting illustrated book contains valuable information you should have. It tells you fully how to obtain a patent on your idea in the quickest way. With this Free Book you will also receive a "Record of Invention" form on which you can easily record your idea. Personal and Confidential Service: Your case will be personally handled only by a Registered Patent Attorney who is also a Former Member of the Examining Corps of the U. S. Patent Office. All communications confidential.

MAIL COUPON TODAY for FREE PATENT BOOK and RECORD OF INVENTION Form

**CARL MILLER**  
REGISTERED PATENT ATTORNEY  
FORMER MEMBER EXAMINING CORPS U. S. PATENT OFFICE

Woolworth Bldg., 35th Floor, Dept. 31-B, New York City  
MILLER BUILDING, Dept. 31-B, WASHINGTON, D. C.  
Please send me your Free Book, "How to Obtain a Patent," and your "Record of Invention" form.

NAME .....

ADDRESS .....

**PATENTS** My Personal service assures strictest confidence on all your patent problems. Send me a model or drawing, or sketch and description of your invention, and \$5.00. I will make a search and report promptly as to its patentability and send you a copy of my 72-page booklet. Or, if you prefer to read my booklet first, write today for FREE copy. Registered Patent Attorney.

L. F. Randolph, 761 Victor Building, Washington, D. C.

**INVENTORS**  
**BE SUCCESSFUL**

Read Invention & Finance—it's your chance to make money. Free particulars concerning contents of magazine given to prospective subscribers. Cut out and send us this advertisement to receive your particulars.

**INVENTION & FINANCE MAGAZINE**  
80-H Wall Street, — New York, N. Y.

**BUSINESS AND PERSONAL STATIONERY**  
AT BARGAIN PRICES!  
See MONEYMAKERS & MONEYSAVERS (pages 27-32) for good low-cost printing.

**WANTED INVENTIONS**

WE LOCATE BUYERS for and have many requests from manufacturers for New Inventions of merit, Patented or Unpatented, Cash or Royalty. If will sell, write us today for a FREE PROTECTIVE DISCLOSURE FORM, Descriptive Booklet, References and Full Particulars of our services to inventors. NO OBLIGATION. A post-card will do! Address:

**THE INVENTION REPORTER**  
2E-11236 So. Fairfield Ave., Chicago, Ill.

**Inventions Wanted**  
**Patented or Unpatented**

We have been successfully selling inventions, patented and unpatented, since 1924. Write us, if you have a practical, useful idea for sale.

**CHARTERED INSTITUTE OF AMERICA INVENTORS**  
Dept. 5, Barrister Building Washington, D. C.

# PATENT and SELL your INVENTION

## A Simple Recipe for Inventive Success

**P**ROBABLY the simplest recipe for inventive success would be this: First, a practical, useful invention; second, a good strong Patent; third, a buyer or a market. The inventor needs all three to get anywhere. Lacking any one, he is likely to get nowhere. The recipe is simple. Working it out isn't so simple. That is why inventors—and others inventively inclined—have found the two books shown here so helpful. We've gone into each part of the recipe carefully. Exactly what is an invention? We tell you. What is a strong patent? We tell you. How can I go about finding a buyer? We tell you.

## Many Questions Answered

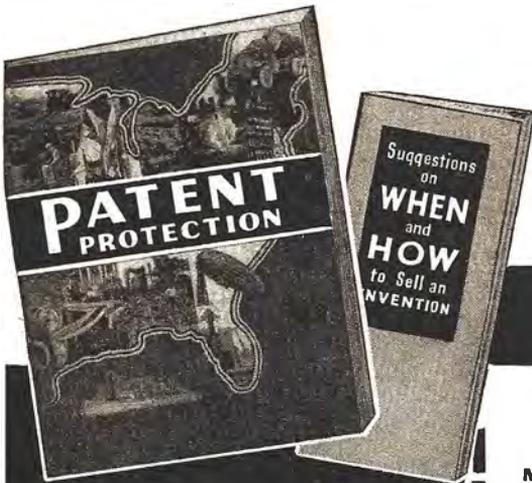
But there's much more. For example, just how an Application for a Patent is made; how an inventor can safeguard himself with dated sketches as he goes along; how the pertinent Patent Office records are checked to see what other inventors may have done along the same line; how some successful

inventors have secured financial backing; simple ways to contact manufacturers; and many other points.

## 43 Years in the Business of Helping Inventors

The world needs, can use and will pay for practical, useful inventions. Manufacturers are on the alert for new articles, or improvements that will help them increase sales. Maybe you have one. Maybe not. These books will help you in deciding that. From that standpoint alone, they are valuable.

For more than 43 years, it has been our business to help inventors. We answer your questions and supply complete information about Patent procedure, costs, steps to take, kind of sketch or model needed, and much more. Our staff is made up of experienced Registered Patent Attorneys, Draftsmen, Searchers. Fees are reasonable—deferred payments arranged. Whether your idea is large or small, finished or still in the rough stage, you should have the facts both about Patenting and Selling. The information which we give you—based on long experience with thousands of inventors—is yours for the asking. No need to delay. These two books of facts may save you time, trouble, money, even later disappointment. Return the coupon—or write us a confidential letter—today.



These 2 books tell you  
how to go about it ..  
**Both Sent FREE >**

## 115 Mechanical Movements Shown

In our book "Patent Protection" you will find illustrated 115 different mechanical movements. Maybe you'll find just what you need to work out some of your own ideas. Many other interesting pictures are shown in this book. Both books and an "Evidence of Invention" form sent to you FREE the same day we hear from you.

VICTOR J.  
**EVANS & Co.**

*Merlin M. Evans*

### REGISTERED PATENT ATTORNEYS

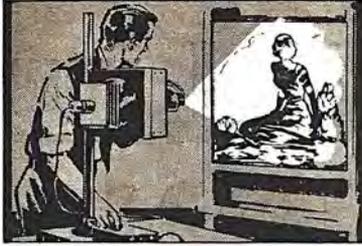
MAIN OFFICE: 425-C VICTOR BUILDING  
WASHINGTON, D. C.  
Pittsburgh Office, 514-B Empire Building

Rush by return mail. Free copies of your books "Patent Protection" and "When and How to Sell an Invention"—also important "Evidence of Invention" Form.

Name .....

Address .....

City and State.....



# Chips from the EDITOR'S WORKBENCH

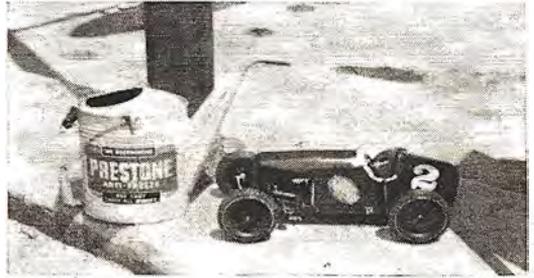
**W**ELL, we've learned one thing—when we ask you chaps to write letters, you really write 'em! We mentioned in this space, a month or so ago, that we'd like to hear from you readers, to learn what's on your mind. And, since then, we've been simply swamped with mail, offering every kind of suggestion, from ways to fix up our magazine, to what we could do about it if we didn't like the suggestions.

From it all, though, we've gotten some very helpful hints. One of the things you readers seemed to want the most in MI is more news of your favorite hobby, and, accordingly, we are happy to announce that, beginning in the April issue, the hobby section of the magazine will be considerably expanded. There'll be a definite section set aside for hobbies, and in it will be the latest news of photography, model building and racing, woodcraft, radio, stamps—in short, just about everything you fellows have indicated you would like to see.

We don't plan to devote a complete section to any one of these hobbies in each issue; the hobby department simply will contain, each month, the outstanding events of importance in various fields, and if there isn't any big news in some particular field, we'll just skip that one for the time being and give more space to the more important hobbies of the moment. The main thing is that we want to please you readers, and, in the words of



Mr. W. Ballingall, of Moose Jaw, Saskatchewan, wins a \$5.00 Workbench award with this snapshot of five boats. All of them were built from plans in HOW TO BUILD 20 BOATS, Nos. 4 and 5. The boat at the extreme right is "Scram III," the next three boats are reproductions of "Little Giant," the nearest one having a pointed bow (a modification). The kayak at the extreme left of the picture was made from plans in HOW TO BUILD 20 BOATS No. 4. Blueprints are available for all these boats from Fawcett Publications, Inc., Greenwich, Conn. "Scram III" blueprints cost \$1.50 and are listed as blueprint No. 936. "Little Giant" is No. 910, and costs \$1.50 also. The kayak blueprint costs only .50, and is listed as No. 915.



The postman who takes walks on his day off can shake hands with Harry Cockley, of Scotland, Pa. Harry is an automobile mechanic, and in his spare time he builds model cars! Here is his version of "Spitfire," which is described in MODEL BUILDER'S HANDBOOK. He put in a special carburetor and says that as a result the midget has been clocked at 50 m.p.h.! Harry wins a Workbench award of \$3.00, which should keep "Spitfire" running for quite a while.

the country grocer, if you don't see what you want, write for it!

\* \* \*

**W**E HOPE you've already started to work on your word games for the big MI contest! It's never too early to begin, you know, and if you've got your eye on that Taylorcraft plane, or that Indian motorcycle, you'll want all the time you can get to complete your games so as to get the highest possible score. One thing some of you folks seem to be ignoring is the rule against entering into correspondence with us regarding this contest. We feel certain that you will believe and understand us when we say that this contest involves so much extra work for the members of our staff that, to take time out to answer your kind letters—even when you enclose postage—would be a physical impossibility. We just *can't* do it! So don't feel hurt if you've written to us to ask a question regarding the contest and haven't received an answer. You just do anything you want to do that the rules don't prohibit. But *read the rules carefully!* Remember!—an inaccurate entry is worse than no entry at all.

\* \* \*

**Y**OU chaps who are always writing to tell us the latest bright ideas you've picked up while working around your lathe or drill press, are urged to give a thought to the Revere Award, which is announced in this issue by Revere Copper & Brass Inc. To cooperate with agencies furthering national defense, the Revere company has set up

[Continued on page 14]



# NEW GLUE DISCOVERY

brings modern resin-bonding  
to your workshop!

**THE** biggest news in glue since Casco Powdered Casein! *Cascamite* brings you as great an advancement over casein glues as Casco brought you over all other glues 10 years ago! Look at *Cascamite's* advantages:

**EASY TO MIX**—*Cascamite* dissolves almost immediately in cold water. No waiting, no heating. Easier, simpler than mixing Casein.

**STRONG**—Shear tests on hardwood prove *Cascamite* is stronger than the wood, even after prolonged water soaking.

**WATERPROOF**—*Cascamite* is completely waterproof. Safe for boats, all outdoor construction.

**DURABLE**—*Cascamite* joints are inert, unaffected by mold. Makes joints that withstand any climate.

**STAINFREE**—*Cascamite* is non-alkaline, won't discolor the thinnest of veneers. Won't stain oak, mahogany, etc.

**ADAPTABLE**—For veneering and indoor work, *Cascamite* can be extended with ordinary household flour to make strong water-resistant joints at low cost.

**ECONOMICAL**—*Cascamite* costs more than casein *per pound*, but it is spread *thinner*. When extended with flour, *Cascamite* costs no more than casein.

*Cascamite* is *reliable*. It is made by Casco, manufacturers of industrial glue for over 30 years . . . makers of Casco Powdered Casein Glue . . . America's pioneer in development and manufacture of synthetic resin glue. *Cascamite* is sold by all leading Hardware, Paint, Lumber Dealers. 25¢, 50¢ and 85¢.

## CASCAMITE POWDERED SYNTHETIC RESIN

TEST IT YOURSELF  
SEND 10c FOR  
GENEROUS TRIAL CAN  
AND BOOKLET

CASEIN COMPANY OF AMERICA, Dept. MI 341  
350 Madison Ave., New York, N. Y.

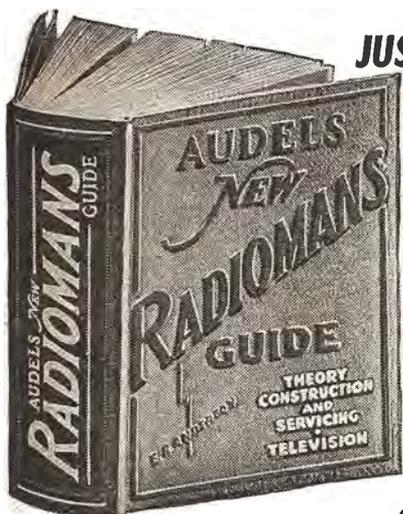
Here's my 10¢. Send me trial can and booklet, "*Mighty Facts on Cascamite*."

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

My Hardware Dealer's Name and Address \_\_\_\_\_



**JUST OUT!**

EVERY  
RADIO  
MECHANIC  
—Service Man  
and Student  
Needs "Audels  
Radiomans  
Guide"  
Just Out!  
The whole sub-  
ject of Modern  
Radio  
Covering the  
Basic Principles — Con-  
struction and  
Operation —  
Service —  
Repairs —  
Troubles —  
All Easily  
Understood  
Over 750 Pages.

400 illustrations, Parts and Diagrams —  
LATE TELEVISION DATA —  
Valuable for  
REFERENCE AND HOME STUDY

**RADIO**

**\$4** To get this practical information in handy form for yourself just fill in and mail coupon today.  
**COMPLETE • PAY ONLY \$1 A MONTH!** ←

THEO. AUDEL & CO., Publishers, 49 W. 23rd STREET, N. Y.  
Mail AUDELS NEW RADIO MANS GUIDE for free examination. If O. K. I will send you \$1 in 7 days; then remit \$1 monthly until price of \$4 is paid. Otherwise, I will return it.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
Occupation \_\_\_\_\_  
Reference \_\_\_\_\_ MM

**Learn AUTO-DIESELS**

Practical, tested training. Backed by 35 years experience. Course includes Auto Mechanics, Diesel Service and Operation, Diesel Power Generation, Machine Shop Practice, Auto Electric, etc. Flexible plan to meet specific needs of those with or without jobs. Oldest, largest trade school in West qualifies you and helps you get a good pay job. Transportation allowed to L.A. Earn room and board while learning. Request Free Catalog.

**National Schools** Dept. 3-MMA  
LOS ANGELES

**LEARN MONEY-MAKING-CARTOONING**

By easy Picture Chart Method. Teaches originality—the big need today. Former students include creators of "Terry & Pirates," "Out Our Way," "Winnie Winkle," etc. Don't wonder whether you have talent—rush name, address and dime RIGHT NOW for: Sample Chart to test your ability, and examples of work of former students earning \$50-\$300. per week. Please state age.



**THE LANDON SCHOOL**  
195-M National Bldg. Cleveland, O.



**High School at Home**

**Many Finish in 2 Years**

Business, industry, social contacts all demand high school GRADUATION. Finish NOW. Go as rapidly as your time and abilities permit. Equivalent to resident school work—prepares for entrance to college. Standard textbooks supplied. Diplomas awarded. Credit for high school subjects already completed. Single subjects if desired. Free Bulletin on request. Write TODAY. No obligation.

**American School, Dept. H328, Drexel at 58th, Chicago**

**Editor's Workbench Chips**

[Continued from page 12]

nine cash prizes, totalling \$10,000, which will be given wage earners in the metal and metal-working industries, as well as machine maintenance men, who have ideas or inventions calculated to speed up defense. The deadline is April 30, and if you think you've got some worth-while thoughts on this defense question, we can't urge you too strongly to get in touch with The Revere Award Committee, in Washington, and get one of the entry blanks. After all, you know, \$10,000 is \$10,000!

\* \* \*

**WE HAD** one pretty stern note this past month from a reader up in Canada who thinks we are unpatriotic. The basis of the complainant's case was that we had criticized the British Navy because it had showed a lack of efficiency in allowing a German submarine to slip into Scapa Flow and take a shot at a couple of Men-Of-War.

**BECAUSE** we know MI readers are a pretty intelligent lot, generally speaking, we don't think it's necessary to tell you here that the new edition of **HOW TO BUILD 20 BOATS** is now on the stands. But, since we're always getting new readers (applause!), we'd like to remind the newcomers that this gigantic book can be bought at every good newsstand in the country. It has the complete plans for building every kind of boat from a rowboat to a cruiser, and is pretty widely accepted as the most popular boating authority published. So, in case your newsstand hasn't got this amazing book, shoot us fifty cents and we'll see that you get one.

Well, now, in the first place, we weren't a bit unpatriotic. At the time that piece was written, the United States was simply an interested observer of a foreign war, and we were squatting in our editorial chair watching the combat as though it were a naval engagement between parties "A"

[Continued on page 19]



Paul Swanson, of Robbinsdale, Minnesota, built this powerful looking little steam engine. He began work on it at 16 years of age and has used his spare time to complete it over a period of years. It weighs about 250 pounds and carries a steam pressure of 50 pounds. On level ground it can haul loads up to 200 pounds, according to its builder. Four feet long overall, it seems well able to pull the wagon and its passenger in the picture. Mr. Swanson wins a \$3.00 Workbench award for this snapshot.

# INVENTORS

*Learn How To*

## PROTECT and SELL YOUR INVENTION

GET NEW  
FREE  
INVENTION  
RECORD

### Newest FREE Patent Book Now Ready

It's fresh from the press—this NEW FREE BOOK—packed and jammed with latest facts about patents, inventions and the modern inventive market . . . newly written, newly published and copyrighted, disclosing the latest developments in modern patent practice. Learn about today's demand for inventions, how modern inventions are sold, how your patent protects you, facts about royalties and the modern method of merchandising new devices, etc. Book contains latest information on patents every inventor should have.

### Request your FREE COPY NOW

The demand for this new free book is so great that our first printing is going fast. Send us your request today and we will arrange to mail you copy of book "How to Protect Your Invention" at once. Take no action about your invention until you receive and read this new book; but act at once in filling out the coupon below and mailing it to us for your FREE copy.

### TAKE FIRST STEP

By all means make an accurate, dated record of your invention on the "Invention Record" form you receive with our FREE BOOK and mail it to us immediately. This form, sent free, will enable you to establish the date of your invention should need for this evidence arise. This step costs you absolutely nothing, yet it may be vital to your success.

### OUR SERVICES TO YOU

As Registered Patent Attorneys before U. S. Patent Office, we are especially equipped by training to handle your patent case with skill, thoroughness, competence and promptness. We are located right here in Washington—we make personal calls at the Patent Office, and we give personal attention to your individual case. Send coupon at once requesting our BOOK and INVENTION RECORD form—both free—know how the Patent Laws protect you, and what steps to take to secure patent protection and sell your invention.

### INVENTIONS FOR DEFENSE

**RUSH** Your Army, Navy or Aviation Invention to us for special precautionary advice and aid. Write McMORROW & BERMAN, 139-G Barrister Bldg., Washington, D. C.

## McMORROW & BERMAN

REGISTERED PATENT ATTORNEYS BEFORE U. S. PATENT OFFICE



139-G Barrister Building  
Washington, D. C.

Send me your NEW FREE Book and specially prepared "Invention Record" form at once. I understand that this request does not obligate me.

Name .....

Address .....

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

(Write or Print Name Clearly)

# ELECTRICAL BOOKS

shipped  
**FREE**

FOR EXAMINATION  
**MODERN  
ELECTRICITY  
INCLUDING RADIO  
AND TELEVISION**

**10  
BIG BOOKS**

Here's great news for anybody interested in Electricity. NEW 17th. edition of Applied Electricity brought right down to date with NEW Electrical subjects fully covered. 10 big Volumes and all shipped FREE for examination.

**For --  
Beginners  
and Experts**

over 3000 pages—hundreds of illustrations—the most complete work of its kind we have ever published. Dynamos, motors, power stations, Radios, television, every thing electrical explained so anyone can understand it.

**BIG FIELD! Big Demand!  
Big Pay!**

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

**SEND NOW** [ A year's consulting privileges with our engineers now given to all buyers of this famous Cyclopedia of Electricity. ]

**AMERICAN TECHNICAL SOCIETY**  
(Publishers—Home Study Courses)

American Technical Society, Dept. E3320, Drexel at 58th St., Chicago Send for 10 days' free use, NEW 10 volume set of Applied Electricity. You also agree to send me a certificate entitling me to consulting privileges for one year. I will pay the delivery charges only on the books. If I wish I may return them in 10 days and owe you nothing, but if I keep them I will send \$2.00 after 10 days, then \$3.00 a month until the total price of only \$29.80 is paid.

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_  
Please attach letter stating age, occupation and name and address of employer and give at least one business man as reference.

**ARE YOU A GOOD CRAFTSMAN?**  
Cash in on your ability by selling what you make. See ads in **MONEYMAKERS & MONEYSAVERS** (pages 27-32).

## DOWN TO EARTH

On **GOODYEAR** **PRICES**  
**FIRESTONE-GOODRICH**  
and Other Standard Makes

Only our 25 years' experience, big buying power and volume production make it possible to offer these amazing tire values. Think of it, Standard Brand reconditioned tires, serviceably repaired by experts with high-grade materials at a fraction of original cost. Order now. Enjoy the tremendous savings our cut prices make possible.

**\$1.85**  
28-4.75-19

| BALLOON TIRES |               | TRUCK BALLONS |               |
|---------------|---------------|---------------|---------------|
| Size          | Tires Tubes   | Size          | Tires Tubes   |
| 29x4-40-21    | \$1.85 \$0.86 | 6.00-20       | \$3.10 \$1.66 |
| 29x4-50-20    | 1.85 .82      | 6.50-20       | 3.35 1.96     |
| 30x4-50-21    | 1.95 .88      | 7.00-20       | 4.10 2.86     |
| 29x4-75-19    | 1.95 .96      | 7.50-20       | 5.15 3.75     |
| 29x4-75-20    | 2.10 .99      | 8.26-20       | 6.75 4.96     |
| 29x5-50-19    | 2.10 1.08     |               |               |
| 30x5-50-20    | 2.40 1.05     |               |               |
| 5-25-17       | 2.45 1.15     |               |               |
| 29x5-25-18    | 2.45 1.15     |               |               |
| 29x5-35-19    | 2.45 1.15     |               |               |
| 30x5-25-20    | 2.50 1.15     |               |               |
| 31x5-25-21    | 2.90 1.35     |               |               |
| 5-50-17       | 3.20 1.35     |               |               |
| 28x5-50-18    | 2.75 1.15     |               |               |
| 29x5-50-18    | 3.75 1.15     |               |               |
| 6-00-16       | 3.15 1.40     |               |               |
| 6-00-17       | 2.85 1.16     |               |               |
| 30x6-00-18    | 2.85 1.16     |               |               |
| 31x6-00-19    | 2.85 1.16     |               |               |
| 32x6-00-20    | 2.95 1.26     |               |               |
| 33x6-00-21    | 3.10 1.38     |               |               |
| 32x6-50-20    |               |               |               |

**HEAVY DUTY TRUCK TIRES**  
Size Tires Tubes  
30x6 \$3.50 \$1.95  
32x6 3.25 2.75  
34x6 3.95 3.25  
36x6 4.95 3.95  
38x6 5.95 3.95  
40x6 6.95 4.15

**EVERY TIRE GUARANTEED**  
Our Guarantee Bond agrees to replace at 1/2 price tires failing to give full 9 months' service. Replacements 2-2-2, Chicago.

**ALL OTHER SIZES DEALERS WANTED**  
Don't Delay—Order Today

**SEND ONLY \$1.00 DEPOSIT** on each tire ordered. (\$3.00 on each Truck Tire.) We ship balance C. O. D. Deduct 5 per cent if cash is sent in full with order. To fill order promptly we may substitute brands if necessary. ALL TUBES BRAND NEW—GUARANTEED—

**PERRY-FIELD TIRE & RUBBER CO.**  
2328-30 S. Michigan Ave., Dept. 6309, Chicago

## MAKE BIG MONEY at HOME!

NEW INVENTION  
**Electroplates by Brush**



New, patented invention makes possible big earnings AT HOME. Replate auto-parts—worn articles in homes, stores, hotels, restaurants, etc., with durable, sparking, new coat of metal—with stroke of brush. Easy, simple, quick. Genuine Gold, Silver, Nickel, Cadmium, etc. Everything furnished. Outfit complete, ready for use. No shop required. Clear from \$2 to \$5 an hour in lifetime business. Small investment starts you in business. Steady repeat. Machine can pay for itself in week. Send TODAY for FREE SAMPLE and illustrated BOOKLET how you can have a life income from a business of YOUR OWN built upon satisfied customers. Act at once!

**FREE SAMPLE and BOOKLET EXPLAINS ALL**

**WARNER ELECTRIC COMPANY**  
225 N. Wabash Ave., Chicago, Ill., Dept. 12-F

## RUPTURED?

Get Relief This Proven Way

Why try to worry along with trusses that gouge your flesh—press heavily on hips and spine—enlarge opening—fail to hold rupture? You need the Cluthe. No leg-straps or cutting belts. Automatic adjustable pad holds at real opening—follows every body movement with instant increased support in case of strain. Cannot slip whether at work or play. Light. Waterproof. Can be worn in bath. Send for amazing FREE book, "Advice To Ruptured" and details of liberal truthful 60-day trial offer. Also endorsements from grateful users in your neighborhood. Write:

**CLUTHE SONS, Dept. 42, Bloomfield, New Jersey.**

## LEARN to PLAY BY EAR



Here is a wonderful NEW way to learn to play the piano, without notes, in as little as 90 DAYS. Play swing or classical. **NEW SYSTEM** is easy. You don't have to practice scales, you don't have to study for years. Young or old have equal opportunities. Amaze your friends. Play for pleasure or for money. Cost is very low, payments small. Send for complete FREE details. No obligation. **WARWOOD SCHOOL OF MUSIC**  
Karl Ostrum, Pres., 30 East Adams St., Dept. 35, Chicago

## WORLD FAMOUS • STANDARD MAKE

# TYPEWRITERS

as Low as  
**\$29.90**

**10 DAY TRIAL**  
No Money Down

**EASY TERMS**  
as low as 60¢ a week



**YOUR CHOICE—UNDERWOODS! ROYALS! REMINGTONS! L. C. SMITHS! WOODS! ROCK!** As low as \$29.90—some as low as \$29.90. Genuine, standard, full sized rebuilt office models—up-to-date improvements—standard keyboard, back spacer, ribbon reverse, 2 color ribbon, etc. Never before such rock-bottom prices! FULLY GUARANTEED! Backed by 30 years of fair dealing. Ten day trial. Easiest terms in history—as low as 60¢ a week. FREE big price slashing catalog shows all makes in colors, details on 10-day trial and easiest terms. FREE Van Zandt Touch Typing course with your typewriter. See catalog before you buy. Mail coupon now while stock is complete.

**INTERNATIONAL TYPEWRITER EXCHANGE**  
231 W. Monroe St., Chicago, Ill. (Dept. 305)  
Send Free Catalog in colors showing late model standard Typewriters at tremendous savings with no money down and 10 days' trial.  
Name \_\_\_\_\_ Address \_\_\_\_\_  
Town \_\_\_\_\_ State \_\_\_\_\_

# \$148 My First Week



## ... Now in my OWN Business.

Would you like to own a business where it was possible to take in as much as \$148 the first week, as did L. A. Rowe in his new business?

We want more reputable, honest men. These men need not have any special experience or more than ordinary ability, but they must be honest and courteous.

To such a man we offer an opportunity to start in business for himself. If you are that man you can make far above average profits in the rug washing business—a high grade business all your own.

### NO SHOP NECESSARY

The rug washer cleans rugs like new on the customer's floor. Anyone can run it. Electricity does the work. A quick, thorough and highly efficient method that removes dirt and grime, thus bringing out the natural beauty of floor coverings.

There are hundreds of customers in your vicinity and nearby towns. The business should grow steadily. Simply wash a few rugs or carpets. These customers tell others as well as giving you their work in the future. Soon you should have a prosperous, money making business. Send coupon for booklet explaining everything.

### PROFITS ENOUGH TO PAY FOR HOME

Men take in \$100 to \$150 in a single week. R. E. Traynor took in \$56 in one day and nearly \$800 in one month. W. F. Drake took in \$186 in three days and \$152 one Saturday night and Sunday. You, too, should be able to enjoy a large income.

**VON SCHRADER MFG. CO., 203 PL., RACINE, WIS.**

*Free Book!*  
**MAIL COUPON now**

VON SCHRADER MFG. CO.,  
203 Pl., Racine, Wis.

Send at once (no obligation) your free booklet illustrating rug washer and telling how I can own my own permanent business; how I can earn large profits at prices below other methods; how I can become financially independent in a short time; and how I can pay on easy terms.

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



### "NEVER A COMPLAINT"

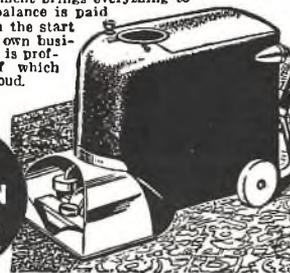
C. J. Wright wrote, "Did \$100 business in six weeks with never a complaint." That is the nicest part of this business. Customers are more than satisfied because of the fine cleaning job you do, and because you do the work right in the home, so they do not have to be without rugs and carpets.

### EVERY MACHINE GUARANTEED

You take no risk. These machines have been manufactured since 1918 and are used by the United States Government and by many of the world's largest hotels. They are fully guaranteed.

### EASY TERMS

The complete equipment is inexpensive. A reasonable down payment brings everything to you and the balance is paid monthly. From the start you have your own business—one that is profitable and of which you can be proud.



MAIL COUPON Today

## Big Money for Workers In Home or Shop



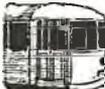
**MONEY-MAKING PROJECTS.** Color-glazed concrete lawn, cemetery pottery made without molds or cores. New, patented method. Use only sand, cement, cheap materials. Tiles, walls, gravestones. Statuary, giftware, Basement waterproofing. Booklet, colorplates, details 10c.

**NATIONAL POTTERIES COMPANY**  
Dept. 8, 11 W. 26th St., Minneapolis, Minn.

## BE A PASSENGER Traffic Inspector



LET US HELP YOU TO A GOOD JOB



Write for Free Booklet describing our 21 years' experience in securing good jobs for our graduates that pay up to \$135 per month, plus expenses, to start. Opportunities in Railway and Bus. Easy, home-study course will train you in a few months. **STANDARD BUSINESS TRAINING INSTITUTE**, Div. 6103, Buffalo, N. Y.



## NOW a DYNAMIC HEAVY DUTY INDUSTRIAL WELDER

Works off 110 volt electric light circuit. For this unheard of price you can get the marvelous Dynamic Super-Charged Welder complete—ready to plug in to light socket. The Dynamic does both metallic and carbon arc welding. You can also solder and braze on the lightest material.

for Only **\$195** RETAIL  
**EASY PAYMENTS**

**WORKS ON IRON, STEEL, TIN, BRASS, COPPER AND ALL OTHER METALS**

With our free instructions you can in no time do finished repair jobs. **BIG PAY IN BOOMING WELDING INDUSTRY** Once you have the Dynamic outfit, you are all set in this profitable field. In a year a Dynamic Welder costs you Less Than 6c a Day. Write for **FREE** particulars **TODAY**.

**DYNAMIC WELDER CO., 2226-PU Silverton Road, Chicago, Illinois**

**WELDS BUMPERS, FENDERS, CYLINDER BLOCKS, BODIES, FRAMES, ETC. Does Farm, Factory and Home Repairs**

Without previous welding experience you can make for yourself as much as \$5.00 on a repair job that can be done in less than one hour. Many welders make as much as \$15.00 to \$20.00 a day. The Dynamic Welder is light and easily portable.

### AGENTS WANTED!

Get our big profit plan and 10-day trial offer. Send for it **TODAY**.

# SPRAYBERRY RADIO TRAINING

## Includes FULL EQUIPMENT!



*Experience Easily Acquired at Home*

**Over 100 Experiments plus Many Other Special Features**  
 ... ALL Designed To Help You Make Fast Progress  
 SPRAYBERRY Training starts right at the beginning of Radio ... unfolds each subject in a simplified, logical, understandable style. You easily learn Television, Frequency Modulation, Signal Tracing, Mobile Radio (Auto-Tank), Aviation Radio, Electronics, Facsimile Radio, Radio Set Repair and Installation Work.

**TRAINING PREPARES YOU FOR A BUSINESS OF YOUR OWN**  
 ... OR GOOD RADIO JOBS AT EXCELLENT PAY  
 The great fascinating and progressive field of Radio offers many opportunities for the man who wants to get ahead. My Training is designed to give you quick access to these opportunities. SPRAYBERRY Methods are thorough and practical. Your Training will not interfere with your present work.

**NO PREVIOUS EXPERIENCE NEEDED**  
 It makes no difference what your education has been. I can fit you quickly for a good-paying Radio job. I make it easy for you to grasp Radio principles and remember them. Your success is my full responsibility.

**YOU GET PROFESSIONAL TEST EQUIPMENT PLUS EXPERIMENTAL OUTFITS**  
 ... Includes 146 RADIO PARTS (to build complete Receiver), RADIO TOOLS and a modern TESTER-ANALYZER. You also receive 8 BIG SHIPMENTS OF RADIO EQUIPMENT for conducting actual experiments with your own hands.

**EARN WHILE YOU LEARN**  
 MY BUSINESS BUILDERS show you how to put your equipment to actual use in handling money-making Radio Service Jobs shortly after you begin Training.  
**THE SPRAYBERRY COURSE IS SOLD UNDER MONEY-BACK AGREEMENT**



**RUSH COUPON for BIG FREE BOOK**

**SPRAYBERRY ACADEMY OF RADIO**  
 F. L. Sprayberry, President  
 1310-C University Place, N. W., Washington, D. C.  
 Please rush my FREE copy of "HOW TO MAKE MONEY IN RADIO".

Name \_\_\_\_\_ Age \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_  
 Mail to: *enclosure or paste coupon on front cover.*

# AUTO

**BOOKS SENT FREE**



### CAN YOU FIX IT?

These wonder books tell step by step HOW to take out "play" in differential—to kill the shimmy in steering—to put your finger on engine trouble and the expert way to FIX it.  
**6 BIG VOLUMES**  
 2500 pages, 2000 illustrations, wiring diagrams, etc., including Marine Engines, Aviation motors, Diesel engines, etc. De Luxe edition, gold-stamped flexible binding.

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

### GET A BETTER JOB

A better job—in the gigantic auto industry. BIGGER PAY—a chance to go into business for yourself and get a share of the profits, are waiting for any man who even half tries to improve himself. Learn auto engineering with these wonder books a new way—a quick reference method. Simply use the INDEX to look up the answer to any auto problem. Built by eleven of America's great automobile engineers, and written in simple language so you can understand it.

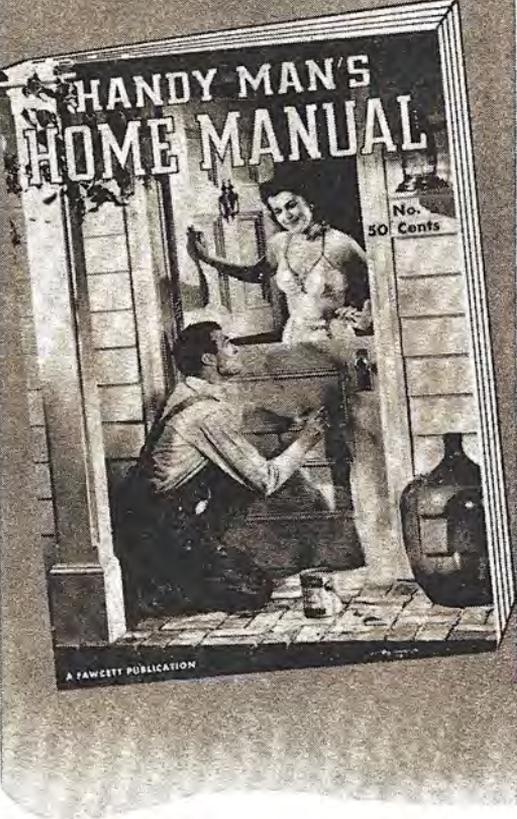
**[ A year's consulting privileges with our engineers now given with these books without extra charge. ]**

Send promptly and we will include a New EXTRA volume with over 300 pages including late cars with wiring diagrams and data sheets on each.

**AMERICAN TECHNICAL SOCIETY (Publishers—Home Study Courses),**  
 Drexel Ave. & 58th St., Dept. A3320, Chicago, Illinois  
 I would like to see the 6-volume edition of your AUTO BOOKS. I will pay the 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 \$24.00 is paid. Please include consulting service and extra Volume No. 7, as per your offer above.

Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_  
 Please attach letter stating age, occupation and name and address of employer and that of at least one business man as reference.

# Save money — FIX IT Yourself!



**D**ON'T rush for the phone if a fuse blows out in the cellar, or your wife wants a new set of shelves in the kitchen! You can fix it yourself, have a lot of fun doing so, and save money in the bargain.

The big new edition of **HANDY MAN'S HOME MANUAL**, just out, shows you a thousand and one easy ways to improve your home and keep it in good repair. Its 146 profusely illustrated pages are packed with valuable ideas, suggestions and short-cuts for the home owner or renter. Also many practical workshop projects.

You will save the 50-cent price of this valuable book many times over in a short time. Use the coupon below.

**Canadian Orders Not Accepted**  
**CUT OUT AND MAIL TODAY!**

**FAWCETT PUBLICATIONS, INC.** MI-3  
 Greenwich, Conn.  
 Enclosed find 50 cents in money order, check or stamps. Please send me, postpaid, a copy of the new **HANDY MAN'S HOME MANUAL (No. 5)**.  
 Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_

# Editor's Workbench Chips

[Continued from page 14]

and "B." It was our contention that, in this particular case, "A," meaning Great Britain, had been lax, and that "B," meaning Germany, had scored a *touche*. We still think that was the case.

Since then, of course, the United States definitely has taken its official stand on the side of the British and, in the opinion of this department, that's just fine. We are sure that our Canadian friends will believe us when we say that Uncle Sam plans to do everything in his power to help defeat the Nazis, and we are with Great Britain every inch of the way. As a matter of fact, two members of the staff of MI are now in the armed forces, one of them a captain in the United States Army, and the other in Canada, training fliers for the Royal Air Force.

But we must urge our readers to be indulgent with us and remember that, as this is written, the United States still occupies the role of a neutral and is not at war with anybody. And, since this is the case, we still must look upon all military engagements as battles between "A" and "B." And patriotism—for us of the MI editorial staff, at least—still consists of loyalty, first and foremost, to the government of the United States.

\* \* \*

**T**HE "little man who wasn't there" apparently has nothing on the astronomers—they've discovered a little star that wasn't there. A certain Dr. Strand, of Swarthmore College, has announced the discovery of a new star without ever having seen it. It was this way: Dr. Strand photographed the well-known double star, Zeta Aquarii, whose two parts revolve around each other once in every 400 years. But, in looking over his photos, the professor found that the movement of these two

[Continued on page 21]



This unusual 1/32 scale model of an oil well represents almost a year of spare time work by Richard Baker, Amity, Pa. He used a variety of materials: balsa wood, pins, small nails, bamboo strips, shoestrings, radio wire, etc. The rig stands thirty-four inches high and about three feet wide and is faithful in all details because the builder once worked in the oil fields and had a chance to familiarize himself with the intricate machinery. He wins a \$3.00 Workbench prize for this contribution.

# NOW Get into Drafting

is the time to



## The Doorway To the Best Positions NOW and LATER

Practical training in Drafting and Designing is valuable for present industrial expansion, offers most splendid opportunities for the Future AFTER-WAR recovery. Drafting and Industrial Design are basic parts of every BIG BUSINESS—Aviation, Automotive, Electricity, Transportation, Machinery, Building Construction, and many others, and offer a dependable future to the thinking fellow anxious to succeed. Don't miss this big opportunity; now is the time to prepare, to be ready for the Big Prosperity ahead of us.

## Be A Draftsman - Designer Learn from an Engineer— AT HOME



Get into BIG PAY mechanized Defense Industries through DRAFTING AND DESIGN. Get started right NOW, and keep on advancing. Let me train you quickly and easily the right way at your home as an Expert Draftsman in your spare time. Learn on practical work until you are experienced and in a good pay position at a straight salary. You don't need any previous experience—and lack of higher education need be no drawback. You can learn from an Engineer all you require.

## All Working Tools Furnished

Mail the coupon below today for full information on Drafting and Industrial Design details of my practical Training, the kind that gives you Actual Working Experience as demanded by employers, and enables you to earn a first-class salary with regular advancements. Professional Drawing Instruments, with all working tools, also drawing table furnished AT NO EXTRA COST.

## SEND FOR FULL DETAILS

ENGINEER DOBE, Div. 4743, Libertyville, Illinois.

Send me full information on Drafting and Industrial Design and how you assist your graduates to good positions in these lines.

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

Address .....

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



## MACHINE SHOP MEN

Learn to set up and run ANY kind of machine; MAKE MORE MONEY NOW by learning quickly HOW TO DO THINGS which usually take years of study and practice. The demand for SKILLED men is ALREADY ahead of the supply, then what WILL IT BE a month or two from now?

# Needed NOW!

**Bigger Pay** Don't miss this chance to qualify for promotion, don't miss this Big Opportunity which is yours almost for the asking. Eight Big Books chockful of important mechanical facts told simply and clearly. Over 3000 pages, nearly 3000 illustrations cover every subject fully, including Tool Making, Pattern Making, Foundry Work, Mechanical Drawing, Forging, Machine Shop Practice and Management, and hundreds of other subjects.

**8 Big Books (Up-to-date Edition) Sent FREE** to you for examination. With them we send a Big Binder of nearly 500 pages with 267 original shop tickets with 1200 illustrations. These show, step by step, how to set up and run almost any kind of job and are in addition to the 8 books. Decide in your own home or place of business whether or not you want to keep them, check up on any facts you want to. Note their great MONEY MAKING value, then, if you want them, pay on the easiest kind of payments. A year's consulting privileges with our engineers now given with these books without extra charge.

American Technical Society, Publishers—Home Study Courses.  
American Technical Society, Dept. 53220 Drexel at 58th St., Chicago.

You may send me the 8 big books and binder of shop tickets for free examination. I will pay the delivery charges only, unless I decide to keep them in which case I will send \$2.00 in ten days and \$3.00 per month until the total price of only \$34.80 is paid. If I return them in 10 days I will owe you nothing. You also agree to send me a certificate entitling me to consulting privileges with your experts for one year without extra charge.

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

## INVENTORS Get PATENT FACTS

Free Books Answer Questions—  
Tell How to Get Protection

Your ideas may be worth money! Get facts first and save time and money. Competent advice on patent procedure is essential to good results. Our 66 years' experience enables us to explain everything you need to know about protecting and commercializing your idea. Prompt, confidential service and results. Mail coupon today for free patent books and Special "Certification of Invention" form for your first important step.



**C. A. SNOW & CO.**  
Patent Attorneys Since 1875  
313 SNOW BLDG., WASH., D. C.  
Please send me the free books illustrated without cost or obligation.

Name \_\_\_\_\_  
Address \_\_\_\_\_

Mail Now  
for Free Books

## TOOL & DIE MAKERS

### Machinists, Screw Machine Men

**EARN BIG PAY** Skilled metal workers earn up to \$50-\$60 a week. Learn these trades by actual work in ALLIED SHOPS. Fully equipped. State Approved. Low Fee. Enter any time. Day and Evening classes. FREE Employment Service. Write for NEW illustrated Catalog.

**ALLIED SCREW MACHINE CO., (School Division)**  
Dept. M 609 W. Lake Street, Chicago, Illinois

# Easier THAN EVER

**To Master, this New 1941 P-A 21 Major Improvements**

\*Just touch a key and blow normally; you can't miss. So easy, and such beautiful tone. Nothing to compare with these new P-A Saxes, Clarinets, Trumpets, and other P-A instruments. Fully guaranteed; your success assured. See your music dealer or write direct for beautiful **FREE BOOK**. No obligation. Easy terms. Greatest fun, easiest with P-A.

**PAN-AMERICAN** 1420  
336 P-A Bldg. Elkhart, Ind.

**Have You Tried a P-A in the Last 30 Days?**

## HAVE YOU SOME SPARE ROOM

a basement or garage where you can do light work? We can offer you a profitable proposition, casting 5 and 10c Novelties, Ashtrays, Toy Autos, etc., for firm of many years standing. No experience necessary as we furnish full instructions with moulds. If interested in devoting spare or full time to profitable work write AT ONCE stating age and space available as we are now closing arrangements for 1941 supply of our goods.

**METAL CAST PRODUCTS CO.** Dept. 2  
1696 Boston Road New York, N. Y.

## BECOME AN EXPERT ACCOUNTANT

Executive Accountants and C. P. A.'s earn \$2,000 to \$10,000 a year. Thousands of firms need them. About 20,000 Certified Public Accountants in the U. S. We train you thoroughly at home in spare time for C. P. A. examinations or executive accounting positions. Previous experience unnecessary. Personal training under supervision of staff of C. P. A.'s, including members of the American Institute of Accountants. Write for free book, "Accountancy, the Profession that Pays."

**LaSalle Extension University, 3493-M, Chicago**  
A Correspondence Institution

## AVIATION APPRENTICES

ARMINGED YOUNG MEN INTERESTED IN TECHNICAL TRAINING FOR ENTERING THE WELL PAID FIELD OF AVIATION AS APPRENTICES—Write immediately, enclosing stamp.

**MECHANIX UNIVERSAL AVIATION SERVICE COMPANY**  
Wayne County Airport, Box 857, Dept. A, Detroit, Mich.

## COIN CHECKS, MAGIC DICE, RAZOR BLADES, TRICK PLAYING CARDS, Etc.

Rush 3c postage stamp for sample layout. Low Wholesale prices to agents.

**DE-VERE NOVELTY CO., Dept. 49, Dayton, Ohio**

## Learn Scientific MOTHPROOFING and PEST CONTROL

### A Business of Your OWN!

Here's a real business! Make \$35 to \$60 weekly Tremendous field servicing Metals, Homes, Cafes, Stores, etc. for monthly fees. Operators of largest firm of its kind in the world teach you at home, spare time. Big opportunity. Invest/Getat Write at once today for big illustrated Free Book.

**MINIX INSTITUTE, 542 S. Broadway, Dept. 28, Los Angeles, Calif.**

# Editor's Workbench Chips

[Continued from page 19]

stars was not uniform but was affected by a regular fluctuation from the normal movement over a period of 25 years. He concluded that this fluctuation was due to a third "invisible member" which simply couldn't be caught by the camera but which was there just the same. We haven't checked our own photos lately, but we're going to do it tonight when we get home. And we're going to be particularly interested in the things the pictures don't show—maybe we've got something there.

\* \* \*

**T**HE search for fifth columnists continues apace, and not the least important agent in the ferreting out of these malefactors is the ultraviolet ray. With this invisible light, G-Men and the members of the Dies Committee have uncovered foreign espionage agents by the carload. But now, according to Prof. R. B. Harvey, of the University of Minnesota, the ultraviolet ray is going even farther in its search for saboteurs and is uncovering them in such out of the way places as potatoes. As Prof. Harvey sees it, ultraviolet is about the only means we have of discovering the presence of ring rot, the number one fifth columnist in the potato world. Potatoes, it seems, carry ring rot only through their seeds, but already they've carried the disease through some 37 states in the union, even though you could look at a barrel full of potatoes dying of ring rot and never know the enemy was within the gates.

[Continued on page 141]



Joe Chamberlain of Bryn Mawr Apts., Ada, Ohio, built this economical little midget motorcycle. Powered with a 1/2 horsepower engine that was purchased for only \$7.00, the tiny machine carries its rider from 100 to 125 miles on a single gallon of gas! "My wife and I both ride it when going on errands," says Mr. Chamberlain. An old bike frame costing \$2.00, and a pair of wheelbarrow wheels for \$4.00, comprise the other major parts of the machine. Joe had the local garage do what welding was necessary—the only tool he used himself, was an electric drill! This picture brings him a \$3.00 Workbench award.

# Will You Let Me PROVE I Can Make YOU a New Man?

LET ME START SHOWING RESULTS FOR YOU

What a difference!

"Have put 3 1/2 in. on chest."  
—F. S., New York

For quick results I recommend CHARLES ATLAS

"Recommend you for quick results!"  
—W. G., N. J.

GAINED 29 POUNDS

"Did weigh 141. Now 170."  
—T. K., N. Y.



## 7-DAY TRIAL OFFER

I could fill this whole magazine with enthusiastic reports from OTHERS. But what you want to know is—"What can Atlas do for ME?" Find out—at my risk! Just give me a 7-day trial. Just one week!—and even in that short time I'll start giving RESULTS. AND it will be the kind of RESULTS that you (and anyone else) can SEE, FEEL, MEASURE with a tape.

## FREE BOOK

I myself was once a 97-pound weakling—sickly, half-alive. Then I discovered "Dynamic Tension." And I won the title, "The World's Most Perfectly Developed Man!" "Dynamic Tension" has done so much for other fellows that I simply ask you to let me prove that it can make a new man of YOU—that it can start new inches of power pushing out your chest—build up your shoulders to champion huskiness—put new, hard, firm muscles on your biceps—make those stomach muscles of yours hard ridges! Why not risk a postage stamp? Mail coupon for my 48-page illustrated FREE BOOK AT ONCE! Address me personally: Charles Atlas, Dept. 6C, 115 East 23rd Street, New York, N. Y.

**CHARLES ATLAS, Dept. 6C,**  
115 East 23rd Street, New York, N. Y.

I want the proof that DYNAMIC TENSION will help make a new man of me—give me a healthy, husky body and big muscle development. Send me your free book, "Everlasting Health and Strength"—and full details of your 7-DAY TRIAL OFFER.

Name .....  
(Please print or write plainly)  
Address .....  
City..... State.....



# LEARN RADIO

SERVICING COURSE - 8 WEEKS  
OPERATING INCLUDES SERVICING - 5 MONTHS

H. C. Lewis

**I'LL FINANCE YOUR TRAINING**  
Mail coupon today for free book showing how you can learn Radio Operating, Servicing, Sound and Television in a few short weeks in Coyne Shops and also how you can pay tuition in easy monthly payments after graduation.

**LEARN BY DOING**  
On real Radio receiving and transmitting equipment at Coyne. Simple, easy method of practical shop training. You don't need previous experience. Preparation for Radio Operators' Government license Exam, and for good jobs in Broadcast, Police Radio, Aircraft Radio, Ships, Commercial Radio stations, or in service shops and radio factories. "Learn by doing", the quick, modern way, at Coyne Shops in Chicago.

**EARN WHILE LEARNING**  
Job Help After Graduation  
We assist you in getting part-time work to help pay living expenses and give you real employment service after you graduate.

H. C. LEWIS, Pres., COYNE RADIO SCHOOL,  
500 So. Paulina St., Dept. 31-1H, Chicago, Ill.

Please send me your free book and details of easy Pay-After-Graduation Plan.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_



SEND COUPON TODAY

## LEARN TO SHOOT STRAIGHT WITH BENJAMIN

MADE IN U.S.A.



**HARD ACCURATE SHOOTING WITH CHAMBERED AIR**

You can use new model BENJAMIN AIR RIFLES WITH LEVER HAND PUMP anywhere for practice firing or just plinking around the house or camping, fishing, hunting, etc., at lowest cost. Shooting force is adjustable with amazing Maximum power and accuracy—no recoil or forward lunge to disturb your aim. Bolt Action—Hammer Fire—Hair Trigger—Safety Lock—Hand Pump—Single Shot BB with 1 lb. shot \$8.50; Single Shot #1, .177 or .22 Rifled—with 500 pellets \$10.00; BB 26 Shot with 1 lb. shot \$10.00. Also a complete line of BENJAMIN GENUINE CHAMBERED AIR PISTOLS from dealer or factory. Write for full details and FREE TARGETS. BENJAMIN AIR RIFLE CO., 829 Marion St., St. Louis, Mo., U.S.A.



## AMAZING NEW ELECTRIC ARC WELDER

**RETAILS ONLY \$2.95 COMPLETE**  
FULLY GUARANTEED



Plugs Into Light Socket

Amazing new HANDI-WELD Electric Arc Welder operates from 110 volts A.C. or D.C. same as other arc welders; higher priced—generates tremendous heat to weld all kinds of metal. Not a toy welder that uses carbons, but actually uses standard coated rods—sizes 1/16" and 3/32". Generous supply furnished with welder. Guaranteed not to burn out. Repairs fenders, auto bodies, radiators, pro-hedge small castings and machinery parts. Take HANDI-WELD anywhere to job, operate from light socket. Sturdily built from finest materials to last years. Fully guaranteed by Big Manufacturer.

**SEND NO MONEY!** You'll find a thousand uses for the HANDI-WELD around your home, garage, work shop. Also by garages, factories, repair shops, mechanics, farmers, inventors, tin shops, plumbers, etc. Order HANDI-WELD now. Send no money. Complete with rods and goggles. Pay postman only \$2.95 plus few cents postage. If not delighted, return HANDI-WELD in 5 days from receipt and money paid for it will be refunded instantly. Rush your order now.

**KUMFY PRODUCTS INC.** Dept. P-209 Cincinnati, Ohio

# MAKE MONEY



**WITH NASH CUSTOM TAILORED CLOTHES**  
Be your own Sales Manager, take orders; earn money with this famous make of clothes. High quality men's tailoring at popular prices. Write in today. Territories open.

**THE A. NASH COMPANY**  
1905 ELM STREET • CINCINNATI, OHIO

## STUDY ENGINEERING AT HOME EARN A DEGREE AT HOME

From A Chartered Institution of Higher Learning Employers Demand Degree Men For Key Positions  
88 Degree Courses in Electrical, Civil, Mechanical, Drafting, Architectural, Automotive, Steam, Diesel, Aeronautical, Radio, Structural, Mining, Industrial Highway, Petroleum, Marine, Refrigeration, Air Conditioning, Chemical Engineering; Arts; Sciences; Philosophy; Education; Public Health; Medical Jurisprudence; Psychology; Sociology; Physics; Chemistry; Geology; Political Science; Theology; Law; Agriculture; Business Training; Accounting; Statistics. Founded 1908. **McKINLEY-ROOSEVELT**, 4610-D Sheridan Road, Chicago

## MONEY FOR MEN ALL FREE

THE PLASTEX Industry needs manufacturers on small scale and for big production of Lamp and Clock Stands, Art Goods and Novelties in Plastex and Marble imitation. Experience unnecessary. regular 10c store sellers. Rubber molds furnished for speed production. Small investment brings big returns. We are now placing big chain store orders with manufacturers. Ambitious men have chance for real prosperity. Our free booklet will interest and benefit you.  
**PLASTEX INDUSTRIES**  
Dept. 3, 1085 Washington Ave., New York, N. Y.

## Send for my 50c book how to develop STRONG ARMS and BROAD SHOULDERS

with 20 pages of illustrations, showing and fully describing exercises that will develop, and make you gain strength in your Shoulders, Arms, Wrists, Hands and Fingers. This is really a remarkable course of Physical Culture exercises without apparatus. Don't fail to send for it NOW. 25c coin or 30c U. S. Stamps.  
Prof. ANTHONY BARKER  
1235 Sixth Ave. Dept. A New York City

## CARTOON YOUR WAY TO SUCCESS!

**DON'T COPY — LEARN TO ORIGINATE!**  
RAYE BURNS will teach you HOW to CREATE ORIGINAL CARTOONS at home that you may SELL. Course contains 26 lessons and over 600 illustrations. All for only \$2.85  
Send name and address for free details.  
**RAYE BURNS SCHOOL, Studio F, Box 3583, Cleveland, Ohio**

## Learn To MOUNT BIRDS

**Tan SKINS, Make Up FURS**  
Be a Taxidermist. Double your hunting fun. We teach you at Home. Mount Birds, Animals, Pets, Heads and Fish. Save your hunting trophies; decorate home and den. **MAKE MONEY**. Mount and Krome-in for others. **FREE** sparetime profits. **INVEST TODAY**. Big spectacle profits. **INVEST TODAY**. Free BOOK with 100 game pictures. 48 pages. **FREE BOOK** for Hunters, get yours! It's Now Free. Send postal card and over 600 illustrations. All for only \$2.85.  
**NORTHWESTERN SCHOOL OF TAXIDERMY**; Dept. 2863, Omaha, Nebr.



Train for a beginning position in 8 to 10 months—detailer's position (\$130-\$225 a month) in 14 to 18 months.



# Draftsmen

## Needed in All Lines

Architectural • Automotive • Aviation Diesel • Electrical • Structural • Mechanical

The Draftsman is the connecting link between the Mechanic and Engineer—earns exceptionally good pay—enjoys wonderful opportunities for promotion. Steady work because everything built or made starts with drawings.

**Employment Service FREE to Students**  
Learn quickly at home in spare time. No experience or artistic talent needed.

School established 1897. Low tuition. Monthly payments. Write TODAY for FREE Bulletin and facts about Selective Employment Service. No obligation. Address

American School, Dept. DD328, Drexel Ave. at 58th St., Chicago, Ill.



## MAKE MONEY AT HOME

### RUBBER MOLDS

Low as 6¢ EA.



Amazing rubber mold-making outfit makes perfect flexible molds or plaques, ash trays, book-ends, etc. Molds cost from 6c to 25c each. Each mold makes hundreds of novelties and gifts to sell up to \$1.00 apiece! No experience necessary. Quick and easy. Start profitable business in your home... sell to stores, gift shops, friends, resorts, road stands, by mail. Full or spare time. "Molders Handy Book," and list of buyers FREE. Write SO-LO WORKS, Dept. T-834, Cincinnati, Ohio.



## NEW BRUSH PLATING OUTFIT For AUTO PARTS

Connects to a battery with no tanks necessary. Plates on iron, steel, brass, copper, etc. Almost as simple as painting. Hundreds of car owners waiting for this low-cost plating. Improves appearance and value of the car.

Your opportunity to make good income plating auto parts, bathroom fixtures, reflectors, mirrors, etc.

### FREE PROOF

Write quick—big season here. Get FREE PROOF and particulars that put you in a paying business of your own.

### GUNMETAL COMPANY

AVENUE P, DECATUR, ILL.



## I LEARNED AVIATION AT LINCOLN

GOT A REAL JOB. I'M TH

mediately get in touch with more men interested in preparing NOW for good pay positions as Air Line Mechanics, Aeronautical Engineers, Commercial Pilots and Airplane Factory Mechanics.

### AIR LINE MAINTENANCE

Lincoln's Government Approved Mechanics Training prepares you for your official Gov't. Rating as an Airplane and Engine Mechanic and immediate employment with Air Line or Airport operator.

### AERONAUTICAL ENGINEERING

Big demand for Engineers. Lincoln's 2 year course teaching airplane design and construction prepares for responsible, high-pay positions as Airplane Factory Engineer.

### COMMERCIAL PILOTING

Lincoln's Government Approved Flight Training prepares for BOTH a Commercial Pilot Rating and Flight Instructor Rating. High-pay jobs open to these Lincoln Graduates.

### START TRAINING NOW!

National Defense program calls for thousands more trained men. Train NOW at this Lincoln School. 21 years training and supplying men to leaders in AVIATION. MAIL COUPON TODAY for complete information.

Acty

LINCOLN AERONAUTICAL INSTITUTE  
LINCOLN AIRPLANE & FLYING SCHOOL  
533 Aircraft Building Lincoln, Nebraska

I'd like to get into Aviation and help my country prepare for National Defense. Rush information about Lincoln Training.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

## Get the THRILL of building it yourself



Get the THRILL of building it yourself! There's a lot of he-man thrill in a short-wave radio of your own. But the biggest thrill is putting this magic Voice-of-the-World together YOURSELF. Our new FREE radio catalog No. 82 features a wide selection of Build-it-Yourself kits and items designed to make that thrill come true. But that's not all. This big 196 page book also contains thousands of other items — tubes, accessories — everything you need in radio. And at real money-saving prices. Don't miss it!

### WORLD'S FINEST RADIO CATALOG FREE!

Why wait? Begin now to save on everything you need in radio. This catalog points the way. Mail the coupon for your FREE copy.

## Lafayette Radio

LAFAYETTE RADIO CORP.  
Dept. 22C1, 901 W. Jackson Blvd., Chicago, Ill.  
or -100 Sixth Ave., New York, N. Y.

NEW YORK, N. Y.  
100 Sixth Ave.  
CHICAGO, ILL.  
901 W. Jackson Blvd.  
ATLANTA, GA.  
265 Peachtree Street  
BOSTON, MASS.  
BRONX, N. Y.  
NEWARK, N. J.  
JAMAICA, L. I.

Please Rush FREE Catalog No. 82.

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_

# PLUMBERS & STEAM FITTERS

Audels Plumbers and Steamfitters Guides



**4 Vols. \$6**  
 A practical, illustrated, Reference Library and Study-Course for Master Plumbers, Journeymen and Apprentice Steamfitters, Gas Fitters and Helpers, Sheet Metal Workers, Draughtsmen, Master Builders, Engineers and all Building Trade Students. This valuable set of handy, pocket-size Guides explains in practical concrete language and well-done illustrations all the principles, advances and short cuts of the Plumbing and Heating trade—based on modern practice. Contains careful, detailed instructions how to figure and estimate various jobs. Use FREE COUPON below to examine, without obligation, this valuable work.

on how to figure and estimate various jobs. Use FREE COUPON below to examine, without obligation, this valuable work.

### INSIDE TRADE INFORMATION ON:

Soldering, tinning, Joint wiping, bending, heating. Pipe—iron—steel, threading. Mathematics, tables, physics. Materials—iron, steel, copper, brass, lead, tin, antimony, etc. Sheet metal—galvanized—plate. Sanitation, siphonage, tanks, Drains, sewage, purification. Fixtures—bath—kitchen. Pipe fittings, soil pipe, tools. Laying out work. Rounding. Screwed fittings, flanges, joints. Pipe bending, examples. Elbows. Heating, ventilation, air conditioning, refrigeration. Water supply, mains, wells, tanks. Gas-fitting, methods. Brass, heating, lead burning. Welding, various welds, methods. Blacksmithing, forges, tools. Air Conditioning.

**THEO. AUDEL & CO., 49 W. 23rd St., New York City**  
 Mail Audels Plumbers 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: ..... MM



### LEARN TO SHOOT STRAIGHT WITH BENJAMIN

For Target—Small Game—Camping—Guaranteed—Accurate—Practical—Economical—Safe—Clean—Quiet. Adjustable Force—Amazing Maximum Velocity. No Smoke or Fumes. Bolt Action—Hammer Fire—Hair Trigger—Safety Lock—Hand Pump. Single Shot BB with 1 lb. shot \$8.50; Simple Shot cal. 177 or .22 rifed—with 500 pellets \$10.00; BB 8-shot with 1 lb. shot \$10.00; Holster \$2.00. Also a complete line of Benjamin Genuine Compressed Air Rifles for BB and cal. 177 or .22. No license required from dealer or factory. Write today for complete specifications and free targets. **BENJAMIN AIR RIFLE CO., 830 Marion St., St. Louis, Mo., U. S. A.**

## LEARN WELDING

Both Electric Arc and Acetylene by practical Shop-Plan method in a few short weeks. No text-books. You learn by doing. Finest equipment. Low tuition. Pay-After-Graduation-Plan. Also, courses in Auto Mechanics, Collision Work, Metal Finishing, etc. Illustrated literature free. Write today.

**MICHIGAN TRADE SCHOOL** FREE 32 PAGE CATALOG  
 3736 Woodward, Detroit, Mich.

### INDUSTRY NEEDS TRAINED MEN IN

# Electricity

Prepare at Bliss for a better place in vital industries and national defense. Learn fundamentals of theory and practice. Course complete in one school year. Students construct motors, install wiring, test electrical machinery. Experienced instructors. Modern shops and laboratories. Highly successful placement record. Bliss graduates are in demand. Comfortable living quarters. Spacious campus. 49th year begins Sept. 24. Ask for Free Vocational Chart, 293 Takoma Ave., Washington, D. C.

# BLISS ELECTRICAL SCHOOL

## A GOOD LIVING FROM POULTRY

with a business of your own. How to start small way, spare time, grow from profits, or prepare for good job in large poultry plant. Harry M. Lamont, nationally known Poultry Expert, shows latest scientific methods, money making secrets in poultry raising. His system of home study training used by thousands. Endorsed by many colleges and leading Poultrymen. Established 22 years. Write today for his big FREE BOOK "How To Raise Poultry For Profit". Shows way to real business opportunity.

Harry M. Lamont, Pres.  
**NATIONAL POULTRY INSTITUTE**  
 Dept. 57-U ADAMS CENTER, N.Y.

## GOLDENTONE... 50% OFF

**AGENTS WANTED**

Deal Direct—Factory Prices Over 60 models to choose from—4 to 12 tubes. Portables \$8.08 up. Farm sets \$9.95 up. Write today for \$8.98 up. Foreign band sets \$8.08 up. Samples 50% off. Quantity discounts. Free 1941 Bargain catalog gives details of 10 day FREE trial, agent's proposition and discounts. No obligation. Mail postcard to:

**GOLDENTONE RADIO CO., Dept. M1, Dearborn, Mich.**

## REAL JOBS OPEN! FOR TRAINED AUTO MECHANICS 8 WEEKS' SHOP COURSE!

**AUTO, DIESEL and AVIATION** Mechanics, welding, body & fender taught with real tools, on real equipment, in 2 biggest, best schools of their kind in the world. Step into Big Pay—\$37-\$60 a week. Low tuition cost! Pay for part of course later! **FREE BOOK!** Send for Big Free Opportunity book and new low rate—write nearest school **TODAY!**

**McSWEENEY SCHOOLS** Dept. Detroit, Mich. C-8 Kansas City, Mo.

## 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 SCHOOL OF PHOTOGRAPHY**  
 1315 Michigan Avenue, Dept. 2053, Chicago, Illinois

## 628 p. CATALOG—9000 NOVELTIES

Rush 3¢ for mammoth catalog of unusual novelties, 628 pages, 4000 illustrations, 9000 novelties. Roto section, 6-color cover. Radios, carded cameras, optical goods, puzzles, wigs, auto and bike accessories, live ants, watches, knives, rubber stamps, smoker's novelties, European novelties, articles from the Orient and Far East, occult and fortune telling articles, money making outfits, muscle developers, religious articles, symbolic jewelry, archery, fencing, stamps for collectors, projectors and films, etc., etc. (Cloth Bound Edition, 15¢)

**JOHNSON SMITH & CO., Dept. 123-B, Detroit, Mich.**

## MAN WANTED

**HANDLE ONE OF OUR BIG PAY ROUTES**  
 Sell To Stores On New Plan  
 Carry a complete "Wholesale Supply House" in your hand. Let us start you making Big Money in permanent business of your own. Show Storekeepers in every business how to **HOURLY** profits on Nationally Advertised Goods. Over 200 Products. No experience needed. We supply everything. Free Book gives amazing facts. **World's Products Co., Dept. 14-J, Spencer, Ind.**

### Operator No. 38

Secret Service Operator No. 38 is on the job! Running down dangerous Counterfeit Gang. Faint finger prints in murdered girl's room.

### Free

The Confidential Report Operator No. 38 made to his chief. Write for it.

Earn a Regular Monthly Salary  
 YOU can become a Finger Print Expert at home in your spare time, at small cost. Write for confidential full report and details. Literature will be sent only to persons stating their age.

**INSTITUTE OF APPLIED SCIENCES**  
 1920 Sunnyside Ave., Dept. 2353, Chicago, Ill.

# EASIEST

## OF INSTRUMENTS TO PLAY

... yet Richest in Opportunity  
Why be just one of the crowd? Enjoy the thrill of the spotlight, the praise of friends, the lifelong pleasure of creating your own music. It's easy with the Deagan Marimba, fastest-growing instrument in the music world today. The ideal home instrument—in demand at dances, clubs, radio stations, etc.—and yet easiest of all instruments to play. Models and terms to suit every budget. Convincing FACTS on request—write for them today!



J. C. DEAGAN Inc. DEPT. 5813, CHICAGO

# It's Easy SHAPE SHEET-PLASTIC

## SOFTEN · SHAPE · HARDEN

Make transparent or translucent globes, shades, lanterns, relief panels, modern glass brick designs, displays, raised letters, etc. I show you how to get depth and 3-dimension, educational exhibits, transparent organs, heart, brain, etc. Unlimited business or pleasure possibilities for the artisan or home craftsman. Plastic sheets are available in various sizes, thickness and color.



Send only \$1 for complete instructions, fully illustrated and experimental plastic sheets  
R. H. VAN MARGER, 55 WEST 42ND STREET, NEW YORK

# LEARN AVIATION

## IN LOS ANGELES Nation's Aviation Capital



Because of huge increases in Los Angeles aviation activity, we cannot supply the demand for graduates. Career training offered for Airline Piloting, Engineering, Mechanics, Drafting, Production Mechanics and Instruments. Low cost 4 to 24 months courses. One of America's most modern equipped and strategically located schools, fully approved by U.S. Gov't for Ground, Flight & Master Mech. trainings. Write for free new 64 pg. cat. Slide age.

**CALIFORNIA FLYERS**  
SCHOOL OF AERONAUTICS—Dept. MX-3  
LOS ANGELES MUNICIPAL AIRPORT · INGLEWOOD, CALIF.

# GET INTO THE BAKING BUSINESS!

National Baking Institute announces a new home study course in commercial baking. Baking now America's fifth industry in wages. Nearly a depression-proof business. Good field for ambitious men. Common school education sufficient. Send for free booklet "Opportunities in Commercial Baking" and requirements.



NATIONAL BAKING INSTITUTE  
1315 Michigan Ave., Dept. 2053, Chicago, U. S. A.

# Learn Profitable Profession in 90 days at Home



Earnings of Men and Women in the fascinating profession of Swedish Massage run as high as \$40 to \$70 per week but many prefer to open their own offices. Large incomes from Doctors, hospitals, sanitariums and private patients come to those who qualify through our training. Reducing alone offers rich rewards for specialists. Write for Anatomy Charts, and booklet — They're FREE.

THE College of Swedish Massage  
30 E. Adams St., Dept. 358, Chicago

# LES COURSES DE RADIO ET ELECTRICITE

## RADIO and ELECTRICAL ENGINEERING

**ELECTRICAL ENGINEERING** Get good grasp of wide electrical field. Prepare yourself, at Low Cost, for secure future. Modern course. So simplified anyone can understand quickly.  
**RADIO ENGINEERING** Extra fine course in radio, public address, photo-electric work. Trains you to be super-service man, real vacuum tube technician. Experimental kits furnished. Diploma given on completion. Tuition, ONLY \$25, either course. Deferred payment plan available.  
**FREE!** Send name quick for free copies of school catalogs, LINCOLN student magazines, complete details. SEND NOW.  
LINCOLN ENGINEERING SCHOOL, BOX 931-M27, Lincoln, Nebr.

SPECIAL Only \$25

# DRAFTING

**BOOKS SENT FREE!**  
ON APPROVAL  
5 VOLUMES — SECOND EDITION

## For Beginners or Experts

Written so you can understand every word, by well known engineers and architects. De Luxe flexible binding, nearly 2,000 pages, 1546 blueprints, charts and diagrams; prepares you for a good drafting job in mechanical or architectural lines. Sent for 10 days' free use if you mail coupon immediately.

Only 15 minutes a day with these WONDER BOOKS can prepare you for a good drafting job. Mechanical and architectural drafting from simple straight lines to important complex plans. A step at a time! Built especially for beginners, for men with only grammar schooling. Drafting room practice, PLUS ENGINEERING, made easy and clear. Includes complete information on blue print reading for building and machine trades.

**Big Field Big Demand Big Pay**  
Competent draftsmen are urgently needed in all building and manufacturing lines at \$30.00 to \$75.00 a week. That's just the beginning—FOR DRAFTSMEN HAVE GOD CHANCES FOR ADVANCEMENT! Pleasant, fascinating work, easy to learn and do. Learn quickly with these books—send coupon for a set and see for yourself.

## Slide Rule Included



[A year's consulting service now given to all buyers of this famous cyclopedia of drafting.]

We will include a brand new circular slide rule to carry in coat pocket. Invaluable in solving all kinds of engineering problems.

AMERICAN TECHNICAL SOCIETY  
Publishers—Home Study Courses.

American Technical Society, Dept. D3320 Drexel at 58th St., Chicago, Ill. Send for 10 days' trial, 5 volumes set of drafting, I will pay the delivery charges only. If I wish, I may return books in 10 days and owe you nothing, but if I decide to keep them, I will send \$2.00 after 10 days, then only \$3.00 a month until \$24.80, the total price is paid. Send latest edition and include slide rule and consulting Service Certificate.

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

**DO YOU WANT \$36.50 A WEEK?**

# U. S. Government Jobs

Many Appointments Every Year

Prepare Now for 1941 Examinations

32-Page Civil Service Book Free

Mail Coupon Today—SURE

**FRANKLIN INSTITUTE**  
Dept. N 255  
Rochester,  
New York

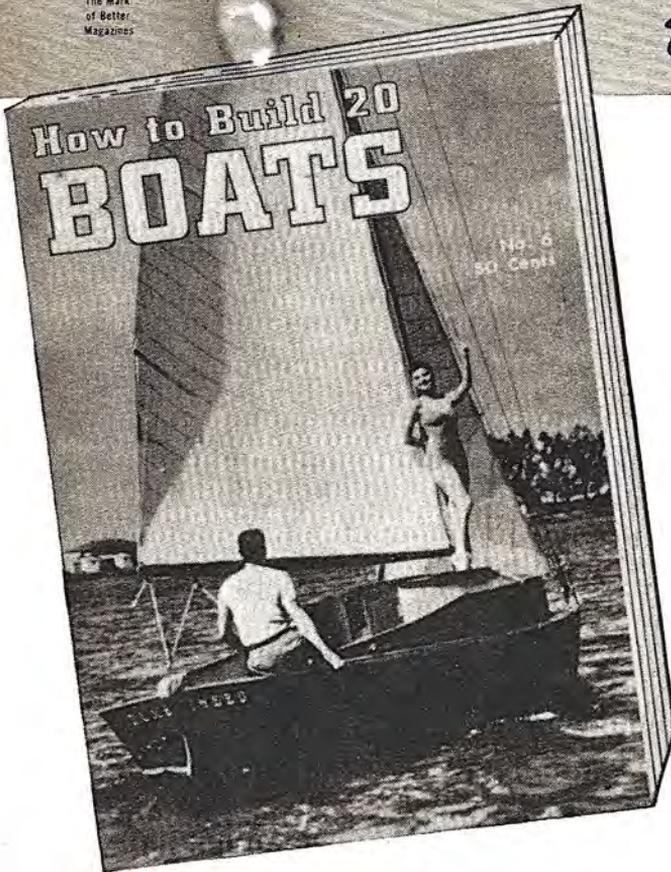
Gentlemen: Rush to me FREE of charge, list of U. S. Government big pay positions. Send me FREE 32-page book describing salaries, hours, work, vacation, and giving full particulars on how to qualify for examinations.

COUPON

Name \_\_\_\_\_  
Address \_\_\_\_\_

# The New How to Build 20 BOATS is out!

A FAWCETT PUBLICATION  
The Mark of Better Magazines



**H**ERE'S the book you boat fans have been waiting for! A brand new 146-page picture and plan-packed edition of the famous HOW TO BUILD 20 BOATS, published annually and priced at only 50 cents.

Twenty *completely new* designs for amateur boat builders and enthusiasts are presented. Many are the latest creations from the boards of well-known naval architects, and all have been thoroughly tested. A good many of these boats utilize the advantages of marine plywood construction, and all can be built by anyone able to follow clear cut plans and handle ordinary tools.

A great variety of craft are included, ranging in size and scope from an 8-foot pram to a 26-foot deluxe streamlined cruiser. Sailboats, power cruisers, dinghies, outboard boats, auxiliaries, and even a canoe and an iceboat—you will find them all in HOW TO BUILD 20 BOATS, No. 6. Plans are all detailed and easy to follow, and a list of materials covers every boat.

## PARTIAL LIST OF CONTENTS

**STORMY PETREL**—26' modern plywood motor cruiser, designed by Sam Rabl, N. A.

**DORETTE**—Seagoing 14' Grand Banks dory, for fishing or sailing.

**FLIGHT**—20' plywood cruiser for outboard power.

**SNUFFY**—Light weight 11' car top boat. V-bottom, plywood construction.

**COOT**—22' auxiliary cabin Sharpie. A famous Chesapeake Bay design.

**WHEELIE WILLIE**—Novel 8' pram that you can roll right up on shore.

HOW TO BUILD 20 BOATS, No. 6 goes on sale Jan. 8, 1941 at newsstands. Be sure to reserve your copy NOW, or use the coupon at the bottom of this page.

## CUT OUT AND MAIL TODAY!

|  |            |
|--|------------|
| Fawcett Publications, Inc.,<br>Greenwich, Conn.  | MI-3       |
| Please send me, post paid, a copy of the New 1941 HOW TO BUILD 20 BOATS. Enclosed find 50 cents in check, money order or stamps. Canadian Orders Not Accepted. |            |
| NAME .....   |            |
| ADDRESS .....  |            |
| CITY .....   | STATE..... |

# MONEYMAKERS

Classified

15¢ a Word

# MONEYSAVERS

## PROFITABLE SIDELINES • HOBBIES • SPECIAL BARGAIN BUYS

To get your share of the business from our MAY ISSUE, your ad with remittance must be in our office MARCH THE FIRST. Mail to MECHANIX ILLUSTRATED • 1501 Broadway • New York

### ADVERTISING AGENCIES

ADVERTISE: 23 WORDS, 149 Newspapers, \$6.50. Free Lists. Advertising Bureau, 4515-B Cottage Grove, Chicago.

### AGENTS WANTED

1,000 BARGAINS—LADIES' Aprons 9c, Hosiery 5c, Shirts 30c, Turkish Towels 6c, Aspirin 1½c dozen, shaving soap 1½c, Reliable Razor Blades 30c hundred, House Slippers 8c; Hundreds other real bargains. Operate from Auto, Home or Store. Make up to 300% Profit. Postcard brings free illustrated catalog of 2,000 fast sellers. Reliable Jobbers, 930 Roosevelt, Dept. C-3, Chicago.

SILVERWARE CLEANED Instantly! Simply dip and dry. Instantly like new. A Catalytic Magnetic Electrode Plate. Unlike anything else. New way to clean, beautify and preserve Silver. Money-back Guarantee. One sent postpaid, with Instructions. Agents prices and Money-Making Plan for \$1.00. NuProcess Silver Cleaner, Dept. 97, Aurora, Ill.

AGENTS: SMASH go prices! Santos Coffees 12c lb. 4-oz. Vanilla 8½c. Razor Blades 10 for 8½c. 100 Sticks Chewing Gum 12c. 150 other Bargains. Premiums. Experience Unnecessary. Carnation Company, MN, St. Louis, Mo.

GOOD SIDELINE for Printing and Advertising Salesman. Decalcomania Name Plates in small quantities. Great demand. Also make money applying initials on automobiles. Free samples. "Ralco," 727 Atlantic Ave., Boston, Mass.

I WILL give you \$6.00 worth full sized packages of food products, soaps, etc. Free, if you agree to show friends and others. Amazing spare time money making opportunity. Write Zanol, 2236 Monmouth, Cincinnati, Ohio.

NEW, UNIQUE Cosmetic Bracelet complete with secret compartments containing Powder, Rouge, Lipstick, Puffs, Mirrors. Exclusive! Sensational \$1 seller. Write: Gifthouse—Box 2008—Miami Beach, Fla.

THE FIRE Exterminator, guaranteed to Exterminate fire quickly. One dollar postpaid. Attractive offer to Distributors. Inventors Development Co., 630 South 31st Avenue, Omaha, Nebraska.

BIG MONEY Taking Orders; Shirts, Ties, Hosiery, Underwear, Pants, Jackets, Sweaters, Uniforms, etc. Sales equipment Free. Experience unnecessary. Nimrod, 4922-AR Lincoln, Chicago.

WILL YOU give us 5% first \$600 you make? Afternoons Free! Work home! \$1,000 month reported (exceptional—fulltime). Expect surprise! National-J, BX1240, San Bernardino, California.

WHY PAY more?—100 Blades 24c. Sideline Midse. Gross \$1.10. No substitutions. Never undersold. Free catalog. Jay Air Specialty Company, Box 7, 150 Christopher Street, New York.

AGENTS—OPPORTUNITY make money; book containing 127 successful business plans; home-office; send for free introductory booklet. Elite Co., 214-G Grand St., N. Y.

SELL ELGINS, Walthams, Bulovas, Hamiltons below wholesale. Reconditioned, guaranteed like new. No investment. Catalog free. Grossman Jewelry, 4666-CX State, Chicago.

REVOLVING ADVERTISING; colorful, motorless window display adapted for every business. Sample \$1.00 postpaid. Geller, 1532-M University Avenue, New York City.

STRANGE CHEMICAL Sponge cleans wall-paper like magic. Banishes housecleaning drudgery. Sensational seller. Samples sent on trial. Rush name, Kristee 125, Akron, Ohio.

AT HOME, your own manufacturing business, making popular \$1 novelties. Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. T-843, Cincinnati, Ohio.

HIGH SCHOOL Seniors: Make good money selling our Graduation Name Cards, 35% commission. Season starting. Hurry!!! Craft-cards, Box 235, Pittsburgh.

WHERE TO Buy At Wholesale 500,000 articles. Free Directory and other valuable information. Maywood MM, Publishers, 1107 Broadway, New York.

SELL DRESSES low as \$1.24. Hundreds sensational bargains. Actual samples free. Send dress size, age. Harford, Dept. T-243, Cincinnati, Ohio.

AGENTS WANTED. Sell vanilla flavoring powder. Nonalcoholic. Package 10c, make 4 oz. bottle. Box 83, Bath Beach Sta., Brooklyn, N. Y.

WANTED AGENTS—Amazing Device, for Quick Application of Skid Chains. Sample 25c. Act. Now, Musser Company, 2112 Ashland, Toledo, Ohio.

YOU'LL LIKE Resilvering Mirrors, Tableware, Making Chipped Glass Nameplates, Signs. Write Sprinkle, Plater, 850, Marion, Indiana.

LOWEST PRICES In America. Free Samples. New Styles. Absolutely Beautiful. Window Sign Letters. Atlas, 7941-G, Halsted, Chicago.

THOUSANDS MONEY Making Opportunities. Samples, Particulars, 25c. Levine's, Box 15-M, Boulevard Station, New York, N. Y.

SENSATIONAL! AMAZING! Low priced shampoo. Big profits. Fast seller. Sample 10c. Eldore, 290-C Madison Ave., New York. 300% PROFIT Selling Gold Leaf Letters for Store Windows; Free Samples. Metallic Co., 448 North Clark, Chicago.

MANUFACTURE OUTSTANDING 1100% everyday home necessity now. Write Box 1100, Cleveland, Ohio.

BEAUTIFUL HAND-MADE Patriotic Emblems! Sample, dime. Marquez, Apartado 1176, Mexico City.

MATRAX DIAMONDS. Effective, inexpensive. Catalog free. Box 388-F, Wheeling, W. Va.

### MALE & FEMALE HELP WANTED

FREE MENU Sells Celluloid Menu Covers. Wholesale 25c. Samples Dime. Celluloid Specialties, Box 15, Station "Dee", Los Angeles, California.

EARN MONEY At Home Compiling Names. Complete instructions 10c. Golliday Industries, 1514 Long Columbus, Ohio.

### MONEY MAKING OPPORTUNITIES

FREE! PROFITABLE Propositions. Ideas. Details for starting business at home, sparetime. Write for free Printers. Business Industries, 10739 Mack, President Theatre Bldg., Detroit, Mich.

MAIL ORDER spare-time or full-time business enterprise. Gather, "edit" and sell names for advertisers. Details Free. Charles N. Schroeder, 56 West Washington, Chicago, Illinois.

PUBLISH A Magazine of your own. Only \$1.00 capital needed. Many Benefits. Free advertising space. Sample magazine 10 cents. I. Koblinski, 25 State Park Drive, Bay City, Mich.

FREE AD Space in Nebr., Calif., Ill., and Chicago publications. Tips, ideas, suggestions and data worth \$\$\$\$\$. Only 10c. George Homer, 1305 West Harrison Street, Chicago, Ill.

FREE! 200 CIGARETTES, any brand. Money-making Mail Business. Fifty new articles. No canvassing. Instructions 25c. Mechmorris, 2534 S. 3rd, Philadelphia.

"OPPORTUNITIES IN Government Employment"—"Mailorder", "Agents", Opportunity Catalogue, 6c. Central Industries, 306M, Simpson, Kansas.

WOMEN—BE independent. Make plenty money at home; 100 splendid plans clearly explained, postpaid 25c. Clever Ideas Co., Ashburn, Georgia.

PREPARE FOR the future. Establish your own business. Now. 100 Ways To Make Money only 50c. George Beach, Hanover, Mass.

PROFITABLE NATIONWIDE proposition. Repeater. Everything. Stupendous! Sample complete 25c. Wardell's, Sherwood, Oregon.

"INFORMATION DIRECTORY" Lists—Free merchandise—bargains—employment—25c. Troubridge, 7915 Parnell, Chicago.

BE FUNNY for money. Write cartoon ideas. Complete instructions 25c. Ulsh Studios, MI-518, Wrightwood, Chicago.

PROFITABLE MAIL Business of Your Own. Complete instructions 10c. Martin, X-203 Myrtle, New Bedford, Mass.

NOTICE. 300 IDEAS for the Making of Money easily. Information free. Clark System, Ellwood City, Pa.

300 MONEYMAKING OPPORTUNITIES Postpaid. 25c. Everett Arnold, Box 64, Forked River, New Jersey.

SENSATIONAL! MONEYMAKING business!! Free literature. Loids, 5400—24th Street, Cicero, Illinois.

MAKE MONEY. 127 plans to choose from. Booklet free. Scheetz, 98-1 Branch, Sellersville, Penna.

DOLLARS DAILY operating amazing new plan by mail. Garret's, Cape May Court House, New Jersey.

FISHERMEN—MAKE your own sinkers. Free folder. Reading Instrument Co., Box 78, Reading, Pa.

FREE! INTERESTING Opportunity Mail. Stamp Appreciated. Janas, 160-M Lyman, Holyoke, Mass.

MAKE MONEY clipping newspapers. Instructions 25c. Brown, 1226 47th, San Francisco.

EXTRA INCOME—plenty mail selling opportunities. Write—Katz, 4254 North Kimball, Chicago.

SLEEKEST LEGITIMATE Opportunities. Write Wildor-x, 434 East 117 Street, New York.

COST 75c. SELLS for \$14.40. Sample, Details 10c. Supply House, Gardens Orange, Conn.

DREWS BULLETIN. Business and Pleasure. 10c. 710-5, Devils Lake, N. Dak.

### HELP WANTED

WANTED: PERMANENT representative for Hoover Uniforms, Snocks, Aprons, Frocks; nurses, doctors, waitresses Uniforms. Smartest styles. Finest quality. Exceptional commissions. Line Free. Hoover, 251 W. 19th St. Dept. PK-47C, New York City.

### PROFITABLE OCCUPATIONS

NOW—YOU can Paint Signs and Showcards easy with Master Patterns, Samples 10c. Folder Free. Economical Signs, 1572-M North Halsted, Chicago.

SUCCESS CAN be yours. Send dime (coin) for sample and successful plan. (Not cleaning crystals.) United Specialty Company, Smithboro, N. Y.

**MONEY MAKING** secrets exposed, trade secrets that work, free literature. Warren White, 1300 Commerce, Dallas, Texas.

#### POULTRY

**AMERICAN POULTRY** Journal, 578 South Clark, Chicago, features colored pictures of poultry and common poultry diseases supplementing valuable information enabling you to increase profit. Six months, 10c; two years, 25c.

**MAKE MONEY** with Poultry. Read America's leading poultry magazine. Five years \$1.00; six months 10c. Agents wanted. Poultry Tribune, Dept. E-62, Mount Morris, Illinois.

#### BUTTERFLIES, INSECTS, WANTED

**EARN CASH** every spring, summer, fall, gathering butterflies, insects. Easy work. 5c-87 each. 750 kinds wanted. Send 10c for Illustrated Prospectus, before sending butterflies. Sinclair, Dealer in Insects, Box 1830-52, San Diego, Calif.

#### SALESMAN WANTED

**FULL-TIME** bonanza; profitable part-time winner. Carry on sample, sell no goods. Collect your commission, we e.o.d. for service we render. Prosperous people everywhere snap this up. Free information. Safenook Service D. Roselle Park, N. J.

**SELL COMPLETE** Line Everyday Business Necessities—over 2,000 items. Lowest prices. Beats competition. Commissions advanced. Experience unnecessary. Samples Free. Federal, 301-H So. Desplaines, Chicago.

#### BUSINESS OPPORTUNITIES

**OWN GROWING** Business, \$2.00-\$5.00 hourly profits. Easily learned. Quickly established. No shop needed. Clean, revive, mothproof upholstery, carpets, clothing in homes, hotels, institutions. Modern absorption process—no scrubbing. Employ servicemen. "Certified" Service. National prestige. Cooperation national organization. "Earned \$90.00 one day."—Anderson. "Working 12 hours daily."—Lookiebill. "Results are amazing."—Brady. "Built building for business."—Pitt. "Cleared \$51.00 fourteen hours."—Nace. "Work advertises itself."—McCoy. "Business exceeding expectations—hire 6 men."—Campeau. "Repeat orders building business."—Hargrave. Portable electric machines, materials, demonstrators, advertising furnished. Moderate payment establishes business. Booklet free. Write while territories open. Home Service, 173-ST, Deerfield, Illinois.

**PLASTEX INDUSTRY** needs manufacturers on small scale and for big production of Art Goods and Novelties in Plastex and marble imitation. Cheaply and easily made in our guaranteed rubber molds. We are now placing big chain store orders with our manufacturers, interesting booklet mailed free. Plastex Industries, Dept. R, 1085 Washington Ave., New York.

**INDEPENDENCE—NO Bosses.** Make Money. Four own business manufacturing candy, popcorn, potato chips, food specialties, using home grown farm products. We furnish cookers, cutters, beaters, simple instructions, advertising material, selling plans. Small investment. Adequate profits. Write Long Eakins, 2082 High St., Springfield, Ohio.

**INVENTORS—DELAYS** are dangerous—Secure patent protection now. Get new Free copyrighted booklet. "How To Protect Your Invention." No charge for preliminary information. McMorrow and Berman, Registered Patent Attorneys, 138-L Barrister Building, Washington, D. C.

**MEN—WOMEN—**splendid year-round, profitable business operated full or sparetime. Plan includes sales literature, promotion letters, planned advertisements, letterhead designs. Booklet 25c. Cortland Advertising, 15-A Park Row, New York City.

**MAIL ORDER** business course shows you how to make money, spare or fulltime. Teaches professional mail order technique—not penny-catching schemes. Free details. Nelson Company, 500 Sherman, Dept. 405-C, Chicago.

**"MONEY MAKING** Business Starters" shows you how to get started in business. Contains latest formulas, business opportunities and mail order plans. Only 25c. Pleasant Products, Box 27, San Bernardino, Calif.

**START BIG** paying mailorder and wholesale Manufacturing business at home. Over 50 bonafide formulas—complete instructions—20 cents (sfrer). Rossean, Station-A, Box 821-B, Grand Rapids, Mich.

**METALLIZING** BABY Shoes makes you money! Simple. Extraordinary market. Small investment, big profits! Inquire Dept. M, Novelty Metallizers, Box 933, Church Street Annex, New York.

**WILL YOU** give us 5% first \$600 you make? Afternoons Free! Work home! \$1,000 month reported (exceptional—fulltime). Expect surprise! National-K, BX1240, San Bernardino, California.

**MEN—WOMEN,** operate "specially candy factory" home, all or spare time. Opportunity for good steady income. (Our 32nd year.) Ragsdale Candies, Drawer 110, East Orange, N. J.

**MONEY, SUCCESS** in Whatever Undertaken; Never Sick; A Message never Forgotten; Eight Lessons make everything Clear, 35c. Reichert Service, 1838 Van Buren, E. Cleveland, Ohio.

**GOOD PAYING** Business silvring mirrors, plating autoparts, reflectors, bicycles, bath-room fixtures by late method. Free particulars and proofs. Gunmetal Co., Ave. A, Decatur, Ill.

**START A** business of your own. Can put you next to 22 new business opportunities. Show you how to start. \$1.00 Postpaid. E. P. Gallagher, Camp Taylor, Grandview, Wisconsin.

**IF YOU** are looking for a chance to devote your spare or full time to profitable work, see our offer on page 20. Metal Cast Products Co., 1096 Boston Road, New York City.

**RAISE** HIGHLY-PROFITABLE Royal squabs. Read new 1941 book. Personal money-making experiences. Free. Rice, Box 602, Melrose, Massachusetts.

**FOR AN** extremely profitable lifetime business, operate a Collection Agency-Credit Bureau. Free folder. Write, Cole & Associates, Syracuse, N. Y.

**YOU'LL** LIKE Resilvering Mirrors, Tableware, Making Chipped Glass Nameplates, Signs, Write Sprinkle, Plater, 845, Marion, Indiana.

**FREE LITERATURE** describes hundreds plans for making money locally and by mail. Gilbert Supply, 5-M West 24th, New York.

**BETTER MAILORDER** Income Propositions of Greater Profits. Amazing particulars for stamp. Filitz, 3309F Holton, Milwaukee, Wis.

**SWISS MUSIC** Box Works—\$1.25 to \$2.10. Suitable for many novelties. Mermud Manufacturers, 147 West 46th Street, New York.

**OPERATE PERMANENT** business making profitable fast-selling products. Literature free. Law, 1700-N, Madison, New York.

**127 WAYS** to make money, in home or office, business of your own. Full particulars free. Elite Co., 214-G Grand St., New York.

**START PHOTO** finishing business. Develop films; make money. Details stamp. Hilgert Service, 3259-D Lexington, Chicago.

**MOLD-MAKING** PLASTER Casting. Money-making Home Business. Literature free. Kemixal, Parkridge, Illinois.

**HANDY MEN—**Earn money home operating Community "Fix-It" Shop. Stafford, 708 Rawlings, Carbondale, Illinois.

**DO TYPING** for Us, good pay. Details Stamp. Richmond Service, 504-55 Broadway, Sterling, Illinois.

**AGENTS—**To mail our literature. Good profits. Home business. M. Maywood, 1107 Broadway, New York.

**START YOUR** own Mail Order Business in your own home. Write, Valko, Dept. 3, Box 151, Beaver, Penna.

**START PAYING** mailorder business. We'll help you succeed! Thorne's 436N Jackson, Jackson, Michigan.

**HOW TO** double and triple your income, no selling, particulars free. Star Service, Wapakoneta, Ohio.

**PROFITABLE** MAIL Order Opportunities. Vassar Service, 332-3 Washington, Hoboken, New Jersey.

**REAL MANUFACTURING** formulas. Lists free. Cummings, Chemist, Gordon Avenue, Syracuse, N. Y.

**AGENTS OPPORTUNITY** that has inventions. National Employment Foundation, Marietta, Ohio.

**MAIL AND** distribute circulars, wonderful opportunity. Miracle Manufacturers, Conshohocken, Pa.

**MAIL ORDER** Business Chances. Write: Goodall, 628 Montgomery Street, San Francisco.

**MAIL ORDER** Opportunities. Send Name—Postal. Loftis, 1129 4th N.E., Washington, D. C.

**TURN TIN** cans into money. Instructions 25c. H. Chaney, 1150 E. 16th St., Jacksonville, Fla.

**EARN EXTRA** Money Sparetime. No Canvassing. Diamond A. Press, Johnston City, Ill.

**PLAYING** CARD game. Jobbers, wholesalers. Cash in. Box 842, Denver, Colorado. **START PAYING** home mailorder business. Write, Wilmer Lawsen, Dryden, Virginia.

#### TREASURE FINDER

**MT-SCOPE** METAL Locator Fully Guaranteed and unsurpassed in efficiency. Time payment plan, trade-in and accessories. Free Literature. Fisher Research Laboratory, Palo Alto, Calif.

#### EDUCATIONAL & INSTRUCTION

**900 PAGE** BOOK, 10,000 trade secrets, processes, formulas for making cosmetics, soaps, beverages, antiseptics, photography, paints, dyes, cements, etc. Supply sources given, instructions, chemical dictionary. Indispensable farm, home, workshop. Postpaid, \$1.35. Catalog 2000 book bargains free. McCully's Bookshop, Louisville, Miss.

**NEW OPPORTUNITIES** in Air Conditioning, Electric Refrigeration and Auto Body-Repairing, including Metal Work, Welding, Painting. Many trained men earn up to \$55-\$50 weekly. Start preparing now. Get Free Facts. Utilities Engineering Institute, 1314 Belden, Dept. 213, Chicago.

**WATCH REPAIRING** is steady profitable work. Experts usually in demand. You can learn watchmaking trade at home, spare time. New original instruction system. Script engraving course included. Write for free details today! Nelson Company, 500 Sherman, Dept. C-2002, Chicago.

**WORK FOR** "Uncle Sam", \$1260-\$2100 year. Prepare now for 1941 examinations. List positions—full particulars—Free. Write, Friday, Franklin Institute, Dept. N40, Rochester, N. Y.

**CLINICAL LABORATORY** Technic taught in your own home. Practice outfit supplied. Bulletin free. Imperial Technical Institute, Box 494-A, Elkhart, Indiana.

**MAKE UP** to \$25-\$35 Week As a Trained Practical Nurse! Learn quickly at home. Booklet free. Chicago School of Nursing, Dept. K-2, Chicago.

**DESIGN ENGINEERING** pays big. Home study course. Low cost. Easy terms. Free Booklet. Ohio Institute of Technology, Dept. 6, Greenview, Ohio.

**CONSTRUCTION** MEN study Hoisting Engineering. 200 practical questions and answers \$2.00. H. & P. Pub. Co., Sta-H, Buffalo, N. Y.

**"SLIDE RULE** Simplified." 100 pages, 135 illustrations. By Professor Clark Lehigh. Unit 50c. Rules \$2 up. Gilson Company, Stuart, Fla.

**PENN REALTY** School trains students at home by mail all branches Realty Practice. Booklet free. 1131 S. 19th St., Phila., Pa.

**LEARN REAL** Estate Business Successfully. \$2.50 Magic City Real Estate System, 337 N. E. 2nd Avenue, Miami, Florida.

**USED EDUCATIONAL** and technical books. List free. Forte, 1509 Mayland, Philadelphia, Pa.

#### AVIATION

**AVIATION** WANTS more Lincoln Trained Men for positions as Airline Mechanics, Aeronautical Engineers, Airplane Factory Mechanics, Commercial Pilots. This Lincoln Government Approved School of Aviation placing graduates in fine big pay positions. Opportunities for many more. Courses from 6 weeks to 2 years prepare for immediate employment. Reasonable rates. Write Today for information. Lincoln Aeronautical Institute (Inc.), 4000 Aircraft Building, Lincoln, Nebraska.

**AIRCRAFT BLUEPRINT** Reading Extension Course \$2.00. Slide rule course including slide rule \$1.00. Salesmanship course \$2.00. Technical School, 1141 North Highland, Hollywood, California.

**AIRPLANE** AND Engine mechanics book. 1940 edition prepares for government examinations. \$3.00 postpaid or C.O.D. Quiz System, Dept. X, 1435 Flower St., Glendale, Calif.

**AVIATION APPRENTICES—**Airminded Young Men interested in Technical training for entering Aviation as Apprentices see ad on page 20.

**100 AIRPLANES,** \$45 UP. Terms. Send 25c for complete catalogue. Used Aircraft Directory, Athens, Ohio.

**MOTORCYCLE ENGINES** with air propeller \$18. Storms, 199 Broadway, Asheville, N. C.

### RADIO, TELEGRAPHY, TELEVISION

**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.

**FIND RADIO** faults without instruments. Simplified diagrammatic method. New booklet, 5c. Supreme Publications, 3727 13th Street, Chicago.

### RADIOS

**RADIOS: DEAL** direct. Free catalog. Autocrat-M. 3855 North Hamilton, Chicago.

### CARTOONING, SIGNPAINTING, DRAWING AIDS

**LEARN CARTOONING**. With this snappy, interesting, practical illustrated method, \$1.00 complete. Studios Of Cartooning, 1202 Carroll St., Brooklyn, N. Y.

**HAVE YOUR** own money making business. Learn show card writing, sign painting. Write for details. Begley Specialty, 1472MI Broadway, New York.

**BE INDEPENDENT**, Learn Sign Painting, Showcard writing, the easy way at home. Write for particulars. Forrester, 401 Broadway, New York.

### CHEMISTRY

**FREE CHEMISTRY** catalog. Supplies at 5¢! Equip complete laboratory. Kemkit Scientific Corp., 397W Bridge St., Brooklyn, N. Y.

### FORMULAS, PLANS

**IRON CEMENT**. Water and Oil resistant. For cylinder blocks, etc. Cheap and easy to make. A high quality product. Formula \$1.00. Write for a list of cements you need. Barton, 2403 Brownsville Rd., Pgh., Pa.

**10,000 MONEY-MAKING** Formulas, recipes, secrets. Make most anything. \$24 page illustrated book. \$1.50 postpaid or C.O.D. (foreign \$1.85). Catalog 3c. Adams and Brown Co., Chestnut Hill, Mass.

**PROVEN PLANS** To Increase Your Income. Ten Cents Coin. Satisfaction Guaranteed. George Gundrum, LeRoy, Michigan.

**SINGLE INGREDIENT FORMULAS**. No manufacturing! Information free. G. Kinford, Fort Lauderdale, Florida.

**THAXLY FORMULAS** for successful products. Accurate Analyses. Catalog Free. A. Thaxly Co., Washington, D. C.

**COSMETIC FORMULAS** and Selling Ideas, book form, \$1.00. National Laboratory, 305 Eastlawn, Detroit, Michigan.

**FORMULAS—LATEST**, best. Analysis. Literature free. D-Belfort, Engineering Building, Chicago.

**DRAWING SALVE** for boils. Best formula 50c. Viggiano, Druggist, 6561 Sheldahl, Pittsburgh, Penna.

**FORMULAS—ALL** Kinds. Moneymakers. Catalog Free. Kemico, 67, Parkridge, Ill.

**PROFITABLE FORMULAS**. Literature free. Garda, 264 Ninth Avenue, Paterson, N. J.

### PRINTING, MULTIGRAPHING, MIMEOGRAPHING, ETC.

**1000 ENVELOPES LETTERHEADS**, statements, \$2.50 delivered. Magazine printing a specialty. 24 page catalog free. Webb Printing Co., LaVale, Wisconsin.

**HAMMERMILL LETTERHEADS**, envelopes, all colors, 32 styles type. Free particulars. Woodruffs', 217-M Lewis, Duluth, Minn.

**\$1.00 POSTPAID**, 100 8½x11 BOND Letterheads And 100 6½ Envelopes. Benneville, 907 West Roosevelt, Philadelphia.

**50 PANELED DELUXE** vellum personal cards with case 50c postpaid, Commercial Press, Penn Yann, N. Y.

**LOOK! 125 8½x11 LETTERHEADS**, 100 Envelopes Both Postpaid \$1.00. Evansprint, 44NT, Reading, Pa.

**FIFTY HALF** Letterheads or Envelopes printed, 35c. Both 60c. Atlantic, Box 653-O, Rockhill, S. C.

**FREE PRINTING** Buyers Guide, Save Money. Fidelity Company, 375 Sixth, Syracuse, Ohio.

**1000 BUSINESS OR** Personal Cards: \$2.00. FMR Service, 1457 Broadway, N. Y. C.

**LOW PRICE** Letterhead Business Card Printing. Boyle, Clinton, New York.

### PRINTING OUTFITS & SUPPLIES

**INEXPENSIVE PRINTING** Cuts. Send time for sample and catalog. M. Neeka, 305 North Ave., Chicago.

**USED PRESSES**, type, supplies. Lists 3c. Turnbaugh Press, Loysville, Penna.

### RUBBER STAMPS & MARKING DEVICES

**CUSHIONED**, 2 LINES 25c. 3-35c. Ours are better! Ads-Craft, Lacrosse, Wis.

### TYPEWRITERS, DUPLICATORS, OFFICE DEVICES

**TYPEWRITERS, ADDER**, Mimeograph, Multigraph, Addressograph. Send for Free lists of machines that will help you at half price. Pruitt, 27 Pruitt Bldg., Chicago.

**BUILD YOUR** Stencil Duplicator. Instructions, two dimes. Nuplans, 32 Ridgeview, White Plains, N. Y.

**MAKE YOUR** own Duplicator. Full instructions 25c. Carleton Sales, East Hartford, Conn.

### STAMP COLLECTING

**SCARCE UNITED** States stamps. Find those hard-to-get, yet inexpensive stamps in our approval books containing over 1500 varieties. Write for a selection now and learn about America's outstanding service. Reasonable prices. United States only. Southern Stamp Co., Box 70-X, Miami, Florida.

**WORLD'S BIGGEST** and Best Stamp Offer. Seven Different Sets of Stamps including Commemoratives, Bi-Colors and Semi-Postals. Regular Price 50c. Only 10c (with Approvals). Friendly Philatelists, Box 4428M, Philadelphia, Penna.

**PICTORIAL OFFER**—Will Rogers Airmail set, Hi-value Tanna Touva diamond, 2 Ecuador World's Fair, Italian East Africa, 25 others for 5c to penny approval applicants. Parkway, Box 3797, Druid (G), Baltimore, Maryland.

**SEYCHELLES, NEJD**, Caymans, Manchukuo, Brunel, Turks Caicos, British Solomons (Cannibalband), Everything 3c with approvals. Viking, 130-R Clinton St., Brooklyn, N. Y.

**BOLIVIA ANIMALS** (5), Complete Spain Cervantes Issue—both sets 10c to approval applicants. Central City Approval Service, Colvin Station, Syracuse, N. Y.

**UNITED STATES \$1 & \$5** Postage Due stamps only 3c. Big approvals! Tong & Lists free! John M. Pettit, Jr., Box 97, Toms River, New Jersey.

**DIAMOND AIRMAIL**, British Colonies, Pictorials, etc. 115 Different Stamps 5c with approvals. Reliable Co., Dept. 6, Box 139, Church Annex, New York.

**NO FOOLIN'**—200 different including Barbados, Sudan, Tasmania, and Victoria, only 10c with approvals. Garlock, 1018 N. Rampart, Los Angeles, Calif.

**MUTINY** on the Bounty Set showing Pitcairn Island, the ship Bounty, Capt. Bligh and crew. 10c coin with approvals. Adlez, 157 Jamesburg, New Jersey.

**U. S. & FOREIGN** Quality ½ lb. Mixtures, \$1.00. Valuable Prize Set Free! Postage, 10c. Rettig Stamp Co., 85-28 252nd St., Bellerose, L. I., N. Y.

**500 U. S., WELL** mixed, many commemoratives, 50 varieties (guaranteed), only a quarter and a 3c stamp. Hogan's Stamp Shop, Ashland, Wis.

**"MUTINY ON the Bounty,"** New Pitcairn Island set, plus other South Sea Islands' stamps, 5c with Approvals. Larry Hendry, York, Penna.

**GIGANTIC WAR** Packet, Danzig, Austria, Netherlands, etc., 5c to approval applicants. Theodore Stevens, 3576 Maryland Ave., Detroit, Mich.

**20 UNUSED SOVIET** Russia. Includes bi-colors, surcharges, Dragon Killer. 3c with approvals. Burton Stockton, Box 212, Batavia, New York.

**25 DIFFERENT CANADA**, 1000 Peelable Stamp Hinges Free with Approvals. Jay Dee, 218 Dickinson, S.W., Grand Rapids, Mich.

**505 GOOD MIXED** foreign (some over 40 years old!) for only 25c. Catalogs free. Mission Mart, Brookland, Washington, D. C.

**AIRMAILS, JUBILEES**, Coronations, Royal Visit set of Canada, 5c—Approvals. Wood, 2015M Stafford, Pittsburgh, Pennsylvania.

**25 GREECE** AND 25 Italy all Five Cents with approvals. Pecono Stamp Company, Dept. M, Box 512, Wilkes-Barre, Pa.

**STAMP BOOK** Free—Forty pages. Includes Stamp Encyclopedia. Free. Write Empire Stamp, Dept. M.L. Toronto, Canada.

**FREE! COMPLETE** United States Stamp Catalog with 1,000 illustrations. Harris & Co., 22 Transit Building, Boston.

**TWO COMPLETE** Sets U. S. Postage Dues—Italy—Propagation—Faith \$1.00. Red Jay Stamps, New Brunswick, N. J.

**"VALUE-PLUS"** \$2.00-\$5.00 lots from old collections, dealers' stocks. Needs? Whitney Safford, Burlington, Vermont.

**SEVEN DIFFERENT** triangles only 5c to approval applicants. Tatham Stamp Co., Springfield-D9, Mass.

**SEND 1c** FOR Triangle stamp, Mexican airmail, and set 4 Djibouti, Sundman, D145, Bristol, Conn.

**50 DIFFERENT BRITISH** Colonies 6c to approval applicants. E. P. Johnson, Box 267, Morgan Hill, Calif.

**1000 UNITED STATES** Grab Bags 15c. Packet two 25c 1870 Up. Andy, 630 Binghamman, Reading, Pa.

**30 DIFFERENT UNITED** States and Foreign—5c. Approvals. Gobrecht, 205 Anderson, Joliet, Ill.

**FREE 20 DIFFERENT** U. S. to Approval Applicants. Sawpit, 287 Olivia, Port Chester, N. Y.

**FREE!!! PONY** Express Set (facsimiles), Postage 3c. Roberts, 403 Shearerblg., Baycity, Michigan.

**300 MIXED U. S.** Postage. 150 Varieties. 58 cents. Jungkind, Box 806MI, Little Rock, Arks.

**GRENADA MINT** set, 10c to approval applicants. W. Rutherford, Kinderberg, Sask., Canada.

**100 DIFFERENT RUMANIA** 15c to approval applicants. Carl Hahn, Mukwonago, Wisconsin.

**500 MIXED INCLUDING** 51 different U. S. 10c! Approvals. Paul Baringer, Defiance, Ohio.

**60 DIFFERENT U. S.** including Commemoratives, Airmails 10c. Seidenburg, Baroda, Mich.

**25 DIFFERENT AIRMAILS** 5c with approvals. Paltra, 3204E Hull Avenue, Bronx, N. Y.

**FREE!!! AUSTRIA** War Set. Postage 3c. Williams, 603 Archerblg., Baycity, Michigan.

**FINLAND! 25 DIFFERENT** 3 cents with approvals. H. Berry, West Burke, Vermont.

**ATTRACTIVE APPROVALS** at Attractive Prices. Stephen Link, Box 397, Union, N. J.

**100 BEAUTIFUL** American Flag Stickers—10c. Walter Welch, East Liverpool, Ohio.

**SIAM 10 DIF.** 3c to approval applicants. Rogers, 643 Seribner, Grand Rapids, Mich.

**APPROVAL SHEETS**. Frederick B. Driver, 401 Finance Bldg., Philadelphia, Penna.

**80 DIFFERENT GERMAN** blocks \$1.00. Emil Auer, 16 Duerstein, Buffalo, N. Y.

**72 DIFFERENT U. S.** 10c. Approvals Album Service, Route 57-22, Sioux City, Iowa.

**25 BRITISH COLONIALS**—3c. CRS, Box 4542, Station "C", Kansas City, Mo.

**FREE PACKET** with approvals. Write C. N. Dailey, Box 1190, Charleston, W. Va.

**20 MEXICO 3c** WITH approvals ¼ c up. Jostax Babcock, St. Joseph, Michigan.

**15 AIRMAIL FREE** with approvals. Leo Martin, Glen Ullin, North Dakota.

**TRY CENT-HI** Penny Approvals. Ransom, 1333 Pontiac, Ann Arbor, Mich.

**100 STAMPS 3c** TO approval applicants. M. Wincholt, Woodbine, Penna.

**NUDE 3c OTHERS, 3c.** Approvals. Turner, 60 Howard, Atlanta, Ga.

### OLD STAMPS WANTED

**OLD STAMPS** Wanted. I Will Pay \$100.00 each for 1924 1c green Franklin stamps, rotary perforated eleven (up to \$1,000.00 each if unused). Send 6c for Large Illustrated Folder showing Amazing Prices paid. Vernon Baker, MI, Elyria, Ohio.

### INDIAN CURIOS & RELICS

**INDIAN RELICS**, Confederate bills, coins, gems, minerals, curios. Catalog 52 illustrations 5c. 100 good ancient arrowheads \$3.00. Tomahawk head 50c. H. Daniel, Hot Springs, Ark.

**30 GENUINE INDIAN** Arrowheads, \$1.00. Catalog. Geo. Holder, Glenwood, Ark.

COINS, BILLS, stamps, photos, arrowheads, Samples 25c. Shutt, Beech City, Ohio.

#### RARE COINS

COMMEMORATIVE HALF Dollars, Lincoln, Stone Mountain, Oregon, Texas, Cleveland, Kentucky, San Diego, Long Island, \$1.50 each. Illustrated Catalogue No. 14, 25c. Norman Schultz, Salt Lake, Utah.

FREE! FOREIGN Coin, banknote and large 36 page illustrated coin catalogue to approval service applicants. Send 3c postage. Tatham Coinco., Springfield-9, Mass.

UNCIRCULATED 1940-S or 1940-D cent and catalog 10c. Landon, 4410-M Lankershim, North Hollywood, Calif.

4 COINS AND lists, 6c. Oddehon, Box 44, Overland, Mo

#### HOBBIES & COLLECTIONS

SWAPPERS LIST! 500 names—25c. Every hobby imaginable, U. S. and foreign. "Hobby." Box 211, Zion, Ill.

BOOK MATCH Covers Colorful, Different, Unused 25 for 25c. George Arendt, 2248 West 35 St., Chicago, Ill.

10,000 STONES removed from jewelry—opals, garnets, amethyst, etc. 200 assorted \$2.00. Love, Box 525, Chicago, Ill.

#### MAGIC TRICKS, JOKERS, PUZZLES

SPECIALTIES FOR Magicians' use. Secret systems, Method, tricks, devices, cards, dice, punchboards, slot machines, and other specialties. Send stamped, addressed envelope, receive free literature. N.W. Book Co., Box 671, Dept. B, St. Louis, Mo.

LOOK! CATALOG 500 Amazing Pocket-Parlor Tricks 10c. Be Popular. Mystic Friends. Earn money entertaining Clubs, Parties. Catalog Professional Stage Magic 10c. Send today! Lyle Douglas, Station A-3, Dallas, Texas.

GET YOUR Magic Adviser "Je-sais-tous." I know all, very fascinating advice, entertain yourself, family and friends. Silver 50c, gold \$1.00. Kingston Park Store, 2600 Telegraph, Lemay, Mo.

GIANT SURPRISE Catalog! Tricks! Jokes! Magic! Novelties! Only 10c. Vick Lawson—House of 1000 Mysteries—Dept. M6, Queens Village, N. Y.

HOLLYWOOD SPECIAL! Magician's button, catalogue, ghost illusion and free trick 25c. Magic House of Charles, Box 888, Hollywood, California.

AN ENVIABLE Reputation in Magic Assured. Dues \$5. United Magicians, Gordon Pough, Box 193, East Paterson, N. J.

MAGICIAN'S HEADQUARTERS, 216-page illustrated catalogue, 25c. Kanter's, P-1311 Walnut, Philadelphia.

WE SUPPLY every noted magician. Large Professional catalog 25c. Holden, 222 West 42nd St., New York.

MAGIC CATALOG newest tricks, illustrated, 15c. St. Louis Magic Studio, 6360 Delmar Blvd., St. Louis.

USED MAGICAL Apparatus, Books bought, sold, exchanged. Waldmann, 332 East 77th, New York.

MAGIC COIN Box 20c. Card Trick Free. Visco, Box 4741, Philadelphia.

MAGICAL COIN and large catalog 25c. Gem, D-8, Wollaston, Mass.

#### CHALK TALKS

TRICK CHALK Stunts, Catalog 10c. Cartoonist John Balda, Oshkosh, Wis.

#### DETECTIVES

DETECTIVES—WORK Home—Travel. Experience unnecessary. Detective Particulars free. Write, George Wagner, 2640-V Broadway, N. Y.

#### HYPNOTISM

HYPNOTISM. COMPLETE 20 Method Course 25c. Western Institute Hypnotism, D-1313, Palatine, Illinois.

#### MUSIC—INSTRUMENTS & INSTRUCTION

SONGWRITERS: SEND your original poem for free examination and our plan. Richard Brothers (Music Composers), 166, Woods Building, Chicago.

PUBLISHERS NEED New Songs. Poems wanted immediately. Five Star Music Masters, 645 Beacon Building, Boston.

SONGWRITERS—MELODY Composed to your words \$1.00. Frank Jugan, Jr., Signal, Ohio.

## Memo Pad Works By "Touch Control"



Combining neatness with efficiency, this new memo sheet case is operated by a plastic roller that projects from the top. When a loose memo sheet is desired, the fingers touch the roller and are drawn forward, which brings out the desired sheet of paper. It eliminates picking out sheets with fingers that invariably wrinkle or soil the paper.

#### BODY-BUILDING COURSES

PREPAREDNESS—HELPING yourself to health means renewed strength, pleasure, earnings, Success. Details about \$25 English Course (which we sell for \$1.00) sent Free. Olympic System, Dept. M, Waterville, Maine.

STRENGTHEN THAT stiff, weak back. Instant results or money refunded, \$1.00 postpaid. Gulick, York St., Lambertville, N. J.

EXERCISE EQUIPMENT, courses, Special offers! Free booklet, Good Barbell Co., Dept. 10, Reading, Pa.

#### CAMERAS & PHOTO SUPPLIES

PHOTO FANS! Here's a bargain book that will help you take, develop and enlarge better pictures. PHOTOGRAPHY HANDBOOK No. 4 contains scores of articles and tips on all phases of picture-taking. Fully illustrated, 144 pages, written by experts—and only 50 cents, postpaid. Send money order, check or stamps to Dept. C-1, Fawcett Publications, Inc., Greenwich, Conn.

MAKE MONEY in photography. Learn quickly at home. Easy plan. Previous experience unnecessary. Common school education sufficient. Booklet and requirements free. American School of Photography, 3601 Michigan, Dept. 2041, Chicago.

BUILD YOUR OWN Automatic Enlarger, at many times less than store cost, using our easily understandable instructions and detailed plan, 25c. Information 10c. Paramount Autofocus Enlarger, Box 2128, Beaumont, Texas.

#### PHOTO FINISHING

8 ENLARGEMENTS AND films developed, 116 size or smaller, 25c coin. Special Introductory Offer: enclose this ad and negative with your order for double weight hand colored Enlargement Free. Enlarge Photo, Box 791, Dept. MI, Boston, Mass.

FREE 3 PROFESSIONAL 5x7 Enlargements of your own choice, 2 guaranteed sets of prints with your roll film developed—all for 25c, original order only. Aro Studios, Dept. 4, Des Moines, Iowa.

18 LIFETIME PRINTS, 3 Sparkling Hollywood enlargement coupon, each roll 25c. 21 reprints 25c. \$1.00—\$1.00. Finished 3 hours. 25 other bargains. Overnight Studio, Albany, Wis.

EXPERT SERVICE. Rolls developed and printed 20c. Forty years experience. Blodgett Industries, Bristol, Vermont.

EXTRA SPECIAL: Five—5x7 enlargements, 25c. Cardinal Photos, Summit, New Jersey.

#### MOTION PICTURES & SOUND EQUIPMENT

ARTISTIC PRODUCTIONS that thrillingly entertain! Listing, sample film 10c. Box 1504, Hollywood, California.

8-MM 100-FT. Subjects 98c. Spring Films, Westboro, Mass.

#### HOME MOVIES

FREE SAMPLE moving pictures: all kinds, lowest prices; catalog free, Goodwill Company, Jackson, Tennessee.

ART FILMS, 8 mm, 16 mm. Lists, free. Catalog, Sample—10c. Box 108, Lefertz, Brooklyn.

#### AUTOMOBILES—MIDGET CARS

SUPERCARGERS \$3.00. Guaranteed mileage increase 20%; power 10%. University of Detroit test. Any car; give make, year. Wrench installs 15 minutes. John Haney, Manufacturer, 5719 Loraine, Detroit, Mich.

INCREASE THE horsepower of your Ford V8 from 85 to 128 HP—without supercharging. Send \$1.00 for detailed, simple instructions. Power Associates, P.O. Box 501-C, Wilmington, Delaware.

GASOLINE SAVING device 50c. Ford 1928-1941, Chevrolet 1932-1941. Valert Co., 3429 N. 10th St., Milwaukee, Wis.

#### AUTO SUPPLIES & EQUIPMENT

GARAGE OWNERS and mechanics only purchase direct at full factory discount Triple-X Alloy Self-Locking Piston Rings. Nationally distributed. Guaranteed performance. Stops oil pumping. Saves gasoline. Re-boring unnecessary. Write for sample and details. Triple-X Co., 3801 S. Racine, Dept. 622, Chicago.

CONVERT YOUR car to burn Diesel oil. Save up to 70% fuel costs. Cheap installation. Wonderful performance. Proven factory method. Different and better. Costs nothing to investigate. Write for free circular No. 5A. Harrington Company, 201-204 Manchester Building, Portland, Oregon.

FUEL OIL Conversions for Automotive, Marine engines, write for free literature. Houston & Logan Conversions, 2112 Addison, Berkeley, California.

UNUSUAL AUTOMOBILE Accessories. List, dime (refunded), Anderson, Box 78, Audubon, New Jersey.

#### MOTORCYCLES, BICYCLES, MOTOR SCOOTERS

MOTORCYCLES, RECONDITIONED. New, used, parts and accessories. All makes. Large stock. Bargains. Illustrated catalog, 15c. Indian Motorcycle Sales, Kansas City, Mo.

MOTORSCOOTERS, MIDGET cars! Easily built. Complete plans and literature on wheels, tires, motors, transmissions, clutches, etc., 10c. Honsaker, Masontown, Pa.

#### MACHINERY, TOOLS & SUPPLIES

FOR 8" SOUTH-BEND Lathes-Milling attachments; threading dial; taper attachments—Also mica undercutters; boring bar holders; collet chuck attachments; 8" face plates and four jaw chucks for all small lathes. Unique Manufacturing Co., 4807 North 31 Ave., Omaha, Nebraska.

ATLAS, CRAFTSMAN Lathe Owners! Tool blocks, rests, faceplates. Excellent quality. Save 75%. Information free. Designer, 8433 Curzon, Cincinnati.

#### ENGINES, MOTORS

AIR COMPRESSORS 1 1/2"x1 1/2" \$6.00; 2x2 \$7.00; 2 1/2"x2 1/2" \$8.00; electric drills 1/4 in. \$5.95. Free folder. National, 1915 S. State, Chicago.

MOTOR WINDING data, diagrams, winding lessons. Particulars, stamp. Motor Data Service, Box 7631, Kansas City, Missouri.

#### ELECTRIC FENCING

ELECTRIC FENCE Units, \$2.75. Guaranteed. Write, Wholesale Fence, Hales Corners, Wis.

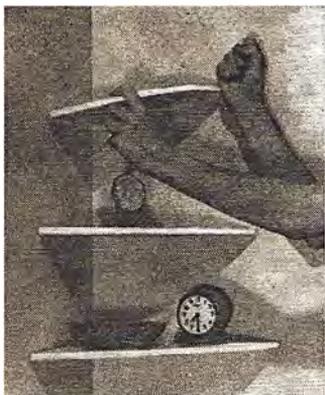
#### ELECTRICITY & ELECTRICAL SUPPLIES

AUDEL'S HANDBOOK of Electricity. For Engineers, electricians, students and all interested in Electricity. A quick, simplified, ready reference, giving complete instruction and practical information. Easy to understand. A reliable authority and a Handy Helper that answers your questions. 1340 pages, 2600 Illustrations. Price \$4.00. Postpaid. Money back if not satisfied. Theo. Audel, Publishers, 40 West 23 St., New York.

HEALTH LAMP: Dual Ray—Ultra Violet—Infra Red. A.C.-DC. Sun-Tan Vitamin "D" \$3.90 Postpaid. Beyer Mfg., 4515-G Cottage Grove, Chicago.

NEW FREE catalog—1000 farm electrical items. Lelay Manufacturing, 814 Lelay Building, Minneapolis, Minn.

## Wall Shelves Fit Without Nails



Tiny metal projections grip the wall firmly when these corner shelves are "thumped" into place with bare hands. No nails, screws, or fastenings of any sort are necessary, those on the edges of the shelves being sufficient. These handy accessories may be had in several attractive colors and also with a raised moulding around the edge. They will support up to 20 pounds safely.

**ELECTRIC PENCIL:** Writes—Engraves all Metals. \$1.00 Postpaid. Beyer Mfg., 4315-G Cottage Grove, Chicago.

**EXPERIMENTERS. WRITE** immediately. Bargain folder. Hulet, 209 East 21st St., New York City.

**SEWING MACHINE** Electrification Outfit. Particulars, Domestic, 118 East 28th, New York.

### WELDING—SOLDERING—PLATING

**D. C. ARC-WELDER.** Build it yourself from Dodge generators. Vehicle motors. Light Plant generators. Plans \$1.00 each (Three for \$2.00). Welders Club, BB-3432 M-Mart, Chicago. (Fifty Arc-welding Lessons 50c.)

**MELTOMATIC PASTE** solder—self-cleaning and fluxing—simply apply and heat. Send 50 cents for four ounce can postpaid. Wayne Chemical Products Co., 9040 Copeland, Detroit, Mich.

**WELDING SHOPS—**Build trailers, farm wagons, use junk auto parts. Information stamp. Plans dollar each. "Doc" Fixit's, Mount Vernon, Ohio.

**AUTOMATIC ACETYLENE** generator, and arc welder plans, both one dollar. Harry Freestone, Backus, Minn.

**WELD WITH Gasoline.** New discovery. Send 25c for particulars. Matthews Mfg. Co., Red Deer, Alberta.

SEE OUR advertisement on page 146. LeJay Manufacturing Co., Minneapolis.

### MANUFACTURING

**WANTED IDEAS** To Manufacture—By well-established manufacturer who has been in business for nearly 50 years—modern plant facilities sales outlets and an organization alive to present day merchandising opportunities. What have you invented and want manufactured and sold? Send complete details and specifications with first letter. R. C. Breth, Inc., Advertising Counsel, Green Bay, Wisconsin.

### FOR INVENTORS

**INVENTORS. WRITE** immediately to two free books, "Patent Protection" and "Selling an Invention". Explain many interesting points to inventors. "Evidence of Invention" form enclosed. Reasonable fees, forty-three years' experience. Avoid risk of delay. Address: Victor J. Evans & Co., Registered Patent Attorneys, 427-C, Victor Building, Washington, D. C.

**INVENTORS—**A complete national service—Patent Searches, Models, Drawings, Engineering, Testing. Ideas commercialized and sold. Write for free booklet, "Inventing for Profit". Cameo Institute of Invention, Cameo Bldg., Grand Rapids, Mich.

**INVENTORS: UNPATENTED** inventions now salable with positive safeguards under patent laws. New, low-cost procedure. Complete details, free. American Patents Corporation, Dept. 11, Washington, D. C.

**INVENTORS—**WE successfully sell inventions, patented or unpatented. Write us, if you have a practical, useful idea for sale. Chartered Institute of American Inventors, Dept. 5-B, Washington, D. C.

**WE LOCATE** buyers meritorious patented, unpatented inventions. If will sell, reply immediately. Descriptive booklet, references, free. Invention Reporter, 4A-11236 South Fairfield, Chicago.

**WILL HELP** with chemical products or problems. Formulas. Surveys. Consultant Chemist, Box 74, Claymont, Delaware.

**WANTED. NEW** gadget ideas and inventions for home and automobile. W. & S. Mfg. Co., 4929 No. Kedvale, Chicago.

**GET YOUR Own** Patents. Legal blanks, complete instructions \$1. Cudding Sons, Campbell, California.

**PATENTS: LOW** cost. Book and advice free. L. F. Randolph, Dept. 341, Washington, D. C.

**CASH FOR** practical ideas and inventions. Mr. Ball FA-9411 Pleasant, Chicago.

### PATENTS

**INVENTORS—**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.

**INVENTIONS PROMOTED.** Patented or Unpatented, Write Adam Fisher Co., 582 Enright, St. Louis, Mo.

### PATENTS FOR SALE

**FOR SALE.** Football helmet. New device, helps players gain physically. Pat. Pending. Matthew McComb, 519 Centennial Ave., Cranford, New Jersey.

### PATENT ATTORNEYS

**INVENTORS: TAKE** first step toward protecting your invention—without obligation. Write for Free "Record of Invention" form for establishing date of invention and Free "Patent Guide for the Inventor"—telling importance of prompt action, confidential search service; how to sell and market inventions; details of convenient payment plan. Send for "Patent Guide" and "Record of Invention" form today. See pages 6-7 for additional information. Clarence A. O'Brien, Registered Patent Attorney, 103B Adams Building, Washington, D. C.

**INVENTORS—**TAKE prompt steps to protect your invention. Delays are dangerous. Get new Free book, "How To Protect Your Invention" and "Invention Record" form. Preliminary information free. Reasonable fees. Conscientious counsel. Easy payment plan. Learn how to protect and sell your invention. Write us today. McMorro and Berman, Registered Patent Attorneys, 138-K Barrister Building, Washington, D. C.

**68 PAGES OF FACTS** for Inventors. Two valuable advisory books specially prepared for men with ideas. "Patent Protection," tells you steps to take quickly without cost. "When and How to Sell an Invention" gives you six basic ways to commercialize your patent rights. Both books sent FREE. Write us today in confidence. Victor J. Evans & Co., Registered Patent Attorneys, 426-C Victor Building, Washington, D. C.

**INVENTORS—**BEFORE disclosing your invention to anyone send for Form "Evidence of Conception"; "Schedule of Government and Attorneys' Fees" and instruction. Sent free. Lancaster, Allwine & Rommel, 426 Bowen Building, 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.

**INVENTORS: SEND** for my free 72-page book. Conscientious, prompt personal service on all patent matters. Registered Patent Attorney, L. F. Randolph, Dept. 763, Washington, D. C.

**PATENTS. BOOKLET** free. Highest references. Best results. Reasonable fees. Watson E. Coleman, Victor Building, Washington, D. C.

## Portable Sun Lamp for Travelers



This quartz mercury tube sun lamp folds compactly into its carrying case for easy transportation. Although it is light in weight it generates 12 bands of useful ultraviolet rays. A handle on the top of the case enables the traveler to carry the lamp like a suitcase.

### INVENTIONS WANTED

**NEW INVENTIONS** needed! Fortunes being made. We have spent 36 years developing ideas into practical inventions. We design, manufacture, etc. Stampings, metal specialties, models, dies. Catalog giving "inside" information free. Crescent Tool Co., Dept. T-S1, Cincinnati, Ohio.

**WANTED INVENTIONS.** New modern method brings quick results for good, practical inventions, patented or unpatented. Write for circular. Invention-Service Co., Professional Arts Bldg., Hagerstown, Maryland.

**SIMPLE, PRACTICAL** inventions wanted by manufacturers, patented or unpatented. For information write Chartered Institute of American Inventors, Dept. 5-C, Washington, D. C.

**SMALL INVENTIONS** wanted by manufacturers. I'll help you sell your invention. Write for free circular. Stanley Hull, 7829-L Euclid Avenue, Cleveland, Ohio.

**WANTED—MERITORIOUS** patented, unpatented inventions. Booklet, references, free. Invention Reporter, 4B-11236 So. Fairfield, Chicago.

**INVENTIONS PROMOTED.** Patented or Unpatented, Write Adam Fisher Co., 582 Enright, St. Louis, Mo.

**521 INVENTIONS DESCRIBED** with selling plan 10c. Patentee System, FB-9441 Pleasant, Chicago, Ill.

### MODELS & MODEL SUPPLIES

**POWER MODELS.** Electric railways, steam locomotives, steam and gasoline engines, all accessories, metals, tools, 84 page catalog 35c. Chas. C. Cole, Ventura, Calif.

**BRASS GEARS** and model supplies. Catalog 3c. Pierce Model Works, Tinley Park, Ill.

### MODEL RAILROAD SUPPLIES

**IMMENSE. 52-PAGE** Mini-Train railroad catalog! 1227 different items. Send 25c. Vanden Boom's, 3825 Broadway, Kansas City, Mo.

### MODEL ENGINES

**ILLUSTRATED CATALOG** 40 Engines, Castings, Supplies 25c. Refunded. Howard Co., M-2417 N. Ashland, Chicago.

### MODEL RAILROADING

**MODEL RAILROAD** Shop, Dept. M1, Dunellen, New Jersey. Catalog 10 cents.

### HOME CRAFTSMEN

**LAWN ORNAMENTS:** Easy to make. 25 full size patterns, birds, animals, etc., 25c. Dutch Windmill 3 1/2" high, complete plans 25c. Flying Duck, Parrot, Hen, Chick, Dutch Boy, Dutch Girl, Sprinkling Girl, 15c each, 2 for 25c. DeLuxe collection including all above and many others (\$1.85 value) \$1.00 postpaid. Limited time offer. Wickman, Dept. 246, Dayton, Ohio.

22 LAWN ORNAMENT patterns 25c. Other patterns; 15"-20" high; Dutch girl, Dutch boy, pirate, bull terrier, Mexican girl, Mexican boy, dwarf, penguin, flower girl, 10c each; 3 for 25c. 25 novelty patterns 30c. All 56 full size patterns \$1.00 postpaid. Strother, Box 383-CE, Belington, West Virginia.

**WOODWORKERS.** CONSTANTINE'S new 1941 Master Manual and Bargain Book presents new projects, new methods and nearly 1000 bargains in fine veneers and woods. Only 10c. Albert Constantine, 801-CC East 135th St., New York City.

**SELECTED WALNUT.** beautifully grained; reasonable prices. Why use inferior woods? Circular Free. What do you need? Boyle Company, 307 Berkeley Road, Indianapolis, Indiana.

**PATTERN CATALOG** finely illustrating over 300 plowwood Novelties, Silhouettes, Lawn Ornaments, Decal Transfer Decorations. Other lines. Wo-Met Shop, Ashburn, Georgia.

1000 TELUHOW PLANS. Explained, useful, interesting, simple. For Homecrafters of all ages. Classified, illustrated list 10c. C. A. King, E. Kingston, N. H.

**FAST-SELLING WALNUT.** plastic Novelties. Knockdown kits easily assembled. Illustrated Catalog 10c. Woodcraft Service, Plainview, Minnesota.

**FLYING GOOSE.** Working plan and instructions 15c. Garden Woodcraft Studio, 2026 Broadway, San Diego, California.

**HOME WORKSHOP**—Manual Make, Toys, Furniture, Novelties 50c; Circular, Carl Odam, Crosbyton, Texas.

**BUILD IT YOURSELF**

**MIDGETS — MOTORSCOOTERS** — Racers. Build your own! Quality parts, plans, building kits—bottom prices. Catalog, 10c. Latest list 100 used motors, midgets, parts, 20c. Shlpps Midgets, Box 543-B, Zanesville, Ohio.

**AUTOMOBILE MECHANICS:** Earn extra money at home by using your spare time building tractors with secondhand automobile parts. Write for information, Nolan's Machine Shop, East Wareham, Mass. Cape Cod.

**BUILD POWER Scooters, Midget Cars.** We supply tires, wheels, motors. Lowest Prices. Send 10c for plans, etc. Bld-Ur-Own Devices, Dept. 3-D, 536 North Parkdale, Chicago.

**GREEK TEMPLE Bird Feeding Station.** Beautiful Plans 35c. Box 663, Pittsburgh, Pa.

**JUNK BOX** Wireless Home Broadcaster Plans 25c (coin). Ryder, Cairo, N. Y.

**BOATS. OUTBOARD MOTORS**

**GENUINE NEW** Evinrude and Elto outboard motors now as low as \$26.50 (plus small transportation charge). Down payment as low as \$6.00. Fifteen advanced 1941 models to choose from. Write for catalogs, boat directory and handy Boat-&Motor Selector—all free! Address, Evinrude Motors, 4597 N. 27th St., Milwaukee, Wis.

**OUTBOARD MOTORS**—used and rebuilt bargains, list free. Used parts, save money, Crandall-Hicks Co., 953 Commonwealth, Boston, Mass.

**OUTBOARD MOTORS** all makes. Used and rebuilt. Stamp for catalogue. Outboard Headquarters, 305 Atlantic Ave., Boston Massachusetts.

**MARINE CONVERSION** Parts for all auto engines. Buy here and save. Conversion Parts Co., 279 Adams St., Boston, Mass.

**KAYAKS. OUTBOARDS.** Rowboats, Duck Boats, Weldwood ready-cut kits. Catalog D. Cre-Craft Boats, Millburn, New Jersey.

**FORD AND ZEPHYR** marine conversions. 19c coin. Lehman Engineering Company, Dept. C, Newark, N. J.

**Cake Cutter Serves the Cake It Cuts**



This cake cutter not only cuts the cake in uniform slices but also serves it. To cut the cake, the tips of the blades are brought together to form a Vee, then they are pressed down through the cake. To serve the slice cut, it is merely necessary to press the handles together until the cake is to be deposited on the plate. Made of stainless metal, the device is durable and inexpensive.

**FISHING TACKLE**

**MAKE FLIES,** Rods, Lures. Profitable pleasure. Instruction Books covering all three. 25c. Materials Catalog Free. Wilb-marths, Roosevelt, N. Y.

**FIELD GLASSES, TELESCOPES, MICROSCOPES, ETC.**

**TELESCOPES, MICROSCOPES, Binoculars;** bargain catalog free. Brownscope Co., 5 West 27th Street, New York.

**SPECTROSCOPES**

**SPECTROSCOPE** QUICKEST way to analyze chemicals, ores \$2.50. Cudding Sons, Campbell, California.

**REAL ESTATE**

**THREE ROOM** Cottage, three acres. Re-possessed Property. Cash \$285. Guy Crockett, Guilford, Maine.

**BUY MICHIGAN** improved farms. Pictures, Catalog. Write Pinch Realty, Charlotte.

**DOGS, PETS**

**PUPPIES, ANY** kind, reasonably priced!! Details Free. Book, photos 104 recognized breeds described 25c. Royal Kennels, #86, Chazy, N. Y.

**TREEFROG** 25c. FREE Reptile and Curio catalogue. Quivira Specialties Co., Winfield, Kansas.

**AUTHORS' SERVICE**

**WANTED**—Authors' manuscripts for publication. Mail manuscripts to Fortuny's, Publishers, 87 Fifth Ave., New York.

**PUBLISHERS** WANT stories! I'll help you sell. Hursh, Box M-1013, Harrisburg, Pa.

**PERSONAL**

**WIN PRIZE** Money: Booklet—"Successful Contesting" Shows how. 10c postpaid. Bulletin listing \$100,000.00 prizes included. World Publishing, 4515-K Cottage Grove, Chicago.

**SUCCESS OR failure?** Personality decides which. Learn secret of being irresistible! "Success" shows how. 60c. Doherty, 4816 46th, Woodside, N. Y.

**MEXICAN LEGAL** Matters, William Cocks, American Attorney, El Paso, Texas.

**SHAVING ACCESSORIES, HAIR CLIPPERS, ETC.**

**SAVE MONEY** with a rebuilt electric hair clipper. \$3.75, \$4.75, \$5.75. Satisfaction Guaranteed. Shaver Service, 1430 Grand, Racine, Wis.

**BOOKS, PERIODICALS, PICTURES, POSTCARDS**

**JUST OFF** the Press! The all-new edition of **HOW TO BUILD IT**, packed full of fresh projects for the home workshop, is now available at only 50 cents, postpaid. Valuable for beginners and experts alike. Dozens of simple, easy-to-make plans for power bikes, water skis, lamps, electrical and radio projects, metal working, etc., etc. Send money order, check or stamps to Dept. C-1, Fawcett Publications, Inc., Greenwich, Conn.

**SAVE MONEY!** Do you own repair work around the house without calling in professional help. **HANDY MAN'S HOME MANUAL** tells you how. This 144-page book is full of easy how-to-repair, how-to-make, and how-to-improve kinks. Written in simple language. Illustrated. Only 50 cents. Send money order, check or stamps to Dept. C-1, Fawcett Publications, Inc., Greenwich, Conn.

**EXCELLENT SPARETIME** Profits taking subscriptions—2500 Magazines. Agents Confidential Catalogue. Complete Starting Supplies Free! Dept. 504, Pines, 583 Monroe, Brooklyn, N. Y.

**KNOW ALL** about colors. Read "Health In Color Power." It instructs how the right colors improve health. Price \$1—order today. Chromatadyne, P. O. Box 42, Detroit, Mich.

**HOLLYWOOD ART** Photos. Assortment. \$1.00. J. Carlisle, 3587 Calumet, Philadelphia, Pa.

**PHOTOGRAPHS: LISTINGS** and sample 19c. Albert M. McGoldrick, Mansfield, Mass.

**ARTISTIC PHOTOGRAPHS.** List, sample, dime. Parisette, Nunn Building, Rochester, N. Y.

**ART MAGAZINE**

25c ART MAGAZINE free. Send 9c postage. Professional Art Magazine, Madison, Wisconsin.

**WATCHES, WATCHMAKING, JEWELRY**

**WATCHES**—HAMILTON, Elgin, Waltham, Bulova as low as \$2.75. Diamond rings at lowest prices. Postal brings free illustrated catalog. Quaker City Jewelry Company, Wholesale Jeweler, N. W. Cor. 8th and Walnut Sts., Philadelphia, Penna. Dept. "M."

**WATCHMAKERS' MATERIALS**—Tools—Watches. Bought—Sold. Best prices for Old Gold, Diamonds. Free Catalog. Ben Segal Company, 59 East Madison, Chicago.

**MISCELLANEOUS**

**RECEIVE GIGANTIC** mails, magazines, samples. Your name in numerous mailing lists 10c. Howard, 396 Broadway, New York.

**BURIED TREASURE.** Minerals, free booklet, photographs. Fisher Laboratory, Palo Alto, California.

**WANTED—MISCELLANEOUS**

**HAVE YOU** anything mechanical to exchange, sell or buy? Send stamp for details to P. Griffin, 103-20 Liberty Ave., Ozone Park, N. Y.

**WANTED TO** buy or borrow, copy of 1920 Flying Manual, Arthur Walker, Rama, Sask., Can.

**WANT TO** buy used Keroseene Refrigerator. (Write) Jacob Bauman, Sassansville, Penna.

**BROOKLYN YMCA TRADE SCHOOL**



**Unlimited** Instruction without additional charge until you have mastered every part of Course.  
**Full Shop** Equipment.  
Unexcelled Instruction  
Fireproof Dormitories  
Special Privileges. **Check your** Interests on coupon to receive free literature.

- Aviation Mechanic
- Machinist
- Mechanical Pre-Engineering
- Diesel Engines
- Diesel Pre-Engineering
- Aeronautical Pre-Engineering
- Auto Mechanic
- Refrigeration
- Television and Radio Mechanic
- Architectural-Mechanical Drafting
- Armature Winding
- Welding
- Tool and Die Making
- Oil Burner
- Talking Pictures
- Electrical

**MAIL COUPON**

117 Bedford Ave., Dept. M1  
Brooklyn, New York City, N. Y.  
Name .....  
Address .....



## Be a RADIO SERVICE EXPERT LEARN AT HOME IN SPARE TIME

The demand for radio experts grows every day. Learn this paying profession under personal guidance of qualified engineer and educator. Clear, fascinating instruction and experimental kits make learning easy. Leaders in the radio industry endorse R.T.A. methods. Spare time profits before graduation soon pay for training.

### NOW IS A FINE TIME TO START

New National defense program requires radio trained men in radio factories and every branch of U. S. Service. Opportunities for advancement almost limitless, or you may run your own radio shop.

**FREE** Write today for complete information and radio book telling why R. T. A. training can do for you.  
**RADIO TRAINING ASSOCIATION OF AMERICA**  
1559 Devon Ave., Dept. MI-31, Chicago, Ill.

## LAW STUDY AT HOME

Legally trained men win higher positions and bigger success in business and public life. Greater opportunities now than ever before. Big corporations are headed by men with legal training.

**More Ability: More Prestige: More Money**

We guide you step by step. You can train at home during spare time. Degree of LL. B. Successful graduates in every section of the U. S. We supply all text material, including 14-volume Law Library. Low cost, easy terms. Get our valuable 48-page "Law Training for Leadership" and "Evidence" book **FREE**.  
**LaSalle Extension University, Dept. 3493-L, Chicago**  
A Correspondence Institution

## Home Study EARN A DEGREE AT HOME

From A Chartered Institution of Higher Learning  
Employers Now Demand College Graduates With Degree  
**88 Degree Courses in:** Art, Science, Philosophy, Education; Psychology, Public Health, Medical Jurisprudence; Sociology; Physics, Chemistry; Pol. Science; Theology; Law, Business, Training; Accounting; Statistics; Agriculture, Electrical, Mechanical, Civil, Structural, Diesel, Architectural, Mining, Drafting, Automotive, Aeronautical, Radio, Refrigeration, Highway, Marine, Air Conditioning, Geology, Petroleum, Industrial, Chemical Engineering. Founded 1905.  
**McKinley-Roosevelt, 4610-C Sheridan Road, Chicago**

## HOW TO DRAW FROM THE NUDE

by CHAS. H. PROVOST

The artist who wishes to draw or paint the human form in its varying positions, will find this book extremely helpful and inspirational. Contains 34 different poses, demonstrating fundamental proportions—action and articulations—obtaining balance, swing lines, etc. A carefully selected and arranged group of full page studies of nudes, with a corresponding line drawing on the page facing it with instructive and explanatory text by the author. 68 pages—8 1/2 x 11 inches—spiral bound. Send \$1.00 or C.O.D., plus postage. Money Back Guarantee if not helpful.



FOUNDATIONS BOOKS, 105 W. 40th St., Dept. 35, New York City

**EARN GOOD MONEY STEADILY WRITE TODAY FOR FREE OUTFIT!**

Be our representative in your locality for Dove Work Garments. No experience necessary. Pleasant, simple work. Every business aspect. Advertising embroidered on garments great sales feature. Increase your income every week. We supply everything needed to start at once, including **FREE OUTFIT**. Write immediately.  
**BEN DOVE GARMENT CO.**  
801 S. Fourth St., Dept. 878, Kankakee, Ill.



## Do You Want To Make A Better Living?

Then prepare yourself for a better job by enrolling now in a good Correspondence School. Pick the course best suited to your talents. And write today to the reliable schools appearing on these pages for further information.



## SO-LO CAN HELP

**SHOES, TIRES, RUBBER GOODS** Last Longer. Fix them with new plastanol 'putty.' MENDS holes and worn spots in leather, cloth, rubber. Spreads on like butter. Dries tough overnight. Flexible, not sticky, water-proof. Won't come off—guaranteed. 25 repairs—25 cents.  
**So-Lo THE HOLE**  
AT HARDWARE AND 10c STORES

# MECHANICS

**KNOW YOUR CAR**

**You Need this Book**

**NEW FLUID DRIVE FULLY EXPLAINED!**

**JUST OUT!**

*Ask to See it!*



Every operator and mechanic needs **AUDELS NEW AUTO GUIDE**. This book saves time, money and worry. Highly endorsed. It presents the whole subject of auto mechanics: 1—Basic principles, 2—Construction, 3—Operation, 4—Service, 5—Repair. Easily understood. Over 1500 pages—1540 illustrations showing inside views of modern cars, trucks and buses with instructions for all service jobs. Diesel Engines fully treated, 4 fully illustrated. To Get This Assistance for Yourself Simply Fill in and Mail Coupon Today.

**4 COMPLETE • PAY ONLY \$1. A MONTH** ←  
**THEO. AUDEL & CO., 49 WEST 23rd STREET, NEW YORK**  
Please send me postpaid **AUDELS NEW AUTOMOBILE GUIDE** (\$4) for free examination. If I decide to keep it, I will send you \$1 within 7 days; then remit 1 monthly until purchase price of \$4 is paid. Otherwise, I will return it to you promptly.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
Occupation \_\_\_\_\_  
Reference \_\_\_\_\_ MM

## AIRCRAFT WELDING ENGINEERING

Industry Offers Outstanding Opportunities to properly trained Commercial Welding Engineers (1 year), Welding Technicians (5 months), Aircraft Welders and Arc Welding Operators (3 months). Learn By Doing. Earn Part Expenses. Write for free 64-page illustrated Book—"Dawn Of A Giant Industry." Mention course desired.



**MILWAUKEE SCHOOL OF ENGINEERING**  
341 MI N. BROADWAY & E. STATE, MILWAUKEE, WIS.



## Learn Public Speaking

At home—in spare time. Many overcome "stage-fright," 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. 2053**  
1315 Michigan Avenue Chicago, Illinois

## SAVE UP TO 50%

**30 DAYS TRIAL 15-TUBE MIDWEST RADIO**

**FACTORY-TO-YOU**

**PUT THIS CHASSIS IN YOUR PRESENT CABINET**

**FOREIGN RECEPTION DIRECT**  
Liberal trade-in allowance on many new models shown in **FREE** catalog—from 6 to 12 tubes—up to 5 bands—including automatic recording-changing radio phonos... Home Recorder, etc) (User-Agents Wanted)  
**ONLY \$19.95 COMPLETE CHASSIS WITH TUBES AND SPEAKER**

**UP TO \$25.00 TRADE-IN ALLOWANCE**  
**EASY TERMS**

**MIDWEST RADIO CORPORATION**  
DEPT. 20-555 CINCINNATI, OHIO



# the Case of the Crying Wife

**1** Ann doesn't cry easily—but that night I found her in tears! "I can't help it," she sobbed. "All the things we were going to do—buy a car, build a home—remember? And here we are—married three years, and just barely making ends meet! I thought our dreams might come true—but it's no use." I made up my mind right then to "have it out" with the boss.



**2** "Look here!" he said. "I can't pay you more unless you're worth more! And frankly, John, you lack the training a bigger job needs. Ever hear of the International Correspondence Schools?"



**3** When I learned the boss was a former I.C.S. student, I signed up quick! And what a difference it made in my work! I'd never realized until then how little I knew about the business.



**4** I'm happy, and Ann's happy, and I guess the boss is happy. (At least I've had two "raises" in the last year!) And here's the very same coupon that I mailed, staring you in the face!

## INTERNATIONAL CORRESPONDENCE SCHOOLS

CELEBRATE 50 YEARS OF SERVICE TO AMBITIOUS AMERICANS

1891 \* 1941

BOX 2324-V, SCRANTON, PENNA.

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

### TECHNICAL AND INDUSTRIAL COURSES

- |   |   |   |   |  |
|---|---|---|---|--|
| <input type="checkbox"/> Agriculture              | <input type="checkbox"/> Air Brake                | <input type="checkbox"/> Cotton Manufacturing     | <input type="checkbox"/> Mfg. of Pulp and Paper   | <input type="checkbox"/> R. R. Section Foreman     |
| <input type="checkbox"/> Air Conditioning         | <input type="checkbox"/> Diesel Engines           | <input type="checkbox"/> Diesel Engines           | <input type="checkbox"/> Marine Engines           | <input type="checkbox"/> R. R. Signalmen's         |
| <input type="checkbox"/> Architectural Drafting   | <input type="checkbox"/> Electrical Drafting      | <input type="checkbox"/> Electrical Drafting      | <input type="checkbox"/> Mechanical Drafting      | <input type="checkbox"/> Refrigeration             |
| <input type="checkbox"/> Architecture             | <input type="checkbox"/> Electrical Engineering   | <input type="checkbox"/> Electrical Engineering   | <input type="checkbox"/> Mechanical Engineering   | <input type="checkbox"/> Sanitary Engineering      |
| <input type="checkbox"/> Auto Engine Tune-up      | <input type="checkbox"/> Electric Lighting        | <input type="checkbox"/> Electric Lighting        | <input type="checkbox"/> Mine Foreman             | <input type="checkbox"/> Sheet Metal Work          |
| <input type="checkbox"/> Auto Technician          | <input type="checkbox"/> Fire Bosses              | <input type="checkbox"/> Fire Bosses              | <input type="checkbox"/> Navigation               | <input type="checkbox"/> Steam Electric            |
| <input type="checkbox"/> Aviation                 | <input type="checkbox"/> Foundry Work             | <input type="checkbox"/> Foundry Work             | <input type="checkbox"/> Patternmaking            | <input type="checkbox"/> Steam Engines             |
| <input type="checkbox"/> Boiler Engineering       | <input type="checkbox"/> Fruit Growing            | <input type="checkbox"/> Fruit Growing            | <input type="checkbox"/> Pharmacy                 | <input type="checkbox"/> Steam Fitting             |
| <input type="checkbox"/> Bridge Engineering       | <input type="checkbox"/> Heating                  | <input type="checkbox"/> Heating                  | <input type="checkbox"/> Plumbing                 | <input type="checkbox"/> Structural Drafting       |
| <input type="checkbox"/> Building Estimating      | <input type="checkbox"/> Heat Treatment of Metals | <input type="checkbox"/> Heat Treatment of Metals | <input type="checkbox"/> Poultry Farming          | <input type="checkbox"/> Structural Engineering    |
| <input type="checkbox"/> Chemistry                | <input type="checkbox"/> Highway Engineering      | <input type="checkbox"/> Highway Engineering      | <input type="checkbox"/> Practical Telephony      | <input type="checkbox"/> Surveying and Mapping     |
| <input type="checkbox"/> Civil Engineering        | <input type="checkbox"/> House Planning           | <input type="checkbox"/> House Planning           | <input type="checkbox"/> Public Works Engineering | <input type="checkbox"/> Telegraph Engineering     |
| <input type="checkbox"/> Coal Mining              | <input type="checkbox"/> Locomotive Engineer      | <input type="checkbox"/> Locomotive Engineer      | <input type="checkbox"/> Radio, General           | <input type="checkbox"/> Textile Designing         |
| <input type="checkbox"/> Concrete Engineering     | <input type="checkbox"/> Machinist                | <input type="checkbox"/> Machinist                | <input type="checkbox"/> Radio Operating          | <input type="checkbox"/> Toolmaking                |
| <input type="checkbox"/> Contracting and Building | <input type="checkbox"/> Management of Inventions | <input type="checkbox"/> Management of Inventions | <input type="checkbox"/> Radio Servicing          | <input type="checkbox"/> Welding, Electric and Gas |
|   |   |   |   | <input type="checkbox"/> Woolen Manufacturing      |

### BUSINESS COURSES

- |  |   |  |   |   |
|--|---|--|---|---|
| <input type="checkbox"/> Accounting              | <input type="checkbox"/> Advertising      | <input type="checkbox"/> College Preparatory | <input type="checkbox"/> Foremanship          | <input type="checkbox"/> Railway Postal Clerk |
| <input type="checkbox"/> Bookkeeping             | <input type="checkbox"/> Commercial       | <input type="checkbox"/> Commercial          | <input type="checkbox"/> French               | <input type="checkbox"/> Salesmanship         |
| <input type="checkbox"/> Business Correspondence | <input type="checkbox"/> Cost Accounting  | <input type="checkbox"/> Cost Accounting     | <input type="checkbox"/> High School          | <input type="checkbox"/> Secretarial          |
| <input type="checkbox"/> Business Management     | <input type="checkbox"/> C. P. Accounting | <input type="checkbox"/> C. P. Accounting    | <input type="checkbox"/> Illustrating         | <input type="checkbox"/> Sign Lettering       |
| <input type="checkbox"/> Cartooning              | <input type="checkbox"/> Civil Service    | <input type="checkbox"/> First Year College  | <input type="checkbox"/> Lettering Show Cards | <input type="checkbox"/> Traffic Management   |
|  |   |  | <input type="checkbox"/> Managing Men at Work | <input type="checkbox"/> Spanish              |

### HOME ECONOMICS COURSES

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Advanced Dressmaking | <input type="checkbox"/> Home Dressmaking                       | <input type="checkbox"/> Tea Room and Cafeteria |
| <input type="checkbox"/> Foods and Cookery    | <input type="checkbox"/> Professional Dressmaking and Designing | <input type="checkbox"/> Management, Catering   |

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

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

Canadian residents send coupon to International Correspondence Schools Canadian, Limited, Montreal, Canada  
British residents send coupon to I. C. S., 71 Kingsway, London, W. C. 2, England

LEFT: Simple flashfilter unit clamped in front of ordinary flash reflector holds back visible rays and passes invisible infra red. BELOW: Taken unawares—exposed in total darkness!



Expose infra red films by filtered flash to make sparkling pictures in total darkness. Use Flashfilter Unit or coated bulbs.

## INVISIBLE FLASH for Blackout Photography

by Kenneth Murray

**E**VER take a flashlight picture with an invisible flash?

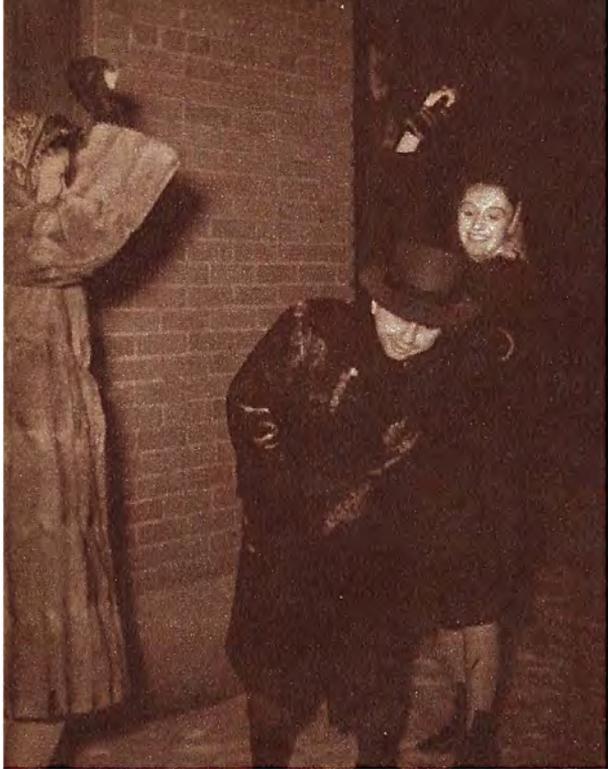
It can be done!

Not only is this trick possible, it is becoming more and more popular among British photographers who will not be denied their photographic pleasures despite the strict blackout rules in force in England. And, although we don't have blackouts here, Americans can have a grand time playing with and improving upon the invisible flash methods improvised abroad.

Invisible flash photography is based on the

recently perfected infra red films that are now available from Eastman, Agfa, and Du Pont, in this country. These films are very sensitive to the invisible infra red component of ordinary light. If the visible rays from a particular standard light source are filtered off in some way and the infra red materials permitted to pass, a camera loaded with infra red film is able to make pictures in total darkness.

The filtering of visible light from a flash bulb may be done either by coating the bulb with a special infra red varnish or by enclos-



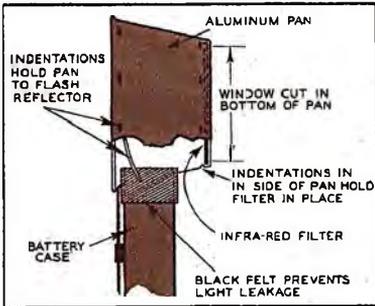
ing the flash lamp and reflector behind a light proof infra red screen made of gelatin or solid-dyed glass.

The writer prefers to use a home-built flashfilter unit employing a gelatin filtering screen. It is made in the following way:

Get an aluminum saucepan whose diameter is slightly larger than that of your flashgun reflector. A 25c pan will be more substantial than the 10c variety. Cut a U-shaped opening in one edge of the pan to make it fit snugly around the top of the synchronizer's battery case—after the latter has been covered with a strip of black felt to make the joint light tight. Now, cut out the bottom of the saucepan to make a "window" for the filter, leaving a narrow rim around the edge to serve as a retaining ring.

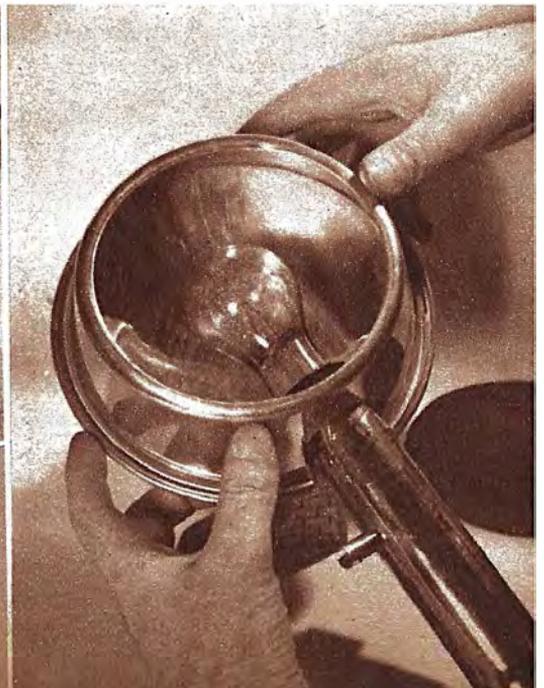
A round or flat metal tool (such as the point of a blunt screwdriver) will serve to indent the sides of the pan at several points from the outside. The indentations hold the filter disc in place against the window opening, and permit the synchronizer reflector to be snapped in place tightly inside the pan. Details are shown in the illustrations.

The most satisfactory filter consists of a disc cut from No. 87 Wratten filter gelatin. Sandwich it between two similar discs of glass, sealing the edges with a heavy application of a cellulose household cement (like Du Pont's) to keep out moisture. A filter may also be made by coating a disc of glass with dyed gelatin, the formula of which is given below. Dyed-glass filters, either in squares or cut to order in discs of suitable diameter, may be purchased from the Corning Glass Works,



ABOVE: A high-speed shot by invisible, filtered flash. Subjects and photographer saw no light during the exposure.

LEFT: Detail of the flashfilter unit, in outline. The writer prefers this device to the use of coated bulbs.



ABOVE: Gap cut into the edge of the pan makes a snug fit around the top of the synchronizer battery case. RIGHT: Fitting the cut-out aluminum pan, minus reflector, in front of the flash reflector to make sure that the flash lamp isn't crowded. Black felt strip at top end of battery case makes a light-tight seal with the fitted reflector-filter unit.

Corning, N. Y. They require considerably more exposure than do the dyed gelatin filters.

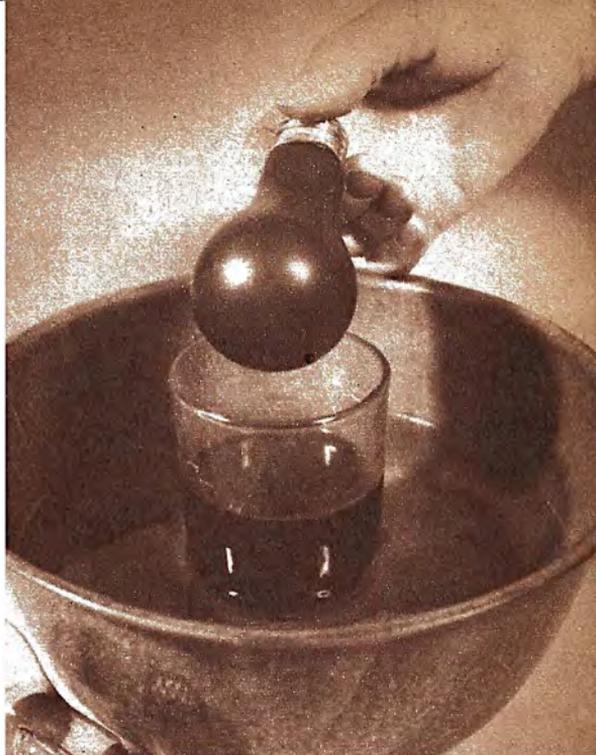
Amateur photographers in England have favored the method in which each individual flash bulb is coated with an infra red varnish, the coated bulbs being used in an ordinary reflector. The following formula will be found suitable for coating flash bulbs or the filter glass for a flashfilter unit:

|                               |           |
|-------------------------------|-----------|
| *Eosine, Color Index 768      | 4 gm.     |
| Tartrazine, C. I. 640         | 6 gm.     |
| Acid Violet, C. I. 698        | 4 gm.     |
| Napthaline Green V, C. I. 733 | 10 gm.    |
| Gelatin (Nelson's Hard)       | 200 gm.   |
| Glycerine                     | 100 c.c.  |
| Water, to                     | 1000 c.c. |

\* Dye sources available on request.

Soak the gelatin for an hour in one-half the fluid volume of water, then warm to 100° F. until it dissolves. Each of the dyes must be dissolved separately in a small quantity of water—the Acid Violet being added a little at a time, dissolving each addition before adding more. The water may be warmed, but to not more than 125° F. Dilute each dye solution with a little of the gelatin solution and dilute the glycerine with an equal quantity of warm water. Mix the ingredients prepared as above, one at a time, and add the remainder of the water. Any air bubbles should be removed by filtering through clean muslin.

Keep the dyed gelatin solution at 96° F. and immerse the bulbs one at a time. As each bulb is slowly withdrawn, turn it cap downward for a few seconds, then invert it, in order to secure an even coating. Allow the



Alternative method: Dip each flash lamp in infra red gelatin dye solution; then set aside to dry. Flash coated lamps in ordinary flash synchronizers without using flashfilter unit.

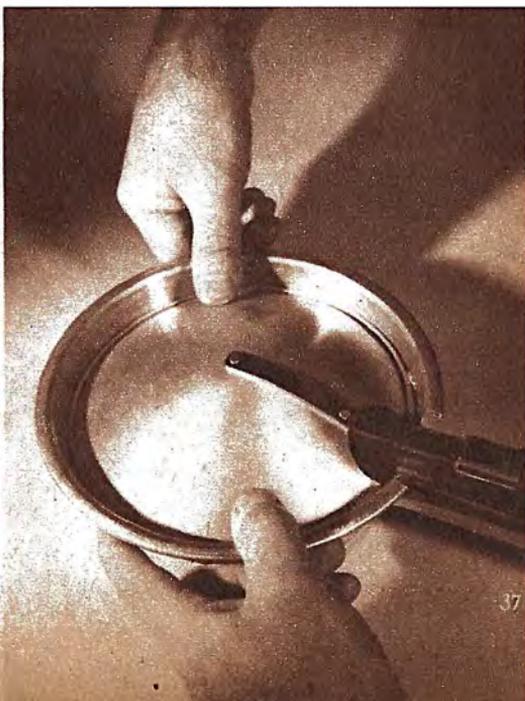
bulbs to dry for at least 24 hours before returning to the original containers for storage.

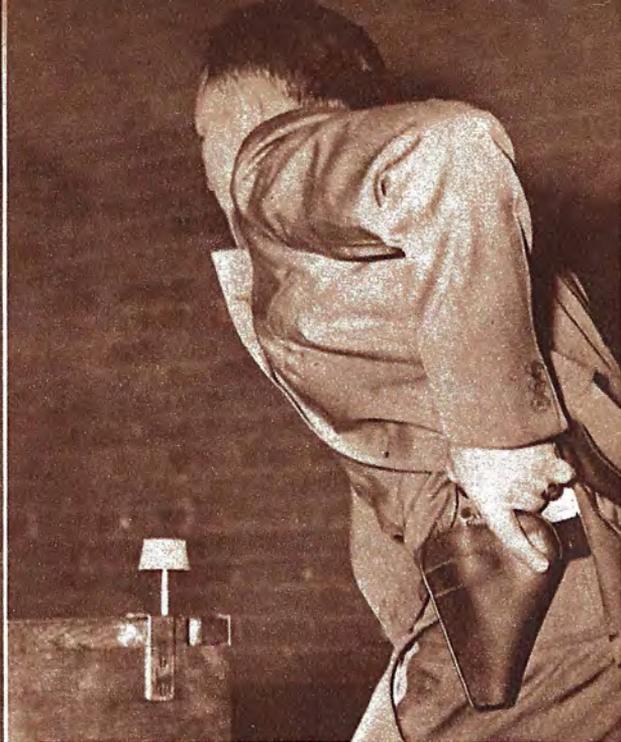
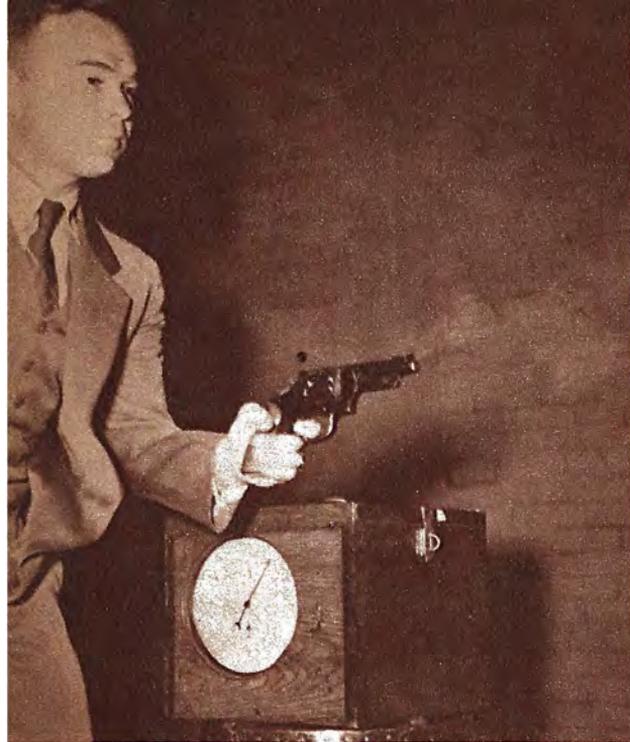
Infra red films are available in a wide variety of types, sizes, and lengths. Du Pont Infra-D comes only in the 35mm size for miniature cameras. Agfa infra red film may be had in 35mm and in various popular

[Continued on page 139]



ABOVE: Fitting the filter disc into the cut-out bottom of the pan. Slight indentations in the pan hold it in place. RIGHT: The improvised flashfilter unit is held to the standard flash reflector by means of indentations pressed into the side of the aluminum pan. The unit may be snapped loose quickly for changing of flash bulbs between exposures.





### G-man Guns Punch A Time Clock Now ▲

**B**AD men will have to practice villainy with a stopwatch from now on. The G-men are using this clock mechanism to make themselves "quicker on the draw." As the officer lifts his hand from the clock release, the pointer on the dial ticks off the fractions of seconds until his bullet hits the target. When the bullet strikes, the clock stops.



### The Printer—

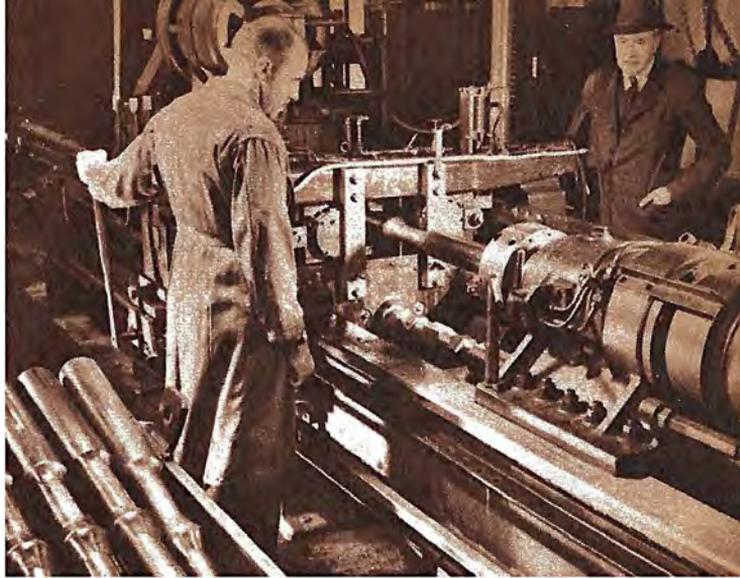
#### ← Is Off To The Races

**T**HE 35,000-pound vehicle at the left is a complete printing plant. (Interior shown above.) Representing an investment of \$65,000, this outfit turns out 10,000 two-color race programs an hour. It follows the horse racing season throughout the country, composing and printing the complete programs at the tracks, in numbers to suit the day's attendance.

*Mechanix Illustrated*

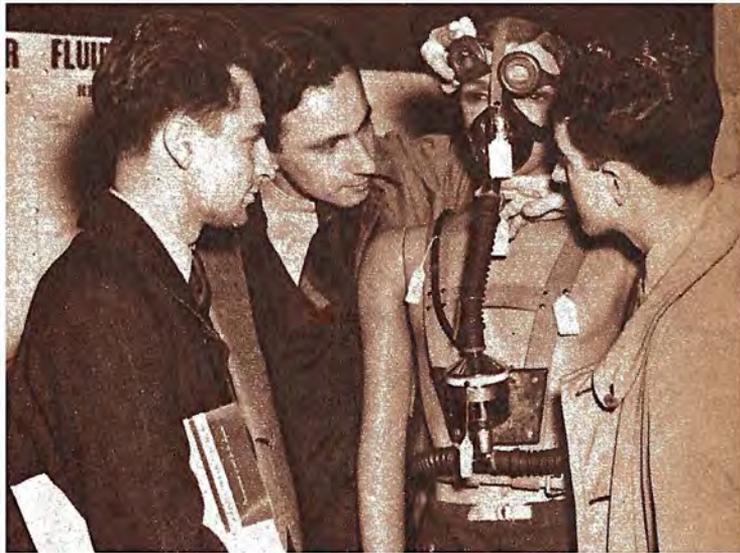
## This Machine Will Replace A Lathe

**D**ESIGNED to eliminate one of the bottlenecks of the armament industry, this new machine automatically shapes tubular products to practically any contour that can be machined from solid stock on a lathe. Employed in the aircraft industry to produce landing gear struts, aileron torque tubes and other similar parts, the machine has provision for control of wall thickness, by means of rolls of various tension.



## Student Invents A New Diving Mask

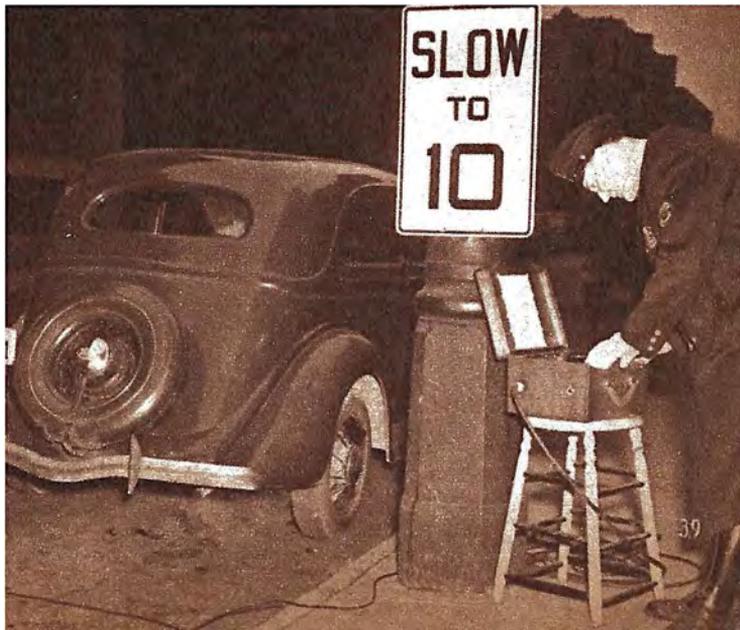
**A** PORTABLE diving apparatus invented for rescue work, which is the invention of Christian J. Lambertsen, 23-year-old sophomore at the University of Pennsylvania medical school, is examined by three of his fellow students. This device makes it possible for a person to stay under water for as much as thirty minutes at a time, and does not use cables or tubes leading to the surface. It was shown at a recent scientific meeting in Philadelphia.



## Setting A Trap For 4-Wheeled "Game"

**T**HIS electric speed trap is the newest traffic device to be placed into operation by the Detroit Police Department's traffic engineers. Motorists who disobey speed limits and slow signs can be clocked as the wheels of their cars pass over outstretched wires twelve feet apart. Portable and inexpensive, the apparatus automatically registers the miles-per-hour of any car passing over the wires.

March, 1941

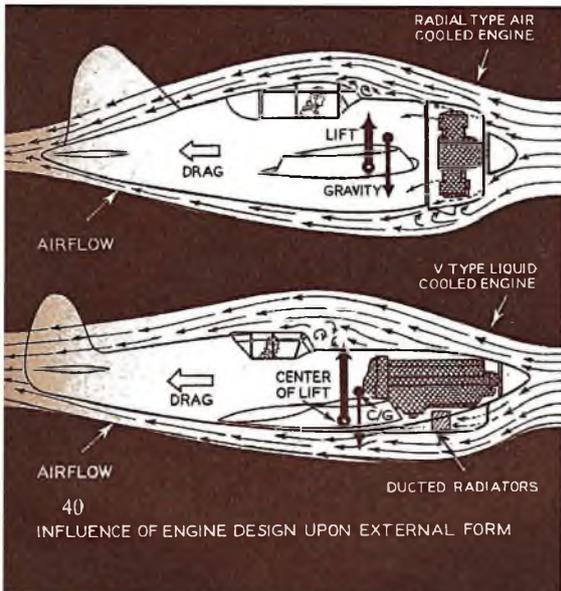


# Air-Cooling

A lightning fighter, the Navy's new Vought-Sikorsky XF4U-1 splits the skies at a clip approaching the speed of sound! A Pratt and Whitney two-row air-cooled radial engine of 1,850 horsepower provides the driving force for this mighty flying warrior. The drawing below illustrates the fallacy of the common belief that long, sleek fuselage designs are necessary to effective streamlining. The stubby outline shown is based on the Grumman Navy fighter. This ship has an air-cooled motor. The lower outline is a generalization of the lines of planes powered by liquid-cooled engines. Short, air-cooled engines concentrate the weight of the plane. The longer liquid-cooled jobs have an opposite effect.

DOUGLAS  
ROLFE

by George Daniels  
and Douglas Rolfe



NOBODY cared what cooled an airplane motor until Louis Bleriot flew the English Channel in 1909. Louis had spent \$100,000 learning to fly, building eleven planes, and having fifty accidents. His trans-Channel monoplane was powered with a 25 h.p. air-cooled Anzani engine. The water-cooled motor that figured in the event belonged to Bleriot's rival, Hubert Latham.

Mr. Latham took off to cross the Channel about a week before Bleriot. He climbed to

*Mechanix Illustrated*

# vs. Liquid-Cooling!



Above: The dart-nosed Curtiss P-40 is typical of military ships driven by liquid-cooled engines. A 1,090 h.p. Allison engine provides the power to drive it.

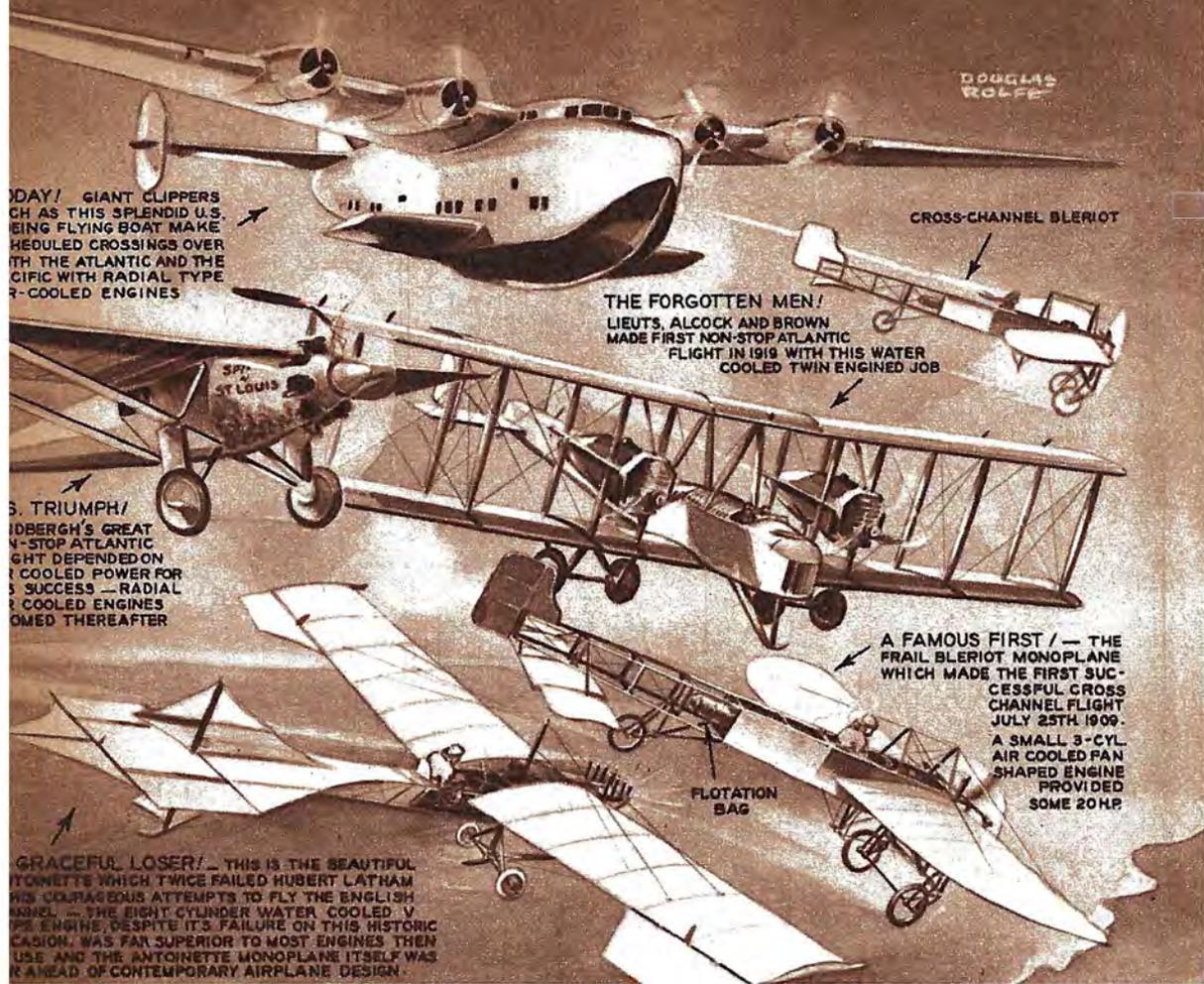
The Navy's new Vought-Sikorsky XF4U-1 has revived the Army-Navy dispute over engine cooling. The famous Army Lockheed P-38, the Bell Airacobra, the Airacuda, the Airabonita, all were liquid-cooled. They set new records for speed and performance. Now those records, close to the 500 m.p.h. mark are toppling! A snub-nosed Navy ship with an 1,850 h.p. air-cooled engine has set new ones!

900 feet and doubled the official altitude record of the time without batting an eyelash. Then, majestically, he sailed eight miles out over the Channel and fell in—when his water-cooled Antoinette engine quit. Typically British, Mr. Latham sat nonchalantly on the tail of his half-sunk airplane and smoked cigarettes, finally being picked up by a tugboat.

The significant point is that the air-cooled Mr. Bleriot finally made it. After landing behind Dover Castle, he was firmly kissed on

both cheeks by some of his countrymen, and taken in town for breakfast. In addition to breakfast, there was the *London Daily Mail* prize of 1,000 pounds. That made air-cooling seem worth while. To cinch it, the water-cooled Mr. Latham made another attempt at the flight and fell in again.

So much for the early history of cooling. The embarrassing thing about any cooling system is the fact that one of its chief purposes is "wasting energy." The average gaso-



DOUGLAS  
WOLFE

DAY! GIANT CLIPPERS  
CH AS THIS SPLENDID U.S.  
BEING FLYING BOAT MAKE  
SCHEDULED CROSSINGS OVER  
THE ATLANTIC AND THE  
PACIFIC WITH RADIAL TYPE  
WATER-COOLED ENGINES

CROSS-CHANNEL BLERIOT

THE FORGOTTEN MEN!  
LIEUTS. ALCOCK AND BROWN  
MADE FIRST NON-STOP ATLANTIC  
FLIGHT IN 1919 WITH THIS WATER  
COOLED TWIN ENGINED JOB

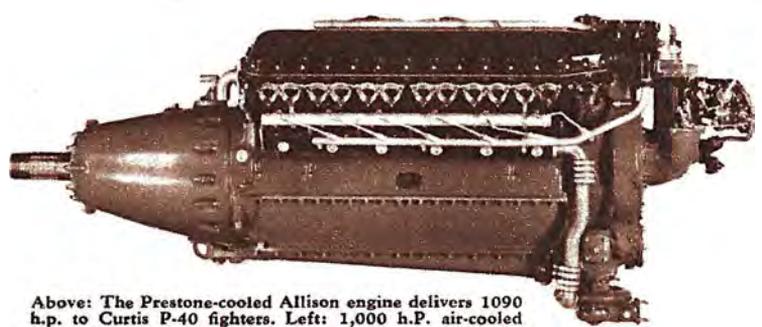
S. TRIUMPH/  
LINDBERGH'S GREAT  
NON-STOP ATLANTIC  
FLIGHT DEPENDED ON  
WATER COOLED POWER FOR  
ITS SUCCESS — RADIAL  
WATER COOLED ENGINES  
DOMINATED THEREAFTER

A FAMOUS FIRST / — THE  
FRAIL BLERIOT MONOPLANE  
WHICH MADE THE FIRST suc-  
CESSFUL CROSS  
CHANNEL FLIGHT  
JULY 25TH 1909.  
A SMALL 3-CYL  
AIR COOLED FAN  
SHAPE ENGINE  
PROVIDED  
SOME 20HP

FLOTATION  
BAG

GRACEFUL LOSER! — THIS IS THE BEAUTIFUL  
ANTONETTE WHICH TWICE FAILED HUBERT LATHAM  
IN HIS COURAGEOUS ATTEMPTS TO FLY THE ENGLISH  
CHANNEL — THE EIGHT CYLINDER WATER COOLED V  
TYPE ENGINE, DESPITE ITS FAILURE ON THIS HISTORIC  
CASE, WAS FAR SUPERIOR TO MOST ENGINES THEN  
IN USE AND THE ANTONETTE MONOPLANE ITSELF WAS  
WELL AHEAD OF CONTEMPORARY AIRPLANE DESIGN.

Above: These planes of the past and present seem to indicate that both air and liquid-cooling can bring fame. Latham's water-cooled ship set a duration record—1 hour, 9 minutes.

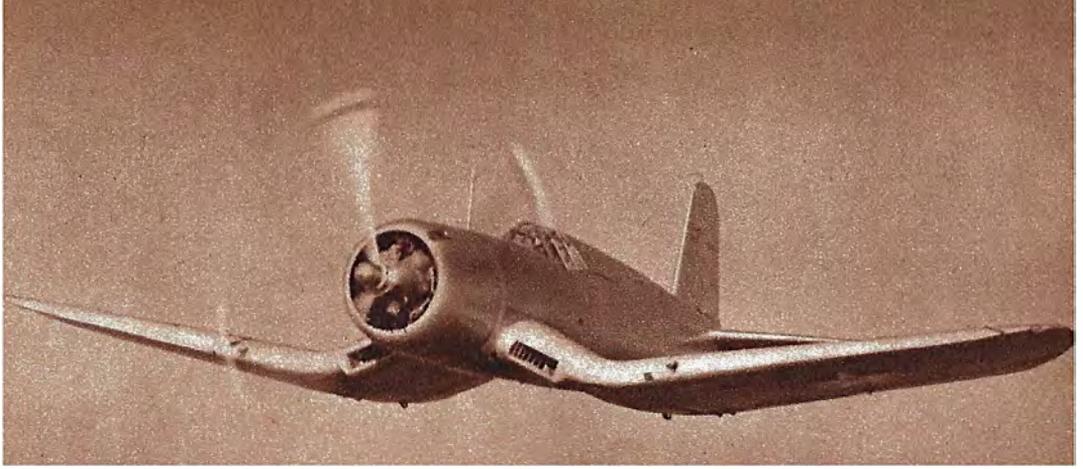


Above: The Prestone-cooled Allison engine delivers 1090 h.p. to Curtis P-40 fighters. Left: 1,000 h.P. air-cooled Wright Cyclone.

line engine is seldom more than 25% efficient. Much of the wanted energy is used to heat the air that passes through the radiator or around the cooling fins. Engine cooling, therefore, is really a matter of finding the best way to waste the energy that engineers don't know how to use.

Just imagine what your electric bill would

be if you plugged in an array of electric heaters and tried to keep 1,000 pounds of steel hot all day long—while a giant airplane propeller drove a constant icy blast to combat your efforts! The bill you would receive would give you a clear idea of the energy lost through the cooling system of an airplane engine. Every unit of 746 watts used would



Above: Vought-Sikorsky XF4U-1. It staged a cooling upset.

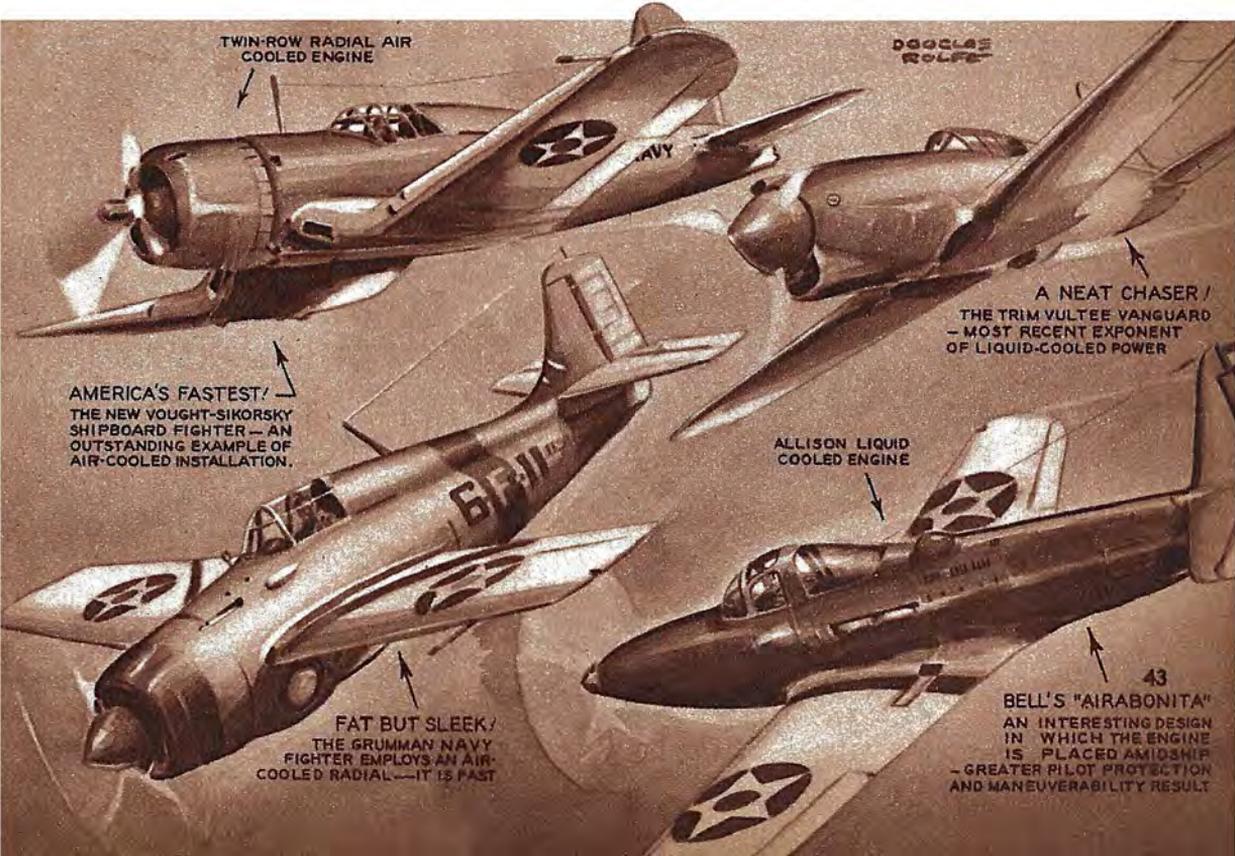
represent one horsepower lost. No method is known at present, however, to utilize the excess heat that must be dissipated through the cooling system. Only a relatively small amount of heat is actually needed to maintain the proper temperature in the manifold for vaporization.

Another fact about liquid-cooling that is seldom mentioned is the improved effectiveness of modern coolants. Certain cooling liquids commonly regarded merely as "anti-freeze," are really more effective coolants than water. Their ability to rid the engine of excess heat with greater efficiency than water, permits the use of smaller radiators. This, of

course, reduces the drag of an aircraft in flight. An example of this is to be found in the Prestone-cooled Allison engine used in the Curtiss P-40. Two tiny cylindrical radiators cool the 1,090 h.p. engine.

With the super-coolants of today and the resultant reduction in radiator size, fluid-cooling boasts of a definite advantage for military aviation use. The sleek fuselages possible with slender, fluid-cooled motors, afford excellent visibility to the pilot. The only way this can be approached with air-cooled engines is found in the inverted "V" engine, in the inverted tandem, or special fuselage designs. This fact no doubt accounts

Below: Cooling systems in modern American war planes.



TWIN-ROW RADIAL AIR COOLED ENGINE

DOUGLAS ROTOR

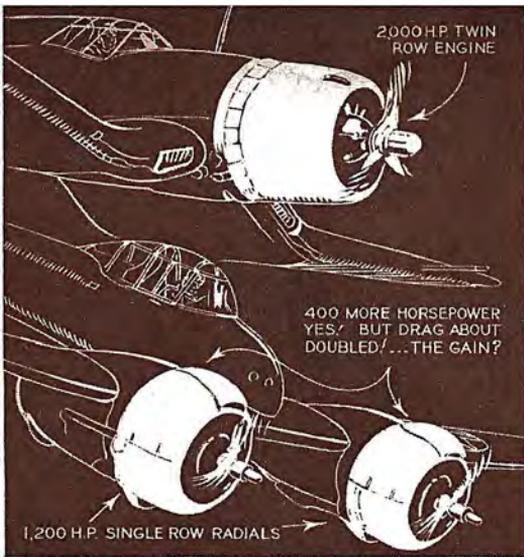
AMERICA'S FASTEST!  
THE NEW VOUCHT-SIKORSKY SHIPBOARD FIGHTER — AN OUTSTANDING EXAMPLE OF AIR-COOLED INSTALLATION.

A NEAT CHASER / THE TRIM VULTURE VANGUARD — MOST RECENT EXHIBENT OF LIQUID-COOLED POWER

ALLISON LIQUID COOLED ENGINE

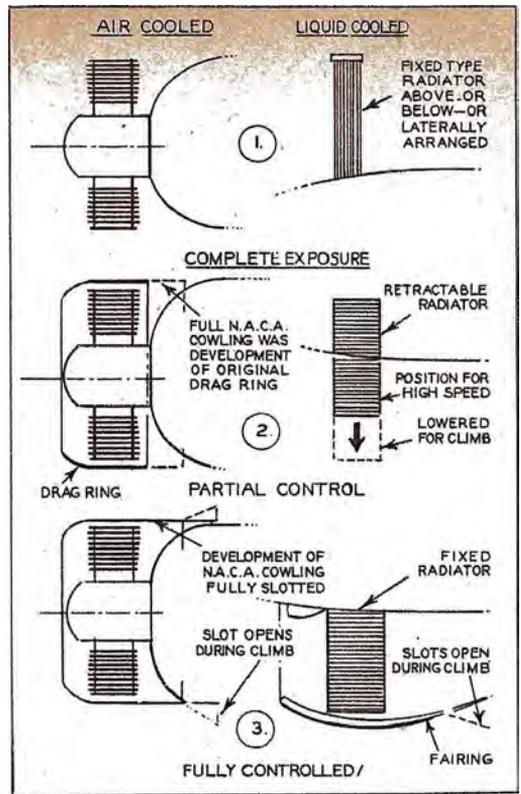
FAT BUT SLEEK / THE GRUMMAN NAVY FIGHTER EMPLOYS AN AIR-COOLED RADIAL — IT IS FAST

43  
BELL'S "AIRABONITA" AN INTERESTING DESIGN IN WHICH THE ENGINE IS PLACED AMIDSHIP — GREATER PILOT PROTECTION AND MANEUVERABILITY RESULT



HOW DOUBLE-ROW AIR COOLED RADIALS SCORE IN EFFICIENCY IS CLEARLY SHOWN HERE — COMBINED FRONTAL AREAS AND RESULTANT DRAG OF TYPICAL TWO-MOTORED INSTALLATION ARE RELATIVELY FAR GREATER THAN SINGLE ENGINE OF COMPARABLE POWER (DRAWINGS IN SAME APPROX. SCALE FOR EASY COMPARISON)

Above: The new XF4U-1 crams nearly 2,000 h.p. in its two-row air-cooled radial. The Grumman Skyrocket uses two single-row engines. Right: Process in adjustable cooling arrangements.



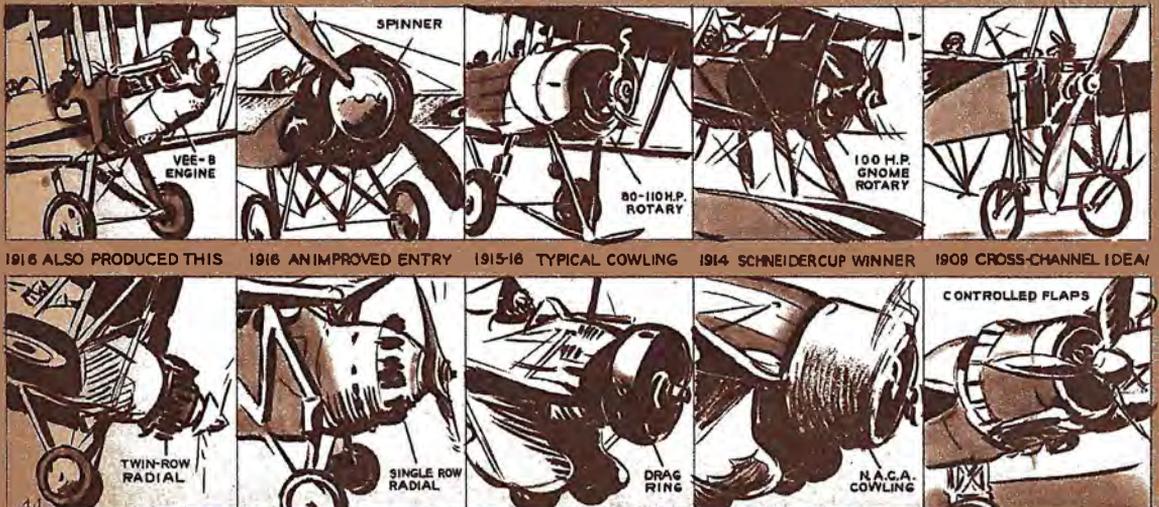
for the popularity of the fluid-cooled engines in current war use.

The cooling dispute reached a fever pitch in the last war. German engineers showed a decided preference for water-cooling. A factor that may have influenced them at that time was the difficulty of mass production of air-cooled cylinders. The fins made casting difficult. One well-known motor of that day sported cylinders that had to be machined on a lathe from 90-pound solid steel bars! Im-

Below: Development of streamlined air-cooling of power plants.

proved foundry techniques have made production much simpler since then. The German designers had considerable success with water-cooling. Their motors of 1914 showed great reliability at a time when that quality was none too common in aircraft engines. The clumsy appearance of such famous fighting planes as the Fokker DVII and the Albatross, however, resulted from the requirements of the then bulky water-cooled motors.

The Allies developed both types of cooling.



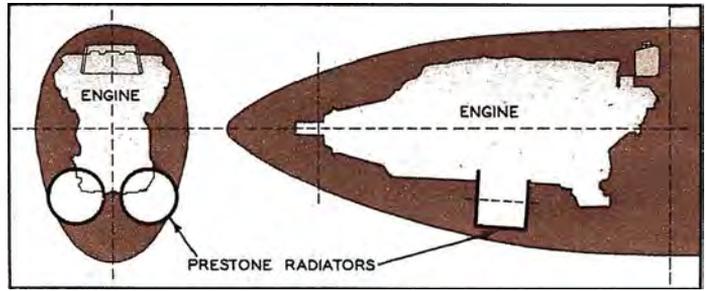
1915 ALSO PRODUCED THIS 1916 AN IMPROVED ENTRY 1915-16 TYPICAL COWLING 1914 SCHNEIDERCUP WINNER 1916 CROSS-CHANNEL IDEA/

1923 OUT IN THE COLD./ 1923 NEATER AND NICER TOWARDS THE GOAL/ FURTHER DEVELOPMENT TODAY-EFFICIENT COOLING

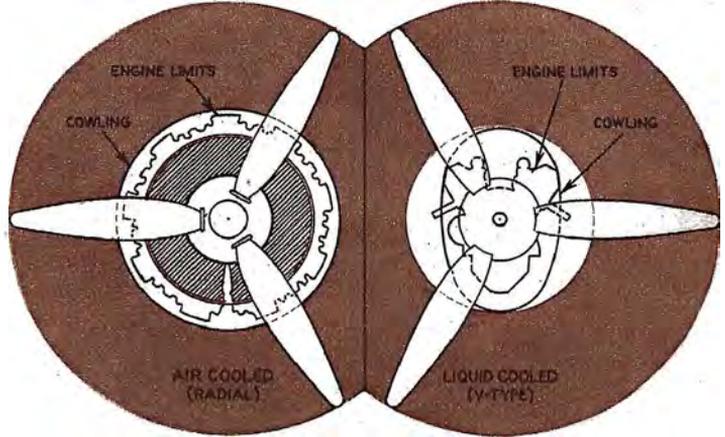
IMPORTANT STAGES IN THE DEVELOPMENT OF AIR COOLED POWER FOR AIRPLANES

The famous Gnome rotary engine, with its whirling cylinders and stationary crankshaft, was one of the most outstanding air-cooled motors of the war. In common with other air-cooled powerplants, it was very light for its horsepower. Its "flat" design aided in concentrating the weight of the plane, a feature that greatly enhanced maneuverability. The Canton and Unne (Salmson) motor, an unusual water-cooled radial, shared this quality, although heavier. The latter motor established an excellent record for reliability despite the rather complicated problem of water-cooling a radial engine. Moreover, it was often mounted horizontally, and geared to the propeller. (See sketch below.)

After the war, most American civilian planes were powered with mass-produced water-cooled war plane engines. Among the most famous of these were the Curtiss OX-5 and the world famed Liberty. The former motor was the mainstay of the "barnstormers." The Liberty helped to make history in 1919 by driving the Navy's NC flying boats on their transatlantic flight. Although three of these boats took part in the flight, only one, the NC-4, actually completed the trip. That fact may be partly re-



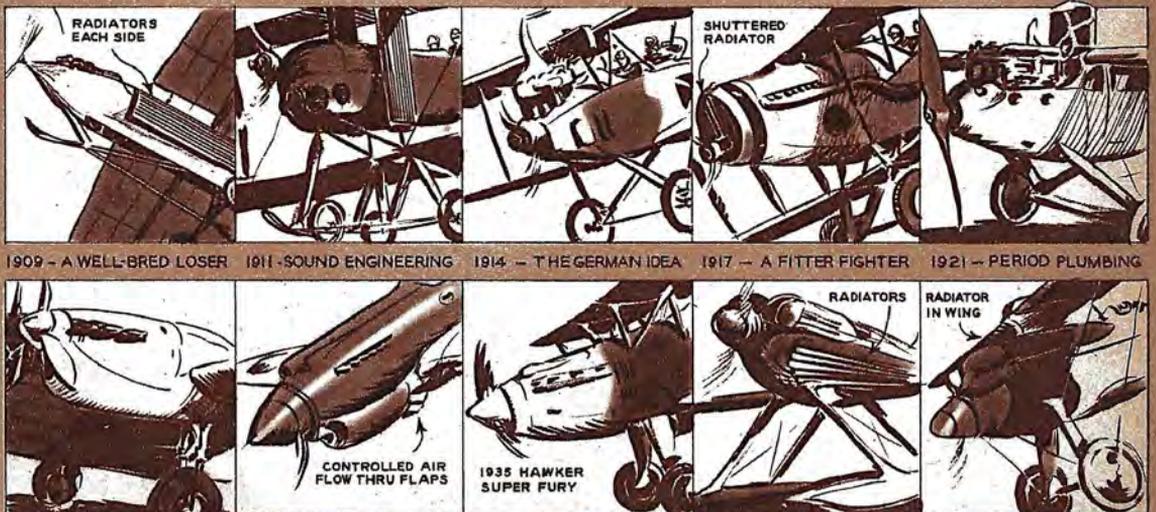
Above: The use of modern coolants makes small radiators possible. Drawing based on P-40 cooling system. Below: The small frontal area of liquid-cooled engine obstructs less propeller disc area than air-cooled job.



sponsible for the Navy's aversion to water cooling.

On June 14, 1919, water-cooled engines scored a real triumph. Two black cats and their English pilots, Alcock and Brown, sauntered across a field of thick Irish mud after having made the first non-stop airplane [Continued on page 140]

Below: How modern liquid-cooling evolved from early types.



1909 - A WELL-BRED LOSER 1911 - SOUND ENGINEERING 1914 - THE GERMAN IDEA 1917 - A FITTER FIGHTER 1921 - PERIOD PLUMBING  
 1941 - A WET WELLINGTON TODAY! A CLEAN NOSE BEFORE THE HURRICANE SCHNEIDER CUP WINNER 1923 - THE AWAKENING

# Wings Over The Water!



Seaplaning, which used to be exclusively a "rich man's sport," has, with the advent of good, light planes, become something which people of moderate means may enjoy.

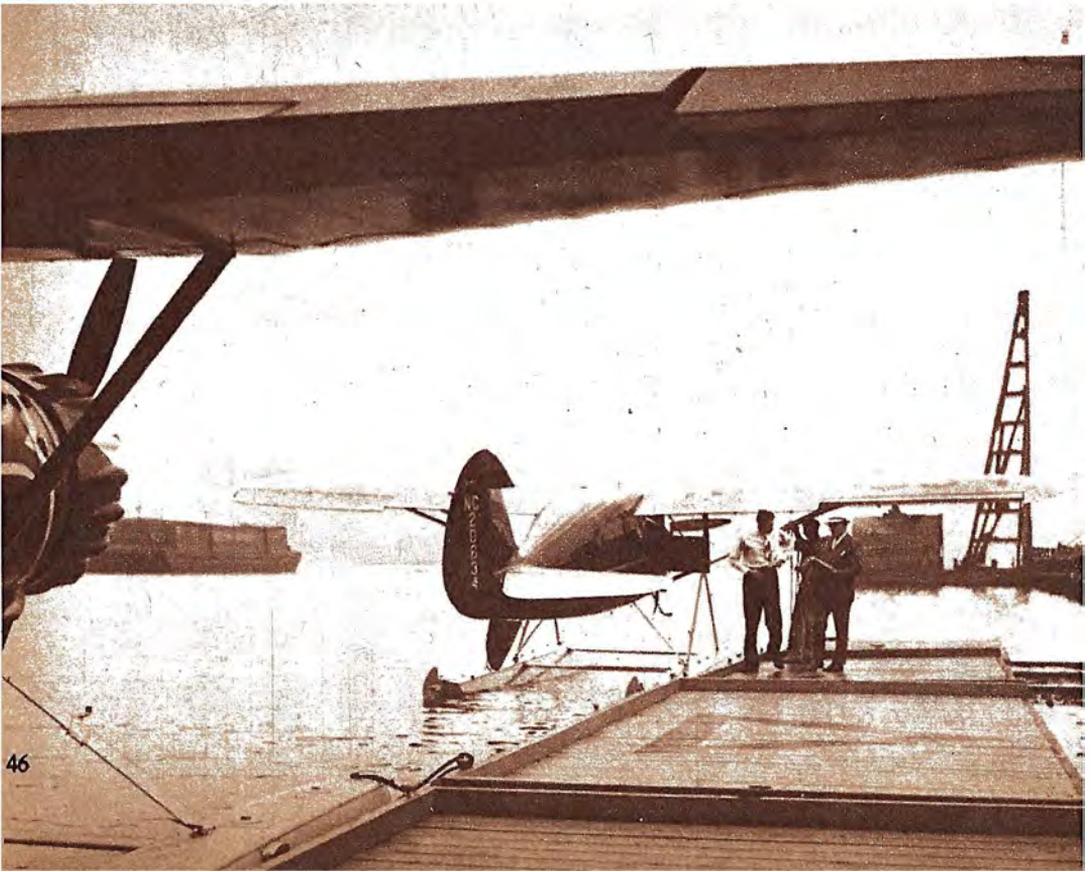
A THUNDER head was piling itself up against the sunset, but the Aeronca cabin job quickly left it behind and sped south over the coastline—only to be challenged to another race by a creeping white wall of fog as it plunged toward Lake Winnepesaukee at 100 miles an hour.

"Think we'll make it, Bud?" asked one of the occupants of the plane, anxiously.

"Sure, with plenty to spare," answered the pilot. "We'll be at Jack's in about ten minutes."

Ten minutes on the nose and the Aeronca came to rest on Lake Winnepesaukee and slowly made its way toward Jack McManus' seaplane base, where the men waited for more favorable weather before resuming their flight to Boston.

Below, is an NYA-built float at the Downtown Skyport, in New York City. The decks of the floats are painted the standard international orange color and carry the usual black triangle for identification. Floats such as this form a network of seaplane landings that dot the coasts and inland waterways of the country.





Hunters, like those shown at the left, have discovered that seaplanes are wonderful for getting them to the hunting territories and bringing them home.

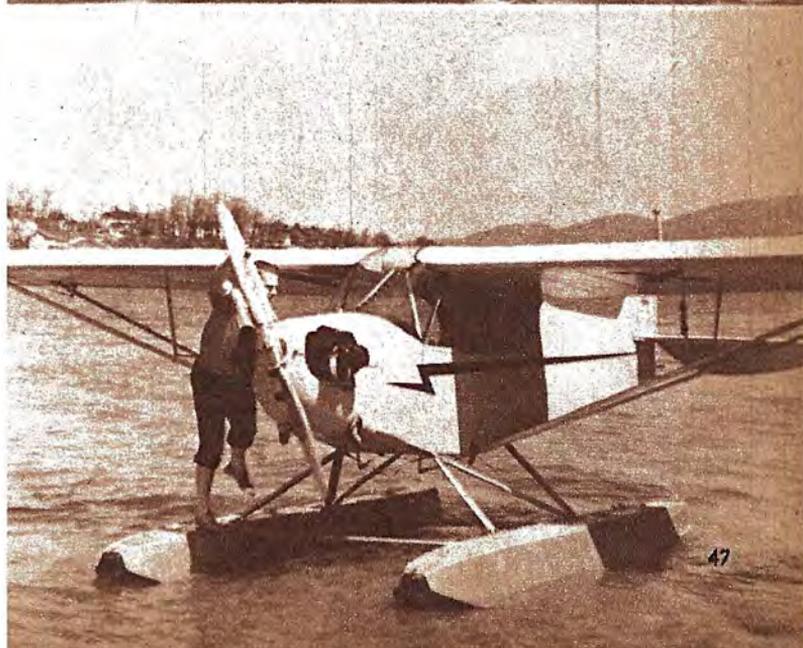
Seaplanes are a great help to fishermen, too! The man below is enjoying his fishing from a seat on one of the pontoons of the plane. If the fish don't bite, he can up and fly to a new spot!

These two men were heading home from a week end hunting trip in the woods of Maine. The trip alone, by any other mode of travel, would have consumed most of the week end. Instead, the two men chartered a seaplane at the Wiggins Airways in Boston, flew to Lake Winnepesaukee, breakfasted and continued to Naples, Maine, put in two solid days of hunting, and returned by the same route in time to report to work on Monday morning.

Seaplane operation is striking a responsive chord with the American public, which seems ready and willing to dish out hard cash for the fun of flying on water. The business is equally divided between pilots taking instructions or renting the plane for local flights, and the general public buying \$1 joy hops or the \$5 scenic rides.

Through the joint CAA-NYA low-cost seaplane base program some 300 floats have mushroomed throughout the country and there will soon be more. The fixed base operators bless the day they left a hot dusty

[Continued on page 136]

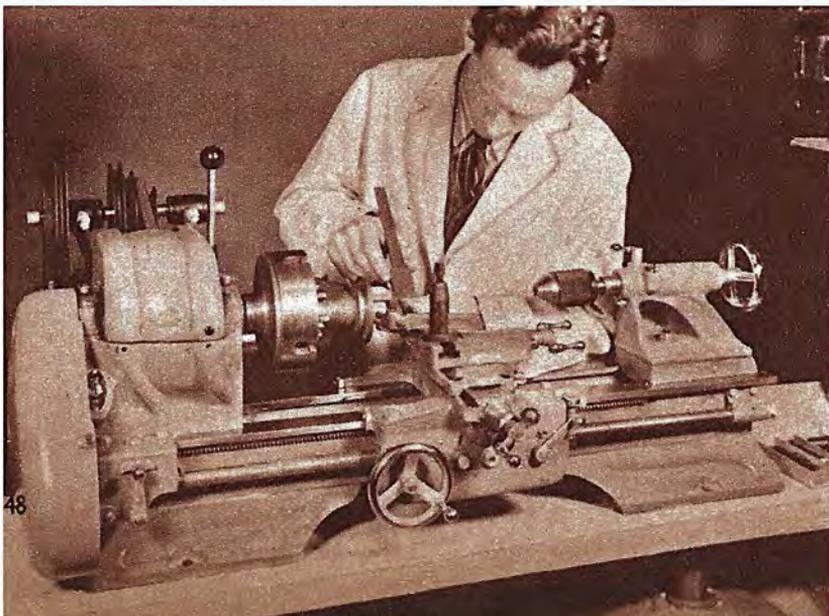


# YOU CAN WIN THESE

**FIRST PRIZE**  
\$1,500 Taylorcraft Airplane



A Taylorcraft plane, an Indian motorcycle, a lathe, and 100 other valuable prizes, to be given away absolutely FREE in the **MECHANIX ILLUSTRATED** contest!



**THIRD PRIZE**

Atlas Lathe  
and  
Accessories

# GREAT PRIZES!

**C**OME on, boys—it's still not too late!  
You still have a chance to enter the great  
**MECHANIX ILLUSTRATED** contest!

Get in this thrilling contest *today*—and you may win the \$1,500 Taylorcraft Trainer pictured on the opposite page, an Indian Junior Scout 1941 motorcycle, an Atlas lathe and accessories valued at \$225, or any one of a hundred other amazing prizes valued at thousands of dollars. They're all **FREE!**

Just look at that plane! Ever see anything like her? A perfect dream of a flying ship, that's what she is! And that motorcycle—why a fellow would give the shirt off his back to own a machine like that! Then look at the rest of these great prizes—that lathe, the Deagan marimba, the boats, radios, camera supplies, and shop equipment.

It's the most astounding collection of prizes ever offered to the readers of a magazine!

**B**UT here's the swell part of it—you can win one of these great prizes *just by playing a game!*

There are no essays to write in this contest, no box-tops to send in, no statements to fill out and no subscriptions to sell! All you have to do is play **MECHANIX ILLUSTRATED's** fascinating new word game, "Words-Within-Words."

You'll find this month's "Words-Within-Words" game on pages 56 and 57. You don't have to send it in now—just start working on it, and wait for next month's puzzle.

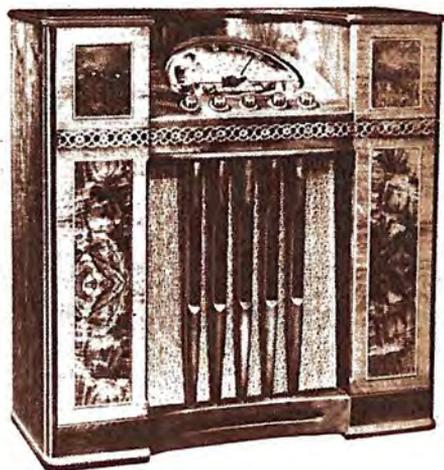
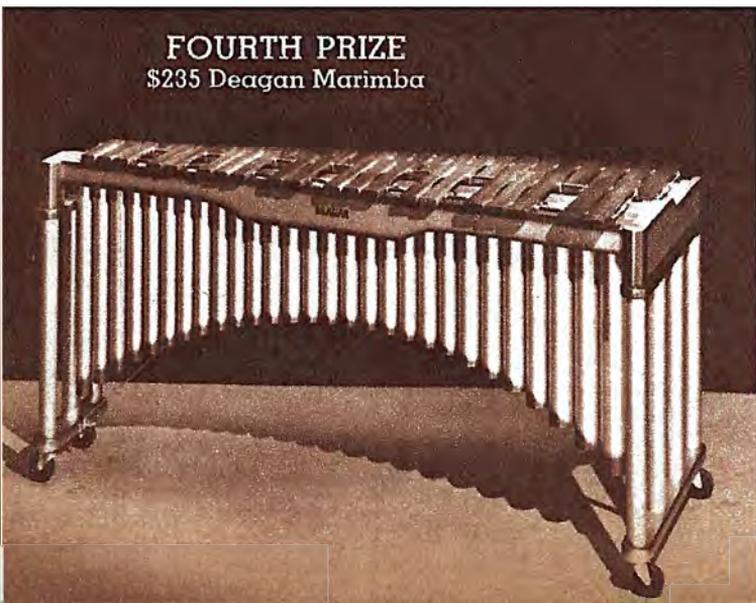
But start working on them *now!* And then get ready for the big closing puzzle in the April **MECHANIX ILLUSTRATED!**



**SECOND PRIZE**

1941 Indian Junior Scout Motorcycle

**FOURTH PRIZE**  
\$235 Deagan Marimba



**FIFTH PRIZE**  
Midwest Radio, valued at \$109.75



# Contest Prizes!



**6th PRIZE**  
\$100 Gruen Curvex  
Wrist Watch.

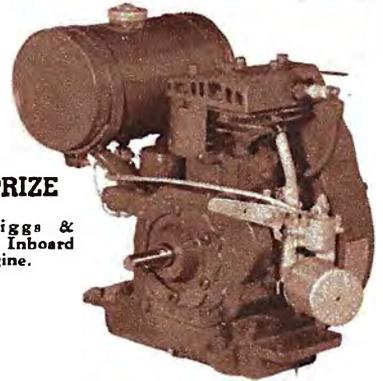


**7th PRIZE**

Choice: Fisher  
MT Scope or  
Fisher Junior  
Radio Pilot.



**8th PRIZE** Penn Yan Cartop Boat, value \$89.

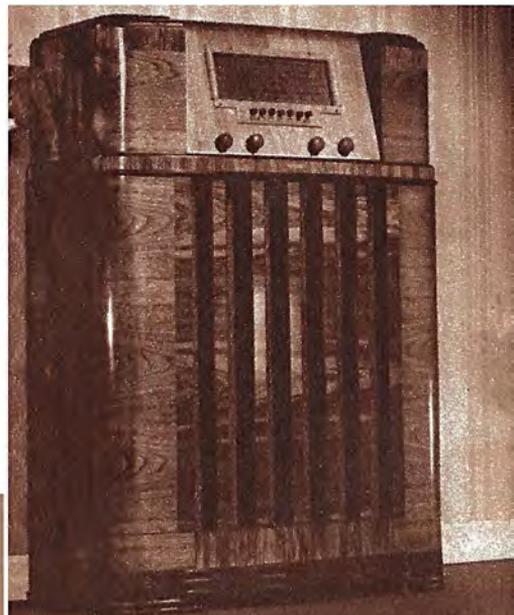


**9th PRIZE**  
\$75 Briggs &  
Stratton Inboard  
Engine.



**10th PRIZE** \$70 Mead Glider Ki-Yak.

**11th PRIZE** 12-Tube Knight Radio, value \$55.





**12th PRIZE**

\$50 Zephyrplane Jr. Belt Sander.

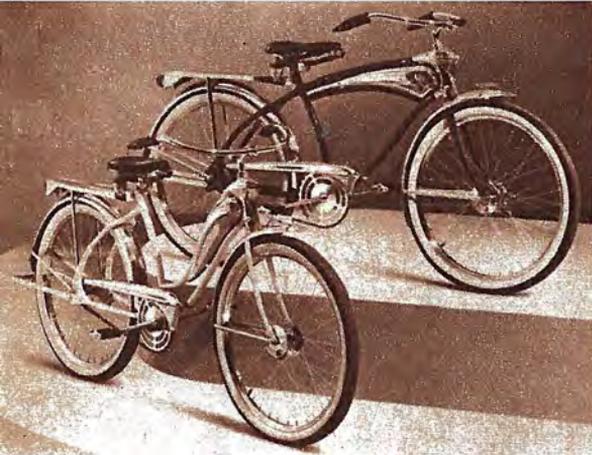


**13th PRIZE** Hallicrafters Marine Radio, value \$49.50.



**14th PRIZE**

Evinrude Ranger Outboard Motor, value \$47.50.



**15th PRIZE** Mercury Bicycle, value \$47.24.



**16th PRIZE**

Columbia Bicycle, value \$42.15.



**17th PRIZE**

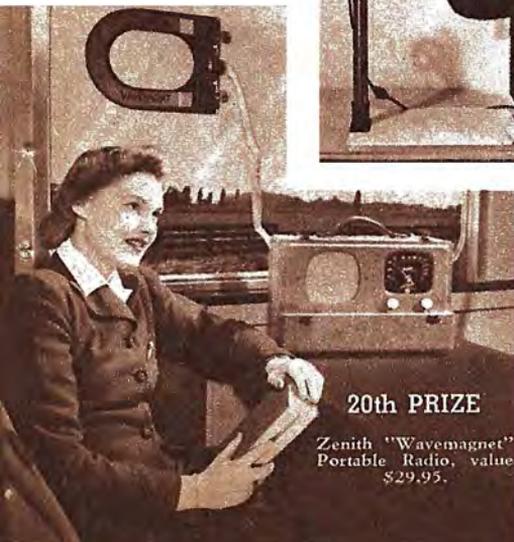
Marlin Model 90 Shotgun.

**18th PRIZE**

\$34.50 Burke & James Solar Enlarger.

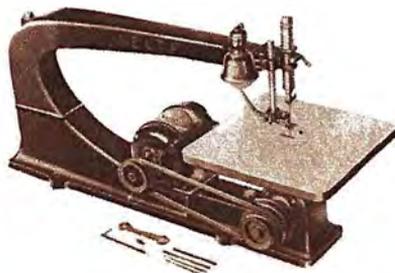


**19th PRIZE** Mossberg "Targo" Home Skeet-shooting Outfit, value \$32.10.



**20th PRIZE**

Zenith "Wavemagnet" Portable Radio, value \$29.95.



**21st PRIZE**

Delta \$29.90 4-Speed Scroll Saw.



# More Prizes!



## 22nd PRIZE

Foredom Portable Workshop,  
value \$29.45.



## 23rd PRIZE

\$25 Pflueger "Supreme"  
Fishing Reel.



## 24th PRIZE

Stanley Tool Chest, worth \$25.



## 25th PRIZE

\$23.50 Dremel  
Moto-Tool Kit.



## 26th PRIZE

General Electric Triple-Whip  
Mixer, value \$22.75.



## 27th PRIZE

Iver Johnson Champion Target  
Pistol, value \$21.25. (Winner must  
have state gun license!)



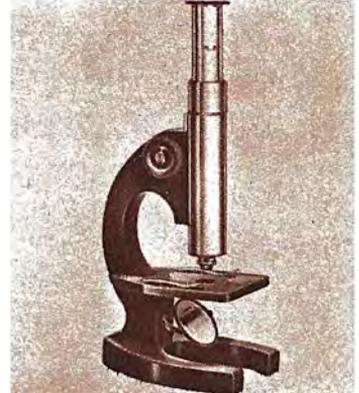
## 28th PRIZE

\$21.90 Federal Enlarger.



## 29th PRIZE

General Electric Exposure Meter.



## 30th PRIZE

\$21 Bausch & Lomb Microscope.

## 31st PRIZE

\$20 Flexible Flyer  
"Splifkein" Skis.



52

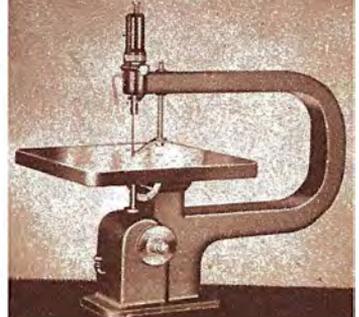
## 32nd PRIZE

\$20 RCA Victor Personal Radio.



## 33rd PRIZE

Boice-Crane Jig Saw,  
value \$19.95.





**34th PRIZE**

Hein-Warner Model OS "O'Boy"  
Hydraulic Jack, value \$19.95.



**35th PRIZE**

\$19.95 Motorola Bike Radio.



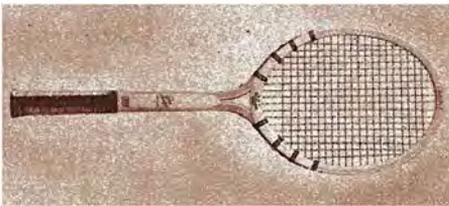
**36th PRIZE**

\$19.75 Sheaffer Crest  
Lifetime Ensemble.



**37th PRIZE**

\$17.50 Remington  
Rand Triple Header  
Electric Razor.



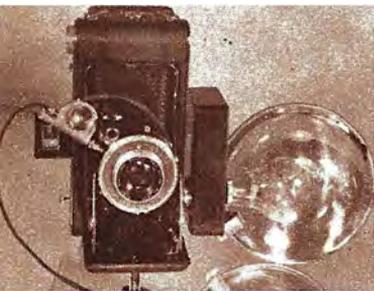
**38th PRIZE**

\$17 Wilson  
Don Budge Autograph  
Tennis Racket.



**39th PRIZE**

Wilcox-Crittenden Marine  
Compass, value \$16.50.



**40th PRIZE**

\$14.95 Kalart Speed Flash Outfit.



**41st PRIZE**

Casco Electri-Craft Set, value \$14.95.



**42nd PRIZE**

Blackhawk Hexite Wrench Set,  
value \$14.35.

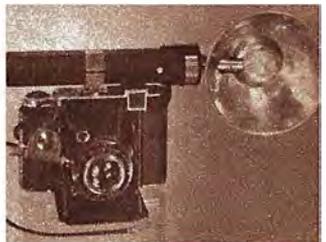


**43rd PRIZE**

\$13.75 J. B. Wil-  
liams Roto-Shaver.

**44th PRIZE**

A. C. Gilbert Locomotive &  
Tender Kit, value \$12.50.



**45th PRIZE**

\$11.50 Kalart  
Speed Flash Outfit.



# More Prizes!

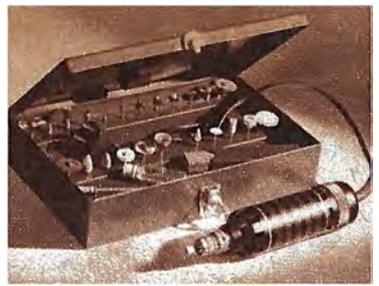
46th PRIZE

\$10.95 Genuine "Alaska"  
Sleeping Bag.



47th & 48th  
PRIZES

De luxe "Handee"  
& De luxe "Artizan"  
Workshop Tools.



49th PRIZE

Ronson "Crown" Table  
Lighter, value \$10.



50th PRIZE

K-D Adverse Weather  
Lamp, value \$10.



51st PRIZE

Axel "Rainsulter,"  
value \$10.



52nd PRIZE

\$10 DeJur-Amsco  
Exposure Meter.



53rd PRIZE

\$9 Utica "Dux-  
bak" Hunting  
Jacket.



54th PRIZE

G-M Standard Exposure  
Meter, value \$8.75.



55th  
PRIZE

Kirsten Scientific  
Pipe, value \$8.50.

56th  
PRIZE

Benjamin Super Single  
Shot Air Rifle, value  
\$8.50.



57th PRIZE

Weed Tire Chains,  
value \$7.75.



58th PRIZE

\$7.50 Brownie  
Junior Model  
Gas Engine.



59th & 60th  
PRIZES

G.H.Q. Model  
Gas Engines,  
value \$6.95.



61st PRIZE

Comet Sailplane  
Gas Model Kit,  
value \$5.95.



62nd PRIZE

Albert Specialty  
"Foldex" Camera  
Tripod.

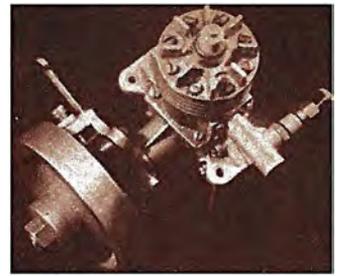




**63rd PRIZE**  
\$5 Gale Kaywoodie Pipe.



**64th PRIZE** Polaroid Day Glasses.



**65th, 66th & 67th PRIZES**  
Three \$4.95 G.H.Q. Motor Kits.



**68th PRIZE**  
\$4.85 Haynes Photometer.



**69th PRIZE**  
Dremel Moto-Saw, value \$4.85.



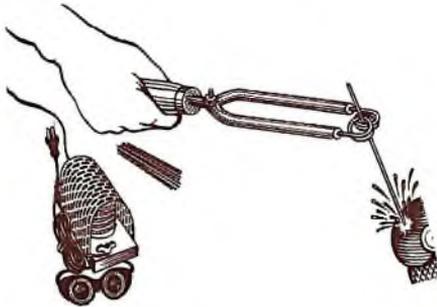
**70th PRIZE**  
\$4.50 Boyce-Meier Sextant.



**71st PRIZE**  
Hull Streamline Auto Compass, value \$2.95.



**72nd PRIZE** \$2.95 Daisy "Red Ryder" Carbine.



**73rd PRIZE**  
Handiweild Electric Welder, value \$2.95.



**74th PRIZE**  
Kirsten Cigarette Holder, value \$2.



**75th PRIZE**  
Hull Pocket Compass

—AND STILL MORE PRIZES!

- Prize No. SCALE BLUEPRINTS FOR:
- 76—"Bonnie," 18' Auxiliary Sloop.
  - 77—"Pixie," 20' Plywood Auxiliary Cruiser.
  - 78—"Buzzer II," 14' Outboard.
  - 79—"Zipper," 20' Bilgeboard Scow.
  - 80—"Chieftain," 70 m.p.h. Ice Sled.
  - 81—"MI Whirlwind," Air Driven Model Car.
  - 82—"Electra," Model Cruiser.
  - 83—"XP-3," Gas-Powered Model Plane.
  - 84—"Barbara Q," 15' V-bottom Utility Outboard.
  - 85—"Jitterbug," 17½' Cabin Sailboat.
  - 86—"Midge," 7½' Roped Dinghy.
  - 87—"Mountain Lake," Plywood Skiff.
  - 88—"Zinky Dink," Unsinkable Steel Rowboat.

- Prize No. SCALE BLUEPRINTS FOR:
- 89—"Tahiti," 30' Ocean Cruising Ketch.
  - 90—"Oriole," 22' V-bottom Cabin Cruiser.
  - 91—"Polaris," 25½' Auxiliary Sloop.
  - 92—"Kingfisher," 20' Raised Deck Cruiser.
  - 93—"Corky," 18' Sailboat.
  - 94—"Pirate Too," 17½' Cabin Sloop.
  - 95—"Sea Rover," 24' Cabin Auxiliary Sloop.
  - 96—"Scram III," 15½' Speedboat.
  - 97—"Cloud Clipper," Passenger Carrying Glider.
  - 98—"Stormy Petrel," 26' Cruiser.
  - 99—"Pilgrim," 22' Auxiliary Sloop.
  - 100—"Super Sunray," Racing Sloop.

# Here Are Puzzles Nos. 1 & 2

## CONTEST RULES

1. A different "Words-Within-Words" puzzle appears in the February, March and April issues of this magazine. Puzzle Number 2 is on the opposite page. A reprint of Puzzle Number 1 appears on this page, for those who may have missed the February issue. Contestants will complete each of the three puzzles, striving to attain a high score, printing this score in the proper space, marked "Total" on the entry blank. The third entry blank will contain a space to print your "grand total," the total number of points accumulated in all three puzzles.
2. The individual having the largest correct "grand total," as printed on the third entry blank, will win first prize. The individual having the second largest correct "grand total" will win second prize, etc. Duplicate prizes will be awarded in case of ties.
3. Do not send in entry blanks separately. Save blanks until you have all three. Then send them together, by first-class mail, to "Words-Within-Words" Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York City.
4. Contestants may submit legible copies of the first two entry blanks as their official entry if they so desire. The third entry blank must be the one clipped from the April issue of MECHANIX ILLUSTRATED. (Note: This is permitted because we believe contestants may find it possible to secure a larger score after a little practise, and such practise may mess up the original blank. With that in mind you may want to practise a bit on a separate sheet before filling out the entry blank appearing in the magazine.)
5. Webster's New International Dictionary, Second Edition will be consid-

ered final authority on acceptance of words used in the puzzles.

6. This contest closes April 1, 1941. Entries post-marked later than that date will not be considered.
7. No entries will be returned, nor can we enter into correspondence regarding this contest. Judges will be the editors of MECHANIX ILLUSTRATED. Their decisions are final. Anyone in the United States and Canada may compete except employees of Fawcett Publications, or members of their families.

Below is a reprint of Puzzle No. 1, which appeared in the February issue. Contestants may use this blank or a legible copy of it, as an official entry in the contest.

PAR FOR PUZZLE NO. 1 IS 225

| PUZZLE NO. 1 |  |  |  |  |  |  |  | TOTAL |
|--------------|--|--|--|--|--|--|--|-------|
| C            |  |  |  |  |  |  |  |       |
| R            |  |  |  |  |  |  |  |       |
| A            |  |  |  |  |  |  |  |       |
| F            |  |  |  |  |  |  |  |       |
| T            |  |  |  |  |  |  |  |       |
| S            |  |  |  |  |  |  |  |       |
| M            |  |  |  |  |  |  |  |       |
| A            |  |  |  |  |  |  |  |       |
| N            |  |  |  |  |  |  |  |       |
| S            |  |  |  |  |  |  |  |       |
| H            |  |  |  |  |  |  |  |       |
| I            |  |  |  |  |  |  |  |       |
| P            |  |  |  |  |  |  |  |       |
| TOTAL        |  |  |  |  |  |  |  |       |

### CONTESTANTS!

Would you like to have a chance to win a cash prize, as well as one of the regular contest prizes, shown on the preceding pages? If so, turn to page 79 and see how you can win a Cash Sponsorship prize, merely by telling some of your friends about MECHANIX ILLUSTRATED'S great "Words-Within-Words" contest!

# In The MI PRIZE CONTEST

## HOW TO DO "WORDS-WITHIN-WORDS"

Insert on each horizontal line a single word, of not more than eight letters, the first letter of which is already printed on that line. These letters, already on the puzzle and reading from top to bottom, comprise the KEYWORD. Each word you fill in on horizontal lines must consist of letters appearing in the KEYWORD. Any English word appearing in the Webster's New International Dictionary, Second Edition, may be used, provided no letter appears in your word more often than it appears in the KEYWORD. Example: If "T" appears in the "Keyword" three times, it may not be used more than three times in any one horizontal word. No word may be used more than once in the same diagram. Plurals are permissible.

Method of scoring: Each letter in the finished diagram counts one point the first time it is used, two points the second time it is used, three points the third time, etc. In filling spaces, place letters below and their point value above the curved line as shown in the Specimen Puzzle on this page. Thus, above the first letter of the KEYWORD put the figure 1. Place 2 above the letter the next time it is used, 3 above it the third time, etc. Your completed diagram will show a score above each letter of each word. Then total all numbers appearing in each horizontal line. The total of these figures, is your total for the puzzle.

PAR FOR THIS IS 210

| SPECIMEN PUZZLE |                |                 |                 |                |                |  |  | TOTAL |
|-----------------|----------------|-----------------|-----------------|----------------|----------------|--|--|-------|
| M <sup>1</sup>  | A <sup>1</sup> | I <sup>1</sup>  | N <sup>1</sup>  |                |                |  |  | 4     |
| A <sup>2</sup>  | C <sup>1</sup> | T <sup>1</sup>  | I <sup>2</sup>  | N <sup>2</sup> | G <sup>1</sup> |  |  | 9     |
| N <sup>3</sup>  | U <sup>1</sup> | T <sup>2</sup>  |                 |                |                |  |  | 6     |
| U <sup>2</sup>  | R <sup>1</sup> | N <sup>4</sup>  |                 |                |                |  |  | 7     |
| F <sup>1</sup>  | A <sup>3</sup> | I <sup>3</sup>  | R <sup>2</sup>  |                |                |  |  | 9     |
| A <sup>4</sup>  | G <sup>2</sup> | A <sup>5</sup>  | I <sup>4</sup>  | N <sup>5</sup> |                |  |  | 20    |
| C <sup>2</sup>  | A <sup>6</sup> | R <sup>3</sup>  | T <sup>3</sup>  |                |                |  |  | 14    |
| T <sup>4</sup>  | R <sup>4</sup> | I <sup>5</sup>  | M <sup>2</sup>  |                |                |  |  | 15    |
| U <sup>3</sup>  | N <sup>6</sup> | I <sup>6</sup>  | T <sup>5</sup>  |                |                |  |  | 20    |
| R <sup>5</sup>  | A <sup>7</sup> | I <sup>7</sup>  | N <sup>7</sup>  |                |                |  |  | 26    |
| I <sup>8</sup>  | N <sup>8</sup> | N <sup>9</sup>  |                 |                |                |  |  | 25    |
| N <sup>6</sup>  | U <sup>4</sup> | N <sup>11</sup> |                 |                |                |  |  | 25    |
| G <sup>3</sup>  | R <sup>6</sup> | I <sup>9</sup>  | N <sup>12</sup> |                |                |  |  | 30    |
| TOTAL           |                |                 |                 |                |                |  |  | 210   |

A par, or average score, will be given with each of the three contest puzzles. Do your best to beat par!

A careful study of the "Specimen Puzzle" appearing on this page is recommended, as it illustrates the correct scoring procedure.

PAR FOR PUZZLE NO. 2 IS 275

| PUZZLE NO. 2 |  |  |  |  |  |  |  | TOTAL |
|--------------|--|--|--|--|--|--|--|-------|
| M            |  |  |  |  |  |  |  |       |
| E            |  |  |  |  |  |  |  |       |
| C            |  |  |  |  |  |  |  |       |
| H            |  |  |  |  |  |  |  |       |
| A            |  |  |  |  |  |  |  |       |
| N            |  |  |  |  |  |  |  |       |
| I            |  |  |  |  |  |  |  |       |
| Z            |  |  |  |  |  |  |  |       |
| A            |  |  |  |  |  |  |  |       |
| T            |  |  |  |  |  |  |  |       |
| I            |  |  |  |  |  |  |  |       |
| O            |  |  |  |  |  |  |  |       |
| N            |  |  |  |  |  |  |  |       |
| TOTAL        |  |  |  |  |  |  |  |       |

NAME .....

ADDRESS .....

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

If you were sponsored in this contest fill out the following. If not, leave these spaces blank.

SPONSOR'S NAME .....

ADDRESS .....

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

Save this puzzle and Puzzle No. 1 until you have completed Puzzle No. 3, appearing in the April issue of MECHANIX ILLUSTRATED. Send all three completed puzzles in together.

# Secrets of The Old Masters!



AS THESE pictures show, the X-ray is revealing hidden details of the artistic masterpieces of the past. The old masters used white lead in various parts of their pictures, and white lead, it happens, stops X-rays. That fact makes the present day X-ray "detective work" possible.

Famous artists of yesterday were likely to use white lead most heavily on such parts of a portrait as the forehead and nose—points where the light strikes most powerfully. The parts of the face that appear in shadow, such as eyes and cheeks, are done with other paint.

This interesting process was first employed by Mr. Alan Burroughs and Dr. J. Lloyd Bean, a physicist. The first X-rays of paintings, or "shadowgraphs" as the developed films are called, were taken in the Fogg Museum and the Museum of Fine Arts in Boston.

One of the latter museum's paintings, a Holbein portrait of Sir William Butts, dating back to 1543, was "discovered" beneath another painting. The surface painting (which had been thought genuine) was then cleaned off. The real Holbein portrait which had been painted over, was then restored.

Francisco Jose De Goya's "Portrait of a Spanish Lady" shown on this page, is another example of shadowgraph detection. The child had been painted out.



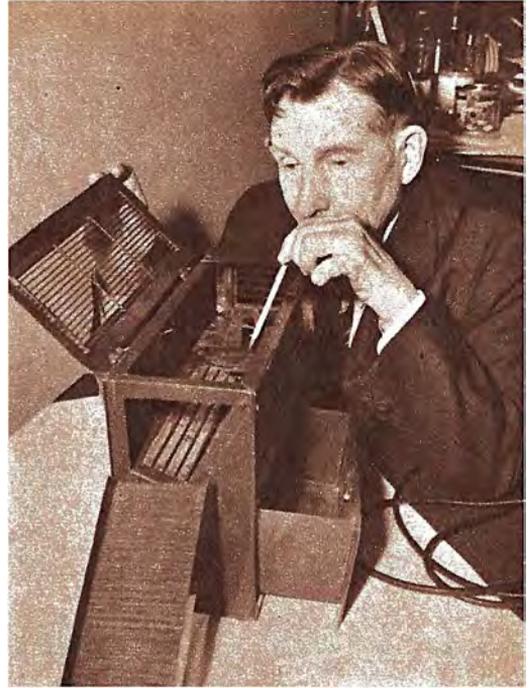
Top: "Portrait of a Spanish Lady." This famous painting shows only a handkerchief where the X-ray shows a child. The curvature of the wrist aroused suspicion that some detail had been painted over. Center: The child revealed by the shadowgraph is expected to be restored. Right: X-raying a portrait in the Dallas, Texas, Museum of Fine Arts. This is very exacting work.





## Mechanical Chiropractor

**M**ISS BERYL THORPE doesn't look very comfortable in this exercising and adjusting machine. Displayed at the Inventors of America Show, in Los Angeles, California, the machine stretches muscles. A head and neck exerciser makes the user's neck delightfully limber. The whole apparatus hangs from a hook. You simply get in it and stretch.

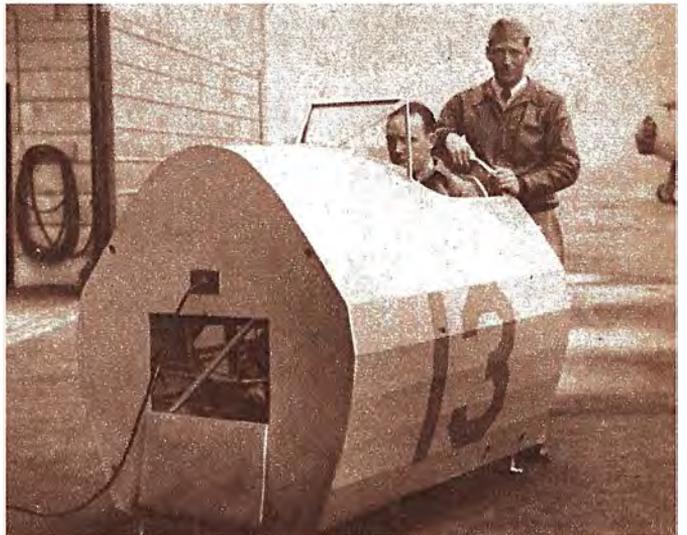


## 8,000 Volts Kill The Mouse

**I**NVENTOR FRANK FORD points proudly to the deadly mechanism of his new electrical mousetrap which was shown at the same exhibition as the apparatus to the left. The trap grabs the hapless mouse by the neck with a pair of pincers, hurls 8,000 volts through it for a quarter of a minute, and then drops it through a trap door into a steel box.

## Learn To Fly With Electric Bells

**I**NSTRUCTOR H. G. NICHOLSON, of the Air Corps Training center at Oxnard, California, invented this flight training device. It is a duplicate of a training plane's cockpit, complete with all controls. In early lessons, the controls are connected together to work automatically in proper coordination. Later, when the student must operate them, any mistake rings a bell.



The boys who make the noise are all set to forget their old tricks and learn new ones for radio's new revolution in the transmission of sound—frequency modulation!

# THE SOUND OF

by Jo Ranson and Dick Dorrance



With frequency modulation, tea being poured will sound like tea being poured, and not like rain on a roof, or the roar of Niagara Falls.

IT'S not too unlikely that if you attend a radio broadcast sometime a few years from now you may find a sign outside the studio door reading: "Please leave all keys, coins and metallic objects here until conclusion of the broadcast."

And then, if you are wearing a dress shirt front, stiff and starched, you may well be stopped by a courteous usher at the entrance to the studio who will say: "Sorry, sir, no persons in formal dress are permitted at the broadcast."

If you do enter the studio, you will probably find when the program starts that the announcer and other principals use no scripts, or maybe have their lines printed on limp, flexible paper that makes no sound.

Sound, you see, is getting to be a problem in broadcasting. Not only extraneous, unwanted noises, but sound that is a perfect reproduction of the real thing, lending a new depth and reality to radio programs as they are heard in the home.

The reason for all these startling changes and many more in the business of broad-

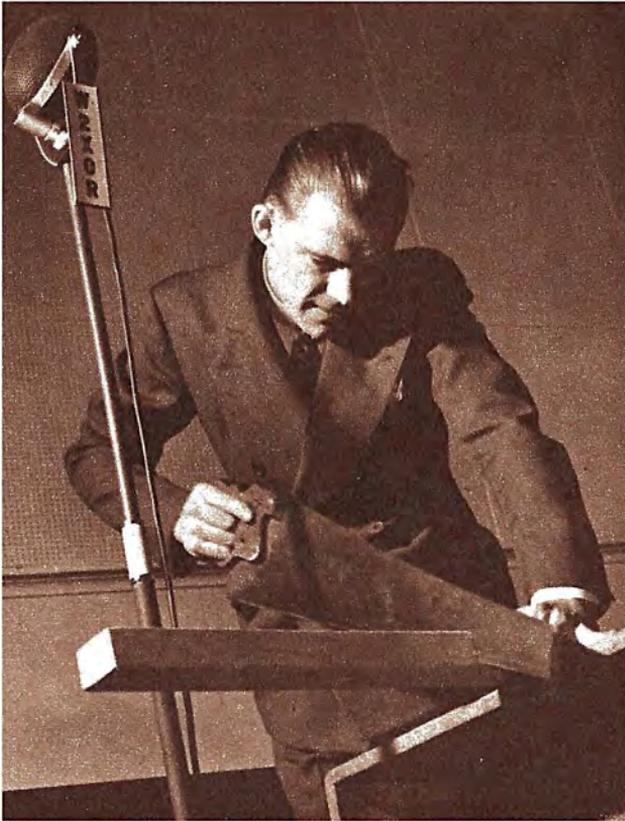
casting is contained in two cryptic letters—FM—which stand for "frequency modulation." That in turn means a new kind of radio transmission which has a whole hatful of much-needed advantages.

Probably there is no single group as excited about the possibilities of FM than the sound effects men. These imaginative gentlemen who are daily called upon to imitate every noise from Niagara plunging over a rocky cliff, to the first peep of a newly-born chick, find that FM offers them an immeasurably better



The boiled shirt, as worn by this broadcaster, will be out when the acute ear of FM is widely used.

# THINGS TO COME!



The man at the left sawing wood sounds to the listener of this FM station just like a man sawing wood! Note the "ostrich egg" microphone. Above: Major Edwin Armstrong.

chance to display their talents. FM, you will recall, is the new noise-free, crystal-clear type of radio transmission developed by Major Edwin H. Armstrong, one of radio's greatest living figures (see MI for May, 1940). So great has been the interest of the radio industry in frequency modulation during the past year that at least 200 new stations are expected on the air, operating with FM, before 1941 ends. Because of its complete absence of background "rush" and internal tube noises in the receiver, FM programs come over the air against a background of complete silence. When no music or voices are being transmitted, you cannot tell whether your set is on or off.

FM possesses a tonal range far beyond that of standard, or amplitude modulation (AM), broadcasting, being able to reproduce all notes from the bassiest 30 cycles up to the extreme treble of 15,000 cycles—a range superior even to that of an excellent musical ear.

But most important for the sound engineers is the fact that over FM things always sound like exactly what they are. If you crumple cellophane in front of the microphone—it sounds like cellophane being crumpled and not a raging forest fire. The tinkle of coins is precise, so much so that you can even tell what denomination they are. Bells sound like bells and not buzzers. A gong clangs, and you hear every lingering overtone in a wavering haze of perfect sound.

The sound effects men have not always had an easy life. Everyone has seen or heard of the peculiar contraptions they are often forced to devise when creating a certain noise to the satisfaction of the radio audience.

The life of the sound effects man, ever a squirrelish existence, promises to be even more unpredictable under the influence of FM. The possibility of whole automobiles rolled into the studio, of gravel walks being built on the studio floor, of real rain falling



Skilled in their work, these girls are wiring power units for a General Electric 250-watt FM transmitter.

from the ceiling—are all lively and likely vistas.

NBC, even now, has 16 “gunmen” in its sound effects department who handle the gunplay for radio skits. It has been necessary for the New York Police Department to issue permits to these men because they use real guns. Despite the fact that blank cartridges provide ammunition, each gun is checked twice before being used in the studio.

The playfulness of sound effects men sometimes extends beyond the walls of the broadcasting station. CBS still chuckles over one screwball who operated a complete sound effects set-up at his home near New York’s fashionable Sutton Place. His idea of fun was to come home at two in the morning, roll his loudspeaker up to the window, turn the volume on full—and then simulate a train coming into a station.

Half-awakened sleepers heard the slowing chug of the drivers, a hiss of steam, a whistle—all in the court of their apartment house. Then a voice would shout “Board!” loudly, and the mythical train pulled out of the

mythical station—leaving the neighbors in near panic.

His other tricks included having a bombing plane apparently dive into the courtyard, engines screaming, then pull up in a sharp dive, followed a few seconds later by the detonations of bombs. A third highly effective stunt featured an auto wreck in the courtyard, with a skid, broken glass and screams. The last item on the program eventually proved so real that it brought two police radio cruisers to the scene.

Listeners are usually rather observant of sound effects on the air. One man—a mechanic—applied for a job at NBC with the following letter: “I have noticed that the gears in the transmissions of all your cars are worn and exceptionally noisy in first and second.”

It took the sound men a little while to explain to this individual that if the gears didn’t make any noise, the listeners would never know that the imitation automobile was there!

Realism can be carried a notch too far. During a recent Phil Baker program, the



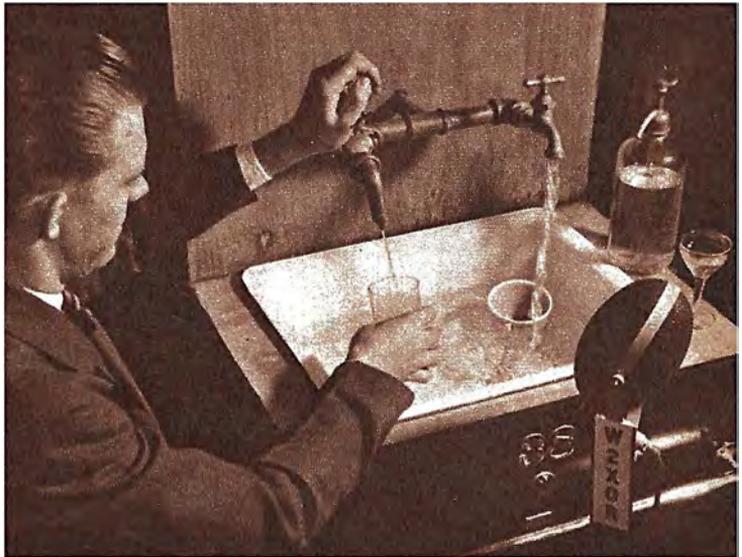
FM will be alternately a delight and a problem to the sound effects men. A man lighting a match, as the one at the left, will be heard distinctly by listeners. On the other hand, script paper that crackles will be taboo.

necessity for the sound of frying bacon occurred in the script. So the sound men just took a frying pan, some raw bacon, and proceeded to fry it in front of the microphone. It was an audible success — except that the odor wafted up into the air conditioning system and thence all over New York's Radio City!

After considerable sniffing, executives traced the lunch wagon aroma and immediately handed down a mandate that in future all cooking in the studios—even for the sake of pure illusion—was out so far as NBC is concerned.

And the business is also fraught with dangers. Recently a noise expert landed in the hospital with a badly cut leg as the result of kickback from a thunder machine. He bumped the gadget accidentally, causing it to swing back and catch him on the leg. The official report was worded: "Wounded on the field of rattle."

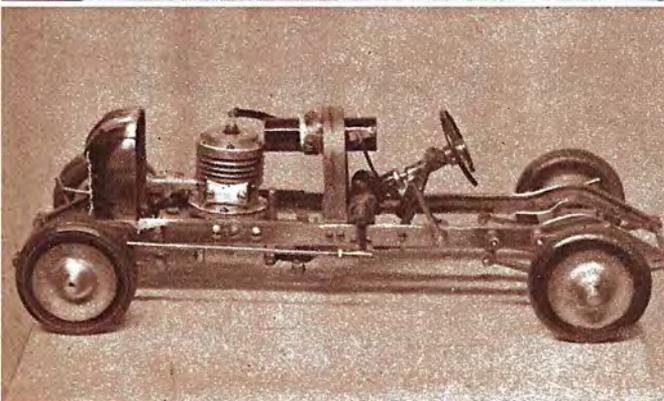
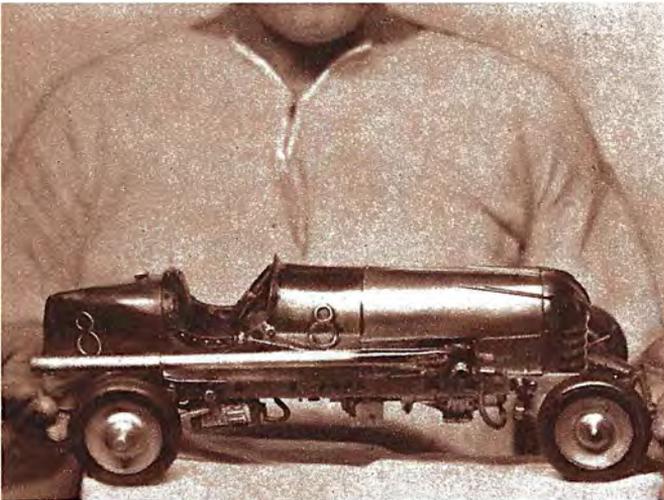
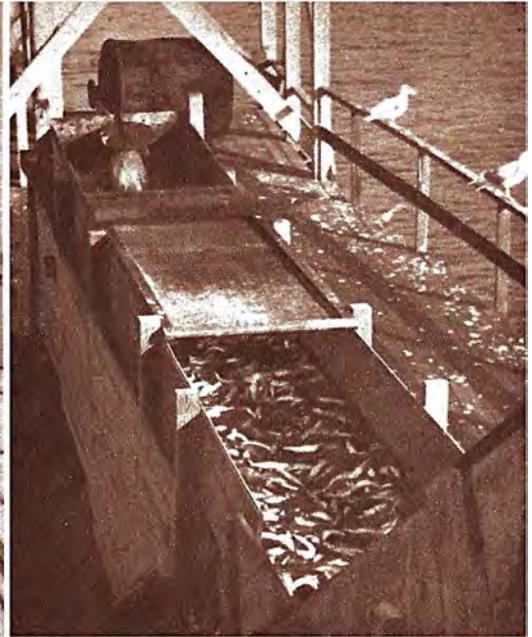
Ray Kelly, who is head of the sound effects department at NBC, feels rather enthusiastic



Microphone at New York FM station W2XOR picks up the sound of running water.

about FM. "There is no doubt," he says, "that FM will prove a boon to the sound effects engineer. It will make things a lot easier than they are now. We won't have the restrictions on high audio volume. I'm referring to the explosion sounds that give us so much trouble—such as pistol shots, thunder.

[Continued on page 134]



## Plumbers' Nightmare —Sardine Pipes

**S**ARDINE canners of Monterey, California, sent thousands of tons of sardines swirling through pipe lines from fishing boats to cannery, in the 1939-1940 season. The rugged shoreline makes boat landing difficult. The answer is the type of pipe line shown under construction at the upper left. Upper right picture shows entrance hopper. The fish are pumped through.

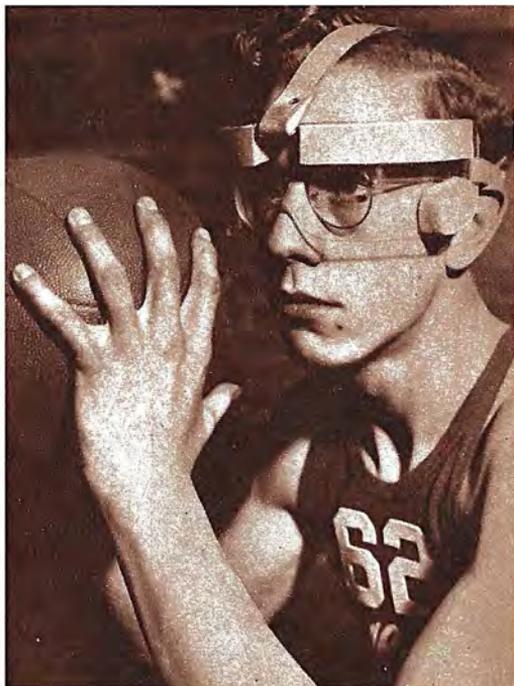
## Fully Equipped Model Race Car

**T**HIS miniature race car has four wheel brakes, fingertip controlled clutch, worm and sector steering, and outboard spring suspension. The body, resembling a piece of jewelry, is of German silver with a silver trimmed bronze radiator shell. Built by Will F. Kelly, of Michigan City, Indiana, the model attained estimated speeds of 40 to 50 m.p.h. in tests.



### Built-In Car Showcase

**G**EORGE DRESCHER points to the glass covered showcase built into the luggage compartment of a traveling salesman's car. This useful sales accessory was exhibited at the 21st Automotive Service Industries Show in Chicago. There are several glass topped drawers in the unit, one of which is shown pulled out to its maximum extension. It can be withdrawn to the compartment.



### Plastic Eyeglass Guard

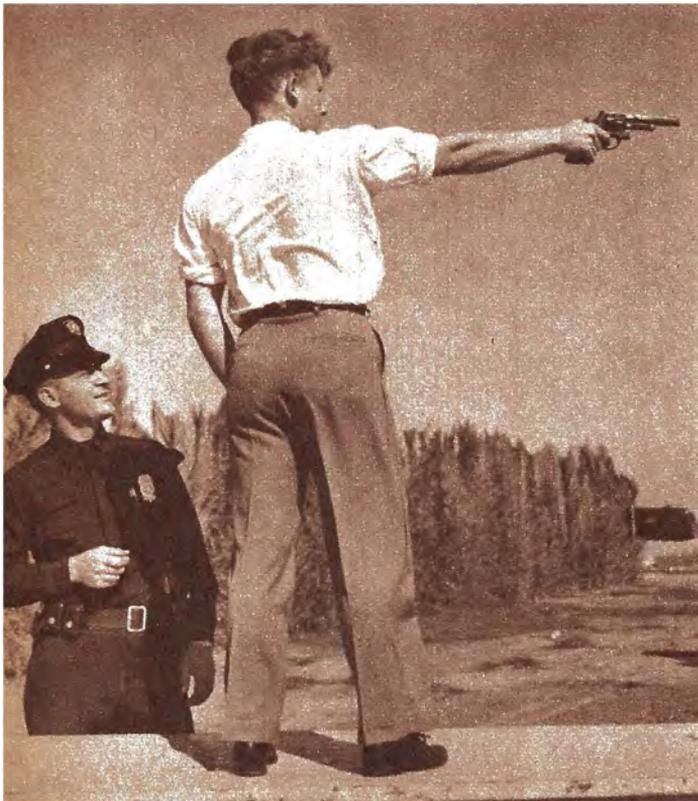
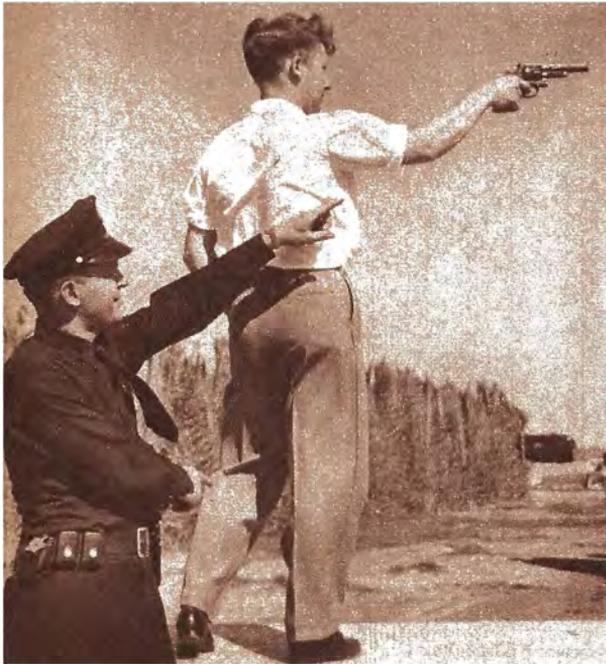
**T**HE eyeglass protector on Detroit's Dick Dikeman is hardly visible. It is made of a new non-breakable plastic, and cushioned against the forehead and cheeks with sponge rubber. A cloth strap arrangement over the top of the wearer's head and behind it, holds the guard in place. Although this device affords adequate protection during sports competition, it does not block vision.

### New Glass Cloth For Airplane Wings

**C.** G. TAYLOR, president of the Taylorcraft Company stands with chief test pilot James Ludwig while the gentleman with the torch tries to burn a hole in the glass cloth covering on a Taylorcraft wing. The new woven glass cloth is known as Fiberglas, and will not burn. It does not absorb moisture, nor does it rot. It has an extremely high strength-weight ratio.



# Bullets to The Bull's-Eye!



Long Beach is training civilians to be crack shots with a pistol in a ten-day "short cut" course. Here's how it's being done!

by Richard W. Emery

**T**WO hours of study, ten shots a day for 100 shots, and you'll be at least a fair pistol marksman—not ready to break a world record, but a good, solid, safe pistol shooter who can make the bull's-eye look pretty sick!

That's the guarantee of the Police Pistol Club at Long Beach, California, which recently started the first mass training of civilian pistol users on the West Coast.

"It can't be done," several be-medaled marksmen said when the club announced its plan. "It takes months, even years, to learn to shoot a pistol."

After seeing the club's graduates in action, the scornful experts have had to eat their own words!

Using a hurry-up, short-cut course, the club is drilling shooters by the hundreds. The course is based on the psychological fact that habit patterns are formed by the repeating of identical acts over a period of time. It's a high-hat idea, but it's no pipe dream. It was outlined by William C. Wright, Long Beach chief of police, a Texan, who by anybody's reckoning must be classed as an expert pistolman.

A rookie learns the right way. The top photo shows him in a wrong pistol-shooting posture, with his right arm bent and his weight thrown to his right foot. The lower picture shows him after the faults have been corrected—the right elbow is straight and the weight is placed evenly on both legs.



Ten shots a day, in ten days of shooting, will make good pistol shooting form a habit. The marksmen above are using a 25-yard range on the Police Pistol Club course, at Long Beach, Calif. Notice that all of them use the same stance.



Here's the array of targets on the 25-yard range used by the Long Beach marksmen. The targets are about two feet square.

The course is being taught by Range-master Malcolm McGuire, a tough, stocky, blue-eyed police officer, ex-Navy instructor in the rough-and-ready use of Navy .45's. Sixty marksmen from the police department and sportsmen's clubs are helping out; the lessons are free, and the instructors serve without pay.

Suppose you are enrolling for the short-cut course. You drive to the range on a

sunny morning. Already the racket of .22's, .38's and .45's roll from the long gray shed over the firing line. You join other rookies on a bench and you hear McGuire launch into an A B C lecture on pistols.

"If you have normal health and fair vision, with or without glasses, you can learn to shoot in this ten-day course. When you graduate, you won't have the bad shooting habits that handicap untrained shooters. For your first



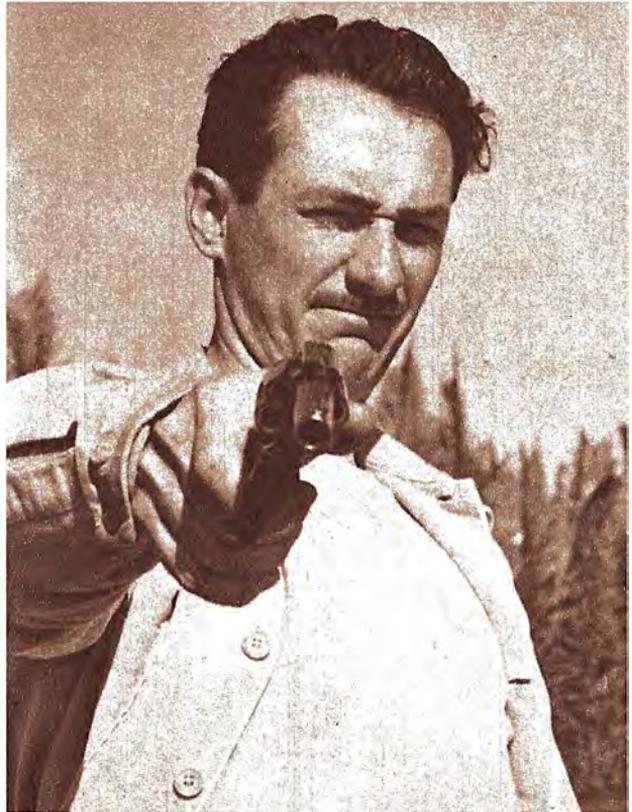
Here's the proper pistol grip, as seen from the right. The index finger is on the trigger.

gun you should choose a pistol of moderate caliber, preferably a revolver. You should use shells of mid-range load, instead of high-powered shells, so that you won't develop a flinch from recoil."

Demonstrating as he talks, McGuire shows how the typical beginner, without training, starts out wrong, facing the target square-away, standing off-balance, bending arms and legs, squinting one or both eyes, and otherwise taking positions which will handicap him.

Then he shows you how to stand properly. Your position will vary slightly according to your build; it must be a comfortable position in which you can relax. Your left foot should be at right angle to the line of fire. Your right foot, a half-step away, should be pointing toward the target, or somewhat to your left of the target. Your weight should be borne equally on your two feet, well forward on the balls of the feet. Your body should be erect with head up and left arm relaxed.

"Keep both eyes open and focused on the target," McGuire says. "The pistol, when ready to fire, will lie along the line of vision of your right eye. Your right arm should be straight, but not strained. Only the shoulder joint should move as you sight your gun; the elbow and



Known as the "rookie squint," the one-eye aim shown above is not recommended for marksmen. Both eyes should be open, as shown on opposite page.

wrist must not be flexed. That way, the pistol is an extension of your whole arm, easy to aim."

McGuire demonstrates how to hold a pistol in left hand and load it with right hand, al-



Here's the advised grip, seen from the left side. Note how the thumb is held high against the gun.



This officer shows the right way to aim. Although only one eye sights along the pistol, both eyes are held open. The high thumb helps to steady the gun.

machine gun, always firing. You must keep it pointed, loaded or empty, where it can't do damage. The safety position for the pistolman is the "raise pistol" position, in which the gun is held at half arms-length, pointed at the sky.

You and the other rookies now take firing positions on the target range, facing targets 25 yards away. The targets are about two feet square with bull's-eyes as big as saucers.

Your first firing is "dry firing" with an empty gun. Over and over again, while instructors watch your position and correct your faults, you pick up your gun, keeping its barrel pointed out toward the target; fit the gun into the grip of your right hand, take your stand in firing position, and keep your aim all the way through a careful three-or-four-second squeeze on the trigger.

"Don't try to fire at the precise instant when the sights are aligned on the bull's-eye," McGuire warns you. "The jerk will throw your aim off. Keep your aim as best you can and gradually squeeze the

trigger; your accuracy will be much better that way and will improve with practice."

Finally you load your gun. You repeat the aiming and trigger-squeezing; the gun barks, the sharp recoil lifts your hand—and presto!

ways keeping the barrel pointed earthward. The two-hour study ends with an emphatic lecture on safety, covering the standard safety rules on the handling of firearms. He tells you to imagine that your gun is a



Correct position for the gun in loading. Barrel points down; left hand grips the gun securely around the trigger guard.

A tiny black mark appears on the target! You place the gun on the table and relax your arm for one minute before trying again. In that manner you take nine more shots, finishing Lesson No. 1. Instructors take care that your position is correct for each shot.

Those ten shots are a minimum for each lesson, not a maximum. Shoot more if you want, but make sure that you shoot in proper form, squeezing the trigger. After the second or third lesson, have someone else load your gun, half with empties and half with loaded bullets.

If you are developing an unconscious flinch at recoil, a very common fault which handicaps almost every beginner, this stunt will help



The entire Long Beach city council enrolled in the Police Pistol Club's classes for civilian shooters. The council men, city manager and chief of police are shown here as they inspect the police instructors.

you to correct your ways.

There is no reason why anybody with fair vision can't learn to shoot a revolver properly just as easily as the civilian students at Long Beach's Police Pistol Club.

Just remember the rules: Start off with mid-range load shells rather than high-powered shells; stand erect, with head up, left arm relaxed, and your weight evenly distributed on both feet, with the right foot pointing toward the target and the left foot, half a step back, at right angles to the line of fire.

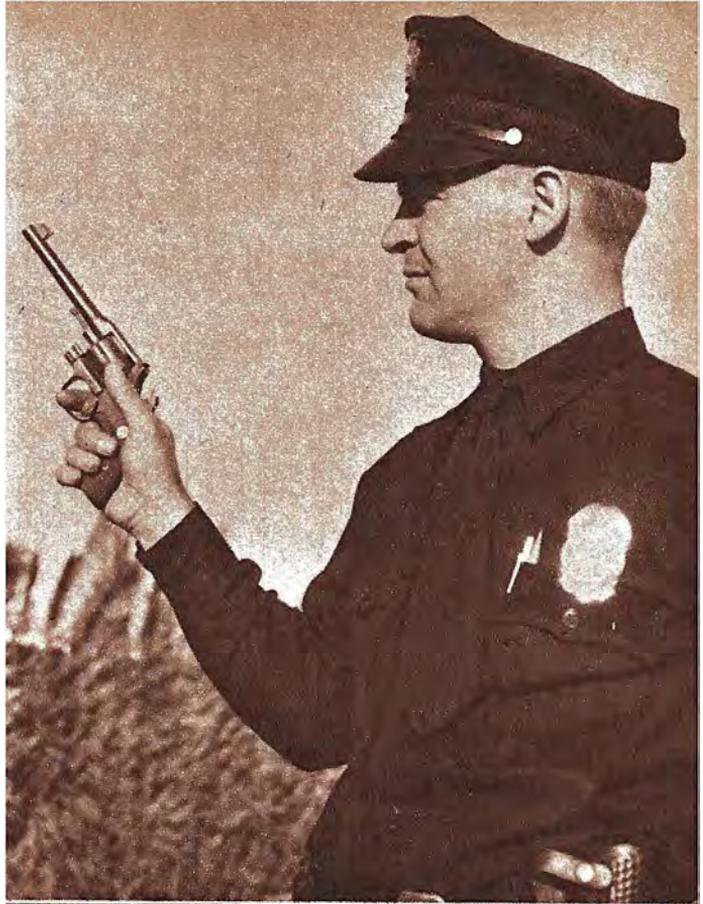
Keep both eyes open and focused on the target; have the right, or shooting arm straight but not strained; move only the shoulder joint when you sight the gun; take three or four seconds to squeeze the trigger after getting your target sighted.

As you gain experience you will develop an "easy" mental and physical attitude when shooting. A tense, nervous posture is one of the outstanding drawbacks common to amateur marksmen. The tendency of many beginners is to "jerk" the trigger the instant the sights find the target. This hasty firing defeats the purpose the marksman is attempting to achieve. The pistol is far less likely to wander from its intended mark if fired in a more deliberate manner. Much time can be wasted by starting wrong.

Above all, remember the rules of safety—gun pointed earthward or skyward when not being aimed at the target!

If you correct your form by careful adherence to these rules and by studying the pictures on these pages, you will find when you finish your ten days of shooting, that you'll be shooting in good form.

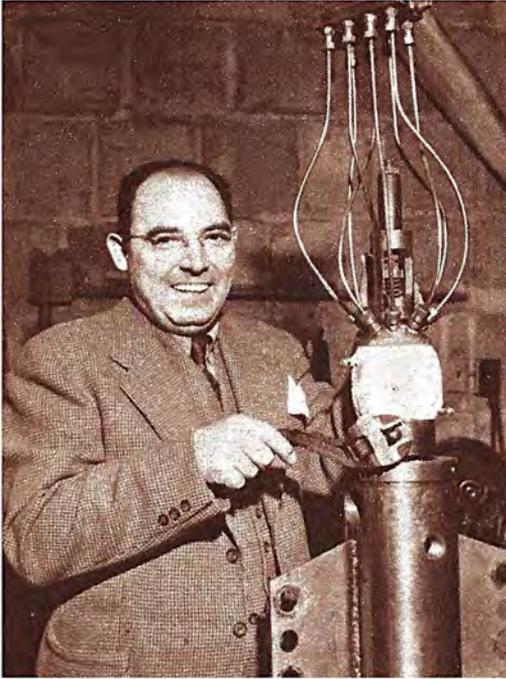
You'll be putting bullets in the bull's-eye!



The safety position for the pistolman is the "raised pistol" position shown above, in which the gun, at half arms length, is pointed skyward.



Choosing the right type of gun is important. Pupils of the course are shown various types of pistols and are helped in their selection of a gun. The upper gun shown is a .45 Colt automatic, the lower a .38 Colt revolver.



## War Plane Blast-Engine

**E.** B. MYERS, of New York, wields a wrench on his newly invented jet reaction motor. Using fuel which Army experts say is as powerful as TNT, the new power plant is known as a blast engine. Its operation is similar to that of a rocket except that its power impulses are intermittent instead of constant. It may add 200 m. p. h. to war plane speeds, hence it is kept under guard.



## Bomb Proof Eye-Guards

**E**NGLAND offers these cross-slit eye protectors for the use of those who are likely to be caught in air raids. Rubber padding between the steel front and the wearer's face absorbs the shock of impact if a bomb fragment strikes the device. It is, of course, designed only for protection from the smaller fragments. When not needed, disc shutters are opened.



## Retractable Curb For Varied Traffic

**C**HICAGO'S new 8-lane access highway to the business district boasts of hydraulic curbing sections. When the incoming traffic is heavy, the curbs are lowered to widen the incoming lane. When the traffic reverses in the evening, the lowered curbs are raised and the outgoing lane widened. The retractable curbing extends over 6½ miles. Electric power operates the hydraulic system.

# You're RIGHT — That's WRONG!

Here are 25 statements, some of them true, the others false. The trick is to separate the true statements from the false ones—and it isn't as easy as it looks! Use a pen or pencil and check the correct box under each statement and see how you make out! After you've given yourself the test, try it out on friends and other members of the family and compare scores. They'll enjoy it and so will you.

Are you ready? Let's go!

1. The famous Hope diamond is not white, but brilliant blue.  
True  False
2. A socket wrench is a trick used by skilled wrestlers to force an opponent to the mat.  
True  False
3. A toxophilite is a doctor who specializes in the development of antidotes for poisons.  
True  False
4. A pinhole camera is not suitable for use in photographing fast action pictures.  
True  False
5. The United States Patent Office issues patents for other things than mechanical devices.  
True  False
6. A saw horse is a small, but powerful mule used in the lumber industry for hauling freshly cut logs to the mill.  
True  False
7. Pythagoras are the largest and most deadly of all known tropical reptiles.  
True  False
8. A pterodactyl is a colloidal fluid from which the modern tough and transparent resins are made.  
True  False
9. When one airplane is overtaking another, it must pass the slower plane on the right, not on the left, as would be the case on the highway.  
True  False
10. Myopia is not an African seaport, but nearsightedness.  
True  False
11. Dr. Rudolf Diesel, inventor of the Diesel engine, disappeared from a steamer on Sept. 30, 1913, and has never been seen since.  
True  False
12. The United States Government does not charge for airplane pilots' certificates.  
True  False
13. All licensed aircraft flown in the United States are required by law to be equipped with wheel brakes.  
True  False
14. A bo'sun's pipe is a large water-cooled tobacco pipe smoked by sailors to repel sea gnats.  
True  False
15. Glenn Curtiss once made a world's speed record on a motorcycle.  
True  False
16. A \$15,000 prize was offered at one time for the successful designer and demonstrator of a twin-engined airplane.  
True  False
17. A stereopticon is a device used by surgeons to locate inedible articles swallowed by infants.  
True  False
18. A new American helicopter has demonstrated its ability to fly forward, backward, sideways, straight up, and straight down, with its pilot at the controls.  
True  False
19. Motorcycles first made their appearance in France and Germany in 1885.  
True  False
20. A rocker arm is a rheumatic elbow joint, so called from the ancient belief that rocking chairs caused it.  
True  False
21. "Print dodging" is an expression applied to photographers who dislike publicity.  
True  False
22. A radial engine and a rotary engine are one and the same thing.  
True  False
23. The thin sheets of wood that make up plywood are not sawed from the logs, but are cut with a knife on a gigantic lathe.  
True  False
24. The front of an airplane propeller blade is known as the back.  
True  False
25. A Woolly Saki is a tropical American monkey with a long bushy tail and loose whiskers.  
True  False

## WHAT'S YOUR SCORE?

To get your score simply give yourself 4 points for every question you answer correctly and total the result. If your mark is above 90, you are exceptional; if it is between 80 and 90, you deserve high praise; if it's between 70 and 80, you're good; between 60 and 70, fair; and below 60—well, try again next month!

Answers will be found on page 148



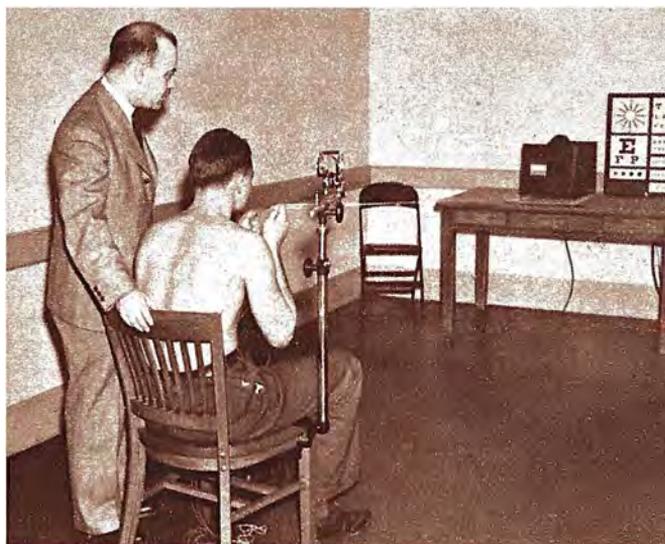
## No Bugles—But What Bells!

**C**ORPORAL J. L. DE COODY grins at the alarm clock in his hand. He's pressing a button that will awaken a portion of the 174th Infantry at Fort Dix, New Jersey. The bugles no longer blow at Fort Dix when the dawn is breaking. A new electrical system rings bells to do the job instead. The wiring now bears the brunt of the angry looks formerly cast at the bugler.



## Jiggle Machine For Muscles

**T**HE box this man is standing on can jiggle him up and down 2,100 times per minute. It provides exercise for those who would not bother to get it by any other means. No exertion is necessary—you just stand up and let it send its super jiggles through your body. It is said to increase circulation and relieve insomnia as its vibratory massage is conducive to sleep.



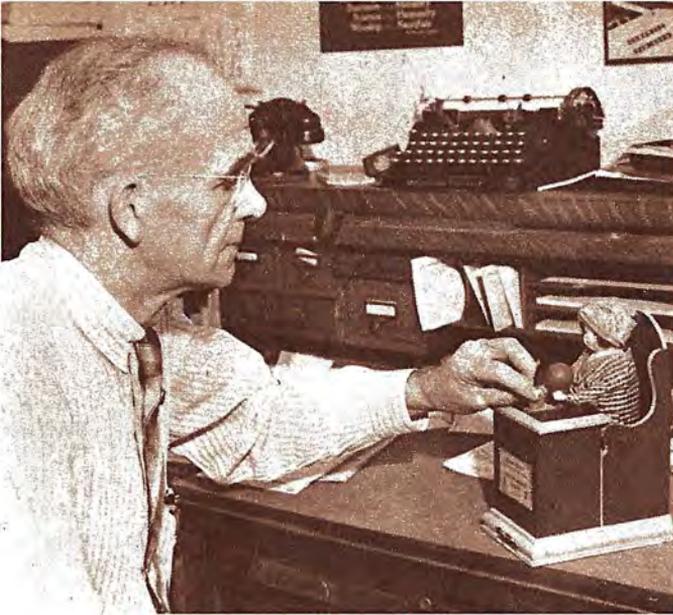
## Depth Perception For Flying Cadets

**C**APTAIN M. H. SAFFRON, flight surgeon, watches closely as George Stallings takes the rigid depth perception test given to Flying Cadets. The box at the far end of the room contains one rigid post and one sliding post which Mr. Stallings must succeed in placing side by side. When the test begins, the would-be pilot does not know which post is nearer. He must determine their position and align them by pulling strings.

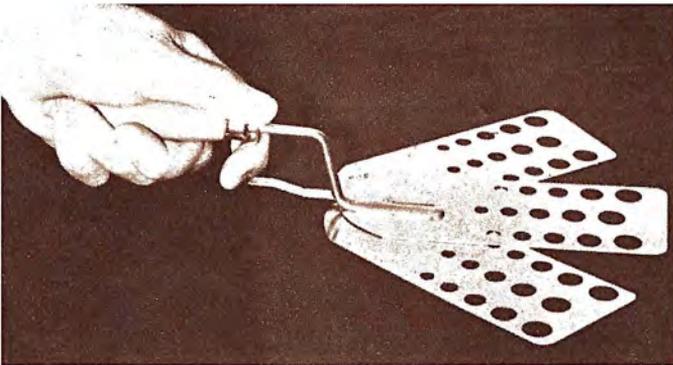
# GADGET MAN!

There's a fortune in small gadgets if you know how to pick out the right ones!

by  
Andrew R. Boone



R. H. Whyman is shown testing a question and answer bank. Intended to coax children to save, Madame Melba, on top, responds to questions by nodding or shaking her head when a coin is deposited in the box.



Two women suggested the three-bladed spatula, at the left, for lifting such difficult foods as meat loaves and fowl. Pulling the trigger causes the two side blades to fan outward. At the right, is a throwing arm which enables children and adults to engage in the game of parlor skeet.



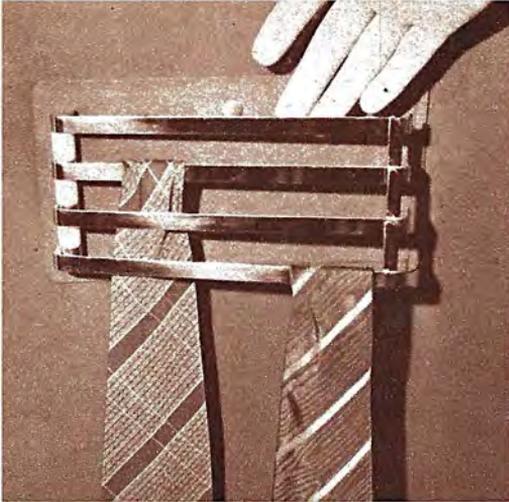
**S**CIENTISTS will tell you there's nothing new under the sun.

As an engineer-gadgeteer, R. H. Whyman dissents. To prove his case, he points to a record of more than 1,500,000 copies of gadgets he's turned out during the last seven years from a tiny shop in Los Angeles, California. Three-bladed spatulas, repeating rifles which shoot elastic bands, question-and-answer banks, indoor skeet games, lighted boudoir cologne bottles. He's actually built 100,000 four-shot rifles in twenty days!

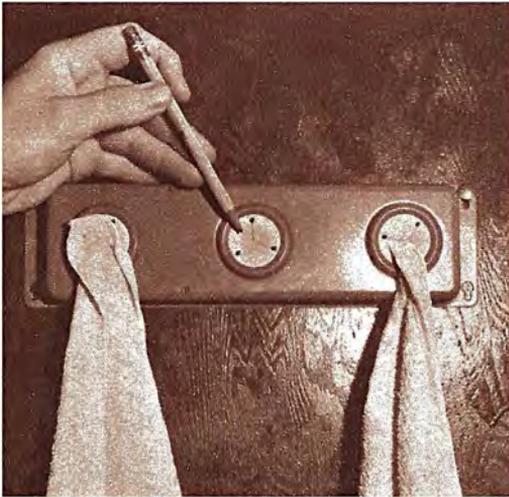
Until 1934, Whyman never dreamed that one day he would be turning out trinkets in staggering numbers. Years earlier he'd

learned engineering at the University of Wisconsin, and one fine spring morning of 1934, while on the train between Salt Lake City and Los Angeles, he chanced to talk with the manager of a five-and-dime store. Whyman at the time was selling agricultural and road-building machinery.

"Small profits and quantity sales," remarked his companion, "spell success for the dime stores." The idea struck Whyman that the same principle could be applied to a manufacturing business producing inexpensive novelty items. On reaching home, he broached the idea to his wife. "Fine," she agreed, "and because you can't name them,



Thirty-two ties can be hung on this four-tier rack, which measures only four by nine inches, and swings outward when ties are needed.



Whyman's newest gadget is the towel holder, shown above. You simply press the corner of the towel into the center of the slotted rubber disc. Below, a rubber band pistol being used on a trick target; the squirrel jumps when hit.



call your firm the 'Gadget Manufacturing Company.'

The engineer set up shop in Los Angeles' industrial district and began seeking items. Scores of inventors knocked at his door, and one day two women laid a spatula on his desk. It resembled an ordinary flapjack turner, but when Whyman pulled a trigger two leaves flew out sideways. "That," explained the ladies, "enables the cook to lift meat loaves, soft-crustied pies and fowl."

After trying the gadget at home, Whyman made a few improvements, and it wasn't long before 50,000 housewives were flipping the leaves out and slipping the triple-bladed contraption under foods which formerly crumbled when they were lifted from the pan.

What spells success for a gadget? There is no sure fire rule by which sales may be gauged, Whyman tells you. Public acceptance is fickle. They may buy hundreds of thousands, or turn a new item down cold. Each is a gamble.

After analyzing, figuring costs and discussing the possibilities of improvements on several thousand ideas, Whyman has hit only three or four which really proved profitable. He keeps his door open to inventors, always hoping to see the "one in fifty thousand," which will click in a big way. By that, he means something which will sell a million copies a year for five or six years.

Often one gadget leads to another. Some months ago, he turned out several thousand small repeating rifles which shoot elastic bands. Made of 10 parts, including a wooden barrel painted black to resemble metal, one gun takes four rubber bands fitted over a notch in the muzzle and stretched back to a four-pronged ratchet which is rolled back one-quarter of a turn to cock the piece. When the trigger is pressed, the ratchet flies



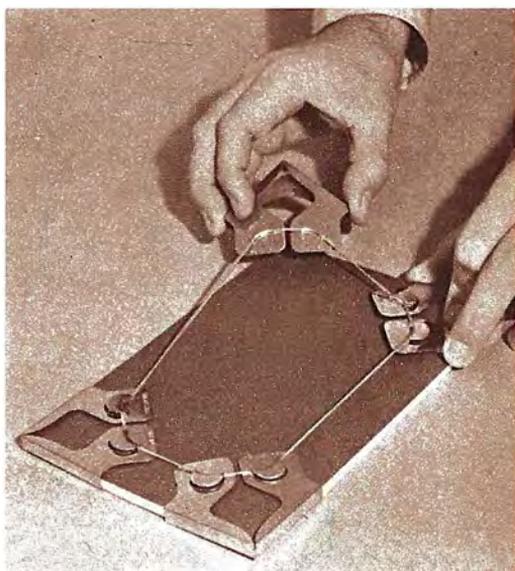
Above is a corner of Whyman's "Arsenal." Made of ten parts, 100,000 of these realistic guns were manufactured in twenty days. At the left is a closeup of the gun, showing how it is "loaded" with ammunition—rubber bands.



Below: The framente—four pressed corners are held around a picture by an elastic band.

back a quarter-turn, releasing one band. They sold well enough, but Whyman wanted to stimulate interest among grown-ups as well as children. Shortly, he perfected a throwing device which sails four-inch paper plates across the room. These consist of a metal arm fitted with metal fingers, and apparatus for holding the upper end of the arm back in the firing position. By pressing a trigger, the arm flies forward. Thus was born the game of parlor skeet, and soon afterward he turned out 100,000 repeating rifles during 20 working days. "This sort of game appeals," according to Whyman, "because Dad and the kids can compete indoors on cold winter nights without danger of injuring anyone. The bands are accurate for 20 feet, and a youngster with practice can hit the plate four times in five."

Most inventors fail to consider production  
 [Continued on page 146]



# Musical Number, Please!



Record finder Helen Petkan scans the cross index for a requested melody.

A NEW mechanical aid to the nocturnal rhythm purchasers has arrived. It is the telephonic record player. An adaptation of the familiar musical number machine, it offers a choice of 8,000 tunes instead of twelve. In its simple form, the juke-box is complete with coin slots, colored lights and automatic record changing mechanism for a stack of 12 to 24 discs. But during the past year, the juke-box has been menaced by science's onward march. A chain system of juke-boxes, all wired to a central studio with a practically unlimited choice of records, found many subscribers. One of the largest companies in the new wired juke-box field, began by supplying 32 Detroit night spots. When a patron drops a nickel in these new machines a soft, feminine voice inquires, "What is your selection please?" The patron

then speaks the title of the number he wants, into the microphone atop the machine.

In their telephone room, girl operators, working six hour shifts with telephone girls' headsets, parade back and forth before long rows of phonograph turntables, supplying different bars and night clubs. As patrons drop their nickels into the slots and make their requests, the operators consult their elaborate cross-indexed file, pick the disc from among 8,000 titles, play it back to the place the request comes from.

To music-hungry revelers, the climax of [Continued on page 142]



When the music loving cafe patron at the left drops his nickel into the slot, one of the operators (above) locates his selection from among the 8,000 records in the vast files.

# YOU Can Win CASH, Too!

ON PAGES 48-55 appear pictures of valuable prizes as they are to be given free to readers of MECHANIX ILLUSTRATED. You probably know all about the big contest by now, but you must have several friends who would like to know about the "Words-Within-Words" game and the valuable prizes, too.

There are enough prizes for all, so why not make a list of friends you know will be interested in this contest and whom you believe have the skill with which to win?

By so doing, you may win one hundred dollars, cash!

See your friends personally, telephone them, or send them one of the coupons at the bottom of this page. Be sure they put YOUR NAME on the contest entry blank as sponsor.

That's all you have to do!

If one of your friends wins a prize, YOU, as his or her sponsor, will be eligible for a cash prize for having introduced a prize winner to the contest.

The person who sponsors the winner of the biggest prize will receive \$100. The sponsor of the individual

winning the second largest prize will get \$50. The sponsor of the winner of the third largest prize will get \$25. In addition, there are five more prizes of \$5 each.

That doesn't mean you have to sponsor the winner of the 1st prize (A Taylorcraft airplane) to win \$100. The winner of the first prize may not have a sponsor. The \$100 may be won by someone sponsoring a minor prize winner!

Sponsoring one or more of your friends does not injure your chances of winning a prize in the "Words-Within-Words" contest, but gives you a chance to take in a CASH PRIZE as well as one of the big contest prizes.

All you have to do is let your friends in on this big contest. Tell them to put you down as their sponsor and you automatically

become eligible for a cash sponsorship prize!

Be sure, though, that you, as sponsor, select entrants skillfully, sponsoring those persons you believe are capable of winning a prize in the "Words-Within-Words" contest.

## SPONSOR PRIZES

1st Prize ..... \$100

2nd Prize ..... \$ 50

3rd Prize ..... \$ 25

In addition, there are five more prizes of \$5 each!

Dear.....

I think you can win a Taylorcraft airplane or an Indian Motorcycle free!

If not one of those prizes, a camera, a set of tools, a power lathe, a portable radio or one of a hundred valuable items. For details see the "Words-Within-Words" contest in the magazine MECHANIX ILLUSTRATED. It's now only 10c at all newsstands.

I hope you enter. If you do, I may win \$100 as your sponsor. Don't forget, put my name down on your entry blank as sponsor!

There are no catches in this contest. No slogans to think up. No essays to write. The highest score wins and I'm sponsoring you because I think you can win.

Your friend

Dear.....

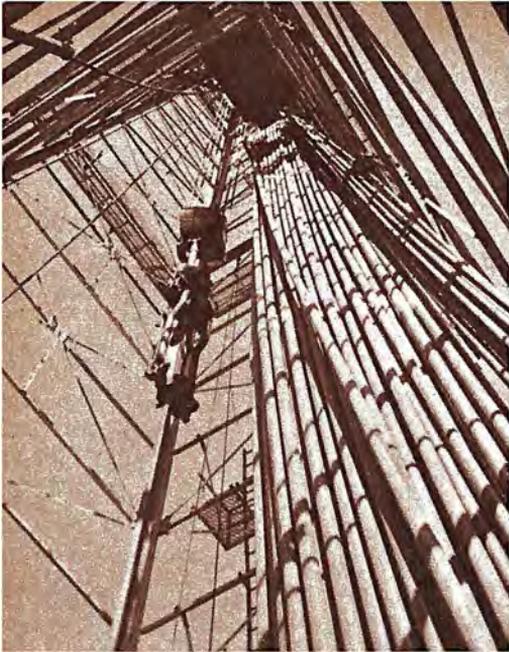
I think you can win a Taylorcraft airplane or an Indian Motorcycle free!

If not one of those prizes, a camera, a set of tools, a power lathe, a portable radio or one of a hundred valuable items. For details see the "Words-Within-Words" contest in the magazine MECHANIX ILLUSTRATED. It's now only 10c at all newsstands.

I hope you enter. If you do, I may win \$100 as your sponsor. Don't forget, put my name down on your entry blank as sponsor!

There are no catches in this contest. No slogans to think up. No essays to write. The highest score wins and I'm sponsoring you because I think you can win.

Your friend



**A**MERICA'S vast defense program is swinging into high!

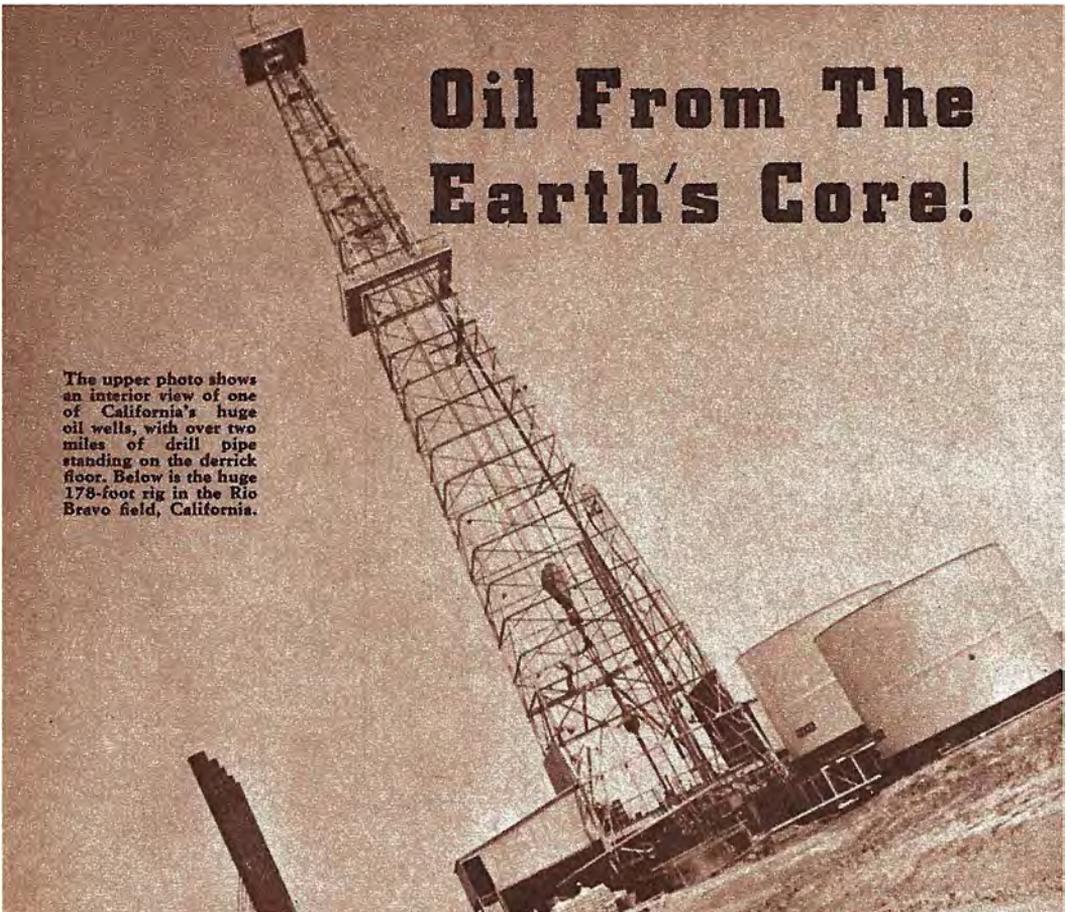
Planes, tanks, armored cars and truck transports are rolling off assembly lines; submarines, destroyers, cruisers and dreadnaughts are sliding down shipyard ways into the water; arms factories are working on 24-hour shifts to supply the rifles, cannons, machine guns and mortars to arm our nation's manpower.

For all these things there is one essential operating ingredient—oil! Oil to power the great diesels; oil to lubricate the guns; oil to furnish the gas to run the planes and motors.

We have oil, yes. The American Petroleum Institute estimates nearly 18,500,000,000 barrels of oil are in reserve through known fields in eighteen states. But we're going to need more. Experts estimate that in the event of war the navy's requirements alone would jump from 9,000,000 barrels of fuel oil, produced from 36,000,000 barrels of crude, to the staggering figure of 50,000,000 barrels of fuel

## Oil From The Earth's Core!

The upper photo shows an interior view of one of California's huge oil wells, with over two miles of drill pipe standing on the derrick floor. Below is the huge 178-foot rig in the Rio Bravo field, California.





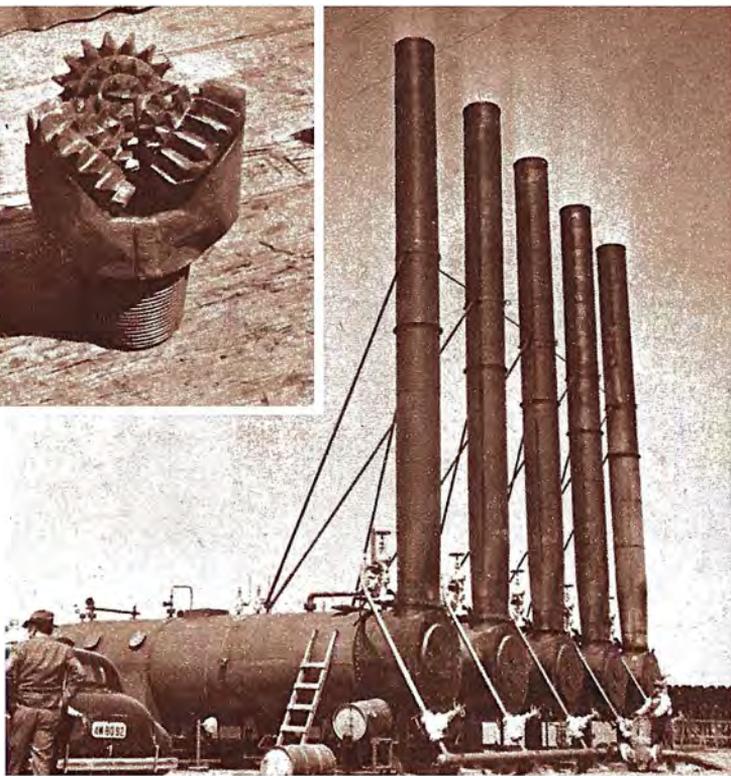
Above are rock bits, revolving grinders that are used when the going gets tough for the drill.

taken from 200,000,000 barrels of crude!

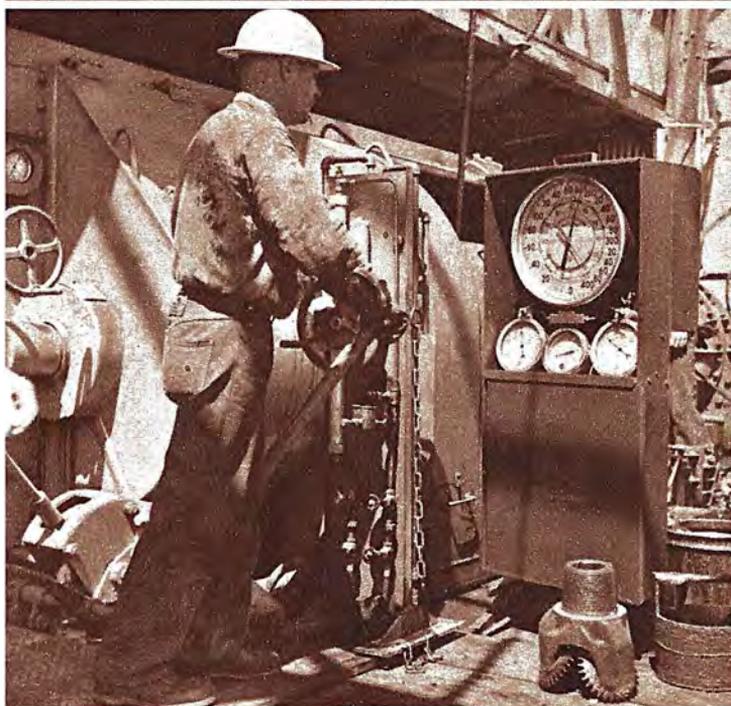
Brother, that's oil!

And it's why there are now nearly 4,500 drilling rigs in operation seeking new supplies. It's why more than 25,000 wells or more will be completed this year. It's why men in Texas, Oklahoma and California are drilling down, through the Miocene and Eocene sands, boring farther toward the earth's core than man has ever before gone, in an endless search for the new fields of liquid "black gold" so vital to our needs.

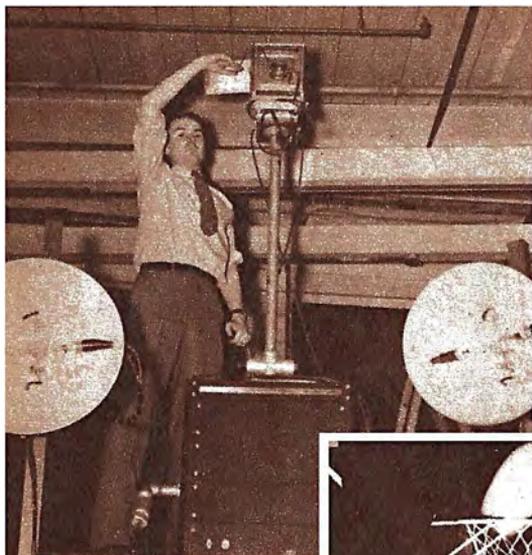
Rearing its crown block 178 feet above the floor of San Joaquin valley, not far from Bakersfield, California, the world's tallest oil rig spins its drill at 750 revolutions a minute in search for oil. Powered by steam generated in five 130 h. p. boilers, the bit of the drill can make more than 650 feet a day. So powerful is the machinery, this rig is capable of reaching a depth of 17,500 feet, nearly a half-mile deeper than the deepest drilling ever made before. Because of this [Continued on page 138]



Above: Five 130-horsepower boilers operating under pressure of 500 pounds per square inch supply power to turn the drill. Below: By keeping watch of these dials, the driller can tell exactly what is happening to the drill end, far below the surface of the earth.

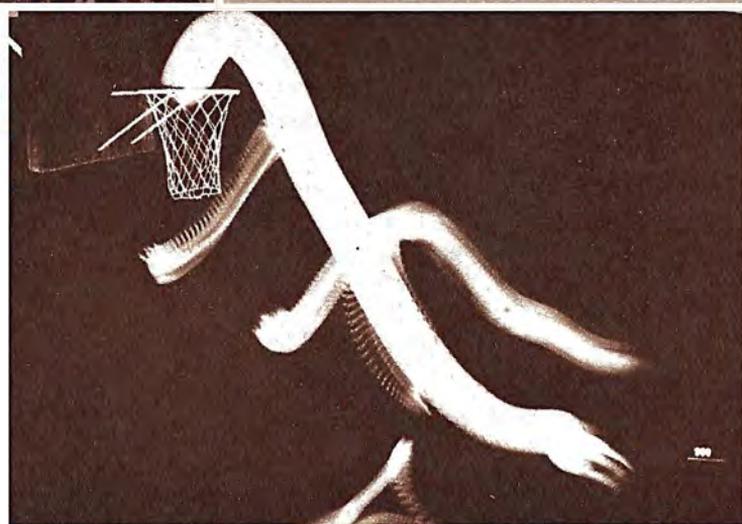


# Snapshots of Court Shots!



At the left, George Temple, Spalding high-speed photographic technician, is shown ready to snap Nat Holman shooting a basket in the Spalding Research Laboratory.

Below is the striking picture that results when the complete action of a shot into the basket is frozen on one photographic plate. This picture was taken at 100 exposures per second!

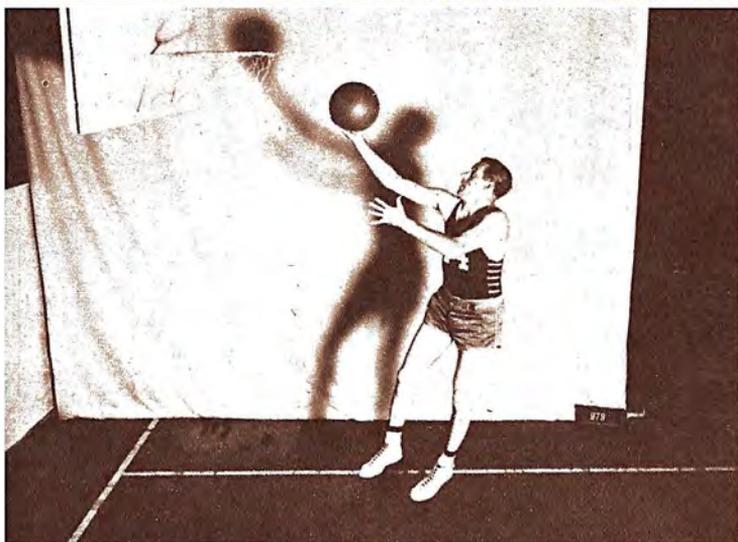


The picture below shows Nat Holman, the world's most famous basketball authority, caught with a single flash at  $1/30,000$  of a second just as he jumps from the floor and tosses for the basket.

**W**HEN the spectator sees a basketball player charge down the court and shoot a basket, the terrific speed which the player uses prohibits following the play, and the beautiful form and grace of motion is lost to the fans. Even basketball coaches, in trying to instruct their players on form, are at a loss because of the fast action of the game.

In order to give both fans and coaches alike a better insight into what takes place when a basket is made, George Temple, Spalding high-speed photographic technician, at the A. G. Spalding Research Laboratory, Chicopee, Mass., picked the world's leading exponent of the court game, Nat Holman, to show the superb form which made him famous as a basketball player and coach throughout the country. Nat Holman is C.C.N.Y. coach, and president of the National Association of Basketball Coaches.

[Continued on page 142]

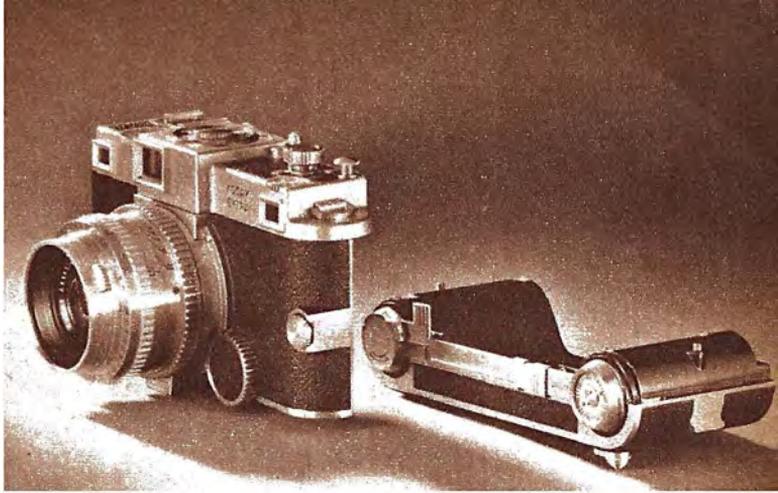


## Miniature Super Camera Introduced

**T**HIS new super camera has recently been introduced to the miniature camera field by the Eastman Kodak Company of Rochester, N. Y. The camera embodies the features found on cameras one time available only by importation. Film is contained in interchangeable magazine backs, lenses are interchangeable, and a variable power view finder accommodates both normal and long focus lenses. The range finder is said to be the most precise design found in any miniature camera. Another feature is the focal plane shutter. There are also individual adjustments for the user's vision.

When the camera back is being removed, a metal slide comes into place to cover the film aperture. Until the magazine back is made light-tight in this manner, it is impossible to remove it from the camera. The camera, known as the Ektra, is shown here equipped with a 50mm. f/1.9 lens.

Effort has been made to incorporate in this camera all of the proven features found to be suitable for 35mm. equipment.



## X-ray Detector Worn On Wrist

**A**S A safeguard to scientists doing X-ray work in General Electric's laboratories at Schenectady, N. Y., its men are equipped with what is known as an X-ray safety "wristwatch." This is a leather case worn on the wrist into which a small piece of unexposed X-ray film is placed. This is carried all day and when developed will show any scattered X-ray by black spots on the film. This acts as a warning.

March, 1941

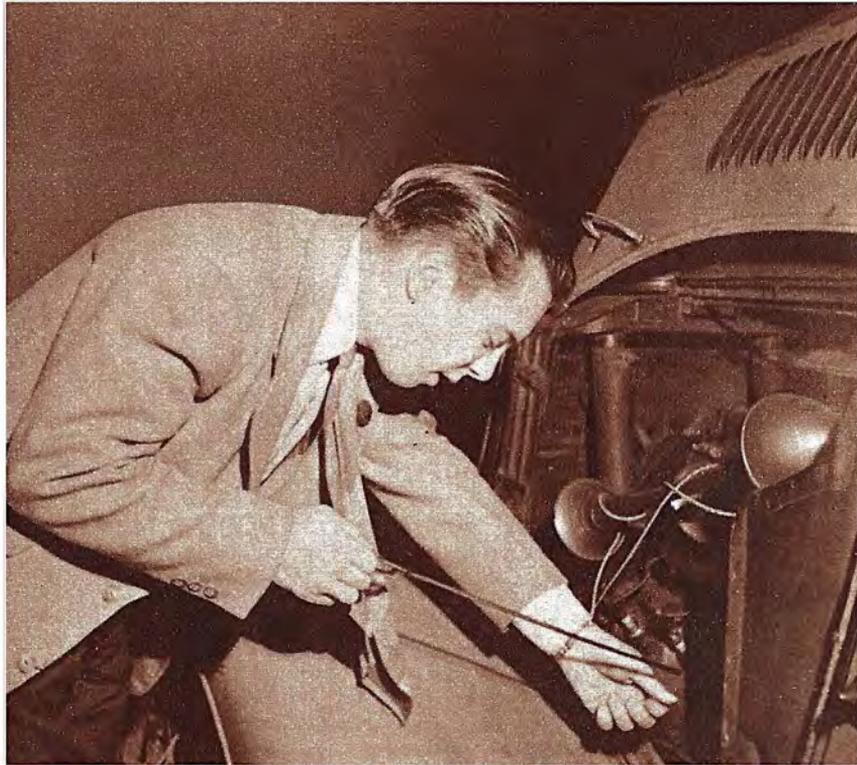


# How To Buy

Don't get stung on a used car! This article tells the simple tests you can make to detect a lemon!

Examine the oil on the measuring rod. If it is unusually heavy it has probably been used to hide motor knocks. Drain it and replace with a normal grade of oil.

Run the car on to a lift to examine the under parts. If the muffler has a piece of tin wired around it, replacement will undoubtedly be necessary.



**T**EN million motorists have never owned a new car. Those who bought their "second-hands" without knowing a few practical rules generally had to shell out hard-earned cash for repairs or replacements.

Although the majority of used car dealers are fundamentally honest, the used car market is essentially a "let the buyer beware" proposition. The careless buyer often falls heir to a car that has had the cream of its performance value removed, leaving a burden of worn tires, bearings, slipping clutches, and defects ad infinitum.

A wise thing to do is to

*Mechanix Illustrated*

# A Used Car

by Rory O'Shane



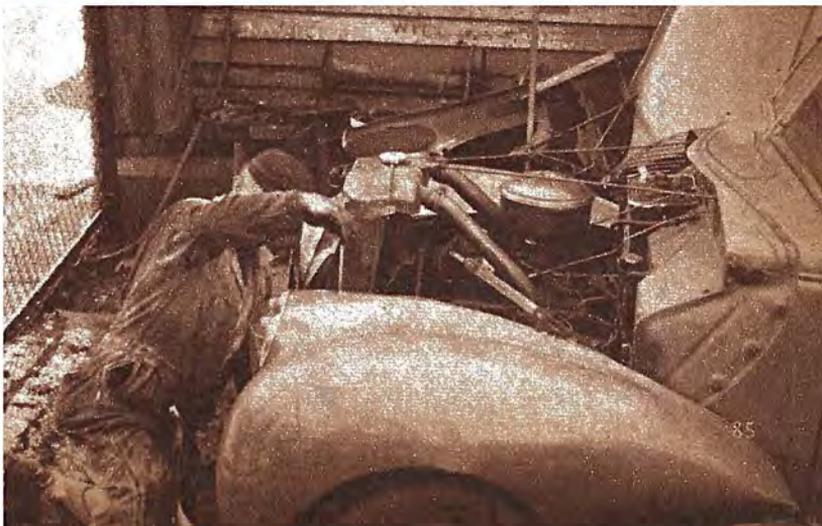
Note that the lower corner of the door shown above has been sprung out of line—by a crash, perhaps.

steer clear of slick looking paint jobs. Though logically a carefully protected interior should denote the same condition for the rest of the car, a new paint job in this situation is a camouflage for abnormal wear, tear, and abuse.

In the interest of safety it is important not to buy a rebuilt "wreck." The car may have regained its original contours and finish, but hidden structural

Check battery with a hydrometer. Heavily charged, it may have a dead cell.

Collision necessitated this radiator replacement. Numerous new parts may tell tale.



weaknesses are apt to appear at dangerous moments. No amount of ingenious body work can restore strained motors and frames to their initial strength.

Putting your finger on a rebuilt "wreck" is not difficult. Replaced radiators, fenders, bumpers, and running boards are the danger signals. Doors that sag, or open and close with difficulty indicate that the frame has been sprung. Some mechanics raise the hood and examine the braces that run from the top of the radiator to the back of the motor. The force necessary to bend or twist these is evidence that the car has been in a severe collision if bends are present.

The best procedure is to run the car on a hoist and examine the frame. Nothing the dealer can do will hide weld marks underneath the car. Bluish patches on the frame are signs of a heat straightening process. Where the frame has been cold straightened, you can see the marks of the press.

While the car is elevated, you might take

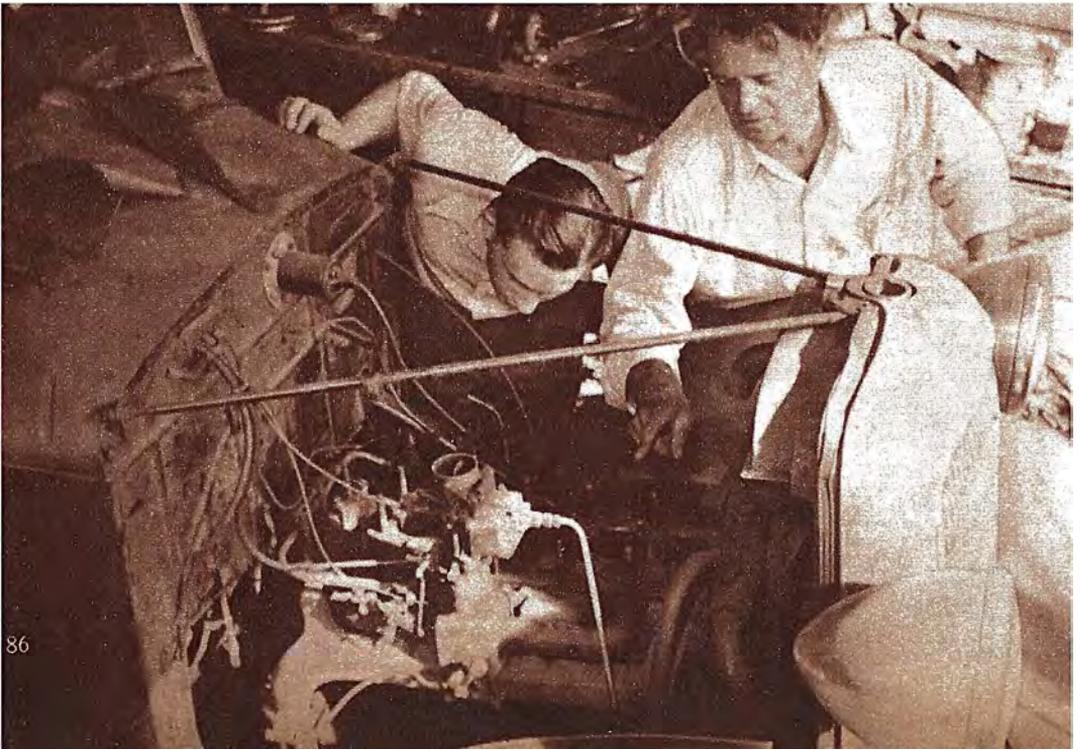


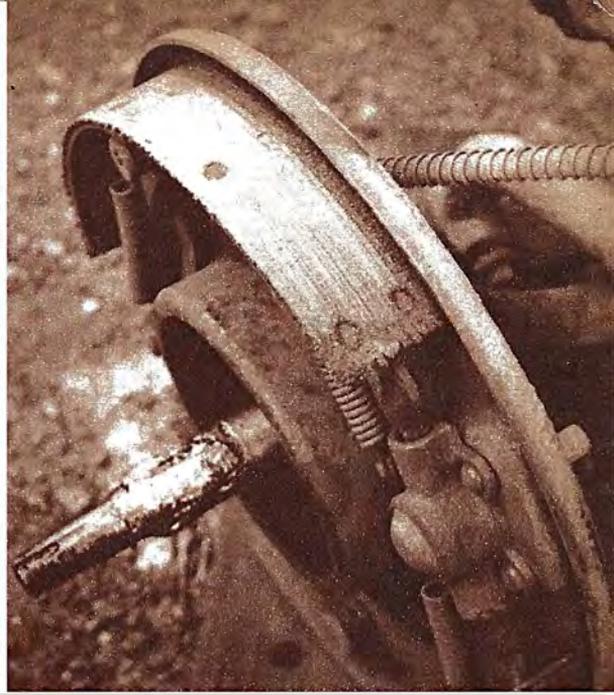
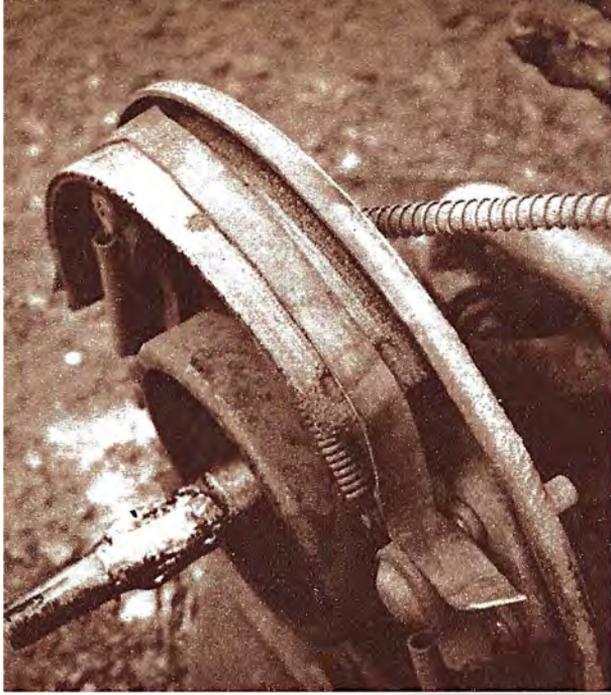
Uneven front tire wear is evidence of bad alignment or worn steering mechanism.

a glance at the muffler. Wrapping a sheet of tin around a broken muffler is an old trick, but quite effective.

The life of a tire is roughly 30,000 miles. Therefore if the tires are fairly new but of different makes, you can safely estimate a car mileage figure of over 30,000 miles. Another reason for the different brands may be that the former owner was too hard on the original tires. If so, he probably

Removal of the cylinder head may reveal presence of graphite and paraffin compound.





was hard on the motor also.

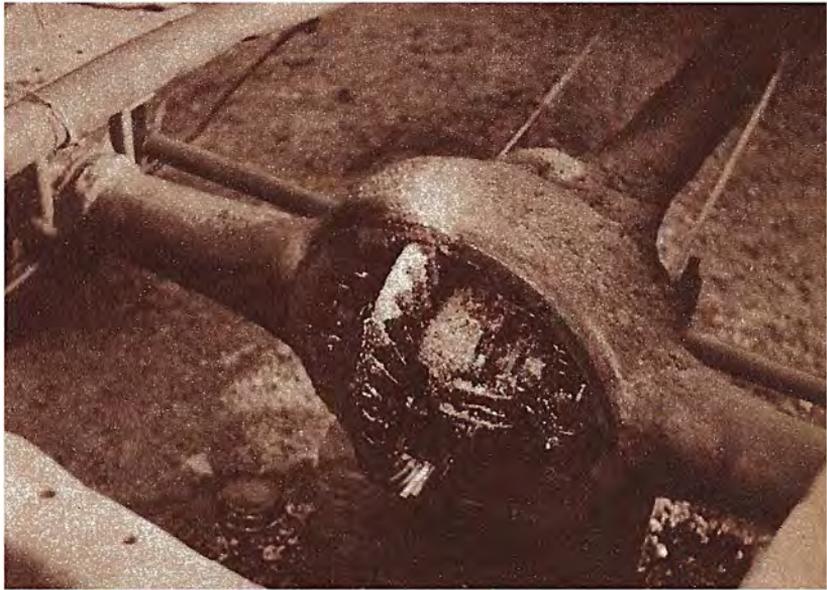
The fact that the tires look brand new is not conclusive proof that they are. Retreading or recapping processes cut beautifully new grooves into bald or worn tires and are inexpensive for the dealer. But such tires are dangerous at high speeds and will have to be replaced shortly.

You can spot a retread by looking for the faint impressions of the original tread, or by the fact that the new grooves do not extend clear to the outer ridges of the tire. Recapped bald tires are distinguishable by their extremely thin treads.

If the front wheel tires have treads worn more on one side than the other, the trouble may be incorrect wheel alignment, broken springs, or a bent tie-rod.

Shake the wheels from side to side. If they wobble noticeably, they need a rebushing job. Worn out bushings will also cause the front wheels to "shimmy." Unscrupulous dealers may rectify this condition by pouring sand into the bushings and king-pins, so have a front wheel removed and look at the bushings

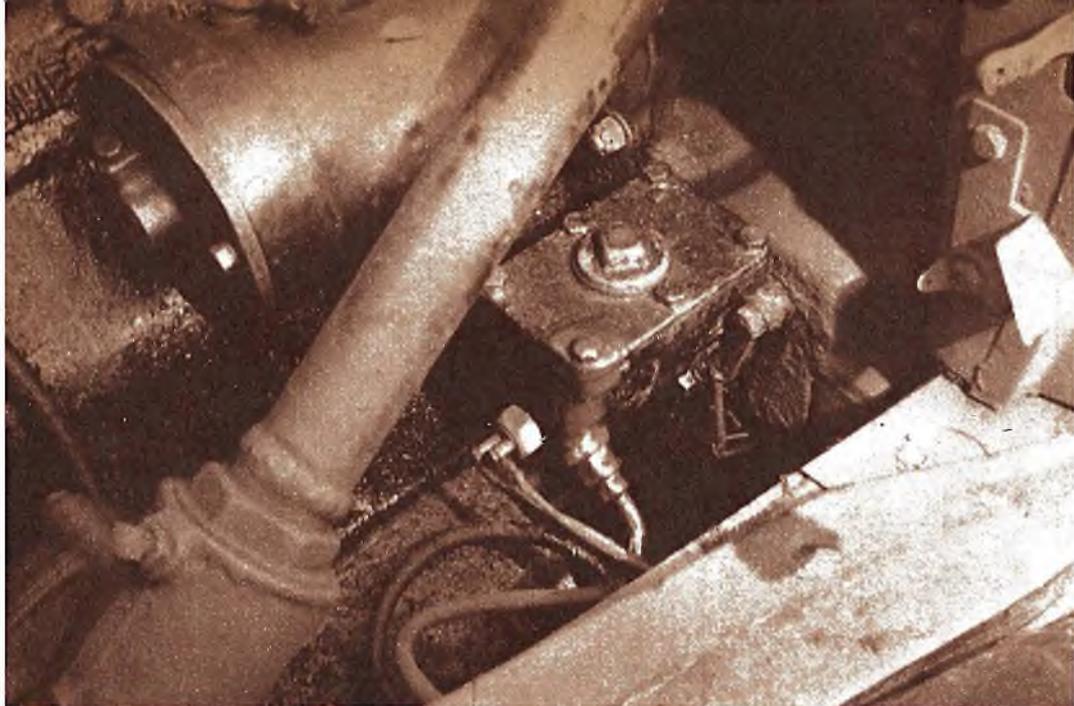
Above Left: A brake band whose action has been faked with strip of inner tube.  
Above Right: A brake band that has been worn down to the brass rivet heads.



This differential has been made to run quietly with sawdust in grease.

for traces of sand. Before turning on the ignition, step on the starter button and keep it going for about ten seconds. This is long enough to hear the b-r-r of broken starter teeth.

Use a hydrometer to check the battery. Quite often the dealer will put a highly charged battery with one dead cell in the car to save himself a few dollars. His idea is



Notice the wet tubing close to the fittings on this hydraulic brake mechanism. A big repair job.

that you buy the new battery after using the car about a week.

A quiet sounding motor may not mean a thing. Heavy tractor oil will deaden all rod and bearing knocks. Look at the oil on the plunger stick. If it is unduly thick, ask to have it drained and oil from sealed tins put in. Then listen to the motor.

Probably the slickest device is pouring a compound of graphite and paraffin through the spark plug holes. This spreads around the pistons and hardens into a padding which silences piston knocks and gives increased

compression for awhile. The mixture, however, has been known to cake into a substance so hard it had to be chiseled from the cylinder walls.

Removing the engine head is the only way this can be detected. If you can't do this yourself, bring a mechanic. A dealer who will refuse to have this done even under his supervision has ulterior motives. Best look elsewhere for your car.

Because of the widespread disregard of the laws against tampering with speedometer readings, the amount registered on the car

will have no significance.

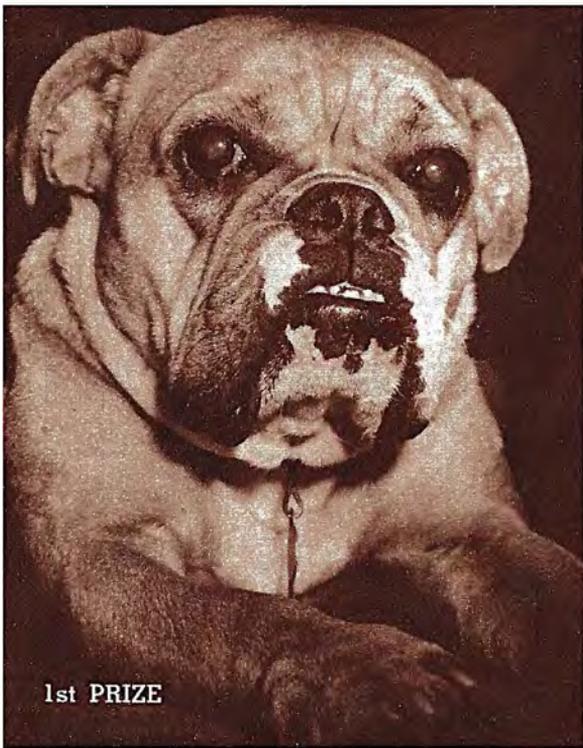
To get an approximate idea of the mileage, multiply the age of the car by 10,000, which is the mileage per year of the average motorist.

The condition of the upholstery has tales to tell. If the previous owner was careful of it, he probably was easy on the car in general. A back seat showing signs of wear such as are made by salesmen's sample cases is a "steer clear" signal. A car used by a traveling salesman is invariably "shot" beyond hope.

The road test is still an  
[Continued on page 143]

He's getting his written guaranty and his bill of sale before he takes the car home.





1st PRIZE

**PHOTO CONTEST**

**FIRST PRIZE** (\$10.00): "Honorable Maud" by Vincent S. Barker, 4714 261st Street, Great Neck, L. I., N. Y., flashed with 4x5 Speed Graphic on Agfa Isopan developed in Agfa 17. **SECOND PRIZE** (\$5.00): "Glass Pattern" by Donal Stole, Big Timber, Montana, taken with Kodak Monitor 620 and portrait attachment—4 minute exposure at  $f/16$  by "spot" produced by flashlight. **THIRD PRIZE** (\$4.00): "Dorothea Goes Skiing" by Nancy Hendrickson, Mandan, North Dakota, taken with Ansco Speedex 3A camera—outdoors under cloudy sky. **FOURTH PRIZE** (\$3.00): "Sunrise and the Harvest" by E. J. Eisenmeier, 3700 Frankford Ave., Baltimore, Maryland, exposed on Ilford infra red film with "A" filter and developed in DK-20.

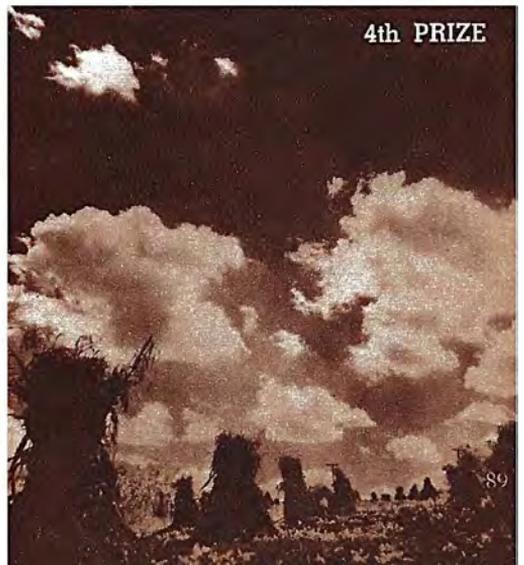
New contest this month. Submit prints unmounted—no larger than 8x10. With each print list your camera, film, lens opening and shutter speed, illumination and developer. Write your full **NAME** and **ADDRESS** on each print and wrap securely with corrugated or cardboard stiffeners. If you want unused prints returned, please enclose postage. (Published prints will not be returned.) **Address:** Photography Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y.

2nd PRIZE



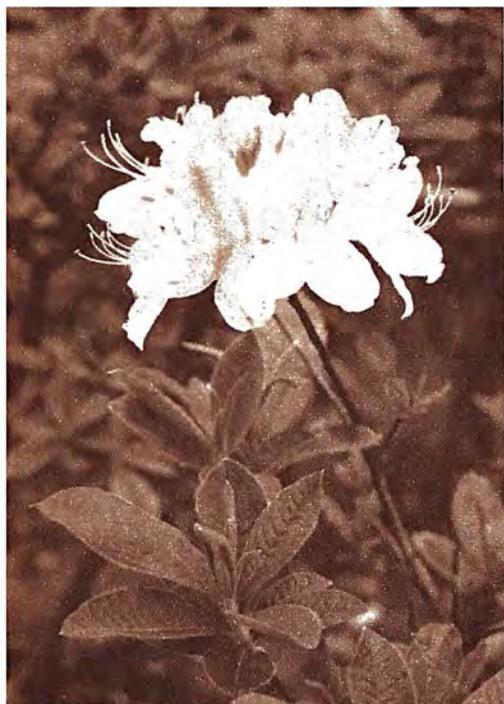
3rd PRIZE

4th PRIZE



# Print "Dodging" in

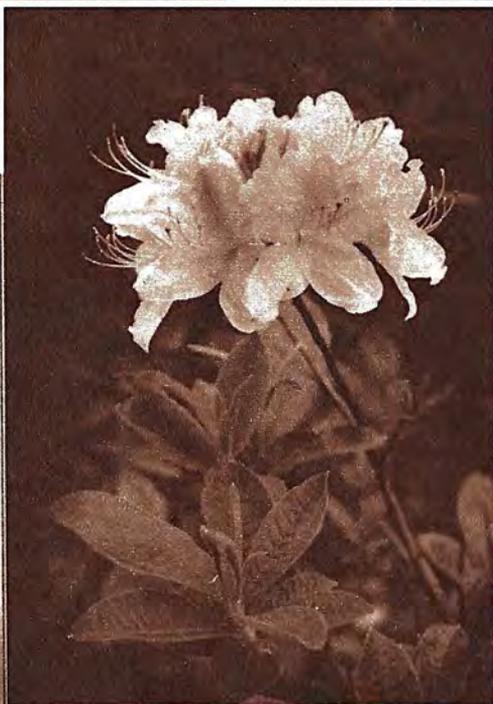
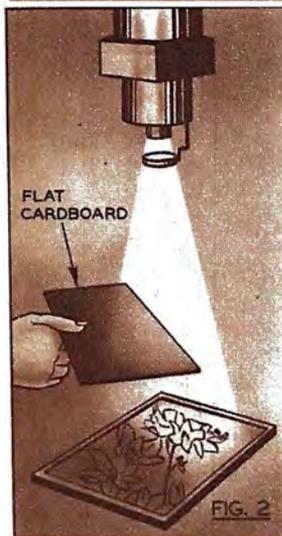
by  
Flora K. Howes



LEFT: Background detail is distracting in this straight, undodged flower "portrait." BELOW: Local printing. The petals receive additional exposure from the light passing through the hole.



RIGHT: Dodged print from the same flower "portrait" negative. Note how the petal detail has been accented by local printing. Background detail was dodged in by the method shown below.

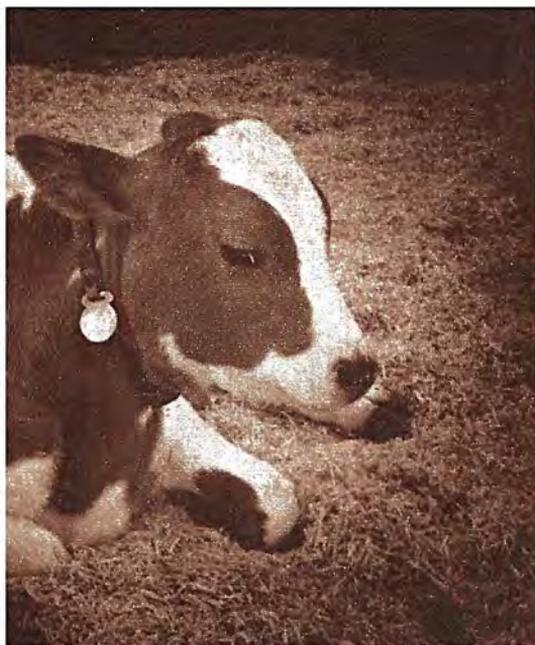
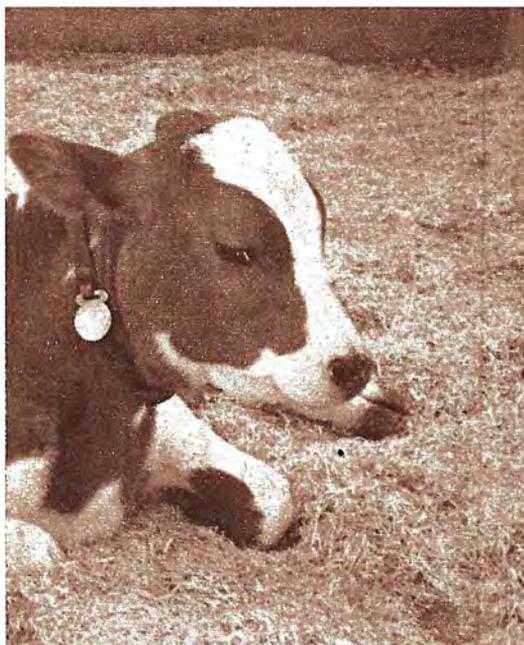


EVERY amateur photographer has negatives which would make excellent salon enlargements if only something could be done about their light backgrounds and their spotty, distracting foregrounds. Light areas and unwanted details draw the eye away from the principal subject of the picture; they weaken the composition.

The only answer is dodging or local printing, or a combination of both. Many references are made in photographic literature to these two standbys. Just what does each operation involve? What tools are needed? Is it hard or easy?

Dodging and local printing are easy if you are patient. It takes nothing more than a knack to master them. Figure 1 is a rough sketch of the local printing operation. After the print has been normally exposed to the enlarger light, a cardboard with a circular or oval hole or aperture cut in its center is placed between the enlarger lens and the paper. The printing light is

# One Easy Lesson



ABOVE LEFT: "Straight" print and, ABOVE RIGHT, dodged print from the same negative. Fig. 3. RIGHT: How the dodging was done. The printing light flows around the cardboard disc, thereby darkening the marginal areas and leaving the head and shoulders of the principal subject as they were in the straight print. Darkening of spotty foreground and background detail accents the main interest—strengthens the composition.

permitted to pass through the hole in the cardboard to the part of the picture area that needs darkening. There may be one or several such areas. When an area that is to be printed locally is fairly large and at the edge of the picture area a solid cardboard sheet is used as in Figure 2. The portions exposed to the unimpeded printing light are darkened here again.

Figure 3 shows how dodging is done. The position of the cardboard disc between the enlarger lens and the printing paper is controlled by the thin wire handle. The areas over which the disc is held are "held back" while all surrounding areas are darkened.

In all three instances the dodging or local printing medium must be kept moving continuously either up and down through a short distance or a little to each side of the area concerned. This prevents the formation of sharp demarcation lines between the areas receiving additional exposure and those that don't. The normal position of the dodging or

local printing board is about midway between the lens and the paper easel.

Let's consider a typical example, the case of the rhododendron "portrait." Use of a portrait lens from a close-up camera position threw most of the background detail out of focus.

However, light areas from adjoining blossoms nearby continued to distract the eye when the enlargement was made in the usual way, and the petal detail was slightly washed out. On the basis of test strips made for the various

[Continued on page 144]



# "Darkroom Spot"



Print in hypo solution under the "Darkroom Spot."

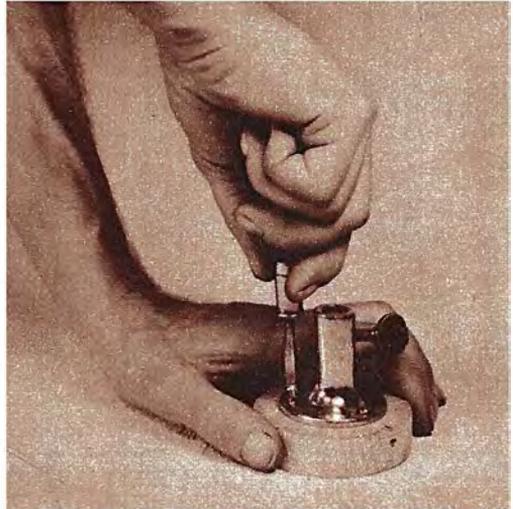
by Arthur Trauffer

**S**USPENDED above the hypo tray, this lamp will enable the photographer to inspect his prints while they are still in the hypo and without any danger of fogging sensitized paper that happens to be lying open in the darkroom. The spot of light produced is confined to the hypo tray and is adjustable for both diameter and intensity. Control is accomplished by changing the position of the bulb within the lamp tube, and by raising or lowering the lamp proper.

An added feature is the use of a blue (daylight) bulb in the lamp. The spot of "daylight" directed into the hypo tray closely approximates natural daylight. It will give one a reasonably accurate idea of how the prints will look when they are dry and viewed in natural daylight (taking into consideration, of course, the fact that most papers darken up a bit in drying).

The lamp is turned on and off by means of a pull-chain switch, connected to the drop-cord by which the lamp is suspended. A pull-cord is tied to the chain of this switch and the cord is hung within easy reach of the hypo tray. All parts necessary for the construction of this inspecting-lamp are easy to obtain, and should not amount to more than \$1.35 all told. These are:

Pasteboard or cardboard tube, 22 in. long, inside diameter  $3\frac{1}{2}$  in. to 4 in.  
 $\frac{1}{8}$ -in. iron or brass pipe, 17 in. long.  
 Supply pipe bracket, or flush-pipe bracket (flange only).  
 $\frac{1}{4}$ -in. thumb-screw,  $1\frac{1}{8}$  in. overall length.  
 Hardwood  $5$  by  $5$  by  $\frac{3}{4}$  in.



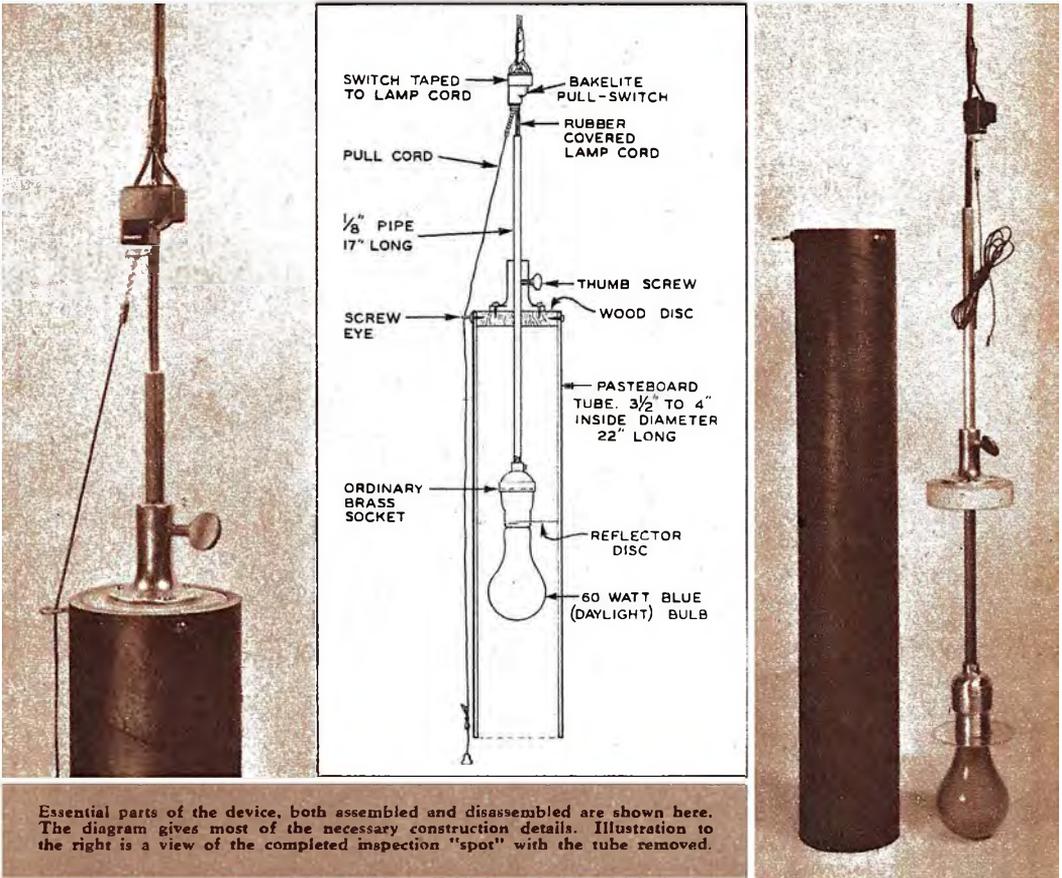
Above: Fastening flange to the wooden disc. Below: Soldering the metal "reflector" disc to the bottom of the brass-shell electrical socket (with switch removed).



Ordinary brass-shell lamp socket (plain, without switch).  
 22 gauge sheet metal, 5 in. by 5 in. (not aluminum).  
 Six nickel-plated, round-head wood screws, overall length,  $\frac{3}{4}$  in.  
 One screw-eye, about 1 in. long.  
 A 60-watt blue (daylight) bulb.  
 Small, bakelite pull-chain switch (pigtail type).  
 Length of rubber-covered drop-cord ("pull-apart" type).

The cardboard tube, which should be about 22 in. long, with a  $3\frac{1}{2}$ -in. to 4-in. inside diameter, is painted inside with flat black paint to kill undesired reflections. The tube will then throw a fairly sharp spot of light. The outside of the tube is also painted flat black, and when dry, is given a coat of shellac or varnish to make it moisture-proof.

# For Print Inspection



Essential parts of the device, both assembled and disassembled are shown here. The diagram gives most of the necessary construction details. Illustration to the right is a view of the completed inspection "spot" with the tube removed.

From a piece of  $\frac{3}{4}$ -in. hardwood stock, jigsaw a disc that will fit snugly into one end of the tube. Bore a  $\frac{3}{8}$ -in. diameter hole through the exact center of this wooden disc. The disc can be stained and varnished to moisture-proof it.

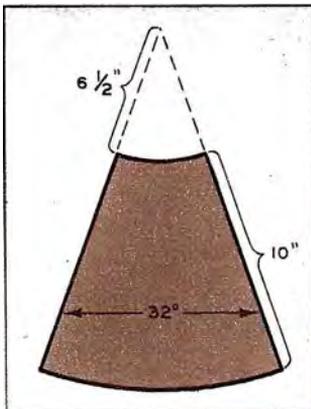
Obtain the wall-flange part of a supply-pipe or flush-pipe bracket. This is a standard piece of sanitary plumbing equipment and can be obtained from a plumber or plumbing supply house. (The writer bought his for 20 cents.) This flange comes threaded for a  $\frac{3}{8}$ -in. bracket, making it necessary to enlarge the opening a trifle with a rat tail file, so that a standard  $\frac{1}{8}$ -in. pipe will pass through the flange snugly. Now bore a  $\frac{7}{16}$ -in. hole in the nipple of the flange and thread this hole with a  $\frac{1}{4}$ -in. by 20 USS tap; this is for the  $\frac{1}{4}$ -in. thumb-screw.

Now fasten the flange and the wooden disc together with three, round-head wood screws about  $\frac{3}{4}$ -in. long. Be sure that the holes are in line before fastening them together.

Thread one end of a 17-in. length of standard,  $\frac{1}{8}$ -in. pipe with a  $\frac{1}{8}$ -in., 27 NPT die. This thread fits the threaded nipple on the cap of an ordinary, brass-shell lamp socket. Screw the cap of the socket onto the pipe and tighten the set-screw.

The metal disc which is mounted onto the socket not only acts as a reflector, but also keeps the bulb centered within the cardboard tube. This disc, which is cut from 22-gauge sheet metal, should be  $\frac{1}{8}$ -in. smaller in diameter than the inside diameter of the cardboard tube. An opening, which is equal to the outside diameter of the socket, is cut out of the

[Continued on page 144]



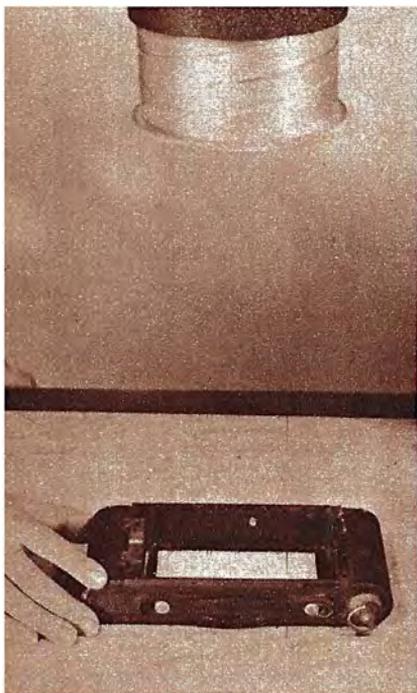
# Helpful Picture Making Aids

BELOW: "Desk Lamp Safelite." An ordinary goose-neck desk lamp can be converted into a flexible safelight for the darkroom by fastening an amber "fog light" over the lamp shade. Made of amber-colored flexible material, "fog light" covers are available at auto supply stores; the elastic in the seam makes them easy to slip over the shade. Used with a 7 1/2-watt frosted bulb, the unit is suitable for contact printing. For bromide paper printing, fasten a few sheets of red cellophane over the "fog light" with a rubber band.—Robert Scott.

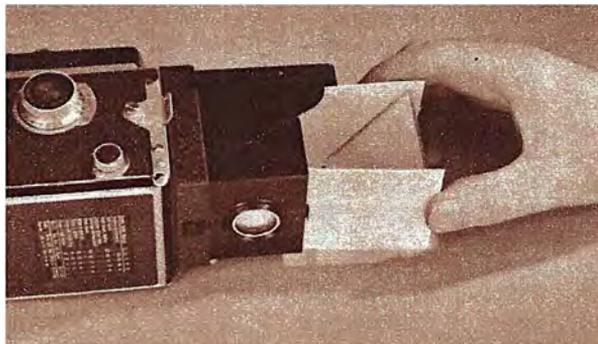
ABOVE: This folding hood extension makes reflex camera focusing easier by cutting down overhead sky reflections; it permits photographers to view focusing screen comfortably at 9 inches. Hood is made of tire inner-tubing 9 1/2" long; upper opening 1" in diameter, lower 2 1/2". Sketch shows paper pattern from which tubing is cut. Overlap of the tubing is 1/4".—Robert Scott.



BELOW: A mirror placed next to the hood of a twin lens reflex as illustrated permits pictures to be taken in a horizontal position. This is necessary when such cameras, whose ordinary film format is square, are used with Kodachrome reducing adapters. Two strips of cardboard are first cut to fit inside the viewing hood; then cement a square piece of mirror between them adjusted at 45 degrees to the viewing screen. This makes it possible for the screen to be observed from above when the camera is held horizontally at waist level.—Kenneth Murray.



ABOVE: Use an old camera back to hold film when enlarging positive transparencies from small negatives, or black and white negatives from small Kodachrome transparencies. Rip away the camera bellows and bed; load film on camera's spools and advance by turning the key.—Louis Hochman.





# How to Build SECTION



## IN THIS ISSUE

The projects shown on this page are but a few of the many interesting workshop jobs in this issue. Such proven designs as these are pleasing to make and use.

The attractive household accessory shown below is a match pack magazine. See plans on page 128.



Radio fans will like this fine all-wave receiver. See plans and instructions on page 100.



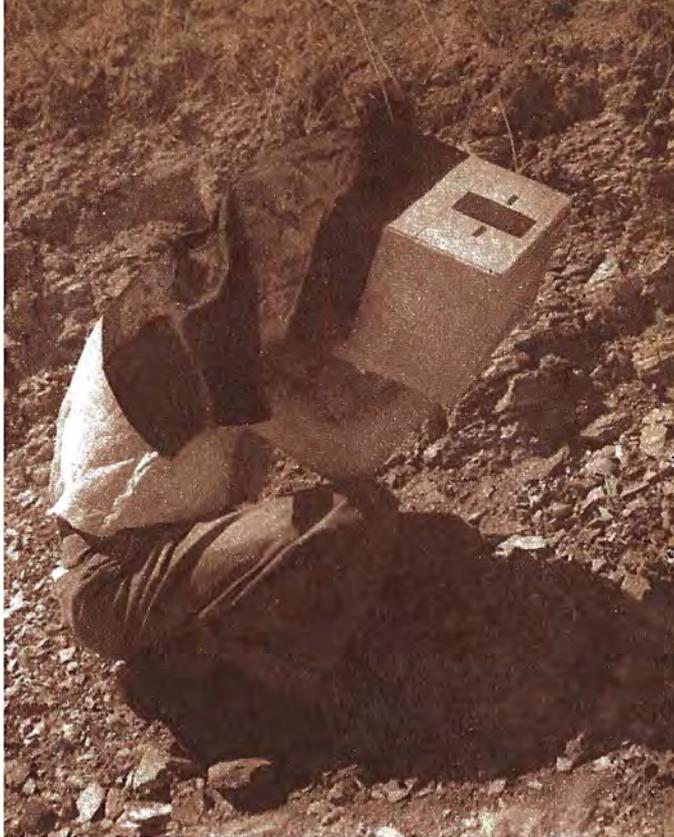
The useful and decorative boxes shown above are made from wood blocks. Complete plans and data on page 105.

A little wood and some old wallpaper are all you need to make this correspondence case. Page 126.



A sturdy trailer that can be used for camping or hauling. It is easily built from plans and instructions on page 106.

Below: Portable battery, transformer and mercury-vapor lamp make up this light, powerful torch for night prospecting. Right: Daylight viewing box utilizing filter glass over window in top of carton. Specimens are examined by the sun's ultraviolet.



Discover beautiful fluorescent minerals at night with a homemade black light outfit!

## Prospecting

This bearded and tattooed western desert prospector examines a find under the almost invisible beam of a black light torch made from a 5-cell flashlight and a disk of filter glass.



**F**LASH your ultraviolet torch on a pile of rocks and see minerals gleam as if outlined in fire!

Night prospecting is as simple as that. Any of the 300-odd "fluorescent" minerals—including some commercial ores such as tungsten and zinc—can be detected by their brilliant glow under the dim purple ray from a mercury lamp. Many of them will respond to the weaker light from a simple homemade outfit costing as little as two dollars.

Luckily for the amateur prospector, these minerals are scattered widely throughout the United States. Every rock pile, every gravel bank or quarry, is a prospecting ground. A collection of these strange minerals, mounted in a dark cabinet and lighted by the dim

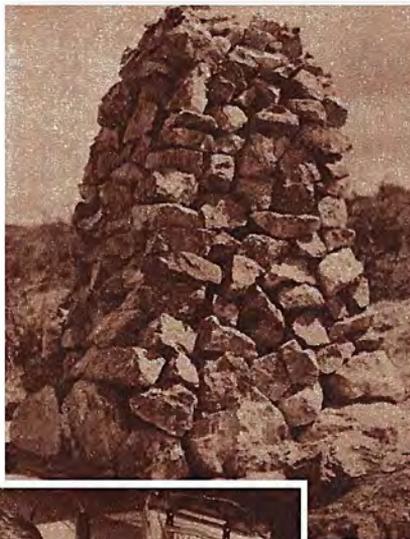


# With Black Light

by  
Sterling Gleason

Right: Day and night views of claim monument at a tungsten mine in California. Night view was made by the glow of the tungsten ore under an ultraviolet lamp.

glow of an ultraviolet torch, makes a spectacular exhibit. Visitors gasp when the dull, drab-rocks suddenly flame many colors, intense and beautiful, as if from fires within. Some of these minerals also are phosphorescent. They can be "charged" with light by holding the torch close to [Continued on page 116]

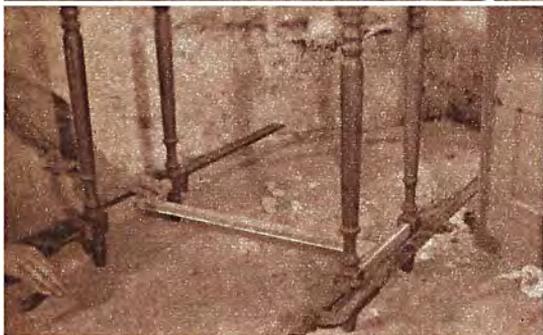
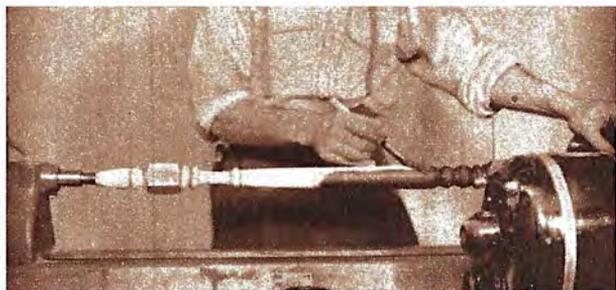
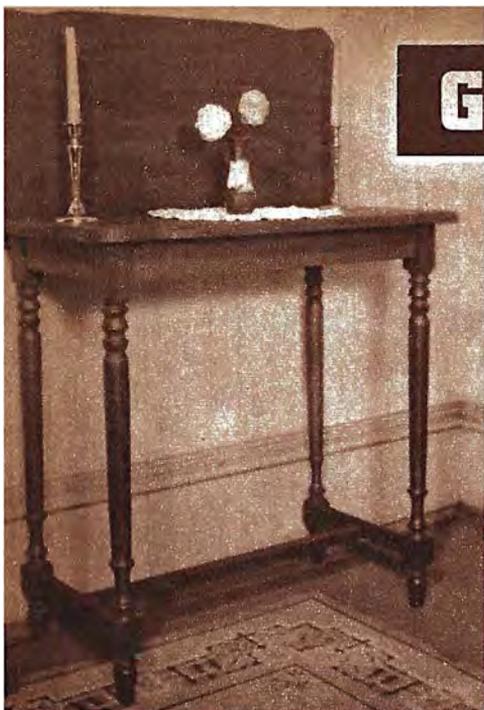


Rock specimens may be viewed in daylight by putting them into a drawer in this cabinet, shoving it under ultraviolet torch which plugs into the top, and looking down through the peephole. Such equipment is very useful in field work either by day or by night.

# Graceful Console

This is a piece of furniture that anyone would be proud to own. You can build it easily with regular shop tools and a wood turning lathe.

Left: This is how the finished table will look in your living room.  
Below: After sanding the legs, polish them while still in the lathe.



Left: The stretcher, or cross rung is doweled in place. Clamps hold parts.

Right: Fastening legs in place with lag screws. Bottom is plywood.



Right: Screwing the arm in place. This holds the rear top panel vertically rigid.

Below: The sides of the table must be well finished to have a beautiful appearance



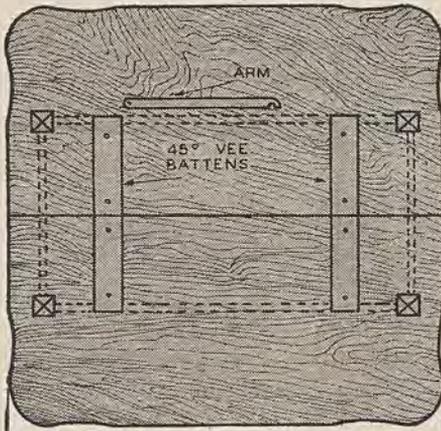
**T**URNING the graceful legs of this console table will test your skill as a craftsman, but even the novice will be pleasantly surprised at his handiwork if he exercises caution as he goes along. The table, of beautifully grained red gum wood, designed in the modern mode, features a split top which normally folds up against the wall but which can lie flat thus forming a table large enough to seat four for cards or tea.

The legs are turned from 1 5/8" square gum

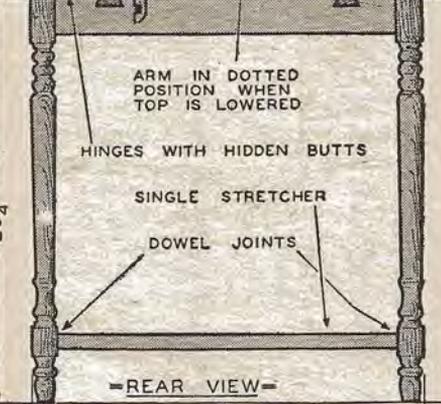
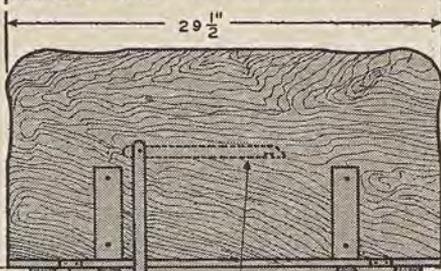
*Mechanix Illustrated*

# Table Is Easy To Make

by George E. Basich



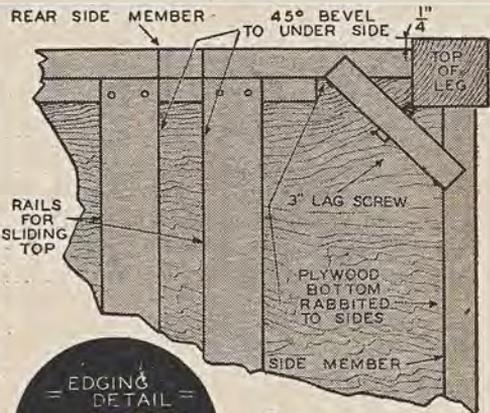
UNDER SIDE OF TABLE TOP SHOWING POSITION OF BATTENS. DOTTED LINES SHOW POSITION OF LEGS & SIDE MEMBERS WHEN TOP IS FLAT



= REAR VIEW =

26 1/2"

= DETAIL OF LEG JOINERY & SLIDE =  
FOR TABLE TOP



RAILS FOR SLIDING TOP

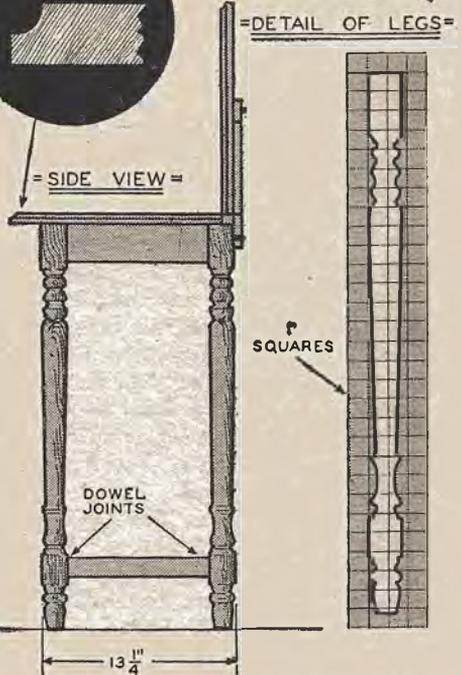
PLYWOOD BOTTOM RABBETED TO SIDES

SIDE MEMBER

EDGING DETAIL



= SIDE VIEW =



SQUARES

DOWEL JOINTS

13 1/4"

Above: These are the detailed plans of the table. Follow the squared drawing for lathe work on the legs.

wood 28 1/4" long. After they have been finished and sanded, stain and varnish them in the lathe and care must be used thereafter in handling them in the workroom. The side members are 3" wide, as shown, and are

assembled with screws. The bottom of these are rabbeted to take 1/4" plywood which forms a small compartment beneath the table top and which adds extra strength to the table

[Continued on page 145]

# "ALL-WAVE ELEVEN"

An advanced communications-type receiver embodying every modern feature of the refined superheterodyne circuit. A project for the experienced radio constructor who wants to enjoy superlative results.

(This is the first of two articles describing this set. The second will appear in the April issue.)

by Howard G. McEntee

THE "All-Wave Eleven" receiver may seem to be quite a large job to tackle, and so it is. But it is offered as a radio set which can be built at home with the least possible interference from "bugs" and one which is modern and up to the minute in every respect.

The outfit is built along the lines of a commercial communications receiver and has the same general tube lineup. The tubes are used as follows (see diagram opposite): V1, r.f. stage; V2, mixer; V3, high-frequency oscillator; V4, voltage regulator; V5, first i.f. amplifier; V6, second i.f. amplifier; V7, detector; V8, noise silencer; V9, first audio amplifier and beat oscillator; V10, audio power amplifier; V11, rectifier.

Since band spread is of prime importance in such a set, great care was taken in the selection of the tuning controls. The band spread is accomplished by the parallel condenser system, wherein one condenser gang of large capacitance acts as the so-called "tank" and is set to the vicinity of the frequency desired, then actual coverage is obtained by means of the small parallel condenser gang. Both sets of condensers are combined in one frame, resulting in a compact and efficient unit.

Two dials are required. The band-set dial is a friction drive 4 to 1 unit which is also used for the main tuning control on the lower frequency bands. The band-spread dial is an exceptionally smooth 10 to 1 ratio unit of the type used on many communication receivers, and is absolutely without backlash in operation.

As mentioned above, the general coverage dial is used almost exclusively for tuning on the lower bands, as the band spread dial does not cover a wide enough band of frequencies to make it usable. The latter is always available as a vernier, however.

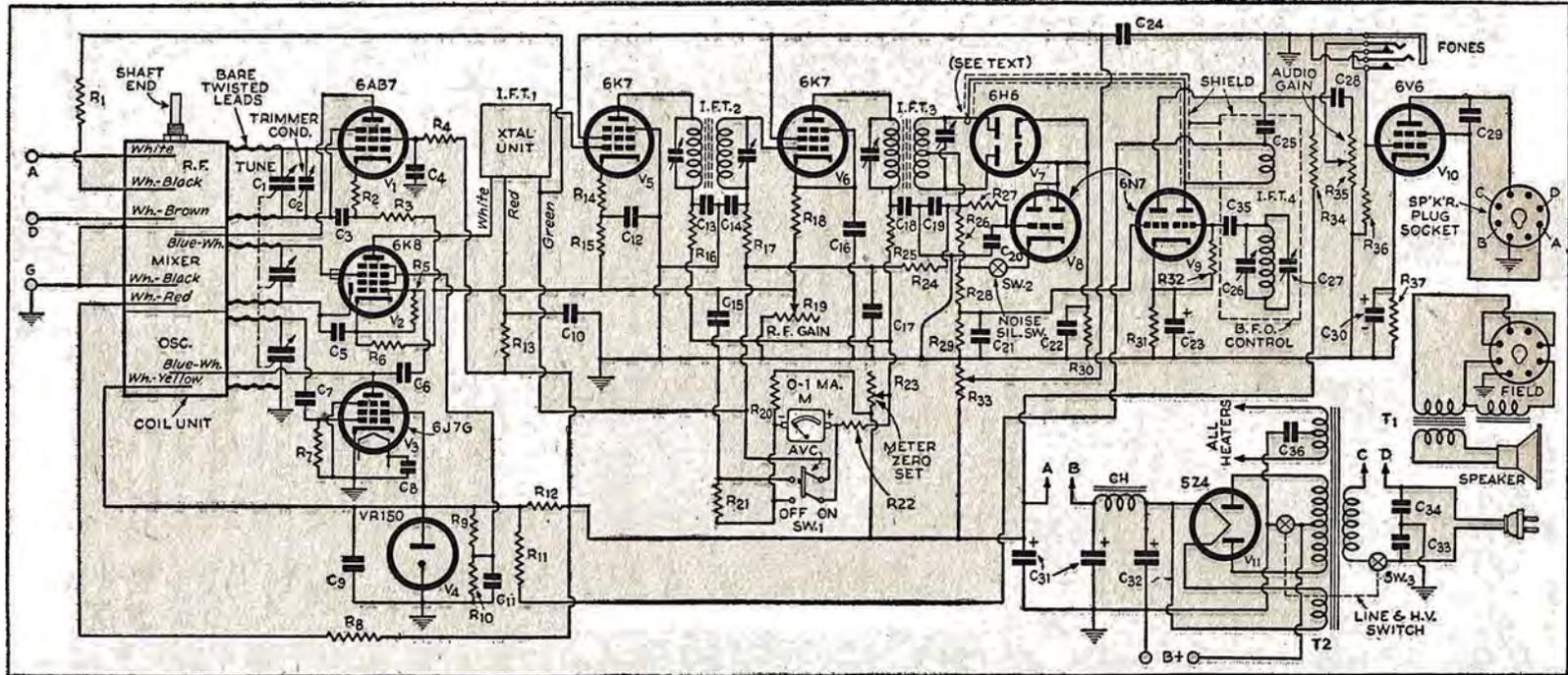
An extra control in the form of a trimmer condenser C2, across the first section of the main tuning condenser, C1, has been installed. This trimmer serves to compensate for various different types of antennas, and allows the r.f. stage to be kept in exact resonance, thereby affording higher gain and a better image ratio.

The coil set comes all wired and assembled and covers a range from 530 kc. to 32 mc. in five ranges, selected by a built-in switch. The use of such a commercially available coil set is of the greatest help to the less experienced builder, and even to the expert it is a great saver of time and trouble. This coil set must be altered slightly as will be described later in order to fit under the chassis.

Following the high frequency section comes the crystal filter unit and here again a completely assembled and factory-wired unit is employed. This particular crystal circuit is exceptionally efficient and is designed for peak performance on both phone and c.w. signals. It has two panel controls, selectivity and phasing; the former is a six-position switch. When properly aligned in the circuit there is absolutely no difference in strength of an incoming signal between the No. 1, or OFF position, and No. 2 or No. 3, and very little drop in signal strength is noted even in the extreme selective position. Its ability to eliminate heterodyne interference is remarkable.

Two conventional i.f. stages follow, with iron-core, air-tuned transformers throughout. The full-wave second detector, V7, and associated noise silencer, V8, come next. V7 provides a.v.c. voltage for the r.f. and i.f. tubes, a.v.c. being controlled by SW1. This same switch also shorts the tuning meter when in the OFF position. In this condition the r.f. gain control, R19, is used to prevent circuit overload on strong signal input.

The meter is of the forward reading type, that is, it moves to the right as a signal comes



**PARTS LIST**

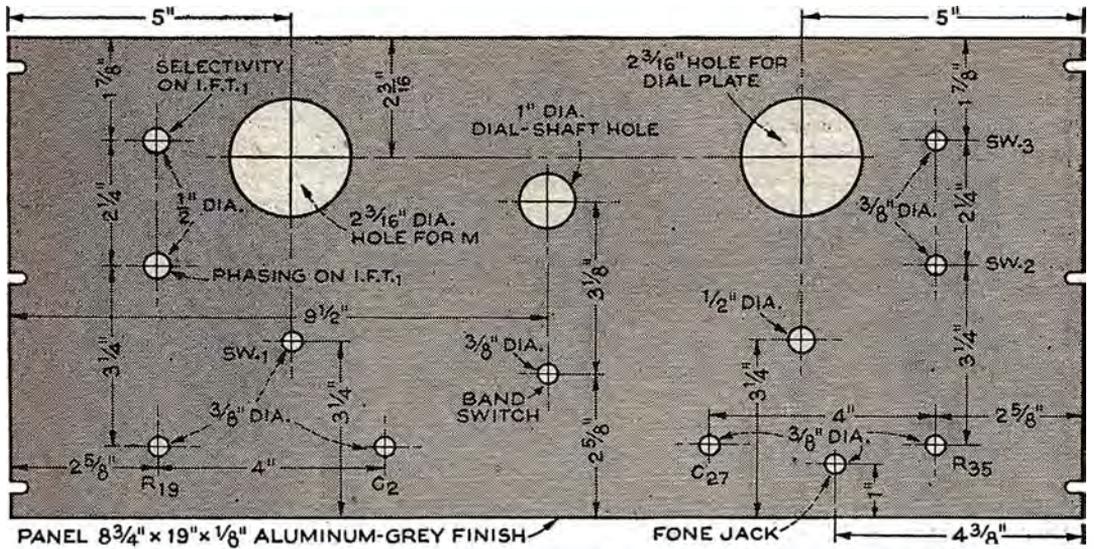
- V1—Type 6AB7 (Raytheon)
- V2—Type 6K8 (Raytheon)
- V3—Type 6J7G (Raytheon)
- V4—Type VR150 (Raytheon)
- V5, V6—Type 6K7 (Raytheon)
- V7—Type 6H6 (Raytheon)
- V8, V9—Type 6N7 (Raytheon)
- V10—Type 6V6 (Raytheon)
- V11—Type 5Z4 (Raytheon)
- C1—3-gang, 280 mmf. dual purpose condenser (Meissner 21-5143 B)
- C2, C7—15 mmf. variable condensers (Hammarlund HF-15)
- C3, C8, C12, C14, C33, C34—.01 mf., 400 volt paper condensers (Cornell-Dubilier DT4S1)
- C4, C10, C13, C18, C25—.01 mf., 600 volt paper condensers (Cornell-Dubilier DT6S1)

- C5, C11, C15, C16, C20, C24, C36—.1 mf., 400 volt paper condensers (Cornell-Dubilier DT4P1)
- C28—.1 mf., 600 volt paper condenser (Cornell-Dubilier DT6P1)
- C6, C35—100 mmf., mica condenser (Cornell-Dubilier 5W5T1)
- C7—25 mmf., mica condenser (Cornell-Dubilier 5W5Q25)
- C9, C29—.002 mf., mica condenser (Cornell-Dubilier 1W5D2)
- C17—.05 mf., 400 volt paper condenser (Cornell-Dubilier DT4S5)
- C19, C21, C22—50 mmf., mica condenser (Cornell-Dubilier 5WSQ5)
- C23, C30—25 mf., 25 volt electrolytic condenser (Cornell-Dubilier BR252-A)
- C31—Dual 8 mf., 450 volt electrolytic condenser (Cornell-Dubilier KRC588)
- C32—8 mf., 600 volt electrolytic condenser (Cornell-Dubilier KR608)

- R1, R17, R26, R29, R34—.1 meg., ½ watt resistor (I. R. C. BT ½)
- R2, R14—50 ohm, ½ watt resistor (I. R. C. BT ½)
- R3—100 ohm, ½ watt resistor (I. R. C. BT ½)
- R4—30,000 ohm, 1 watt resistor (I. R. C. BT 1)
- R5, R7, R11, R32—50,000 ohm, ½ watt resistor (I. R. C. BT ½)
- R6, R15, R18—300 ohm, ½ watt resistor (I. R. C. BT ½)
- R8, R20—1,000 ohm, 1 watt resistor (I. R. C. BT 1)
- R9—10,000 ohm, 1 watt resistor (I. R. C. BT 1)
- R10—50,000 ohm, 1 watt resistor (I. R. C. BT 1)
- R12—5,000 ohm, 10 watt wire wound resistor (I. R. C. AB)
- R13, R16, R25—5,000 ohm, ½ watt resistor (I. R. C. BT ½)

- R19—10,000 ohm, variable resistor (I. R. C. 14-116)
- R21—.01 meg. ohm, 1 watt resistor (I. R. C. BT 1)
- R22, R31—500 ohm, 1 watt resistor (I. R. C. BT 1)
- R23—1,000 ohm, variable resistor (I. R. C. 11-108)
- R24, R27, R36—.1 meg., ½ watt resistor (I. R. C. BT ½)
- R28—25,000 ohm, ½ watt resistor (I. R. C. BT ½)
- R30—.25 meg. ohm, ½ watt resistor (I. R. C. BT ½)
- R33—50,000 ohm, 50 watt wire wound resistor (I. R. C. EPA)
- R35—.5 meg., variable resistor (I. R. C. 13-1333)
- R37—300 ohm, 10 watt wire wound resistor (I. R. C. AB)
- Coil Set—5-band, 530 kc. to 32 mc. (Meissner 13-7603)

(The rest of the parts list will be found on page 151)



Drilling layout for the front panel of the "All-Wave Eleven."

in, and is set to zero with no signal input by means of resistor R23, which is placed on the chassis near the r.f. tube, with a knob above the chassis for ease of adjustment. This control will seldom need changing once it has been set.

The audio amplifier consists of two tubes, V9 and V10, and will produce 3 or 4 watts of output. While not exactly high fidelity, due to the sharply-tuned i.f. channel and other factors, the output tone quality is really very fine.

In addition to service as an audio amplifier, V9 also acts as a beat oscillator. All parts of the oscillating circuit are shielded with C26 and the secondary and tickler coils in the shield can above the chassis. The beat note is varied from the front panel by means of C27, which is placed at the rear of the chassis and operated by an extension shaft in order to keep the associated leads short. The beat oscillator is cut off by a very simple means. One tip of one of the rotor plates on C27 is bent out at an angle so that when turned fully counter clockwise it shorts the condenser and stops oscillation. This dodge makes for simplicity and is entirely practical.

The phone jack is inserted between V9 and V10 and is arranged so that when phones are in use the speaker output is nil. Since no d.c. flows through the phones, any type may be safely used.

About the only control not mentioned so far is SW3, which is a three-position unit. The left-hand setting is OFF, center is a.c. ON alone, or the standby position, and right

is full ON for reception. An extra pair of binding posts at the rear of the chassis shunts the high voltage section of the switch so that the receiver may be silenced automatically by means of a relay when used with a transmitter.

The loud speaker plug has a connection in the power transformer primary circuit so that removal of the plug cuts the a.c. power input to the set, a measure of protection for the filter condensers.

While the total of 11 tubes is around average for a set of this type, two of these may be omitted if desired. Those are V4 and V8. The former, a voltage regulator, serves primarily to keep a steady input to the high-frequency oscillator, V3, regardless of line fluctuations. This is of great help when receiving c.w. signals, particularly on the higher frequencies. It also supplies regulated voltage to the screen grid of V2 and to the beat oscillator.

The noise silencer tube, V8, is also a sort of luxury and its omission will obviate the need for a flock of small parts. It is very useful, however, and should be retained if its extra cost is not objectionable. If not desired, the following parts may be omitted: V8, SW2, R26, R27, R30, C20, C22. Without this circuit the upper end of R28 would connect to the center tap on the secondary of IFT3 and to C19 and R24.

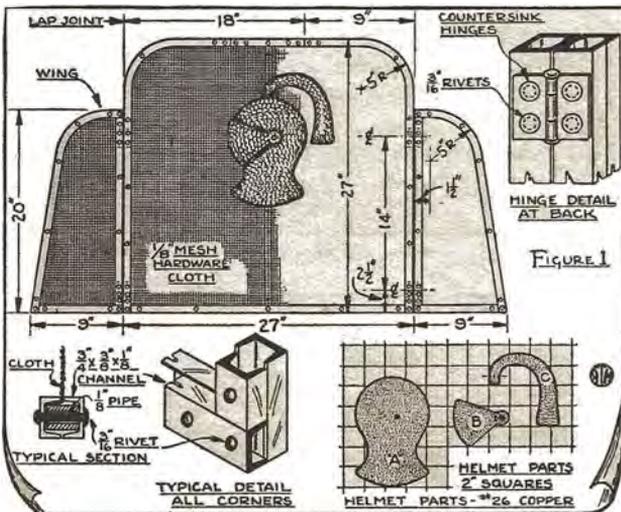
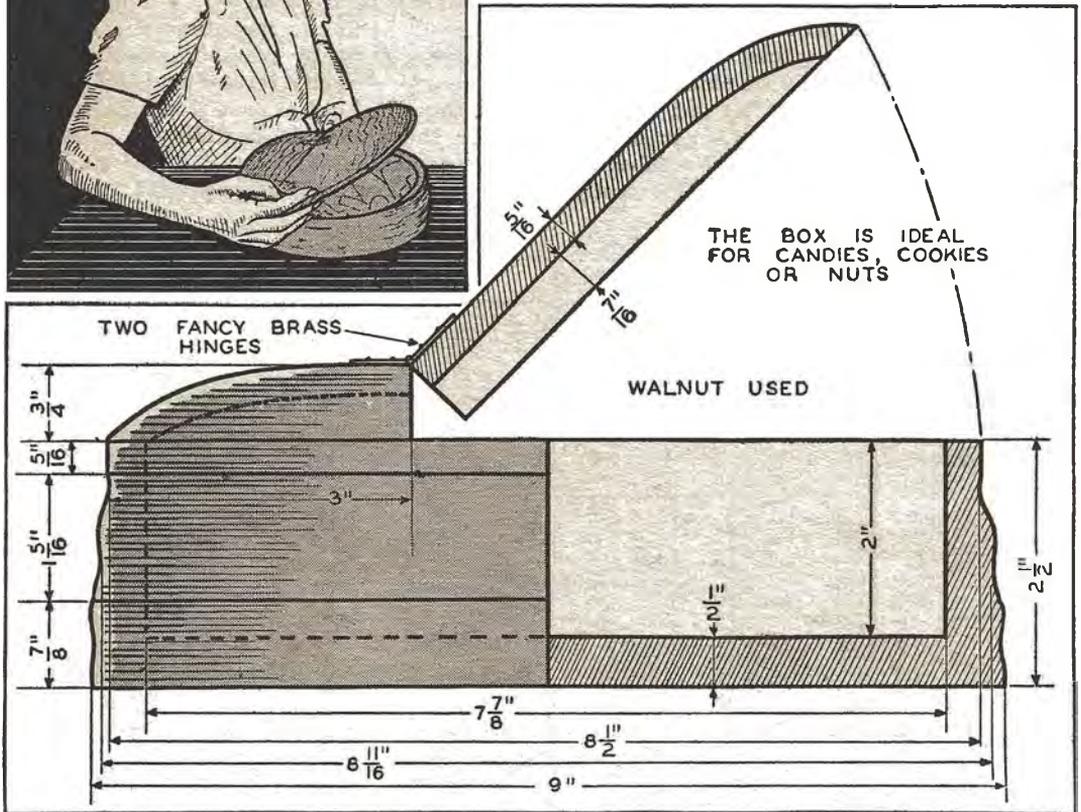
The noise silencer is of the greatest aid for weak signal reception and works best in reducing noises similar to auto ignition. It is therefore practically a necessity for those





## TURNUED CANDY BOX

**T**HIS candy box can be made from either two or three pieces of wood. If a piece can be obtained 9" in diameter, and 2½" thick, only one piece will be necessary for the bottom of the box. Otherwise bottom must be glued to side. Top is turned separately and attached with hinges.—D.V.H.



## KNIGHT FIRE SCREEN

**T**HE enjoyment of a crackling wood fire can often be marred by flying sparks which are uncomfortable and dangerous. Then too, an attractive fire screen can add much in ornamental value. Here is an all metal fire screen that is not only easy to construct but rugged enough to last a lifetime. It is of such merit that it could not be purchased for twenty dollars although the materials may be purchased for a nominal amount.

Small iron U-channel No. 15-

[Continued on page 147]



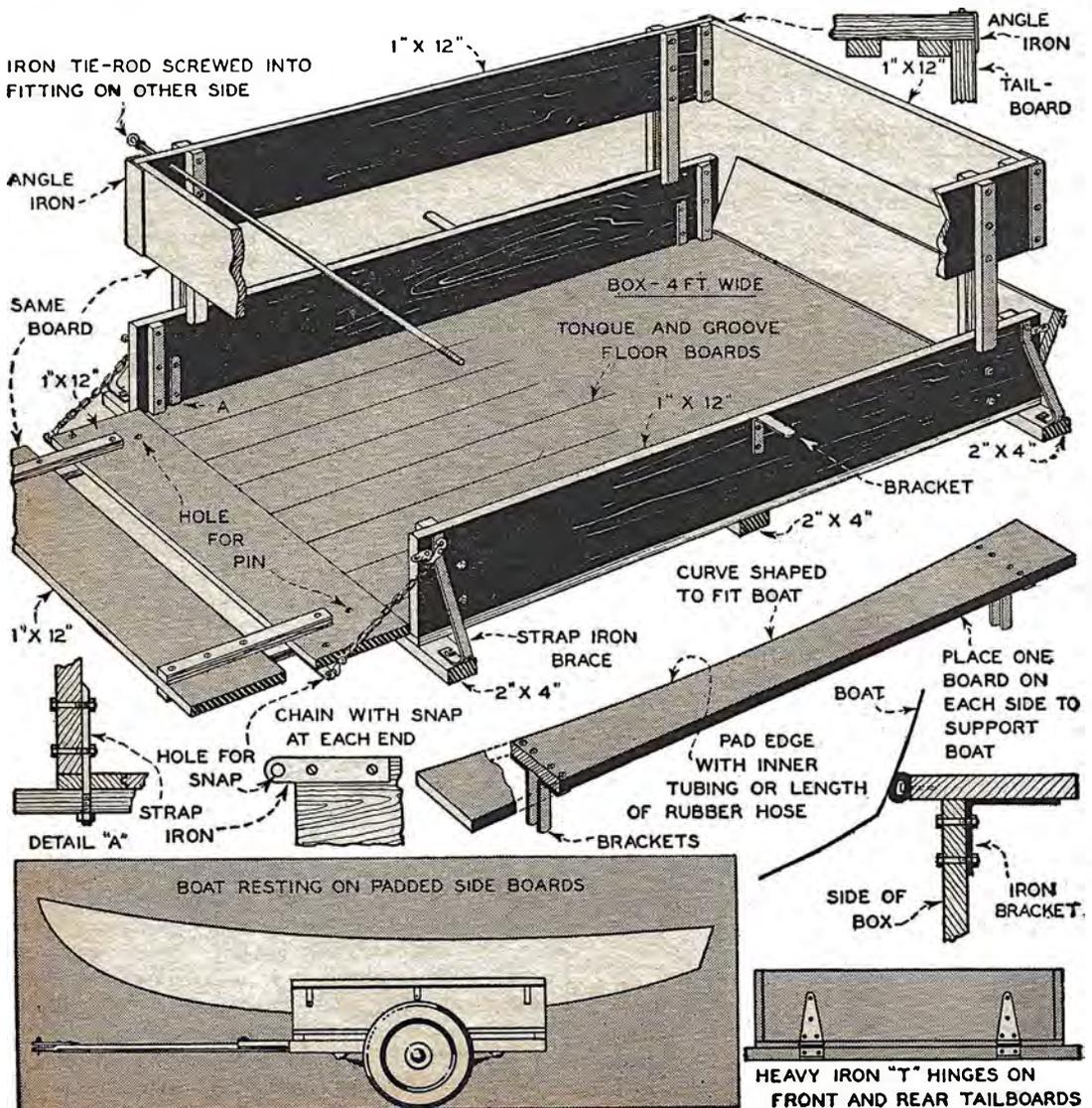
# Build This Convertible

**T**HIS trailer may be built on the installment plan, additions and features being added as needed, and as time is found to build them. Many uses will be found for this convertible trailer.

As the original trailer often carries a ton or more, and is used continually, the chassis is all-steel. The axle and chassis frame are from a wrecked Chevrolet (front axle). A wrecking yard furnished everything except the ball hitch for \$15.00. A strong 2-inch

galvanized pipe is used for the extensible tongue. The auto frame is bent to a V at the front and fastened together at the tip of the V with two heavy steel plates, one above and one below—to leave room for the pipe tongue to slide through. One bolt through the tongue and the two plates is removed when adjusting the tongue to short or long position. The back end of the tongue is hammered flat and drilled for another strong bolt which goes through the angle-irons

The drawings below show the "box" construction for hauling, and the adaptation for carrying boats. Note brackets.

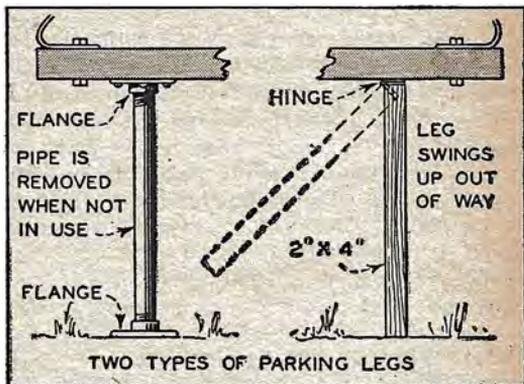


# All-Purpose Trailer

by W. Warren Anderson

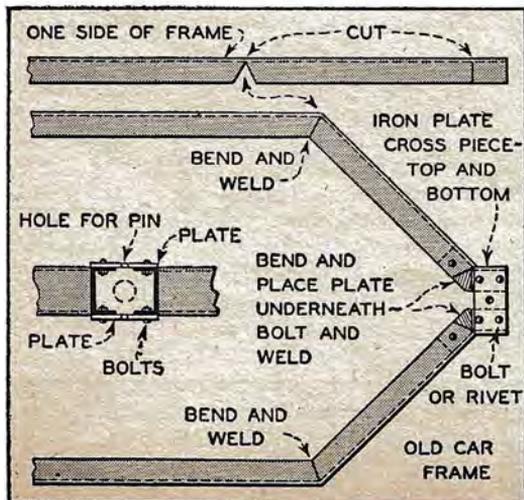
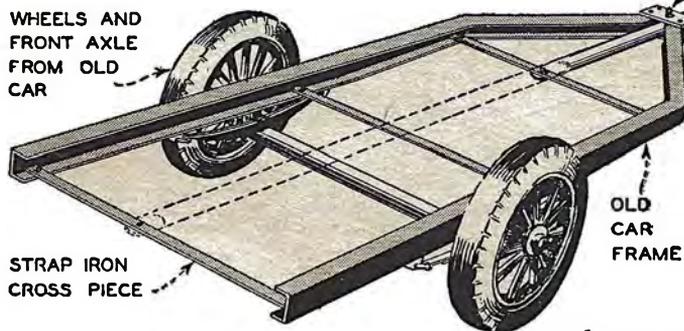
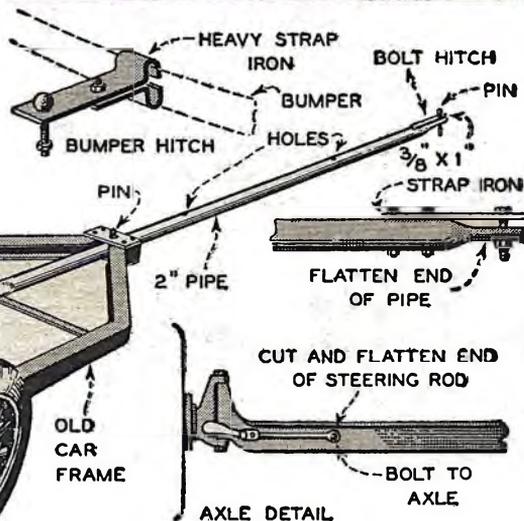
which serve as cross-members for the auto-frame at the rear and at the front where the V-bend begins. Another cross-member in the middle may also be drilled to afford a third, or medium position for the tongue. Corresponding bolt holes should be drilled in the tongue to take the bolt through the plates at the V in front. A simple bolt hitch may be made as shown in the sketch, although a ball and socket hitch of good strength is preferable. A removable bumper hitch, as sketched, may be used for renting the trailer, although the trailer-owner's tow-car would be better equipped with a patented bar hitch which pulls from the rear spring-points and merely steadies itself from the car bumper. Worn bushings in the chassis may be replaced

Below: Frame construction details and parking supports.



WHEELS AND FRONT AXLE FROM OLD CAR

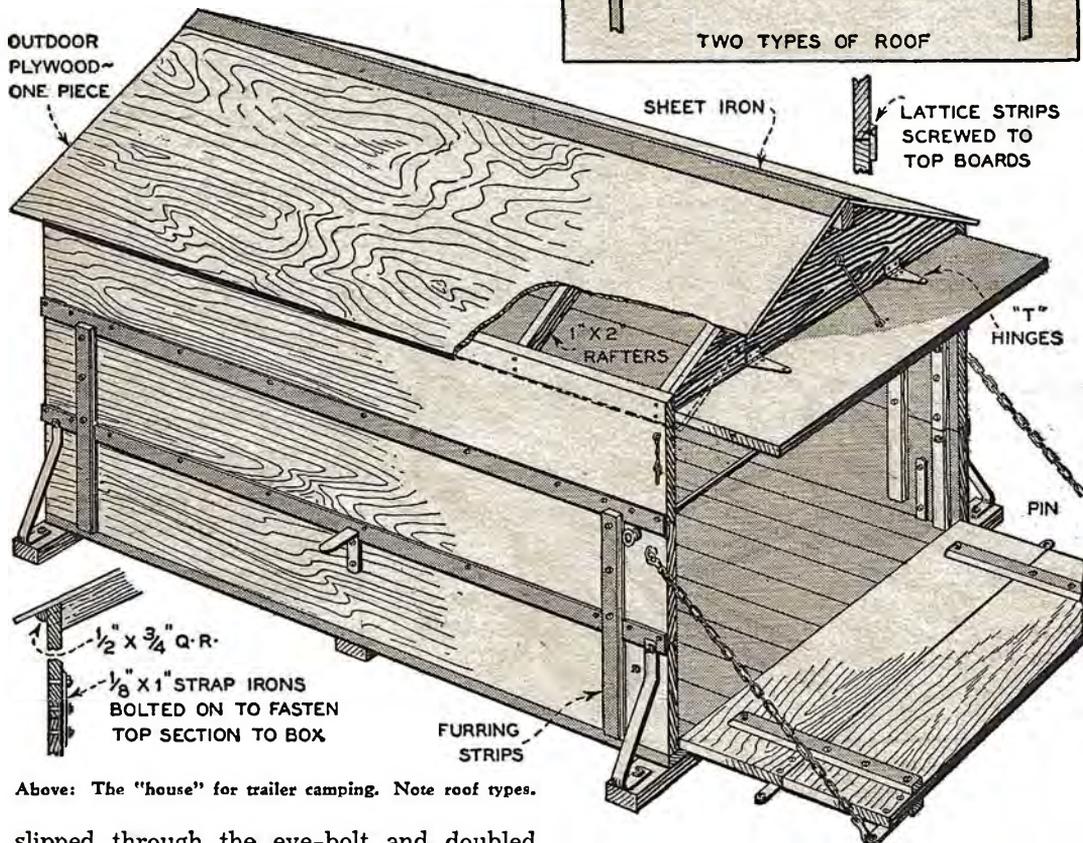
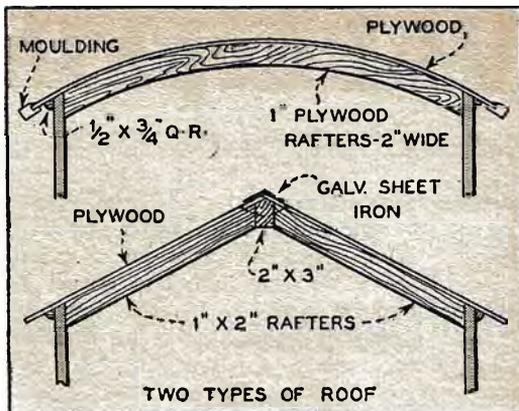
STRAP IRON CROSS PIECE



and new grease-fittings added. Brakes are not retained, although they must be used unless the trailer is kept light enough to avoid the requirement of the state law for brakes. Wood 2"x4" timbers could be used in place of the steel chassis but they are not as strong.

The basic box of this trailer should be strongly built to withstand its many uses. Cross-pieces (2"x4") of oak or very hard yellow pine are best. The 1"x12" sideboards and end gates are of hard straight-grain yellow pine. The flooring is 1"x4" tongue and groove clear fir. Six heavy wagon-box body-irons and ready-made corner latches may be purchased from a hardware dealer. Four outside corner-braces of 1/8"x1" strap iron must be made by a blacksmith. The top edge of the lower box is faced with 1/16"x3/4" bevel edged strap iron put on with flat-head

screws through countersunk holes. Heavy 10" strap hinges are used on the end gates, the bottom end of each hinge being bent around under the 2"x4" cross-piece of the box for extra strength. Cow-chain with a heavy harness-snap at each end supports the end gates. An eye-bolt near the top of each corner of the box and a flat strap iron plate with projecting eye bolted to the four end gate corners, serves to receive the harness snaps. The chain is made just long enough to support the double-box end gate, and is



Above: The "house" for trailer camping. Note roof types.

slipped through the eye-bolt and doubled back to support the single end gate.

Vertical battens of 1"x2" are bolted to the sideboards with 1 3/4"x1/4" carriage bolts flat washers and lockwashers; these battens serve as stops. The balance of this trailer was planned to place the center of the axle 1 1/2" behind the center of the box. This avoids too much weight on the tow-car—loading should be done with this in mind, and all loads should be arranged so they will not shift their center of balance on the road. Too much weight on the tow-car necessitates adding leaves to the rear spring of the tow-car, which makes it hard riding at other

times. Too much weight on the rear of a trailer makes it whip around on the road. About 100 pounds on the hitch is a good working weight for this trailer although 200 or even 250 will not overload the tow-car springs.

The boat-hauling attachments are made from 2"x8" or larger planks, cut to fit the boat hull and well padded with old auto rubber or burlap and canvas pads tacked on over the curved edges. Fitted with two strong pairs of angle irons or shelf-brackets

[Continued on page 152]

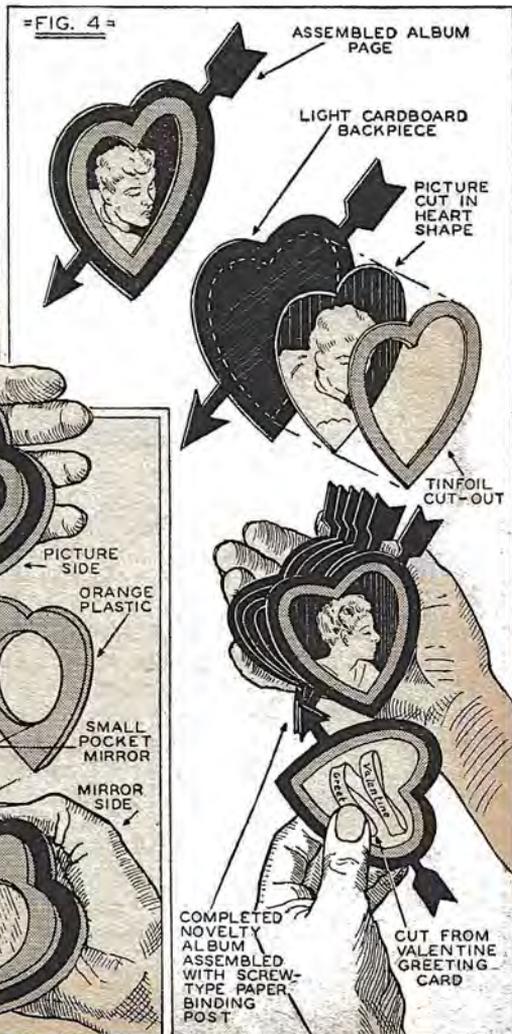
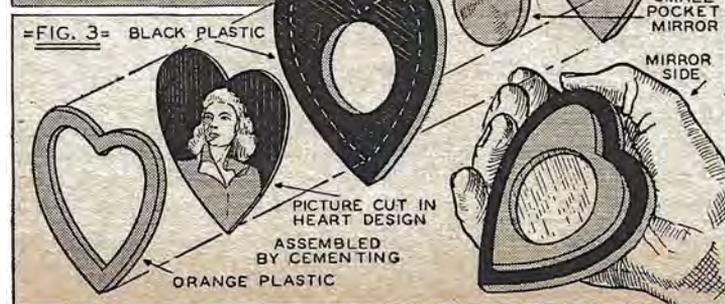
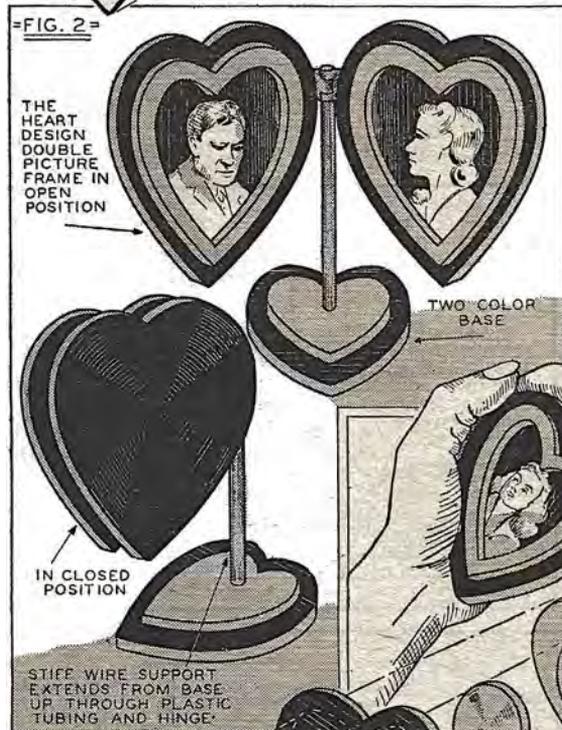
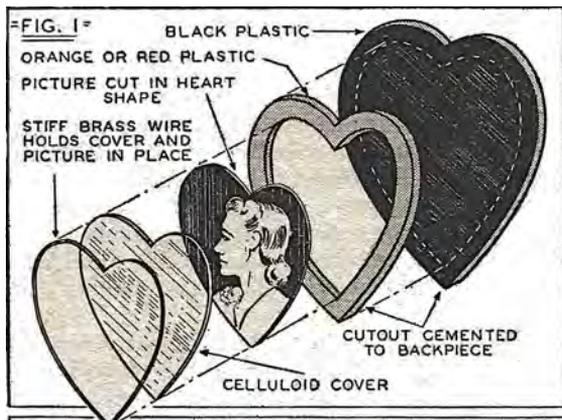
# VALENTINE HEARTS

by M. G. Winterton

**Y**OUR handiwork will attract a special touch of personal appreciation in any one of these attractive projects you may choose to make up as a Valentine gift for your fair lady. A glance at the accompanying illustrations will give a clear idea of the different projects and their make-up.

The largest of these projects is the double heart picture frame with heart design pedestal base. Constructed of plastic of contrasting colors, it is very attractive and embodies a novel folding feature.

[Continued on page 154]



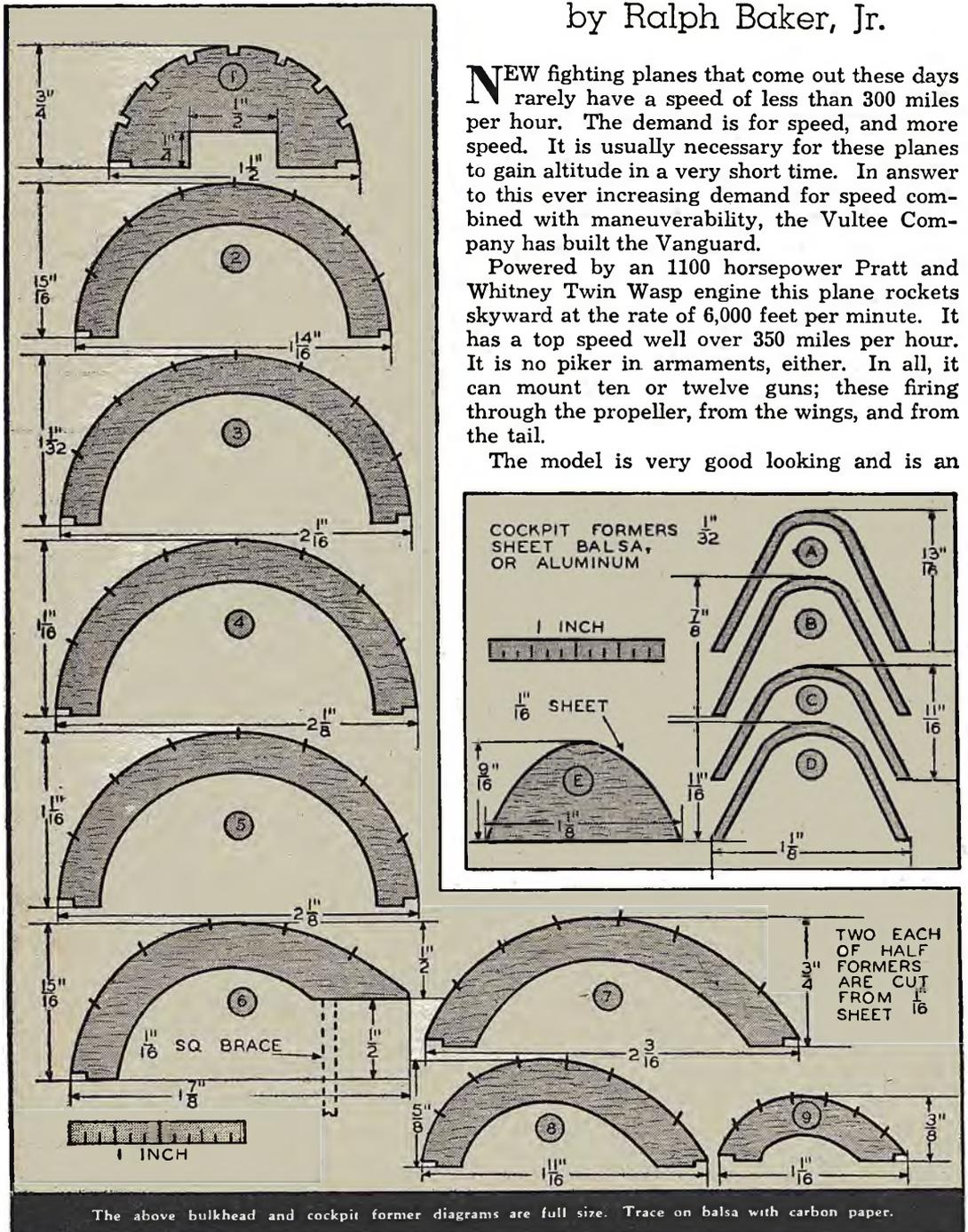
# The Vultee Vanguard

by Ralph Baker, Jr.

**N**EW fighting planes that come out these days rarely have a speed of less than 300 miles per hour. The demand is for speed, and more speed. It is usually necessary for these planes to gain altitude in a very short time. In answer to this ever increasing demand for speed combined with maneuverability, the Vultee Company has built the Vanguard.

Powered by an 1100 horsepower Pratt and Whitney Twin Wasp engine this plane rockets skyward at the rate of 6,000 feet per minute. It has a top speed well over 350 miles per hour. It is no piker in armaments, either. In all, it can mount ten or twelve guns; these firing through the propeller, from the wings, and from the tail.

The model is very good looking and is an



# Flying Model

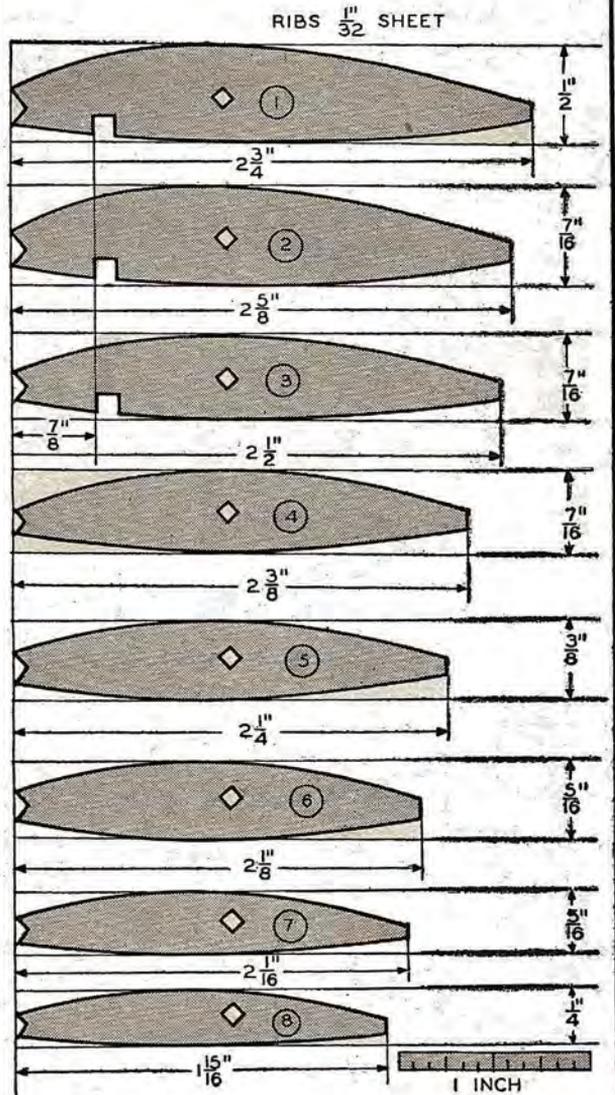
Photograph on page 95.

excellent flier for its type. The construction is not difficult, even though it retains many features of its prototype. Be sure to look the plans over carefully before starting construction.

## Fuselage

To construct the fuselage, trace the shapes of the bulkheads (which are shown full size) with the aid of carbon paper. Cut them from  $\frac{1}{16}$ " sheet. Only half of each bulkhead is shown on the plan. Cut two of each type. Next lay out side plan according to dimensions. Pin the keels over the plan and cement half of the bulkheads in position. After the cement has dried remove frame from the plan and add the other half of the bulkheads to the frame.

Now cement the  $\frac{1}{16}$ " square stringers over the bulkheads. The fuselage can be kept from getting out of line by adding the opposite stringer each time one is cemented on. Cement the spinner block to the No. 1 bulkhead with several tiny drops of cement so that it can be shaped more easily and then removed. Sandpaper the whole fuselage framework smooth. Do not cover the fuselage at this time.



The rib plans above are actual size. Model can be built twice size shown, if desired, by doubling all dimensions.

## Wing

Make the two wing panels on a full sized sketch of the plan. The ribs are shown full size. Make a plan of the other half of the wing by tracing it on semi-transparent paper, then turning the tracing over. Cut the ribs from  $\frac{1}{32}$ " sheet balsa of medium weight, and sandpaper them. The leading and trailing edges and the spar should be of hard balsa. Sandpaper the wings when glue is dry.

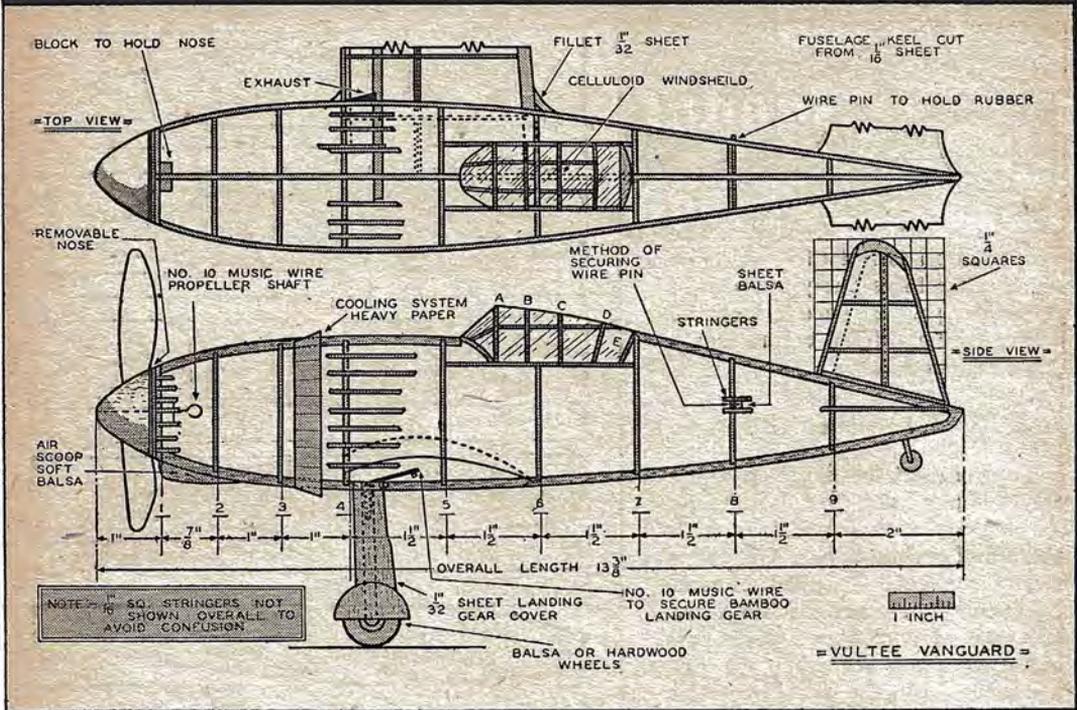
## Tail Surfaces

The tail surfaces have been enlarged for the model for more efficient flying. The stabilizer is built in two pieces and cemented on each side of the fuselage after covering.

## Propeller

A three bladed propeller is used as on the real plane. Carve three blades from balsa

Build fuselage according to dimensions shown on drawing below. Assemble in halves as instructed.

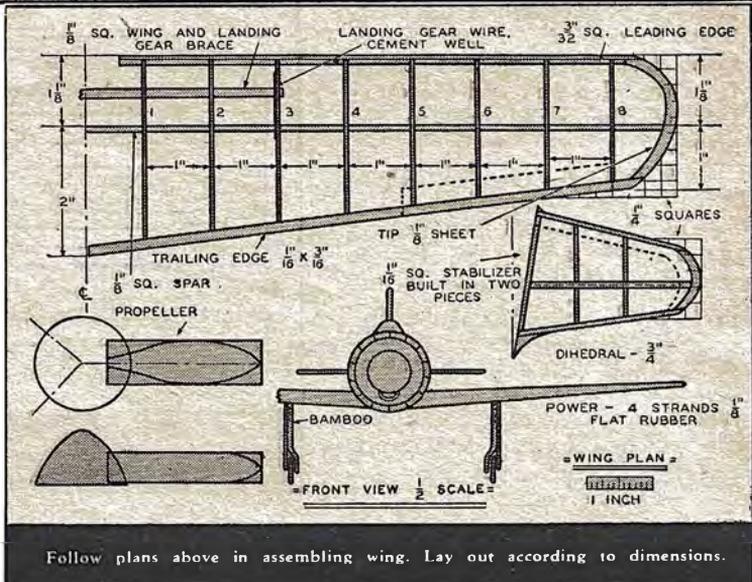


blocks  $\frac{1}{2}'' \times \frac{3}{4}'' \times 2\frac{1}{4}''$  and cement in notches in the spinner 120 degrees apart. Be sure to carve right hand prop blades.

To make the removable nose, cut a piece of  $\frac{1}{16}''$  sheet balsa the same shape as bulkhead No. 1. Cement to the back of this piece a balsa block to fit the hole in bulkhead No. 1. Then cement a washer on either side of the prop shaft hole. Bend the prop shaft from No. 10 music wire. Another washer is put on the prop shaft between the prop and the nose block as a bearing. Another washer is cemented to the back of the prop hub. Paint the prop and spinner with clear dope before coloring them.

### Covering

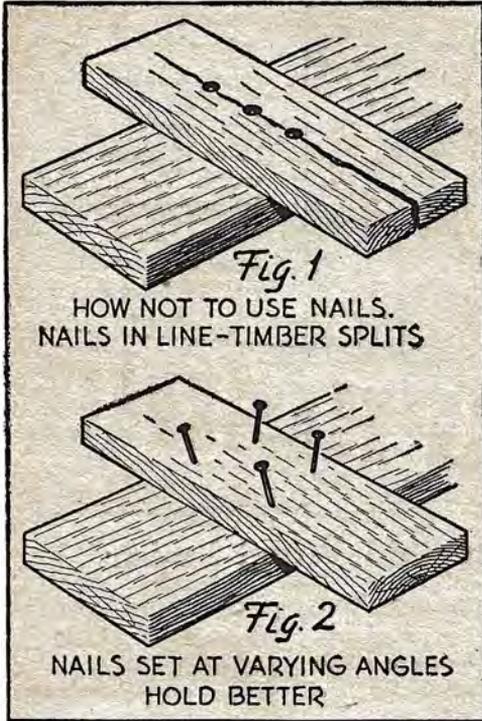
The original model is covered with silver tissue. Any other color may be used, how-



Follow plans above in assembling wing. Lay out according to dimensions.

ever, though the real plane is the natural metal color. Attach the wing to the fuselage before covering the model. Put on the landing gear also before covering the model. The landing gear is bamboo and wire. Bend the bamboo to shape by heating. Bend the wire  
 [Continued on page 145]

# HOW TO USE NAILS



Don't hammer like the workman above. He's holding the hammer too close to the head and has his left index finger in a dangerous spot. Note how grain lined nails have wood in Fig. 1. Angle driven nails in Fig. 2 hold better.

by Walter S. Chansler

**I**T IS surprising how few people there are who know how to use nails. Most people, perhaps, have given the subject little or no thought; or what little thought they have given it has been relative to how to use nails so as to add to the attractiveness of the job rather than to the efficiency of the work.

To use nails efficiently, one must know woods, their nature, consistency, inherent qualities. Nails hold much better in hard woods than they do in soft woods. Some woods have a tendency to split easily, while others are tough and split only under great strain. The texture of some woods calls for long slim nails, while that of other woods is such that much shorter, thicker nails may be used effectively. All such factors govern the proper use of nails.

All kinds of timber are composed of minute particles or fibers. These are arranged in various orders in the different kinds of wood, being held together by a certain inherent at-

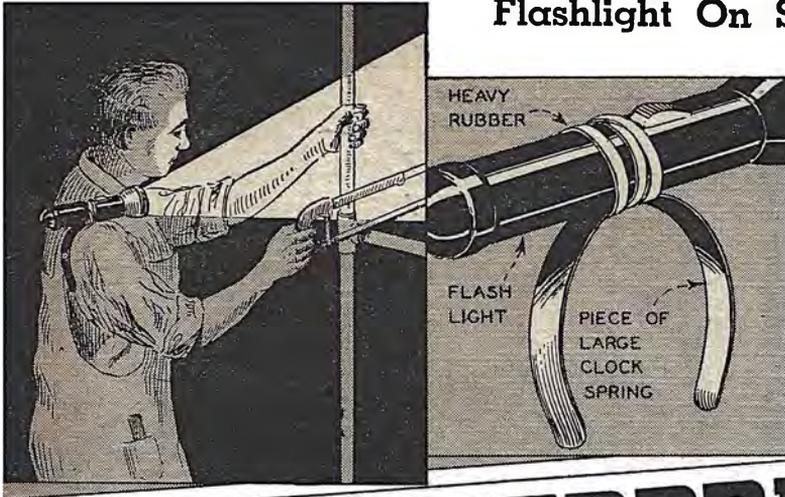
tractive force known as molecular force. This varied arrangement of these fibers or particles together with their composition determine the grain and consistency of the various woods. When we drive a nail into a block of wood we displace these particles and create a force antagonistic to the attractive force of the wood fibers. If this displacement is such as not to overbalance the molecular force, the nail holds firmly, but if the displacement is so great that the molecular force is overcome, then the wood splits along the line of least resistance. This is always with the grain. Consequently the nail, having no antagonistic force to the displacement of wood particles which its entrance has produced, fails to hold.

The common error in using nails is to line off the timbers and drive the nails at equal distances along this line. This is a mistake of the worst kind. For instance, assume you are nailing a cleat to a plank. If you

[Continued on page 154]

## Flashlight On Shoulder Clamp

WHEN doing any type of work in the dark that requires both hands, this easily made shoulder clamp will hold your flashlight so as to shine on the work. A section of a large clock spring is cut as shown. Ends must be ground round so they won't tear.



# FOR ENTERPRISING

## Non-Skid Wood Finish

### Nail Through Screwdriver Makes Working Easier



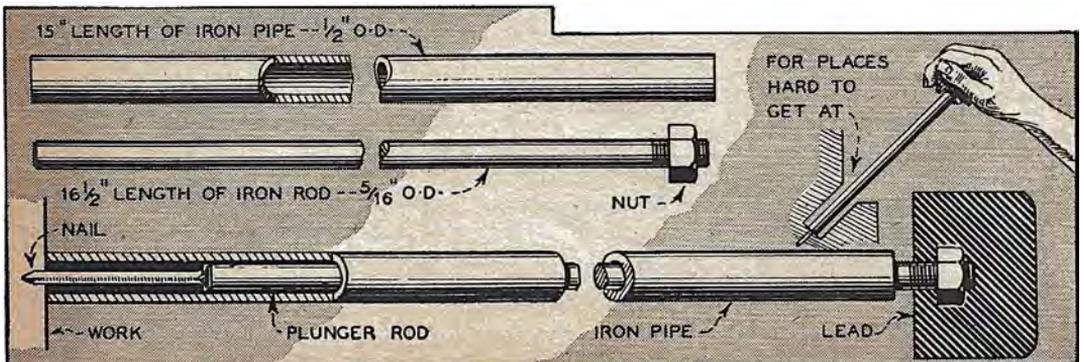
WHEN driving screws in hard wood, a hole bored through the handle of the screwdriver as shown, will be a great help. A large nail can be inserted through the hole to act as a lever, when desired.—A. V.

A TEASPOONFUL of powdered pumice stone mixed with two ounces of white or orange shellac or varnish, makes an inexpensive and easily applied non-skid finish for table tennis paddles, etc.



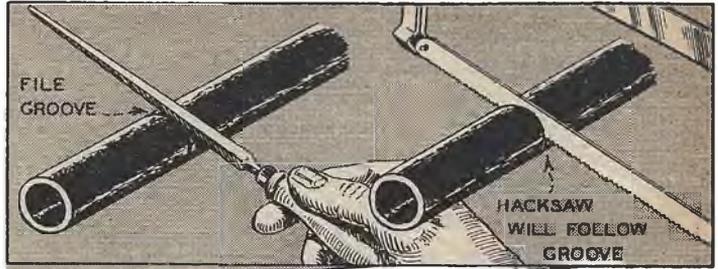
## "Tight Spot" Nail Driver

NAILS can easily be driven into surfaces ordinarily difficult to reach when this simple tool is used. Made from a  $\frac{5}{16}$ " iron rod and a length of  $\frac{1}{2}$ " O.D. iron pipe, it will be a great aid to the woodworker.—A. T.



## Making Square Hacksaw Cuts On Pipe

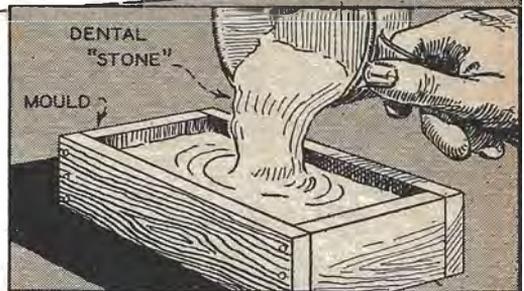
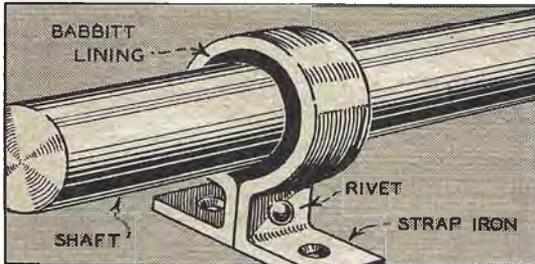
IT IS often desirable to cut off a piece of pipe with a hacksaw in such a way as to be certain the cut will be squared. One method of assuring a square cut consists of first filing a shallow groove around the pipe with a 3-cornered file. The saw will follow the groove.



# SHOP HOBBYISTS

## Simple Shaft Bearings

LINE shaft bearings for machine tools can be made of strap iron  $\frac{3}{16}$ " thick and about 1" wide. Bend iron first, then pour the babbitt. Drill oil hole in top.—H. J.

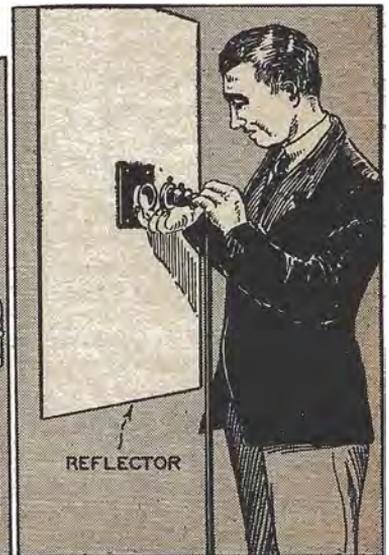
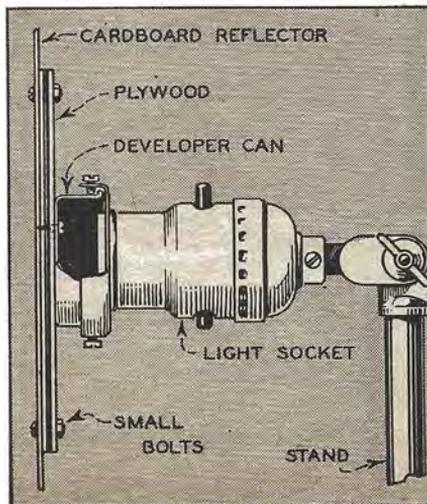


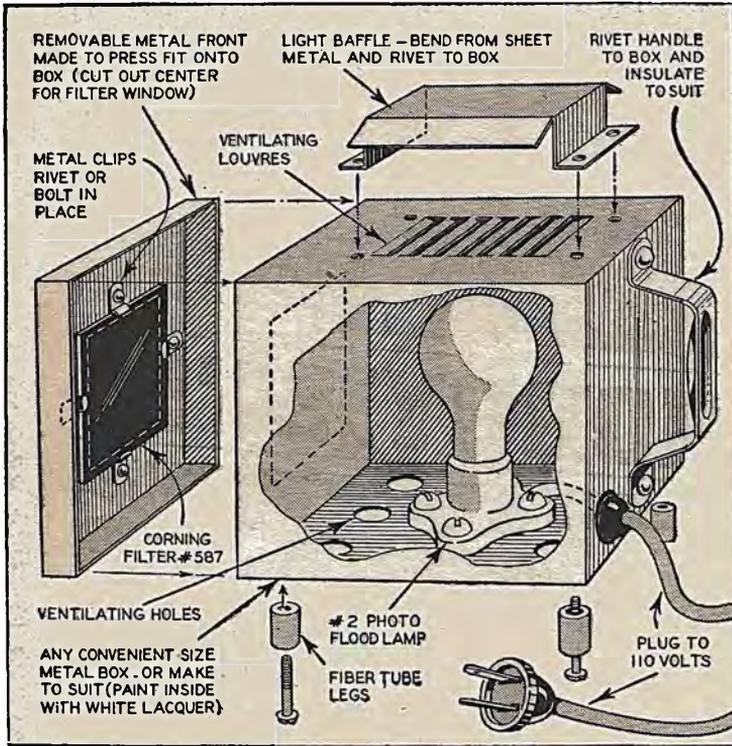
## Dental Stone For Moulds

SOME of the uses to which amateur mechanics put plaster of Paris will be much better filled by dental "stone." This is a compound used by dentists. It costs about 15c a pound, is very strong and may be used for foundry patterns.—C. B.

## Holder For Cardboard Reflectors

CARDBOARD reflectors can be adapted for mounting on bridge lamps and portable photolight stands by making use of the top container of a two quart developer can. Readily snapped into the shade bracket, into which it fits perfectly, the adapter can be locked in place by tightening the bracket set screws. A small plywood panel supports the cardboard.—J. M.





An AC-DC lamp for use in home or laboratory. Oil can will make a suitable box.

## Prospecting With Black Light

[Continued on page 97]

them for a few seconds. Uncannily, they spit flame for seconds or perhaps minutes after the torch has passed on. Recently an amateur prospector found a piece of willemite that glowed so brilliantly he could read a newspaper by its light. It kept right on glowing for nearly two hours!

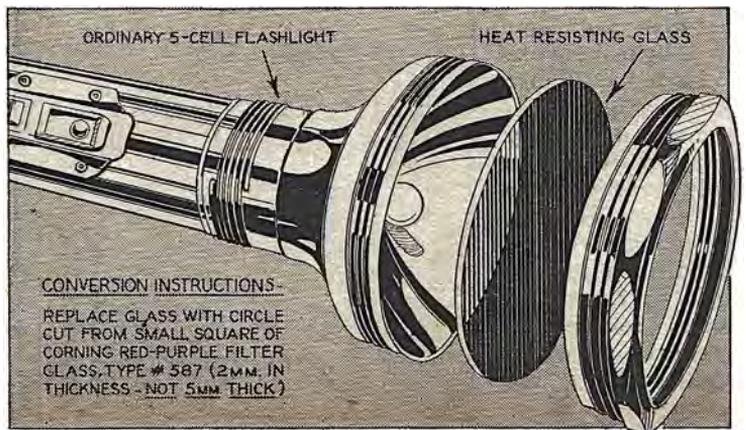
War needs are booming black light prospecting for scheelite, ore of tungsten, which looks just like common rock among which it is found, but under the torch glows a brilliant blue. Miners use mercury-vapor lamps to follow the vein, to sort ore from worthless rock, and to test waste on the dump to be sure all the tungsten has been removed. One mill found unsuspected ore only a quarter of a mile away. On test it proved far richer than where they had been working three years! A prospector crawled down into six "gopher holes" where an earlier miner in

Right: The flashlight ultraviolet torch. Filter comes  $\frac{3}{8}$ " square, standard size, which is just right to obtain the correct sized circle.

holes don't leak light, blanking out the glow of the rocks.

Still more ultraviolet, and correspondingly better effects, can be had with a 25-watt light "black light bulb." Like the photoflood, this runs on 110 volts, t.c. or d.c., and needs no filter, but does not need to be enclosed. Never operate this type of bulb more than five to ten minutes at a time, as they get very hot and may swell up dangerously—and don't mount them close to anything that will burn.

For field prospecting, however, the photoflood and black bulb are out of the question because



portable current supply is impractical. Fortunately, the General Electric Company now is making a small argon-filled glow bulb which has no filament and lends itself well to portable units. It fits a standard lamp socket and operates from 90 volts or more of radio "B" battery, or from a small spark coil such as that from a Model "T" Ford. Best of all, it sells for only fifty cents. A bank of four, placed close together with a reflector behind, makes a convenient outfit which needs no filter because little visible light is produced. The Ford coil can be operated from a six-volt "Hot-Shot" battery, or four standard dry cells taped together and slung on shoulder straps. Adjust the vibrator so the coil gives the fattest spark, as determined by a short spark gap between two wires attached to the secondary terminals. Be sure of all wires leading from the secondary of the coil to the glow lamps are well insulated, as the high-voltage can give you a nasty bite.

One ingenious prospector operates his lamp by wires attached to the high-voltage leads on his automobile distributor head. Plenty of insulation is necessary.

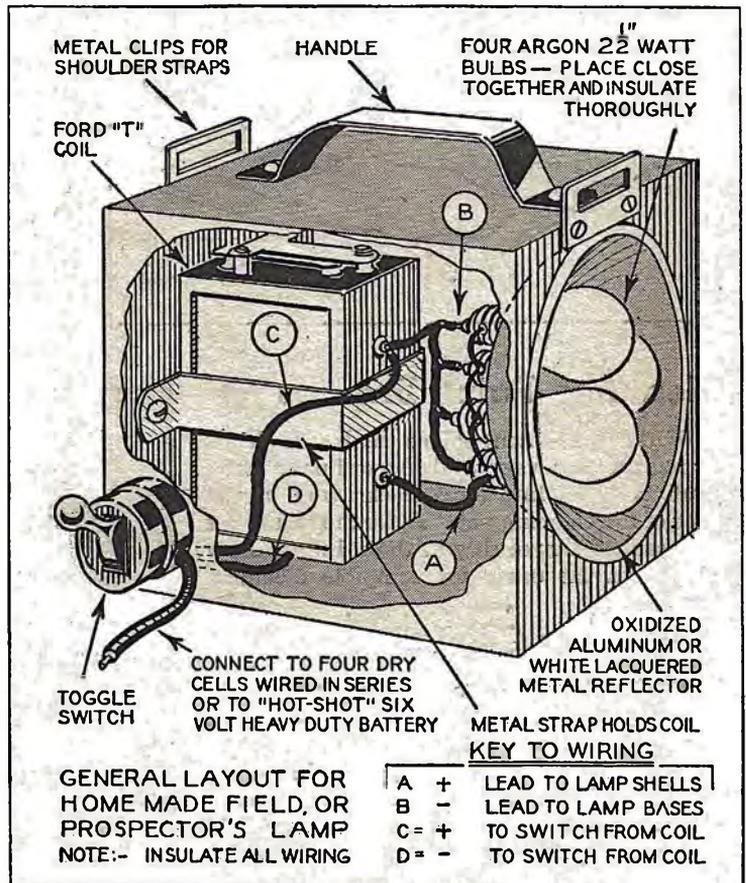
The argon glow bulb works equally well on ordinary 11-volt house current, d.c. or a.c. It is handy also for exhibiting your collection of fluorescent minerals. A bright reflector will help in directing the rays where desired. The shiniest looking material is not necessarily the best mirror for the very short ultraviolet rays. Aluminum is an excellent material, and strangely, oxidized aluminum reflects more ultraviolet than the polished kind. Ordinary aluminum paint, however, is not bright, and unless your paint is a very bright sprayed aluminum, a pure white lacquer is better.

If you'd rather do your night prospecting by daylight, you can utilize the sun's ultraviolet. Fit a light cardboard box with a black cloth big enough to drape around your shoulders and keep out the light, except what is allowed to come through a No. 587 filter glass fastened over a hole in the top. Fasten the flaps of the open side so you can put specimens inside and look at them under the filtered sunlight. This "solariscope" viewing box will not work with scheelite or certain other ores requiring very short rays, as the earth's at-

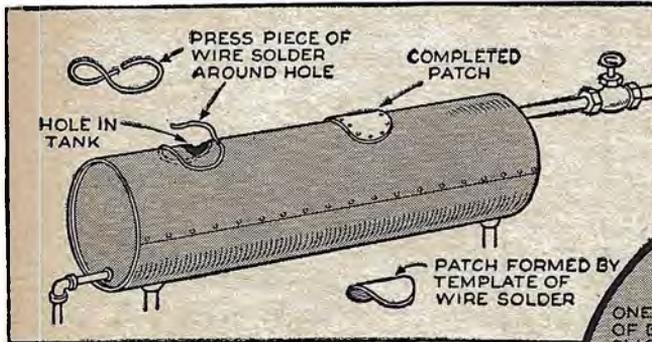
[Continued on page 156]



A cluster of four argon bulbs form the black light element of this easily made portable lamp. Oxidized aluminum makes the best reflector for ultraviolet light—polished or bright materials are not as good. Dimensions are not given as box can be made to suit.

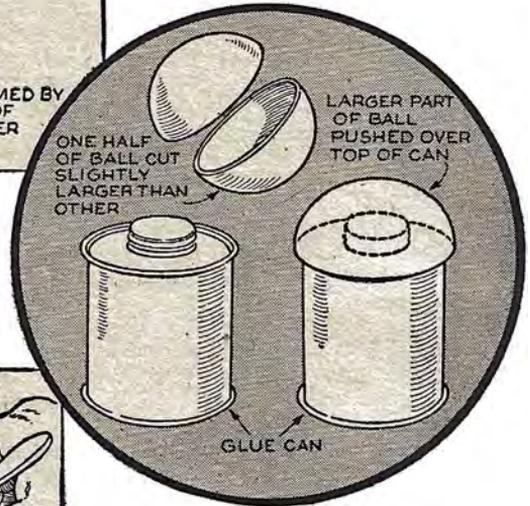


# Improve Your Shop



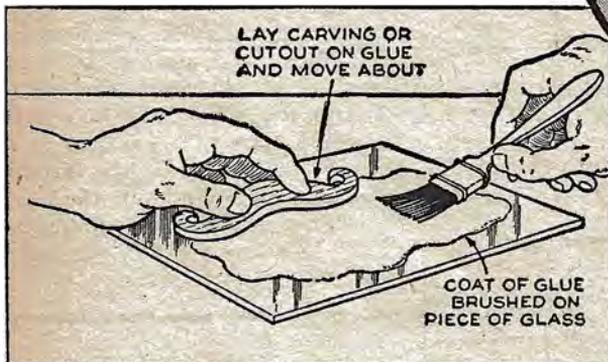
## ← Template Of Solder

WHEN making patches or other articles to fit irregular shapes, the ordinary type of wire solder makes good templates.



## Airtight Glue Can Cover →

QUICK drying cement evaporates rapidly if the cover is loose. Half of a rubber ball makes a handy airtight safety cover.

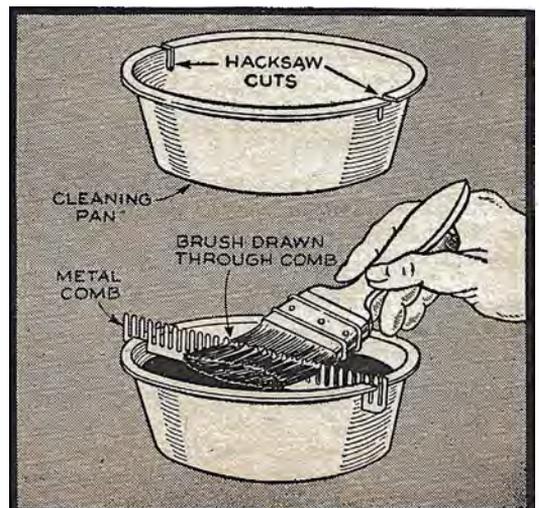


## ← Gluing Carvings

WHEN scroll saw cut outs are to be glued to flat surfaces the glue often runs over the edges. If the glue is spread on glass and the work pressed down on it, surfaces coated will not run over.

## Cleaning Paint Brushes →

THIS arrangement solves the brush cleaning problem very well. An ordinary metal comb is fitted into slots hacksawed in the sides of the cleaning pan. After the brush has been soaked thoroughly in the solution, draw it through the comb for complete cleaning.



## Preserving Color Of Chestnut

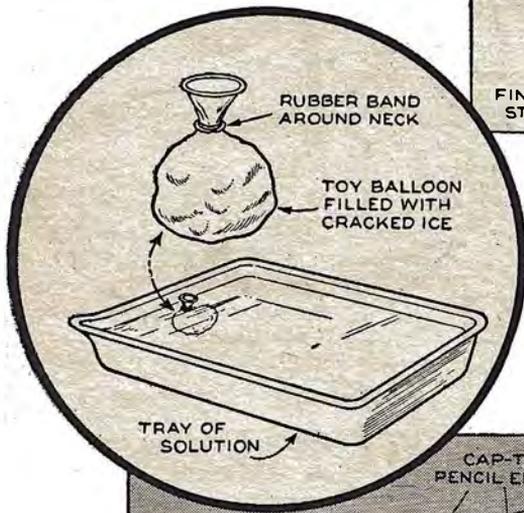
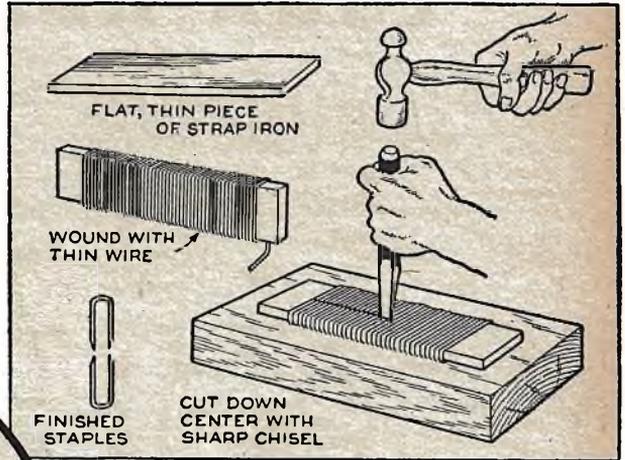
TO PRESERVE the natural color of chestnut paneling, use a protective coating of white wax or white shellac. A very thin coat of shellac followed, when dry, by a finishing coat of white wax, is recommended. Polish until the finish is as high as you desire. If you prefer a dull coat, use two thin coats of shellac, sandpapered down between coats.

# Technique

by A. H. Waychoff

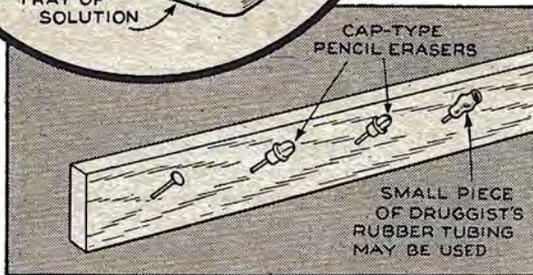
## Making Staples

**I**F A particular size staple is required and none are available, this simple method will often save the day. A piece of strap iron of the proper size is wound with medium stiff iron wire as shown. A sharp cold chisel is then used as indicated to sever the windings along the center line. They must be cut on both sides, of course, and then separated for use.



## Ice Bag For Photo Trays

**W**HENEVER it is desirable to maintain a fixed temperature in any solution that has a tendency to heat up, this device will be effective. A large toy balloon such as can be bought in the 5 and 10 cent store is used as an ice bag. Crushed ice is placed in it through the neck. The thin rubber permits the ice to cool the solution without diluting it. This is especially important in photographic work.



## Eraser-Nail Coat Hooks

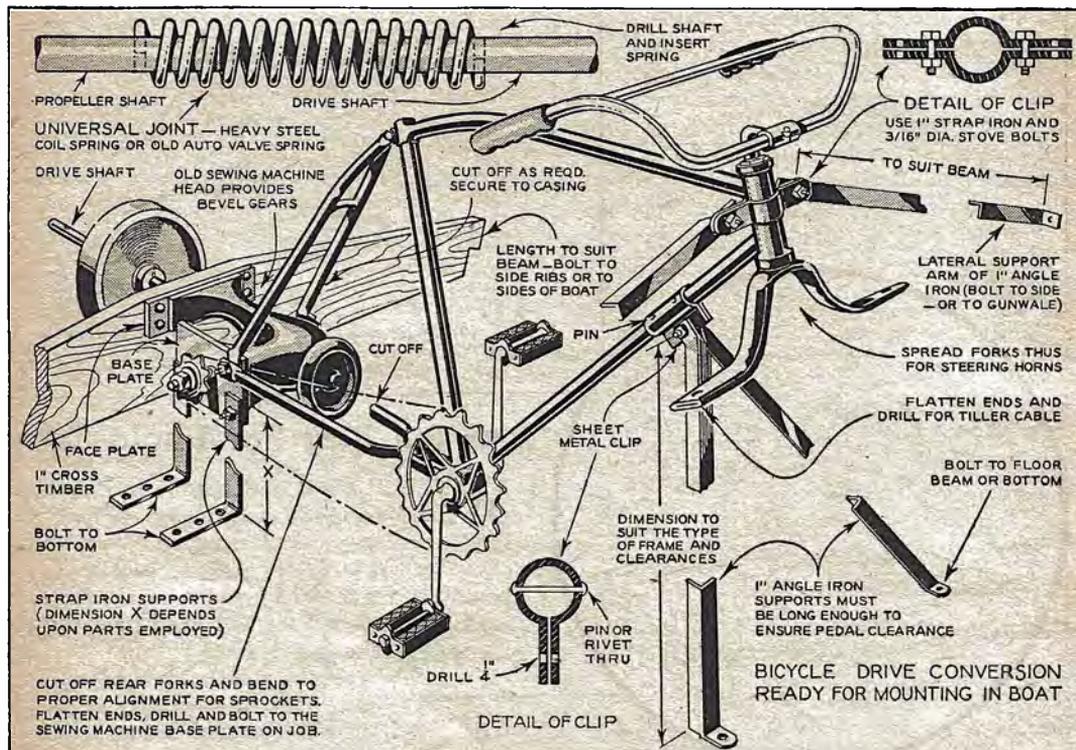
**S**LIP-ON type pencil erasers will prevent nails from tearing clothes that are hung on them. The erasers are simply pressed over the heads of the nails as shown.



## Paint Spray Improvement

**A** LOW level in the paint supply jar of a spray gun often causes interruptions in the spray. A flexible rubber tube, weighted to swing to the lowest point in the jar, will use all the paint. A rigid tube won't.

# A BICYCLE DRIVE FOR YOUR ROWBOAT



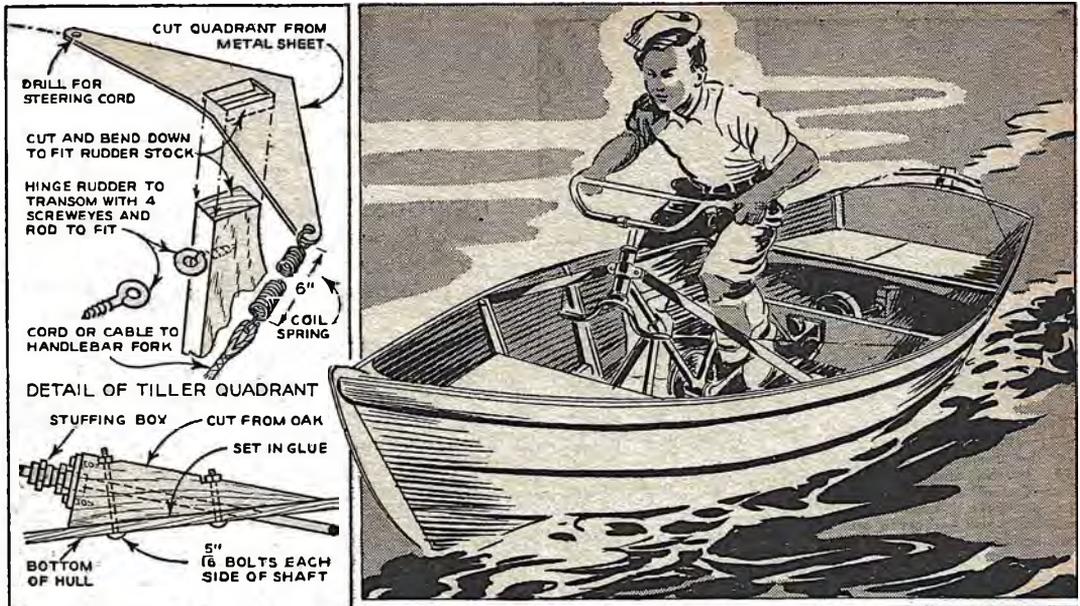
The drawing above shows the construction details of the driving mechanism for the pedal-powered boat. Note universal joint.

**A**N OLD bicycle, the head from a discarded sewing machine and a few odds and ends of metal will suffice to enable the home boat builder to rig up a bicycle drive for the rowboat. Many details of the construction and assembly will have to be arranged to suit the size and design of the boat and the bicycle. But, using the design and arrangements shown in the sketches as a basis, a driving unit can be put together that will propel your rowboat along at reasonable speed with no more exertion than pedaling a bicycle down Main street. The cost is little, the fuel absolutely free, and the results as good as a small outboard motor. So let's get going.

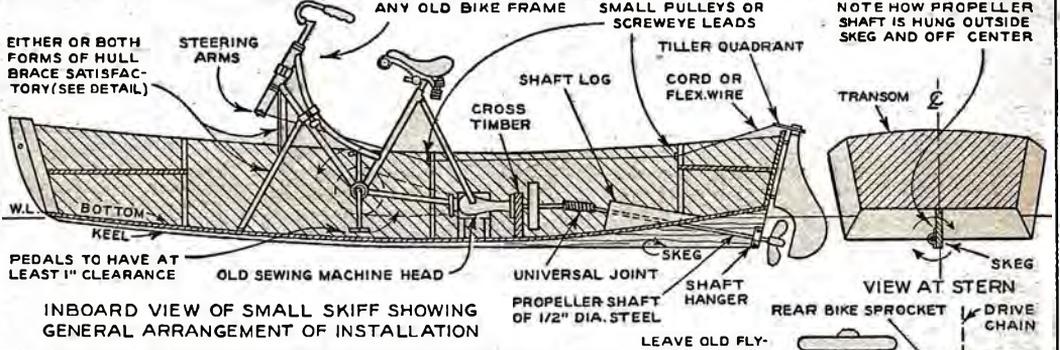
This design is suited to a boat of from ten to twelve feet in length. The lighter the construction the better. First erect the bicycle frame and line up the remainder of the assembly from that.

Strip a bicycle of its wheels, rear hub and all accessories. Sit in the boat so you will be at a point to keep the boat in trim, fore and aft and from gunwale to gunwale. Saw off the front fork about 6-in. below the spreader and spread out the tines horizontally to form the steering-bar. Then fashion a support of angle-iron to clamp solidly about the steering-head and reach across the width of the hull and bolt through each gunwale. Note that the bicycle frame must be supported high enough to allow the pedals to clear the bottom of the boat by at least 1-in. when at their lower point. Do not bolt frame down until drive shaft has been lined up. Bike will set slightly off center because of width of sewing machine head.

Strip the sewing machine head of all its parts and remove the bevel gears. Drill out and rearrange these on 1/2-in. steel shafting so they will mesh in the position shown. This



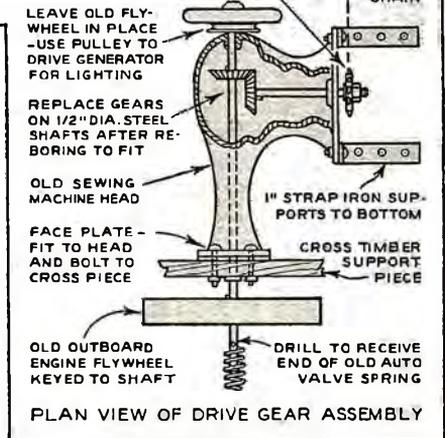
DETAIL OF SHAFT LOG



The installation in the boat is clearly shown in sketch above.

will allow the rear bicycle sprocket to be keyed onto the end of the vertical gear shaft and project outside the rear bicycle fork which later can be attached to the sewing machine head base. Sprocket outside makes it necessary to re-align chain drive to pedal sprocket. The other fork will have to be bolted to the machine head by drilling and tapping the latter. This arrangement places the sewing machine head on its side and the working end, which should have a face plate fitted and bolted to it (with bearing) bolts solidly to a cross timber bolted across the boat. The horizontal shaft should be sufficiently long to reach back through a hole in this timber and carry a fly-wheel and universal joint.

The flywheel is utilized to steady the propeller revolutions as well as provide latent power to assist the rider. Key or fasten these parts on in the usual manner. When all is completed as far as the universal joint; go over the assembly and line up as true as possible to remove distortion in the shafting



and assure of good gear meshing and chain tension. Then grease and oil all moving parts.

From the universal joint, run a 1/2-in. shaft down through a shaft-log to [Continued on page 160]

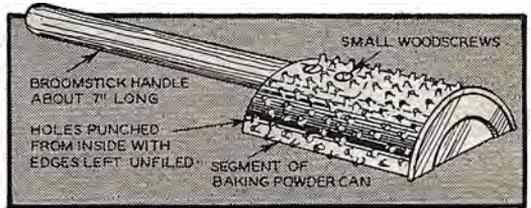
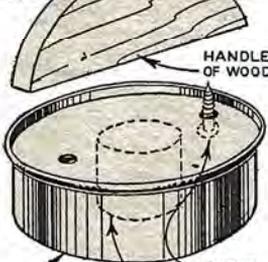
# TINCAN

by L. B. Robbins

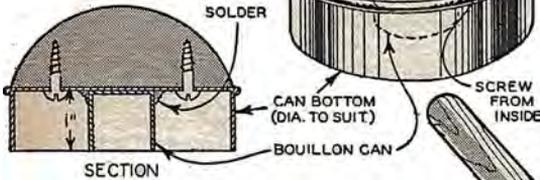
**T**HOUSANDS upon thousands of dollars worth of tin cans are thrown away every year. Many of these cans can be redeemed and excellent use made of them about the house or in the camp. Anyone with a bit of mechanical ingenuity who is able to wield a soldering iron can do much with an empty can. The follow-



A **COOKIE CUTTER** is a simple affair. Use a can cover the size of cookies desired. In the center, solder a second small can for forming the hole. Fashion a handle of wood and screw on from inside the larger can.



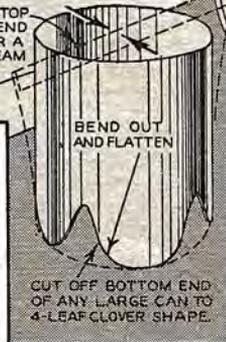
Grated cheese is a simple matter with this tin can **GRATER**. Cut a can in half lengthways, leaving half the bottom in place. Lay the can on a block of heavy wood and punch holes from the inside, using a large spike. Fasten a handle to one end.



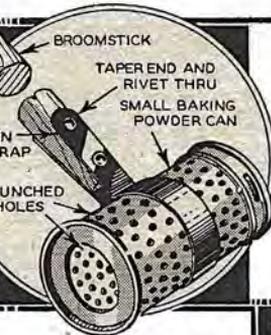
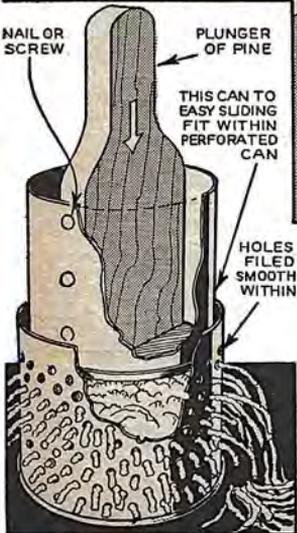
**SHOESCRAPER.** Cut the bottom out of a large tin can. Shape as shown. Nail the flanged ends to the doorstep and the flattened end is used as the scraper.



SQUEEZE TOP IN AND BEND OVER FOR A TIGHT SEAM

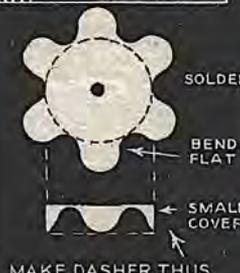
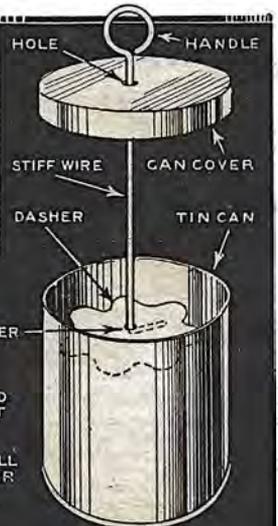


Riced potatoes are easy with this **RICER**. Using a large spike, punch a good sized can full of holes. File off the barbs inside. Then get a slightly smaller can and fit it snugly over a wooden plunger whittled out of a piece of pine. Place the can in the bowl, put potatoes in the can and then bear down on them with the plunger. Potato shreds (riced) will squeeze out of holes,



Soap in the dishwater is necessary. For a **SHAKER** use a small baking powder can. With a rounded piece of wood inside, punch the sides, bottom and cover, full of holes. Make a metal strap of other can material and fasten to a wooden handle as shown. Fill can with soap flakes or a small piece of solid soap. Swish around in the water.

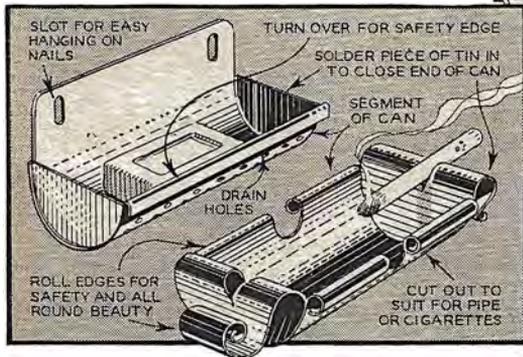
Here's a **CREAM WHIPPER** that has everything. A pound size coffee can, baking powder can cover and a piece of stiff wire are all parts needed. Pushing the dasher up and down in the cream rapidly whips it.



# -OLOGY

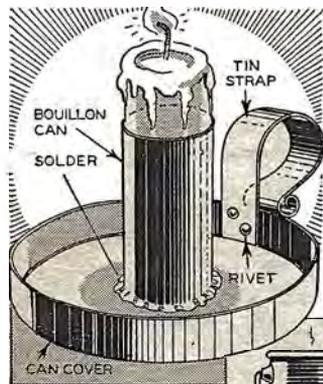
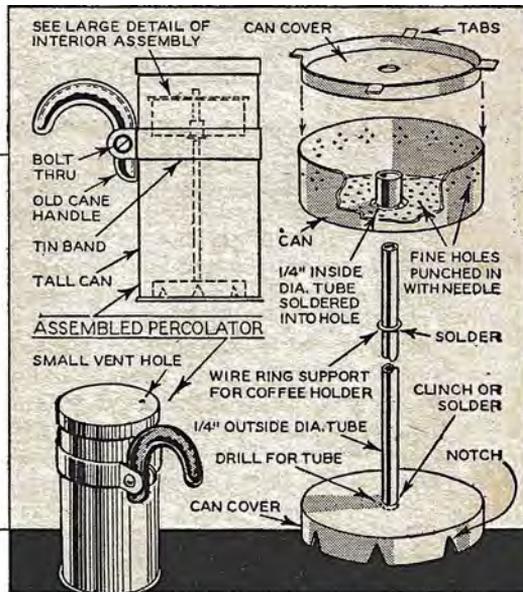
## Useful gadgets from old tin cans

ing ideas are only a few of many possible ones. Look them over. Then get busy and make a few handy gadgets for the wife, yourself or your friends. It's fun and you'll be surprised at what can be made from an otherwise useless object.



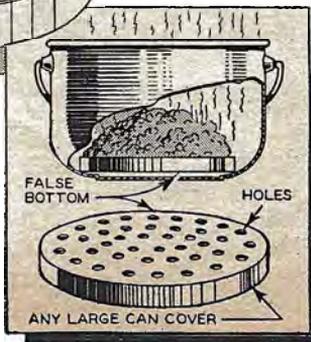
Let's make a little **FRYING PAN** for frying an egg at a time. It is only necessary to find the cover to one of those large cracker tins. Drill two holes about 2" apart near the top edge. Then attach about 30" of galvanized telephone wire for a handle as shown. Push the ends through the holes in the pan, turn the handle over and it will grab the pan nicely from below. Insulate the handle with wood. It can be quickly taken apart and stowed in the knapsack if camping.

Want a good **SOAP DISH**? Cut out a suitable tin can as shown. Punch the rounded portion full of holes with a nail and make two holes in the tab to hang it up by. In much the same manner you can make an **ASH TRAY**, that will also hold cigar or pipe. Cut a can in half lengthways but leave each end intact. These are then squared off and bent over for legs. Two notches act as the cigar holder.



For a **CANDLE-STICK** look at the sketch. It's so simple it's funny. Simply saw off a section of a bouillon cube can, scrape the bottom and solder it to the center of an overturned can cover for the base. By decorating it, you can show your friends a fair sample of clever handcraft.

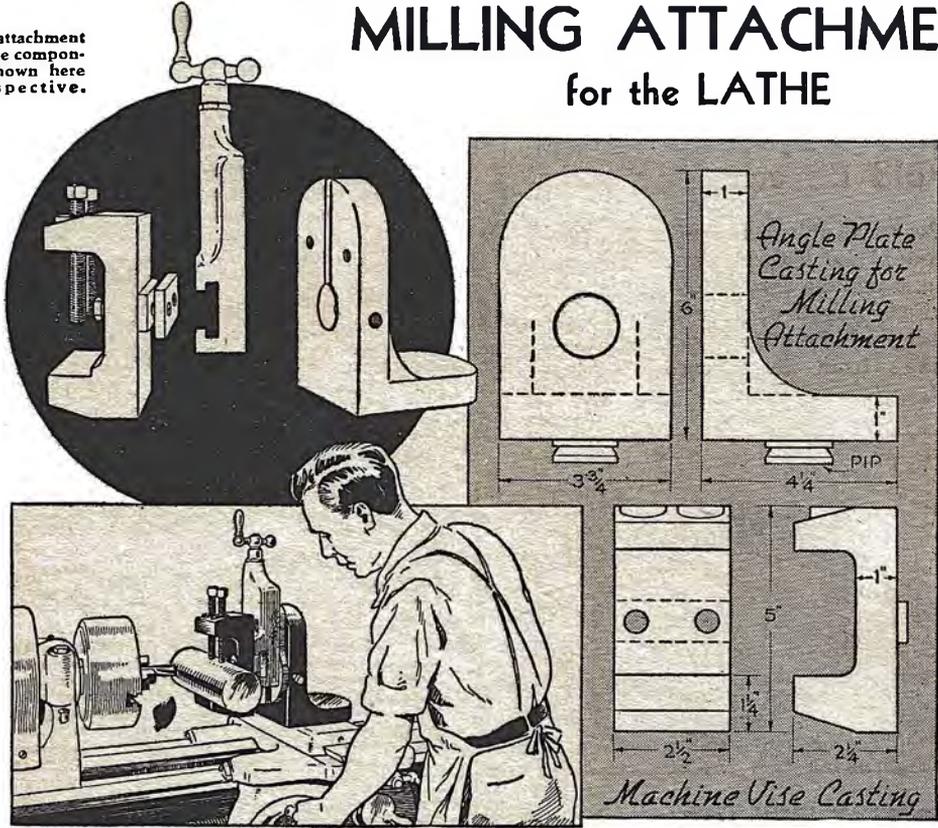
To prevent vegetables, etc., from burning on the bottom of a kettle place a large can cover in the bottom as shown. Punch this cover full of holes. When the water boils away the vegetables will rest on the cover top instead of the kettle bottom, thus eliminating a burned dinner.



Our final and crowning project is a **COFFEE PERCOLATOR**. Use a large, tall can for the bottom. Make a wide band of tin to strap around the middle, and add a handle, as shown. The in'ards consist of a smaller can cover into which is soldered the end of a piece of 1/4" metal tubing slightly shorter than the "urn." Choose a short can and cover for the ground coffee. With a needle awl punch the bottom full of small holes. Make a hole in the center of the cover to fit over the long tube and cut four tabs around the edge. Solder a wire ring on the tube.

The attachment has three components, shown here in perspective.

# MILLING ATTACHMENT for the LATHE



by W. D. Slocombe

**M**ANY hobbyists purchase their lathes and then find that they require various attachments before being able to complete the project they are contemplating. Much experience in tool making, not to speak of pleasure and real satisfaction may be had by constructing lathe accessories such as the milling attachment described here.

The back-gear metal-turning lathe is well named "The King of Tools," and if equipped with a milling attachment puts its owner into position to do an endless variety of machine work. This accessory, while fairly expensive to buy, can be made at low cost.

A milling attachment for a lathe consists primarily of an angle-plate for attachment to the cross-slide. This is provided with a device to vertically raise and lower a machine vise in which the article to be milled is held. The vertical movement should also be adjustable to any angle between the vertical and horizontal. We first proceed to construct a strong angle plate, as shown. It is a straight forward pattern-making job made out of 1"

lumber to give the finished article real rigidity. It is 6" high, has a base 4 1/4" long and 3 3/4" wide. It should be very sturdily braced at the bottom inside angle with a good file as illustrated.

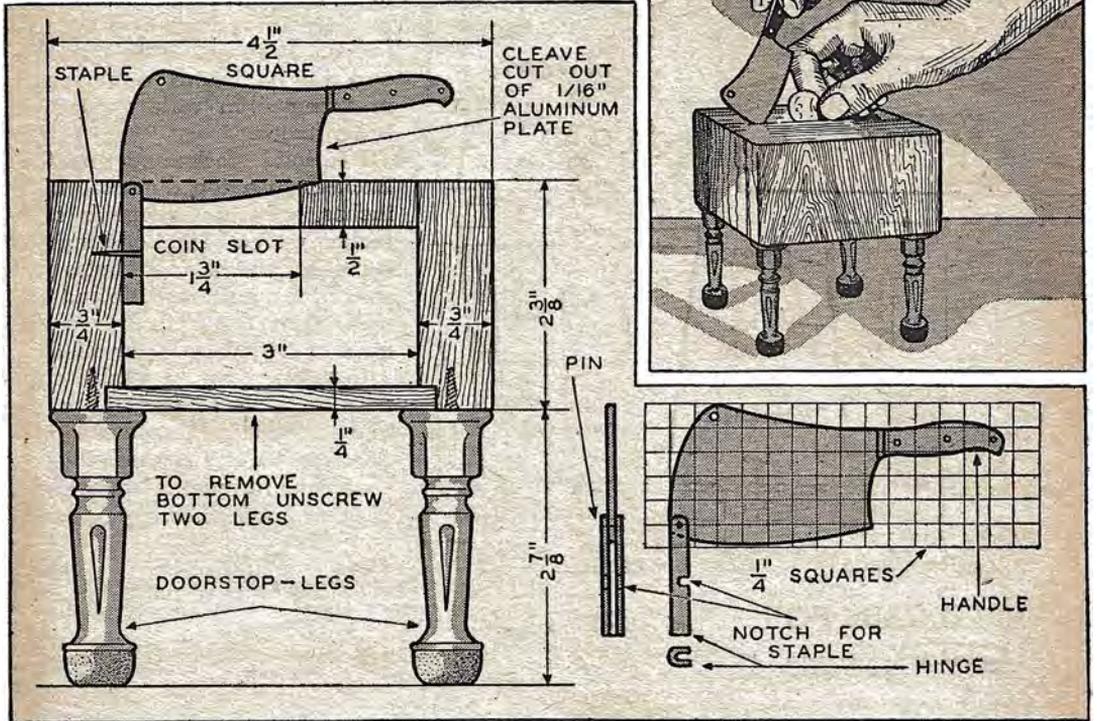
Most standard lathes have a center hole in the cross-slide of the compound rest into which the top slide fits and is secured by two set screws gripping on a pip similar to that shown on base of angle plate. Therefore a print of sufficient size to provide metal for machining this pip should be provided on the base of this pattern.

When the angle plate casting is ready it can be machined easily on the lathe by means of a simple jig. This consists of a piece of 3/4" round stock 9" long screwed into a small circular flange which in turn is attached to the inside of the vertical side of the angle plate by three machine screws. The round stock is then held in the chuck, allowing easy facing of the large face of the angle plate. This machining operation should be done with lathe in back-gear to offset uneven weight of casting. After facing has been completed remove jig and discard.

[Continued on page 158]

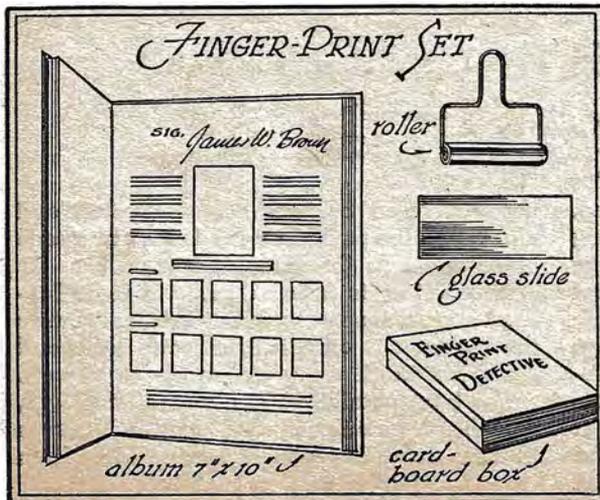
# Children Will Save With This Butcher Block Bank

The drawing below shows the details of the block bank.



ALTHOUGH almost any kind of wood may be used satisfactorily in this child's novel bank, maple makes the most attractive job. The parts are glued together as illustrated, with a good grade of waterproof glue. The butcher's cleaver is cut from sheet aluminum.

The handle of the tiny tool is made of two pieces of stained wood, cemented to the sides. The cleaver is pivoted as shown, acting as a cover for the slot through which the coins are inserted. The legs are simply doorstops, or "bumpers." These can be obtained for a few cents from the local hardware store. The wooden parts should be finished with clear shellac or varnish, and waxed to produce a lustre.—A. O.



## Finger-print Set For the Home

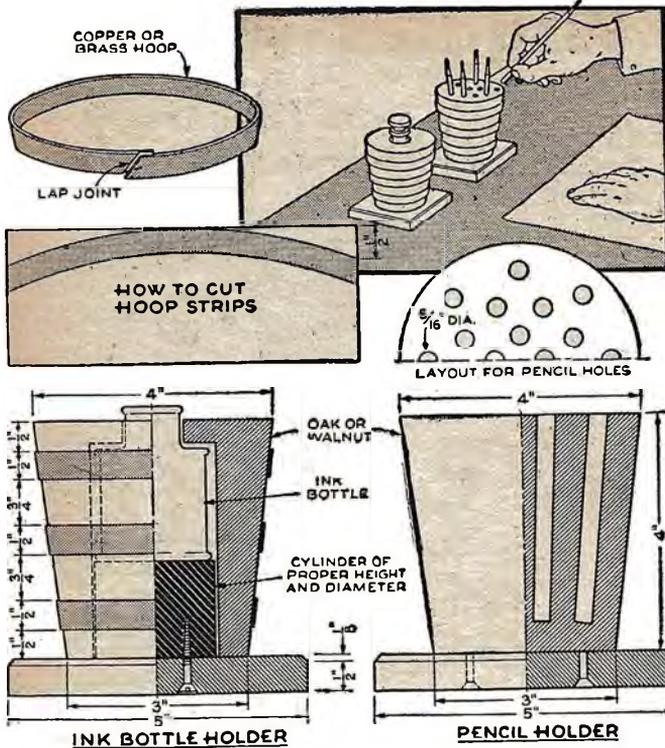
THIS simple finger-printing set will provide much amusement. The "gallery" consists of an ordinary photographic album, with pages divided for fingers as shown. A glass plate about 3"x7" holds the ink. Printers' ink is used, rolled out with the roller. The roller is made from a 2" long dowel covered with rubber tubing. The handle is of wire. Use little ink, and clean hands with benzine.—G. E. V. H.

## OAKEN BUCKET DESK SET

THESE two buckets sit on the desk. One holds pencils and a pen or two. The other is hollow and drops down over the ink bottle. Both are lathe turnings and may be finished either plain or trimmed in wide copper or brass hoops.

Use solid blocks and turn the buckets to a top diameter of 4 inches, a bottom diameter of 3 inches, with a height of 4 inches. Bore a number of holes as shown. Sand the outside and top well, then finish in the usual manner with lacquer or shellac.

Cut the base  $\frac{5}{8}$  inch thick with a  $\frac{1}{8}$  inch chamfer, finish to match the bucket, then fasten the two parts together with a couple of screws. Oak, walnut or other hard wood may be used. D. V. H.

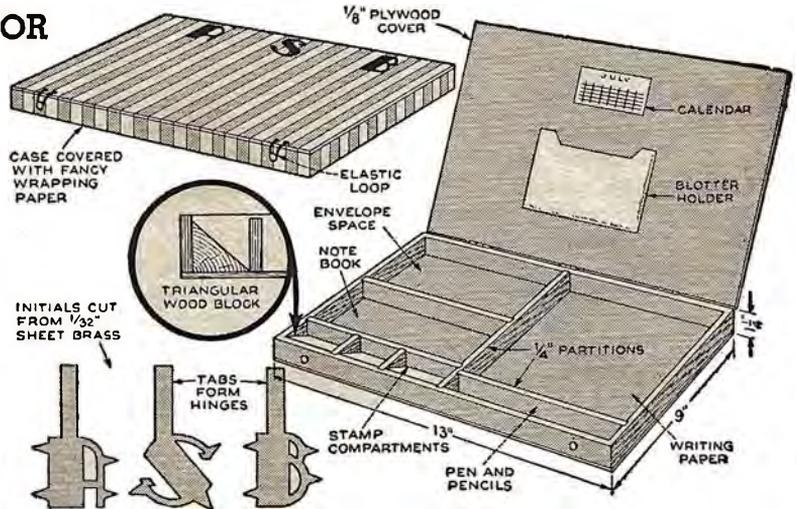


## PAPERED CASE FOR STATIONERY

THIS correspondence case is 9"x 13"x1 $\frac{1}{4}$ ", plenty large enough to write on. The bottom and the lid are of  $\frac{1}{8}$ " plywood. The sides and partitions are of  $\frac{1}{4}$ " birch. It is covered with striped wallpaper and lined with a solid color paper to match. After the paper is rubber cemented in place the box is lacquered inside and out to prevent the paper becoming soiled or scuffed.

The hinges are cut from brass sheeting about  $\frac{1}{2}$ " thick, and the part of each hinge that lies on the lid is cut to form one initial of the box's owner. Two hinges are enough should there be only two initials. The box is held closed by two loops of round silk-covered elastic which snap over upholsterer's nails set in the front.

In order to stand wear and handling, the box is made as strong as the light material



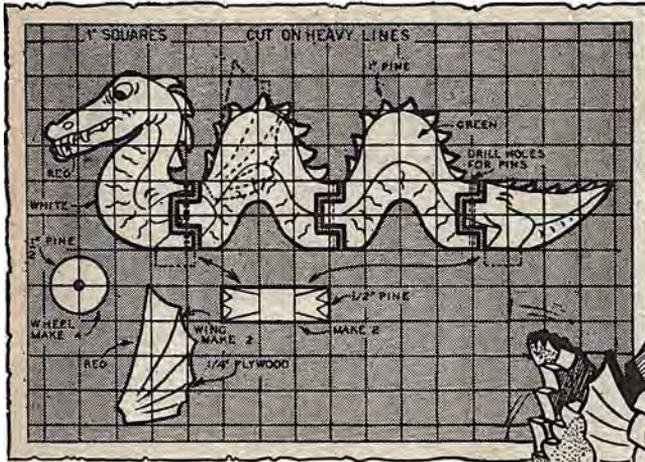
permits. The corners are dovetailed and glued, and the partitions are dadoed into each other and into the sides and glued.

The bottom is fastened on with light flat-head screws countersunk flush. These screws are placed not only in the front, back and sides, but in all the partition pieces as well.

The box contains writing paper, envelopes, date-book, pencil, fountain-pen, and stamps in three denominations—1c, 2c, and 3c. Each

[Continued on page 160]

# Toy Dragon Wiggles



The squared drawing above will enable the workshop enthusiast to duplicate the exact form of the dragon. Plywood or heavy cardboard is used for the wings.



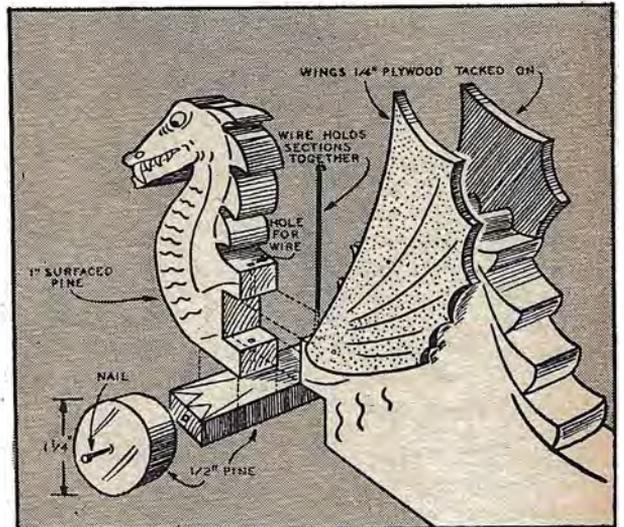
**T**HIS winged monster is sure to amuse any child. Being jointed and having the wheels on the front and rear sections, it wiggles realistically back and forth as it is pulled along. The sections of the dragon are cut from 1" surfaced pine.

The axles, or feet and the wheels should be cut from 1/2" stock. The two wings are cut from 1/4" plywood, being shaped with a jig saw. A 1/8" hole is drilled where the sections of the dragon come together and a wire slipped through and bent at each end to hold the joints together. The hole must be large enough to allow the joints to work freely.

Nail the feet to the first and last sections and then drill a 1/8" hole carefully through the center of each wheel, and attach one to each end of the feet with a nail. Be sure the holes of the wheels are true.

The wings are then tacked one on each side of the second section, and a screw eye-fixed in the mouth to which a string may be tied. Paint the entire toy with shiny enamel in many bright colors.

Large glass headed pins may be cut off to about the length of a tack, and inserted in the sides of the dragon's head to form the eyes. If any old celluloid golf tees are available, their stems may be cut into about three pieces each and glued to the sides of the mouth. These

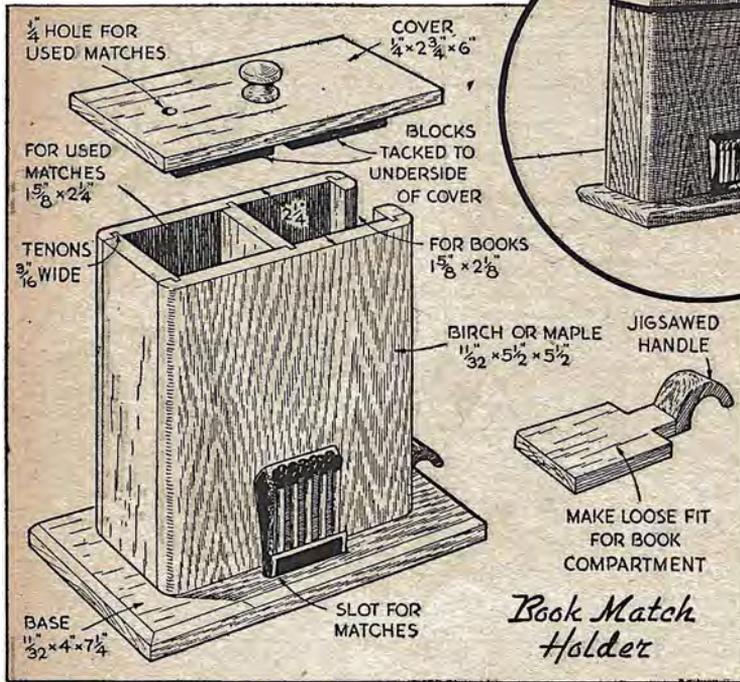


The drawing above shows the joint assembly of the toy. Pivots are wire.

make very realistic teeth. Several full length tee stems can also be cemented under the front of the nose and chin of the toy to give the appearance of tusks.

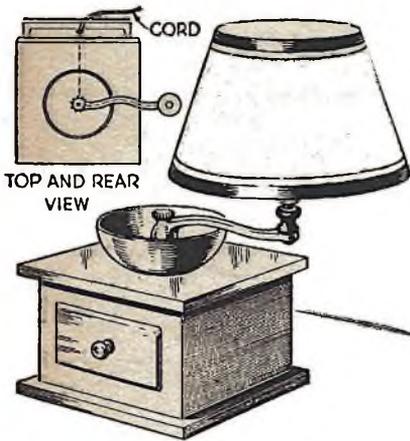
Allow plenty of clearance space in the joints of the body to prevent it from sticking in any one position. Flat headed nails should be used to fasten the wheels in place, so axle holes can be large enough to turn freely without having wheels come off.—R. L. Fairall.

## Book Match Holder Keeps A Large Supply Handy



These easily-made novelties will add a quaint touch to the home. Two old-fashioned lamps and a modern style holder for book matches.

**H**ERE is a container that holds fifteen books of matches in one compartment. In another compartment space is provided for used matches and empty match books. A cover on top with knob handle has a  $\frac{1}{4}$ -inch hole over the empty book compartment through which the matches are dropped as they are used. Nails, screws, and glue are used to assemble the parts. The match book lifter's handle protrudes from the end slot. On the side is another slot which holds an open pack of matches for current use, as shown in circle.—D.V.H.



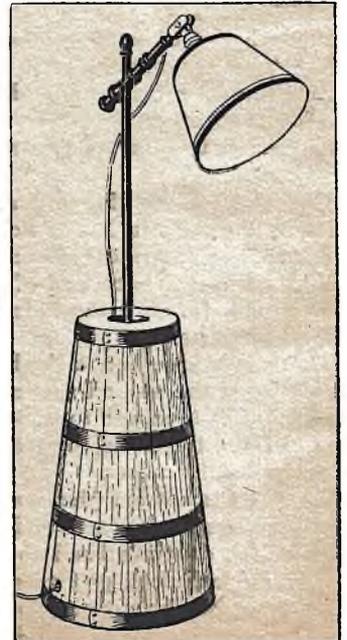
## Coffee Grinder Table Lamp

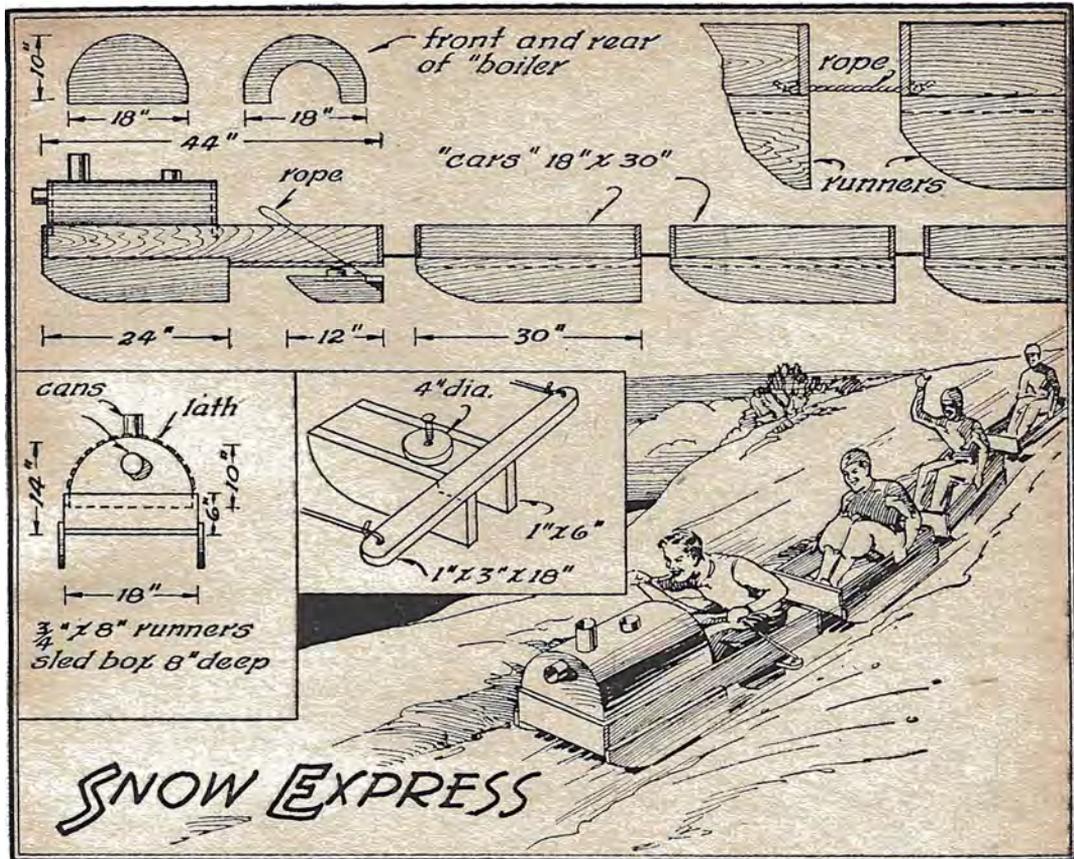
**T**HIS lamp, made from an old coffee grinder, will enhance the beauty of any room furnished in antique style. A hole is bored in the base of the grinder, and the lamp cord run through it to another hole in the top. The cord is then led along the under side of the handle to the knob on the end.

The bulb socket is mounted in place of the knob. The little drawer, originally intended for the storage of the whole coffee beans, makes an ideal place to keep little household accessories.

## Floor Lamp From Old Butter Churn

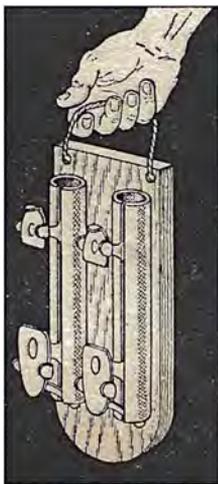
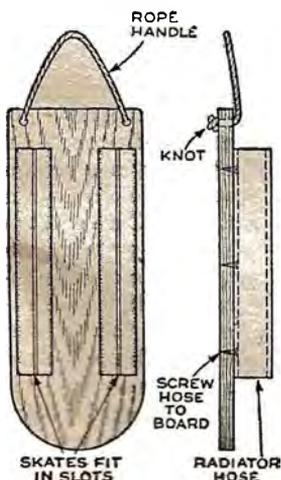
**O**LD butter churns, which are available very cheaply in most rural sections, can easily be made into attractive floor lamps. The churn handle supports the lamp. The cord enters the base through a small hole bored for the purpose. The lid of the churn base can be lifted when necessary, and various articles stored in the lamp base.—Adelaide Blanton.





## Ice Skate Holders

**A**UTO radiator hose, slit lengthwise and tacked to a wooden base board, makes an efficient ice skate holder. The runners are inserted into the slits. The nails holding the hose are covered with tape.—L. B. R.



## Snow Express

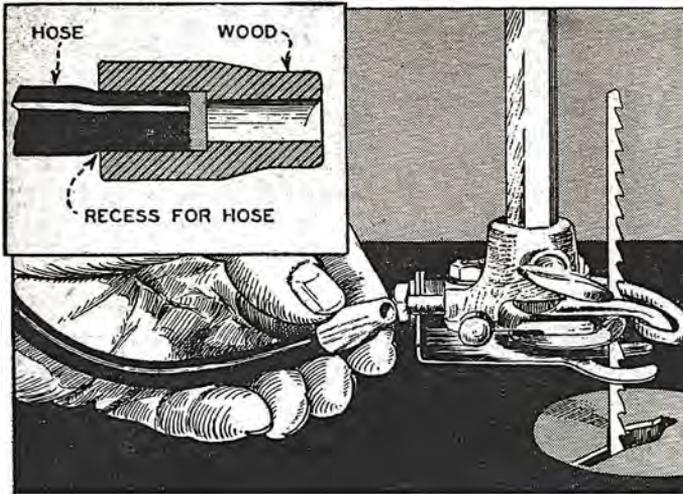
**T**HIS realistic locomotive sled can easily be built from cheap  $\frac{3}{4}$ " planks of the dimensions shown. The semi-circular ends of the "boiler" support laths covered with tar paper. The smoke stack and headlight are tin cans. The chassis of the locomotive and the cars are boxes 8" deep, to the bottom of which the runners are attached. The rear engine runner steers by rope.—G. E. V. H.

## Windy Matches

**F**RICTION matches dipped in melted paraffin and pressed together as shown, will light in wind and rain. Water does not spoil them.—C. B.



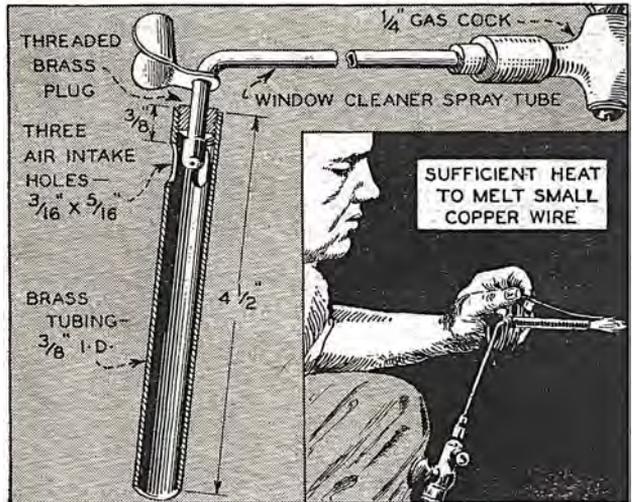
## Wooden Tips For Blower Hose



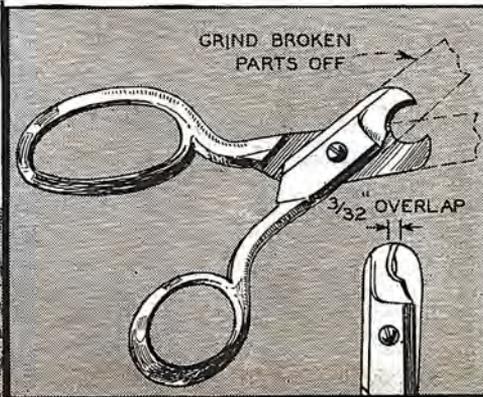
THE rubber tubing that carries the air to the saw table of many power saws frequently splits. When this happens it is usually necessary to repair it immediately to prevent it from blowing the sawdust in the eyes of the worker. This repair job usually consists of cutting off the split end of the tube and slipping it back on the fitting again. If this is repeated too often the hose becomes too short and must be replaced. To prevent this from happening, it is advisable to fit the tube with a wooden tip as shown. This will prevent it from splitting at the end. It may be bored and whittled.—E. M. L.

## Old Window Spray Makes Blowtorch

AN OLD window spray of the type frequently fitted to bottles of the cleaning solution can be made into an efficient blowtorch. The tube, with its fine spray jet hole is fitted into a  $4\frac{1}{2}$ " length of  $\frac{3}{8}$ " inside diameter brass tubing. Holes are cut to admit air, as shown in the drawing. The end of the spray tube is attached to the gas line, and a valve provided near the connection. The air holes must be of the size indicated on the drawing to provide the correct mixture.—E. M. L.



## Wire Cutters From Old Scissors



THESE inexpensive wire cutters will be a great aid around the shop. They are ground from a broken pair of scissors. Care must be taken in grinding, to provide the overlap indicated. If this is not provided the cutters will not be effective. Be sure also to grind to the "hook" shape shown, to prevent slipping.—E. M. L.

# Addresses Of Manufacturers Of The Prizes In The MECHANIX ILLUSTRATED CONTEST

|  |       |                    |
|--|-------|--------------------|
| 1 Taylorcraft Aviation Corp.                       | ..... | Alliance, Ohio     |
| 2 Indian Motorcycle Co.                            | ..... | Springfield, Mass. |
| 3 Atlas Press Co.                                  | ..... | Alliance, Michigan |
| 4 J. C. Deagan, Inc.                               | ..... | Chicago            |
| 5 Midwest Radio Corp.                              | ..... | Cincinnati         |
| 6 Gruen Watch Co.                                  | ..... | Cincinnati         |
| 7 Fisher Research Laboratories                     | ..... | Palo Alto, Calif.  |
| 8 Penn Yan Boats, Inc.                             | ..... | Penn Yan, New York |
| 9 Briggs & Stratton Corp.                          | ..... | Milwaukee          |
| 10 Mead Gliders                                    | ..... | Chicago            |
| 11 Allied Radio Corp.                              | ..... | Chicago            |
| 12 Skilsaw, Inc.                                   | ..... | Chicago            |
| 13 The Hallicrafters                               | ..... | Chicago            |
| 14 Evinrude Motors                                 | ..... | Milwaukee          |
| 15 Murray Ohio Mfg. Co.                            | ..... | Cleveland          |
| 16 Westfield Mfg. Co.                              | ..... | Westfield, Mass.   |
| 17 Marlin Firearms Co.                             | ..... | New Haven, Conn.   |
| 18 Burke & James Corp.                             | ..... | Chicago            |
| 19 O. F. Mossberg & Sons, Inc.                     | ..... | New Haven, Conn.   |
| 20 Zenith Radio Corp.                              | ..... | Chicago            |
| 21 Delta Mfg. Co.                                  | ..... | Milwaukee, Wis.    |
| 22 Freedom Electric Co.                            | ..... | New York, N. Y.    |
| 23 Enterprize Mfg. Co.                             | ..... | Akron, Ohio        |
| 24 Stanley Works                                   | ..... | New Britain, Conn. |
| 25 Dremel Mfg. Co. (Moto-Tool Kit)                 | ..... | Racine, Wis.       |
| 26 General Electric Co.                            | ..... | Bridgeport, Conn.  |
| 27 Iver Johnson Arms & Cycle Works                 | ..... | Fitchburg, Mass.   |
| 28 Federal Stamping & Engineering Corp.            | ..... | Brooklyn, N. Y.    |
| 29 General Electric Co.                            | ..... | Schenectady, N. Y. |
| 30 Bausch & Lomb Optical Co.                       | ..... | Rochester, N. Y.   |
| 31 S. L. Allen & Co., Inc.                         | ..... | Philadelphia, Pa.  |
| 32 RCA Mfg. Co.                                    | ..... | Camden, N. J.      |
| 33 Boice Crane Co.                                 | ..... | Toledo, Ohio       |
| 34 Hein Werner Motor Parts Corp.                   | ..... | Waukesha, Wis.     |
| 35 Galvin Mfg. Corp.                               | ..... | Chicago            |
| 36 W. A. Sheaffer Pen Co.                          | ..... | Fort Madison, Iowa |
| 37 Remington Rand, Inc.                            | ..... | Bridgeport, Conn.  |
| 38 Wilson Sporting Goods Co.                       | ..... | New York, N. Y.    |
| 39 Wilcox-Crittenden & Co.                         | ..... | Middletown, Conn.  |
| 40 Kalart Company (Flash Gun No. 1)                | ..... | New York, N. Y.    |
| 41 Casco Products Corp.                            | ..... | Bridgeport, Conn.  |
| 42 Blackhawk Mfg. Co.                              | ..... | Milwaukee          |
| 43 J. B. Williams Co.                              | ..... | Glastonbury, Conn. |
| 44 A. C. Gilbert Co.                               | ..... | New Haven, Conn.   |
| 45 Kalart Company (Flash Gun No. 2)                | ..... | New York, N. Y.    |
| 46 Alaska Sleeping Bag Co.                         | ..... | Portland, Ore.     |
| 47 Chicago Wheel & Mfg. Co. (De Luxe Handee Tool)  | ..... | Chicago            |
| 48 Chicago Wheel & Mfg. Co. (De Luxe Artizan Tool) | ..... | Chicago            |
| 49 Art Metal Works, Inc.                           | ..... | Newark, N. J.      |
| 50 K-D Lamp Co.                                    | ..... | Cincinnati         |
| 51 Leon A. Axel, Ltd.                              | ..... | New York, N. Y.    |
| 52 DeJur-Amsco Corp.                               | ..... | Shelton, Conn.     |
| 53 Utica Duxbak Corp.                              | ..... | Utica, N. Y.       |
| 54 G-M Laboratories, Inc.                          | ..... | Chicago            |
| 55 Kirsten Pipe Co. (Kirsten Pipe)                 | ..... | Seattle, Wash.     |
| 56 Benjamin Air Rifle Co.                          | ..... | St. Louis, Mo.     |
| 57 American Chain and Cable Co., Inc.              | ..... | York, Pa.          |
| 58 Junior Motors Corp.                             | ..... | Philadelphia       |
| 59 GHQ Motors, Inc. (2 Motors)                     | ..... | New York, N. Y.    |
| 60 GHQ Motors, Inc.                                | ..... | New York, N. Y.    |
| 61 Comet Model Airplane & Supply Co.               | ..... | Chicago            |
| 62 Albert Specialty Company                        | ..... | Chicago            |
| 63 Kaywoodie Company                               | ..... | New York, N. Y.    |
| 64 Polaroid Corporation                            | ..... | Cambridge, Mass.   |
| 65 GHQ Motors, Inc. }                              |       |                    |
| 66 GHQ Motors, Inc. } (3 Motor Kits)               | ..... | New York, N. Y.    |
| 67 GHQ Motors, Inc. }                              |       |                    |
| 68 Haines Products                                 | ..... | New York, N. Y.    |
| 69 Dremel Mfg. Company (Moto-Saw)                  | ..... | Racine, Wis.       |
| 70 Boyce Meier Equipment Co.                       | ..... | Bronxville, N. Y.  |
| 71 Hull Mfg. Company (Auto Compass)                | ..... | Warren, Ohio       |
| 72 Daisy Mfg. Co.                                  | ..... | Plymouth, Mich.    |
| 73 Kumfy Products, Inc.                            | ..... | Cincinnati         |
| 74 Kirsten Pipe Co. (Cigarette Holder)             | ..... | Seattle, Wash.     |
| 75 Hull Mfg. Co. (Campers' Compass)                | ..... | Plymouth, Mich.    |

Note: All blueprints by MECHANIX ILLUSTRATED and HOW TO BUILD 20 BOATS

# New Ideas for Home & Shop

Names and addresses of manufacturers of products described below will be sent free to any reader on request, provided a stamped, return envelope accompanies the inquiry. Mention date of issue when writing.

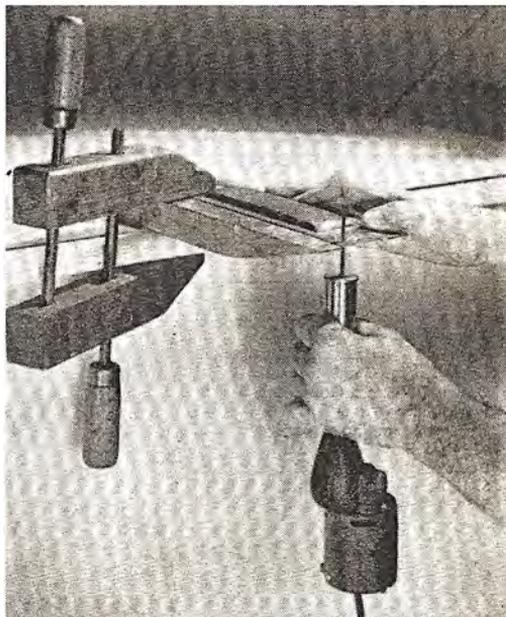
## NEW ELECTRIC HAMMERING TOOL



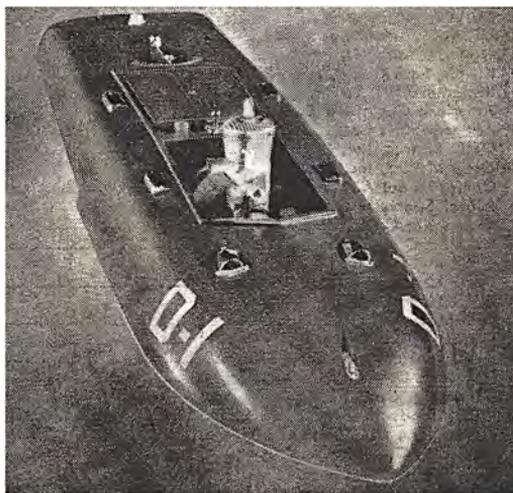
A new craft tool on the market works on either metal or leather. Delivering 800 blows per minute, the stroke length can be varied from  $\frac{3}{8}$ " to  $1\frac{1}{8}$ ". Sawing and filing attachments are available for the tool giving it a wide range of use on materials.

This tool is simply plugged into any convenient lighting socket and then applied to the work at hand. The high speed hammer greatly reduces the time formerly required to turn out the type of work shown. As the strokes may be adjusted to suit the type of material being worked, excellent results can be obtained.

It is handled in similar fashion to an electric drill, and is of about the same weight. When the sawing or filing attachments are employed, the device permits an extremely wide range of operations. Model makers can turn out metal parts of shapes hitherto impossible without machinery costing many times the price. Filing such shapes by hand would be a long and tedious procedure.



*Model makers* will admire the sleek lines of the new bakelite model racing boat shown below. The entire top part of the hull is molded of that material. The bottom is planked with waterproof resin bonded plywood. The construction kit includes fittings, propeller, and rudder in addition to the hull parts. The boat is designed for the "D" class in competitive model boat racing.





# Top Sport for Thrills

## -Motorcycling

**S**OMETHING doing every minute when you ride a Harley-Davidson. You get more fun out of life — visit famous beauty spots — explore distant places — go on glorious vacation trips at little cost. Take in exciting club rallies, hill-climbs, race meets and other thrill-packed motorcycle events. Visit your Harley-Davidson dealer today — see the 1941 models with their airplane styling, zooming power, rugged dependability and important mechanical improvements — and ask about his Easy Pay Plans.



**MAIL COUPON NOW**

**HARLEY - DAVIDSON**  
 WORLD'S CHAMPION MOTORCYCLE

**HARLEY-DAVIDSON MOTOR CO.,**  
 Dept. MI, Milwaukee, Wis.

Send pictures and descriptions of smart 1941 models. Also **FREE** copy of big 24-page **ENTHUSIAST** magazine filled with thrilling motorcycle photos and stories. Stamp enclosed for mailing cost.

Name

.....

Address

.....

200-Mile National Speedway Championship again won by Harley-Davidson. Louis Guarella first — setting new A.M.A. record. First seven places go Harley-Davidson!

# Sound Of Things To Come!

[Continued from page 63]

bombs—in fact any of the large noises. Since there is no distortion in FM, we'll be able to do a lot of new things.

"You know that nowadays all the 'small sounds' are lost in amplitude modulation broadcasting. Such noises as, say, removing your coat or vest. We'll be able to give you that when FM rolls around. And a great many of our synthetic effects will have to be abandoned, too.

"Today we have a lot of trouble with water sounds. They get 'washed out' in the transmission from studio to receiver at home. In other words, all the wetness is taken out. FM doesn't have that trouble."

Over at CBS the sound effects department sees a number of hopeful advantages in FM, too. Walter Pierson, who heads the group, declares: "I have a feeling that it will bring about several important changes. The tinkle of glass, for example, will be improved. When we're called upon to handle fine goblets and glassware, we'll get excellent results. In fact anything with fine overtones will come through beautifully on FM.

"In ordinary radio you don't hear such high frequencies. Water effects in particular will be much better. But we'll have to be very careful in the FM studio, since the slightest noise is picked up clearly. A sound effects engineer, for example, standing off in the corner, tinkling coins or keys in his pocket, might easily enough upset a program. Who knows but maybe you'll see the day when all persons taking part in a broadcast, including the studio audience, will be required to empty their pockets before going into the studio!"

Pierson also points out that the high tensile sound of surgical instruments, sometimes necessary in dramatic sketches, is very troublesome under the present system of broadcasting. Quiz shows using silver dollars as prizes will be infinitely improved—since today silver dollars on the air sound like iron washers. Other new vistas in noisedom that send sound effects men into happy raptures include cowbells, cups and saucers, chains, keys, crackling fire, watches, clocks and rain.

Demonstration programs, designed to show the superiority of FM over the ordinary method of broadcasting, are now being held in many parts of the country. The clarity of reproduced sounds invariably brings oohs and ahs from listeners—particularly such noises as the pounding of nails (with the tone of the blows changing as the nail sinks into the wood), wood-sawing (with the teeth of the saw biting realistically, followed by a thump as the sawed-off end falls on the floor), mixing of a highball (the clink of ice and sharp fizz of carbonated water).

The announcing profession will also see changes due to the advent of FM. Affected, bombastic voices will come over the air poorly, and the

premium will be on natural, genuine personalities that use precise inflection and pronunciation. As Charles Godwin, chief announcer at Mutual, puts it: "There can't be any stuffed-shirt announcers in FM—literally or figuratively. Announcers must be careful of formal evening clothes when they face the super-sensitive FM mike because the crinkle of soup-and-fish fronts will be picked up. And announcers can't be stuffed-shirt in manner either. FM wants natural, informal announcers. Pompous and affected mikemen are definitely taboo.

"Announcers are going to have to learn new methods and new tricks for FM," Godwin continues. "You see, in regular broadcasting they've been accustomed to stand about a foot or two from the microphone, but with FM they'll have to get at least six feet away. Announcers must learn to modify their delivery to this new situation, and some may even have to change their style. Those ultra-intimate announcers who like to 'crawl into' the mike may have difficulty. Above all, FM is so sensitive, announcers must be more careful than ever of their diction and enunciation."

Pat Kelly, Australian-born chief announcer at NBC, who is no relation to the NBC sound effects head of similar name, also favors FM when he says: "It will give the richer, purer voice a chance to show off to much better effect. By the richer voice, I mean the baritone."

FM promises new tricks for the dramatic actors and actresses who stage our radio plays. Unless they change their technique, working much further away from the microphone, the FM loud-speaker will be filled with an odd assortment of mouth noises, sibilance, and harsh voices. The rustle of paper as actors turn from one page of the script to the next is also apparent. Perhaps radio thespians of the future will be forced to memorize their lines. In any event, the keener ear of the FM mike will unquestionably put an increased emphasis on dramatic ability, raising the caliber of daytime script shows.

FM's greater pictorial ability may also be well used to good advantage by manufacturers of ginger ale, effervescent alkalizers, engine-soothing motor oils, noiseless typewriters and other products whose merits can be represented in sound or sound comparisons. Whatever the progress of FM, it inevitably seems to lead to a higher degree of realism and finer sound illusions than the American radio public has ever known before!

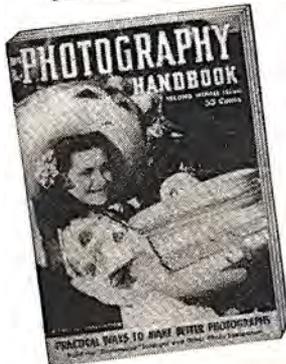
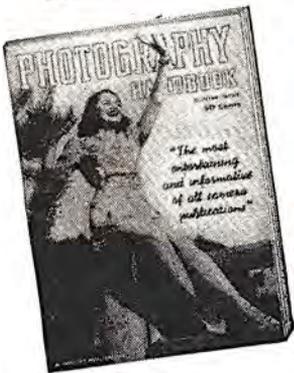
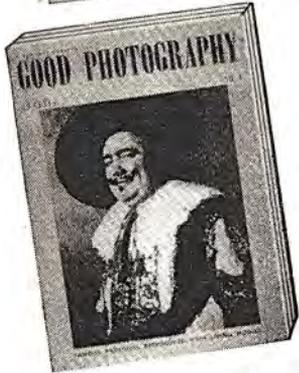
---

About one-fifth of the Atlantic coast oysters come from Virginia waters.

---

A self-heating aviator's suit of rubber is being turned out for the Army Air Corps.

# Now—You Can Add These Issues to Your Photographic Library at a Special Bargain!



FOR the first time, special bargain rates are now available for purchasers of previous issues of PHOTOGRAPHY HANDBOOK and GOOD PHOTOGRAPHY. These books are full of practical, useful, time-and-money-saving information on all phases of black-and-white and color photography. They are of great value to amateur and professional alike. Each contains 144 pages, superbly printed in rotogravure and illustrated by hundreds of fine pictures. A complete set of these volumes belongs in the library or darkroom of every camera-owner.

Newcomers to photography will find these books the easiest and quickest means of acquiring camera knowledge and skill. Experts will find in them innumerable tips and articles on improving technique.

Group purchases of the books shown on this page can be made at a saving of 25 cents a copy. *Here is our special offer; one copy, 50 cents; two copies, 75 cents; three copies, \$1.00; four copies, \$1.25. You may pick any number or combination of books illustrated on this page.* Get your order in quickly, while our supply lasts. This bargain rate is obtainable only by mail from Fawcett Publications, Inc., not from your photographic dealer or newsstand. CANADIAN ORDERS NOT ACCEPTED.

## CUT OUT AND MAIL TODAY!

FAWCETT PUBLICATIONS, Inc. MI-3  
 Greenwich, Conn.

Please send me the book or books I have checked below. Enclosed find check, money order, or stamps amounting to 50c for one book, 75c for two, \$1 for three, \$1.25 for four. All books will be sent postpaid.

PHOTOGRAPHY HANDBOOK No. 4       GOOD PHOTOGRAPHY No. 3  
 PHOTOGRAPHY HANDBOOK No. 5       GOOD PHOTOGRAPHY No. 4

NAME .....

Address .....

City .....

State .....

# Wings Over The Water!

[Continued from page 47]

airport for the cooling breezes of a lake or a river; they bless the day they were forced off busy airports by the airlines, and moved to a water base where the crowds are—the stable population from whom they get students and charter hops, and the transients that are a steady source of new business and free advertising. Every flight a ship makes is an advertisement for the business.

We are blessed in most sections of this country with an abundance of water areas. Here is a God-given airport which often stretches for miles. Perhaps the CAA has already provided the landing float. For a few hundred dollars a ramp can be built and the ingenious operator can construct a small marine railway and a Boston dolly for hauling his ships from the water.

In many areas the state pays for the material and the NYA boys do the work. The state maintains and operates them, in some instances letting out concessions to private operators. The East coast has dozens of these operators, with its miles of rivers, bays, and inlets attracting more pilots every year.

One of the oldest is the Winnepesaukee Air Service of New Hampshire founded by Bob Fogg, who is now the Seaplane Facilities Expert for the CAA and who is the man to ask for help and advice concerning seaplane bases. He has been flying seaplanes for over twenty years and is a real enthusiast. In addition to the technical details, he is a master showman at knowing how to draw in the crowds for seaplane openings and ceremonies. The seaplane service which he has founded has flown some 60,000 passengers without an accident of any kind. A seaplane that stalls or spins in, usually lands in such a way that a wing-tip and a float hit the water first. This provides a cushioning effect. Planes have been completely demolished on falling into the water but pilots are seldom seriously hurt.

Guy A. Ham has maintained a charter service, the Cape Aircraft, Inc., on Coonamessett Pond, West Falmouth, Massachusetts, for five years, and

although Guy is now an instructor at the Harvard Aviation Camp on Cape Cod, the Cape Aircraft still services all seaplanes landing on Coonamessett Pond.

Jack McManus operates from Lake Winnepesaukee and although only 3,000 feet from Bob Fogg's, neither one complains of competition. The ingenuity of this operator can well be proven by the fact that he built his own ramp at a cost of \$72 and uses his car to haul the plane out of water. To take off, he releases a mooring cable, starts the motor and wiggles the tail surfaces to start the plane sliding down the ramp and into the water.

Another seaplane pilot, way down in the heart of the Blue Ridge mountains, used to fly ten miles from the airport to town—Charleston, West Virginia—but decided to move where the people were. He bought an old barge, and built a hangar on one end at the cost of \$700. Since then he has expanded several times. Being on the waterfront, he gets lots of visitors, so he built a restaurant for them, also put in an out-board motor boat business and other attractions that pay him well.

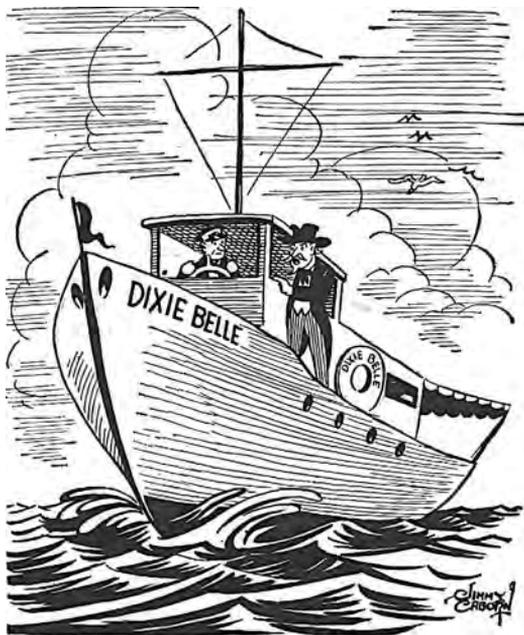
A Boston operator, E. W. Wiggins started his business at the Boston Municipal Airport, putting some of his ships on floats and taking them to Naples, Maine, for the summer.

Today, in addition to his original bases, he operates at Norwood, Massachusetts, Newport and Providence, Rhode Island, featuring airline charter service, aerial advertising and CAA approved flying and ground schools.

As late as 1936, seaplaning was definitely a rich man's sport but now with air flivvers such as the Cub and the Aeronca, pontoons can be had at a comparatively low cost, complete with struts for attaching them to the fuselage. Pontoons with retractable landing wheels are to be had today, and the plane thus equipped can be handled both on land and water.

The story of the Wall Street ramp, in New York City, is fairly well known. Every year sees more

[Continued on page 138]



"Throw that confounded Yankee compass ovabho'd! It keeps pointin' No'th!"



**KNOWLEDGE  
THAT HAS  
ENDURED WITH THE  
PYRAMIDS**

## **A SECRET METHOD FOR THE MASTERY OF LIFE**

**W**HENCE came the knowledge that built the Pyramids and the mighty Temples of the Pharaohs? Civilization began in the Nile Valley centuries ago. Where did its first builders acquire their astounding wisdom that started man on his upward climb? Beginning with naught they overcame nature's forces and gave the world its first sciences and arts. Did their knowledge come from a race now submerged beneath the sea, or were they touched with Infinite inspiration? From what concealed source came the wisdom that produced such characters as Amenhotep IV, Leonardo da Vinci, Isaac Newton, and a host of others?

Today it is known that they discovered and learned to interpret certain *Secret Methods* for the development of their inner power of mind. They learned to command the inner forces within their own beings, and to master life. This secret art of living has been preserved and handed down throughout the ages. Today it is extended to those who dare to use its profound principles to meet and solve the problems of life in these complex times.

### **This Sealed Book—FREE**

Has life brought you that personal satisfaction, the sense of achievement and happiness that you desire? If not, it is your duty to yourself to learn about this rational method of applying natural laws for the mastery of life. To the thoughtful person it is obvious that everyone cannot be entrusted with an intimate knowledge of the mysteries of life, for everyone is not capable of properly using it. But if you are one of those possessed of a true desire to forge ahead and wish to make use of the subtle influences of life, the Rosicrucians (not a religious organization) will send you A Sealed Book of explanation without obligation. This Sealed Book tells how you, in the privacy of your own home, without interference with your personal affairs or manner of living, may receive these secret teachings. Not weird or strange practices, but a rational application of the basic laws of life. Use the coupon, and obtain your complimentary copy.

**The ROSICRUCIANS**  
SAN JOSE (AMORC) CALIFORNIA



**AMENHOTEP IV**  
Founder of Egypt's  
Mystery Schools

*Use this  
coupon for  
FREE  
copy of book*

-----  
SCRIBE H. W. Y.  
The Rosicrucians (AMORC)  
San Jose, California

Please send free copy of Sealed Book, which I shall read as directed.

NAME.....

ADDRESS.....

CITY.....



only  
**EVINRUDE**  
GIVES THIS SMOOTHER  
*4 cylinder*  
PERFORMANCE

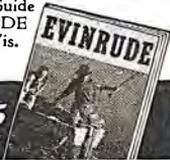
S-M-O-O-T-H! . . . here's silky smoothness . . . surging responsiveness . . . thrilling performance that packs more pleasure into every mile! And now you can choose a four-cylinder Evinrude right in the same price range with "twins" of comparable power. Evinrude offers 4 great "fours" — see them at your dealer, or write for new catalog!

**NEW FULL REVERSE!** Now yours in two famed light motors, Evinrude's advanced development of *Full Reverse!* Steer in any direction . . . reverse the course . . . back away from crowded docks . . . the last word in complete maneuverability is built into these two models.

**CATALOG FREE!** Handsomely illustrated, full-color catalog of 9 Evinrude models—also catalog of 6 Elto models priced as low as \$26.50 —handy Boat-and-Motor Selector and Boat Guide of Leading Builders—Free. Address, EVINRUDE MOTORS, 4650 N. 27th St., Milwaukee, Wis.

All Prices F.O.B. Factory

AN EVINRUDE  
FOR AS LITTLE AS **\$29.95**



**Thompson**  
BEATS  
the World  
on **BOATS**

**Better Built  
Lower Prices**

Canoes  
\$70  
and up

All popular models, canvas covered. Light, swift, safe, strong and durable. Many color combinations.

Rowboats  
\$42  
and up

Most complete line ever offered, at real money-saving prices.

Out-board  
Boats  
\$42  
and up

**THOMPSON BOATS HAVE FULL LENGTH SPRAY RAILS. KEEP PASSENGERS PERFECTLY DRY AT HIGH SPEEDS.**

## SAIL BOATS

Today's Six Most Popular Models

|                        |       |
|------------------------|-------|
| 12 ft. OLYMPIC . . .   | \$148 |
| 15 ft. SNIPER . . .    | \$215 |
| 16 ft. COMET . . .     | \$248 |
| 17 ft. NATIONAL . . .  | \$320 |
| 18 ft. SEA GULL . . .  | \$425 |
| 19 ft. LIGHTNING . . . | \$475 |

These boats are complete, with sail, mast and rigging at prices quoted above.

CATALOG FREE—SAVE MONEY—PROMPT SHIPMENT  
Please state the kind of boat you are interested in (103)

**THOMPSON BROS. BOAT MFG. CO.**  
230 Ann St. [Write to] 130 Elm St.  
PESHTIGO, WIS. [Either Place.] CORTLAND, N. Y.

## Oil From The Earth's Core!

[Continued from page 81]

penetrating power, drillers are already contemplating going down more than four miles in their search for gold!

Their hopes are justified by past performances. The huge rig mentioned is engineered to drill 17,500 feet. Others, planned to go down only 10,000, have been landed well below 13,000. So, say petroleum engineers, there's no reason why the big fellow can't hit four miles, or more.

Off the Gulf coast of Louisiana several rigs, standing on submerged barges are pressing down through the salt water sands into submarine deposits lying nearly three miles below the ocean bed. In Dewey County, Oklahoma, a bit recently rested on the bottom at 14,582 feet. Recent surveys on Washington's Olympic peninsula, called the "last wilderness" of American oil exploration, indicate oil-bearing marine beds to be nearly six miles thick.

When drillers reach the bottom of those beds, whose limestone bases probably mark the depth end of the world's oil supply, they'll go down with incredible speed, and perhaps at a much lower cost than is now anticipated. Three years ago, oil companies spent \$300,000 and more to drill a 15,000-footer, taking nearly a year to do the job. Now they can perform this miracle in less than two months at half the cost!

Heretofore, only the cost of drilling and existing prices for petroleum products stood in the way of reaching sensational depths. Now, with defense giving a vital reason for finding new oil beds, the drills are really beginning to go down deep.

"We'll find new fields," claimed one enthusiastic driller, "if we have to bore through to China!"

## Wings Over The Water

[Continued from page 136]

business men commuting by seaplane. This successful development is typical of what every large city with a waterfront will have in the future, especially with the advent of the flying boat, a two place plane that lands on its hull much like the huge China Clippers. Its 75-horsepower engine makes it adaptable for use in the mountainous country and the lowlands as well.

As a result of the CAA program, the production of seaplanes has increased 50% within a year's time and water flying has gained an appeal which attracts people who would not otherwise fly. As a means of recreation and commuting, the seaplane is without peer, and most of today's seaplane owners have purchased their first plane for that particular purpose. With a seaplane a pilot can fly to a lake in wooded country only an hour or two away by air, with no possible landing place for wheeled planes. Landing, he can taxi to a likely spot, anchor, and break out his fishing gear. If the fish aren't inclined, he can move to another spot within short flying distance.

# Blackout Photography

[Continued from page 37]

rollfilm sizes. Eastman markets infra red film in 35mm, Bantam and popular rollfilm sizes in addition to the cut sheet film and plate forms, each in a variety of sizes. Take your pick; the cost is nominal and emulsion speeds about equal.

General Electric No. 21 or Wabash No. 2 bulbs are recommended for blackout flash photography. Using the G.E. No. 21 lamp, it was found that the minimum synchroflash exposure at 6 ft. was 1/200 at f/3.5, using a No. 87 gelatin filter in the flash-filter unit described above. Multiplying the "f/" number by the distance, this amounts to a flash factor of 21; a negative of equivalent quality can be produced by using any distance (in feet) and "f/" number whose product equals 21—as long as the same shutter speed, flash bulb and reflector are used. Synchronizing at 1/50 second permits the flash factor to be doubled, to 42.

The exposures and flash factors above are of course approximate. They will vary somewhat with the infra red transmission of the particular camera lens used as well as with the efficiency of the camera shutter and flash reflector. Exposure should be standardized before serious work is done.

Although these exposures would seem to limit blackout flash photography to fairly close subjects, inanimate scenes may be photographed by this system from quite a distance. To do this, set up the camera on a tripod leaving the shutter open at time and then walk closer to the subject than the camera position, shooting more than one bulb at a time with the flashfilter unit, and from different positions.

The usual infra red focusing corrections must be made for blackout flash photography. Generally the lens will have to be racked out about 2% beyond the position at which the visual focus is sharp. This makes the infra red rays converge on the film plane. The use of a Wratten No. 25 (red) filter will help correct visual focusing on the ground glass screen.

The developing procedure for infra red film is quite ordinary. Just be sure to develop in total darkness as with ultra rapid panchromatic films. For serious work, infra red film may be hypersensitized before or after exposure in mercury vapor, which will just about double its emulsion speed.

In making infra red photographs of people it will be noticed that there is a considerable whitening of skin tones. This can be overcome to some extent by application of a dark brown "sun tan" powder to the face, and the lips will photograph more naturally by the sparing use of brown or black eyebrow pencil instead of lipstick.

It has been estimated that the German army used more gasoline in its four-week campaign in the low countries and France than in the entire World War.



## Fixing versus Building!

Seems like there's a couple of schools of thought about just what your tool-kit's for — fixing things that get broken, or building things from scratch.

One thing sure, a good kit needs a good soldering iron and a can of Kester Metal Mender — the solder that's best for building and best for fixing, too.

Lots of men get busy this time of year and put together some good-looking metalware—using Kester Metal Mender. Things like lamps and wire baskets for flower-pots and ash-trays come in mighty handy around the house. And it's a cinch to build 'em with this handy home solder that carries its own flux inside — and always works just right.

Other times a man gets the fixin'-itch and saves himself a lot of money repairing broken metal kitchenware for the Missus, and all kinds of other metal things from door-knobs to down-spouts. Kester Metal Mender hits a homer when it comes to making perfect repairs—all you supply is heat and a little elbow grease.

Find out how easy Kester Metal Mender is to use, and how many ways there are to use it. Clip the coupon and mail it in today—for a good-sized *free sample* of this special solder, and free "How-to-Use-It" Booklet.



# KESTER METAL MENDER

Kester Solder Company, 4252 Wrightwood Ave., Chicago, Ill.  
Please send me free sample of Kester Metal Mender and "How-to-Use-It" Booklet.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

..... Mail the Coupon Now .....

## Air vs. Liquid-Cooling

[Continued from page 45]

flight across the Atlantic Ocean. They had taken off from Newfoundland and landed near Clifden, Ireland—nose down in what had deceptively appeared to be a "smooth green field." Two water-cooled Rolls Royce engines provided the power for their specially adapted Vickers bomber.

Despite the success of their flight, Alcock and Brown and their feline mascots were soon forgotten. When Lindbergh made his flight in 1927, however, his air-cooled Wright Whirlwind engine exerted great influence on the industry. Its faultless performance on such an epochal over-water flight no doubt had its effect on the U. S. Navy—today's record breaking Vought-Sikorsky naval fighter, XF4U-1, is powered by an air-cooled motor. This ship, with its Pratt and Whitney 18 cylinder two-row radial, of 1,850 horsepower, is reported to be faster than the Army's liquid-cooled Lockheed P-38 and Bell Airacobra. Army liquid-cooling suffered another major setback when the Navy's air-cooled Grumman Skyrocket whined across the skies at better than 400 m.p.h. a short time before.

The majority of inexpensive civilian light planes have now also taken to air-cooling for their power plants. The ease of manufacture, servicing, and repair, makes the air-cooled motor logical for private use. The elimination of anti-freeze solutions in another convenience apparent even to the earth bound motorist.

As the other extreme the largest and most powerful airplane ever built, the 212-foot Douglas B-19 bomber, is powered with four air-cooled motors. The Boeing "flying fortresses," likewise, rely on air-cooled engines.

The vulnerability of a liquid-cooled engine is slightly higher than that of an air-cooled one. The radiator must be of thin material in order to dissipate the engine's heat properly. As the water-cooled engine has all the other parts found on an air-cooled engine, it is apparent that the radiator is one added Achilles heel. While an air-cooling fin, chipped by some missile or fragment, does not necessarily put the engine out of commission, a punctured radiator eventually does. When the cooling fluid leaks away, a fluid-cooled engine quickly overheats and "freezes," or sticks.

The smaller radiators now in use, however, are difficult targets. The visibility advantages of fluid-cooling, are therefore able to balance the argument. A careful survey of European war planes proves absolutely nothing. A glance at the Army-Navy cooling feud in the United States shows records alternately being broken by each type of engine. Perhaps the answer lies in the perfection of the gasoline engine, itself. The problem may be solved in the not-too-distant future by an engine that requires no cooling whatever.

A new petroleum lubricant "desqueaks" rubber.

**Special Value!**  
Professional Type  
**HOME RECORDING DISCS**  
(Heavy Metal Core—Non Flammable)  
**10" only 19c each**

Made by foremost manufacturer. Proven equal or superior to any recording blanks regardless of cost. These blanks have very slight imperfections but guaranteed to make perfect recordings or your money back. Coated on both sides. Big savings!  
6" Discs 10c; 8" 14c; 10" 19c; 12" less in 25 lots  
Send no money—shipped C.O.D. plus postage.

**FREE!** NEW 1941 **RADOLEK** RADIO PROFIT GUIDE  
Everything New in Radio at **BARGAIN PRICES**



Shows hundreds and hundreds of up-to-the-minute radio parts, sets, accessories, ham gear, electric appliances and supplies. Indispensable to every amateur, experimenter, assembler, sound engineer and serviceman. Keep up with radio and all its phases—send for the big **FREE Radolek Profit Guide** now!

**SEND TODAY!** PASTE ON A PENNY POST CARD

**RADOLEK CO., Dept. X-52**  
601 W. Randolph St., Chicago, Ill.

Send **FREE** Catalog.  Ship \_\_\_\_\_ discs;  
size \_\_\_\_\_ inches, C.O.D. plus postage.  
Name \_\_\_\_\_  
Address \_\_\_\_\_

Get a Genuine **MOTO-TOOL**  
**100 TOOLS in ONE**

Grinds, polishes, sharpens, drills, engraves . . . saves time, cuts costs. Handiest tool in the home or shop . . . use it daily. Moto-Tools are used on precision jobs in factories.

**27,000 R.P.M.** Dremel higher speed conserves cutters . . . does finer work. Moto-Tools have oil-less (oil-sealed) bearings, built-in cooling fans, balanced armatures to eliminate vibration.

**Model One**, with chuck and 1/8" collet, only \$9.85.

**Master Model Two**, heavier, more powerful, with chuck and 1/8" collet, only \$16.50.

**10-DAY TRIAL.** If your dealer does not handle Moto-Tools, order direct . . . We pay postage if you send money order or draft. Or, send only \$1, pay postman balance plus postage.

**DREMEL MFG. CO., Dept. T141-C, Racine, Wis.**



**WRITE FOR FREE CATALOG** of Dremel Tools, Equipment & special combination offers.

# SAW-FILING

**Pays up to \$2 or \$3 an Hour**

A **FOLEY** Automatic Saw Filer files hand, circular and band saws better than the best hand filer. Cash business, no canvassing, no eyestrain. No experience needed. "Bought a Foley, one year later had all debts paid and \$400 on new home. Many days I earn as much as \$16.00!"  
J. H. Kellogg. Send coupon for **FREE PLAN**, no obligation.

.....  
**FOLEY MFG. CO., 317-1 Foley Bldg., Minneapolis, Minn.**  
Send Free Plan on Saw Filing business.

Name \_\_\_\_\_  
Address \_\_\_\_\_



# Editor's Workbench Chips

[Continued from page 21]

Professor Harvey says, however, that when you place potatoes in a darkened room and flash ultraviolet on them, you can tell in a minute the ones that are good from those that aren't; the good spuds remain invisible and the saboteurs glow with a "ghostly, greenish" light. The moral, then, is to get yourself an ultraviolet lamp, if you plan to grow the mysterious Murphys. After all, you wouldn't want a Karloff in your potato bin, would you?

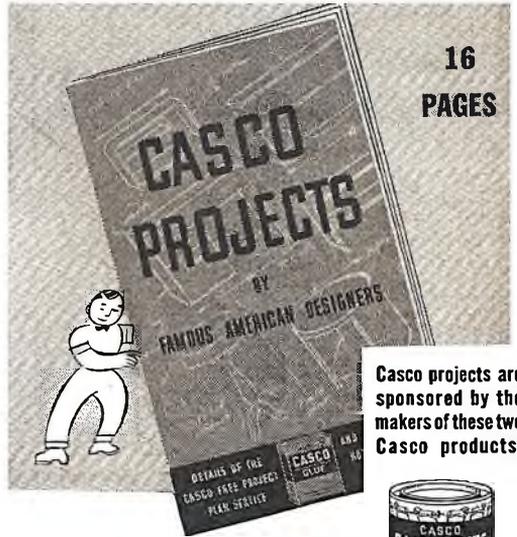
\* \* \*

ON PAGE 40 of this issue you'll find what we think is a mighty important article, a discussion of the relative merits of air cooled engines for aircraft as opposed to the water cooled variety. As you know, this is an argument that has been going on ever since the Wright brothers took off from Kitty Hawk, and we don't think for a moment that our little story will settle the matter one bit. The discussion still goes on, though we have it on direct word that the argument will be settled when they invent an engine that won't need to be cooled at all. At any rate, we think you'll be interested in the article, especially if you've been reading about that 2,000-h.p. engine Uncle Sam now has for his fighter planes. The most powerful engine now in use abroad, you know, is a 1,250-h.p. job, and if we get into active production on a large scale of the 2,000-h.p. plants, you can see where the rest of the world's planes, including our own, soon would be obsolete. Well, we don't want to take any sides in the air cooled versus water cooled battle, but we may as well tell you that this new 2,000-h.p. creation is air cooled. You don't have to draw any conclusions either, if you don't want to. We're just giving you the information—take it or leave it.—*The Editor*



This car attracts a lot of attention wherever Gaylard Train, of Hardy, Neb., drives it. It is a three-wheeled job of his own design and construction. It uses a Model T frame which was shortened and narrowed at the rear end. It is powered by a Harley 74 and has a Harley three-speed transmission. Top speed is about 45 m.p.h. A \$3.00 Workbench check is going out to Gaylard for this snapshot.

# FREE BOOK OF NEW 1941 PROJECTS to build in your own workshop!



Casco projects are sponsored by the makers of these two Casco products:



CASCAMITE, the new waterproof glue that brings modern resin-bonding to your workshop. 25¢, 50¢ and 85¢.

## 24 original designs by ★ GILBERT RHODE ★ RUSSEL WRIGHT ★ HERMAN HJORTH

● Stop wasting good workmanship on poor design. Choose your projects from these handsome, modern pieces designed exclusively for Casco by leading professional designers. Free book illustrates tables, "unit" chests and cabinets, desks, bookcases, lamps, trays; tells how you get free plans through the purchase of Casco Casein Glue or the new Cascamite Resin Glue.

Mail coupon today. Get the most from your efforts—with a professionally-planned Casco project!



Casco Powdered Casein glue, the standard casein glue for water-resistant wood gluing. 10¢ to 65¢.

CASEIN COMPANY OF AMERICA  
Dept. MI-341  
350 Madison Ave., New York, N. Y.

Sold at Hardware, Paint and Lumber Dealers'.

Send me a copy of the new, free "CASCO PROJECTS" by return mail.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Save 2c... stick coupon on penny post card.

# NEW BOAT READY!

**BUILD OK-4 at Home in a Few Evenings!**



*OK-4 speeding along using 9 h. p. motor*

Here is Mead's sensational new 14-foot portable outboard KI-YAK—the OK-4! Carries 4 adults and duffel—takes motors up to 9 H. P., oars and sail! Weighs only 76 lbs. Seaworthy. Dependable. Big! Light! STRONG!

You can build yours easily, quickly, perfectly at home in a few evenings from our patented, complete construction kit and save nearly HALF! Big money assembling, selling to others. Then there's the 50-lb. OK-2 for motor, sail, oars—and 3 other paddle-sail KI-YAKS from 18 to 45 lbs! Double Paddle or Oars now INCLUDED with your Kit! Write for FREE big colored "Picture Circulars"—amazing low Factory-to-You Prices!

Write FOR BIG LAVISHLY ILLUSTRATED Free CIRCULARS

OK-3 with sail rig

## MEAD GLIDERS

15 S. MARKET Dept. M-31 CHICAGO, U.S.A.

SAVE MONEY!

See **MONEYMAKERS & MONEYSAVERS** (pages 27-32)

**Happy Shavers**

**USE "3-IN-ONE" ON RAZOR BLADES**

Rust dulls razor blades quickly! A drop or two of 3-IN-ONE Oil applied to the edges after shaving prevents rust—lengthens blade life! Get it at Hardware, Drug, Grocery, 10¢ Stores.

**3-IN-ONE OIL**

LIBRICATES - CLEANS - POLISHES - PREVENTS RUST & TARNISH

# Snapshots Of Court Shots!

[Continued from page 82]

By means of the newly developed multi-flash camera, one can see the perfect arcs and whirls, step by step, as the ball approaches the basket. With this new type of photography, the fans can now fully appreciate the artistry of shot making. Likewise, coaches with adequate photographs at their command, can better instruct their players.

Unquestionably this high speed photography will take its place in helping coaches just as the slow motion movie is being used by football coaches to assist in instructing the team. The multi-flash camera is superior because it stops the ball from 10 to 600 times per second enabling the coach and players to follow the exact arc.

Since the complete action is frozen on a single photographic print showing what happens to a basketball, and other equipment used under actual playing conditions, this new method of photography is also very useful in the study of athletic products.

In taking these interesting pictures, George Temple used a regular Eastman Kodak 5x7 view camera with a 4.5 lens, for both multiple-exposure and single flash shots.

Multiple exposure photography is made possible by the aid of a Stroboscopic light which controls the number of exposures in a print. The light can be set to flash at varying speeds, ranging from 10 to 600 flashes per second. Spalding is justly proud of its multiple exposure technique since it is the only one in the world at present equipped to take action multiple exposure pictures.

Single flash pictures are taken with the same camera at 1/30,000 per second. Again a special light is used, one that can be synchronized with the camera and can even be controlled with a sound pickup when desired.

# Musical Number, Please!

[Continued from page 78]

the invention came when they discovered they could have their requests played not only in their own bar but in any of the other bars subscribing to the service. Not only that, they could dedicate the performance to anybody who was, at that moment, in any of the other cafes. For example, a celebrant in a night spot, who knew that his fellow worker was in some dining place, could put in his nickel and request that a number be played in that location for his friend's benefit. Presently a mellow feminine voice would dedicate it.

Two floating Weather Bureau stations have been established on U. S. Coast Guard cutters in mid-Atlantic since war has almost cut off weather information from ships at sea.

A camel can take 15 gallons of water in one drink.

## How To Buy A Used Car

[Continued from page 88]

excellent indication of the car's qualities, though its efficiency has been somewhat dimmed by corrective devices of underhanded dealers. A favorite is putting sawdust in the rear axle to hide telltale hums.

Check to see if the car uses oil excessively. Start the motor, put the gears into neutral, and pull the throttle out. If the exhaust exudes *bluish* smoke, the car definitely is an "oil-burner."

Brakes that go all the way to the floorboards may need adjustment or relining. Even though they seem to be in good order, they may be drawn up to the last notch. Where the brake lining is gone, brakes are often tightened until the brake shoe and metal drum make a metal-to-metal contact which works well temporarily. It is also a simple matter to create a new brake "feel." All the dealer needs is a piece of inner tube slipped between the brake-shoe and the drum.

If the brakes are of the hydraulic type, snap your foot down hard and continue to exert pressure. A sinking underfoot means that the fluid is leaking out past the brake pistons. The repairs are expensive.

Watch out for slipping clutches. A properly adjusted clutch takes hold gradually and releases the instant the clutch pedal is depressed. To test it, keep the motor running, put the emergency brake on hard, shift into low and let the clutch engage the motor. If the motor doesn't stall immediately, but continues to turn over, the clutch is slipping. This wastes power and fuel, besides putting an extra strain on the motor.

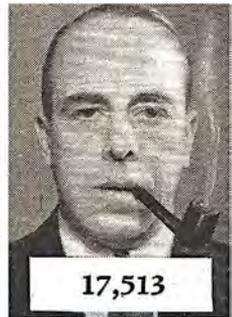
The steering wheel should be tried for excessive free movement. If there are more than two inches of "play," the worm apparatus which controls the steering mechanism is badly worn.

The front wheels should have proper "caster." This is an adjustment action which causes the wheels to return to a straight ahead position after the car has rounded a corner. In the same category is "drift," which is a tendency of the car to edge toward one side of the road although the front wheels are in the straight ahead position. Improper alignment, bent springs, or broken shock absorbers are the probable causes.

Be sure to get a written guaranty covering both labor and parts for at least thirty days. Guaranties that call for replacement of defective parts alone with the customer paying for labor mean that in reality he pays for the parts, too. A guaranty that puts the burden of proof on the purchaser is valueless. If the dealer has stated that the car has been reconditioned, have him include this in the instrument.

The purchase of a used car is a serious business. If possible, bring a skilled mechanic along. Lacking this, keep these few fundamental rules in mind and remember, it is better to do your detective work before and not after you buy the car.

# HELP LOCATE THIS MAN!



**CONVICTED**  
*with 17,512 others of not  
having found the right tobacco*

Out of every thousand exacting pipe-smokers—a high percentage refuse to smoke any other brand once they try **BOND STREET**.

And so—by applying that percentage to readers of this magazine, we know that 17,513 pipe-smokers are missing the *one* tobacco they'd like best!

**BOND STREET** contains a *rare aromatic tobacco not hitherto used in a popular priced mixture*.

It smokes clean—sweet—without bite. Never leaves stale pipe odors in the room. (*Even the ladies approve the aroma.*) Try it—today—and see!

**15¢** **GENEROUS SIZE**  
**POCKET TIN**



A Product of Philip Morris

# LEARN TO FLY

146-Page  
Illustrated  
Aviation Handbook

# FREE!



EVERYTHING you want to know about planes, gliders, flying and related subjects will be found in the big, new edition of the Fawcett FLYING MANUAL, now available for only 50 cents!

FLYING MANUAL contains articles covering: THREE DIFFERENT WAYS TO LEARN TO FLY FREE, HOW TO BUY A USED PLANE, EMPLOYMENT OPPORTUNITIES IN AVIATION, complete plans and specifications for building a modern glider, model planes, and a host of other home workshop projects.

Anyone interested in flying as a sport, hobby or career will find the new FLYING MANUAL crammed with entertaining and useful information. It's a whole library on flying packed into one book.

Get your copy today. FLYING MANUAL costs only 50 cents.

CANADIAN ORDERS NOT ACCEPTED.

## CUT OUT AND MAIL TODAY!

|  |            |
|--|------------|
| Fawcett Publications, Inc.<br>Greenwich, Conn.   | M1-3       |
| Please send me, postpaid, a copy of the latest FLYING MANUAL. Enclosed find 50 cents in check, money order, or stamps. |            |
| Name .....   |            |
| Address .....  |            |
| City.....  | State..... |

## Print "Dodging," One Lesson

[Continued from page 91]

portions of the picture, it was found that the delicate leaves called for only 20 seconds printing time and the upper petal portion, 40 seconds. The total printing time required to darken the background areas ranged from one minute and 20 seconds to two minutes and 5 seconds. The printing was done in the following way:

First, the entire negative was given 20 seconds. The central and upper portions of the blossom were then given an additional local printing of 20 seconds—Figure 1. Following this, the background to the right of the blossom was given an additional 45 seconds, the background to the left one minute additional, and the background at the top of the print one and one-half minutes more than the blossom. The technique illustrated in Figure 2 was employed to burn in the background in each case.

In subduing the spotty foreground and background of the calf picture, a small, round dodging disc was used to hold back the principal subject—Figure 3. The head and shoulders of the calf were printed for 20 seconds in a general exposure of the printing paper. Then the background was given 45 seconds additional exposure and the immediate foreground, 65 extra seconds of burning in. Slight but constant movement of the dodging disc made for the soft blending effect obtained.

## "Darkroom Spot" Inspection

[Continued from page 93]

exact center of the disc with a narrow chisel and hammer. Solder the disc onto the bottom of the socket. Then connect a length of "pull-apart," rubber-covered drop-cord to the socket and pass the cord through the  $\frac{1}{8}$ -in. pipe. To prevent rust, paint the reflecting side of the disc with aluminum paint, and the back of the disc with black enamel.

Slip the flange and wood-disc unit onto the pipe. Insert the socket unit into the tube and fasten the wood disc to the end of the tube with three, round-head wood screws  $\frac{3}{4}$  in. long.

If you do not want to fasten a pull-chain switch to the ceiling of the darkroom, simply tape a small bakelite pull-switch to the cord that suspends the inspection lamp. One side of the suspending-cord is broken and the pigtailed on the switch are soldered to the cord and taped over. A pull-cord is tied to the pull-chain and led down the side of the lamp through a screw-eye—the latter replacing one of the screws that holds the wood disc into the end of the tube. If the walls of the darkroom are white, it is recommended that a hard rubber or other black hypo tray be used, as a black tray will reflect very little light when it is filled with hypo solution.

## Graceful Console Table

[Continued from page 99]

itself. The legs are held in place easily with 3-inch lag screws and bolts which you may purchase second hand from any upholsterer. Before installing them it will be better to practice on an old scrap so your chances of splitting the legs will be lessened. Then tack the plywood bottom into the rabbets of the side members.

The stretcher is next doweled and glued to the bottom of the legs. The tracks which receive the beveled battens of the table top are screwed in place. These consist of four strips cut to a 45 degree angle on one side and installed as shown. On the back top panel member, that is the one which faces the wall when the top is up, you will have to carefully locate the beveled battens that slide into the tracks. Candle wax rubbed over the moving parts to prevent binding is next applied.

The top itself is glued up from three boards each 10" wide and about 30" long. Two hinges, mortised so that they are hidden when the top is lowered, hold the two pieces together.

The four pieces of beveled battens which enter the ways of the table, are bradded lightly into place until you determine their exact position. Then screw down firmly using flat head screws 1 1/4" long. The arm which holds the top vertical is fastened into place next. A slot at the lower end fits snugly beneath the head of a round-headed brass screw.

## The Vultee Vanguard

[Continued from page 112]

to shape and cement it to the bamboo. Cut a notch in the bamboo for the wire so it will fit flush to the 1/32" sheet balsa landing gear cover, which is added after the wire is cemented to the rib No. 3.

Cover the fuselage first, using dope to stick the paper, all but the part where the wing is filleted into it. It should be covered in small pieces to avoid wrinkles. Next cover the wing and fillet it into the body very carefully. This will not be found difficult if small strips of paper about 1/4" wide are used, running the length of the opening, each one overlapping slightly. Trim the surplus paper with a sharp razor. Cover the tail surfaces on both sides and cement to fuselage. Make sure they are in correct alignment. Then spray the whole model with water. When the water is dry give the model one coat of thin dope. Make the cockpit enclosure of thin celluloid. Cement it on in sections over the framework. Dope thin strips of black tissue to the covering of the wing and tail panels to represent the control surface junctures.

Use four stands of 1/8" flat rubber to power the model. A wire pin holds the rubber in the rear of the fuselage.

## NEW 1941 SPRING FRAME INDIAN



*The  
RIDE  
of  
RIDES!*

For new thrills, new fun, ride an Indian — there's nothing like it! 1941 Indians are power-packed streamlined beauties, built with Indian's exclusive "Spring Frame" that floats you over the roughest roads as though they were super-highways. No jolt, no jar — just easy comfort that leaves you fresh as a daisy after the longest ride. But "Spring Frame" is only one of the features that make these the greatest Indians ever built.

Visit your Indian dealer today. See the three great "Spring Frame" models, and the famous Junior Scout, still America's lowest priced "twin". For fun this summer, pick your Indian now — pay as you ride. INDIAN MOTORCYCLE CO., Springfield, Mass.



# Indian

**FREE!**



Beautiful full-color 1941 catalog.  
Fill out coupon and mail today!

Please check your age group  
 16-19  20-30  31 and up  under 16

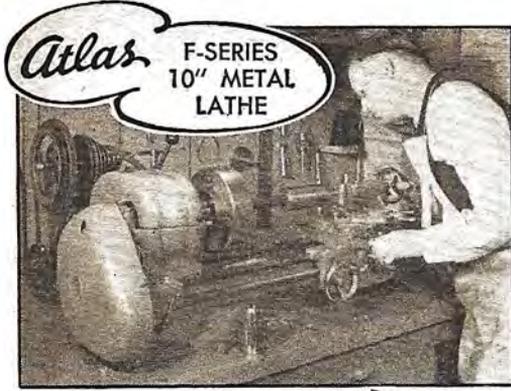
Name \_\_\_\_\_

Address \_\_\_\_\_

MI-9

# Gadget Man!

[Continued from page 77]



## Send for Your 1941 Catalog

Get all the facts about this great lathe with power cross feed as standard equipment and many other exclusive modern features. 72 pg. catalog free. Send coupon today.



ATLAS PRESS COMPANY  
352 N. Pitcher St.,  
Kalamazoo, Mich.

Please send me your 1941 catalog on:  10" Metal Lathes,  
 6" Metal Lathes,  New Milling Machine,  7" Metal  
Shaper,  Drill Presses,  Arbor Presses.

Name .....

Address .....

City and State .....

## BUILD ARC WELDER FROM OLD GENERATOR

WE SHOW YOU HOW

Light or Heavy Work  
Produces 75-200 amperes.  
Takes no previous experience  
or hard work to make one of  
these welders. Complete PLANS  
and valuable catalog 35c. Over  
1000 Electrical Supply Bargains.  
Send 35c today.



LEJAY MFG 1314 LEJAY BLDG MINNEAPOLIS, MINN.

# INVENTORS

Know when you have  
a cashable idea  
SEE PAGE 15

## PROTECTION



**JUST GUIDE IT!**  
More like magic than any  
tool you ever saw. Imagine  
an electric scroll saw only  
slightly heavier than a  
hand coping saw . . . a  
tool that takes no effort  
to run, no pressure to feed.  
Works at any angle—on  
big assembly jobs or on  
the tiniest piece you can  
hold in fingers. 7200  
strokes a minute . . . so  
fast the blade seems to  
stand still. Sturdily built  
. . . only two moving parts  
. . . never needs oil. Easily  
cuts intricate designs—so  
smooth it eliminates sand-  
ing. Novice or craftsman,  
a thrill awaits you.

DREMEL MFG. CO.  
Dept. 5141-C,  
Racine, Wis.

Safe as a Hand Saw  
It's fast . . . cuts  
on an average of 1  
ft. per minute up to  
3/4" medium hard  
wood. Operates on  
110-120 V. 50 or  
60 cycle alternat-  
ing current. If your  
dealer does not yet  
have MOTO-SAW,  
send only \$4.85.  
Or, send \$1. pay  
postman balance  
D. U. S. POSTAGE  
**MONEY BACK** if not  
delighted after in-  
spection.

costs in planning new devices, and Whyman usually re-designs their products. Nearly all must be constructed of light-weight metal to permit mass production stamping. Too, they must be compact. One man brought him a four-tier tie-rack. After studying the device, Whyman started to turn out 100,000 of them, each measuring 4x9 inches, with four bars capable of taking 32 ties. More important, each tie may be picked off individually and not pulled out. The four bars are so arranged that they may be swung in and out by pressure on either the lowest or topmost.

Turning out 100,000 toy rifles in twenty working days was no trick at all, to hear Whyman explain it. First, he bought the stocks ready for assembly. Second, a workman stamped out the blanks for the star wheel and trigger from bar steel. As these rolled off, another man swaged the shaft into the star wheel so it would turn with the shaft. Next, the trigger was connected to the shaft. Then the metal barrel and other parts were dipped into black enamel, baked and delivered to the assembly table. After these parts were brought together, the stock was riveted to the frame, two rivets being used. As the final step, the completed rifles and a half-dozen rubber bands were packaged. The parts never piled up, and each day's output was boxed ready for delivery that night.

Whyman looks on his novel enterprise only as an elaboration of a home workshop. He parcels out the various jobs to his employees, and he does the perfecting of the gadgets, and later, the marketing of them.

A manufacturer came to him not long ago, requesting that he make a sure-hold towel rack. "In most homes," explained the gentleman, "towels too often slip to the floor." Whyman agreed with this observation, and a few weeks later was manufacturing small pressed frames containing three rubber discs, each containing three slits coming together at the center. Now milady need only press a corner of the towel into the disc and it will hang there forever. Yet only a slight pull will remove the towel.

Many of these devices are practical, while some combine novelty with practicability, being more novel than practical. Such is the essence of a lighted boudoir lamp. Containing six ounces of cologne, the bottle is fitted with a cap containing a small battery and a lamp. By twisting the shade, you turn on the lamp. Shade, battery and tube are easily removed when access to the cologne is desired.

His newest is a question-and-answer bank. The gadgeteer only the other day started work on this one. You walk up to the device, ask a question, and Madame Melba nods or shakes her head. Her responses depend upon how the coin strikes a mechanism inside. When he figures out how to press it from two pieces of metal, it will appear in dime stores from coast to coast.

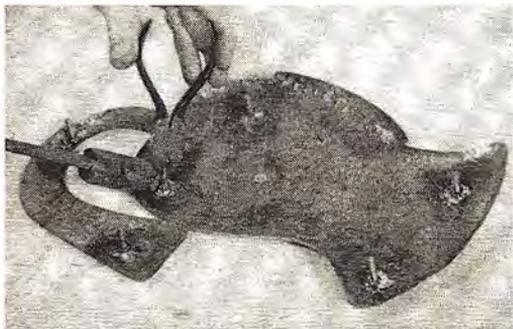
# Knight In Armor Fire Screen

[Continued from page 104]

$\frac{3}{4}$ " x  $\frac{3}{8}$ " is used for the frame and this may be purchased at almost any hardware or builders' supply house. Just 37 feet of this are required. The screening is of  $\frac{1}{8}$ " or  $\frac{1}{4}$ " mesh hardware cloth. Obtain this in the 28" width  $1\frac{1}{4}$  yards long. From the drawing lay out the entire screen and wings on a level floor and mark the location of the lap at the top of the main frame. The bends in these channels are made cold although they may be made hot if facilities are available. Hammer the channels to accomplish the bends. Bend all of the pieces, fitting them to the floor layout. Note that all of the pieces are double as shown. Now drill the pieces with  $7/32$ " holes as shown, by clamping matching pieces together. When drilled, bolt the frame together as a final check and then cut the hardware cloth to fit just inside the channels.

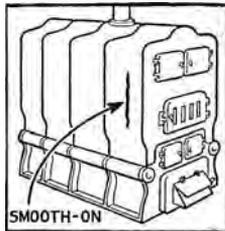
From  $\frac{1}{8}$ " pipe saw off 54 spacer pieces to fit between the channels. Now reassemble the frames with the hardware cloth between by bolting through the pipe spacers. Note that these spacers stretch the hardware cloth as the bolts are drawn up. Next replace the bolts one at a time with  $3/16$ " round head rivets. After the riveting is completed cut a single length of channel for the center vertical piece. Be sure this is long enough to stretch the screen. This piece is located at the back and is held in place by three rivets into the screen using a washer next to the screen. After this, drill the butt hinges located at the back, and rivet these in place as shown. Then cut out the pieces from No. 26 ga. copper for the ornamental helmet. Using a ball peen hammer, hammer these pieces from the back to form a bas-relief. If the copper becomes hard to hammer or form, heat over a gas flame until red and quench in water. This anneals the copper and it may again be formed easily. After hammering the visor piece of the helmet cut the edges of it to fit neatly over the curve of the head piece. A copper rivet is inserted at the visor hinge to hold it to the head piece. Solder holds the outer edge to the head piece. Also solder the plume to the back

[Continued on page 148]

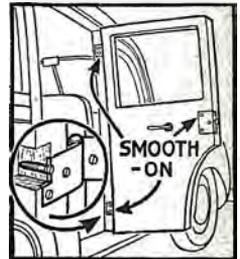


Here's how to solder the bolts to the back of helmet.

# HOW to REPAIR Cracks, Leaks, and Loose Parts at least cost



Sealing Crack  
in Boiler



Tightening  
Loose Fixtures

In every household, repair jobs are sure to be required from time to time. The boiler, heater or a radiator may leak, a pipe may split, the auto water jacket or gear case may crack, and handles of tools, utensils, doors, umbrellas, etc., are always coming loose.

A little Smooth-On No. 1 will permanently cure each of these and many similar troubles. Protect yourself against such emergencies by getting a can of Smooth-On and keeping it handy. The first application will pay for the can many times over, and a can will last a long time to save you from many an expensive repair job.

Buy Smooth-On No. 1 in  $1\frac{3}{4}$ -oz., 1-lb. or 5-lb. cans from your hardware store or, if necessary, from us. For your protection, insist on Smooth-On, used by mechanics and repair men since 1895.

## FREE Repair Handbook



40-Page Repair Handbook which will enable any handy man to be his own repair mechanic on dozens of jobs that would otherwise mean the delay and expense of getting a professional. 170 Diagrams show ingenious and practical methods of making cracked, broken, leaky, or worn apparatus as good as new. This useful guide is literally a necessity in every home and shop, and will be sent you FREE if you fill in and return the coupon.

SMOOTH-ON MFG. CO.,  
Dept. 69, 574 Communipaw Ave.,  
Jersey City, N. J.

Please send Smooth-On Repair Book

Name .....

Address .....

3-41 .....



Do it with SMOOTH-ON

**I'M SO HAPPY NOW THAT CHARLES IS DOING SO WELL IN HIS NEW BUSINESS**



**TOOK IN \$217 in 10 DAYS WASHING WALLS**

● Newly invented machine washes walls 6 times faster and better than by hand. Charles Stelle took in \$217 first 10 days. We want more men to go into business for themselves. Customers everywhere—homes, schools, offices, stores, churches, lodge halls, hotels all have walls that need washing. You don't have to rent a store or office. You operate this business from your home. The expense for materials is small. What you take in is practically all profit. On a \$10 job cost for materials is about 20c. Write now for complete facts on this Von Schrader Wall Deterger which washes paint beautifully and postpones repainting many years.

Harold Jones writes: "I landed a \$40 job the first day."

J. Cranston says: "I have several jobs to start on Monday, thanks to your help."

Clyde Brandt writes: "I made a demonstration in a public school and got a contract which will more than pay for my machine in the next few days."



**Easy Payments**  
It takes only a few dollars to get started in this money-making profession. No experience necessary. The total price is so small and the payments so easy that anyone with ambition should get started NOW.

**SEND FOR FREE INFORMATION**

There is No Obligation  
**MANUFACTURING CO.**

**VON SCHRADER**

763 Pl. Racine, Wisconsin.

**NEW FREE CATALOG**

**STOVES, HEATERS, FURNACES AT FACTORY PRICES**

Send for Free Catalog! 136 Styles and Sizes. Coal-Wood Ranges; Combination Gas-Coal or Oil Ranges; Gas Ranges; Oil Ranges; Oil Heaters; Coal-Wood Heaters; Furnaces. 30 Days Trial. 24 hour shipments. 1,600,000 Satisfied Users. Stoves \$5 Down, up to 18 months to pay. Factory guarantee.

**EASY TERMS**



**KALAMAZOO Stove & Furnace Co., Mfrs.**  
403 Rochester Ave., Kalamazoo, Mich.

**A Kalamazoo Direct to You** 40 years in business

**KUNS' ILLUSTRATED AUTOMOBILE RACING BOOKS**

Tell you how to lay out and build high-speed engines, racing car frames and bodies. Complete, easily understood working drawings and building instructions. World's speed records. Complete details and illustrations world's fastest cars. Fourth Edition book deals largely with midgets. Fifth Edition covers dirt track racers and engine rebuilding. (Each book entirely different.) Order NOW—\$1.00 each postpaid; \$1.15 C. O. D.



**RAY F. KUNS, Dept. A-27, Madisonville, Cincinnati, Ohio**

**WOODWORKERS 1941 MASTER MANUAL**

10¢

"Get the Brand new Constantine Master Manual for Woodworkers and Big 1941 Bargain Book, listing and describing over 100 different kinds of wood in 980 different items in concise, lumber panels, tray work, turning squares, and helpful woodworking aids. Printed and illustrated articles on How to Make Mould Pictures; How to Make Veneered Panels. How to Finish Different Kinds of Woods. A source of supply for you in small sized quantities—every kind of wood you are looking for. Send 10c today in stamps or coin."

**ALBERT CONSTANTINE & SON, INC., 801-C, East 135th St., N. Y. C.**

**Knight In Armor Fire Screen**

[Continued from page 147]

of the head piece. Then solder six 1/8" x 3/4" bolts to the back of this assembly. Polish the helmet and bolt it to the center of the screen using washers next to the screen at the back. This also helps to tighten the screen and the excess bolt length is then cut off.

Clean up rough places on the frame with a file and steel wool and paint with staturary bronze. Two coats will be necessary.—R. T. H.



This is the way the curved channels are matched up.

**(Correct Answers To Quiz On Page 73)**

1. True.
2. False. A socket wrench is a tool.
3. False. A toxophilite is a person interested in archery.
4. True.
5. True.
6. False.
7. False. Pythagoras was a philosopher.
8. False. A pterodactyl is an extinct flying reptile.
9. True.
10. True.
11. True.
12. True.
13. False.
14. False. It is a type of whistle.
15. True.
16. True. The prize was offered by Edwin Gould.
17. False.
18. True. The Vought-Sikorsky VS-300.
19. True.
20. False. A rocker arm is a part of a gasoline engine.
21. False.
22. False. A radial engine has a revolving crankshaft. A rotary engine has a stationary crankshaft, the engine revolving.
23. True.
24. True. The surface of a propeller blade that corresponds to the upper surface of an airfoil is called the "back."
25. True.

Checks have been sent to the following: Ross R. Latchaw, Ida Grove, Iowa; Lew Gourley, Jr., Shoshoni, Wyoming; H. Radzinsky, Great Neck, N. Y.; Theron G. Cady, Palo Alto, Cal.; Angil Tomontong, Waipahu, Oahu, T. H.; Casimer Remus, Pittston, Penna.; Edwin H. Chase, Lyndhurst, N. J.; Ted Wilson, Marshall, Minn.

# "All-Wave Eleven"

[Continued from page 103]

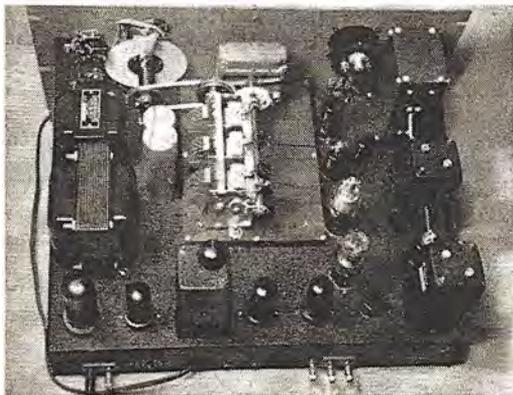
The coil set is the biggest part and it is well to get the holes for this, together with those for the tuning condenser and dials, cut out first. As it comes, the coil set is too high and must be disassembled so that the three shield pieces may be trimmed down a bit. Remove the two long rods that hold all sections together and trim off the three shield pieces on the upper side (opposite side from that in which the trimmer screws face) until all are 3/4 inches high. Then reassemble, using care to get the various washers and spacers back in the proper places.

The coil set is still so high that a hole must be cut in the chassis for it to pass through and a shelf built above it. The hole is 8 1/4 x 5 1/4 inches and is made with a hacksaw blade, starting each cut in a series of four or five 1/8-inch drill holes. When the edges are smoothed the shelf may be assembled. It must be 1/2 inch high, so 1/2 x 1/4-inch dural strips are used for sides and back. Three pieces are required, as none is used in front (although a front piece would give a little more rigidity). The shelf top is a plate of aluminum 8 3/4 x 6 inches x 1/8-inch thick and three screws through each side and through holes in the dural strip hold the whole thing firmly to the chassis.

The next job is to mount the band spread dial and its housing. This is centered laterally on the shelf and the housing is 3/8 inch back from the front of the chassis. It is held by four machine screws.

The tuning condenser gang may now be set in place with the front edge of the frame 3 3/8 inches back from the front chassis line. Three screws hold this unit, two in front and one at the rear, and it will doubtless be found that several thin washers are required beneath the condenser brackets in order to raise the band spread shaft (the small one) on a line with the dial shaft. The flexible coupling will take up a certain amount of

[Continued on page 150]



Arrangement of chassis is compact, balanced, yet not crowded. Note antenna and ground terminals, and speaker receptacle at rear of set.

**"You can earn \$150 to \$300 extra profit monthly with this HOBART WELDER"**

**Liberal Trial**  
in your shop on your own work to prove it  
SEND for complete details

### IT'S EASY TO GET BIG PROFITS WITH HOBART ARC WELDING EQUIPMENT

Because of big profits realized with the Hobart 40-Volt "Simplified" Arc Welder you can start a big paying business of your own . . . with almost no investment! Arc welder prices are the lowest in history, making it possible for even the smallest shop to own one of these money-makers. Extra profit from a single job is often more than enough to take care of the small monthly payment. Arc welding is today's profit opportunity . . . don't miss it!

**Remote Control.** This is an important feature you get at no extra cost with Hobart. It lets you control your welder from any working point. Saves time, temper and eliminates the need for a helper on overhead or congested work. **Easy to Operate.** Hobart Welders have "Simplified" operation. This means faster welding—with the right current for every job. Hobart is so simplified that any one of your men can weld easily and successfully. **60% Extra Capacity** over old style 25-Volt Welders . . . necessary for welding with the new coated rods. **Automatic reactance** lets you handle light welder work without losing the arc.

**"Pays-for-Itself" Terms.** You can try this complete Hobart Welder in your own shop for a Liberal Trial to prove that extra earnings and savings obtainable with this improved welder makes it easy for you to own a Hobart with practically no cash outlay.

### ECONOMICAL HOBART A. C. ARC WELDER



Now you can get all the advantages of the finest arc welding at low cost! This new welder lets you handle hundreds of jobs with far more profit on repair and general job shop work. It's easy to use; easy to own; economical to operate. Comes complete with all accessories, electrodes and instructions for use. Ask for Liberal Trial. Quickly pays for itself on low monthly payments of

**\$12.50**

### HOBART One of the World's largest builders of Arc Welders

HOBART BROS. CO., Box 5M-31, Troy, Ohio

Tell me more about—

- Building My Own Portable Welder
- Complete Gas Engine Drive
- Electric Drive Welder
- Send FREE Book on "New Profits in Arc Welding"

Name \_\_\_\_\_

Address \_\_\_\_\_  
Interested in  LIBERAL TRIAL.  EASY TERMS

Own this PROFIT MAKER for only \$20 MONTHLY

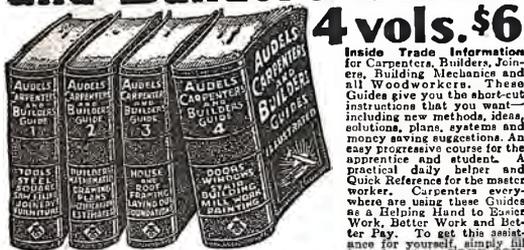


Build Your Own Arc Welder with above Hobart unit SAVES YOU \$300 to \$500

Use this Coupon to get FREE Arc Welding Book



# AUDELS Carpenters and Builders Guides



4 vols. \$6

Inside Trade Information for Carpenters, Builders, Joiners, Building Mechanics and all Woodworkers. These Guides give you the short-cut instructions that you want—including new methods, ideas, solutions, plans, systems and money saving suggestions. An easy progressive course for the apprentice and student. A practical daily helper and Quick Reference for the master worker. Carpenters everywhere are using these Guides as a Helping Hand to Better Work, Better Work and Better Pay. To get this assistance for yourself, simply fill in and mail the FREE COUPON below.

## 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—Carpenter arithmetic—Solving measurement problems—Determining strength of timbers—How to set girders and sills—How to frame houses and roofs—How to estimate costs—How to build houses, barns, garages, bungalows, 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 exterior 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. I.O.R.® 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..... **MM**

## AMAZING PERFORMERS MONEY-MAKERS NEW

### FIFEL-GEARED PITRENCHE KIT-7" & 8 1/2"



"Pocket Machine Shops" that do the work of \$50 worth of other tools. Amazingly Quicker, Better... Easier!

Now of ALLOY Steel—65% Stronger! • NEW PLANT... Quadrupled Capacity. • Now have your Own Business in a New Selling Case. Full-time men making \$1000 incomes yearly... Part-timers in proportion. We need Many More!



Mail Your Address Today (on a post card will do) Get FREE—this 6-Edge End-& Angle Screw-driver and 101-Picture Manual of Mechanics, with...  User Offers: or, with...  DISTRIBUTOR, Territory, Demo, and SELLING KIT Offers!

AMERICAN PITRENCH CORP. 3311-4517 W. RAVENSWOOD AV. CHICAGO, ILL.

## GET THIS NEW EDITION OF



### "FISHING DIGEST"

FREE!

Just out—new 1941 edition! Digest of the year's best articles on fishing. 100 pages of facts, fiction, thrills. Includes chart of world's record catches.

Also information on outboard motors. Sent free! Write JOHNSON MOTORS, 1511 Pershing Road, Waukegan, Ill.

## "All-Wave Eleven"

[Continued from page 149]

misalignment, but every effort should be made to get the two shafts as closely in line as possible. The band spread dial and condenser should turn very smoothly when properly adjusted. Remove the stop pin on the rear of the condenser shaft before final assembly.

The band-set dial should be mounted next. Note on the top view of the chassis that rectangular cuts are made in the chassis top both sides of center. The dial is mounted in the right hand cut with the bottom of the shaft just level with the chassis top. Two flat-head screws through the front drop hold the dial firmly.

An upright post of dural 1/2x1/4x2 1/2 inches is now cut and mounted 2 1/4 inches back from the chassis edge. Mark the spot on this piece which is directly behind the shaft hole of the dial and drill a 1/4-inch hole. A short length of 1/4-inch rod then is fitted from the dial through the post, to extend about 1/2 inch behind the latter.

The band-set section of the condenser may be driven by dial cord, wire belt, or flat strip. The latter is used in this set; the 1 3/4-inch diameter drums over which it runs were obtained from an old broadcast set together with a length of 1/4-inch wide thin brass strip to connect the two. The strip is cut about 1 1/2 inches shorter than is required to run all the way around both drums and a coil spring fastened between the two ends, with sufficient tension to take up all backlash in the drive.

The chassis may now be drilled for all other parts. The layout does not show the actual holes used for mounting screws, but the center point of each part is marked out so that no confusion will exist. Sockets are held by 6/32 screws run into holes tapped in the chassis. Hole sizes are noted on the drawings.

The panel is drilled last. The meter and the bakelite plate for the band-set dial are mounted in two 3/16-inch diameter holes made with a fly cutter.

Note that the bottom of the panel is not flush with the lower edge of the chassis, but comes 1/8 inch further down so it will fit properly in the case.

The chassis side brackets are mounted flush with the chassis bottom edge; this will entail some filing of the mounting holes. The chassis bottom plate is not used.

The panel is fitted flat against the front of the chassis, which necessitates cutting 3 inches off the flange on the mounting brackets. Otherwise there would be a space between chassis and panel.

As noted previously, the beat frequency oscillator control condenser is mounted near the rear of the chassis. It was placed in a small jack shield in the original receiver. Later it was found that the bottom of the BFO transformer case IFT4 should be shielded along with C25, C35, and R11, and a small square shield was fitted over these parts. It would save time to use a single shield

## "All-Wave Eleven"

of larger size for all components. (Parts list).

The only other large part under the chassis, R33, is bleeder and voltage divider near side.

A word of explanation is needed on the mounting of SW2. This is placed near the socket of V8, to keep the leads as short as possible for highest efficiency, and is fastened to the chassis back. Control is had by means of a copper tube of 1/16 inch inside diameter, through which runs a piece of No. 11 music wire. The tube may be seen curving around the corner of the chassis above R33. The panel control is made from a switch similar to SW1 with the stationary contact points and bakelite plate removed. A hole drilled in the moving contact strip takes the upper end of the music wire. The lower end of the latter of course fits in a hole drilled in the bakelite knob of SW2.

Before assembly, oil is poured in the tube and drained to leave a film inside. The switch really operates quite well; the one precaution to observe is to have both wire and tube free of all small kinks and bends and to make the curves in the tube as smooth and of as large radius as possible.

This is the end of Part 1. The second and concluding article will appear in the April issue and will describe the wiring and circuit alignment.

## Parts List [Continued from page 101]

- I FT1—455 kc. crystal filter unit (Hammarlund XU-455)
- I FT2—Interstage I.F. transformer (Meissner 16-6123)
- I FT3—Output I.F. transformer (Meissner 16-6139)
- I FT4—Beat frequency I.F. transformer (Meissner 17-6779)
- T1—Speaker output transformer (Jensen ZX-1002)
- T2—Power transformer 300 volts D. C., 6.3 A.C. (Thordarson T13R15)
- CH—Filter choke, 12 henrys at 150 ma. (Thordarson T17COO-B)
- Band-Set Dial—Rear illuminated (Millen 10011)
- Band-Spread Dial—10 to 1 ratio (National NPW-0)
- M-1 ma. "R meter"—Rear illuminated (Triplett 227A)
- SPK—8-inch size with 650-ohm field (Jensen ST460)
- SW1—D.P.S.T. rotary switch (Centralab 1462)
- SW2—S.P.S.T. slide switch (Eby 1011)
- SW3—Three position, 2 circuit switch (Centralab 1465)
- Case—Par Metal SC-128
- Panel—8 3/4" x 19" x 1/8" aluminum, grey finish (Par-Metal G-3679)
- Brackets—(Par-Metal SB-713)
- Chassis—(Par-Metal 15213)
- Speaker Case—(Par-Metal SC-1270)
- Shield for C27—(National HRO)
- 3 Isolantite Sockets—Octal type (National-CIR-8)
- 2 Dual binding posts—(National FWH)
- 1 Single binding post—(National FWA)
- 2 Flexible couplings—(National TX9)
- 9 Sockets—Octal bakelite (Meissner 25-8209)
- 1 Jack—double circuit
- Hook-up wire—R.F. pushback type (Lenz)
- 11 standard name plates—(Gordon)
- 8 1 1/4" knobs with pointers—(Crowe 591)
- 2 1 1/2" knobs with pointers—(Crowe 590)
- 1 Bar knob for band switch—(Eby E6844)
- Line cord, grommets, hardware, etc.



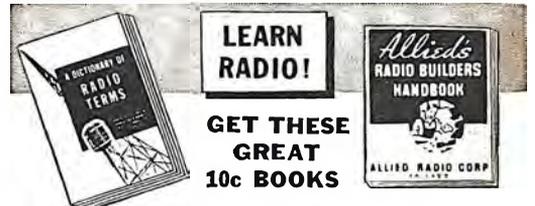
## EVERYTHING IN RADIO AT LOWEST PRICES!

You'll want this Great Radio Catalog—it's not only the Biggest but the Best! Shows Everything in Radio! 85 New Radios! Real "hits"—new "Camera" and three-way Portables; Recorders; Phonograph Combinations; Plastic Sets; World-wide Models; Auto Sets; Farm Radios; Amateur Receivers—all at lowest prices! 24 New Sound Systems! For every Public Address application—7 to 75 watts. New features—low prices. Time Payments—15 Day Trial Offer.



New Kits! Build your own radio! Learn and profit. Dozens of new low-cost, easy-to-build kits to select from—finest circuit designs; free Parts Lists on request—everything you need in radio for every building requirement. Let ALLIED help you—just ask us—you'll learn quickly.

15,000 Parts! The biggest selection of quality parts in all radio. Every leading make—complete listings for every radio building and servicing requirement. If you're interested in Radio, you can't afford to be without the new 1941 ALLIED Radio Catalog—the reliable Guide to Everything in Radio at the Lowest Prices!



**Radio Dictionary**  
Nothing like it ever before—complete, authoritative, worth many times the price! Compiled by leading Radio authorities under ALLIED supervision. Gives concise, easy-to-understand definitions of all the commonly used radio words and terms. A "must-have" at only **10c**

**Builders' Handbook**  
The most popular and widely sold Radio publication—ALLIED'S own valuable beginner's book on RADIO. Tells how to select circuits, read diagrams, build sets, etc. Fully illustrated. Easy to understand. Order by coupon below. It's yours for only **10c**

### ALLIED RADIO

833 W. Jackson Blvd., Dept. 6-C-1  
Chicago, Illinois

Send me your FREE 1941 Radio Catalog.

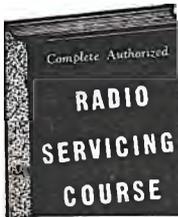
I enclose 10c for Radio Dictionary.

I enclose 10c for Radio Builders' Handbook.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_



# RADIO COURSE

**AMAZING OFFER \$1.95**

Exact reprint of regular \$39.00 Radio Tech. Institute Course complete in book form for only \$1.95. This is the latest practical Radio Course, complete in every way, and exactly the same as the much higher priced original lessons. Learn radio quickly and easily with this training.

## BECOME A RADIO EXPERT QUICKLY

You will find the training remarkably easy. You quickly learn radio work from simple circuits to advance servicing. You really get three courses in one: (1) Elements of Radio and Electricity, (2) Practical Radio, and (3) Advanced Training. The course will enable you to earn spare-time money before you reach the 14th lesson. Covers all sides of radio—servicing, building, transmission, and national defense.



### HELP YOU GET A JOB

"The R.T.I. Course is a complete education in radio servicing. It put me in my present job at a well known radio shop." James P. McIntyre, Houston, Texas.

"Your course is a steady companion at my work bench. I am now employed in electronics dept." J. E. Turgeon, Canada.

### FOR HOME STUDY

This complete, low-priced course will give you all the training needed. No special education or previous experience required. The lessons are clear, interesting, easy to master and use. A final exam, and diploma available after course is finished. Examine the course without any risk. Read a few lessons, look at the hundreds of illustrations, decide if you want it.

### NEW 1941 EDITION

Latest important radio developments included in recent reprint. Limited quantity available. Send coupon for free trial. Begin your study without any obligations. If you are pleased, the complete course will cost you only \$1.95, full price, if not you loose nothing.

## 10 DAYS' FREE EXAMINATION

Supreme Publications, Room 633, 3727 W. 13th St., Chicago, Ill. Ship the complete course on approval without any obligation to buy. I may keep the course for 10 days. If, for any reason, I am not pleased, you guarantee to refund my money immediately.

- I will pay \$1.95 and 15c postage to the mailman.
- I am sending \$1.95, the full price, ship postpaid.

Name: .....

Address: .....

## Print Your Own

Cards, Stationery, Advertising, labels, paper, circulars, photo and movie titles, tags, etc. Save money. Sold direct from factory only. Junior outfit \$8.25. Senior outfit \$16.55 up. Do popular raised printing like engraving with any press.

**Print for Others, Big Profits**

Pays for itself in short time. Easy rules sent. Write for free catalog of outfits and all details.

**KELSEY, Inc. - H-9, Meriden, Conn.**

## 8 MODELS!

Solo, Tandem, Delivery, Side-car — all featuring ALL STEEL Frame. Wonderful new Automatic Gear Shift, clutch. Write!



120 Miles Per Gallon 30 MPH

## EARN BIG MONEY!

Ride, Sell or Rent the NEW **Ranger SCOOTER**

Big money selling Meade's new power SCOOTER to stores needing quick, cheap, delivery—renting or selling to persons! Good territory still open but hurry! Write for EASY TERMS, Free Circular now!

**Mead CYCLE CO.**  
DEPT. S-3  
CHICAGO—U.S.A.

## Why Change Oil!

U. S. Bureau of Standards states: "Oil does NOT wear out mechanically and may be used over and over again." (After reclaiming).

Thousands of car, truck and tractor owners have proven the truth of this statement with the use of 'RECLAIMO.' This revolutionary device filters and reclaims crankcase oil as you drive.

**Saves Time, Trouble and Money!** Our 36-page illustrated booklet, "OIL FACTS," contains complete details and startling oil truths that will amaze you. Write for your copy today—It's FREE.

(Sold direct and by reliable dealers everywhere.)  
**RECLAIMO MFG. CO., 2306 N. Western, Dept. 56, CHICAGO**



# All-Purpose Trailer

[Continued from page 108]

under each plank, they are slipped down over the sides of the box.

The roof adds a valuable asset to this trailer. Anyone who ever hauled furniture in a snow-storm, or who ever arrived in camp with all bedding rain-soaked, will appreciate a roofed trailer. This roof section also uses 1"x12" side-boards, with the front end fastened in firmly with long No. 8 or 10 screws. The back end hangs from the gable-end boards as an end gate that swings up to a horizontal position and fastens with two screen-door hooks. This gives more headroom for entering and leaving the trailer, and for loading bulky objects.

Special lighting conveniences may be installed in this roof section. An outside plug-in of the ten cent type which screws to wood, may be installed on an outside front corner, for connection with either 110-volt current or with a special socket in the dash of the car. Ordinary rubber covered 2-strand 110-volt wire from the dime-store serves as an extension cord. This should not be over 15 to 20 feet long when used from an auto battery.

A small wooden-frame screen about 12"x46" should be made to take the place of the rear end gate. Small screen-door hooks or merely nails slipped into small holes through the sides and into the ends of the screen, hold it in place. When the trailer is used for sleeping, this is a great convenience.

Parking legs will be needed to support both ends of the trailer. They may be made from 2"x4"s fastened with a large strap hinge and a brace of strap iron. The whole arrangement may be folded up under the body and wired, or fastened by more elaborate means. One of the strongest



Here the trailer is being used for the "tough" hauling.



This time the trailer is going on a holiday pleasure trip.

## All-Purpose Trailer

and least troublesome parking legs is made from 1½" or 2" pipe and two floor-flanges as shown in the sketch. These legs are unscrewed and stowed inside the trailer when traveling. The cheaper auto jacks may also be used, and give the advantage of being adjustable in height.

An added convenience for traveling, camping or photography work, is a set of "bookshelves" about 1'x4' to fit across the inside front end of the trailer. They can lift out easily and fasten in place with screen door hooks. These shelves accommodate small articles such as flashlight, cameras, tackle boxes, etc. They may have a 1"x2" strip screwed along the front edge of each shelf to keep articles from sliding off too easily in transit. These shelves also are important when doing photography work in the trailer. If photography work is done at night the trailer will probably be tight enough. Some calking of stray leaks or perhaps covering the rear end with a large blanket may be necessary if films are to be developed safely in the day time. A small portable safelight may be carried to plug in to the electric sockets in both gable ends, or 5"x7" safelights may be used in the gable-end windows.

## HOME CRAFTSMEN!



Build These  
Projects Now  
From the MI  
"PAMPHLET PLANS"

Start preparing for your summer fun today! Get these simplified MI plans in the new handy-size pamphlet form. Four splendid little booklets, selling for 25c apiece and containing complete plans for building:

- BONNIE, an 18-foot cabin auxiliary sloop.
- CLOUD CLIPPER, a full-sized training glider.
- DUSTMASTER, an all-purpose photo enlarger.
- XP-3, a gas-powered model pusher plane.

Select the project you want to build and send for your booklet today. Or, better yet, get all four by sending a dollar to:

**FAWCETT PUBLICATIONS, Inc.**  
Greenwich, Conn.

## HAMMER-SMITHING

★ *The Fascinating New Art* ★

**NEW**  
**Power Tool**  
**Sensation**  
**of 1941**

**HANDEE**

*Artizan*



**HAMMERS**  
**SURFACES**  
**SINKS**  
**SHAPES**  
**FORMS**  
**PIERCES**  
**ENGRAVES**  
**CHASES**  
**FILES**  
**SANDS**  
**REPOUSSE**

## NEW and DIFFERENT HOBBY TOOL

This marvelous invention enables anyone without previous experience to produce a beautiful hand hammered finish on aluminum, copper, brass, pewter or silver—a finish that defies detection from expensive hand-wrought articles displayed in gift shops and museums.

**EASY TO USE**—In one evening at your work bench, desk or even the kitchen table, with the ARTIZAN you can make valuable and decorative pieces for a few cents each. No more exertion on your part than it takes to guide this amazing tool—and what a thrill you'll get! This companion tool to the famous Handee Tool of 1001 Uses does all the hard, back-aching work formerly done with hammers and punches.

Plugs in any socket, weighs only 1½ lbs. Speed of reciprocating plunger, 800 strokes a minute. Stroke variable 1½" to ⅜".

### ORDER ON 10 DAYS TRIAL

In steel case with hammering and forming accessories, directions and materials for making artistic trays, ..... **\$29.50**

POSTPAID



## A PRIZE TOOL FOR JUNIOR DAD and GRANDPA

Does just about everything on metal, wood, alloys, plastics, horn, bone, glass, etc. A whole shop full of tools in one. Uses 300 accessories to grind, drill, polish, rout, cut, carve, sand, saw, sharpen, engrave. Plugs in AC or DC socket.



Save  
Hours  
of Hard  
Work

### FREE 64-Page Catalog

Describes all Handee Products and their wide application in crafts and industry all over the world.

### 10-DAYS MONEY-BACK TRIAL

For your own hobby enjoyment or as a gift. DeLuxe Model weighs 12 oz. Speed 25,000 r.p.m. \$18.50 with 7 Accessories.

**CHICAGO WHEEL & MFG. CO.** 1101 W. MONROE ST.  
Dept. MI, CHICAGO, ILL.

- Send ARTIZAN on trial  DeLuxe Handee MI-3  
 64-page Catalog

Name .....

Address .....

# HOT WATER with

## SPEED KING



### From Any Electric Light Socket

MILLIONS of homes, stores and offices everywhere need **SPEED KING**—the new, amazing **Water Heater**—that heats water boiling not so fast it takes your breath away. No muss! No waste of time or fuel! Just a simple "plug-in" at any 110-volt light socket—and presto... just the amount of hot water you need for the bath, for shaving, for dish washing. **CHEAPER** because you don't have to heat gallons when you need only a few quarts. **FASTER** because the intense electric heat goes directly into the water. Sells fast on a 60-second demonstration. Small in size—fits the pocket, easy to carry. Anyone can afford it.

**60-SECOND Demonstration Amazes Housewives**

## SAMPLES for AGENTS JUST SEND

I WANT you to know the almost uncanny heating action of this speedy water-heating invention. Write quick for my **SAMPLE OFFER**—a postcard will do. Get an actual **Sample SPEED KING** for demonstration. You can make plenty of cash as my agent. **HURRY!** Big season starting now. **SPEED KING** solves the hot water problem when furnaces shut down. Get quick and I'll show you how to make the fastest money of your life.

**NAME**  
 WRITE your name and address in the margin, clip & mail this coupon or send money postcard to Dept. E23.

Send No Money!—Just your name.

Name .....

Address .....

City .....

**NU-WAY MFG. COMPANY**  
 Dept. 623, Walnut Bldg., DES MOINES, IOWA

## 60 POWER TELESCOPE... \$2.19

**NEW!** VARIABLE EYEPIECE 20X-40X-60X. 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.



Most powerful made for anywhere near the money. Close to lens than a foot in length. Multiple lens system. 30 mm. objective lens. 5 sections. Directions included for using as a compound 4 lens microscope. American made. Prompt shipment guaranteed. Write for postage. Only \$2.19. **BROWNSCOPE CO., Dept. 73A 5 W. 27th St., New York, N. Y.**

**CAMERA EXCHANGE** **NEW and USED** **ORIGINATORS SINCE 1880**

**Cameras Accessories**

**TREMENDOUS BARGAINS—LARGE STOCK—LIBERAL TRADE-IN ALLOWANCES**

**WRITE YOUR WANTS TO DEPT. MX-3**

**NEW YORK CAMERA EXCHANGE**  
 116 FULTON ST. NEW YORK CITY

**LATHE OWNERS and OPERATORS**

**LOOK**

At This New and Unique **KRAMER-ADJUSTABLE-CENTER**

**TAPER ATTACHMENT**

Do Luxe Pat. Pend.

**ONLY \$7.50**

POST PAID

for standard model with No. 2 Morse taper shank. All other sizes available!.

This new tool will enable you to do lathe work in one-tenth the time and much more accurately than ever before. **USED IN PLACE OF REGULAR CENTER. ADJUSTMENT UP TO 7/32 OF ONE INCH OFF CENTER IN EITHER DIRECTION WITHOUT MOVING THE TAIL STOCK, and BEST OF ALL THIS ADJUSTMENT MAY BE MEASURED WITH MICROMETER: NO GUESSING.** Lathe may be set up to turn tapers in one minute or less and back in true alignment by merely changing centers. Order direct or **WRITE FOR FREE** descriptive LITERATURE.

**KRAMER TOOLS**  
 Michigan City, Indiana  
 Dept. M. I. P. O. Box 92

## How To Use Nails

[Continued from page 113]

line off the cleat near the center and drive your nails along this line, the displacement of wood particles in the cleat takes place (if the grain of the timber is straight) at each nail at the same grain line. If this displacement is at all great, the cleat is almost certain to split. Following the line of least resistance, which is the grain, this split will reach every nail in the cleat, thereby greatly lessening the efficiency of your work. It is much better to vary the position of the nails in respect to the grain of the timber, thus eliminating the danger of "grain splitting," which is often very troublesome when working with brash timber.

The angle at which nails are set when driving them has a great deal to do with their efficiency. A nail driven at an angle of some twenty degrees less than at right angles to the timber has much greater holding power than a nail driven at right angles. When nails are driven straight into the timber at right angles, the wood particles are usually separated along the grain lines rather than at an angle to them. This reduces very materially the force exerted against the entrance of the nails and consequently effects their holding power. When driving several nails in one piece of timber, as when nailing a cleat to a two-by-eight timber, it is advantageous to vary the angles at which the nails are driven. By so doing, the number of nails necessary to fasten the cleat securely will be much reduced.

Sometimes, in order to have nailing work show more attractiveness, it becomes necessary to drive the nails along a straight line, often with the grain of the timber. When this is necessary, great care must be used to select nails of such length and slimmess as to reduce the danger of splitting to rather a negligible quantity. Frequently under such circumstances one can choose timber that does not readily split, thus aiding the cause somewhat. Spacing the nails at distances as great as effectiveness will permit, and driving them at varying angles, will often reduce the danger of splitting. Anyway, it is well to avoid this sort of nailing work as much as possible, employing it only where the work of the nails is secondary to the attractiveness of the job.—Walter S. Chansler.

## Valentine Hearts

[Continued from page 109]

Another pleasing project is the heart design photo mirror also constructed from brilliant plastic. As will be noted from the illustrations a small pocket mirror is built into the plastic heart and exposed on one side, with a favorite picture attractively displayed on the other.

The novelty heart design album differs from the others in as much as it may be made without the use of any shop tools or equipment.

# John Took in \$75 in one day in his NEW Business



**Get Into This Business Now—**

a business which is so new that it is practically without competition. This should enable you to make really BIG MONEY. Hotels, homes, clubs, office buildings offer tremendous possibilities. Our new DETERGER washes upholstered furniture, electrically, right in your customer's home, with a new soapless soap whipped into DRY suds. *No liquid touches the fabric*, therefore the furniture is ready for use soon after cleaning. We have helped hundreds of men get into business for themselves with our automatic equipment. Several great railroads and many of the world's largest hotels use our machines.

## Make Money the FIRST DAY

The Deterger is ready to use when you receive it, so you ought to be taking in big profits the first day. We want more honest, ambitious men. If you are that kind of a man we can help you get started for yourself in a business with tremendous possibilities.

**No Rent to Pay** You don't have to rent a building, for you do the work right in your customer's home. You save the expense of carting furniture back and forth to a central plant; the owner's home is your workshop.

## J. S. Corbit says

"I cleaned seven living room sets and fourteen chairs as well as twenty-five automobile interiors the very first month and took in \$279.50." M. Parker wrote: "Did a twelve hour job at our country club and collected \$40." C. Childers sent us a list of thirty-nine pieces which he cleaned and for which he was paid \$121.00. Barrett says, "Made \$28 in eight hours. On other job made \$11 in two and one-half hours." It should be easy to expand this business by adding machines and hiring good men to run them. Look into these opportunities now. Send for free book.



**No liquid touches the fabric when cleaning with the DETERGER.**

## Pay as you Earn

Only a limited amount of money is needed for a down payment, the balance you send on easy terms. Many men find it possible to make far more than the cost of the machine in a short time and it should be easy for you to take in many times the amount of each payment before it comes due. Every machine is fully GUARANTEED.

## Book sent FREE

Write today for copy of our booklet, "Your Own Business, Profits Instead of Wages." Let us tell you how easy it is to get started in a profitable business where you are your own Boss and can stop worrying about just a job. Write today—NOW.

VON SCHRADER MFG. CO. 543 Pl., Racine, Wis.

## VON SCHRADER MFG. CO., 543 Pl., Racine, Wis.

Send me (without obligation) your free booklet telling me how I can own my own business and become financially independent and how I can pay for the Deterger on easy terms.

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

## WIND DRIVEN Electric PLANT

**Build Your Own—We Show You How**

Easily made from old auto generator. Dime brings complete Plans and Big NEW catalog listing over 1,000 electrical items at 1941 low prices. Over 100 other generator changes into 6, 12, 22 or 110 volt wind plant generators, motors, welders, drills, electric fence units, grinders, etc. Send 10c today for your set of plans and copy of this valuable catalog to

LEJAY MFG. CO., 1414 LeJay Building, Minneapolis, Minnesota.

## MYSTERIOUS DEVICE WELDS BRAZES AND SOLDERS ANYONE CAN OPERATE



Now, an electric welding, brazing and soldering Torch, complete with power unit, goggles and supplies. **Works INSTANTLY off any light socket.** Does a thousand and one repair jobs at amazingly LOW COST on aluminum, iron, steel and other metals. **Indispensable** for Auto, Body and Fender Repairs, and home repairs—shop, factory, farm, engineer, janitor, sheet metal, radio and bicycle repairs. Anyone can handle without previous experience with our simple **10-DAY HOME TRIAL**. Write at once for Special Introductory Low Price Offer. Try 3 in 1 Electric Torch for 10 days at our risk, or get one free by mailing to introduce it. **ELECTRO-TORCH CO., 2613 MM, Michigan Ave., Chicago**

## BILD-UR-OWN COASTERS • MIDGET AUTOS • SCOOTERS

It always pays to use the best materials and parts are fully guaranteed. Use them and save money. Headquarters for leading brands of Balloon Tires **GOODRICH-GOODYEAR-FIRESTONE** at lowest prices. We specialize in wheel sets of all kinds, scooter kits, motors, parts, etc. Send 10c to cover cost of mailing book and Free Plans. **BILD-UR-OWN DEVICES, 536 N. Parkside, Dept. M-3, Chicago, Ill.**

## SpeedWay DRILL \$7.95 GRINDER \$5.95



...products of Speed Way, for 30 years manufacturers of electric tools. Specially sound high torque 110 V universal tool motors. Improved designs, correct speeds, 1000 RPM Drill with die cast handle **GRINDER \$9.95** has 1/2" capacity in steel. 20,000 RPM Hand Grinder has speed essential for efficiency and collets for both 1/8" and 3/32" arbors. Drill and Grinder and sinter or together with 5 accessories in fitted Steel Kit. Stand takes either drill or grinder. Router Frame converts grinder into router. Bench Grinder is complete with motor. Write, for Circulars, -Speedway Mfg. Co., 1860 S. 52nd Ave., Cicero, Ill.

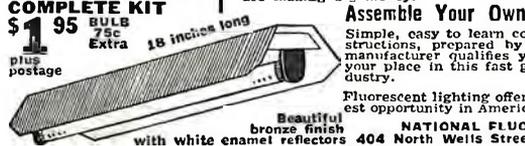
## LEARN THE FLUORESCENT LIGHTING BUSINESS

Today—right now—men who can sell, install and service fluorescent lighting fixtures, are making big money.

**Assemble Your Own Fixtures** Simple, easy to learn course of instructions, prepared by prominent manufacturer qualifies you to take your place in this fast growing industry.

Fluorescent lighting offers the greatest opportunity in America today for

**NATIONAL FLUORESCENT SALES AND SERVICE COMPANY**  
404 North Wells Street  
Chicago, Illinois



Modern wall and ceiling fixture.

Complete Kit

**\$2.75**

plus postage

**BULB 75 cents extra.**

Polished metal end caps. White enamel body. Price includes switch.





Tens of thousands of photo fans throughout the country have found PHOTOGRAPHY HANDBOOK the ideal cameraman's companion. And the new edition (No. 7), just off the press, lives up to the high standard set by previous issues.



Packed with practical ideas for enjoying and improving your photo hobby, this 144-page book will repay its purchase price many times over. It's only 50 cents.

PHOTOGRAPHY HANDBOOK No. 7 gives you full information on prize-winning Kodachrome technique; fine points of synchroflash photography; fresh ideas on "Photo Fun"; an outstanding pictorial salon, and dozens of other features, including tips on building your own equipment.

PHOTOGRAPHY HANDBOOK is written in plain, clear, non-technical language, easy for everybody to understand. Get your copy today!

**CUT OUT AND MAIL TODAY!**

Fawcett Publications, Inc., MI-3  
Greenwich, Conn.

Enclosed find money order, check or stamps in the amount of 50 cents. Please send me, postpaid, a copy of PHOTOGRAPHY HANDBOOK No. 7.

Name .....

Address .....

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

*Canadian orders not accepted.*

**Prospecting With Black Light**

[Continued from page 117]

mosphere absorbs all waves below 2850 Angstrom units in length.

For the very best results, there is nothing as satisfactory as the mercury-vapor lamp. A short length of quartz tubing filled with mercury can be bought for about ten dollars, but since it requires a step-up transformer and will be suitable only for work at close range, it would be better to get hold of a commercial ultraviolet lamp, which now can be bought for as little as \$24.50. No other lamp fluoresces such a wide variety of minerals nor gives such brilliant effects, and for tungsten, it is an absolute necessity.

If you buy a mercury-vapor lamp, by all means use it with care. Never look directly at the glowing element. Ultraviolet light will injure the eyes seriously, long before you feel any pain. The homemade lamps described offer little danger, yet make it a rule never to look directly at the lamp, as it will only dim your vision to the beauties of fluorescence.

To supplement the minerals you discover in your own prospecting, you can purchase additional specimens or perhaps exchange with other collectors.

To exhibit your trophies of night prospecting, you'll want either a dark viewing box or a dark-room. You can curtain off a small cubicle with heavy drapes, and the darker you make it, the better. The closer you get the source of ultraviolet to the mineral, the brighter the effect will be. A collection is more interesting if each specimen is carefully labelled with the correct name of the mineral and where it was obtained.

You will note, too, that a great variety of other substances have interesting properties when viewed under ultraviolet light. Imitation gems can be detected, for genuine rubies fluoresce a very distinctive deep wine red, while synthetics look much lighter. Diamonds and zircons look quite different under ultraviolet; natural amber fluoresces brightly while bakelite imitations glow little or none. Butter remains yellow under the lamp but margarine turns blue. Many kinds of garden seeds can be sorted because infected and healthy seeds look different. Old bones and teeth fluoresce brilliantly. Ladies shudder when they see how their complexion turns green and their lips a ghastly purple under the lamp.

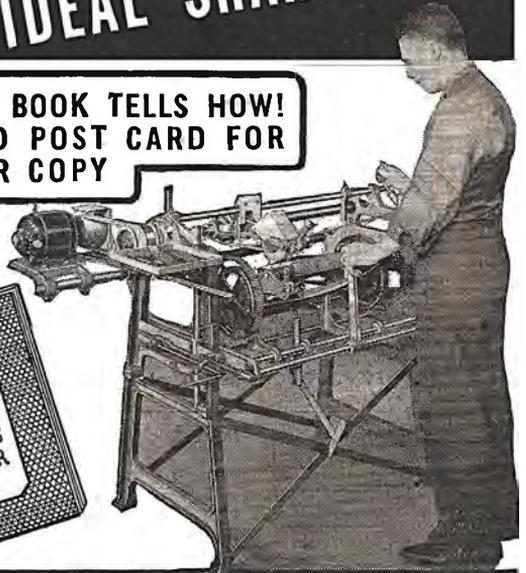
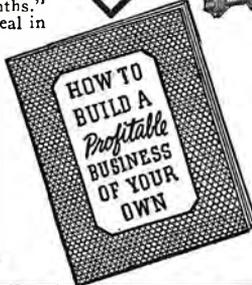
One last word of caution for night prospectors: If you go out into the desert or the mountains at night wear high boots and be careful what you pick up. Every now and then, some one grabs a lizard or scorpion, mistaking its beautiful fluorescence for a marvelous specimen of scheelite!

MECHANIX ILLUSTRATED will be glad to inform its readers, upon request, as to where fluorescent materials and black light equipment are obtainable. Address Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y., enclosing stamped and addressed return envelope.

# EARN MORE MONEY sharpening lawnmowers on the IDEAL SHARPENER

The Ideal Lawnmower Sharpener offers you an opportunity to make MORE money in your spare time. Yes, it will even build up a permanent business for you. Every home is a prospect for business, year after year. The Ideal Lawnmower Sharpener is a machine that grinds all makes of lawnmowers in 15 to 20 minutes. The usual charge, \$1.00 to \$1.50 per mower. Easy and simple to operate. Just plug into a light socket in your basement or garage, and you're on the road to success. When lawnmowers are sharpened on the Ideal, they run like new. Every customer is satisfied. G. A. Blanchard Mass., writes: "I sharpened 300 in two months." Walter Roth, Mich., writes: "I bought my Ideal in May, 1939, and sharpened 867 mowers that year, and 893 mowers in eight months of 1940." Howard Hellen, Minn., writes: "I sharpened 745 lawnmowers, sold 60 used mowers and grossed \$1,100.00 from Apr. 5 to Sept. 15." The Ideal Lawnmower Sharpener is heavily constructed and will last for many years. It is designed to sharpen all reel knives and straight blades accurately. Write today for the book that tells you HOW you can earn MORE money and establish a PERMANENT business with the Ideal Lawnmower Sharpener.

FREE BOOK TELLS HOW!  
SEND POST CARD FOR  
YOUR COPY



## THE FATE-ROOT-HEATH CO.

291 Bell Street Plymouth, Ohio

**SIMPLE! FAST! EASY TO OPERATE!** GRINDS MOWERS IN 15 TO 20 MINUTES

## HOW YOU CAN CATCH MORE FISH



Creek Chub's new 1941 Catalog is a practical, fascinating, reliable guide to better fishing! Shows lures and flies in natural colors! Sent FREE upon request! Write today!

**CREEK CHUB BAIT CO.**  
433 So. Randolph St. Garrett, Ind.

## FREE TRAILER PARTS CATALOG

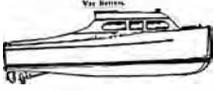


Complete Plans and Building Instructions 10c

We'll save you money on—axles, springs, wheels, couplers, windows, sinks, water pumps, brakes, refrigerators, beds, lamps, inside and out, 67 lamps, furniture, jacks—everything. Special discount to mfrs. NATIONAL TRAILER EQUIPMENT CO. Largest and most complete trailer builders supply house in the United States. Successors to Kar-A-Van Industries, Inc., Dept. M, 714 W. Wisconsin Ave., Milwaukee, Wis.

## FULL SIZE CUT-TO-SHAPE BOAT PATTERNS

22 FOOT SEDAN RUNABOUT



Also Blueprints and Complete Specifications

Newest designs by Naval architect. Cruisers, runabouts, sloops, snipe, outboard boats, sailing canoes (Kayak), etc. 8-38 ft. Surprisingly low prices. Rush \$1.00 (coin) for latest illust. catalog. Send \$1 for "HOW TO BUILD BOATS," book postpaid.

Cleveland Boat Blueprint Co., Station A-23, Cleveland, O.

## ELECTRO NAME ETCHER

WRITE YOUR NAME ON TOOLS—ALL KINDS METAL ARTICLES!

Guard against tool thieves. Amazing new Electro Name Etcher writes your name or any design on tools, instruments, toys, skates, bicycles, etc. ANY METAL. Easy and simple to use. SEND NO MONEY! Mail order today—pay postman only \$1.00 plus few cents postage on delivery. If not satisfied return Etcher in 6 days from receipt and money paid for it will be refunded immediately. YOUR ORDER NOW.

ELECTRO NAME ETCHER  
Dept. P-606 254 Robb St., Cincinnati, Ohio



Powerful

## DOUBLE-LEVER Action LOCKS Jaws to Work with TON-GRIP!



World's most powerful hand-tool! Unique "Double-Lever" Action enables the grip of one hand to close the jaws with TERRIFIC Non-Slip Pressure! Jaws LOCK to the work—remains locked with hands removed. Adjust exactly to size, stays adjusted. NEVER SLIPS! No lost motion. Does more things than any other hand tool. "Impossible" jobs made easy. Is perfect hand-vice to hold small work for filing, grinding, sawing, drilling. Scores other uses. Is actually a portable Vise, Clamp, Super-Plier, Pipe-Wrench, Open-End Wrench, Locking Wrench, Toggle Press—ALL IN ONE! Holds anything, round, square or otherwise. Works in close quarters, at any angle. Adjustable to ratchet-like or super-plier action. Light, trim, handsome. Finest alloy tool steel. Nickel finish.

TRY IT NOW! See Vise-Grip at better dealers or order direct from factory on 10-day money-back trial. 10"-\$1.95, 7"-\$1.65. C.O.D., Check or Money Order. Free Folder.

PETERSEN MFG. CO., Dept. L-3, DeWITT, NEBR.



## WISE-GRIP WRENCH

Easy to Adjust

"Double-Lever" Action Does It!

Stays Adjusted

**SEE  
The Rings  
of Saturn  
The Moons  
of Jupiter**



**ONLY  
\$395**

**50 POWER  
REFLECTING TELESCOPE**

**Amazingly Low Priced**

Study the wonders of the heavens—the mountains of the Moon, the planets, comets, stars. Strange thrills! Hours of fun—with this big powerful reflecting telescope. **EARN MONEY FOR YOURSELF.** Charge 10c for a look at the moon. **NOT A KIT.** A splendid instrument, sturdily built in three inch, heavy metal tube with machine ground, hand finished reflecting lens—18 inches long finished in black crystallized enamel. Will last lifetime. Guaranteed that you see the Moons of Jupiter. Can be used to take telescopic pictures and as a spotting scope for target practice. Complete and ready for use. Nothing else to buy. **TEN DAYS FREE TRIAL.** Rush only \$1.00 now. Pay balance of \$2.95, plus few cents postage, when postman delivers. Keep ten days. If not more than delighted, return telescope and money will be refunded.

**KUMFY PRODUCTS, INC., Dept. P-504  
4033 Eastern Ave., Cincinnati, Ohio**



**PIONEER  
NON-SINKABLE  
BOATS**

Always ready to use—**PIONEER** Boats give you everything you want—speed, safety and care-free boating! **AMERICA'S OUTSTANDING VALUES!** No work, worry or up-keep cost! Endorsed by 10 years by leading summer camps and resorts! Send post card for **FREE Catalog!**

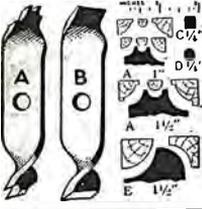
**PIONEER MFG. CO., 433 Perry St., Middlebury, Ind.**



**Send For BALKO'S 1941  
TOOL CATALOG!**

THE CATALOG OF EVERYTHING IN POWER TOOLS, SPRAY EQUIPMENT, MODEL SUPPLIES, ELECTRIC MOTORS, Metal Lathes, accessories, Artist Air Brushes, Spray Guns, Elec Bench Grinders, Grinding Wheels, Lathe Chucks, Micrometers, Pulleys, V Belts, Carving Tools, Compressors. BALKO'S complete stocks and fast service save you time and money. Send a 5c stamp today for your big new copy.

**BALKO ELECTRIC TOOL & SUPPLY CO.,  
605 W. Washington, B-15, Chicago**



**Use Your Bench Saw for Jointing  
and Cutting Mouldings**

**ATTACH THESE SIX INCH TOOL STEEL CUTTERS IN PLACE OF SAW CUT DESIGNS SHOWN AND MANY OTHERS.**

Moulding Cutters A" \$1.25, A1 1/2" \$1.50, Jointing Cutters B1" \$1.25, B1 1/2" \$1.50, Groove Cutters C or D 3/16", 1/2" or 3/4", \$1.25 Each, Cove and Quarter Cutters E1" \$1.25, E2" (MAKES 3/4" STOCK) \$1.50.

**STATE SIZE HOLE. POSTPAID**

**J. SANDSTROM, Box 217, Stow, N. Y.**

**Attachment For Your Lathe**

[Continued from page 124]

If you do not possess a face and angle plate for your lathe you can machine the other face by placing the finished surface face downward on your marking-out table, or a piece of plate glass, locate center hole in pip print on base and transfer it to a piece of round or square stock securely bolted to the inside of the angle plate at opposite end. This enables you to locate the center hole for your headstock center. After doing this, mount between centers and machine base and pip to fit hole provided for same in your compound rest saddle. Dimensions of the pip with its set screw groove can be taken off the base of the tool holder top slide of your compound rest as this angle plate fits the same hole when top slide is removed.

As we are using your top slide as the elevating and lowering mechanism of the milling attachment, which works just as well as the specially constructed article, we have to provide ways and means of attaching it to the vertical part of the finished angle plate. Set up the finished angle plate on cross-slide saddle, making sure the face is perfectly square with your face plate or driving plate, which presumably, you have already taken a cut from to ensure its running true. Tighten set screws very tight and locate a center midway between the sides of your new angle plate for a hole to accommodate the pip of your top slide. Drill a hole large enough to start a rigid internal boring tool held in the chuck and bore a hole the correct size to snugly fit the pip on the base of your top slide. Next locate, bore and tap set-screw holes on each side of casting to secure pip of top slide when it is put into the hole you have just bored. You should provide pieces of round mild steel slightly smaller than tapped. Set screw holes should be suitably filed, similar to the set screw holes on cross slide saddle of your lathe. This prevents marring of pip on the top slide when it is tightened up to angle plate casting. By laying off one vertical and one horizontal line on casting face to correspond with zero graduation of top slide you will have no difficulty in setting elevating mechanism to any desired angle for special work.

To complete the milling attachment it is now only necessary to construct a suitable machine vise to hold what is to be milled. By referring to the drawing it will be seen that this is also a very straight-forward pattern to make. It is also made of 1" lumber, 5" long, 2 1/2" wide with jaws 2 1/2" from base to top of jaws. It will be noted that both jaw ends are heavier than the balance of the casting which is 1" thick; therefore make jaws 1 1/4" thick providing a very substantial fillet where they join main casting. Casting is machined all over by holding in four jaw chuck placing lathe in back-gear. Locating of set screw holes should be accurately done. To secure machine vise to vertical slide is simple.

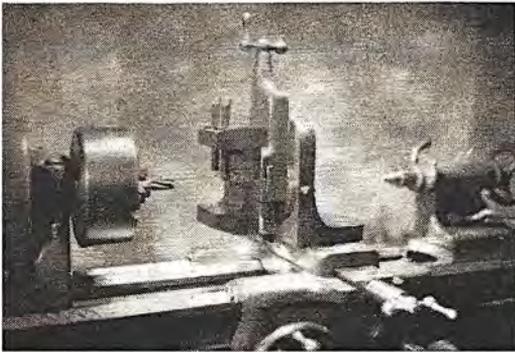
**Artists  
make money!**

**IF** you have some natural drawing ability—the knack of sketching objects, people or designs, don't waste your rare gift. Train your ability for a career in the ever widening field industry offers commercial artists, illustrators, designers and cartoonists. You can do it in your spare time—at home—by studying the same lessons that have enabled our many graduates, both men and girls, to earn up to \$5000 a year—some even more. Send for Free Book describing opportunities. Give age and occupation.

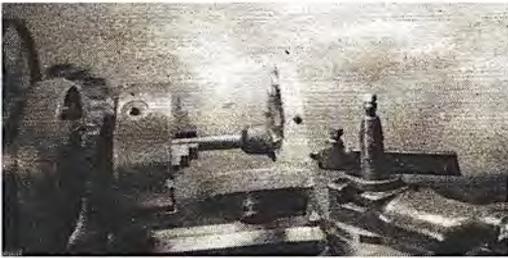
**3061 FEDERAL SCHOOLS, Inc.  
Federal Schools Bldg., Minneapolis, Minn.**

## Attachment For Your Lathe

It is done in a similar manner to the way the tool holder is normally used, namely, by providing an under plate which engages T slot. To provide against possibility of machine vise moving, a piece of stock cut to exact size of upper part of T slot in top slide is fastened to the back of machine vise by machine screws so it will fit snugly along top of slot when it is tightened up by the short bolts provided for that purpose. Holes for these bolts through machine vise casting should be one size larger than clearing size. When the angle plate, top slide, machine vise combination is set up, the milling attachment is complete. It only remains to take a squaring off cut on the inside of the lower jaw to provide a true working surface.



Milling attachment in position, ready to use. Assembly fits on cross-slide of the compound rest, with top slide acting as moving mechanism.



Casting for angle plate is mounted on the lathe in this manner for machining.

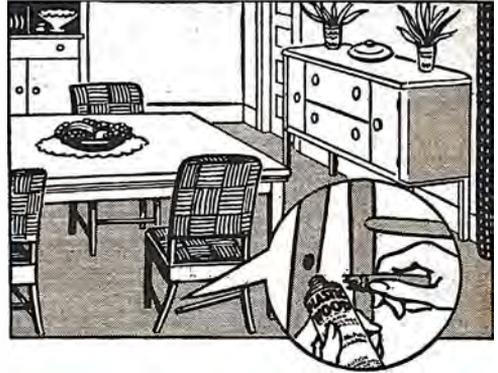


**NEW! NO TUBES**  
**DURABLE PLASTIC CABINETS**

1941 MODEL  
**POCKET RADIO**

Dual Bands — Magictenna — Microdial  
Fits your pocket or purse—Wt. 6 ozs.  
Small as cigarette package. Receives  
standard and some short wave. **PAT-**  
**ENTED POWER RECTIFIER.** No tubes,  
batteries. Hi-ratio easy turning slide  
"MICRODIAL". M. L. OF ILL. SAYS:  
"MIDGET RADIO WORKS FINE!"

**ONE YEAR SERVICE GUARANTEE!** Send complete  
with instructions and tiny phone for use in homes, offices, hotels,  
in bed, etc. **SIMPLE TO OPERATE—NO ELECTRICITY NEEDED!**  
**SEND NO MONEY!** Pay postman only \$2.99 plus postage charges  
on arrival or send \$2.99 (Check, M. O. Cash) and yours will be  
sent postpaid. **A MOST UNUSUAL VALUE! ORDER NOW! FREE!**  
**PLUG IN "MAGICTENNA"—ELIMINATES OUTSIDE WIRES!**  
**MIDGET RADIO CO.** Dept. M-3, Kearney, Nebr.



## P. W. REPAIRS FURNITURE

PLASTIC WOOD handles like putty—hardens into wood. Makes quick, yet lasting repairs to broken furniture; resets drawer pulls and casters.



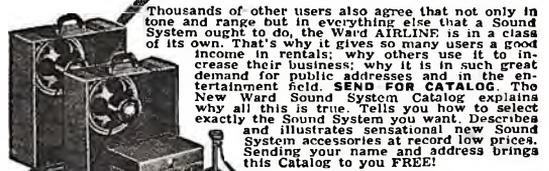
## PLASTIC WOOD

STAMP-COLLECTING is one of America's most popular hobbies . . . for young and old alike. See **MONEY-MAKERS & MONEYSAVERS** (pages 27-32) for the names and addresses of reliable stamp-dealers.

## Airline SOUND SYSTEMS

*Excel in Tone and Range*

Bryan Turner (Texas)



Thousands of other users also agree that not only in tone and range but in everything else that a Sound System ought to do, the Ward AIRLINE is in a class of its own. That's why it gives so many users a good income in rentals; why others use it to increase their business; why it is in such great demand for public addresses and in the entertainment field. **SEND FOR CATALOG.** The New Ward Sound System Catalog explains why all this is true. Tells you how to select exactly the Sound System you want. Describes and illustrates sensational new Sound System accessories at record low prices. Sending your name and address brings this Catalog to you FREE!

**EASY TERMS**  
**15 DAY APPROVAL**  
**Money-Back Guarantee**

*Montgomery Ward*

9 Great Mall Order Houses • More Than 400 Retail Stores

**MONTGOMERY WARD & CO.**  
Dept. ME-42, Chicago, Ill.

Rush Coupon or Send Postcard.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

## A Bicycle Drive

[Continued from page 121]

the rear shaft hanger at the stern end of the skeg. Make the shaft-log of oak or ash and bolt solidly to the boat bottom. A stuffing-box inside prevents water from leaking in around the shaft. The angle between the two shafts should, of course, be as slight as possible but any ordinary angle will be taken care of by the universal joint. The universal joint can be a piece of heavy valve spring as shown or even heavy duty hose.

Choose the propeller with an eye to efficiency and direction of turn. With the gear line up shown a right hand propeller will be needed. With the gears meshing in the opposite direction a left hand propeller will be in order.

The rudder shown indicates the method of steering. Cut a quadrant of stiff metal to slide down over the oblong top of the rudder post. Connect the ends of the quadrant to the ends of the steering bar by strong cords or small wire rope, leading the lines through eyes or small pulleys on inside of the gunwales. When the handlebars are straight back the boat steers straight. Perhaps a turn-buckle or heavy spiral spring would be advisable in one side of the tiller rope to aid in keeping it tight at all times.

Paint all new woodwork and oil and grease all metal work exposed to water. Pack the stuffing-box with grease. At the same time it will be wise to run some light oil down through the shaft-log hole.

Provision may be made to belt the old sewing machine head pulley to a small generator if so desired. Thus a sailing light could be lighted for night travel.

When your boat is launched take note of how she rides with someone astride the bike seat. If it is down any by the head put sufficient ballast in the stern to give it a good trim and, incidentally, settle the propeller completely under water.

Grasp the handlebars and commence pedaling slowly to gain momentum in the fly-wheel. Then gradually increase the speed until the boat moves ahead at a normal rate for the propeller size and pitch. If there is too great a strain on the legs of the "power plant" reduce the gear ratio of the bicycle. Pedaling backwards will propel the craft to the rear.—L. B. Robbins.

## Papered Case For Stationery

[Continued from page 126]

of these things rests in a compartment of correct size, and on the inside of the lid is glued a calendar and a pocket for a blotter. In order to allow room for the calendar and blotter, the partitions are not quite as high as the sides.

Glued into each stamp-compartment is a block of wood which is triangular in cross-section. This gives the stamp-compartments sloping floor and facilitates picking up stamps.—B. B.



Now Only  
**\$4.95**

### REAL ENGINE VALUE

The G.H.Q. is a miniature gasoline engine that really operates. Over 15,000 sold in the last year. Now is your chance to buy the *New Improved 1941 model kit* for \$4.95. Absolutely complete with **COIL, CONDENSER**, plug, gas tank, simple illustrated instructions, etc. Send only \$1. Shipped Coll. C.O.D. same day. Send for **FREE** literature or 6c for Jumbo catalog.



1/2 Horsepower  
All Parts Guaranteed

For Boats, Planes,  
Midget Cars, Etc.

ALL PARTS FINISHED—ONLY A SCREWDRIVER NEEDED  
AVERAGE ASSEMBLY TIME 30 MINUTES

GHQ MOTORS, Dept. A, 40 East 21 St., New York, N. Y.

## 5¢ MODEL BUILDERS CATALOGS

Each 24 pages or more. Widest variety of kits and materials under one roof in America.

- AIRPLANE CATALOG: Contest and Scale Types, - 5c
- RACE CAR CATALOG: All popular makes, - - - 5c
- RAILROAD CATALOG: Complete Line, All Gages, 5c
- SHIP CATALOG: Many types, 25c up - - - - 5c

Send for the ones you want.

CLEVELAND MODEL & SUPPLY CO., INC., 4508A23 Lorain Ave.  
Cleveland, Ohio,  
U. S. A.

**STANDARD GARDEN AND SMALL FARM TRACTORS**

**Plow Seed Cultivate Mow Hay and Lawns** Powerful Gas Tractors for Small Farms, Gardeners, Florists, Nurseries, Fruit Growers, Poultrymen.

**1 & 2 Cylinders** High Wheels, Rubber or Steel Tires. Walk or Ride.

Do Belt Work—Free Catalog

**STANDARD ENGINE CO.**  
Minneapolis, Minn. New York, N. Y. Philadelphia, Pa.  
4023 Como Ave. 629 West 26 St. 2532 Market St.





FLOATING DRIVE  
is swell!

Ride 100 Mi.  
for 50¢  
**Auto-Glide**

**\$115 and Up**

The leader, for years! Now, greatly improved with "Floating Drive"—sensational new centrifugal principal that applies power with the ease and speed of a clutch pedal or gear shift. You start, speed up, slow down, stop and start again—simply by touching hand accelerator! You can't "kill" the engine even on steepest grades. Improved and strengthened throughout for even easier, safer riding. Powerful Cushman engine, almost 3 h.p., carries rider and good load 100 miles for only 50¢!

**Write!** Send for new illustrated booklet if Auto-Glide not handled by your dealer. Send today!  
CUSHMAN MOTOR WORKS, Dept. X-3, Lincoln, Nebr.

**Dealers WRITE!**

# BOOK BARGAINS for MEN AND BOYS!

These four handsome books, priced amazingly low at only 50 cents each, belong on the shelf of every man or boy who likes to work with his hands. They are printed in rotogravure, expertly written, and lavishly illustrated. All books sent postpaid. Order by coupon.

**HOW TO BUILD IT**—This all-new edition is packed with fascinating and useful home workshop projects, suitable for beginners and experts alike. Contains articles on woodworking and metal projects, radio, hammered copper ware, glass blowing, lamps, plaques, tennis table, sidewalk runabout, etc. Complete, detailed, simple specifications throughout. Fully illustrated, 144 pages.

**MODEL BUILDERS' HANDBOOK**—Build your own model planes, boats, auto racers! *Model Builders' Handbook* contains complete, detailed plans for the construction of twenty-seven superb working models. Using these plans, you can easily build gas-powered planes; Slipstream Susy, super-streamlined auto racer; Yumping Yiminy, fast 27" powered speedboat, and others. Also special features on care and conditioning of model engines.

**HANDY MAN'S HOME MANUAL**—This book will repay its cost many times over by telling you how to make countless repairs and improvements around the house without calling in professional help. Full of easy how-to-make, how-to-repair, and how-to-improve kinks. Simple plans for building useful equipment such as gates, garden furniture, kitchen cabinets, etc. Hundreds of other valuable tips for the handy householder. Fully illustrated.

**PHOTOGRAPHY HANDBOOK NO. 6**—Packed with useful information and unusual photographs, this 146-page book will increase the skill of the beginner and improve the technique of the expert. Contains articles on camera tricks, studio and darkroom technique, a whole section to build-it-yourself plans for camera equipment, etc. Belongs in the library of every camera lover.



50¢

**CUT OUT AND MAIL TODAY!**

FAWCETT PUBLICATIONS, INC. MI-3  
Greenwich, Conn.

Enclosed find money order, check or stamps. Please send me, postpaid, the book (s) I have checked below, at 50 cents each.

- HANDY MAN'S HOME MANUAL
- MODEL BUILDERS' HANDBOOK
- PHOTOGRAPHY HANDBOOK No. 6
- HOW TO BUILD IT

Name .....

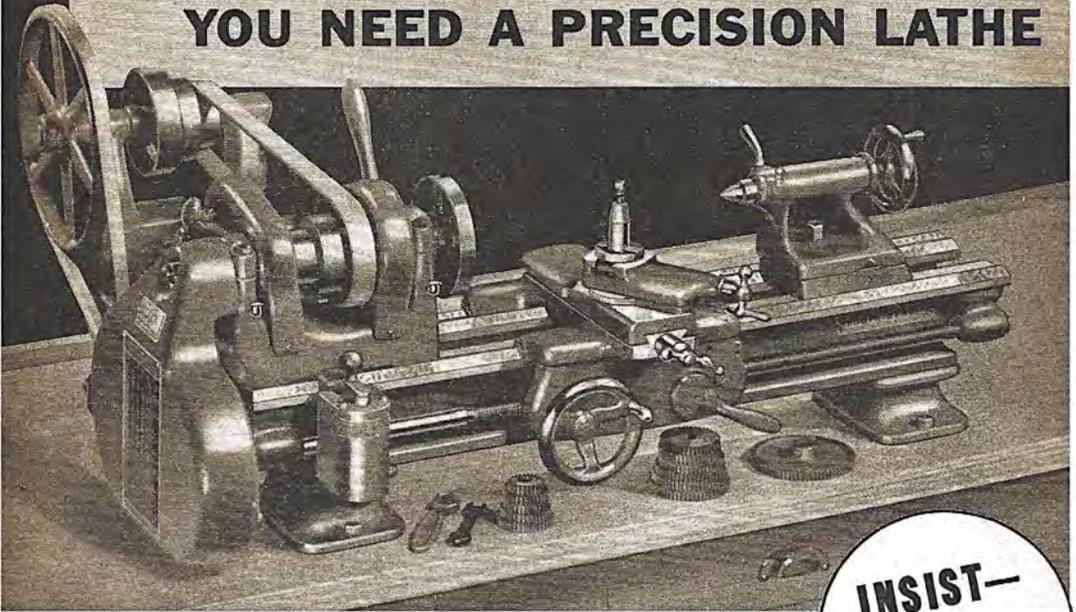
Address .....

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

(Note: If you do not wish to cut this page, you may order by letter. Be sure to enclose full address and remittance.)

Canadian orders not accepted.

# FOR ACCURATE WORK . . . . . YOU NEED A PRECISION LATHE



No. 415-YC, 9 $\frac{1}{4}$ " swing by 3' Bed Workshop Bench Lathe with Horizontal Motor Drive, reversing motor, and reversing switch. Shipping weight 320 lbs.

**INSIST—  
ON THESE  
FEATURES**

**O**NLY good shop equipment has the precision accuracy demanded in modern manufacturing plants, tool rooms, laboratories, machine shops and repair shops. South Bend Lathes are designed and built to assure this precision and to simplify the most difficult metal working jobs.

The South Bend 9" Workshop Lathe shown above is available in Model A with Quick Change Gear and Power Cross Feeds, Model B with Power Cross Feed, and Model C with Hand Cross Feed.

Catalog No. 50 illustrates and describes all models of the 9" lathe. Get a copy from your dealer, or write direct to company. Mailed Free on request.

## **SOUTH BEND LATHE WORKS**

516 East Madison Street, South Bend, Indiana, U. S. A.

1. Back-gearred headstock.
2. Hand-scraped V-ways on lathe bed.
3. Heat-treated alloy steel headstock spindle with precision ground bearing surfaces.
4. All steel and iron construction.
5. Precision machine cut gears.
6. Precision lead screw cuts screw threads to most exacting tolerances.
7. Ball thrust bearing for spindle.
8. Twin gear reverse on headstock for right and left hand threads and feeds.
9. Precision graduated steel micrometer collars on cross feed screw and compound rest screw.
10. Semi-steel lathe bed, heavily constructed.

## **ON DISPLAY IN ALL PRINCIPAL CITIES**

Boston, Mass.—South Bend Lathe Works\*  
Buffalo, N. Y.—R. C. Neal Company, Inc.  
Chicago, Ill.—South Bend Lathe Works†  
Cleveland, Ohio—Reynolds Machinery Co.  
Detroit, Mich.—Lee Machinery Company  
Los Angeles, Cal.—Eccles & Davies Mach. Co.  
Milwaukee, Wis.—W. A. Voel Machinery Co.

Newark, N. J.—J. R. Edwards Machinery Co.  
New York, N. Y.—A. C. Colby Machinery Co.  
Philadelphia, Pa.—W. B. Rapp, Machinery  
Portland, Ore.—Portland Machinery Company  
Providence, R. I.—Geo. T. Reynolds & Son  
Rochester, New York—Ogden R. Adams  
San Francisco, Cal.—Moore Machinery Co.

\*Boston Sales Office, 67 Broadway, Kendall Square, Cambridge, Mass.; Telephone Trowbridge 6369.  
†Chicago Sales Office, Room 308 Machinery Sales Building; Telephone State 7283.

Popular sizes of South Bend Lathes are carried in stock for immediate delivery by dealers in 477 principal cities.

# **SOUTH BEND** *Precision* **LATHES**



STUDENTS BUSY AT WORK IN LARGE COYNE SHOPS

# Learn ELECTRICITY

## Pay For Your Training After You Graduate

Find out all about this wonderful offer. My big Free Book tells you how you can train for a good job and a future . . . And through my "Pay Tuition After Graduation" Plan you can get your training now and pay your tuition in easy monthly payments after you graduate.

# "LEARN BY DOING" 12 Weeks' Practical Training in COYNE Shops

In the Big Coyne Shops you have individual help by expert instructors so that you quickly and easily learn Electricity by actual work. No advanced education or previous electrical experience is needed. You are taught . . . Not by correspondence, not by books or embarrassing reciting . . . but by the Famous Coyne "Learn-By-Doing" training method which has helped hundreds of successful graduates to get and hold the job they like, or go into business for themselves.

At Coyne you do PRACTICAL ELECTRICAL WORK on real electrical equipment.

**PART TIME WORK  
WHILE TRAINING  
EMPLOYMENT HELP  
AFTER GRADUATION**

If you are short of money and need part-time work to help pay for your room and board while training, my Employment Department will help you get a part-time job. When you have graduated, they will give you Lifetime Employment Service.

You wind real armatures . . . run real motors, dynamos, generators. When you have finished each step, you KNOW HOW because you have done it yourself. If you are ambitious here is your chance to get the PRACTICAL TRAINING and a good electrical job with a future.

*H. C. Lewis*

### READ WHAT THESE GRADUATES SAY

I think the "pay after graduation" plan . . . offers the fellow who wants to get ahead in life a wonderful opportunity . . . I am now employed by the — Power Co. I have been employed by this Company ever since graduating from COYNE . . . I make almost double what I did at my previous work . . . COYNE School helped me in landing the job I now have.

*James Dible*

I owe a lot to COYNE . . . I secured a job after returning home wiring cranes for the — Machine Co. Before going to COYNE I was clerking in a grocery store earning the usual clerk's wages. I was in doubt about quitting my job but I have tripled the cost of the entire course . . . in the first ten months. The school is everything you say it is and more. I was completely satisfied. Thanking you for your kind cooperation while at school and since returning home.— Jack E. Stroup.



### GET THE FACTS

Don't let lack of money keep you from sending in the Coupon now. My Big FREE Book is full of facts and photographs which tell you about Coyne Training. It also gives you the details of my Pay After Graduation Plan, Spare Time Employment Offer, Graduate Employment Service, Lifetime Scholarship and other advantages.

MAIL  
COUPON



### ELECTRIC REFRIGERATION AIR CONDITIONING

In addition to the extra Radio Course at this time I am including additional valuable instruction in these two important branches of electricity.

COYNE occupies this entire Modern, fireproof Building



**COYNE** H. C. LEWIS, President FOUNDED 1899  
**ELECTRICAL SCHOOL**  
500 S. Paulina St., Dept. 31-53, Chicago, Ill.

### Send Today for this FREE Book!

H. C. LEWIS, President,  
COYNE ELECTRICAL SCHOOL,  
500 S. Paulina Street,  
Dept. 31-53, Chicago, Ill.

Dear Mr. Lewis:—Without obligation send me your big free illustrated catalog, with all facts about Coyne Training and details of your "Pay-Tuition-After-Graduation" Plan, as well as the details of your 4 weeks' Radio Course you are including.

Name . . . . .

Address . . . . .

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

Mail in envelope or paste on a postcard

# "HERO OF JERVIS BAY" SEA BATTLE TELLS HIS STORY!



A true experience of THOMAS F. DAVISON, Dover, England, of the hero-ship, Jervis Bay.



"PROTECTING A BRITISH CONVOY, the merchant cruiser *Jervis Bay* battled a surface raider to the death," writes Mr. Davison. "Ablaze from stem to stern, we were sinking fast. With others, I dove overboard, clutching a flashlight."

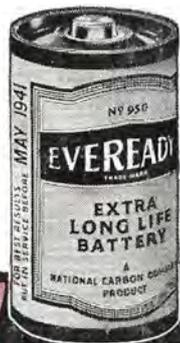
"UNDER DEADLY SHRAPNEL fire, fourteen of us managed to board a flimsy raft. For hours, we sat in icy water up to our chests. Huge waves battered us . . . swept us into the sea. Half dead, we crawled back. Three men died of cold or wounds.



"AFTER ELEVEN HOURS, the soaked flashlight saved us.\* The Swedish freighter *Stureholm* saw its beam and picked us up. Without those dependable 'Eveready' fresh DATED batteries, we would have died miserably.

(Signed) *Thomas F. Davison*"

\*An "Eveready" Flashlight with "Eveready" batteries, will normally continue to burn under water. The word "Eveready" is a registered trade-mark of National Carbon Company, Inc.



**FRESH BATTERIES LAST LONGER... Look for the DATE-LINE**

NATIONAL CARBON COMPANY, INC., 30 EAST 42nd STREET, NEW YORK, N. Y.  
Unit of Union Carbide and Carbon Corporation